# Mathematics

## Teacher's Manual

## Grade 4

Papua New Guinea
Department of Education

JICA

**Issued free to schools by the Department of Education**

First Edition

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# Acknowledgements

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The Mathematics curriculum officers, textbook writers, pilot teachers from NCD and Central Provinces and the Subject Curriculum Group (SCG) are acknowledged for their contribution in writing, piloting and validating this teacher's manual.

The Curriculum Panel members, members of the Subject Advisory Committee (SAC) and the Basic Education Board of Studies (BEBOS) are also acknowledged for their advice, recommendation and endorsement of this teacher's manual.

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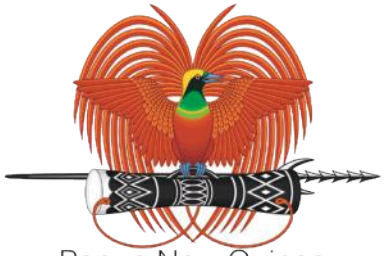
# Mathematics Teacher's Manual

## Grade 4



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# Secretary's Message

**Dear Teacher,**

The Mathematics Teacher's Manual is produced for Grade 4 teachers to help and guide them to plan and teach the Mathematics lessons in line with the National Mathematics Textbook for Grade 4 students. The Textbook and Teacher's Manual were developed for quality teaching and learning by our Curriculum Officers, Textbook Writers and Pilot Teachers, who have worked together with Japanese Subject Specialists for 3 years.

The Teacher's Manual is designed to achieve the implemented curriculum of the content standards outlined in the syllabus. It provides suitable teaching and learning content and concepts for the primary school teachers to promote and maintain standard lessons for daily, termly and yearly teaching and learning activities Nationwide.

The Teacher's Manual guides critical thinking and problem-solving approach in which you can easily visualise the concept in the lesson flow that is expanded from the textbook. It addresses necessary areas of what to teach, how to teach and what to measure (assess). The manual is user friendly and reflects PNG contexts in daily situations to help students acquire knowledge, skills, attitudes and values set through the lesson objectives.

We understand that some teachers are confident in teaching mathematics and some are not. This Teacher's Manual introduces many new approaches for lessons with more mathematics teaching aids, full utilisation of the blackboard using students' ideas and prior knowledge. It will help you to teach mathematics processes step by step with necessary information to a standard or higher level. Therefore, you can demonstrate and improve your lessons with new teaching approaches through careful reading and preparation of each lesson using this Teacher's Manual.

You are encouraged to use the Teacher's Manual and Textbook with other relevant resources to deliver the mathematics contents with enjoyment and for your students to have fun and love mathematics.

I commend this Teacher's Manual for Grade 4 Mathematics to be used with the National Textbook as an official resource for teaching in all primary schools throughout Papua New Guinea.

**Dr. Uke Kombra, PhD**
**Secretary for Education**

# Introduction

The Teacher's Manual (TM) has been developed for teachers to teach learning contents to their students more effectively with the National Textbook (TB). The features of this Teacher's Manual and its contents correspond to the National Mathematics Textbook according to Grades 3-5 Mathematics Syllabus. The standards outlined in the syllabus are reflected in this Teacher's Manual to help teachers plan and conduct lessons.

The Prelimenary pages of the Teacher's Manual consists of the following 7 sections:
How to Use Teacher's Manual, Lesson Presentation using TB and TM, How to use Blackboard plan, Assessment, Attachments, Yearly Overview and Mental Mathematics Skills.

It is important for you to take time to read and understand how to use the Textbook and the Manual.

# 1. How to use the Teacher's Manual

In order to use the Teacher's Manual effectively, it is important to understand the composition of the National Textbook.

## 1.1 Composition of National Textbook

The composition of the National Textbook consists of the following features.

### 1. Heading colours of the Textbook

Heading colour for each term changes to assist teacher to recognise teaching periods.

### 2. Titles and Numbers

Each chapter consists of Chapter and Sub-chapter titles with numbers. All problems in the textbook have Task and activities using numbers to indicate. We call 1 as task 1 and 1 as activity 1.

### 3. Students' ideas

Textbook uses students' ideas for students to think and reason mathematically. Basically, students learn using prior ideas to higher order thinking.

### 4. Activity Symbol

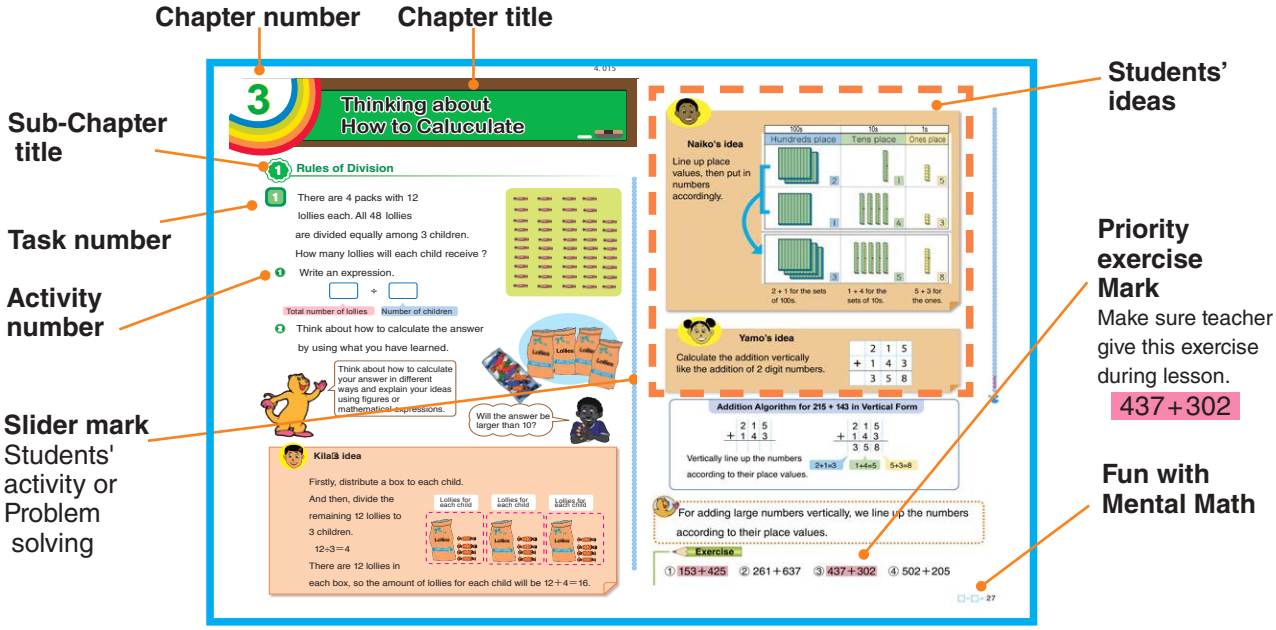
Some chapters have Ice breaking activity as the lead up activity for chapter.

### 5. Fun with Mental Math!

$26 = \square \times \square$

The students can enjoy by filling in the boxes with numbers where the answer equate to the page numbers.

## Sample Textbook page



## "Necessary Competencies acquired through the use of textbook"

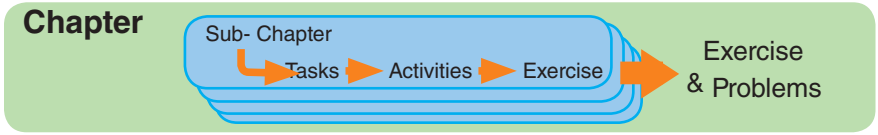
Experimental mathematical activities such as "measure", "compare", "divide", "order", "touch", "pile up" and "throw" are contained in all grades. It is intended to develop the ability and skills to be able to solve various problems logically in daily life by considering many ways.

## Mathematical Literacy

Activities for improving reading, expression and comprehension abilities and skills are contained in relating formulas, letters and graphs. In addition, textbooks are designed in order to use acquired abilities and skills for future learning content and daily life situations.

## Structure of a Chapter in the Textbook

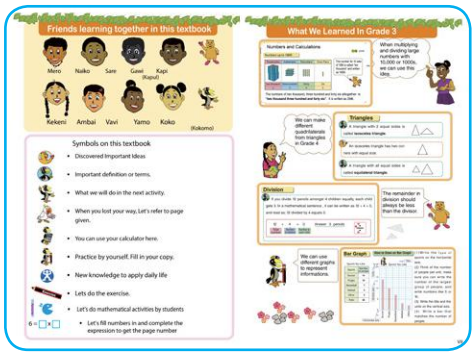
The structure in the Chapter consists of several Sub-Chapters, Tasks, Activities, Exercises and ends with a set of Exercise and Problems.

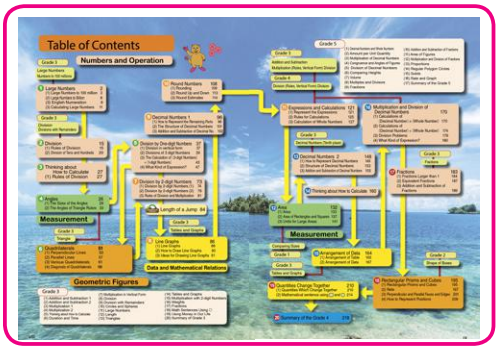



# Parts of the Textbook

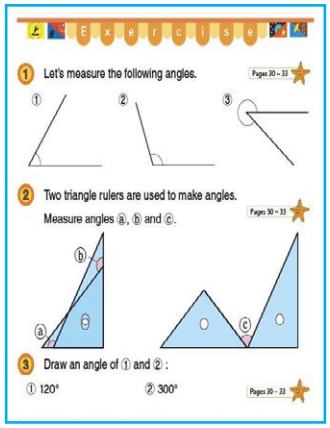
## Textbook Introduction Page

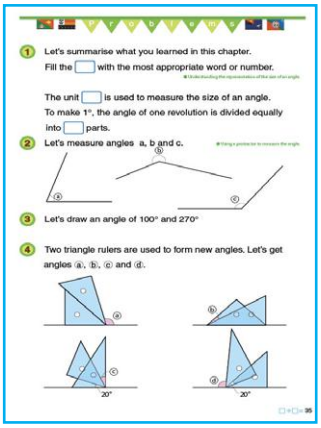
The introduction page consist of two pages which introduces very important information and icons allowing students and teachers to be familiar with what is expected to be encountered in the textbook. It also has chapters learned from previous grade outlined carefully and a table of contents. It promotes sequences of learning to help teachers to plan and program effectively.



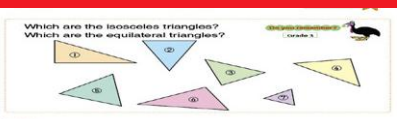

## Exercise & Problems



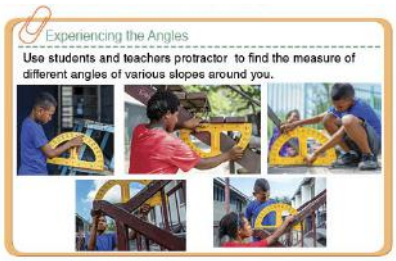

At the end of each chapter, Exercises are set for students to consolidate what has been learnt in a particular chapter. Page numbers indicating specific content found for each exercise is tagged beside each exercise. The Problems are placed after each exercise in each chapter. The problems are more advanced in order to enhance students higher order thinking skills for each chapter. It also guides students to apply what they have learnt.

## Revison "Do you remember?"




This section of the textbook is purposely for revision. Before moving into the next chapter, these set of exercises will enable students to reflect to the contents covered in the past and relate to the new chapter. This also promotes solidifying of previous content.

## Additional Information




Additional information is placed in some units to relate the content covered to cultural and social aspects of life. It helps the students to think mathematically in solving daily life situations.

## 1.2 Main content of the Teacher's Manual

The layout of the Teacher's Manual has 9 components, Basic lesson information, Objectives, Prior Knowledge, Assessment, Preparation, Lesson flow, Teacher's note, Sample Blackboard Plan and reduced textbook page. The information given in each component will help in preparing and conducting lessons. Therefore, it is strongly recommended that the manual is read and understood before planning each lesson. Teachers should use Chapters and Sub-Chapters in the textbook and Units and Sub-units in the Teachers' Manuals.

### Lesson information

Basic information consists of unit title, sub-unit or topic and lesson number for each sub-unit. The textbook page and actual lesson number is indicated for easier reference.

### Sub-unit objective

Each Unit consists of one or more sub-units and is indicated only at the beginning of each sub-unit. The Sub-unit objectives explain specific Attitudes,Skills, Knowledge and Mathematical Thinking (ASK-MT) which should be achieved in this sub unit.

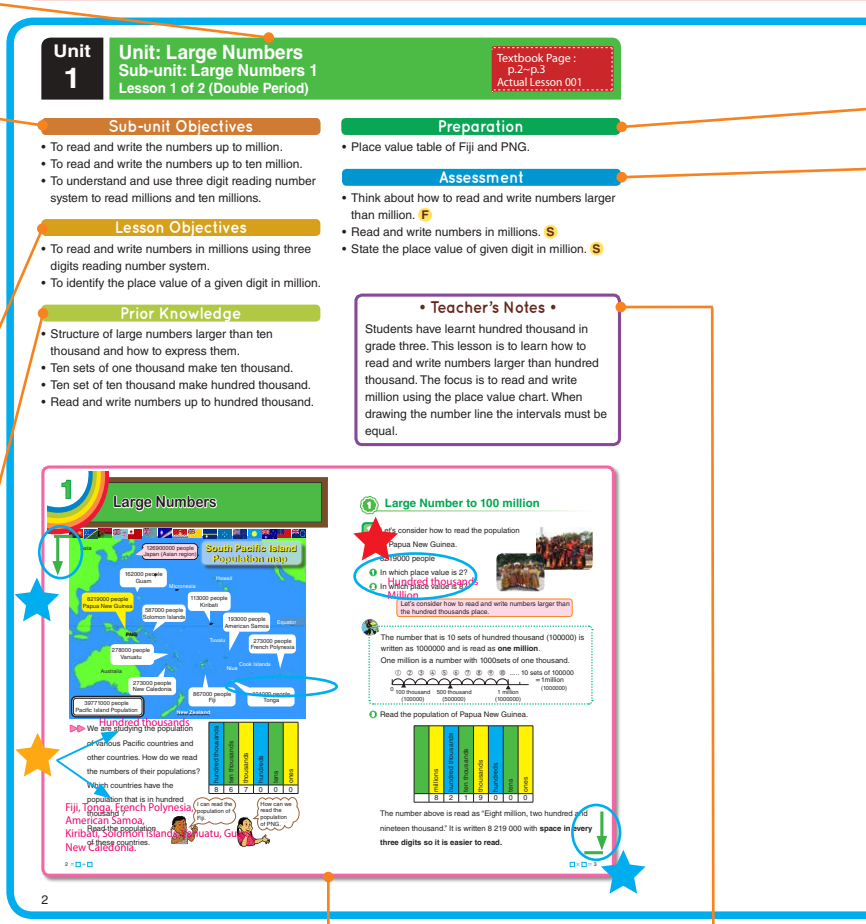
### Lesson objective

Objectives capture the ASK-MT of every lesson that should be achieved.

### Prior Knowledge

Prior knowledge describes contents that students should have acquired before the new lesson. In the case where students are not ready to learn new concepts, the teacher can identify which contents to review and refer back to while teaching.

### Teacher's Manual page sample




### Reduced Textbook page of the lesson

Corresponding textbook page is shown at the bottom of the left page.
The following are written in the page.

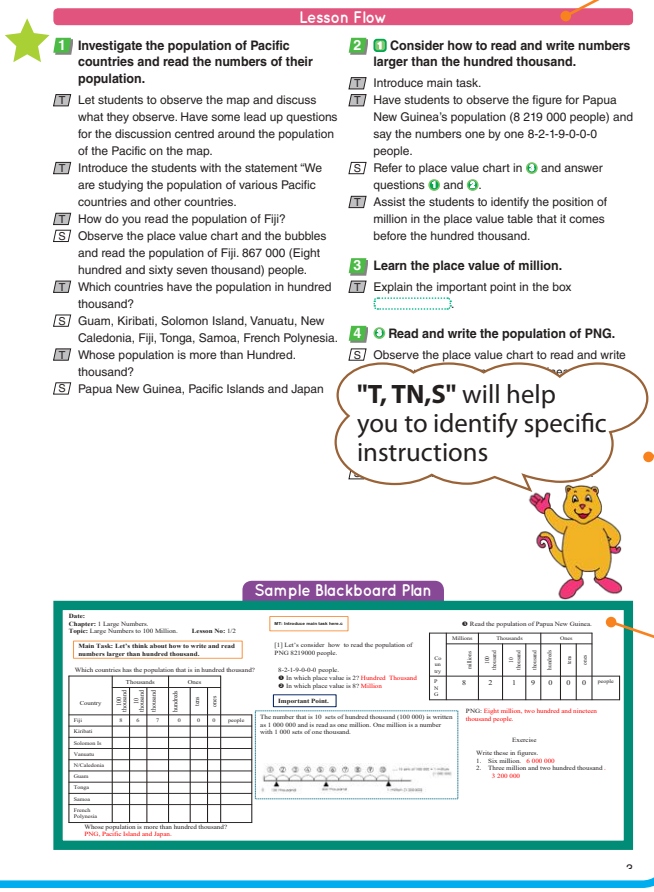
- **Lesson span** :Where the lesson begins and ends is indicated.
- Answers and solutions of the Tasks, Activities, Problems and Exercises.
- Teaching points such as; Purpose of the Tasks, Exercises and Problem types and characteristics of the problem, calculation and concepts.

## Assessment

There are two types of assessment in this textbook, 'Formative (F)' and 'Summative (S)'. The details are shown on page XI.

## Preparation

The preparation specifies the materials or resources which are recommended for use in the lesson. Some materials may not be available or accessible in the local community. In such cases, teachers are encouraged to improvise or replace them with other relevant and available materials.



Lesson Flow

**1 Investigate the population of Pacific countries and read the numbers of their population.**

T Let students to observe the map and discuss what they observe. Have some lead up questions for the discussion centred around the population of the Pacific on the map.
T Introduce the students with the statement "We are studying the population of various Pacific countries and other countries.
T How do you read the population of Fiji?
S Observe the place value chart and the bubbles and read the population of Fiji. 867 000 (Eight hundred and sixty seven thousand) people.
T Which countries have the population in hundred thousand?
S Guam, Kiribati, Solomon Island, Vanuatu, New Caledonia, Fiji, Tonga, Samoa, French Polynesia.
T Whose population is more than Hundred. thousand?
S Papua New Guinea, Pacific Islands and Japan

**2 1 Consider how to read and write numbers larger than the hundred thousand.**

T Introduce main task.
T Have students to observe the figure for Papua New Guinea's population (8 219 000 people) and say the numbers one by one 8-2-1-9-0-0-0 people.
S Refer to place value chart in 3 and answer questions 1 and 2.
T Assist the students to identify the position of million in the place value table that it comes before the hundred thousand.

**3 Learn the place value of million.**

T Explain the important point in the box

**4 3 Read and write the population of PNG.**

S Observe the place value chart to read and write

"T, TN,S" will help you to identify specific instructions

Sample Blackboard Plan

Date:
Chapter: 1 Large Numbers.
Topic: Large Numbers to 100 Million. Lesson No: 1/2

Main Task: Let's think about how to write and read numbers larger than hundred thousand.

Which countries has the population that is in hundred thousand?

| Country | Thousands: 100 thousand | Thousands: 10 thousand | Thousands: thousand | Ones: hundreds | Ones: tens | Ones: ones | |
|---|---|---|---|---|---|---|---|
| Fiji | 8 | 6 | 7 | 0 | 0 | 0 | people |
| Kiribati | | | | | | | |
| Solomon Is. | | | | | | | |
| Vanuatu | | | | | | | |
| N/Caledonia | | | | | | | |
| Guam | | | | | | | |
| Tonga | | | | | | | |
| Samoa | | | | | | | |
| French Polynesia | | | | | | | |

Whose population is more than hundred thousand?
PNG, Pacific Island and Japan.

MT: Introduce main task here.

[1] Let's consider how to read the population of PNG 8219000 people.

8-2-1-9-0-0-0 people.
In which place value is 2? Hundred Thousand
In which place value is 8? Million

Important Point.

The number that is 10 sets of hundred thousand (100 000) is written as 1 000 000 and is read as one million. One million is a number with 1 000 sets of one thousand.

3

❸ Read the population of Papua New Guinea.

| Country | Millions: and Hundreds | Thousands: 100 thousand | Thousands: 10 thousand | Thousands: thousand | Ones: hundreds | Ones: tens | Ones: ones | |
|---|---|---|---|---|---|---|---|---|
| PNG | 8 | 2 | 1 | 9 | 0 | 0 | 0 | people |

PNG: Eight million, two hundred and nineteen thousand people.

Exercise

Write these in figures.
1. Six million. 6 000 000
2. Three million and two hundred thousand. 3 200 000

## Lesson flow

A lesson flow consists of several teaching points that will help in the understanding and visualisation of the lesson sequence. It is important to read this part in preparation for the lesson.

T : What the teacher should do and say during the lesson.

TN : Supplementary information or key ideas and points that should be considered when conducting the lesson.

S : Students' expected responses and what they are expected to do during the lesson.

1 The number in the square corresponds to the "Task" in the textbook.

1 The number in the circle corresponds to the Activity in the Textbook content of the lesson.

Important point to be emphasised during the lesson as below boxes.

## Blackboard Plan

Shows a plan of how the blackboard can be arranged and should be utilized as a guide. (Refer to page X)

## Teacher's Notes

Contains supplementary information that is useful to teachers and enhance their content background knowledge.

It is very important to read these information before conducting the lesson to understand the objective of the lesson.

## 1.3 Other Contents: Chapter Introduction Page

The Chapter Introduction page is found at the beginning of every Unit and consists of the Unit Objectives with specific numerical representations of the Content Standards and Performance Standards in the Syllabus, Teaching Overviews and Related Learning Contents.

### 1. Unit Objective

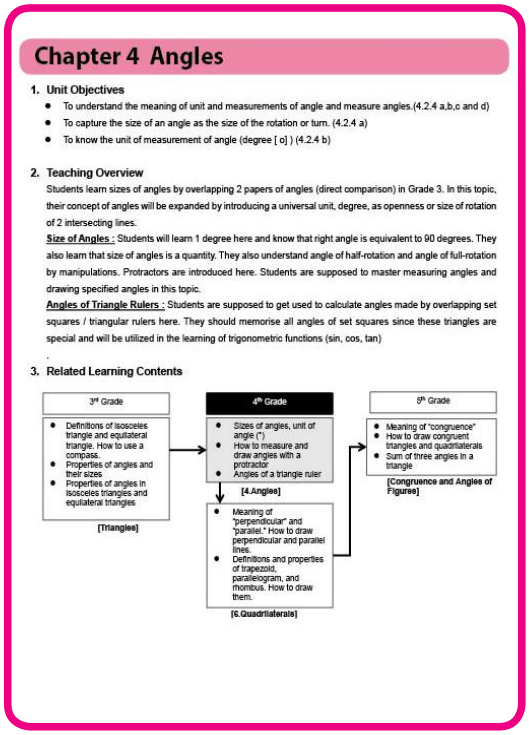
Outlines the key ASK-MT that students are expected to learn or acquire at the end of each unit. There may be one or more unit objectives for each unit depending on the unit capacity and content.

### 2. Teaching Overview

Outlines the main content areas to be covered in each unit with sub units briefly described to rationalise an overview of the unit. This section can also assist the teachers to be aware of the type of content expected in each unit and prepare in advance.

### 3. Related Learning Content

Shows the content map of what the students have learned already, in-line with the current unit to be taught. The previous content covered will serve as the foundation for students to learn new concepts and contents. Furthermore, the current unit to be learned is also linked to the next learning area and grade level.



**Chapter 4 Angles**

1. Unit Objectives
   - To understand the meaning of unit and measurements of angle and measure angles.(4.2.4 a,b,c and d)
   - To capture the size of an angle as the size of the rotation or turn. (4.2.4 a)
   - To know the unit of measurement of angle (degree [ o] ) (4.2.4 b)

2. Teaching Overview

Students learn sizes of angles by overlapping 2 papers of angles (direct comparison) in Grade 3. In this topic, their concept of angles will be expanded by introducing a universal unit, degree, as openness or size of rotation of 2 intersecting lines.

Size of Angles : Students will learn 1 degree here and know that right angle is equivalent to 90 degrees. They also learn that size of angles is a quantity. They also understand angle of half-rotation and angle of full-rotation by manipulations. Protractors are introduced here. Students are supposed to master measuring angles and drawing specified angles in this topic.

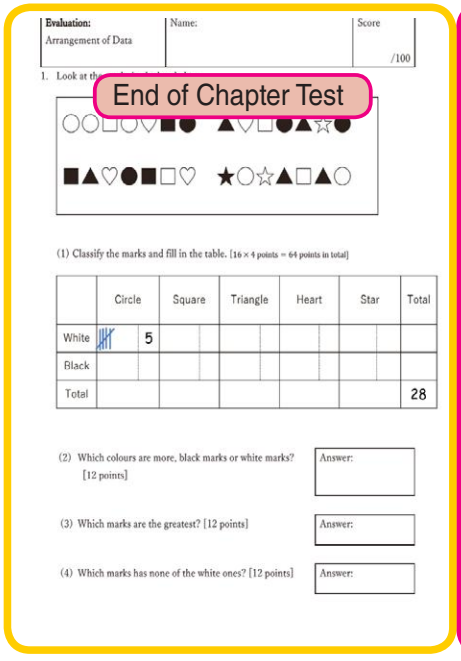
Angles of Triangle Rulers : Students are supposed to get used to calculate angles made by overlapping set squares / triangular rulers here. They should memorise all angles of set squares since these triangles are special and will be utilized in the learning of trigonometric functions (sin, cos, tan)

3. Related Learning Contents



## 1.4 Other Contents: End of Chapter Test

At the end of each unit in the Teacher's Manual, there is an attached End of Chapter Test.
The test is purposely used to measure how much content and mathematical concepts the students have understood and acquired for each Chapter. This will also help teachers and students to understand better and observe vital areas to be improved in both teaching and learning.



Evaluation: Arrangement of Data | Name: | Score /100

End of Chapter Test

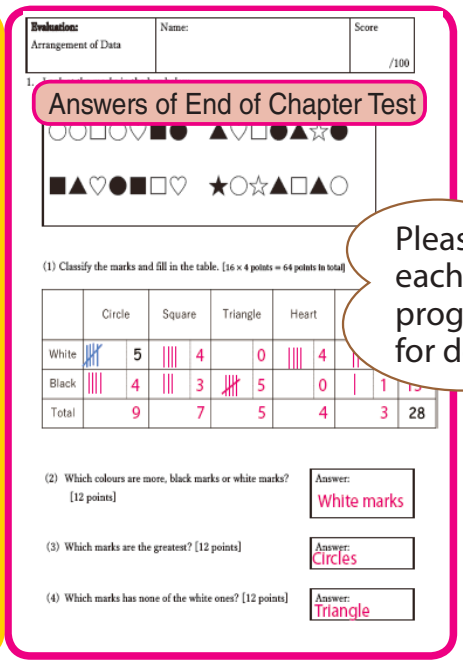
(1) Classify the marks and fill in the table. [16 × 4 points = 64 points in total]

| | Circle | Square | Triangle | Heart | Star | Total |
|---|---|---|---|---|---|---|
| White | 5 | | | | | |
| Black | | | | | | |
| Total | | | | | | 28 |

(2) Which colours are more, black marks or white marks? [12 points] Answer:

(3) Which marks are the greatest? [12 points] Answer:

(4) Which marks has none of the white ones? [12 points] Answer:



Evaluation: Arrangement of Data | Name: | Score /100

Answers of End of Chapter Test

(1) Classify the marks and fill in the table. [16 × 4 points = 64 points in total]

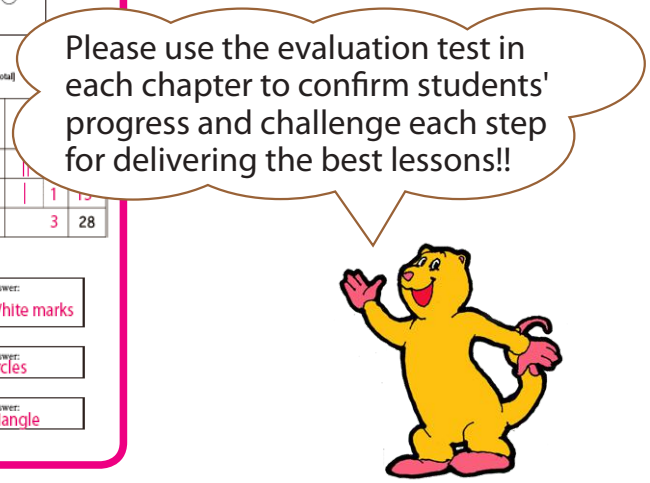
| | Circle | Square | Triangle | Heart | |
|---|---|---|---|---|---|
| White | 5 | 4 | 0 | 4 | |
| Black | 4 | 3 | 5 | 0 | 1 |
| Total | 9 | 7 | 5 | 4 | 3 |

(2) Which colours are more, black marks or white marks? [12 points] Answer: White marks

(3) Which marks are the greatest? [12 points] Answer: Circles

(4) Which marks has none of the white ones? [12 points] Answer: Triangle

Answers of the end chapter test is located before a page of End of chapter Test as sample on left.



# 2. Lesson presentation using TB and TM

In every lesson preparation, teachers should always consider what to do before, during and after the lesson. Both the TM and TB must be used to conduct a successful lesson.

## 2.1 Lesson Preparation

When preparing a mathematics lesson the following requirements should be considered;

1. Ensure to have both TB and TM and read and understand the lesson content.
2. Review previous lesson and understand the next day's lesson before delivering the current lesson.
3. Work out the answers to the activities and exercises in advance.
4. Study the Sequence of the lesson, relate to the blackboard plan and visualise how to use it.
5. Prepare teaching materials prior to the lesson.
6. Plan and prepare according to the recommended time.

## 2.2 Lesson Presentation

When you have prepared your lesson, you should now be ready to present your lesson. Consider the following points during the lesson.

1. Have only the TM during the presentation of the lesson.
2. Review students prior knowledge.
3. Present the task or problem situation from the textbook.
4. Encourage problem solving approach and facilitate group or general discussions.
5. Analyse and consider students' opinions or findings and always direct misconceptions back to the main concept.(Formative Assessment)
6. Encourage students to do homework for consolidation of skills.
   (Formative and Summative Assessment)
7. Assist students to master the skills in the lesson content through the exercises and problems.
   (Formative and Summative Assessment)
8. Evaluate and summarise important points, concepts or ideas learnt and predict what is expected to be learned in the next lesson.

**Dos**

1. Strictly follow Teachers Manual with reference to the Textbook.
2. Conduct experimental activities when necessary.
3. Expansion of student ideas in the textbook.
4 Involve students in outdoor exercises when required to.
5. Encourage students to use mathematical tools or instruments appropriately for its purpose.
6. Encourage more student interactions.
7. Every lesson is important as concepts are linked from one lesson to the next lesson.

## 2.3 Lesson Evaluation

After the lesson, teachers should reflect on the lesson taught and evaluate students achievements and do self reflection.
These can be done through;

1. Marking of exercises or tasks done.
2. Observation checklists.
3. Review of board plan.
4. Student responses during summary of the lesson.
5. Making adjustments based on the evaluation to improve teaching strategists lessons may require re-teaching.

# 3. How to use the blackboard plan

The Blackboard is an important tool for teachers to use daily. This TM introduces the strategy for enhancing the effective use of the blackboard to Improve Student Learning. The whole blackboard should be utilised fully from left to right corresponding to the lesson flow.

Use the blackboard according to the following steps.

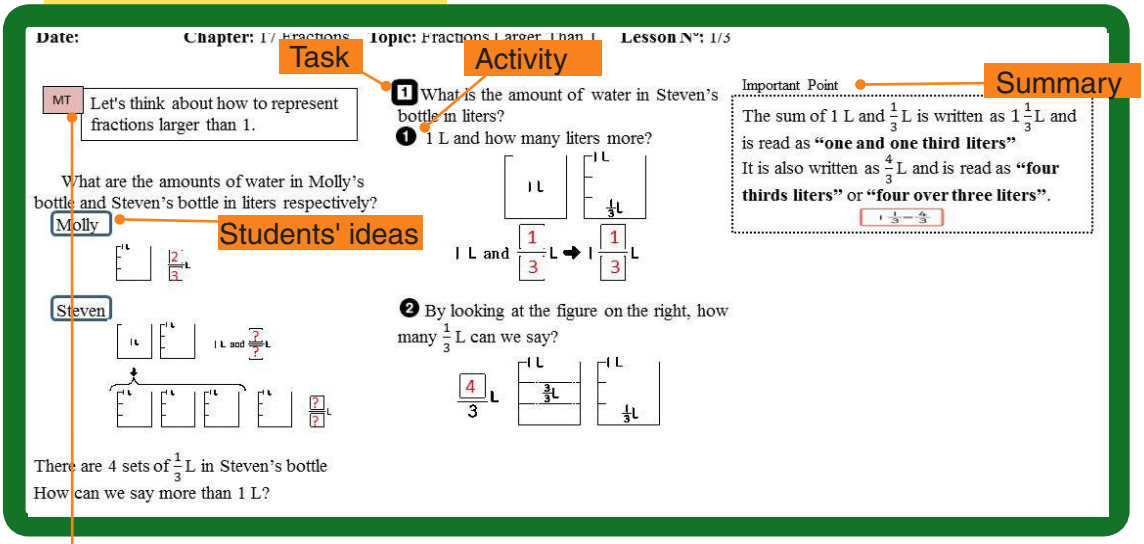
1. Ensure that the whole blackboard is clean.
2. Write Date, Chapter, Topic and lesson number from the top left hand corner to the right.
3. Follow the sequence of the lesson working from left to right according to the blackboard plan including:
   a) Main Task Heading (MT)*
   b) Review(Where necessary)
   c) Student Ideas and textbook ideas
   d) Important points
   e) Tasks and activities (practices)
   f) Summary (All of the components will depend and correspond with the flow of the lesson.)

Points to consider.

1. Write in a very organised manner so the students can see connections and is visible from all parts of the room.
2. Check what you write as you write if we intend students to copy it down in their exercise books to learn.
3. Encourage students to display their ideas on the blackboard by writing and explaining what they have and promote student centred learning.
4. Allow students sufficient time to copy what you wrote.
   (Students should copy only the important points, not necessary to copy all.)

At the end of the lesson, it is time for summary of the lesson. Teachers should summarise using whole blackboard to point out important points.

## Sample Blackboard Plan




*MT: Main task mark

The Main Task is introduced as indicated on the Blackboard plan according to the lesson flow. In this sample blackboard plan, the teacher writes and explains the Main task, then proceeds with 1 (Task 1) 1 and 2 (activities 1 and 2).

# 4. How to conduct Assessment

Assessment is a fundamental aspect of students mathematical learning and performance. Results of assessment will benefit the students in setting goals, take high responsibility for their own learning and become more independent learners.
There are two main types of assessment used in this book which is in line with the syllabus assessment to assess the students.
They are:
1. Formative Assessment (Assessment Of or As)
2. Summative Assessment (Assessment For)
This should guide teachers to prepare assessment tasks and methods.
You will find summative (S) and formative (F) assessment indicated in every lesson so it is important for you to plan how you want to assess students' learning and performance.

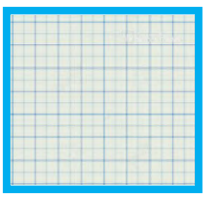
**(F) Formative assessment**
Formative assessment examples in the TM are:
1. Observation checklists
2. Correction of exercises
3. Analysis of discussions
4. Students' participation.

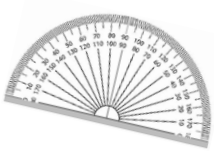
**(S) Summative assessment**
Summative assessment examples include:
1. Exercise and Problems
2. End of Chapter Test
3. Projects
4. Homework and Assignments.

# 5. Attachments

The Teacher's Manual has four attached pages that the teacher can use when teaching lessons. The pages consists of a 5 $mm^2$ grid, a 1 $cm^2$ grid, a 1 $cm^2$ dotted grid and triangle rulers and a protractor.

1. **5 $mm^2$ grid**
   The 5 $mm^2$ grid can be used for drawing graphs, sketching nets or solids and drawing various figures with 5 mm scale.
2. **1 $cm^2$ grid**
   The 1 $cm^2$ grid can be used for drawing graphs, sketching nets or solids and drawing with 1 cm scale.
3. **1 $cm^2$ dotted grid**
   The 1 $cm^2$ dotted grid can be used for drawing various lines, shapes or figures.
4. **Triangle rulers and protractor**
   The triangle rulers and protractor can be used to draw shapes and figures, measure and confirm lengths and angles.





# 6. Yearly Overview

**Yearly overview** is an essential and systematic plan of the grade content. It is helpful in the preparation of the yearly program to effectively plan for teaching strategies. The strand is outlined and identifies each unit and topic into different strand groups. The units are in sequential order from the first to the last unit.

| Strand | Unit # | Unit & Topic | Lesson # | Single/ Double | Page No. |
|---|---|---|---|---|---|
| Number & Operation | 1 | **Large Numbers** | | | |
| | | 1. Large Numbers to 100 Million | 1 | D | 2 |
| | | | 2 | D | 3,4,5 |
| | | 2. Large Numbers to Billion | 3 | D | 6,7,8 |
| | | 3. English Numeration | 4 | D | 9,10 |
| | | 4. Calculating Large Numbers | 5 | D | 11,12 |
| | | Exercise and Evaluation | 6 | D | 13,14 |
| | 2 | **Division** | | | |
| | | 1. Rules of Division | 7 | D | 15,16 |
| | | | 8 | D | 17,18 |
| | | | 9 | S | 19, |
| | | 2. Division of Tens and Hundreds | 10 | S | 20 |
| | | Exercise and Evaluation | 11 | D | 21,22 |
| | 3 | **Thinking about How to Calculate** | | | |
| | | 1. Thinking about How to Calculate | 12 | D | 23,24 |
| | | | 13 | D | 25 |
| | 4 | **Angles** | | | 26,27,28 |
| | | 1. The Sizes of the angles | 14 | D | 28,29 |
| | | | 15 | D | 30,31 |
| | | | 16 | D | 32 |
| | | | 17 | D | 33 |
| | | 2. The Angles of Triangle Rulers | 18 | S | 34,35,36 |
| Number & Operation | 5 | Exercise and Evaluation | 19 | D | |
| | | **Division by 1-digit Numbers** | | | |
| | | 1. Division in Vertical Form | 20 | D | 37,38 |
| | | 2. Division of 2-digit Numbers | 21 | D | 39, 40 |
| | | | 22 | D | 41 |
| | | | 23 | D | 42 |
| | | 3. The Calculation of (3-digit Numbers)÷(1-digit Number) | 24 | D | 43,44,45 |
| | | | 25 | S | 45 |
| | | | 26 | D | 46 |
| | | 4. What Kind of Expression | 27 | S | 47 |
| | | Exercise and Evaluation | 28 | D | 48,49,50 |
| Geometrical Figures | 6 | **Quadrilaterals** | | | |
| | | 1. Perpendicular Lines | 29 | D | 51,52 |
| | | | 30 | D | 53,54 |
| | | | 31 | D | 55,56 |
| | | 2. Parallel Lines | 32 | D | 57,58 |
| | | | 33 | D | 59,60 |
| | | 3. Various Quadrilaterals | 34 | D | 61 |
| | | | 35 | D | 62 |
| | | | 36 | D | 63 |
| | | | 37 | D | 64 |
| | | | 38 | D | 65,66 |
| | | | 39 | S | 67 |
| | | 4. Diagonals of Quadrilaterals | 40 | D | 68,69 |
| | | | 41 | S | 70 |
| Number & Operation | 7 | Exercise and Evaluation | 42 | D | 71,72 |
| | | **Division by 2-digit Numbers** | | | |
| | | 1. Division by 2-digit Numbers (1) | 43 | D | 73, 74 |
| | | | 44 | D | 75 |
| | | | 45 | D | 76 |
| | | | 46 | D | 77 |
| | | 2. Division by 2-digit Numbers (2) | 47 | D | 78,79 |
| | | | 48 | D | 80 |
| | | 3. Rules of Division and Multiplication | 49 | S | 81 |
| Data & Mathematical Relations | 8 | Exercise and Evaluation | 50 | D | 82,83 |
| | | Length of a Jump | 51 | S | 84,85 |
| | | **Line Graphs** | | | |
| | | 1. Line Graphs | 52 | S | 86, 87 |
| | | | 53 | D | 88,89 |
| | | 2. How to Draw Line Graphs | 54 | D | 90 |
| | | 3. Ideas for Drawing Line Graphs | 55 | D | 91,92,93 |
| | | | 56 | D | 93,94 |
| Number & Operation | 9 | Exercise and Evaluation | 57 | D | 94,95 |
| | | **Decimal Numbers 1** | | | |
| | | 1. How to Represent the Remaining Parts | 58 | D | 96,97 |
| | | | 59 | D | 97,98 |
| | | | 60 | D | 99 |
| | | | 61 | S | 100 |
| | | 2. The Structure of Decimal Numbers | 62 | D | 101 |
| | | 3. Addition and Subtraction of Decimal No. | 63 | D | 102,103 |
| | | | 64 | D | 104,105 |
| Number & Operation | 10 | Exercise and Evaluation | 65 | D | 106,107 |
| | | **Round Numbers** | | | |
| | | 1. Rounding | 66 | D | 108,109 |
| | | | 67 | S | 109, 110,111 |
| | | | 68 | D | 111, 112 |
| | | 2. Rounding Up and Down | 69 | D | 113 |
| | | 3. Rough Estimates | 70 | D | 114,115 |
| | | | 71 | D | 116, 117 |
| | | | 72 | D | 118 |
| | | Exercise and Evaluation | 73 | D | 119,120 |

Under each unit in the Overview, the topics for each lesson are also indicated. For all topics, the actual lesson numbers are given according to the student textbook. Each lesson is recognised as either single (S) 30 minutes period or double (D) 60 minutes period. Finally, page numbers are attached to each lesson to easily identify the lesson topics for planning.
**Note** that in the Yearly overview, the term 'units' is used while the term 'chapter' is used in the textbook.

| Strand | Unit # | Unit & Topic | Lesson # | Single/ Double | Page No. |
|---|---|---|---|---|---|
| Number & Operation | 11 | **Expressions and Calculations** | | | |
| | | 1. Represent the Expressions | 74 | D | 121, 122 |
| | | | 75 | D | 123 |
| | | | 76 | S | 124 |
| | | 2. Rules for Calculations | 77 | D | 125,126 |
| | | 3. Calculation of Whole Numbers | 78 | D | 127,128 |
| | | | 79 | D | 129 |
| | | Exercise and Evaluation | 80 | D | 130,131 |
| Measurement | 12 | **Area** | | | |
| | | 1. Area | 81 | D | 132,133,134 |
| | | | 82 | D | 134,135,136 |
| | | 2. Area of Rectangles and Squares | 83 | D | 137,138, |
| | | | 84 | S | 138,139 |
| | | | 85 | D | 139,140 |
| | | 3. Unit for Large Areas | 86 | D | 141,142 |
| | | | 87 | D | 143,144 |
| | | | 88 | S | 145,146 |
| | | Exercise and Evaluation | 89 | D | 146,147 |
| Number & Operation | 13 | **Decimal Numbers 2** | | | |
| | | 1. How to Represent Decimal Numbers | 90 | D | 148,149,150 |
| | | | 91 | D | 151 |
| | | | 92 | S | 152 |
| | | 2. Structure of Decimal Numbers | 93 | D | 153,154 |
| | | 3. Addition and Subtraction of Decimal Numbers | 94 | D | 155,156 |
| | | | 95 | D | 156,157 |
| | | Exercise and Evaluation | 96 | D | 158,159 |
| | 14 | **Thinking about How to Calculate** | 97 | D | 160,161 |
| | | | 98 | D | 162,163 |
| Data & Mathematical Relations | 15 | **Arrangement of Data** | | | |
| | | 1. Arrangement of Table | 99 | D | 164, 165,166 |
| | | | 100 | D | 166 |
| | | 2. Arrangement of Data | 101 | D | 167 |
| | | Exercise and Evaluation | 102 | D | 168, 169 |
| Number & Operation | 16 | **Multiplication and Division of Decimal Numbers** | | | |
| | | 1.Caluculation (Decimal Number)x (Whole Number) | 103 | D | 170,171 |
| | | | 104 | D | 172 |
| | | | 105 | D | 173 |
| | | 2.Caluculation (Decimal Number) ÷ (Whole Number) | 106 | D | 174,175 |
| | | | 107 | D | 176 |
| | | | 108 | D | 177 |
| | | 3. Division Problems | 109 | D | 178,179 |
| | | | 110 | D | 179 |
| | | 4. What kind of expression? | 111 | D | 180 |
| | | Exercise and Evaluation | 112 | D | 181,182 |
| Number & Operation | 17 | **Fractions** | | | |
| | | 1. Fractions Larger than 1 | 113 | S | 183,184 |
| | | | 114 | D | 184,185 |
| | | | 115 | D | 186 |
| | | 2. Equivalent Fractions | 116 | S | 187 |
| | | | 117 | S | 188 |
| | | 3. Addition and Subtraction of Fractions | 118 | D | 189 |
| | | | 119 | D | 190 |
| | | | 120 | D | 191 |
| | | | 121 | D | 192 |
| | | Exercise and Evaluation | 122 | D | 193,194 |
| Geometrical Figures | 18 | **Rectangular Prisms & Cubes** | | | |
| | | 1. Rectangular Prisms & Cubes | 123 | D | 195,196 |
| | | 2. Nets | 124 | S | 197 |
| | | | 125 | S | 198 |
| | | | 126 | S | 199 |
| | | | 127 | S | 200 |
| | | 3. Perpendicular and Parallel Faces and Edges | 128 | D | 201, 202 |
| | | | 129 | S | 203 |
| | | | 130 | S | 204 |
| | | 4. How to Represent Positions | 131 | S | 205 |
| | | | 132 | S | 206 |
| | | | 133 | S | 207 |
| | | Exercise and Evaluation | 134 | D | 208,209 |
| Data & Mathematical Relations | 19 | **Quantities Change Together** | | | |
| | | 1. Quantities Which Change Together | 135 | S | 210, 211 |
| | | | 136 | D | 212 |
| | | | 137 | D | 213 |
| | | 2. Mathematical Sentence using □ and ○ | 138 | S | 214 |
| | | | 139 | S | 215 |
| | | Exercise and Evaluation | 140 | D | 216,217 |
| Summary | 20 | **Summary of Grade 4** | | | 218 |
| | | | 141 | S | 219,220,221 |
| | | | 142 | S | 222,223,224 |
| | | | 143 | S | 225 |
| | | | 144 | S | 225 |

# 7. Let's have fun for improving Math skills

Some interesting games are introduced in the textbooks for improving students mathematics thinking skills. Teachers are encouraged to facilitate these games during lesson time, recess, lunch and after lessons.
Below is an example of addition, subtraction and multiplication in a number card game to improve students' mental calculation skills.

## Let's Play "Number Card Game"

Objective: Students will be able to do mental calculations of addition (up to 9+9), subtraction(up to 18−9), and the multiplication(up to 9×9).

### When to play

It is very effective if you play the game 5 minutes at the beginning of every lesson.

### How to play

### 1. Addition

Teacher gives the students a number to be added. Teacher shows different number cards and the students do mental calculation to add the number mentioned to the number shown as quickly as possible.
Example:
Teacher: "Please add 5 to the shown number card".
Show a number card (3).
Students: "8"
Teacher: Show a number card (6).
Students: "11"

### 2. Subtraction

Teacher gives the students a number to be subtracted from. Teacher shows different number cards and the students do mental calculation to subtract the number mentioned to the number shown as quickly as possible.
Example:
Teacher: "Please subtract the number shown on the card from 15".
Teacher: Show a number card (8).
Students: "7"
Teacher: Show a number card (6).
Students: "9"

### 3. Multiplication

Teacher gives the students a number to be multiplied. Teacher shows different number cards and the students do mental calculation to multiply the number given by the teacher with the number in the card and answer as quickly as possible.
Example:
Teacher: "Please multiply 3 to the shown number card".
Teacher: Show a number card (8).
Students: "24"
Teacher: Show a number card (5).
Students: "15"

# Chapter 1 Large Numbers

## 1. Unit Objectives

- To deepen their understanding of base ten place value for larger numbers. (4.1.1b,c and d)
- To understand the unit of million and represent, read and write those numbers using place value. (4.1.1a)

## 2. Teaching Overview

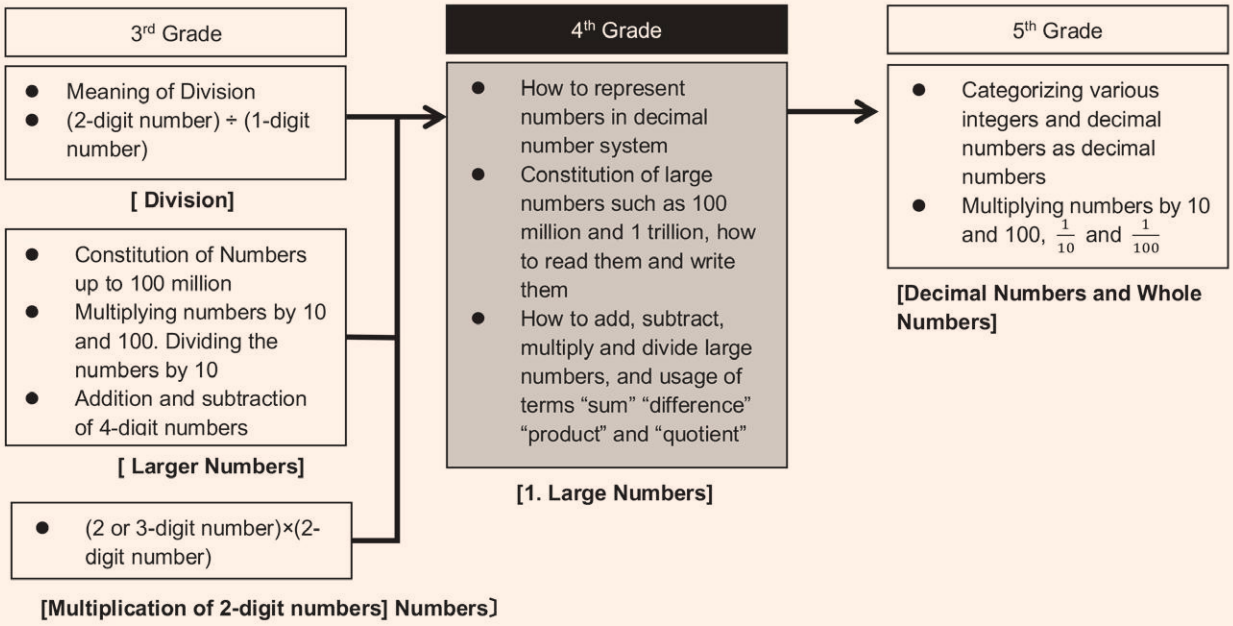
Students consolidate binary notation of base 10 in this unit. Two important things in binary notation is; 1. 10 makes 1 in the next unit/digit, 2. The 1 as the new unit is to be written on the left column. Students will understand any large whole numbers can be expressed in binary notation as the summary of learning large numbers.

**Large Numbers :** They learn new unit, billion and notice that 100 million makes 1 billion as 100 thousands makes a million.

**English Numeration :** Students should get used to reading, writing and understanding the amount of numbers and also appreciate the way of writing numbers by separating by 3 digits each.

**Calculating Large Numbers :** They compare numbers by paying attention to numbers on number places. To enable it, they should be able to understand numbers. For assessing if they understand the numbers, teachers can ask students if they can explain numbers in the ways of 4 operations; e.q. 255 400 000 is made up with 2554 of 100,000, or a tenths of 2 554 000 000.

## 3. Related Learning Contents



# Unit 1

# Unit: Large Numbers
## Sub-unit: 1. Large Numbers to 100 Million
### Lesson 1 of 2 (Double Period)

Textbook Page : p.2~p.3
Actual Lesson 001

## Sub-unit Objectives

- To read and write the numbers up to million.
- To read and write the numbers up to ten million.
- To understand and use three-digit reading number system to read millions and ten millions.

## Lesson Objectives

- To read and write numbers in millions using three-digits reading number system.
- To identify the place value of a given digit in million.

## Prior Knowledge

- Structure of large numbers larger than ten thousand and how to express them.
- Ten sets of one thousand make ten thousand.
- Ten set of ten thousand make hundred thousand.
- Read and write numbers up to hundred thousand.

## Preparation

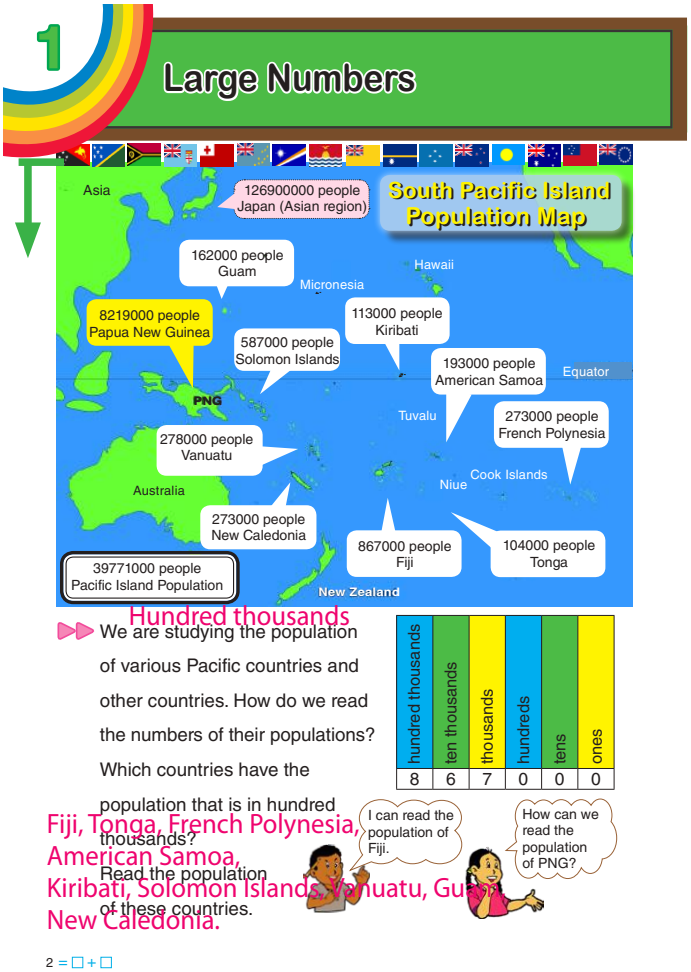
- Place value table of Fiji and PNG

## Assessment

- Think about how to read and write numbers larger than million. F
- Read and write numbers in millions. S
- State the place value of given digit in million. S

## • Teacher's Notes •

Students have learned hundred thousand in grade three. This lesson is to learn how to read and write numbers larger than hundred thousand. The focus is to read and write million using the place value chart. When drawing the number line the intervals must be equal.




Hundred thousands

We are studying the population of various Pacific countries and other countries. How do we read the numbers of their populations? Which countries have the population that is in hundred thousands? Read the population of these countries.

| hundred thousands | ten thousands | thousands | hundreds | tens | ones |
|---|---|---|---|---|---|
| 8 | 6 | 7 | 0 | 0 | 0 |

Fiji, Tonga, French Polynesia, American Samoa, Kiribati, Solomon Islands, Vanuatu, Guam, New Caledonia.




2 = □ + □

## 1 Large Numbers to 100 Million

1 Let's consider how to read the population of Papua New Guinea.

8219000 people

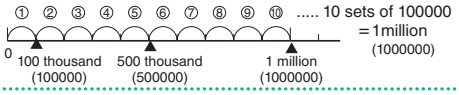
1 In which place value is 2?

2 In which place value is 8?

Hundred thousands
Million

Let's consider how to read and write numbers larger than the hundred thousands place.

The number that is 10 sets of hundred thousand (100000) is written as 1000000 and is read as **one million**.
One million is a number with 1000 sets of one thousand.




3 Read the population of Papua New Guinea.

| millions | hundred thousands | ten thousands | thousands | hundreds | tens | ones |
|---|---|---|---|---|---|---|
| 8 | 2 | 1 | 9 | 0 | 0 | 0 |

The number above is read as "Eight million, two hundred and nineteen thousand." It is written 8 219 000 with **space in every three-digits so it is easier to read.**

□ × □ = 3

# Lesson Flow

## 1 Investigate the population of Pacific countries and read the numbers of their population.

T Let students to observe the map and discuss what they observe. Have some lead up questions for the discussion centred around the population of the Pacific on the map.

T Introduce the students with the statement "We are studying the population of various Pacific countries and other countries.

T How do you read the population of Fiji?

S Observe the place value chart and the bubbles and read the population of Fiji. 867 000 (Eight hundred and sixty seven thousand) people.

T Which countries have the population in hundred thousand?

S Guam, Kiribati, Solomon Island, Vanuatu, New Caledonia, Fiji, Tonga, Samoa, French Polynesia.

T Whose population is more than Hundred. thousand?

S Papua New Guinea, Pacific Islands and Japan.

## 2 ❶ Consider how to read and write numbers larger than the hundred thousand.

T Introduce main task.

T Have students to observe the figure for Papua New Guinea's population (8 219 000 people) and say the numbers one by one 8-2-1-9-0-0-0 people.

S Refer to place value chart in ❸ and answer questions ❶ and ❷.

T Assist the students to identify the position of million in the place value table that it comes before the hundred thousand.

## 3 Learn the place value of million.

T Explain the important point in the box .

## 4 ❸ Read and write the population of PNG.

S Observe the place value chart to read and write the population of Papua New Guinea.

## 5 Exercise

T Ask students to write these in figures.

1. Six million
2. Three million and two hundred thousand

S Complete the exercise with their answers.

# Sample Blackboard Plan

**Date:**
**Chapter:** 1 Large Numbers.
**Topic:** Large Numbers to 100 Million. **Lesson No:** 1/2

**Main Task: Let's think about how to write and read numbers larger than hundred thousand.**

Which countries has the population that is in hundred thousand?

| Country | Thousands | | | Ones | | | |
|---|---|---|---|---|---|---|---|
| | 100 thousand | 10 thousand | thousand | hundreds | tens | ones | |
| Fiji | 8 | 6 | 7 | 0 | 0 | 0 | people |
| Kiribati | | | | | | | |
| Solomon Is | | | | | | | |
| Vanuatu | | | | | | | |
| N/Caledonia | | | | | | | |
| Guam | | | | | | | |
| Tonga | | | | | | | |
| Samoa | | | | | | | |
| French Polynesia | | | | | | | |

Whose population is more than hundred thousand?
PNG, Pacific Island and Japan.

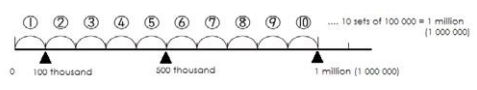
MT: Introduce main task here.c

[1] Let's consider how to read the population of PNG 8219000 people.

8-2-1-9-0-0-0 people.
❶ In which place value is 2? Hundred Thousand
❷ In which place value is 8? Million

**Important Point.**

The number that is 10 sets of hundred thousand (100 000) is written as 1 000 000 and is read as one million. One million is a number with 1 000 sets of one thousand.




❸ Read the population of Papua New Guinea.

| Country | Millions | Thousands | | | Ones | | | |
|---|---|---|---|---|---|---|---|---|
| | millions | 100 thousand | 10 thousand | thousand | hundreds | tens | ones | |
| PNG | 8 | 2 | 1 | 9 | 0 | 0 | 0 | people |

PNG: Eight million, two hundred and nineteen thousand people.

Exercise

Write these in figures.
1. Six million. 6 000 000
2. Three million and two hundred thousand . 3 200 000

# Unit 1

# Unit: Large Numbers
## Sub-unit: 1. Large Numbers to 100 Million
### Lesson 2 of 2 (Double Period)

Textbook Page : p.4~p.5
Actual Lesson 002

## Lesson Objectives

- To read, write, represent and understand the size of numbers and quantity using the three-digit number system.
- To understand and make sense of the given situation and relate to their daily life.

## Prior Knowledge

- How to read and write the number million (Previous lesson).

## Preparation

- Place Value Table

## Assessment

- Read and represent numbers up to 10 million and more using three-digit number system. S
- Write given numbers in words or figures using the three-digit number system. F
- Do the exercise correctly. S

## • Teacher's Notes •

Large numbers are separated in these groups of Ones, Thousands, Millions, Billions, etc. The digits are then grouped into three starting from the right to the left and each group is separated by a comma or a small space.

Generally, writing numbers on number line helps to identify numbers which are greater or less and for easier reading.

A number line shows numbers that are written from the smaller to larger.

**2** The following number represents the estimated cost of hosting the South Pacific Games held here in Papua New Guinea.

Estimated cost: 30 000 000 kina

1. In which place value does 3 represent in the number? 10 million
2. How many 10 million are there in the value of 3? 3 ten million

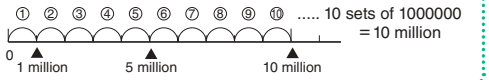
Let's consider how to read and write numbers larger than the millions place.

3. Read the number below that shows the estimated cost of hosting the South Pacific Games in Papua New Guinea.

| Millions | | | Thousands | | | Ones | | |
|---|---|---|---|---|---|---|---|---|
| | ten millions | millions | hundred thousands | ten thousands | thousands | hundreds | tens | ones |
| | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

It is easier to read large numbers when we use the space in every 3-digits such as 30 000 000, isn't it?

The number that is 10 sets of 1 million is written as 10 000 000 and is read as **ten million**. It is also written as 10 million. 10 million is a number with 10 sets of one million.




4. Fill in the population of the Pacific Islands and read it.

| Millions | | | Thousands | | | Ones | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 10 millions | millions | 100 thousands | 10 thousands | thousands | hundreds | tens | ones | |
| Pacific Islands | | | | | | 0 | 0 | 0 | People |

The total number of the people in the Pacific Islands is 39771000.

It is read as "thirty nine million, seven hundred and seventy one thousand".

It is written as 39 771 000 with space in every three-digits.

100 sets of 1 million is hundred million.

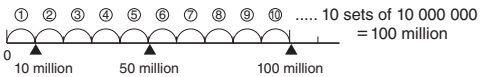
5. Fill in the population of Japan and read it.

| Millions | | | Thousands | | | Ones | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 100 millions | 10 millions | millions | 100 thousands | 10 thousands | thousands | hundreds | tens | ones | |
| Japan | 1 | 2 | 6 | 9 | 0 | 0 | 0 | 0 | 0 | People |

The number of population of Japan, 126900000, is written as 126 900 000 and read as one hundred twenty six million and nine hundred thousand.

The number that is 100 sets of 1 million is written as 100 000 000, and is read as **hundred million**. It is also written as 100 million.

100 million is a number with 100 sets of one million.




**3** Write the following in numbers.

1. The number that is the sum of 10 sets of 100 thousand is 1 million, written as 1 000 000.
2. The number that is the sum of 10 sets of 1 million is 10 million, written as 10 000 000.
3. The number that is the sum of 100 sets of 1 million is 100 million, written as 100 000 000.

4 = □ + □

□ × □ = 5

## Lesson Flow

### 1 Review the previous lesson.

### 2 ❷ Observe the estimated cost of hosting the South Pacific Games.

T Introduce the main task.

T Have students to observe the estimated cost of hosting the South Pacific Games and say the numbers one by one 3-0-0-0-0-0-0-0 kina. Have some lead up questions to guide the students to recognise and identify that the amount is more than one million kina.

S Answer ❶, ❷ by observing the place value table.

T Emphasise the position of ten million in the place value table that it comes before the millions place.

S ❸ Read the estimated cost of hosting the South Pacific Games by observing the place value table and the speech bubble.

T Explain the important point in the box ⬚.

S ❹ Fill in the population of Pacific Island and read it.

S ❺ Fill in the population of Japan and read it.

T Explain the important point in the box ⬚.

### 3 ❸ Solve the task.

S Answer ❶, ❷ and ❸.

T Assist those in need and give ample time for students to work.

T Ask students to present their answer.

## Sample Blackboard Plan

**Date:**
**Chapter:** 1 Large Numbers.
**Topic:** Large Numbers to 100 Million. **Lesson No:** 2/2

**Main Task: Let's think about how to write and read numbers larger than millions.**

MT: Introduce main task here.

Estimated cost : 3-0-0-0-0-0-0-0 kina.

[2]❶ What does 3 represent in the number? 10 million

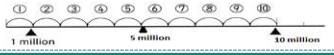
❷ How many 10 million are there in the value of 3? 3 ten million.

| | Millions | | Thousands | | | Ones | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 10 million | million | 100 thousand | 10 thousand | thousand | hundreds | tens | ones | |
| Estimated Cost of South Pacific Games. | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | kina |

❸ Read the estimated cost of hosting the South Pacific Games.
Thirty million kina (30 million kina).

**Important Point.**

The number that is 10 sets of 1 million is written as 10 000 000, and is read as ten million. It is also written as 10 million. 10 million is a number with 10 sets of one million.




❹ Fill in the population of Pacific Island and read it.

| | Millions | | Thousands | | | Ones | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 10 million | million | 100 thousand | 10 thousand | thousand | hundreds | tens | ones | |
| Pacific Islands | 3 | 9 | 7 | 7 | 1 | 0 | 0 | 0 | people |

Thirty nine million, seven hundred and seventy one thousand people.

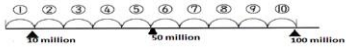
❺ Fill in the population of Japan and read it.

| | Millions | | | Thousands | | | Ones | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 100 million | 10 million | million | 100 thousand | 10 thousand | thousand | hundreds | tens | ones | |
| Japan | 1 | 2 | 6 | 9 | 0 | 0 | 0 | 0 | 0 | people |

One hundred twenty six million and nine hundred thousand people.

**Important Point.**

The number that is 100 sets of 1 million is written as 100 000 000 and is read as hundred million. It is also written as 100 million. 100 million is a number with 100 sets of one million.




[3] Write the following in numbers.
❶ 1 000 000
❷ 10 000 000
❸ 100 000 000

# Unit 1

# Unit: Large Numbers
## Sub-unit: 2. Large Numbers to Billion
### Lesson 1 of 1 (Double Period)

Textbook Page : p.6~p.8
Actual Lesson 003

## Sub-unit Objectives

- To read and write the numbers up to billion.
- To understand and use three-digit reading number system to read billions.

## Lesson Objectives

- To read and write numbers in millions and billions using three-digits reading number system.
- To identify the place value of a given digit in billion.

## Prior Knowledge

- Reading and writing numbers up to million and ten million using three-digit number system.

## Preparation

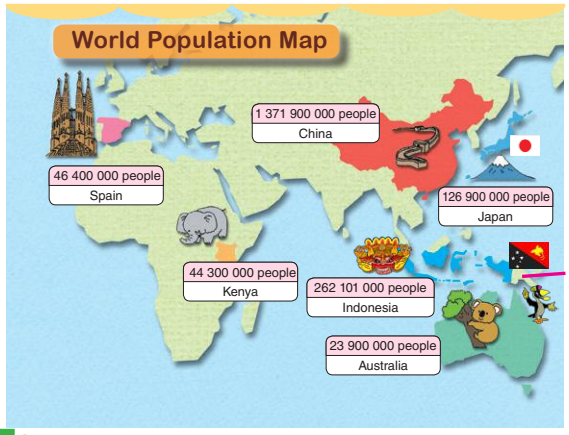
- Place value table and chart

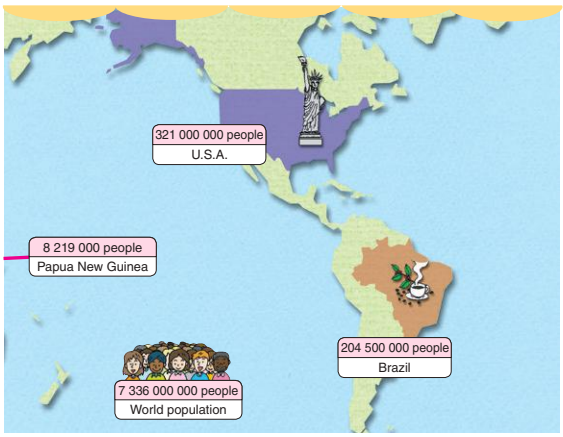
## Assessment

- Read numbers in millions and billions. F
- Write numbers in millions and billions. F
- Explain the place value of given digit. F
- Do the exercises correctly. S

## • Teacher's Notes •

- Large numbers are usually regarded as numbers bigger than what is used in their daily lives.
- All the large numbers are separated into three main groups ones, tens and hundreds. Each of three main groups are then separated into sub main groups known as ones, thousands, millions, billions, etc.
- When reading or writing large numbers we start from the left to the right in that manner. For example, if we have 5834, we read as five thousand, eight hundred and twenty four.




## 2 Large Numbers to Billion

1 The map above shows the population in figures of various countries around the world.

1 Write the population below and read them.

| Countries | ? | | | Millions | | | Thousands | | | Ones | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 100 millions | 10 millions | millions | 100 thousands | 10 thousands | thousands | hundreds | tens | ones | |
| PNG | | | | | | 8 | 2 | 1 | 9 | 0 | 0 | 0 | People |
| Australia | | | | | 2 | 3 | 9 | 0 | 0 | 0 | 0 | 0 | People |
| Japan | | | | 1 | 2 | 6 | 9 | 0 | 0 | 0 | 0 | 0 | People |
| Indonesia | | | | 2 | 6 | 2 | 1 | 0 | 1 | 0 | 0 | 0 | People |
| China | | | 1 | 2 | 7 | 1 | 9 | 0 | 0 | 0 | 0 | 0 | People |
| World | | | 7 | 3 | 3 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | People |

Can we read?

2 Let's consider how to read the population of China 1 371 900 000 people. In which place value is 3?

1 How many hundred millions are there in the value of 1? (1 371 900 000) 100 million / 10 sets of 100 million

2 Let's consider how to read and write numbers larger than the hundred millions place.

The number that is 10 sets of 100 million is written as 1 000 000 000 and is read as one **billion**. One billion is a number with 1 million sets of one thousand.

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ..... 10 sets of 100 000 000 = 1 billion

0 — 100 million — 500 million — 1 billion

6 = □ + □

□ × □ = 7

## Lesson Flow

### 1 Review the previous lesson.

### 2 ① Write and read the population of various countries.

T Refer to the map and have discussion about the various countries. Have lead up questions to guide the discussion.

S Write and read the population of the countries by using the map and fill in the place value table.

T Let students to recognise and identify that some of the places have the population more than hundred million.

T "Whose population is more than hundred millions?"

S China and the world population.

T Introduce the main task.

### 3 ② Consider how to read the population of China.

T Let's see the population of China; read the numbers one by one. 1-3-7-1-9-0-0-0-0-0 people.

S Complete ①, ②.

TN For question ② the value of 1 refers to the shaded 1 in the number (1 371 900 000).

### 4 Understand the place value of billion.

T Read and explain the important point in the box .

### 5 Use billions to read 1 371 900 000 people.

S Use the billions place for reading 1371900000 people.

TN one billion, three hundred and seventy one million, nine hundred thousand.

### 6 ③ Write the population of the world.

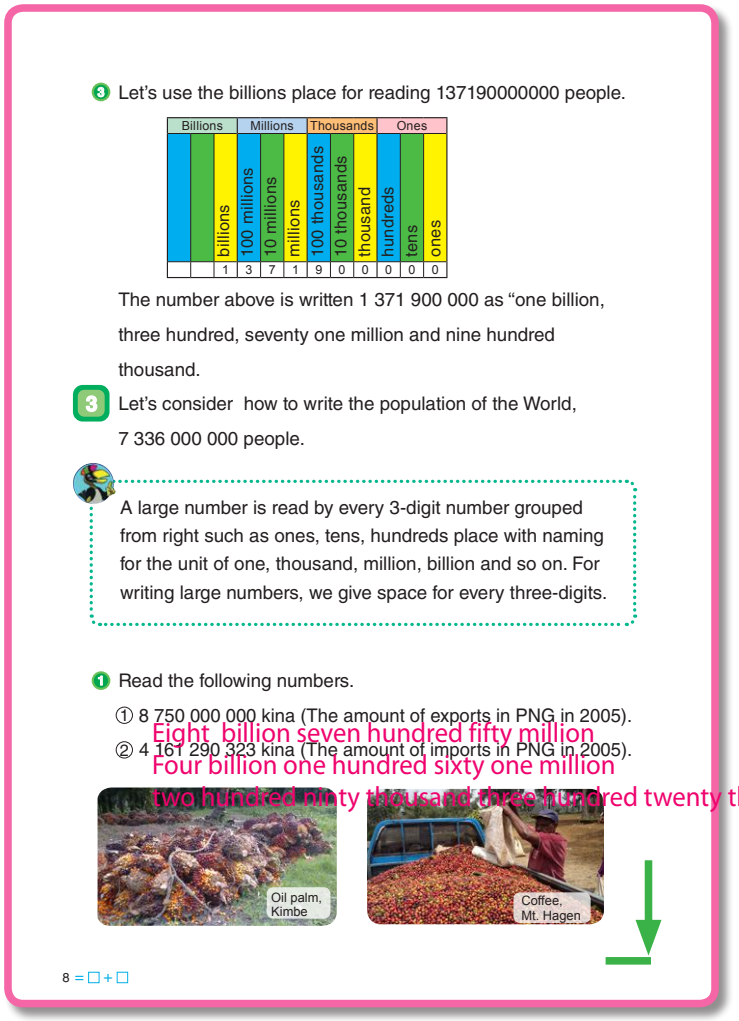
S Write the population of the world 7 336 000 000 people in words.

TN 'seven billion three hundred and thirty six million'.

T Read and explain the main important point in the box.

### 7 Activity ①

S Do the activities ① and ②.



③ Let's use the billions place for reading 137190000000 people.

| Billions | | | Millions | | | Thousands | | | Ones | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | billions | 100 millions | 10 millions | millions | 100 thousands | 10 thousands | thousand | hundreds | tens | ones |
| | | 1 | 3 | 7 | 1 | 9 | 0 | 0 | 0 | 0 | 0 |

The number above is written 1 371 900 000 as "one billion, three hundred, seventy one million and nine hundred thousand.

③ Let's consider how to write the population of the World, 7 336 000 000 people.

A large number is read by every 3-digit number grouped from right such as ones, tens, hundreds place with naming for the unit of one, thousand, million, billion and so on. For writing large numbers, we give space for every three-digits.

① Read the following numbers.

① 8 750 000 000 kina (The amount of exports in PNG in 2005).

② 4 161 290 323 kina (The amount of imports in PNG in 2005).

Eight billion seven hundred fifty million

Four billion one hundred sixty one million two hundred ninty thousand three hundred twenty three.

Oil palm, Kimbe

Coffee, Mt. Hagen

8 = □ + □

## Sample Blackboard Plan

Sample blackboard plan refer to page 9

# Unit 1

# Unit: Large Numbers
## Sub-unit: 3. English Numeration
## Lesson 1 of 1 (Double Period)

Textbook Page : p.9~p.10
Actual Lesson 004

## Lesson Objectives

- To consider the structure of numbers from the word.
- To understand the English numeration system.
- To review what students learned in the unit.

## Prior Knowledge

- Numbers up to billion

## Preparation

- Place Value Table

## Assessment

- Read and write large numbers considering English numeration system. F
- Do the exercise correctly at the end of the lesson. S

## • Teacher's Notes •

1. 'bi' means 2 in Latin.
2. 'tri' means 3 in Latin.
3. 'quad' means 4 in Latin.

Latin is the language of ancient Rome and its empire.

### 3 English Numeration

The name of places changes in every 3-digit as follows:

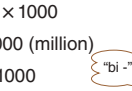
1 000 (thousand) ×1000 → 1 000 000 (million) [1] ×1000 → 1 000 000 000 (billion) [2] [1] ×1000 → 1 000 000 000 000 (Trillion) [3] [2] [1] ×1000 → 1 000 000 000 000 000 (Quadrillion) [4] [3] [2] [1]

"million" originated from "mile in Latin.

"bi -" means 2 in Latin.

"Tri-" means 3 in Latin.

"Quad-" means 4 in Latin



English numeration is originated from Latin and others. 3-digit numeral system is usually used in commonwealth countries. For reading large numbers, we have to count the number of 3-digit at first.

1 How many zeros are there in the following numbers?

① One million six zeros ② One billion nine zeros ③ One trillion twelve zeros

2 Let's find the answer.

① 1234×1000 1234 000 ② 1234×1000000 1 234 000 000

③ 1234×1000000000 1234 000 000 00

3 Put a space in every 3-digits when reading numbers.

① 8219 8 219 ② 82190 82 190 ③ 821900 821 900

④ 8219000 8 219 000 ⑤ 82190000 82 190 000 ⑥ 821900000 821 900 000

□×□=9 10=□+□

### Exercise

1 Fill in the ☐ with numbers.

① 0 ☐ 1 million 5 million ☐ 7 million 10 million ☐ 12 million

② 0 10 million ☐ 50 million ☐ 70 million 100 million

③ 0 ☐ 100 million ☐ 500 million ☐ 700 million 1 billion ☐ 1 billion 200 million

2 Draw a number line and represent the following numbers.

① 300 million ② 9 million ③ 1 billion and 800 million

3 Fill in the ☐ with the appropriate inequality signs.

① 110 950 000 < 111 095 000

② 213 610 000 > 203 161 000

Remember Inequality signs? Example 2<4, 5>3....

4 Read the numbers from Ⓐ to Ⓕ on the following number lines.

① 0 Ⓐ Ⓑ 100 million Ⓒ

A. Ten million B. Fifty million C. One hundred ten million

② 0 Ⓓ Ⓔ Ⓕ 1 billion

A. Two hundred million B. Five hundred million C. Nine hundred million

# Lesson Flow

## 1 Consider English numeration system.

T Introduce the main task.

T Explain the important point in the box .

S Discuss the English Numeration.

T Have the students to make a list of things discovered from what they find from the important point and discussion.

S Write important points discovered and share their findings with friends. Such important points as;

- meaning of mile, bi, tri and quad.
- name of the places changes in every 3-digit and is multiplied by 1000.
- number of zeros in thousand, million, billion, trillion and quadrillion.
- Originated from Latin and others.
- 3-digits numeral system usually used in common wealth.
- To read large numbers, we have to count the number of 3-digits first.

## 2 Complete actvities ①, ② and ③.

TN Let students aware of English numeration system to solve the questions.

## 3 Do the exercise ①, ②, ③ and ④.

TN ② Let the students draw the number line to represent the figures given. Let students think of how much one measure represents when they are drawing the number line.

TN ③ Should compare the number from the higher value.

TN ④ Let the students discover how much one measure represents on the number line.

# Sample Blackboard Plan (Lesson 3)

**Date:**
**Chapter:** 1 Large Numbers.
**Topic:** Large Numbers to Billion. **Lesson No:** 1/1

**Main Task: Let's think about how to write and read numbers larger than hundred millions.**

[1] The map shows the population in figures of various countries around the world. ❶Write the population and read them.

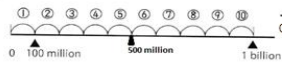
| Countries | Billions | Millions | | | Thousands | | | Ones | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Billion | 100 million | 10 million | million | 100 thousand | 10 thousand | thousand | hundreds | tens | ones | |
| PNG | | | | 8 | 2 | 1 | 9 | 0 | 0 | 0 | people |
| Australia | | | 2 | 3 | 9 | 0 | 0 | 0 | 0 | 0 | People |
| Japan | | 1 | 2 | 6 | 9 | 0 | 0 | 0 | 0 | 0 | People |
| Indonesia | | 2 | 6 | 2 | 1 | 0 | 1 | 0 | 0 | 0 | People |
| China | 1 | 3 | 7 | 1 | 9 | 0 | 0 | 0 | 0 | 0 | People |
| World | 7 | 3 | 3 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | people |

MT: Introduce the main task here.

[2] Population of China 1-3-7-1-9-0-0-0-0-0 people
❶ In which place value is 3? 100 million
❷ How many hundred millions are there in the value of 1? 10 sets of 100 million.

**Important Point.**

The number that is 10 sets of 100 million is written as 1 000 000 000 and is read as one **billion**. One billion is a number with 1 million sets of one thousand.




❸ Let's use the billions place for reading 1 371 900 000 people.
"One billion three hundred, seventy one million and nine hundred thousand".

| | Billions | Millions | | | Thousands | | | Ones | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Billion | 100 million | 10 million | million | 100 thousand | 10 thousand | thousand | hundreds | tens | ones | |
| China | 1 | 3 | 7 | 1 | 9 | 0 | 0 | 0 | 0 | 0 | people |

❹ Let's consider how to write the population of the world. 7 336 000 000 people. "Seven billion three hundred and thirty six million".

**Important Point.**

A large number is read by every 3-digit number group from right such as ones, tens, hundreds place with naming for the unit of one, thousand, million and billion and so on. For writing large numbers, we give space for every three digits in case.

**Exercise**

Read the following numbers.

① Eight billion, seven hundred and fifty million kina.

②Four billion, one hundred, sixty one million, two hundred, ninety thousand, three hundred and twenty three kina.

# Sample Blackboard Plan (Lesson 4)

**Date:**
**Chapter:** 1 Large Numbers.
**Topic:** English Numeration. **Lesson No:** 1/1

**Main Task: Let's look at the 3-digit numeral system.**

MT: Introduce the main task here.

**Important Point.**

The name of places changes in every 3-digit as follows:

1 000 (thousand)
↓ x 1000
1 000 000 (million) [1]
↓ x 1000
1 000 000 000 (billion) [2] [1] bi- means 2
↓ x 1000
1 000 000 000 000 (Trillion) [3] [2] [1] tri- means 3
↓ x 1000
1 000 000 000 000 000 (Quadrillion) [4] [3] [2] [1] quad- means 4

English numeration is originated from Latin and others. 3-digit numeral system is usually used in commonwealth countries. For reading large numbers, we have to count the number of 3-digit at first.

❶ How many zero in the following numbers?

1) One million — six zeros
2) One billion — nine zeros
3) One trillion — twelev zeros

❷ Let's find the answer

1) 1234 x 1000 — 1 234 000
2) 1234 x 1000000 — 1 234 000 000
3) 1234 x 1000000000 — 1 234 000 000 000

❸ Put the space in every 3-digits for reading numbers.

1) 8219 — 8 219
2) 82190 — 82 190
3) 821900 — 821 900
4) 8219000 — 8 219 000
5) 82190000 — 82 190 000
6) 821900000 — 821 900 000
7) 8219000000 — 8 219 000 000
8) 82190000000 — 82 190 000 000
9) 821900000000 — 821 900 000 000

**Exercise**

①②③④

***NB: For exercise ①②③④ write them on the board.***

**Summary**:
- English Numeration is done systematically so it is easy to read.
- We have to count the numbers of 3 digits at first.

# Unit 1

# Unit: Large Numbers
## Sub-unit: 4. Calculating Large Numbers
## Lesson 1 of 1 (Double Period)

Textbook Page : p.11~p.12
Actual Lesson 005

## Sub-unit Objectives

- To recognise and compare the size of numbers and represent them correctly.
- To calculate large numbers with the four main operations based on the unit of millions and billions.

## Prior Knowledge

- Addition and subtraction of large numbers (Grade 3)

## Lesson Objectives

- To read and represent large numbers and solve simple calculations using 3-digit number system.
- To make sense of a given situation and relate it to daily life.
- To calculate the sum, difference, product and quotient of the problem.

## Preparation

- Description of Sum, Difference, Product and Quotient.

## Assessment

- Read and represent numbers using three-digit number system. F
- Solve problems by calculating large numbers. S

### 4 Calculating Large Numbers

**1** In PNG, company tax collection is expected to reach 1 200 000 000 kina and 3 300 000 000 kina for personal tax income.

1. How much was the total cost for company tax and for personal tax? 4 500 000 000

Compare the following expressions.

A. 1 200 000 000 + 3 300 000 000

B. 1 billion, 200 million + 3 billion, 300 million

2. What was the difference between the tax collection for company tax and the personal tax income? 3 300 000 000 − 1 200 000 000 = 2 100 000 000

The result of adding numbers is called **sum**. The result of subtracting one number from another is called **difference**.

**2** Let's find the sum and difference in the following problems.

1. The sum of 1 billion, 700 million and 2 billion, 900 million — Sum 4 600 000 000
2. 2 million and 350 thousand plus 5 million and 150 thousand — Sum 7 500 000 000
3. The difference of 1 billion and 8 million — Difference 992 million
4. 8 billion and 700 million − 5 billion and 200 million — Difference 3 billion and 500 million

**[Sum]** to add and combine

**[Difference]** to take away or subtract

500 million 800 million

**3** The National Library has a monthly budget of 650 000 kina to purchase books.

Write the mathematical expression and calculate the annual budget?

650 000 x 12 7 800 000 kina per year

The result of multiplying numbers is called **product**.

**4** The Government spent 350 000 kina to buy 5 days meal and accommodation for a special meeting.

Write the mathematical expression and calculate the daily budget? 350 000 ÷ 5 Daily budget 70 000 kina per day

The result of dividing one number by another is called **quotient**.

**5** Let's find the products and quotients from the following problems.

1. 760 thousand × 2 — (1) 1 miilion and 520 thousand
2. 9 million and 10 thousand × 10 — (2) 90 million and 100 thousand
3. 8 million and 500 thousand ÷ 10 — (3) 850 thousand
4. 9 billion ÷ 3 — (4) 3 billion

**[Products]** pile up, repeated addition.

**[Quotient]** Measure, compare, repeated subtraction.

500 million 800 million

□ × □ = 11 12 = □ + □

## Lesson Flow

### 1 ① Understand the given situation.

T Introduce the main task.
S Read and understand the given situation.
S ①, Compare the expressions and think of the operation to be used to calculate.
T Remind students with the use of the question in the bubble to help them.
S Find the sum of 1 200 000 000 and 3 300 000 000.
S ②Find the difference of 3 300 000 000 and 1 200 000 000 000.
T Remind the students of the meanings of the words Sum and Difference from the chart.
T Explain the important point in the box .....

### 2 ② Find the sum and difference ① to ④.

S Complete activities ① to ④.

### 3 Students read and understand ③.

T What is the annual budget.
S Write the mathematical expression and solve ③.
T Explain the important point in the box .....

### 4 ④ Read and understand the situation.

T What is the daily budget for the meeting.
S Write mathematical expression and solve.
T Explain the important point in the box .....

### 5 ⑤ Read and solve the task.

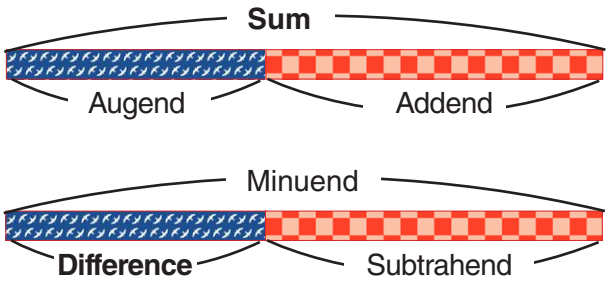
S Solve ① to ④.

### 6 Summarise the lesson.

T Summarise the mathematical expression with the students to help them of the meanings. Sum, Difference, Product and Quotient.

## • Teacher's Notes •

"Sum" and "Difference"
Have students understand the meaning of terms of "sum" and "difference" by using the column of "phrase" in the textbook. When doing so, it is much easier to have students understand the meaning visually by using the line segment diagram, etc.




After confirming a meaning of terms, use them as much as possible. It is important to have students use them as much as possible and have them become used to them by using them enthusiastically in teaching and learning.

## Sample Blackboard Plan

**Date:**
**Chapter:** 1 Large Numbers.
**Topic:** Calculating Large Numbers. **Lesson No:** 1/1

**Main Task: Let's calculate large numbers.**

MT: Introduce the main task here.

[1] ① How much is the total cost for purchasing the land and for the constructing the Five Star Hotel?
A 1 200 000 000 + 3 300 000 000 = 4 500 000 000 Answer:4 500 000 000 kina.
B 1 billion, 200 million + 3 billion, 300 million
1 200 000 000 + 3 300 000 000
②What is the difference between the cost of purchasing the land and the cost of constructing the building?
300 000 000 - 1 200 000 000 = 2 100 000 000 Answer: 2 100 000 000 kina

**Important Point.**

The result of adding numbers is called **sum**. The result of subtracting one number from another is called **difference**.

[2] Let's find the sum and difference in the following problems.
① 1 700 000 000 + 2 900 000 000 = The sum is 4 600 000 000
② 2 350 000 + 5 150 000 = The sum is 7 500 000
③ 1 000 000 000 – 8 000 000 = The difference is 992 000 000
④ 8 700 000 000 – 5 200 000 000 = The difference is 3 500 000 000

[3]The National Library for Papua New Guinea ha a monthly budget of 650 000 kina to purchase books..
Mathematical Expression 650 000 x 12
650 000 x 12 = 7 800 000 Answer: 7 800 000 kina per year.

**Important Point.**

The result of multiplying numbers is called **product.**

[4]The Government spent 350 00 kina to buy 5 days meal and accommodation for a special meeting.
Mathematical Expression 350 000 □ 5
350 000 □ 5 = 70 000 Answer: 70 000 kina per day.

**Important Point.**

The result of dividing one number by another is called **quotient.**

[5] Let's find the products and quotients in the following problems.
① 760 thousand x 2 Answer 1 million 520 thousand
② 9 million and 10 thousand x 10 Answer 90 million 100 thousand
③ 8 million, 500 thousand □ 10 Answer 850 thousand
④ 9 billion □ 3 Answer 3 billion.

**Summary:**
Refer to the text Book for explanation.

# Unit 1

# Unit: Large Numbers
## Sub-unit: Exercise and Evaluation
## Lesson 1 of 1 (Double Period)

Textbook Page : p.13~p.14
Actual Lesson 006

## Lesson Objectives

- To deepen understanding on what the students have learned in this unit.

## Prior Knowledge

- All the contents of the unit

## Preparation

- Place Value Chart
- Evaluation sheet for all students

## Assessment

- Do the exercise and evaluation correctly. F S

### Exercise

Pages 5 ~ 10

1 Let's summarise what we learned about large numbers.

① The number that is 10 sets of 100 thousand is [1 million].

② 1 million is [1000] sets of 1 thousand.

③ 1 billion is [10] sets of 100 million.

2 Let's read and write the following numbers. Pages 3 ~ 9

① The number that is the sum of 2 sets of 1 billion and 237 sets of 1 thousand. 2 billion 237 thousand

② The number that is the sum of 1 set of 1 billion and 45 sets of 10 thousand. 1 billion 450 000

③ The number that is 10 times of 180 thousand. Pages 11 ~ 12 One million 800 thousnad 1 800 000

3 Let's calculate the following expressions.

① 7 billion + 2 billion 9 billion

② 735 million − 396 million 339 million

③ 526 million × 5 2 billion 630 million

④ 6 billion ÷ 2 3 billion

4 Let's make various numbers by using the 10 cards on the right. Pages 9

| | | | | |
|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 |
| 1 | 2 | 3 | 4 | 5 |
| 6 | 7 | 8 | 9 | |

① Make the largest number. 9 876 543 210

② Make the smallest number. 1 000 002 345

Let's calculate. Grade 3 Do you remember?

① 416 + 254 670

② 527 + 3817 4344

③ 652 + 194 846

④ 590 − 241 349

⑤ 708 − 474 234

⑥ 905 − 328 577

### Problems

1 Fill in the ☐ with appropriate numbers and words.
● Understanding the place value system of large numbers.

① The 6 in 36 495 000 000 is in the [billions] place value.

② 465 billion is [465] sets of 1 billion.

③ 1 million is equal to [100] times 10 thousand.

2 Let's read the following numbers.
● Reading large numbers.

① The distance from the Sun to the Earth. 149 million 600 thousand km
149 600 000 km

② Total budget for PNG Government in 2016. 14 million 209 thousand kina
14 209 000 kina

3 Let's write the following in numbers.
● Interpreting the explanation of numbers.

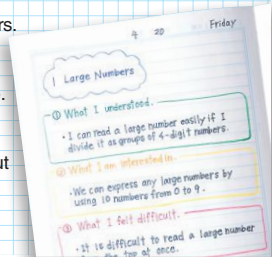
① The number that is 100 times 340 million. 34 000 000 000

② The number that is the sum of 3 sets of 1 billion and 48 sets of 100 million. 3 billion and 4 800 000 000 = 7billion 800 million

**How to use your exercise book!**

Write in your exercise book what you have learned about large numbers.

- What I understood.
- What was interesting for me.
- What was too difficult.
- What was good for me about my friend's ideas.
- What I want to do next.




□ × □ = 13

14 = □ + □

## Lesson Flow

**1** ① **Structure and relative size of large numbers.**

TN Explain using place value table with students who do not understand well.

**2** ② **Structure of large numbers.**

TN Explain using place value table to those who do not understand well.

**3** ③ **Addition, Subtraction, Multiplication and Division of Large Numbers.**

TN Explain using place value table to those who do not understand well.

**4** ① **Place value system of large numbers.**

**5** ② **Reading large numbers.**

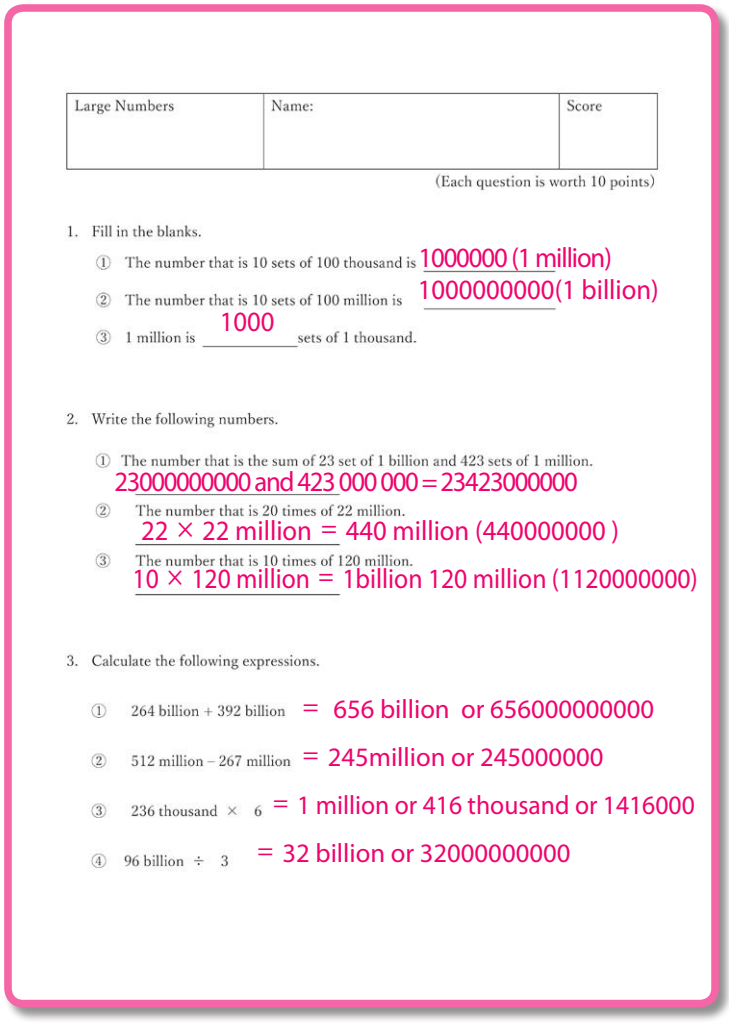
**6** ③ **Interpreting the explanations of numbers.**

TN Explain using place value table to those who do not understand well.

**7** **Do the evaluation.**

T Distribute evaluation sheet to all students.

S Complete the sheet and submit to teacher.



| Large Numbers | Name: | Score |
|---|---|---|
| | | |

(Each question is worth 10 points)

1. Fill in the blanks.

① The number that is 10 sets of 100 thousand is 1000000 (1 million)

② The number that is 10 sets of 100 million is 1000000000(1 billion)

③ 1 million is 1000 sets of 1 thousand.

2. Write the following numbers.

① The number that is the sum of 23 set of 1 billion and 423 sets of 1 million.
23000000000 and 423 000 000 = 23423000000

② The number that is 20 times of 22 million.
22 × 22 million = 440 million (440000000 )

③ The number that is 10 times of 120 million.
10 × 120 million = 1billion 120 million (1120000000)

3. Calculate the following expressions.

① 264 billion + 392 billion = 656 billion or 656000000000

② 512 million − 267 million = 245million or 245000000

③ 236 thousand × 6 = 1 million or 416 thousand or 1416000

④ 96 billion ÷ 3 = 32 billion or 32000000000

**End of Chapter Test: Chapter 1** **Date:**

| Large Numbers | Name: | Score |
|---|---|---|
| | | |

(Each question is worth 10 points)

1. Fill in the blanks.

   ① The number that is 10 sets of 100 thousand is _____

   ② The number that is 10 sets of 100 million is _____

   ③ 1 million is _____sets of 1 thousand.

2. Write the following numbers.

   ① The number that is the sum of 23 set of 1 billion and 423 sets of 1 million.

   _____

   ② The number that is 20 times of 22 million.

   _____

   ③ The number that is 10 times of 120 million.

   _____

3. Calculate the following expressions.

   ① 264 billion + 392 billion

   ② 512 million – 267 million

   ③ 236 thousand × 6

   ④ 96 billion ÷ 3

# Chapter 2 Division
# Chapter 3 Thinking about how to calculate

## 1. Unit Objectives

- To understand division in relation to rules and relationships between mathematical sentences in division (4.1.4 c)
- To use rules of division for easier and exact calculation in division (4.1.5 c and d)

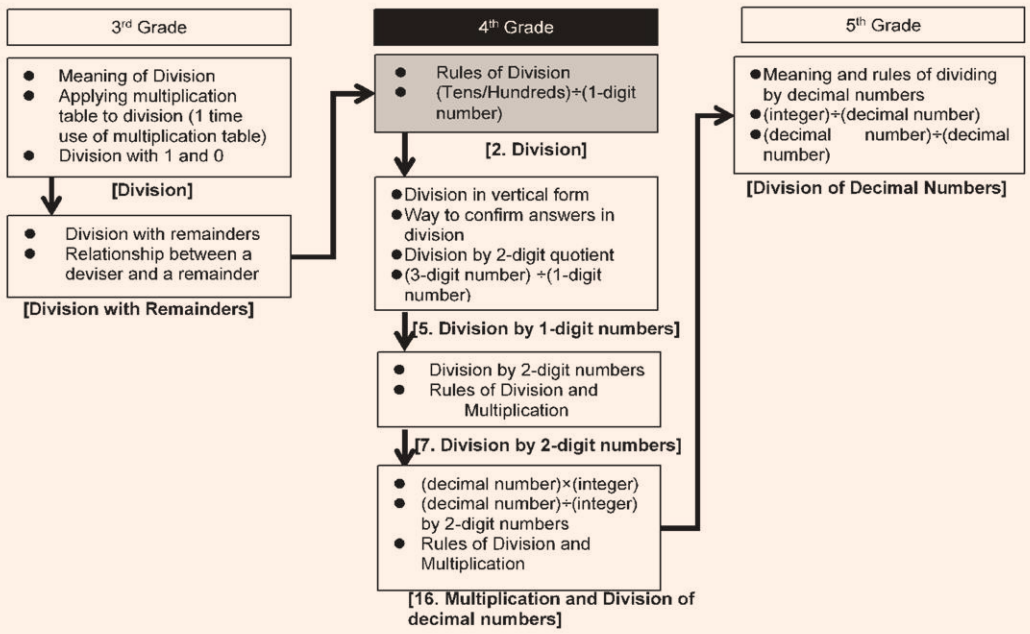
## 2. Teaching Overview

In this unit, students learn properties or rules of division as tools of further learning of division. They should be able to use the properties freely for discovery-learning for division of decimals. Teachers should encourage students to enjoy discovering patterns by utilising properties of division.

**Rules of Division:** Students should think as "**what if** this number is xxx…?" speculatively. Fix dividends or divisors to find the patterns by students' own motive.

**Division of Tens and Hundreds:** They also find what happen if they divide by 10 or hundred as discovery. Picture cards of bunch of 10 or 100 will help students understand.

## 3. Related Learning Contents




# Unit 3: Thinking about How to Calculate

## 1. Unit Objectives

- Understand division in relation to rules and relationships between mathematical sentences in a given situation. (4.1.4 c)
- Use the rules of division for easier and exact calculations in division. (4.1.5 d)

## 2. Teaching Overview

In this unit, students think about how to calculate $48 \div 3$. This division is not solved using multiplication table of one-digit numbers once. Therefore, students are supposed to be encouraged by teachers to develop the attitude to struggle with the unknown questions by utilising their known knowledge.

Corresponding expressions with diagrams will help students think about how to solve it. In addition, students should exchange ideas how they think and tell other students how they think to make the friends understand. Teachers should facilitate the discussion by focusing on the common things of each idea and differences, then summarise the lessons.

# Unit 2

# Unit: Division
## Sub-unit: 1. Rules of Division
## Lesson 1 of 3 (Double Period)

Textbook Page :
p.15~p.16
Actual Lesson 007

## Sub-unit Objectives

- To use the rules and relationships of division and multiplication for easier ways of getting the answer for mathematical sentences in a given situation.

## Lesson Objectives

- To find and apply the rules of division to calculate when the dividends and divisors are the same and the quotient is unknown.
- To recognise and make sense of the given situation using a mathematical expression and relate it to their daily life.

## Preparation

- Flash cards

## Assessment

- Enjoy finding and recognising situations of division and calculating the problem using the mathematical expression. F
- Enjoy applying and calculating using the rules of division in different situations, conditions and questions of the problems given. F
- Understand the rules of division. S

## Prior Knowledge

- Using easier ways of calculation to solve simple division. (Grade 3)
- Calculation using the relationships between division and multiplication. (Grade 3)
- How to find the quotient by using the multiplication table such as 12 ÷ 3. (Grade 3)
- How to calculate when the division is 1-digit number and the dividends is a 2-digit number such as 80 ÷ 4. (Grade 3)
- Rules of Addition and Subtraction. (Grade 3)
- Partitive and quotative division in solving division situations. (Grade 3)

2 Division

### 1 Rules of Division

Find the rules of the division when the divisors are the same.

1 There are 24 lollies. They are divided equally among □ children.
How many lollies will each child receive?

1 Put various numbers into the □ and find the answer.
If lollies are divided among 4 children, how many will each child receive?

① If there are 8 children, how many lollies will each child receive?

② If lollies are divided among 4 children,
24 ÷ 4 = 6

③ If lollies are divided among 8 children,
24 ÷ 8 = 3

□ ÷ □ = 15

2 What rules are there between the divisor and the answer (quotient)?

If the divisor was twice as large, the quotient (answer) will be reduce into half.

3 Check this with some other division problems.

12 ÷ 2 = 6 (× 2) ÷ 2
12 ÷ 4 = 3

12 ÷ 3 = 4 (× 2) ÷ 2
12 ÷ 6 = 2

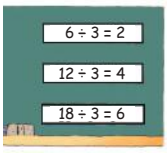
2 Rules of division with the same divisor.

When the divisor is multiplied by a number, the answer (quotient) is divided by the same number.

If there are 6, 12 or 18 lollies and each child receives 3.
How many children can have lollies in each case?

1 Write a mathematical sentence for each of them.

□ ÷ 3 = ○



6 ÷ 3 = 2 (× 2) × 2
12 ÷ 3 = 4

18 ÷ 3 = 6 (÷ 3) ÷ 3
6 ÷ 3 = 2

2 What rules are there for the dividend and the answer (quotient)?
Check this with some other division problem.
If the divisors are the same, the dividends are multiplied or divided by a number □, quotient is given by multiplying or dividing by the same number □.

If the divisors are the same, the dividens are multiplied or divided by the same number, the quotient is given by multiplying or dividing by the same number.

16 = □ × □

## Lesson Flow

### 1 ❶ Read the task.

S Read and understand the situation.

T ❶When shared equally by 4 or 8, how many will each child receive ? Write mathematical sentence.

S 24÷4=6

S 24÷8=3

T When comparing the two mathematical sentence what relationship can be found?

S If the number of children becomes 2 times the number of lollies for each child, the lollies will be reduced into half.

TN Students should use the number of lollies and children.

### 2 ❷ Find the rules of division between the divisor and the answer (quotient).

T Let's find the rules of division.

TN Introduce divisor, dividend and quotient.

S Explain the rule using divisor and quotient.

S If the divisor is twice as large then the answer (quotient) will be reduced by half.

S Check with some other division problems to complete the □ with their answers.

T Introduce the main task.

### 3 ❷ Check the relationship between 6, 12 and 18 when the divisor is 3.

T ❶ Ask students to write the mathematical sentence.

S 6÷3=2, 12÷3=4 and 18÷3=6

S ❷ Check the relationships between the dividend and the quotient to find the rule.

S Check the relationships between the dividend and the quotient to find the rule and complete filling in the □.

T Can you find any new rules?

TN Students should use the terms dividend, divisor and answer to explain their rule.

S Summarise the rule.
Students write down the rules for the dividend and the quotient.

T Confirm the rules and asks the children to read the two rules from the blackboard to summaries the lesson.

### • Teacher's Notes •

There are two rules that will be emphasised in this lesson. Refer to ❷❷

6 ÷ 3 = 2
dividend divisor quotient

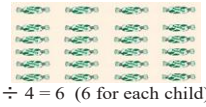
## Sample Blackboard Plan

**Date:** **Chapter: Division** **Topic: Rules of Division** **Lesson: 1 of 3**

Let's find out answers using the rules of division and check answers.

1. There are 24 lollies. They are divided equally among children. How many lollies will each child receive?

❶ a.) If there are 4 children, how many lollies will each child receive?



24 ÷ 4 = 6 (6 for each child)

b.)If there are 8 children, how many lollies will each child receive?

24 ÷ 8 = 3 ( 3 for each child)

❷Let's find the rules of division between the divisor and the answer.

Rule 1: **When the divisor is multiplied by a number, the answer (quotient) is divided. By the same number**

❸ 12÷2=6 → ×2 → 12÷4=3 ÷2

12÷3=4 → ×2 → 12÷6=2 ÷2

MT

2. **There are □ lollies. If each child recieves 3, how many children can have lollies.**

❶ **Write mathematical sentence for each of them.**

□ ÷ 3=○
6 ÷ 3 = 2
12 ÷ 3 = 4
18 ÷ 3 = 6

6 ÷3= 2 → ×2 → 12÷3= 4

18 ÷3= 6 → ÷3 → 6 ÷3=2

❷Rule 2: **If the divisors are the same, the dividends are multiplied or divided by a number □, the quotient is given by multiplying or dividing by the same number □.**

**Summary**
**Finding the Rules of Division with the same divisor.**

**▪When the divisor is two times, the quotient (answer) will be reduced to half.**

**▪When the divisors are the same, the dividends are multiplied or divided by the same number. The quotient is given by multiplying or dividing by the same number.**

# Unit 2

# Unit: Division
## Sub-unit: 1. Rules of Division
## Lesson 2 of 3 (Double Period)

Textbook Page : p.17~p.18
Actual Lesson 008

## Lesson Objectives

- To calculate using the tape diagram to get the image of the given problem to solve divisional problems and relate it to daily life.

## Prior Knowledge

- Rules of division when the divisor is the same. (Previous lesson)
- Rules of division when the dividend is same. (Previous lesson)

## Preparation

- Tape diagrams (Strip of paper) which are equally distributed $\frac{1}{3}$.
- Chart of mathematical sentences in activity 4.

## Assessment

- Apply the rules of division for finding the answer of the division. F
- Enjoy recognising situations of division problems and represent the given situations with the tape diagram. F
- Do the exercise correctly. S

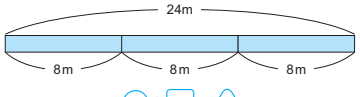
## • Teacher's Notes •

Characteristic of division
In this lesson students will learn following rules of division.
When 'a ÷ b = c' , (a×m) ÷ (b×m) = c,
(a ÷ m) ÷ (b ÷ m) = c.
It means that if dividend and divisor are divided or multiplied by same number, the answer will not change.
When using this characteristic, we can think 350 ÷ 50 is same as 35 ÷ 5.

### Rules of division with the same quotient.

**3** If you cut ☐ m each from ◯ m of tape, you will get exactly 3 tapes.

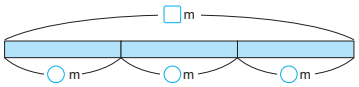
1. There is a 24 m length of tape. If this is cut into parts of 8 m each, how many parts are there?




24 ÷ 8 = 3

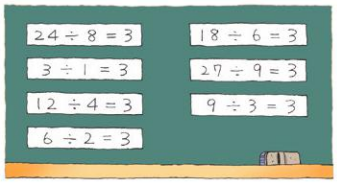
A. 3 parts

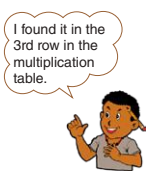
2. Let's write this as a division sentence using the ☐ and the ◯. The length can be less than 27 m.




☐ ÷ ◯ = 3

3. Let's find the correct numbers for the ☐ and the ◯. Are there any rules for the relationship between the mathematical sentences?



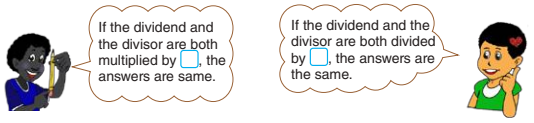




When the quotients are the same, the dividhend is divided by the quotient or the divisor is multiplied by 3.

4. Line up the cards 12 ÷ 4 = 3 and 6 ÷ 2 = 3, and compare.

6 ÷ 2 = 3
×2 ×2
12 ÷ 4 = 3

12 ÷ 4 = 3
÷2 ÷2
6 ÷ 2 = 3




5. Check this with some other division problems.

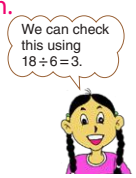
### Checking the rules of division.

9 ÷ 3 = 3
×3 ×3
27 ÷ 9 = 3

6 ÷ 2 = 3
×4 ×4
24 ÷ 8 = 3

9 ÷ 3 = 3
÷3 ÷3
3 ÷ 1 = 3

12 ÷ 4 = 3
÷4 ÷4
3 ÷ 1 = 3




In division, the answers (quotients) are the same if the dividend and divisor are multiplied or divided by the same number.

### Application of the rules of division.

**4** Let's use the rules of division to find the correct numbers for the ☐.

1. 32 ÷ 8 = 8 ÷ 2
2. 14 ÷ 2 = 56 ÷ 8

## Lesson Flow

### 1 ❸ (1) Solve the given task.

T Introduce the main task.

S ❶ Read and understand the given situation on the blackboard.

T Use a tape diagram (Strip of paper) to describe the situation showing the length of tape and the sections it was cut into.

S Discover and write the mathematical expression and the answer for the given activity.

### 2 ❷ Complete mathematical sentences.

T Instruct students to put any number below 27 in the □ and ○ to complete the mathematical expression.

### 3 ❸ Identify rules using various mathematical sentences.

S Present various mathematical sentences.

T Write the mathematical sentences on the paper strips and arrange them in order.

S Realise the numbers (Dividends and divisors) are found in the row 3 in the multiplication table.

TN For this case, the rule is "when the quotients are the same the dividend is divided by the quotient or the divisor is multiplied by 3.

### 4 ❹ Apply the previous situation to other number for generalising.

T Place the chart for activity (4) on the board ask students to complete the activity.

S Fill the numbers in the box and identify the rules while comparing the relationships between mathematical sentences.

### 5 ❺ Apply the rules to division.

S Use the rule of division to check with some other division problems.

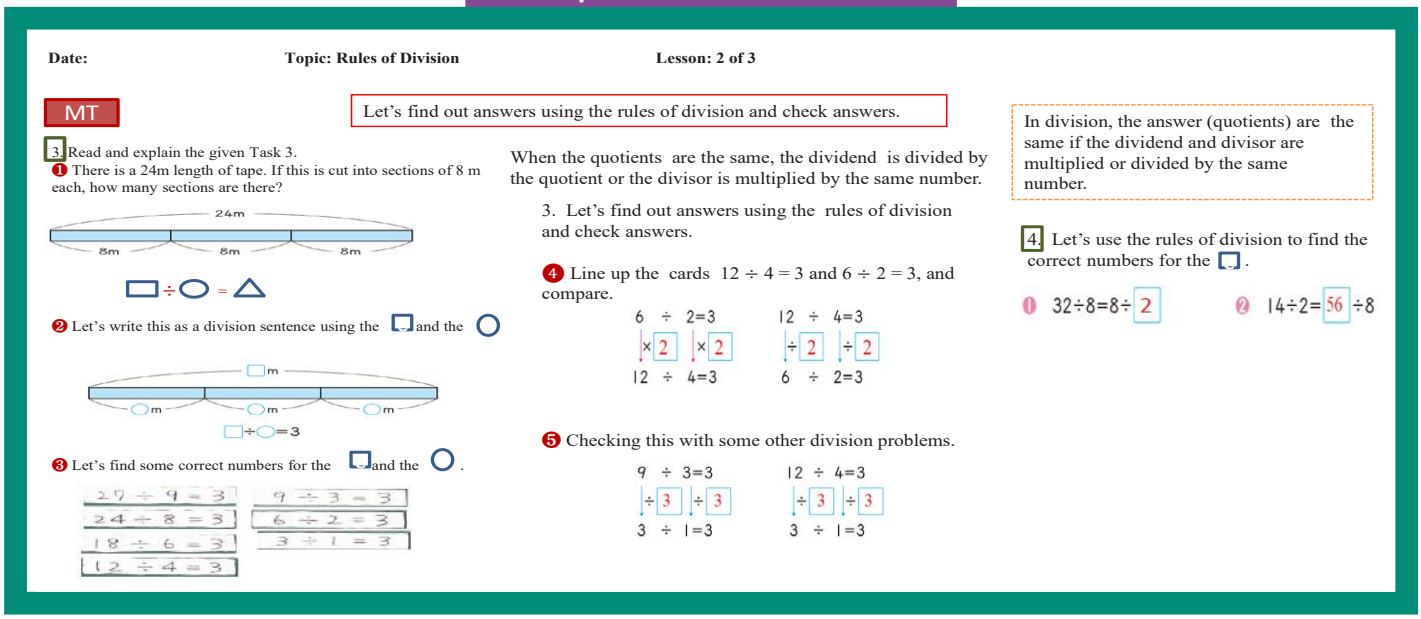
### 6 Important point.

T Explain the important point in the box ⬚.

### 7 ❹ Complete the exercise.

S Complete the exercise.

## Sample Blackboard Plan



# Unit 2

# Unit: Division
## Sub-unit: 1. Rules of Division
### Lesson 3 of 3 (Single Period)

Textbook Page : p.19
Actual Lesson 009

## Lesson Objectives

- To recognise calculation of division with the divisor of hundreds, the problem is calculated by cancelling zeros based on the rules of division.

## Prior Knowledge

- Rules of division with the same quotient. (Previous lesson)
- Rules of division when the divisor is the same.
- Rules of division when the dividend is the same.

## Preparation

- 6 2 on chart

## Assessment

- Apply rules of division using multiplication table to solve division problems. F
- Solve 7 correctly. S

## • Teacher's Notes •

Explain more clearly that when there are situation problems that involve numbers that are big, try to reduce to small numbers so that it would be easier in calculating the problem.

Division using multiplication table.

Let's Use the Rules of Division

5 Steve has 12 bottle tops. Viti has 3 bottle tops.

Steve

Viti

How many times more is Steve's bottle tops compared to Viti? Math expression: 12÷3 Answer : 4 times

6 Ms. John has 1200 kina. Mr. Luke has 300 kina.

How many times more is Ms. John's money compared to Mr. Luke's?

1 Use the picture and find out.

Ms. John

Mr. Luke

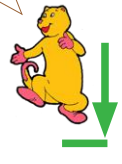
2 Let's fill the correct numbers in the ☐.

1200 ÷ 300 = ☐

÷100 ÷100

12 ÷ 3 = 4

Dividing 1200 by 10 will remove a 0. If you divide it by 10 again it will remove another 0. Which means dividing by 100 will remove two 0s.



7 How many times is 24000 kina compared to 4000 kina.

Math expression: 24000 ÷ 4000

Answer: 6 times

☐ ÷ ☐ = 19

## Lesson Flow

### 1 5 Read and solve the given task.

T Introduce the main task.
S Read and understand the given situation.
S Write a mathematical expression and solve. 12÷3=4.
T How many times more?
TN Confirm the answer by grouping bottle tops and calculation.
S Steve has 4 times more bottle tops than Viti.

### 2 6 Read and solve the given task.

S 1 Read the given situation.
TN Assist students to understand that there are 12 hundred kina in 1200 kina.
S Think about how many times more is Ms. John's compared to Mr. Luke's by grouping the picture of 100 kina notes.
S Ms. John has 4 times more compared to Mr. Luke.

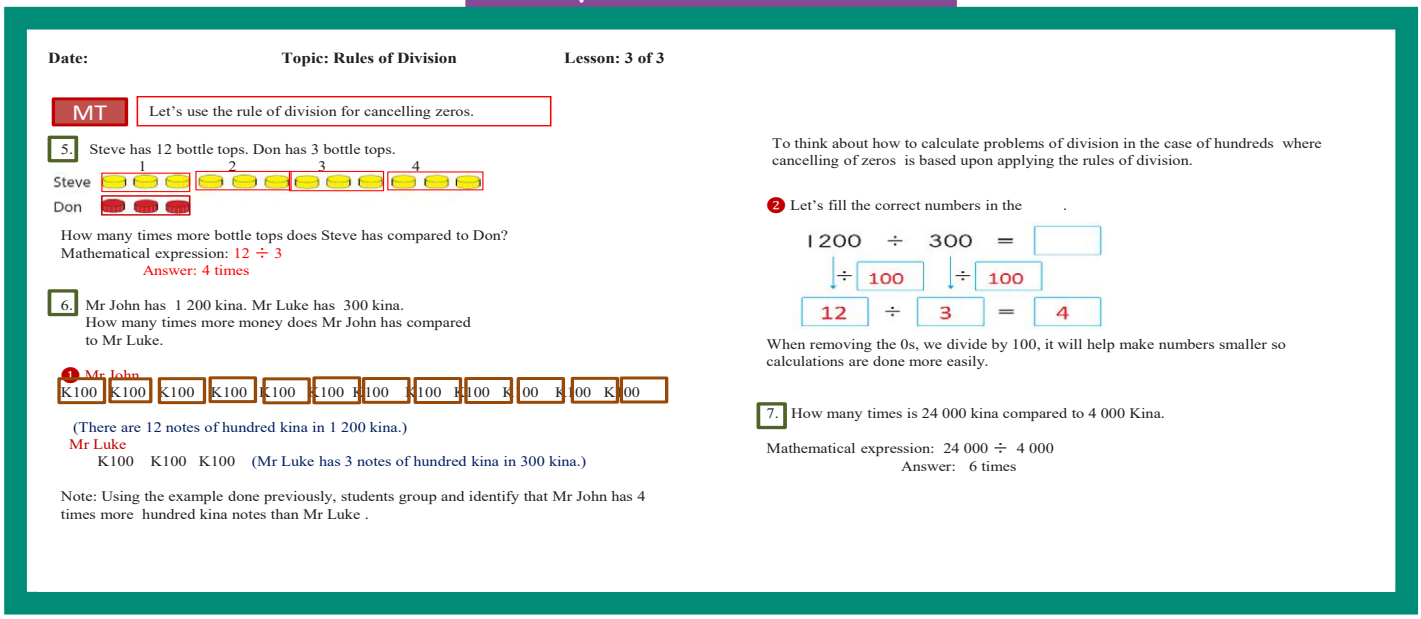
### 3 Apply the rule of division to calculate.

T 2 Place chart on the board and ask stundents to fill in the correct numbers using previous rules of division.
S Complete the problem by putting the missing numbers into the box.
TN If students have difficulty of finding the rule, relate to Kapul's note.
S Present their findings.
T Confirm with explanation of cancelling 0.

### 4 7 Solve the task using the rules of division by cancelling 0.

T How many times is 24 000 kina compared to 4000?
S Write a math expression for the situation and solve by using rules of division.

## Sample Blackboard Plan



# Unit 2

# Unit: Division
## Sub-unit: 2. Division of Tens and Hundreds
## Lesson 1 of 1 (Single Period)

Textbook Page : p.20
Actual Lesson 010

## Sub-unit Objectives

- To understand Tens and Hundreds ÷ by 1-digit number can be calculated as 1-digit number divide by 1-digit number by making a unit of ten and hundred.

## Lesson Objectives

- To understand Tens and Hundreds ÷ by 1-digit number can be calculated as 1-digit number divide by 1-digit number by making a unit of ten and hundred.

## Prior Knowledge

- Meaning of division. (Grade 3)
- Calculation of division 1-digit by 1-digit and 2-digit by 1-digit. (Grade 3)
- Rules of division with the same quotient.
- Rules of division when the divisor is the same.

## Preparation

- Prepare according to Blackboard plan

## Assessment

- Think about how to calculate by grouping in sets of 10s and 100s. F
- Do the exercise correctly. S

### • Teacher's Notes •

- We do not use the coloured papers while introducing the lesson focus on the calculation.
- Use sets instead of groups.
- Students have not yet been introduced to 2-digit by 1-digit in division of vertical form so focuss on the textbook to explain the distribution in groups.

2 Division of Tens and Hundreds

1 If you were to divide 80 coloured papers equally between 2 friends, how many will each friend get?

1 Write a mathematical expression. 80 (Total number of sheets) ÷ 2 (Number of friends)

2 Write a mathematical expression by using groups of 10 sheets.

8 (Total number of sheets) ÷ 2 (Number of friends)

3 How many papers will each friend get? 4 sets of 10 is 40 sheets

2 If you were to divide 800 coloured papers equally between 2 friends, how many will each friend get?

1 Write a mathematical expression. 800 ÷2

2 How many sheets of paper do we need in each group which are represented by the expression 8 ÷ 2? 100 sheets

3 How many will each person receive? 400 sheets

Exercise

Solve the following division by groups of 10 or 100.

① 60 ÷ 2 = 30 ② 80 ÷ 4 = 20 ③ 600 ÷ 2 = 300 ④ 800 ÷ 4 = 200

20 = □ − □

## Lesson Flow

### 1 ❶ Solve the task.

T Introduce the main task.
S ❶ Read and understand the situation.
S Make mathematical expression of 80 ÷ 2.
S Confirm what is dividend (Total number of sheets) and divisor (Number of friends).
S How can we divide equally to two friends?
S It is diffcult to divide one by one or two by two to each friend.
T ❷ Ask students to write an expression by using groups of 10 sheets.
TN When 80 is considered as sets of 10s it is more easier for distribution. The 80 coloured papers are grouped into 10 sheets per group.
S Make the expression 8 ÷ 2 by identifying the number of groups made when 80 coloured papers are grouped into 10 sheets or sets of 10s.
T ❸ How many papers will each friend get?
S 4 sets of 10 is 40 sheets. Each friend receives 40 sheets each.

### 2 ❷ Solve the task.

T ❶ Introduce the situation and ask the students to make mathematical expression.
S Make mathematical expression of 800 ÷ 2
T Confirm what is dividend (Total number of sheets) and divisor (Number of friends).
T How can we divide equally to two friends?
S It is diffcult to divide one by one or two by two to each friend.
T Ask activity ❷ question.
TN When 800 is considered as sets of 100s it is more easier for distribution. The 800 coloured papers are grouped into 100 sheets per group.
S 100 sheets of paper
T ❸ How many papers will each friend get?
S 4 sets of 100 is 400 sheets. Each friend receive 400 papers each.
T Summarise the lesson.
(Calculated as 1-digit number divide by 1-digit number by making a unit of ten and hundred).

### 3 Do the exercise.

T Check students work to assess their understanding.

## Sample Blackboard Plan

**Date:** **Topic: Rules of Division** **Lesson: 3 of 3**

Let's use the rule of division for cancelling zeros with Division of Tens and Hundreds.

MT

1. If you were to divide 80 coloured papers equally between 2 friends, how many will each person get?

❶ Write a mathematical expression: 80 ÷ 2

Total number of sheets — Number of friends

❷ Using groups of 10.

80 ÷ 2 = 40
÷10 ÷ 10
8 ÷ 2 = 4

4 sets of 10 sheets is 40 sheets.

❸How many will each friend receive?
40 sheets each

2. If you were to divide 800 coloured papers equally between 2 friends, how many will each person get?

❶ Write a mathematical expression: 800 ÷ 2

Total number of sheets — Number of friends

❷ Using groups of 100.

800 ÷ 2 = 400
÷100 ÷ 100
8 ÷ 2 = 4

Answer: 4 sets of 100 sheets is 400 sheets.

❸How many will each friend receive?
Each person will get 400 sheets each.
Summary
For easier calculation in division of tens and hundreds we use rules of division.

800 ÷ 2 = 400
x 10 x 10
80 ÷ 2 = 40
÷ 10 ÷ 10
8 ÷ 2 = 4

# Unit 2

# Unit: Division
## Sub-unit: Exercise and Evaluation
## Lesson 1 of 1 lessons (Double Period)

Textbook Page : p.21
Actual Lesson 011

## Lesson Objectives

- To review what the students learned in the unit.

## Prior Knowledge

- All the contents of the unit

## Preparation

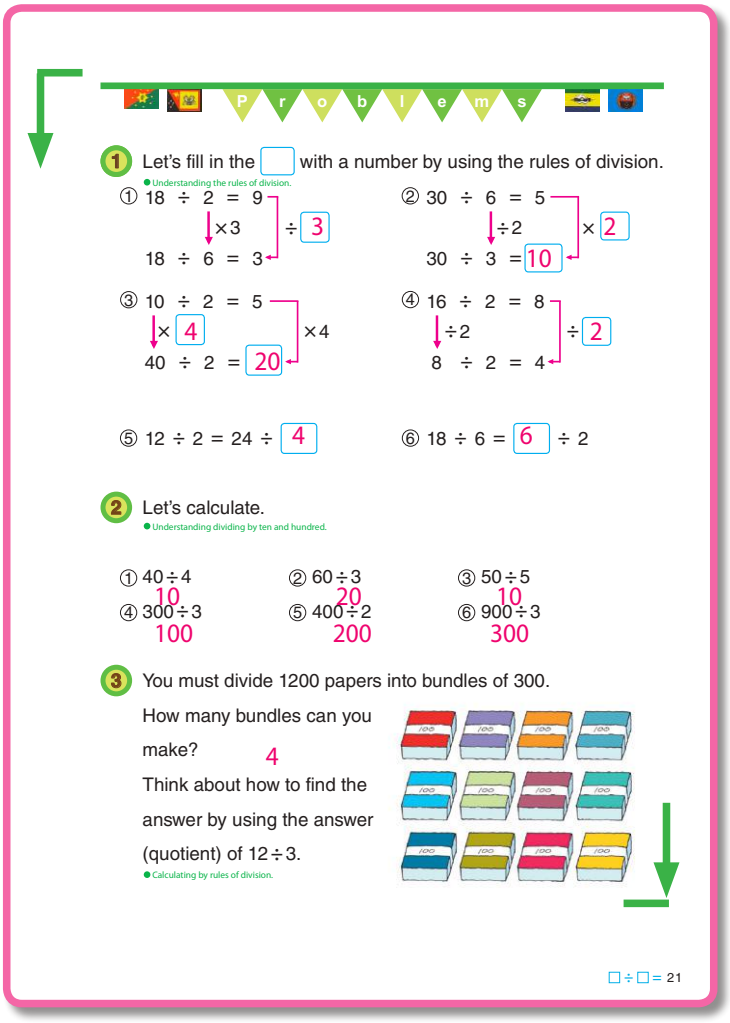
- A4 copy papers, Evaluation sheets

## Assessment

- Solve problems confirming what students learned in the unit. F
- Solve problems correctly. S

### • Teacher's Notes •

Use 30 minutes for the exercise and give the evaluation test after that.



Problems

1 Let's fill in the ☐ with a number by using the rules of division.
● Understanding the rules of division.

① 18 ÷ 2 = 9 (×3) ÷ 3
18 ÷ 6 = 3

② 30 ÷ 6 = 5 (÷2) × 2
30 ÷ 3 = 10

③ 10 ÷ 2 = 5 (× 4) ×4
40 ÷ 2 = 20

④ 16 ÷ 2 = 8 (÷2) ÷ 2
8 ÷ 2 = 4

⑤ 12 ÷ 2 = 24 ÷ 4

⑥ 18 ÷ 6 = 6 ÷ 2

2 Let's calculate.
● Understanding dividing by ten and hundred.

① 40÷4 10
② 60÷3 20
③ 50÷5 10
④ 300÷3 100
⑤ 400÷2 200
⑥ 900÷3 300

3 You must divide 1200 papers into bundles of 300.
How many bundles can you make? 4
Think about how to find the answer by using the answer (quotient) of 12÷3.
● Calculating by rules of division.

## Lesson Flow

### 1 ① Fill in the □ with numbers by using the rules of division.

S Identify relationships between two mathematical sentences and apply rule of division in the problems.

T Check individual work. Is an individual able to understand and apply the rule of division correctly?

### 2 ② Calculate problems ① - ⑥ by dividing by ten and hundred.

S Apply the rules of division to divide by ten and hundred.

T Check individual work. Is an individual able to understand and apply the rule of division correctly to divide by ten and hundred?

### 3 ③ Calculate problem ③ by rules of division.

S Calculate using the rule of elimination of two zeros in dividing by 100.

T Check individual work. Is an individual able to understand and apply the rule of division to divide by rules of division and elimination of two zeros when dividing by 100?

$1200 \div 300$
$= (1200 \div 100) \div (300 \div 100)$
$= 12 \div 3$
$= 4$

### 4 Solve problems in the evaluation sheet.

T Distribute the evaluation paper to each student.

S Complete the evaluation.

| Division | Name: | Score |
|---|---|---|
| | | |

(Each question is worth 5 points)

1. Fill in the blanks.

① $20 \div 5 = 4$ → × 2 → $40 \div 5 =$ 8 → × 2

② $36 \div 9 = 4$ → ÷ 2 → $18 \div 9 =$ 2 → ÷ 2

③ $40 \div 8 =$ 20 $\div 4 = 10 \div$ 2

④ $24 \div 6 = 12 \div$ 3 $=$ 8 $\div 2$

2. Solve the following division.

① $60 \div 2 =$ 30 ② $500 \div 5 =$ 100 ③ $300 \div 5 =$ 60

④ $200 \div 4 =$ 50 ⑤ $560 \div 7 =$ 80 ⑥ $7200 \div 9 =$ 800

3. There are 400 coloured papers.

If you distribute 2 papers per person, how many people can receive?

Math expression: 400 ÷ 2 = 200 Answer: 200 people

If you distribute 5 papers per person, how many people can receive?

Math expression: 400 ÷ 5 = 80 Answer: 80 people

# Unit 3

# Unit: Thinking about How to Calculate
## Sub-unit: 1. Rules of Division
## Lesson 1 of 2 (Double Period)

Textbook Page : p.23~p.24
Actual Lesson 012

## Sub-unit Objectives

- To understand the necessity of division and apply different ways to calculate correctly.

## Lesson Objectives

- To recognise a given situation and think of different ways to calculate your answers using figures and mathematical expressions.

## Prior Knowledge

- Multiplication table
- Meaning and calculation of division.
- Rules of division (Previous unit)

## Preparation

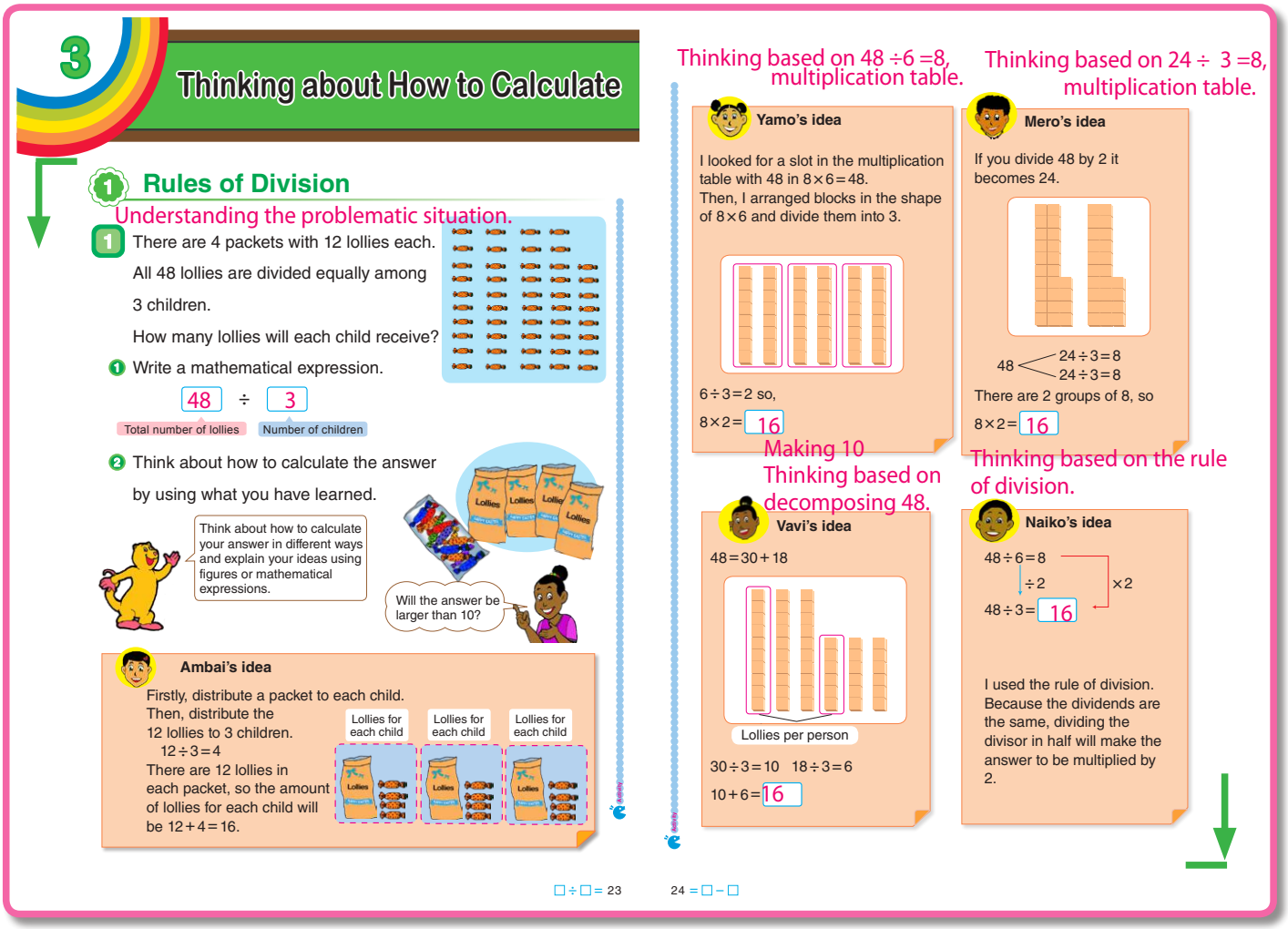
- Pictures of lollies

## Assessment

- Think about how to solve the task using different ways. F
- Calculate division problems using different ways. S

### • Teacher's Notes •

Appreciate students ideas to the ones in the textbook.



## Lesson Flow

### 1 ① Read and understand the given situation.

T Introduce the main task.

S ①Read and understand the situation and make mathematical expression.

T ② Think about how to calculate the answer by using what you have learnt.

S Express ideas on how 48 lollies would be divided equally among 3 children.

### 2 Think about various ways of sharing 48 lollies among 3 children.

TN You may use the students' ideas in class and relate to the ideas in the textbook.

T Yamo's idea was thinking based on the multiplication table.

TN In this idea the student thought of how table of 6 was a useful way for easier calculation. In this case 48 lollies should be shared among the 3 children equally. When she looks for a slot in the multiplication table she noticed that with 48 is $8 \times 6 = 48$. Then, she arranged blocks in the shape of $8 \times 6$ and divided them into 3. When $6 \div 3 = 2$ so, $8 \times 2 = 16$ lollies each.

T Mero's idea was thinking based also on the multiplication table.

TN In this explanation also the thinking was based on the multiplication table of 12. In that manner when you divide $48 \div 2$ the answer will become 24. So, 48 is $24 \div 3 = 8$ and another $24 \div 3 = 8$. Now, there are two groups of 8, so $8 \times 2 = 16$ lollies each.

T Vavi's idea was thinking based on decomposing 48.

TN 48 lollies were shared as 30 and 18 respectively and then further decomposing 30 and 18. Where 30 are divided by 3 to get 10 and 18 is divided by 3 to get 6. So each three person receives 16 lollies each.

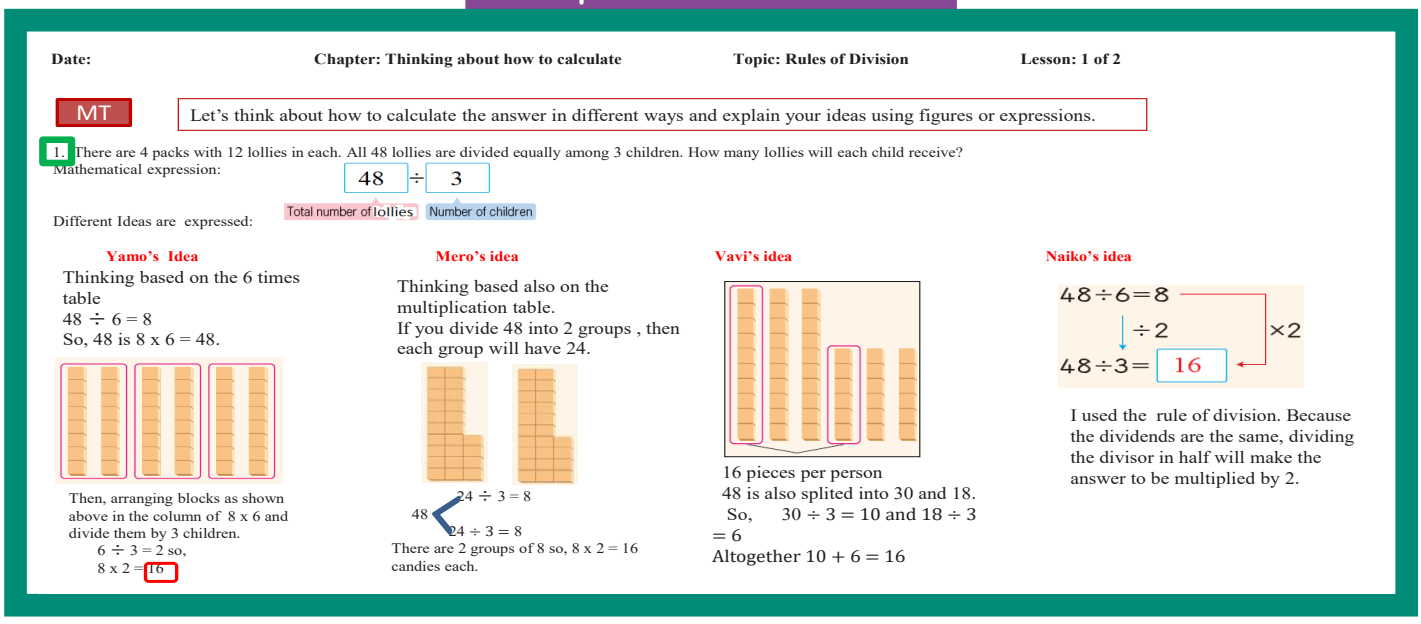
T Naiko's idea was thinking was based on the rule of division for easier calculation of $48 \div 3$.

TN From the explanation that this student had was different where his thinking was based on the rule of division for easier calculation on how best 48 lollies can be shared equally among 3 children. If the dividends are the same, the divisor should be divided into half and so the quotient is then multiplied by 2.

### 3 Summary

T There are various ways of calculating division problems.

## Sample Blackboard Plan



# Unit 3

# Unit: Thinking about How to Calculate
## Sub-unit: 1. Rules of Division
## Lesson 2 of 2 (Double Period)

Textbook Page : P.25
Actual Lesson 013

## Lesson Objectives

- To appreciate and apply different ways of calculations based on 56 ÷ 4 and write a report.

## Prior Knowledge

- Division of Tens and Hundreds
- Rules of division

## Preparation

- Papers, markers for making poster

## Assessment

- Evaluate the understanding, knowledge and express through report writing. F
- Explain the calculation of 56 ÷ 4. S

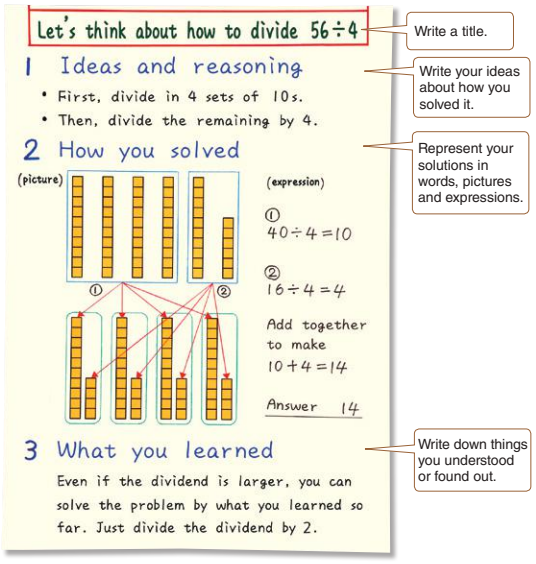
### • Teacher's Notes •

Emphasise to the students to use this format of report writing for an effective presentation in class.

Application of way of calculations based on 56 ÷ 4 and dividing 56 into 2.

2 Let's think about how to calculate 56 ÷ 4.
Let's Report after exploring.
Explain your findings to your classmates in the following.

- How did you explore? Methods and Ideas.
- What did you understand? Explain with examples.
- What did you find? Write down the pattern.




□ ÷ □ = 25

## Lesson Flow

### 1 2 Look at the sample presentation of how to calculate 56 ÷ 4.

T Introduce the main task.
S Explore and identify the ideas and methods used in the sample presentation of 56 ÷ 4.
T Explain the layout of report writing to the class.
S Use the sample layout of the report and do own report in groups.

### 2 Think and use their own idea, method and expression to calculate 56 ÷ 4.

S Reflect and use previous knowledge from the former lesson (Lesson 1) on different ways to calculate 48 ÷ 3 to come up with ideas, method and expression to calculate 56 ÷ 4.
S Use their own idea, method and expression to write the calculation on 56 ÷ 4 in their notebook.

### 3 Present and share their work with others.

S Present work in pairs or groups for the others to explore and identify the method, idea and expression.
T Confirm the calculation 56 ÷ 4 = 14.

## Sample Blackboard Plan

**Date:** **Topic: Rules of Division** **Lesson: 2 of 3**

MT Let's think about how to write a Report for Explanation 56 ÷ 4.

2. Let's think about how to calculate 56 ÷ 4.

**Write a Title**

Let's think about how to calculate 56 ÷ 4.

**1. Ideas and reasoning.**

•Write your own ideas about how you solved it.

**2. How you solved**

Represent your solutions in words, pictures and expressions.

**3.What you learned**

Write down things you understood and found.

**PRACTICE EXERCISE**

1. Use the sample layout and write up a **Report for Explanation** on how to calculate current activity on 56 ÷ 4.

**SUMMARY**

**Children will write their own summary as in the layout "3 What you learned".**

**Sample:**

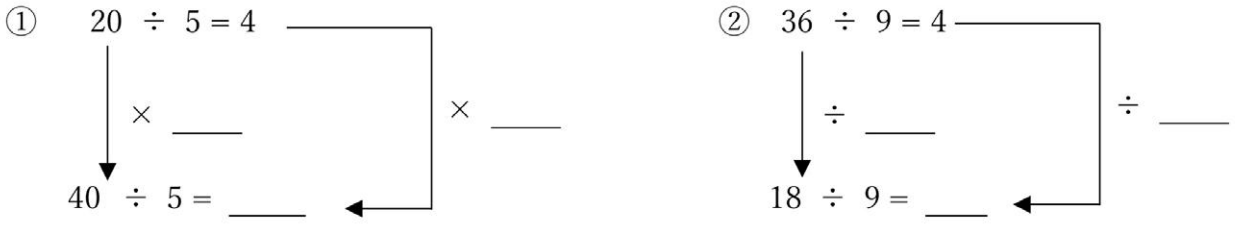
Even if the dividend is larger, you can solve the problem by what you learned so far. Just divide the dividend by 2.

**End of Chapter Test: Chapter 2&3** **Date:**

| Division | Name: | Score |
|---|---|---|
| | | |

(Each question is worth 5 points)

1. Fill in the blanks.




③ 40 ÷ 8 = _____ ÷ 4 = 10 ÷ _____

④ 24 ÷ 6 = 12 ÷ _____ = _____ ÷ 2

2. Solve the following division.

① 60 ÷ 2 = ② 500 ÷ 5 = ③ 300 ÷ 5 =

④ 200 ÷ 4 = ⑤ 560 ÷ 7 = ⑥ 7200 ÷ 9 =

3. There are 400 coloured papers.

If you distribute 2 papers per person, how many people can receive?

Math expression: _____ Answer: _____

If you distribute 5 papers per person, how many people can receive?

Math expression: _____ Answer: _____

# Chapter 4 Angles

## 1. Unit Objectives

- To understand the meaning of unit and measurements of angle and measure angles.(4.2.4 a,b,c and d)
- To capture the size of an angle as the size of the rotation or turn. (4.2.4 a)
- To know the unit of measurement of angle (degree [ o] ) (4.2.4 b)

## 2. Teaching Overview

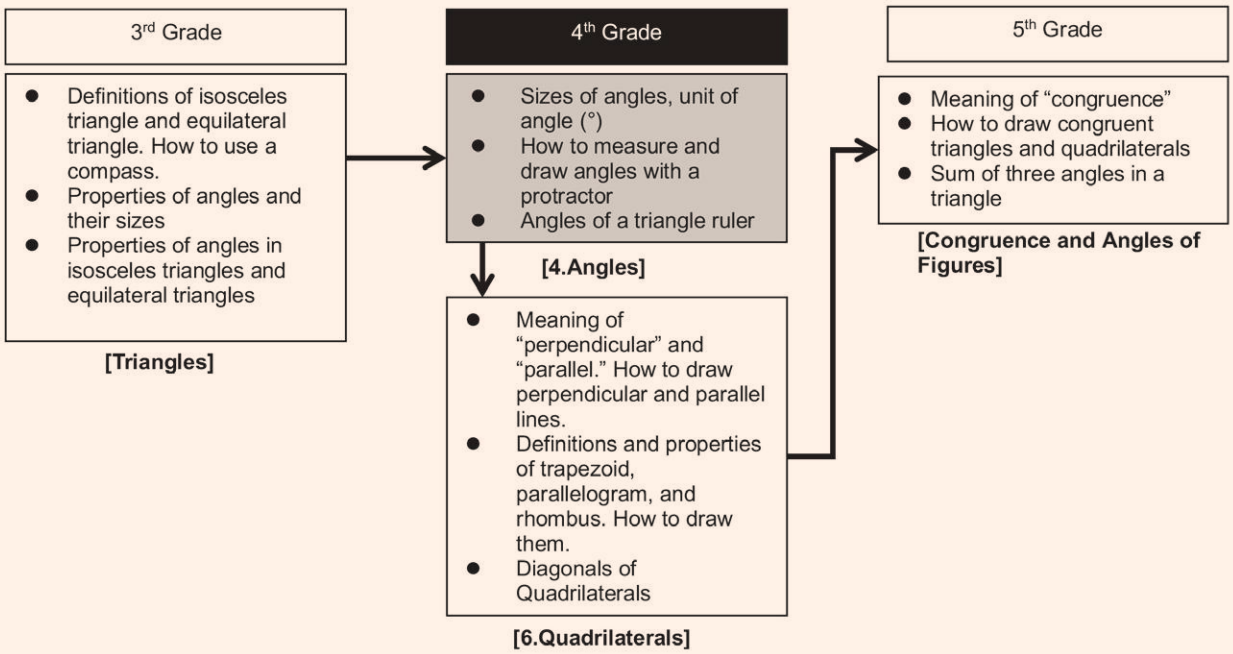
Students learn sizes of angles by overlapping 2 papers of angles (direct comparison) in Grade 3. In this topic, their concept of angles will be expanded by introducing a universal unit, degree, as openness or size of rotation of 2 intersecting lines.

**Size of Angles :** Students will learn 1 degree here and know that right angle is equivalent to 90 degrees. They also learn that size of angles is a quantity. They also understand angle of half-rotation and angle of full-rotation by manipulations. Protractors are introduced here. Students are supposed to master measuring angles and drawing specified angles in this topic.

**Angles of Triangle Rulers :** Students are supposed to get used to calculate angles made by overlapping set squares / triangular rulers here. They should memorise all angles of set squares since these triangles are special and will be utilised in the learning of trigonometric functions (sin, cos, tan)

.

## 3. Related Learning Contents



# Unit 4

# Unit: Angles
## Sub-unit: 1. The Sizes of the Angles
## Lesson 1 of 4 (Double Period)

Textbook Page : p.26~p.28
Actual Lesson 014

## Sub-unit Objectives

- To understand and see angles as rotations or turns and the meaning of measuring angles.
- To compare size of angles and know the unit for measuring angles (degree°).
- To understand and know how to use the protractor to measure size of angles.

## Lesson Objectives

- To compare the size of angles and arrange them in order of sizes.
- To use set squares for indirect comparison.

## Prior Knowledge

- Right angles. (Grade 2)
- The amount of opening between both sides of angle is called size of the angle. (Grade 3)
- Tracing sizes of angles to make comparison and arranged them in order of size of angle. (Grade 3)
- Drawing isosceles and equilateral triangles and comparision of the sizes of the angles respectively.

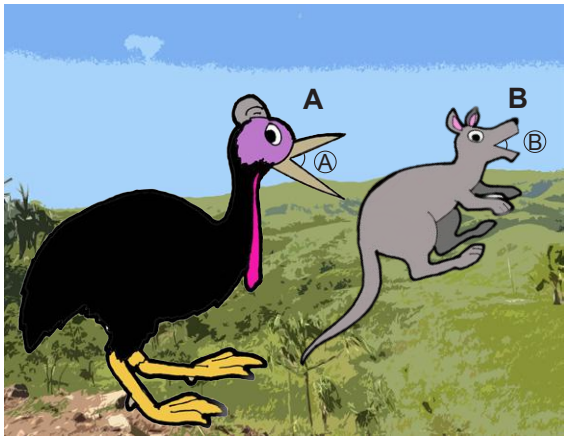
## Preparation

- Triangle ruler, Tracing paper (copy paper)

## Assessment

- Use prior knowledge to measure and compare sizes of the angles. F
- Use the two ideas to measure and compare sizes of the angles. F
- Understand the definition of angle S

4 Angles




### 1 The Sizes of the Angles

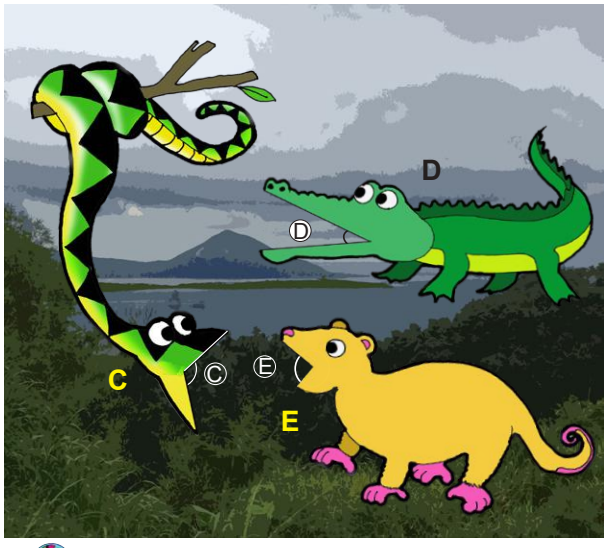
1 Look at the open mouth of the animal from A ~ E.

1 Which animal has opened its mouth the widest? C

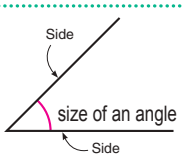
2 Which animal has opened its mouth the narrowest? D

How can we compare?

For teacher's information only
A Cassowary 100°, B Magani 50°,
C Snake 140°, D Crocodile 25°,
E Kapul 70°




The amount of space formed by rotating one side of a line from another side is called the **size of an angle**.




Name the above animals in order from small to big angles of their open mouth.

Let's think about how to compare?

D, B ,A, E, C

Let's investigate how to measure and construct an angle.

## Lesson Flow

### 1 (1) Look at the open mouths of the animals from A-E and compare how wide they opened their mouths.

T Advice students to use their prior knowledge through direct or indirect comparison, using set squares or tracing angle to compare how wide the animals opened their mouths as the size of the angles to share with others.

S Answer activitiy (1) and (2).

### 2 Important point.

T Explain the important point in the [ ].

S Use the definition and prior knowledge to make comparison of the angle size of the animals from smallest to largest.

### 3 Use the two ideas to measure and compare the size of the angles.

T Introduce the main task.

S Read the main task and discuss their ideas and present.

T Explain the two ideas.

S Use the two ideas one at a time to measure and compare the sizes of the angles A - E.

TN Make sure that students understand the two ideas and perform one idea at a time for all the animals A - E.

T Inform students that the size of an angle is determined by the amount of space between sides and not the lengths of the sides.

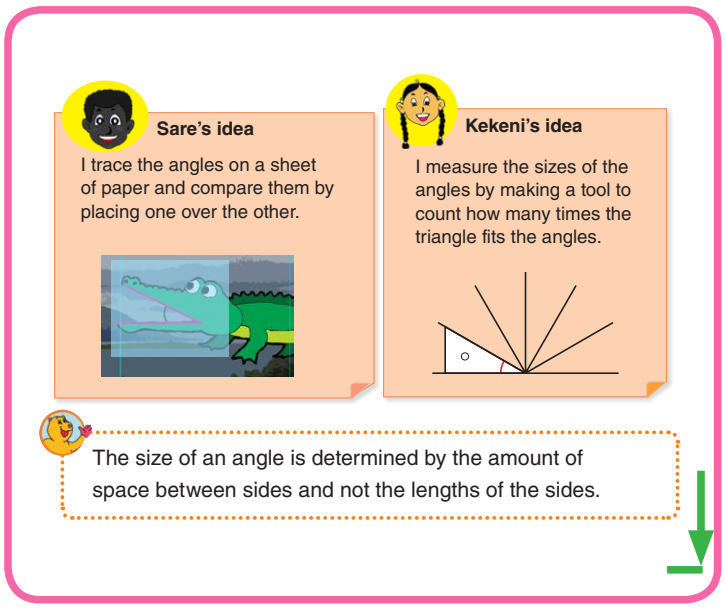
### 4 Important point.

TS Read and explain the important point in the [ ].

### • Teacher's Notes •

'Sizes of the Angles'
Although sizes of the angles are only determined by the amount of space between two sides and not the lengths of the sides, students might get confused by lengths of sides. So, it is important to emphasise that "angles will not change even if lengths of sides change like this", by having students compare enlarged pictures of the animals and the animals in the textbook.

'Development of Meaning of Angles'
Students might have captured angles as "shapes which straight lines make" up to now. In this unit, it's important to understand angles as "quantities which have sizes."




### Sample Blackboard Plan

Refer to Page 39.

# Unit 4: Unit: Angles

## Sub-unit: 1. The Sizes of the Angles

## Lesson 2 of 4 (Double Period)

Textbook Page : p.28~p.29
Actual Lesson 015

## Lesson Objectives

- Investigate and identify that the size of the angles are made by rotation.
- Identify how to express the size of angles in degree (°).
- Enjoy reading accurate sizes of angles with protractor.

## Prior Knowledge

- Definition of size of angle (Previous lesson)

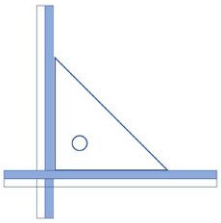
## Preparation

- Protractors, Cardboard bars

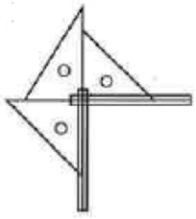
## Assessment

- Create different angle sizes by rotation with cardboard bars. F
- Understand the angles with 1 right angle, 2 right angles, 3 right angles and 4 right angles with their angle sizes respectively. S

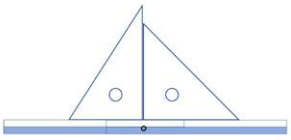
## • Teacher's Notes •



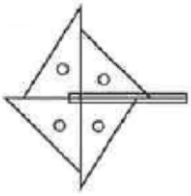
1 Right Angle - 90°



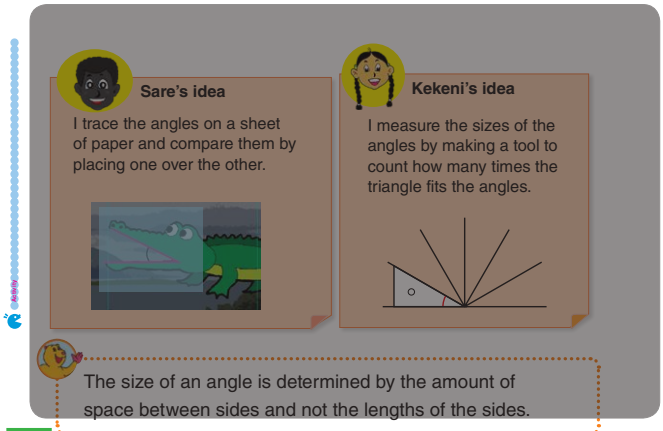
3 right Angles - 270°



2 Right Angles - Angle of half a revolution - 180°



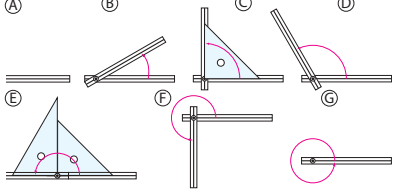
4 Right Angles - Angle of one revolution- 360°




The size of an angle is determined by the amount of space between sides and not the lengths of the sides.

### The size of the angles made by rotation

2 Move the cardboard bars as shown on the right and make different angles.



The size of angle Ⓔ is **2 right angles**.

Which angles have 1 right angle, 2 right angles, 3 right angles and 4 right angles?

C E F G

**4 right angles** are called **"angle of one revolution"** and **2 right angles** are called **"angle of a half revolution"**.

### How to Express the Size of Angles

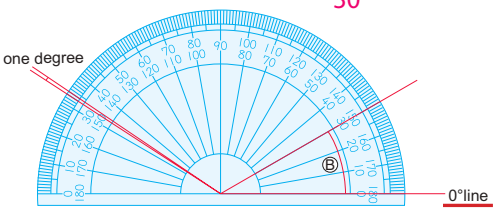
There is a unit to express the size of angles more clearly.

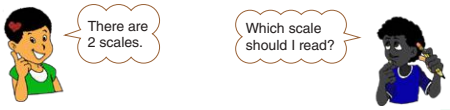
**Degree** is a unit to express the size of angles. The angle of one revolution is divided into 360 parts. The size of one part is one degree and is written as 1°.

### How to measure size of angles using protractor.

3 A **Protractor** is used to measure the size of angles more accurately.

1 How many degrees is angle Ⓑ in 1? 30°




2 How many degrees are in angles Ⓒ, Ⓓ, Ⓔ, Ⓕ and Ⓖ in 2?

Find the degree by applying the knowlege of 1 right angle = 90° C: 90° E: 180° F:270° G: 360°

1 right angle = 90° , 4 right angles = 360°

The size of an angle is simply called the **angle**.

28 = □ × □

□ ÷ □ = 29

## Lesson Flow

### 1 ❷ Move the cardboard bars and make different angles A - G.

T Introduce the main task.

T Let students move the cardboard bars to make angles A-G and find out what happens to the angle if they move one bar.

S Realise that the angles become larger.

### 2 Look at angle E and say what the size is.

S Look at angle E and make their discovery sentence from the learned knowledge of a right angle.

T Which angles are 1 right angle, 2 right angles, 3 right angles and 4 right angles?

S Find out and write which angles are right angles, 2 right angles, 3 and 4 right angles.

T Let students know that 4 right angles are called "angle of one revolution" and 2 right angles are called "angle of half a revolution."

### 3 Important point.

T Explaining the important point in the box .

### 4 ❸ Read the angles.

T Ask students to observe a protractor and discuss what they can see.

S Answer question ❶ observing the diagram in the textbook.

T Assist the students on how to read the angle.

### 5 Answer question ❷ using the given clue 1 right angle = 90°, 4 right angles = 360°

S Students write the angle size in degrees for C, D, E, F and G by using the above hint.

### 6 Know 1 right angle = 90°, 4 right angles = 360°

T Help students to understand and know the important points; 1 right angle = 90°, 4 right angles = 360° and the size of an angle is simply called the angle.

### 7 Important point.

S Read the important point in the .

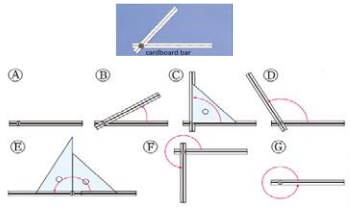
## Sample Blackboard Plan

**Date:**
**Chapter:** 4 Angles.
**Topic:** The sizes of the Angles. **Lesson No:** 2/4

**Main Task: Let's think about how to construct and express the size of angles.**

MT: Introduce the main task here.

[2] Move the cardboard bars and make different angles.




What happens to the angles if one bar is moved?
The angles become larger.

The size of angle E is 2 right angles.

Which angles are
a) 1 Right Angle? Answer: Angle C
b) 2 Right Angles? Answer: Angle E
c) 3 Right Angles? Answer: Angle F
d) 4 Right Angles? Answer: Angle G

4 Right Angles are called angle of one revolution.
2 Right Angles are called angle of a half revolution

**Important Point.**

**Degree** is a unit to express the size of angles. The angle of one revolution is divided into 360 parts. The size of one part is one degree and is written as 1°.

[3] A **protractor** is used to measure the size of angle more accurately.
❶ How many degree is angle Ⓑ in [1] ? Answer: Angle B 30°.

❷ How many degrees are in angles Ⓒ,Ⓓ,Ⓔ, Ⓕ and Ⓖ in [2]?
Answer: Angle C 90°
Answer: Angle E 180°
Answer: Angle F 270°
Answer: Angle G 360°

1 right angle = 90°, 4 right angles = 360°

**Important Point.**

The size of an angle is simply called the angle.

**SUMMARY**
Students can recap what they have learnt.

# Unit 4

# Unit: Angles
## Sub-unit: 1. The Sizes of the Angles
## Lesson 3 of 4 (Double Period)

Textbook Page : p.30~p.31
Actual Lesson 016

## Lesson Objectives

- To identify and know how to use a protractor in measuring angles.
- To enjoy measuring sizes of angles correctly using a protractor.
- To find ways to measure angles that are larger than 180°.

## Prior Knowledge

- How to express the size of angle.

## Preparation

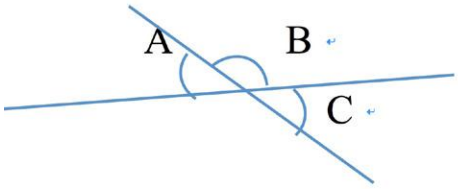
- Protractors

## Assessment

- Enjoy measuring angles which are less or more than 180° using protractors. F
- Understand how to use protoractor and measure angle correctly. S

## • Teacher's Notes •

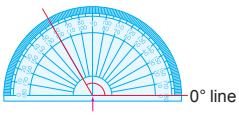
1. Two intersecting lines at 90° create 4 angles where 2 right angles is 180° and 4 right angles is 360°. Therefore;




- The sum of angle A and angle B is 180°. Since angle A is given minus it from 180° to get the angle size of B.
- Angles A and C are alternate interior angles that have the same angle size. Use the angle size of B identified in question 1 to subtract it from 180° to get angle size of C. (180° - angle B) the angle size of C will be the same as angle A.

### How to Use a Protractor

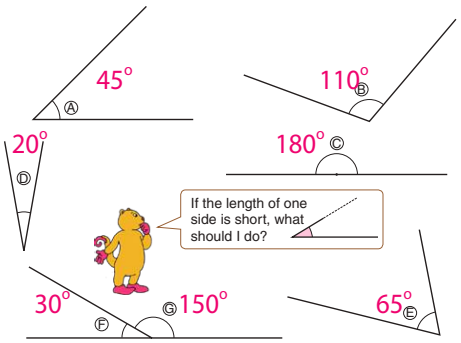
① Put the centre of the protractor over the vertex of the angle.
② Put the 0° line over one side of the angle.
③ Read the scale that is over the other side of the angle.




**Vertex of the angle is the centre of the protractor.**

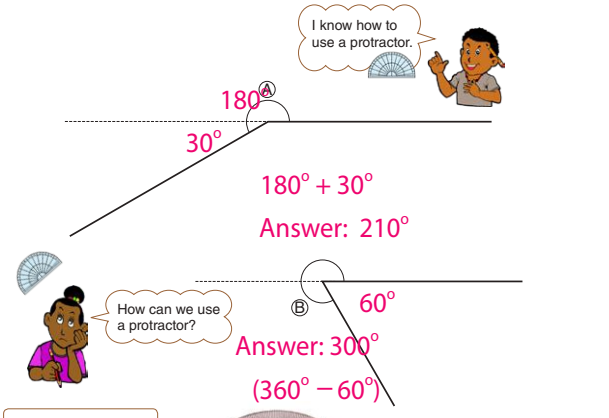
### 4 Measuring Angles

Measure the following angles.



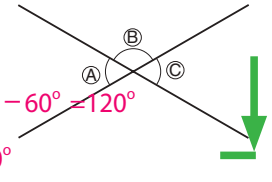
### How to measure angles which is greater than 2 right angle.

5 Let's find a way to measure angles that are larger than 180°.




### The feature of the angles with 2 lines intersecting

6 The figure on the right shows 2 intersecting lines.




1. Angle Ⓐ is 60° . How many degrees is angle Ⓑ ? 180° − 60° = 120°
2. Compare angles Ⓐ and Ⓒ .

A 180° − B (120°) = 60°
C 180° − B (120°) = 60°

30 = □ × □

□ ÷ □ = 31

## Lesson Flow

### 1 Know how to use a protractor using the three steps.

T Introduce the main task.

T Demonstrates how to use a protractor to measure angles using the description of the 3 steps given.

S Use the 3 steps and measure with a protractor the opening of the mouth for animal B to get the angle measurement as 50 degrees.

### 2 4 Measure angle sizes A-G with the protractor using the 3 steps.

S Measure angle sizes A-G with a protractor and write the angle size for each.

T Make sure that the 3 steps of using a protractor is used correctly and check their work.

T Let the students take into consideration the important point on what to do if the length of one side is short. They will have to draw and extend the length of the shorter side.

TN Figures in the textbook are too small to measure using by protractor so let students extend lines before measuring.

### 3 5 Find a way to measure angles that is larger than 180°.

T Let's measure the angles that is larger than 180°.

S Demonstrate and explain how to measure angles A & B respectively to promote their understanding.

TN Link between students demonstration and explanation to angle A that 180° is 2 right angles as shown. Find the other angle size and add with 180° to get the total angle. For angle B, measure the angle size then minus it from 360° to get the total angle size.

S Know the important point that by using a 360° protractor they can measure an angle in one measurement.

### 4 6 Use the figure with 2 intersecting lines to answer questions 1 and 2.

T Let students know that intersecting line are lines that crosses at exactly one point or meet.

TN 1 Let students use their understanding of 180° for angles A and B add to give the total angle sum of 180°.

TN 2 Comparison can be done or using the understanding of 180° again for angle size B and C will add to give total angle sum of 180° where they will find the angle size for C is the same size as angle A.

S Find the angles respectively.

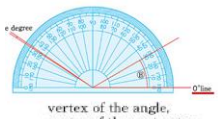
## Sample Blackboard Plan

**Date:**
**Chapter:** 4 Angles.
**Topic:** The sizes of the Angles. **Lesson No:** 3/4

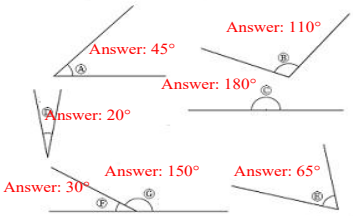
**Main Task: Let's think about how to use the protractor to measure the sizes of angles correctly.**

MT: Introduce the main task here.

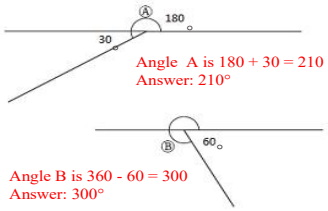
(1) Put the center of the protractor over the vertex of the angle.
(2) Put the 0° line over one side of the angle.
(3) Read the scale that is over the other side of the angle.




[4] Measure the following angles using a protractor.



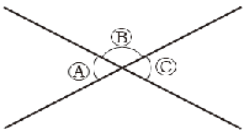

[5] Measuring angles that are larger than 180°.




Angle A is 180 + 30 = 210
Answer: 210°

Angle B is 360 - 60 = 300
Answer: 300°

[6] The figure shows 2 intersecting lines.




❶ Angle Ⓐ is 60. How many degree is Ⓑ?

180 - 60 = 120 Answer : angle Ⓑ is 120°

❷ Compare angles Ⓐ and Ⓒ
Ⓐ = 180 - Ⓑ 120 = 60 Answer: angle Ⓐ is 60°
Ⓒ = 180 - Ⓑ 120 = 60 Answer: angle Ⓒ is 60°

Angles Ⓐ and Ⓒ are same in angle size.

# Unit 4

# Unit: Angles
## Sub-unit: 1. The Sizes of the Angles
## Lesson 4 of 4 (Double Period)

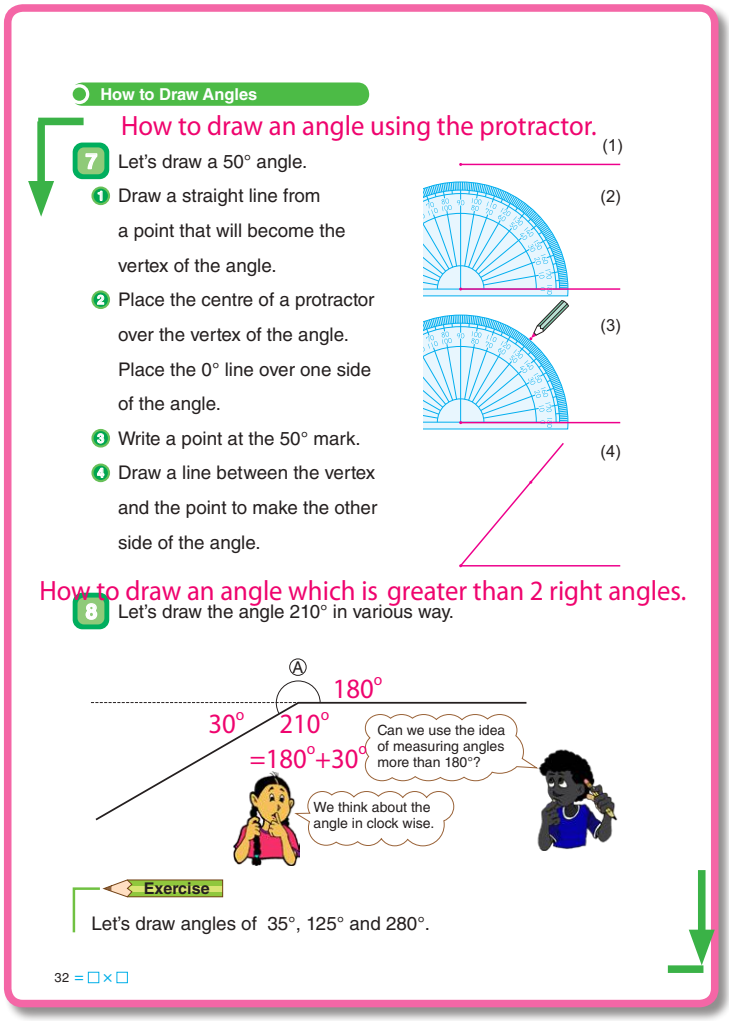
Textbook Page : p.32
Actual Lesson 017

## Lesson Objectives
- To draw different angle sizes using the protractor.

## Prior Knowledge
- Measuring angles using protractor (Previous lesson)

## Preparation
- Protractors, Rulers

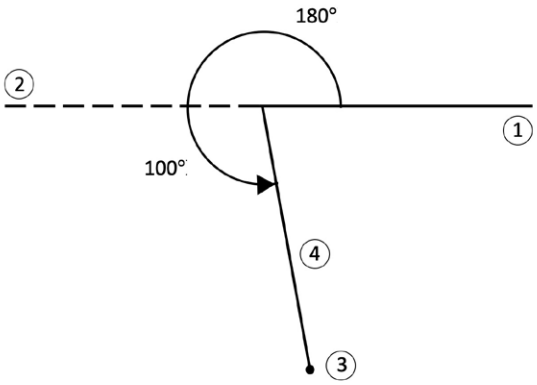
## Assessment
- Draw different angle sizes correctly using knowledge of measuring angles more than 180° and the protractor. F
- Think about how to draw an angle more than 180° F
- Do the exercise correctly. S



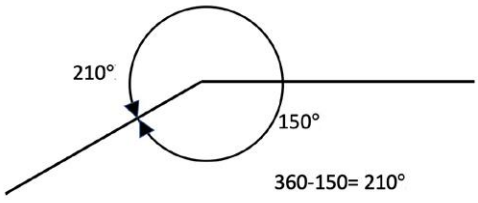

## • Teacher's Notes •

Drawing angle which is greater than 2 right angles. (210°)

• Using 180°
1. Use step number (1) to draw line 1.
2. Draw dash lines from the vertex (line 2) to create 180°.
3. Draw the line (line 3) from the vertex of line 1 and dash line to create 30°. (210° = 180° + 30°)
4. Line 1 and line 3 creates the inside angle.




• Using 360°
1. Use step number (1) to draw line 1.
2. Draw line 2 from the vertex of line 1 to measure and mark 210°. (360° − 210° = 150°)
3. Line 1 and 2 creates the inside angle of 150°



## Lesson Flow

### 1 7 Use a protractor to draw 50° angle.

T Introduce the main task.

T Help students to use the given steps 1- 4 to draw the 50° angle using the protractor.

1. Draw a straight line from the vertex of the angle. The line should be 5 to 6 cm.
2. Place the centre of the protractor over the vertex of the angle. Place the 0° line over one side of the angle.
3. Write a point at the 50° mark.
4. Draw a line between the vertex and the point to make the other side of the angle.

### 2 8 Draw 210° angle in various ways.

S Use 180° protractor to draw 210° angle using the idea of measuring by following the steps given in different ways.

TN When students are struggling in their drawings, advise them to use the knowledge of measuring angles more than 180° to draw the angle.

### 3 Complete the exercise.

S Do the exercise given for more practice.

## Sample Blackboard Plan (Lesson 14)

**Date:**
**Chapter:** 4 Angles.
**Topic:** The sizes of the Angles. **Lesson No:** 1/4

**Main Task: Let's investigate how to measure an angle.**

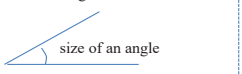
[1] Look at the open mouths of the animals A – E.

❶ Which animal has opened its mouth the widest? Answer: C

❷ Which animal has opened its mouth the narrowest? Answer: D

**Important Point.**

The amount of opened space between two sides of an angle is called size of an angle.




Name the above animals in order of angle size from small to big of their open mouths.
D Crocodile
B Magani
E Kapul
A Cassowary
C Snake

MT: Introduce the main task here.

Students discussions and their ideas.
Write down their ideas and discussion points on the board.

Using two ideas.

Sare's Idea
I trace the angles on a sheet of paper and compare them by placing one over the other.

Kekeni's Idea
I measure the sizes of the angles by making a tool to count how many times the triangle fits the angles.

**Important Point.**

The size of a angle is determined by the amount of space between sides and not the lengths of the sides.

## Sample Blackboard Plan (Lesson 17)

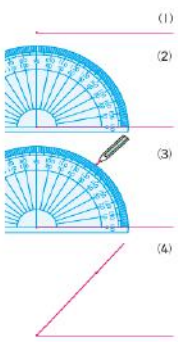
**Date:**
**Chapter:** 4 Angles.
**Topic:** The sizes of the Angles. **Lesson No:** 4/4

**Main Task: Let's think about how to draw angles greater than and less than 2 right angles using the protractor.**

MT: Introduce the main task here.

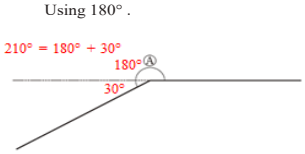
[7] Let's draw a 50° angle.

(1) Draw a straight line from a point that will become the vertex of the angle.
(2) Place the center of a protractor over the vertex of the angle. Place the 0° line over one side of the angle.
(3) Write a point at the 50° mark.
(4) Draw a line between the vertex and the point to make the other side of the angle.

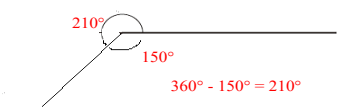



[8] Let's draw the angle 210° in various way.

Using 180° .




Using 360°.




**Exercise.**

Draw angles of
35°
125°
280°

# Unit 4

# Unit: Angles
## Sub-unit: 2. The Angles of Triangle Rulers
## Lesson 1of 1 (Single Period)

Textbook Page : p.33
Actual Lesson 018

## Sub-unit Objectives

- To know the size of triangle rulers and applying those sizes to know other sizes of angles.

## Lesson Objectives

- To think of the size of the angles which are made of triangle squares.
- To arrange the set square to form angles.

## Prior Knowledge

- Measure the size of angle.
- Draw the angle.

## Preparation

- Protractors, set squares (triangle rulers)

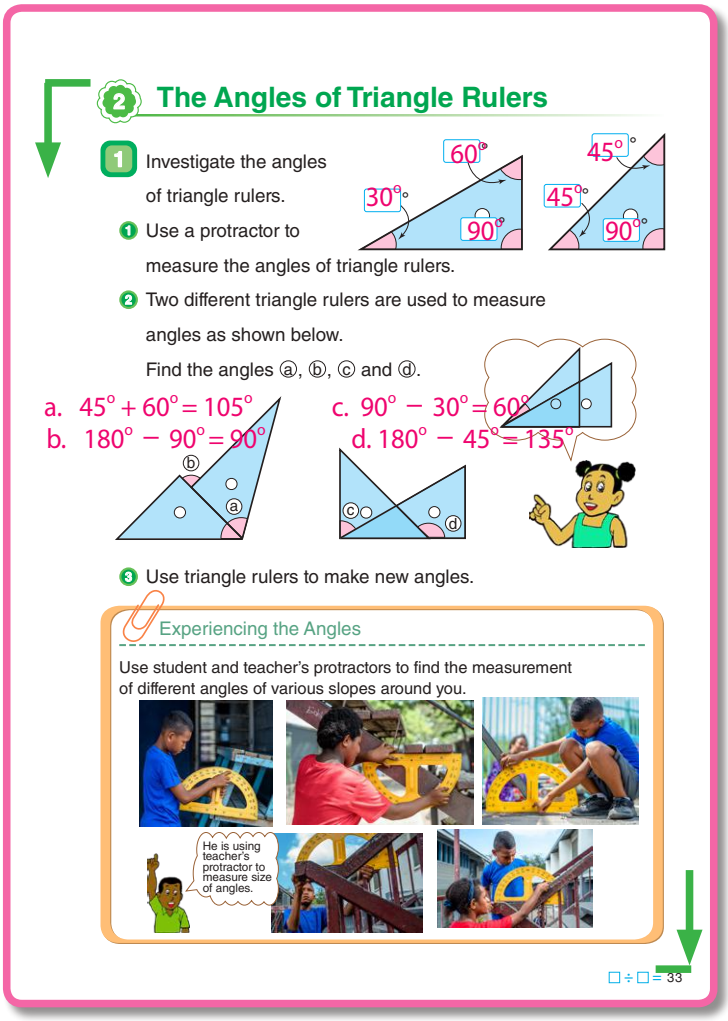
## Assessment

- Enjoy recognising and investigating sizes of the angles using set squares (triangle rulers). F
- Measure and calculate to find the different angles of triangle rulers. S

## • Teacher's Notes •

Set square

Set square comes in two usual forms, both right triangles: one with 90-45-45 degree angles, the other with 30-60-90 degree angles. (Refer to attachment page). Combining the two forms by placing together also yield various angles which are shown in 1 2.



## Lesson Flow

### 1 ❶ Understand the given situation and investigate angles of triangle rulers (set squares).

T Introduce the main task.

S Understand the situation on how they can investigate the angles of triangle rulers.

S ❶ Investigate and measure the angles of triangle rulers and confirm using a protractor to find the size.

### 2 ❷ Use two different triangle rulers to make angles.

S Find the angles size of angle a, b, c and d using two different triangle rulers which are joined together.

a) 45° + 60°  c) 90° − 30°

b) 180° − 90°  d) 180° − 45°

S From the information above the students will use their prior knowledge about the sizes of angles and use that to calculate the missing angles or give the total amount of the angle. The students must use the triangle rulers to confirm the sizes.

### 3 ❸ Triangle rulers are used to make new angles.

S Practice by using the triangle rulers to create or make different angles.

TN Use teacher's protractor for this activity.

## Sample Blackboard Plan

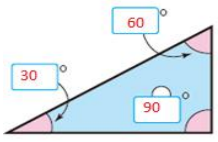
**Date:**
**Chapter:** 4 Angles.
**Topic:** The Angle of Triangle Ruler. **Lesson No:** 1/1

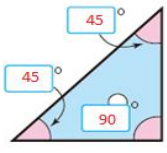
**Main Task: Let's investigate the angle size of triangle rulers to make other angles.**

MT: Introduce the main task here.

[1] Investigate the angles of triangle rulers.

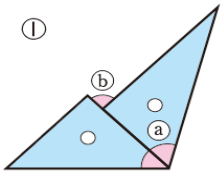
❶ Use a protractor to measure the angles of triangle rulers.




❷ Two different triangle rulers are used to measure angles as shown. Find the angles a, b, c and d.

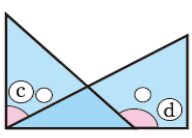
①




a is 45° + 60° = 105°
answer: a = 105°

b is 180° - 90° = 90°
answer: b = 90°

②




c is 90° - 30° = 60°
answer: c = 60°

d is 180° - 45° = 135°
answer: d = 135°

# Unit 4: Unit: Angles

## Sub-unit: Exercise and Evaluation

## Lesson 1of 1 (Double Period)

Textbook Page : p.34-p.36
Actual Lesson 019

## Lesson Objectives

- To deepen the understanding of what you learned.

## Prior Knowledge

- All the contents in this unit

## Preparation

- Protractors, set squares (triangle rulers)
- Evaluation sheet for all students

## Assessment

- Do all the exercise correctly F S
- Complete the evaluation sheet. S

## • Teacher's Notes •

Use 30 minutes for the exercise and give the evaluation test after that.

### Exercise

1 Let's measure the following angles. Pages 30 ~ 33

① 55°

② 110°

③ 320°

2 Two triangle rulers are used to make angles. Pages 30 ~ 33

Measure angles ⓐ, ⓑ and ⓒ.

b. $180^\circ - 45^\circ$ ⓑ

a. $180^\circ - 60^\circ = 120^\circ$ ⓐ

b $180^\circ - (45^\circ + 60^\circ)$
$= 180^\circ - 105^\circ$
$= 75^\circ$ ⓒ

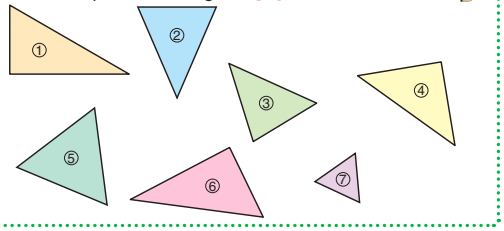
3 Draw an angle of ① and ②. Pages 30 ~ 33

① 120°

② 300°

Which are the isosceles triangles? 2 & 4 Grade 3 Do you remember?

Which are the equilateral triangles? 5 & 7






### Problems

1 Let's summarise what you learned in this chapter.

Fill in the □ with the most appropriate word or number.

● Understanding the representation of the size of an angle.

The unit degree is used to measure the size of an angle.

To make 1°, the angle of one revolution is divided equally into 360 parts.

2 Let's measure angles ⓐ, ⓑ and ⓒ.

● Using a protractor to measure the angle.

ⓐ 70°

ⓑ $220^\circ$ $(180^\circ + 40^\circ)$

ⓒ 130°

3 Let's draw angles of 100° and 270°.

4 Two triangle rulers are used to form new angles.

Let's get angles ⓐ, ⓑ, ⓒ and ⓓ.

ⓐ $105^\circ$
$180^\circ - (45^\circ + 30^\circ)$

ⓑ $15^\circ$
$45^\circ - 30^\circ$

ⓒ 25°
$90^\circ - (45^\circ + 20^\circ)$

ⓓ 95°
$180^\circ - (60^\circ + 45^\circ - 20^\circ)$

## Lesson Flow

**1** ① **Measure the angles.**

**2** ② **Calculate the angles using the properties of set squares.**

**3** ③ **Draw the angles.**

**4** ① **Fill in the blank with the most appropriate word or number.**

**5** ② **Measure angles a, b and c.**

**6** ③ **Draw an angle of 100° and 270°.**

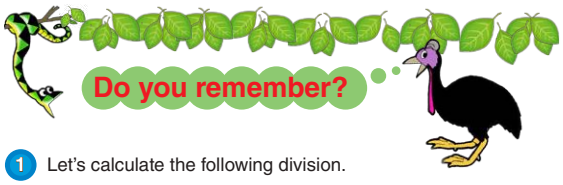
**7** ④ **Calculate the angles using the properties of set squares.**

**8** **Complete 'Do you remember?'**

**9** **Complete the evaluation sheet.**

T Distribute the evaluation sheet.

S Complete the sheet and submit to the teacher.




**1** Let's calculate the following division.

| | | | |
|---|---|---|---|
| ① 24÷3 8 | ② 30÷5 6 | ③ 14÷2 7 | ④ 56÷7 8 |
| ⑤ 32÷8 4 | ⑥ 16÷4 4 | ⑦ 28÷7 4 | ⑧ 72÷9 8 |
| ⑨ 14÷2 7 | ⑩ 25÷5 5 | ⑪ 42÷7 6 | ⑫ 28÷4 7 |
| ⑬ 24÷6 4 | ⑭ 63÷7 9 | ⑮ 64÷8 8 | ⑯ 3÷1 3 |
| ⑰ 2÷2 1 | ⑱ 0÷4 0 | ⑲ 4÷1 4 | ⑳ 9÷9 1 |
| ㉑ 16÷4 4 | ㉒ 49÷7 7 | ㉓ 28÷7 4 | ㉔ 54÷9 6 |
| ㉕ 72÷8 9 | ㉖ 7÷1 7 | ㉗ 3÷3 1 | ㉘ 0÷6 0 |
| ㉙ 2÷1 2 | ㉚ 5÷5 1 | | |

**2** Let's calculate and check the answers.

| | | |
|---|---|---|
| ① 28÷5 5 r 3 | ② 32÷6 5 r 2 | ③ 17÷4 4 r 1 |
| ④ 42÷8 5 r 2 | ⑤ 33÷9 3 r 6 | ⑥ 54÷7 7 r 5 |

**3** Let's find the number which applies to the □.

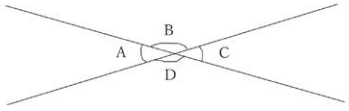
| | |
|---|---|
| ① 3×[5]=15 | ② 7×[9]=63 |
| ③ 8×[3]=24 | ④ 4×[7]=28 |
| ⑤ [6]×7=42 | ⑥ [9]×6=54 |
| ⑦ [6]×4=24 | ⑧ [8]×8=64 |

36 = □×□

| Angles | Name: | Score |
|---|---|---|
| | | |

(Each question: 10 points)

1. When the angle A is 40° , how many degrees is angle B,C and D ?



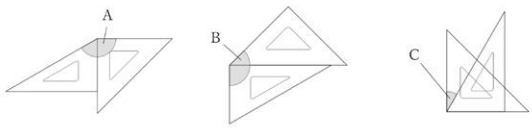

B. 140° C. 40° D. 140°

2. Draw an actual angle size of following angles.

① 30° ② 150°

③ 300° ④ 210°

3. What is the size of angle A, B and C?



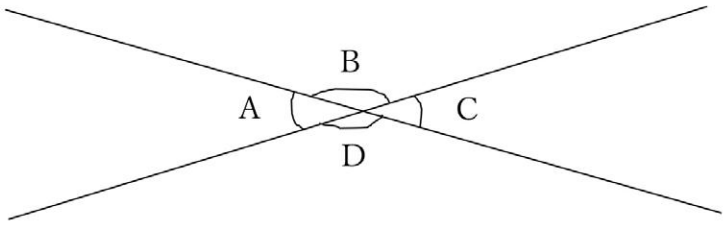

A. 150° B. 135° C. 30°

**End of Chapter Test: Chapter 4** **Date:**

| Angles | Name: | Score |
|---|---|---|
| | | |

(Each question: 10 points)

1. When the angle A is 40° , how many degrees is angle B,C and D ?



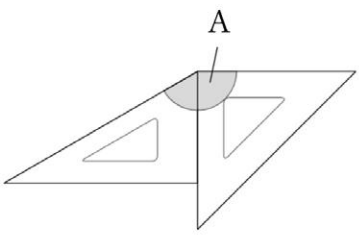

B. _____ C._____ D._____

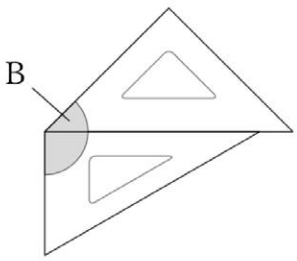
2. Draw an actual angle size of following angles.

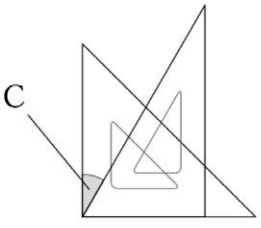
① 30° ② 150°

③ 300° ④ 210°

3. What is the size of angle A, B and C?




A. _____ B._____ C._____

# Chapter 5 Division by 1-digit Number

## 1. Unit Objectives

- To understand the relationship between mathematical sentence of division and division in vertical form.(4.1.3 a)
- To use the understanding of division in vertical form with two digit numbers calculate in vertical form and 3 digit numbers divided by 1 digit numbers. (4.1.3 c and d)
- To explain the process in vertical form using given situation of division. (4.1.3 b)
- To use rules of division and multiplication for easier and exact calculation in division. (4.1.4 d)

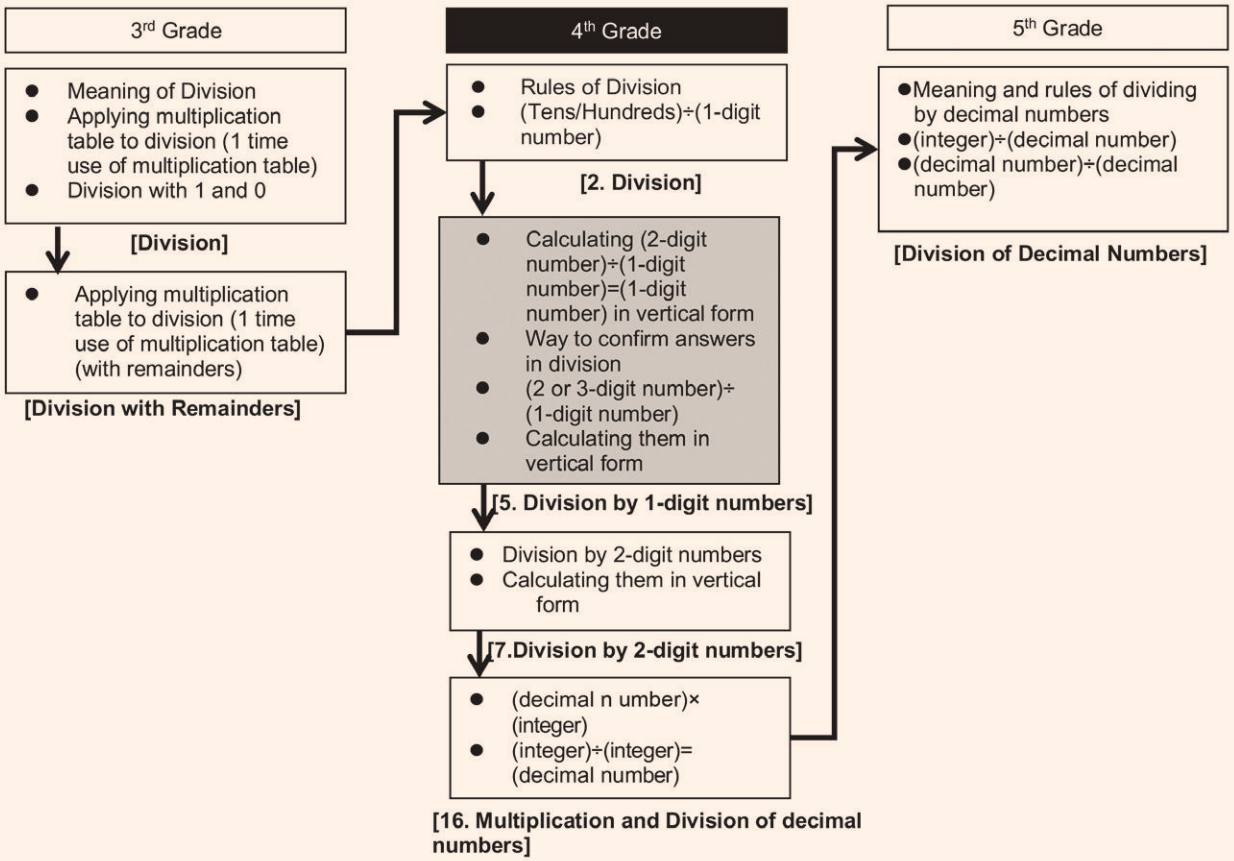
## 2. Teaching Overview

In this unit, students will master to solve 2-digit ÷ 1-digit = 1 or 2-digit and 3-digit ÷ 1-digit = 1-digit by vertical division. Teachers should NOT impart the algorithms of vertical divisions, however, students should be able to explain why they can solve by vertical division by corresponding each step of a vertical division with manipulation of diagrams of bunches of 10 or 100 or 1s. In other words, the result of 639 ÷ 3 is not just arranged the answers of 6 ÷ 3, 3 ÷ 3 and 9 ÷ 3 as 2, 1, 3, in order, however, students should be able to explain that the answers are composition of 600 ÷ 3 = 200, 30 ÷ 3 = 10 and 9 ÷ 3 = 3.

**Division in Vertical Form:** Students will get familiar with vertical divisions of 2-digit ÷ 1-digit = 1-digit, which can be solved using multiplication tables learned in Grade 2 to prepare for the further topics.

**Division of 2-digit quotient /Division of 3-digit ÷ 1-digit :** Firstly, teachers should NOT impart the algorithms of vertical divisions. The important thing is to estimate the quotient first, so that they can find out their mistakes easily in the process. It is also important to do the check the process using the inverse calculation.

## 3. Related Learning Contents



# Unit 5

# Unit: Division by 1-digit Numbers
## Sub-unit: 1. Division in Vertical Form
## Lesson 1 of 1 (Double Period)

Textbook Page : p.37~p.38
Actual Lesson 20

## Sub-unit Objectives

- To understand how to calculate (2-digit number) ÷ (1-digit number) in vertical form.
- To understand how to check answers of division.

## Lesson Objectives

- To express the process of given situations of division with expressions and understand calculations in vertical form.
- To think about how to check answers of division.

## Prior Knowledge

- Calculation in vertical form by 2-digit divided by 1-digit
- Division with remainders

## Preparation

- Cards on which the words, "Divide", "Multiply", and "Subtract" are written and blocks.

## Assessment

- Think about how to calculate (2-digit number) ÷ (1-digit number). F
- Explain the process of division in vertical form. F
- Do the exercise correctly. S

## • Teacher's Notes •

Misconception

In division, "quotient" is the "answer" so make clear the difference between "quotient" and "answer".

For example: ① 40 ÷ 8 = 5

Dividend Divisor Quotient

8 × 5 = 40

② 48 ÷ 9 = 5 remainder 3

Answer: 5 remainder 3

5 Division by 1-digit Numbers

### 1 Division in Vertical Form

#### Making mathematical expression

1 We want to divide 48 lollies equally among 9 children. How many lollies will each child receive and how many will remain?

48 ÷ 9

Total number of lollies / Number of children

**Division Algorithm for 48 ÷ 9 in Vertical Form**

Set up the division as shown on the right.

① Write 5 above the ones place of 48.

② 9 multiplied by 5 equals 45. Write 45 below 48.

③ Subtract 45 from 48. The remainder is 3.

④ Check that the remainder, 3 is smaller than the divisor 9.

"9 multiplied by 6 equals 54" is too big so I need to use "9 multiplied by 5 which is 45."

45 is the number of lollies that are given to the children.

Divide / Multiply / Subtract

Division can be done in vertical form just as with subtraction and multiplication.

#### How to calculate in vertical form without remainder.

2 We want to divide 48 lollies equally among 8 children. How many lollies will each child receive? Let's think about how to calculate the answer in vertical form. Problem like 48 ÷ 8 can also be calculated in vertical form.

8 ) 4 8 — 4 8 — 0 (quotient 6)

The order of writing.

8 ) 48

(1) 48

(2) )48

(3) 48

(4) 8 ) 48

Let's call and write numbers and ⌐ step by step at the same time. "Fourty eight, divided (⌐) by eight."

The answer for divisions with a remainder is a **quotient** and **a remainder**.

48 ÷ 8 = 6 (Dividend, Divisor, Quotient)

48 ÷ 9 ÷ 5 reminder 3 (Dividend, Divisor, Quotient, Remainder)

#### 3 Relation between quotient and remainder on how to confirm or check the answer.

Let's confirm the answers for the following division problems.

48 ÷ 8 = 6

8 × 6 = 48 (Divisor, Quotient, Dividend)

48 ÷ 9 = 5 remainder 3

9 × 5 + 3 = 48 (Divisor, Quotient, Remainder, Dividend)

**Exercise**

Let's divide in vertical form and confirm.

① 13 ÷ 2 6 r1, 2×6+1=13 ② 62 ÷ 7 8 r 6, 7×8+6=62, ③ 32 ÷ 5 6 r 2 5×6+2=32, ④ 57 ÷ 8 7 r 1, 8×7+1=57 ⑤ 7 ÷ 3 2 r 1, 3×2+1=7

⑥ 21 ÷ 7 3, 7×3=21, ⑦ 30 ÷ 6 5, 6×5=30, ⑧ 54 ÷ 9 6, 9×6=54, ⑨ 36 ÷ 4 9, 4×9=36, ⑩ 8 ÷ 2 4, 4×2=8

□ × □ = 37 38 = □ + □

## Lesson Flow

**1 Main task.**

T Introduce the main task.

**2 1 Read and understand the problem and make a math expression.**

S Read and understand how to find out a number of lollies per person and its remainder after dividing the lollies equally.

S Make a mathematical expression. 48 ÷ 9

**3 Think about how to calculate 48 ÷ 9 in vertical form.**

T Demonstrate how to set up the division problem situation (48 ÷ 9) in vertical form.

S Calculate 48 ÷ 9.

**4 2 Think about how to calculate in vertical form.**

S Write and solve the situation in vertical form as instructed.

T Assist students to solve explaining step by step.

TN Definition of "quotient" and "answer" for division needs to be highlighted.

T Read the important point in the box.

**5 Important point.**

T Read the important point in the box .

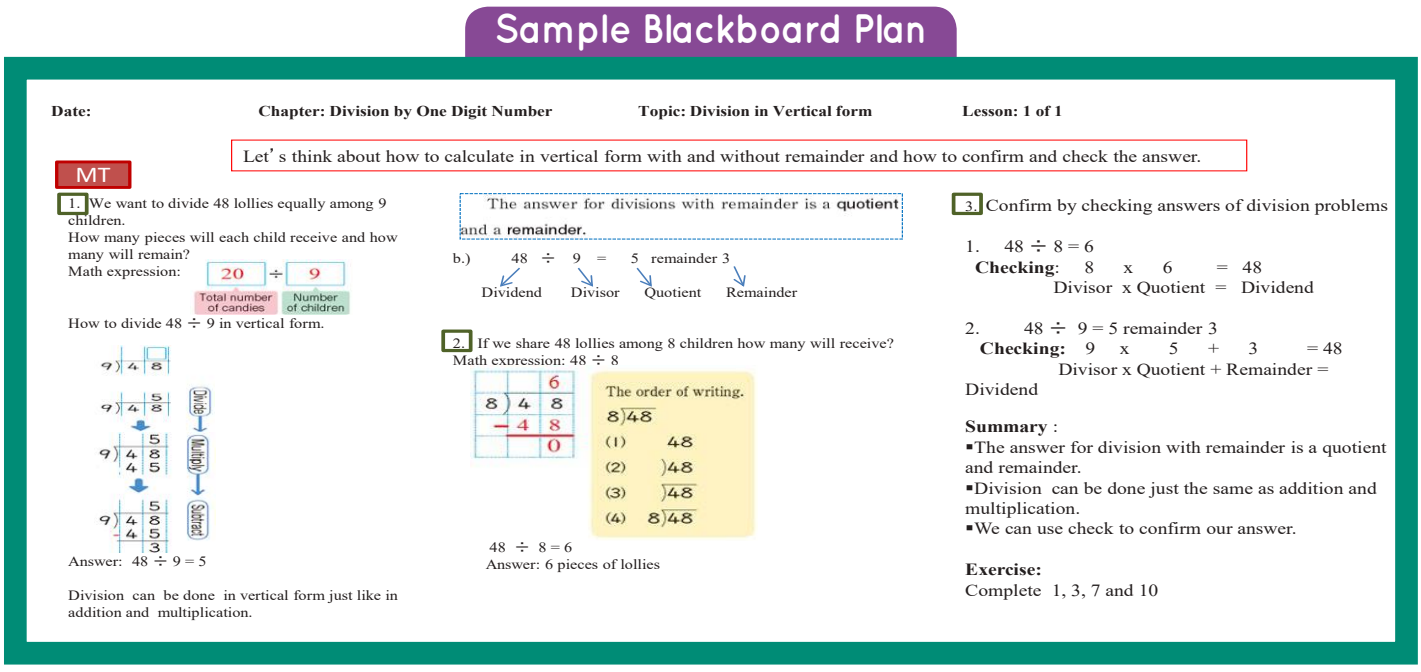
**6 3 Check answers of division.**

S Check the answers of division with or without remainders.

S Confirm the relation of dividend, divisor, quotient and remainder.

**7 Do the exercise.**

## Sample Blackboard Plan



# Unit 5

# Unit: Division by 1-digit Numbers
## Sub-unit: 2. Division of 2-digit Numbers
## Lesson 1 of 3 (Double Period)

Textbook Page : p.39~p.40
Actual Lesson 21

## Sub-unit Objectives

- To understand the meaning of quotients of 2-digit numbers and how to calculate in vertical form for (2-digit) ÷ (1-digit).

## Lesson Objectives

- To think about how to calculate (2-digit number) ÷ (1-digit number) with or without borrowing.
- To think about how to check the answer of calculation.

## Prior Knowledge

- Division in vertical form by 2-digit divided by 1-digit

## Preparation

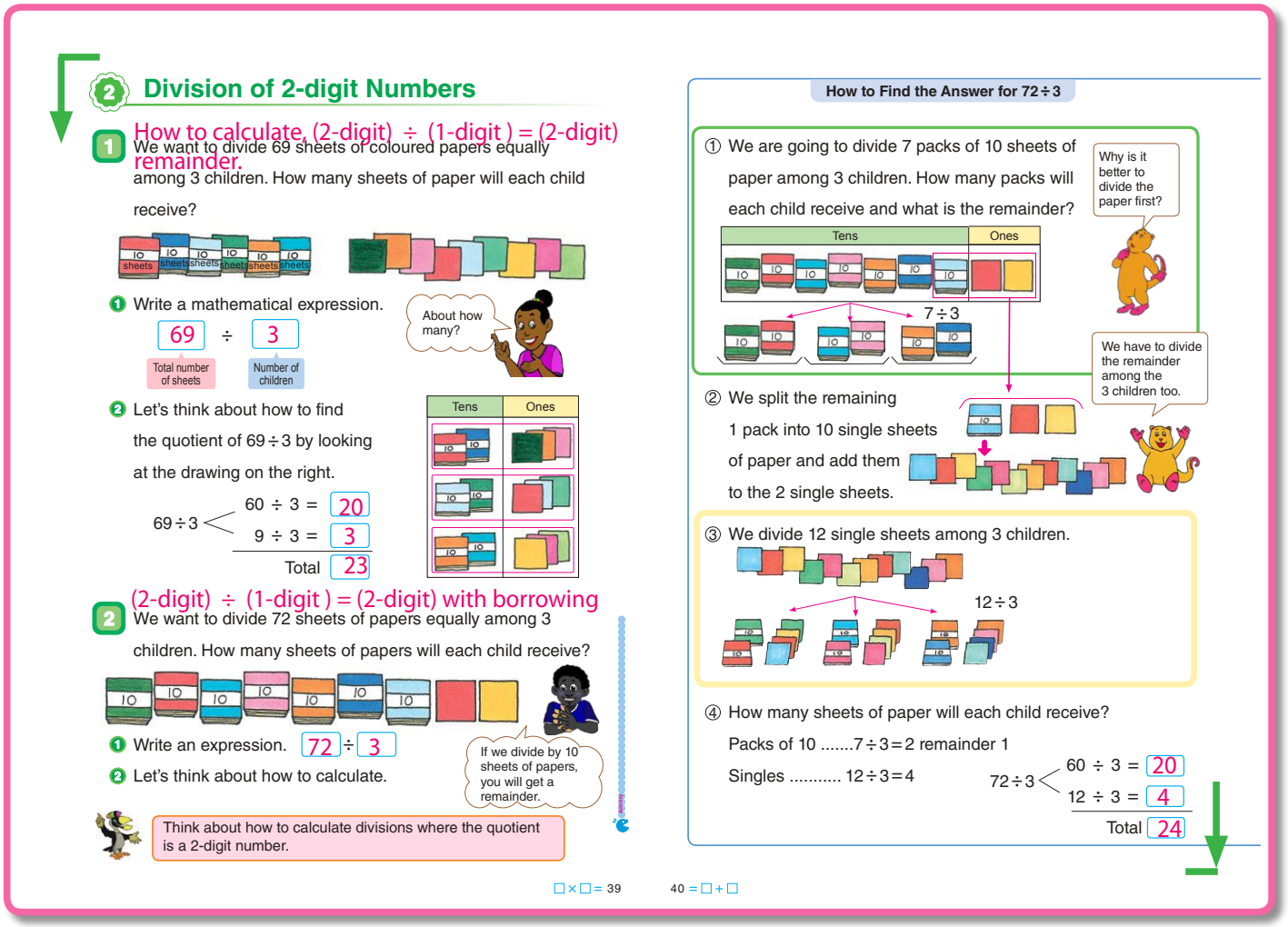
- Refer to board plan.

## Assessment

- Think about how to calculate divisions where the quotient is a 2-digit number. F
- Understand how to calculate (2-digit number) ÷ (1-digit number) = 2-digit number using concrete materials. F
- Understand the process of situations of divisions in vertical form. S

## • Teacher's Notes •

Let students be aware of splitting as shown above, then make a responsive to an expression below in the textbook. Also, here,students realise that single sheets will be able to divide after splitting stacks of 10 sheets first.



## Lesson Flow

**1 Review the previous lesson.**

S Review exercise of division in vertical form (21÷7), and confirm answer by checking.

T Introduce the main task.

**2 ① Think about how to calculate divisions where the quotient is a 2-digit number without borrowing.**

T ① Ask students to read and understand the situation.

S Read, understand and write a mathematical expression for the situation as 69÷3

T ② Let's think about how to find the quotient of 69÷3.

S Split 69 sheets into stacks of 10 and single sheets as 60÷3=20 and 9÷3=3.

S Add up the two quotients for stacks of 10 and single sheets (20+3) to give the total quotient of 23.

T Confirm the answer by making a correspondence with the calculations and diagram(table) representation.

**3 ② Think about how to calculate divisions where the quotient is a 2-digit number with borrowing.**

S ① Read, understand and write a mathematical expression for the situation as 72÷3

T ② Let's think about how to calculate 72÷3.

T Express the diagram representation ① - ④ using concrete or semi concrete objects.

S Interact with the teacher through the explanation.

S Fill in the ☐.

S Realise that in the stacks of 10, 7÷3=2 remainder 1.In the single sheets, 2 cannot divide by 3, therefore borrowing occurs to make 2 become 12. 12÷3=4. So the quotient is 24 when adding the quotient for the stacks and single sheets.

## Sample Blackboard Plan

**Date:** **Chapter: Division by One- Digit Number** **Topic: Division by 2- digit Quotient** **Lesson: 1 of 3**

Let's think about how to calculate division where the quotient is a 2- Digit Number.

**1.** We want to divide 69 coloured paper equally among 3 children. How many sheets of papers will each child receive?

1.) **Math expression: 69 ÷ 3**

**Total number of sheets** **Number of children**

2.) Think about how to calculate and find the quotient by looking at the table.

69÷3 → 60÷3= 20; 9÷3= 3; total 23

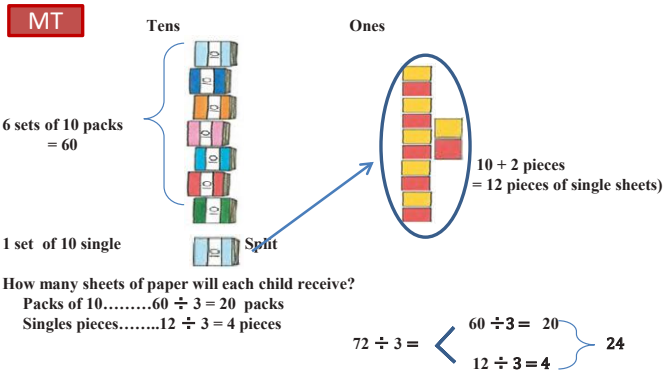
| Tens | Ones |
|---|---|
| 10 10 | |
| 10 10 | |
| 10 | |

**2.** We want to divide 72 sheets of papers equally among 3 children. How many sheets of paper will receive ?

1.) Math expression: **72 ÷ 3**

2. Let's think about how to calculate.

MT




**How many sheets of paper will each child receive?**

**Packs of 10……60 ÷ 3 = 20 packs**

**Singles pieces……..12 ÷ 3 = 4 pieces**

**72 ÷ 3 = 60 ÷3= 20; 12 ÷ 3=4 → 24**

**So, 2 bundles of 10 and 4 single pieces will be 24 pieces for a child.**

# Unit 5

# Unit: Division by 1-digit Numbers
## Sub-unit: 2. Division of 2-digit Numbers
## Lesson 2 of 3 (Double Period)

Textbook Page :
p.41
Actual Lesson 22

## Lesson Objectives

- To explain the steps for calculating division in vertical form.

## Prior Knowledge

- Division in vertical form by 2-digit divided by 1-digit.

## Preparation

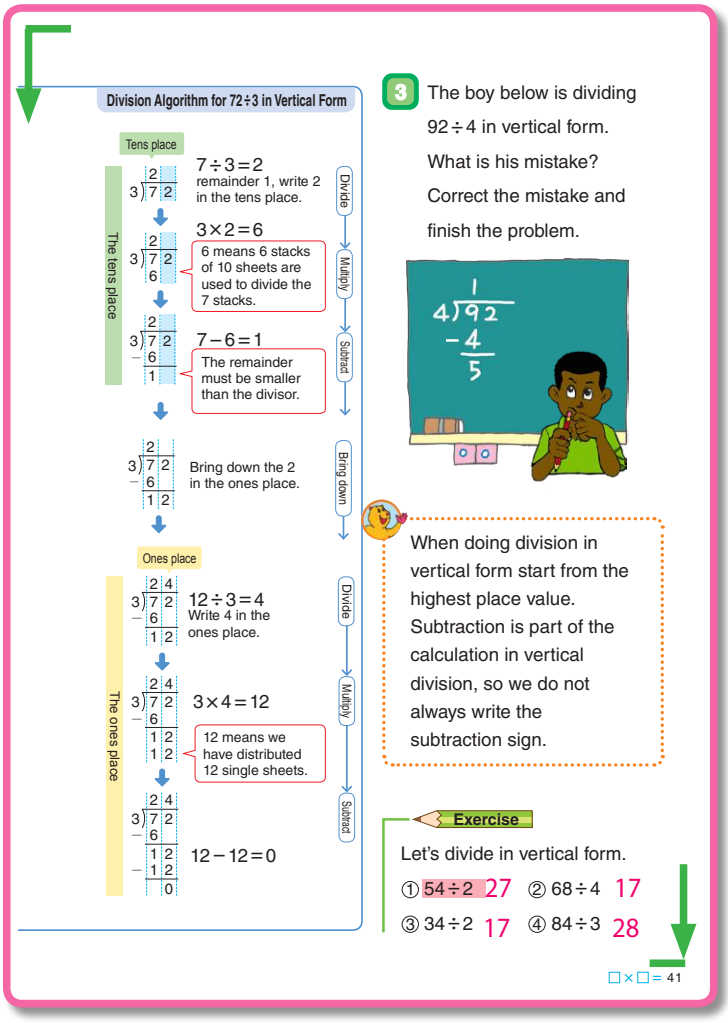
- Cards on which “Divide”, “Multiply”, “Subtract”, “Bring down”, “The ones place”, “The tens place” are written and Blocks/ Sheets of paper sorted out in groups of 10.

## Assessment

- Think about how to explain the process of situations of divisions in vertical form. F
- Explain the steps for calculating divison in vertical form. S
- Do the exercise correctly. S

### • Teacher’s Notes •

Misconception
Students frequently misunderstand that “quotient” is the “answer” so clarify the difference between “quotient” and “answer”.



## Lesson Flow

### 1 Review their previous lesson.

T Pose the problem "How to find the Answer for 72÷3" on the board and encourage the students to use split expression. How many stacks will each child receive?

S Read the display and recall their previous knowledge to think about the representation and explain their answers.

T Introduce the main task.

### 2 Think about how to calculate 72÷3 in vertical form.

T Calculate and solve 72÷3 in vertical form corresponding to the pictures and operations in the previous page and encourage students to use the split expression to calculate easily. This is another way of calculation.

1. First of all, Put up the Division sign. We will divide from stacks of 10 sheets of paper. Confirm that first and have students to decide where to write a quotient. Then, 7÷3=2 remainder is 1. Write 2 in the ten place.

2.Put up the Multiplication sign. Multiply these numbers 3×2=6, So 6 means 6 stacks of 10 sheets are used to divide the 7 stacks.

3. Put up the Subtraction sign. Now we subtract to find the remainder 7−6=1 remainder, the remainder must be smaller than the divisor of 3. While calculating especially when the remainder is smaller than the divisor have the students realise that the remainder of 1 cannot be divided as being a stack of 10 or in other words in the tens place, so have them understand an importance of splitting the stack into 10 single sheets.

4. Put up the Bring down sign. From there we bring down the 2 in the ones place and make 12 single sheets as represented by the sheets of paper from yesterday's lesson.

5. Put up Division sign. Now, we divide the second time because we will divide 12 single sheets (12÷3=4).

So, we write the answer/quotient (4) in the ones place.

6. Put up the Multiplication sign. We multiply for the second time 3×4=12 (12 means we have distributed 12 single sheets out. Write 12 below 12. Lastly, we subtract. 12−12=0. Write 0 and confirm that the answer is 24. Make sure arrows connect from one sign to another.

### 3 Think about the problem and solve.

T Emphasise that after subtraction they have to confirm that the remainder is smaller than the divisor. Follow the example that has been done.

### 4 Do the exercise.

S Remember division steps in vertical form by solving the exercise. To confirm, "Divide", "Subtract", "Bring down", "Divide", "Multiply" and "Subtract".

## Sample Blackboard Plan

**Date:** **Topic: Division by 2-digit Number** **Lesson: 2 of 3**

Let's think about how to calculate 72 ÷ 3 in vertical form.

MT

How to calculate 72 ÷ 3 in vertical form.

```
  2 4
3)7 2
- 6
  1 2
- 1 2
    0
```

Divide
Multiply
Subtract
Bring down
Divide
Multiply and Subtract.

3. Calculate 92÷ 4 correctly in vertical form.

```
    2 3
4)  9 2
  - 8
    1 2
  - 1 2
      0
```

Divide
Multiply
Subtract
Bring down
Divide
Multiply and Subtract

**Summary**
**When doing division in vertical form start from the highest place value.**

**Exercise**
Let's divide in vertical form.

**1.54 ÷ 2**
**2.68÷ 4**
**3.34÷ 2**
**4.84÷ 3**

# Unit 5

# Unit: Division by 1-digit Numbers
## Sub-unit: 2. Division of 2-digit Numbers
### Lesson 3 of 3 (Double Period)

Textbook Page : p.42
Actual Lesson 23

## Lesson Objectives

- To calculate division with remainders and division whose quotients are 0 in the ones place in a vertical form.

## Prior Knowledge

- Division in vertical form (Previous lesson)

## Preparation

- Refer to board plan.

## Assessment

- Explain the process of situations of divisions with remainders and in divisions which has quotients that are 0 in the ones place in a vertical form. F
- Do exercise correctly. S

## • Teacher's Notes •

Exercises can be divided in three types based on their purpose.
First ones are the basic exercises which purpose is to gain algorithm of calculations.
As for these problems, we'd like to spend time for doing 4 to 5 problems for students to acquire skills well.
Second ones are typical problems. Students have to solve by themselves without teacher assisting.
Third ones are problems which some students can solve accurately by themselves but others memorise mistakes as they are or do not realise mistakes. Teachers' assistance will be important.
For example,
1.) Problems which 0 will be written on the ones place with remainders.
2.) Problems which 0 will be written on the ones place without remainders

(2-digit) ÷ (1-digit ) = (2-digit) with remainder.

4 Let's explain how to divide in vertical form.

$$\begin{array}{r} 24 \\ 3\overline{)74} \\ -\,6 \\ \hline 14 \\ -\,12 \\ \hline 2 \end{array} \qquad \begin{array}{r} 34 \\ 2\overline{)69} \\ -\,6 \\ \hline 9 \\ -\,8 \\ \hline 1 \end{array}$$

5 Let's write and explain how to divide 92 ÷ 3 in vertical form in your exercise book.

(2-digit) ÷ (1-digit ) = (2-digit) quotient where the ones place becomes 0

| | | |
|---|---|---|
| $\begin{array}{r} 3 \\ 3\overline{)92} \\ 9 \end{array}$ | $\begin{array}{r} 3 \\ 3\overline{)92} \\ 9 \\ \hline 2 \end{array}$ | $\begin{array}{r} 30 \\ 3\overline{)92} \\ 9 \\ \hline 2 \end{array}$ |
| | | $\frac{0}{2}$ You do not have to calculate this. |
| 9 ÷ 3 = 3 | Because 9 − 9 = 0, | |
| Write 3 on the tens place. | bring down the 2. | Write 0 in the ones place. |
| 3 × 3 = 9 | | 3 × 0 = 0 2 − 0 = 2 |

**Exercise**

1 Let's divide in vertical form.

| | | | |
|---|---|---|---|
| ① 85 ÷ 7 12 r 1 | ② 94 ÷ 4 23 r 2 | ③ 86 ÷ 3 28 r 2 | ④ 75 ÷ 6 12 r 3 |
| ⑤ 68 ÷ 3 22 r 2 | ⑥ 45 ÷ 2 22 r 1 | ⑦ 85 ÷ 4 21 r 1 | ⑧ 56 ÷ 5 11 r 1 |
| ⑨ 54 ÷ 5 10 r 4 | ⑩ 82 ÷ 4 20 r 2 | ⑪ 61 ÷ 2 30 r 1 | ⑫ 42 ÷ 4 10 r 2 |

2 6 children went to gather shells.
They found 90 shells.
If they divide them equally, how many shells will each child receive?

42 = □ + □

90 ÷ 6 = 15 A. 15 shells

## Lesson Flow

### 1 Review how to divide 34÷2 in a vertical form.

S Do the review exercise and explain ideas.

TN Re-emphasise that students remember algorithm in vertical form by solving their problems and then to confirm, “Divide”, “Subtract”, “Bring down”, “Divide”, “Multiply” and “Subtract”.

T Introduce the main task.

### 2 4 Think about an explanation of how to divide in vertical form.

S Explain how to calculate 74÷3 and 69÷2.

TN Let students to realise:

1. that there is a typical way on how to divide with remainders in vertical form and its steps are the same as that of divisible case. Also, have students to confirm that whether the remainder will be 0 and visible or it will be a remainder smaller than the divisor.

2. Students have to confirm a promise of not writing 0 which is a result of subtracting on the tens place.

### 3 5 Summarise how to divide in vertical form.

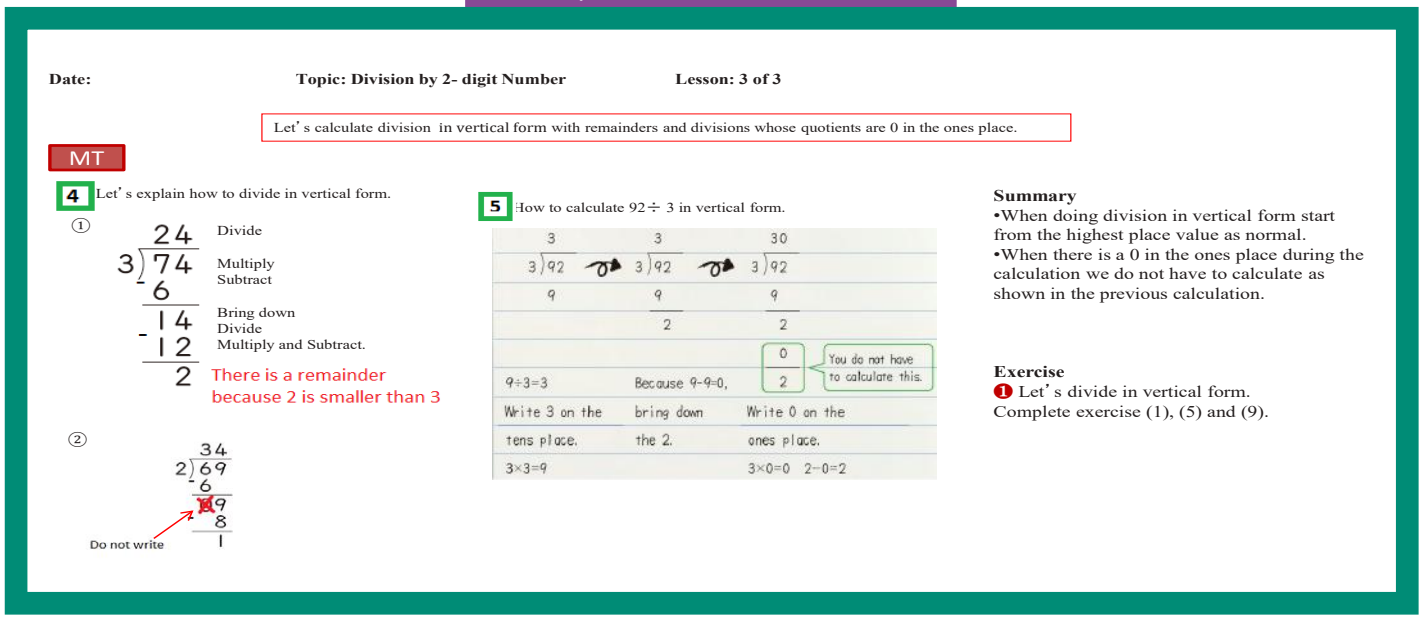
S Explain how to calculate 92÷3 in their exercise book.

T Let students understand where to write 0 when a quotient cannot be written on the ones place. have students to realise that 3 on the tens place will make no sense if not writing 0 on the ones place based on the meaning of decimal position.

### 4 Do the exercise.

S Complete (1), (5) and (9) and the rest can be done as homework.

## Sample Blackboard Plan



# Unit 5

# Unit: Division by 1-digit Numbers
## Sub-unit: 3. The Calculation of (3-digit Numbers)÷(1-digit Number)
## Lesson 1 of 3 (Double Period)

Textbook Page : p.43~p.45
Actual Lesson024

## Sub-unit Objectives

- To understand the meaning of (3-digit number) and how to calculate it in vertical form.
- To understand how to divide in vertical form which quotients have empty places.
- To understand how to check division with remainders.

## Lesson Objectives

- To think about how to calculate (3-digit number)÷(1-digit number) and how to calculate it in vertical form.
- To think about how to calculate (3-digit number)÷(1-digit number) and how to calculate it in vertical form which quotients will be 3-digit numbers.

## Prior Knowledge

- Division in vertical form by 2-digit divided by 1-digit

## Preparation

- Pictures of coloured papers of stacks of 100, stacks of 10 and single sheets.

## Assessment

- Think about how to calculate (3-digt number) ÷ (1-digit number) using previous knowledge. F
- Calculate (3-digit number) ÷ (1-digit number) and express how to calculate in vertical form. S

### • Teacher's Notes •

Align the diagram representation with the vertical calculation and explain to enhance students' understanding How to Divide 536÷4.

Meaning of (3-digit number ) ÷ (1-digit number ) = (3-digit number) and how to culculate it.

### 3 The Calculation of (3-digit Numbers) ÷ (1-digit Number)

**1** There are 639 sheets of coloured paper. If the papers are divided equally into 3 groups, how many sheets of paper will be there in each group?

100 sheet each 10 sheet each single paper

1 Write a mathematical expression. 639 ÷ 3

2 About how many sheets of paper are there in each group?

3 Let's think about how to calculate.

639÷3
- 600÷3=200
- 30÷3=10
- 9÷3=3

Total 213

**2** There are 536 sheets of paper. The sheets are divided equally among 4 children. How many sheets of paper will each child receive? Let's think about how to calculate the answer.

Meaning of (3-digit number ) ÷ (1-digit number ) = (3-digit number) and how to culculate it. in vertical form

536÷4

1 Let's divide into stacks of 100.

5÷4=1 Remainder 1

Number of stacks

How many stacks of 10 will the remaining 100 sheets and the stacks of 10 make?

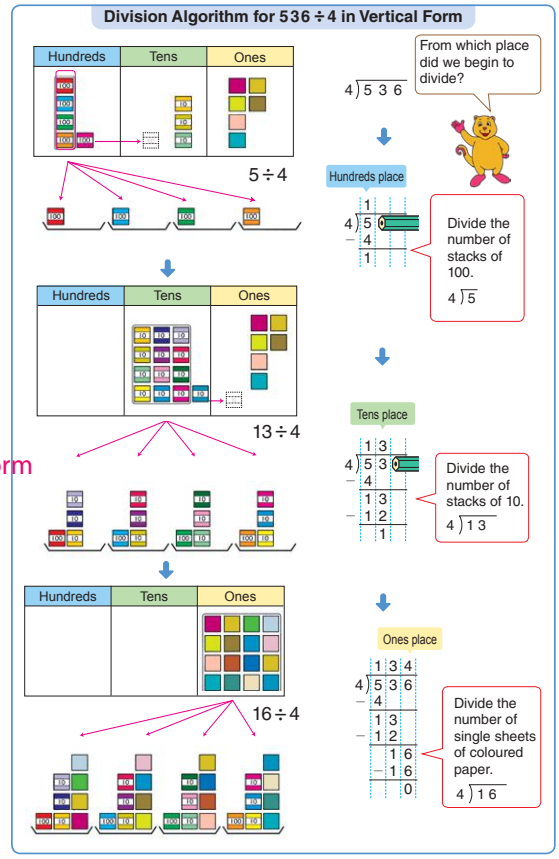
2 Divide the stacks of 10. 13 ÷4=3 Remainder 1

3 Divide the single sheets. 16 ÷4=4

4 How many sheets of paper will each child receive?

536÷4=134

5 Think about how to find the answer in vertical form.




□×□=43 44=□+□

## Lesson Flow

### 1 ① Read the task and make an expression.

T Introduce the main task.

S Read the task, identify the operation and make mathematical expression.

### 2 ② Predict how many sheets of paper per group based on the fact that there are about 600 sheets.

### 3 ③ Understand how to check division.

T Let's think about how to calculate the answer.

S (1) Divide stacks of 100. 6÷3=2
2 is a number of stacks of 100, so it is 200.
(2) Divide stacks of 10. 3÷3=1
(3) Divide single sheets. 9÷3=3

### 4 ② Think about how to calculate the answer of the problem 536÷4.

S Complete (1) - (4)
(1) 536÷4
(2) Divide 5 stacks of 100 by 4 children.
5÷4=1 remainder 1 (Think about the meaning of the remainder 1)
(3) Split the remaining. 1 stack of 100 to make 13 stacks of 10 and divide by 4 children. 13÷4=3 remainder 1.
(4) Split the remaining 1 stack of 10 to make 16 single sheets and divide by 4 children. 16÷4=4
(5) Check the answer.

### 5 Check and confirm the answer using vertical form.

T Explain the vertical calculation for the children to see, understand and confirm their answers.

### 6 ③ Solve the tasks.

S Solve the tasks and confirm the answer.

**3** Let's divide in vertical form.

① 482÷2 ② 264÷2 ③ 936÷3 ④ 848÷4
⑤ 628÷4 ⑥ 861÷7 ⑦ 725÷5 ⑧ 867÷3

**4** There are 254 sheets of coloured paper. If they are divide equally among 3 children, how many sheets will each chil

## Sample Blackboard Plan

**Date:**
**Chapter:** 5 Division by One – Digit Number.
**Topic:** The Calculation of (3- Digit Number ) ÷ (1 Digit Number)
**Lesson No:** 1/3

**Main Task: Let's think about the meaning of (3- Digit Number ) ÷ (1 Digit Number) and how to calculate in vertical form.**

MT: Introduce main task here.

[1] There are 639 sheets of colored paper. If the papers are divided equally into 3 groups, how many sheets of paper will there be in each group?

(1) Mathematical Expression: 639 ÷ 3
(2) About how many sheets of paper in each group? 600

(3) How to calculate the answer.

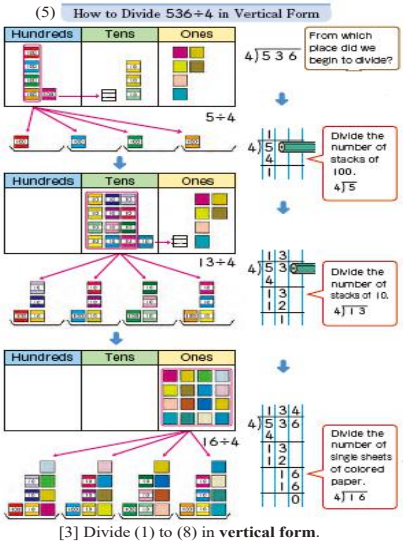
639÷3 = 600÷3 = 200 + 30÷3 = 10 + 9÷3 = 3
Total 213

[2] There are 536 sheets of paper. The sheets are divided equally among 4 children. How many sheets of paper will each child receive? Let's think about how to calculate the answer.

536÷4

(1) Divide bundles of 100 5 ÷ 4 = 1 remainder 1
(2) Divide bundles of 10 13 ÷ 4 = 3 remainder 1
(3) Divide the single sheets 16 ÷ 4 = 4
(4) 536 ÷ 4 = 134

(5) How to Divide 536÷4 in Vertical Form




[3] Divide (1) to (8) in **vertical form**.

# Unit 5

# Unit: Division by 1-digit Numbers
## Sub-unit: 3. The Calculation of (3-digit Numbers)÷(1-digit Number)
## Lesson 2 of 3 (Single Period)

Textbook Page : p.45
Actual Lesson 025

## Lesson Objectives

- To think about how to calculate (3-digit number)÷(1-digit number) in vertical form which quotients will be 2-digit numbers.

## Prior Knowledge

- (3-digit number)÷(1-digit number) in vertical form which quotients will be 3-digit numbers.(Previous lesson)

## Preparation

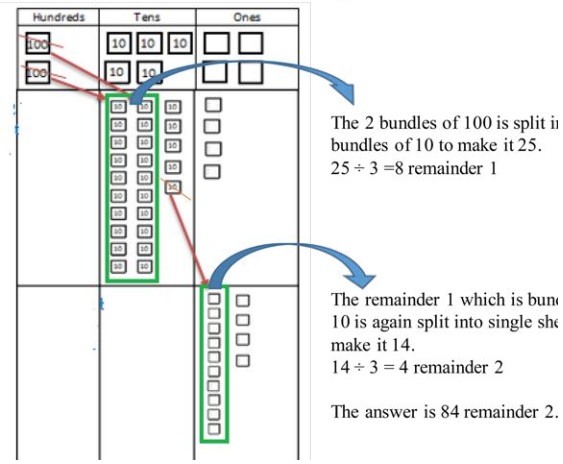
- Pictures of coloured papers of stacks of 100, stacks of 10 and single sheets and blocks.

## Assessment

- Think about how to calculate (3-digit number)÷(1-digit number)=(2-digit number) in vertical form. F
- Do the exercise correctly. S

## • Teacher's Notes •

Align the diagram representation with the vertical calculation and explain to enhance students' understanding" How to Divide 254 ÷ 3.

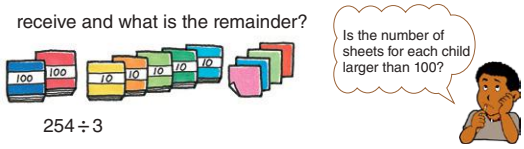



**3** Let's divide in vertical form.

① 482÷2 ② 264÷2 ③ 936÷3 ④ 848÷4
⑤ 628÷4 ⑥ 861÷7 ⑦ 725÷5 ⑧ 867÷3

Meaning of (3-digit number) ÷ (1-digit number) = (2-digit number) and how to calculate

**4** There are 254 sheets of coloured paper. If they are divided equally among 3 children, how many sheets will each child receive and what is the remainder?

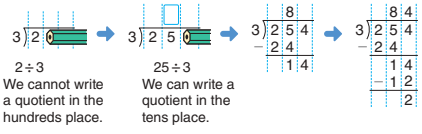



254÷3

① Can they divide the paper without opening the bundles of 100? No

② Think about this problem by changing the two stacks of 100 into stacks of 10. 254 is 25 sets of 10 and 4 sets of 1.

**Division Algorithm for 254÷3 in Vertical Form**




If the quotient is smaller than 100, we begin by writing a number in the tens place.

**Exercise**

① 316÷4 79 ② 552÷6 92 ③ 173÷2 86 remainder 1 ④ 581÷9 64 remainder 5

□×□=45

## Lesson Flow

### 1 ④ Capture a situation of the problem.

T Introduce the main task.
T Let students look at the picture to identify the kind of stacks in 100, 10 and single sheets.
S Identify the kind of stacks as 2 stacks of 100, 5 10 and 4 single sheets.

### 2 ① Think about if they divide the paper without opening the bundles of 100.

T Let students discuss differences while comparing with the previous problems.
S 639÷3 has been divided as stacks of 100, and single sheets.
S 536÷4 has also been divided as 639÷3 but has borrowed in the middle step.
S 254÷3 has 2 stacks of 100 but cannot be divided without opening the bundles of 100.

### 3 ② Think about how to calculate by splitting stacks of 100 into stacks of 10 and link with calculation in vertical form.

T Help assist the students with the following;
(1) Split 2 stacks of 100 into 20 stacks of 10.
(2) It will be 25 stacks of 10 after adding to 5 stacks of 10. It is good to make responsive to semi-concrete objects, pictures and drawings.
(3) Divide 25 stacks of 10.
25÷3=8 remainder 1
Because we are dividing stacks of 10, emphasise that a quotient will be written in the tens place.
(4) Split the remaining 1 stack of 10 into single sheets and calculate as 14 single sheets.
14÷3=4 remainder 2
(5) Check the quotient and remainder.

### 4 Summarise how to divide when there will be no quotients in the hundreds place.

### 5 Do the exercise.

T Have to be aware what they are dividing (stacks of 100, stacks of 10 and single sheets) and have them explain that quotients will be written in which place values.

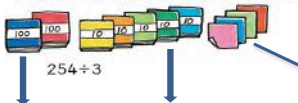
## Sample Blackboard Plan

**Date:**
**Chapter:** 5 Division by One – Digit Number.
**Topic:** The Calculation of (3- Digit Number ) ÷ (1 Digit Number)
**Lesson No:** 2/3

**Main Task: Let's think about how to divide in vertical form by splitting bundles of hundreds into tens and splitting bundles of 10 into single sheets**

MT: Introduce main task here.

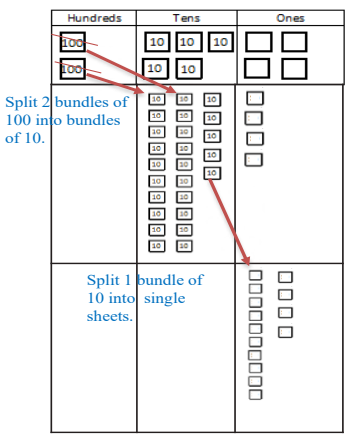
[4] There are 254 sheets of colored paper. If they are divided equally among 3 children, how many sheets will each child receive and what is the remainder?

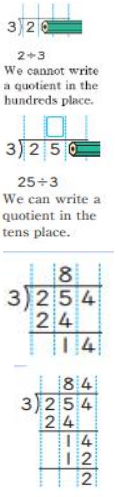



2 bundles of 100 | 5 bundles of 10 | 4 single sheets

[4] (1) Can you divide the paper without opening the bundles of 100?
▪639 ÷ 3 was divided using bundles of 100, bundles of 10 and single sheets.
▪536 ÷ 4 was divided in the same way but the remainder is moved to the lowest place value.
**▪254 ÷ 3 has 2 bundles of 100 but cannot be divided without opening the bundles of 100.**

[4] (2) How to Divide 254÷ 3 in Vertical Form.




Exercise

① 316÷4 ② 552÷6
③ 173÷2 ④ 581÷9

# Unit 5

# Unit: Division by 1-digit Numbers
## Sub-unit: 3. The Calculation of (3-digit Numbers)÷(1-digit Number)
## Lesson 3 of 3 (Double Period)

Textbook Page : p.46
Actual Lesson 026

## Lesson Objectives

- To calculate (3-digit number)÷(1-digit number) in vertical form which quotients have empty places.
- To check quotients and remainders.
- To do easy calculations of (2-digit number)÷(1-digit number) mentally.

## Prior Knowledge

- (3-digit number)÷(1-digit number) in vertical form which quotients are 2 or 3-digit numbers.(Previous lesson)

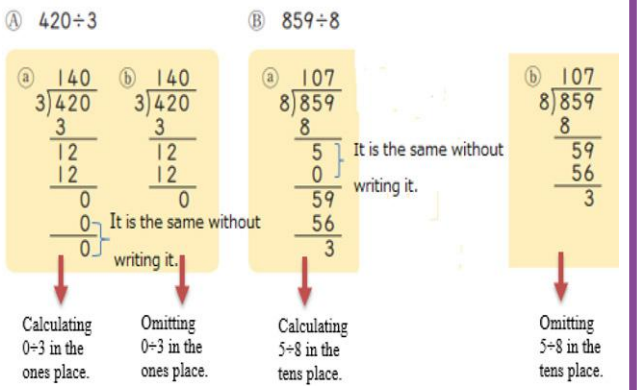
## Preparation

- Refer to board plan.

## Assessment

- Think about how to calculate (3-digit number)÷(1-digit number) which quotient of tens place or ones place becomes 0. F
- Do the exercises correctly. S

## • Teacher's Notes •




Calculations of (3-digit number) ÷ (1-digit number) = (3-digit number) in vertical from which quotients have empty places.

**5** The answers of these 2 division problems were calculated as follows.

Ⓐ 420÷3 Calculating 0 ÷ 3 in the ones place

Ⓑ 859÷8 Calculating 5 ÷ 8 in the tens place

ⓐ 140 / 3)420 / 3 / 12 / 12 / 0 / 0 / 0

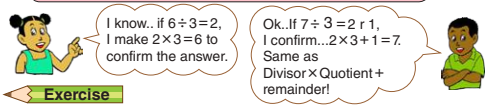
ⓑ 140 / 3)420 / 3 / 12 / 12 / 0 omitting 0 ÷ 3 in the one place

ⓐ 107 / 8)859 / 8 / 5 / 0 / 59 / 56 / 3

ⓑ 107 / 8)859 / 8 / 59 / 56 / 3 omitting 5 ÷ 8 in the tens place

1. How to find the answers in vertical form.
2. Check the answers as follows.

(Divisor × Quotient) + (Remainder) = (Dividend)

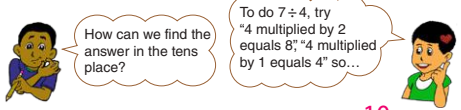



**Exercise**

① 740÷2 370
② 650÷5 130
③ 840÷6 140
④ 810÷3 270
⑤ 742÷7 106
⑥ 618÷3 206
⑦ 958÷9 106 r 4
⑧ 825÷4 206 r 1 , 4 × 206 +1

Mental Arithmetic — Mental calculations of (2-digit number) ÷ (1-digit number)

Let's solve 72÷4 mentally.




4 multiplied by 1 equals 4.....by 8 equals 32

72÷4 < 40÷4 → 40=4×10 → 10 ; 32÷4 → 32=4×8 → 8 ; Total → 18

46 = □ + □

## Lesson Flow

### 1 5 1 Compare ⓐ and ⓑ on how to calculate Ⓐ.

T Introduce main task.

S As for the ones place of ⓐ, write a quotient of 0 by 0÷3.
3×0=0, 0−0=0

TN A Typical error is that students do not write quotient 0 in ones place. Remaind them to write 0 in ones place as quotient.

S As for the ones place of ⓑ, write a quotient of 0 by 0÷3. Omit the rest of the calculation.

T Let students realise that 3×0=0 and 0−0=0 is omitted for ⓑ and let them understand that it can be omited.

TN A Typical error is that students do not write quotient 0 in tens place.
Teacher must remind them to write 0 in tens place as quotient.

### 2 Compare ⓐ and ⓑ on how to calculate Ⓑ.

S As for the tens place of ⓐ, write a quotient of 0 by 5÷8.
8×0=0, 5−0=5

S As for the tens place of ⓑ, write a quotient of 0 by 5÷8. The rest calculation is the ones place

T Let students realise that 8×0=0 and 5−0=5 is omitted for ⓑ and have them understand that it can be omited.

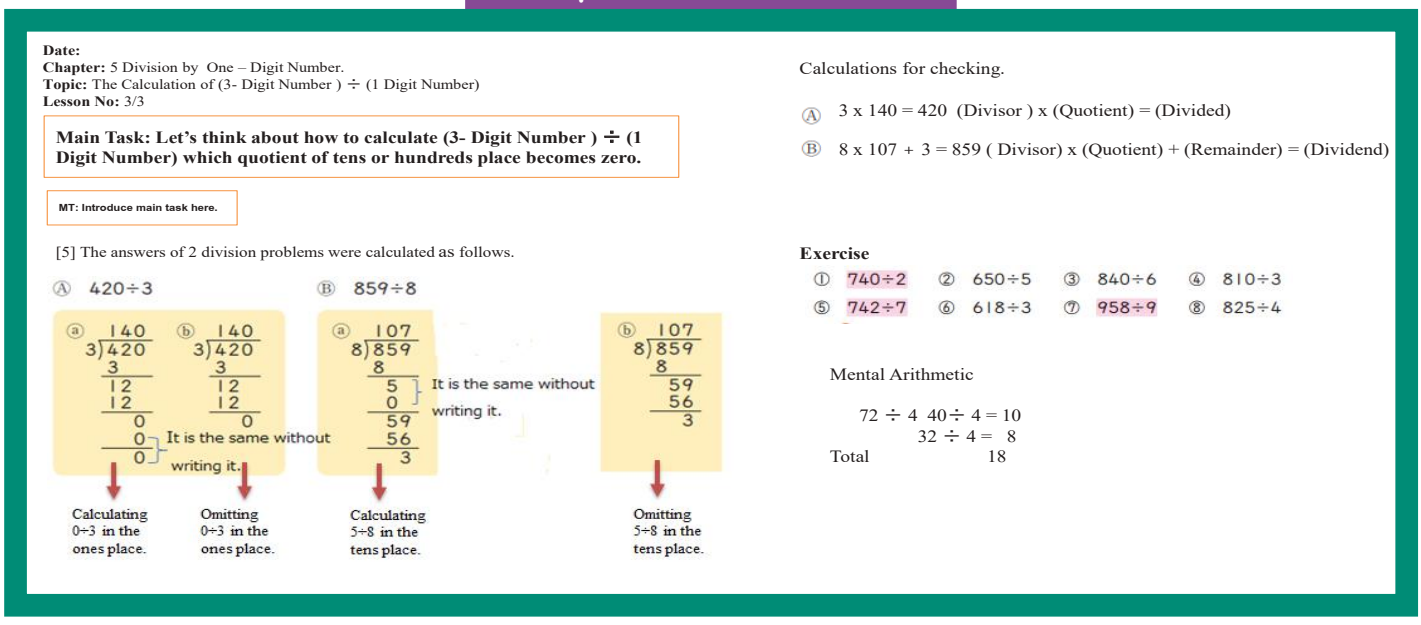
### 3 2 Recall how to check division and check.

### 4 Do the Exercise.

### 5 Think about how to calculate (2-digit number)÷(1-digit number) with borrowing mentally.

T Remind students to be careful not to make mistakes of numbers borrowed.

## Sample Blackboard Plan



# Unit 5

# Unit: Division by 1-digit Numbers
## Sub-unit: 4. What Kind of Expression?
## Lesson 1 of 1 (Single Period)

Textbook Page : p.47
Actual Lesson 027

## Sub-unit Objectives

- To decide operations for situations of multiplication or division.

## Lesson Objectives

- To capture a relation among quantity through word problems and diagrams, decide whether it will be division or multiplication, draw the diagrams and make mathematical expression.

## Prior Knowledge

- Dividing in vertical form with using concrete objects, diagrams and expressions by linking with concrete situations. (Grade 4)

## Preparation

- Papers on which problems in the text book are written and tape-diagrams.

## Assessment

- Think about situations applicable for multiplication and division by using words and diagrams as hints. F
- Decide which operation will be used, division or multiplication. F
- Solve the problems correctly. S

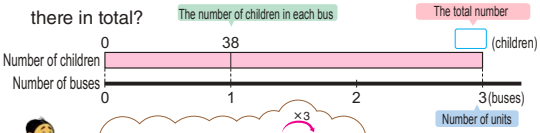
### • Teacher's Notes •

Use the tape diagram and the table for explanation so it can help students to understand, make mathematical expressions and solve the word problems.

Word problems to which multiplication is applied.

### 4 What Kind of Expression?

**1** The fourth grade children went for a field trip in 3 buses. There were 38 children on each bus. How many children were there in total?



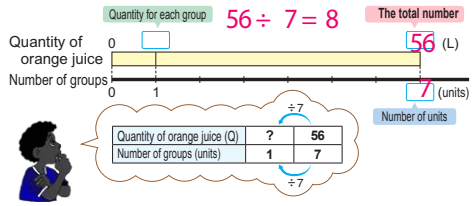
| | | |
|---|---|---|
| Number of children (children) | 38 | ? |
| Number of buses (buses) | 1 | 3 |

×3 ×3

Volume
Decilitre (dl)= $\frac{1}{10}$ Litre

**2** There is 56 dL of orange juice. The juice is divided among 7 groups. How much will each group receive?

1. What is known? Total amount of Juice (total amont ) and number of quantity)
2. What do you want to know? Amount of Juice for a group.
3. Write what is known in the diagram and find the answer.






| | | |
|---|---|---|
| Quantity of orange juice (Q) | ? | 56 |
| Number of groups (units) | 1 | 7 |

÷7 ÷7

**3** 48 boys are participating in a competition. If each group has 4 boys, how many groups are there?

Word problems to which divisions applied (mesurment divisions)

1. What is known? What do you want to know? Total number of boys and the number of boys in each group
2. Write what is known in the diagram and find the answer.

48÷4 = 12 12 group s

□ × □ = 47

## Lesson Flow

### 1 Review previous lesson.

### 2 ① Make an expression by using tables and tape diagrams and solve the problem.

T Introduce the main task.
T Have students come up with 38×3.
T Let's think why it will be multiplication.
S Because total number is calculated if looking at the picture.
S Multiplication can be used because a number of children for each bus is equal.
T Check the answer. 114 children

### 3 ② Make an expression by using tables and tape diagrams and solve the problem.

T Have students come up with 56÷7. Solve ①-②.
T Let's think why it will be division.
S Because quantity for each group is calculated by dividing 56 equally by 7 groups if looking at the picture.
T Check the answer. 8 dL

### 4 ③ Make an expression and solve the problem.

S Read the problem ③ and draw a diagram.
T Have students come up with 48÷4. Solve ①-②.
T Let's think why it will be division.
S Because a number of groups is calculated by dividing children equally.
T Check the answer. 12 groups.

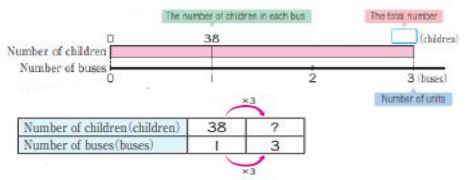
## Sample Blackboard Plan

**Date:**
**Chapter:** 5 Division by One – Digit Number.
**Topic:** What kind of expression. **Lesson No:** 1/1

**Main Task: Let's think about how to calculate and solve word problems using the tape diagrams and table of values.**

MT: Introduce main task here.

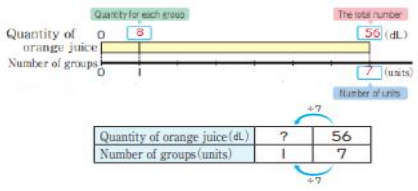
[1] The fourth grade children went for a field trip in 3 buses. There were 38 children on each bus. How many children were there in total?




The word problem to which Multiplication is applied.
The Mathematical Expression 38 x 3
Mathematical Sentence 38 x 3 = 114
Answer: 114 children

[2] There is 5 dL of orange juice. The juice is divided among 7 groups. How much will each group receive?

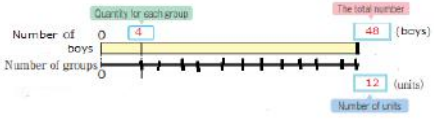
(1)What is known?
▪Word problem to which division is applied.
▪Total amount of juice and number of quantity.
(2) What do you want to know?
▪Amount of juice for a group.
(3) Write what is known in the diagram and find the answer.




56 ÷ 7 = 8 Answer 8 dL

[3] 48 boys are participating in a competition. If each group has 4 boys, how many groups are there?

(1)What is known?
▪Word problem to which division is applied.
▪Total participants and number per unit..
What do you want to know?
▪Total unit.
(2) Write what is known in the diagram and find the answer.




| Number of participants( boys) | 4 | ÷4 | 48 | ÷4 |
|---|---|---|---|---|
| Number of groups | 1 | | 12 | |

48 ÷ 4 = 12 Answer 12 groups

÷4

# Unit 5

# Unit: Division by 1-digit Numbers
## Sub-unit: Exercise and Evaluation
## Lesson 2 of 2 (Double Period)

Textbook Page :
p.48-p.49
Actual Lesson 028

## Lesson Objectives

- Deepen the understanding of things learned in this unit.

## Prior Knowledge

- All the contents in this unit.

## Preparation

- Evaluation sheet for all the students

## Assessment

- Complete the exercise and evaluation correctly.
  F S

## • Teacher's Notes •

Use 30 minutes for the exercise and give the evaluation test after that.

### Exercise

Vertical division

**1** Let's calculate. Pages 37 ~ 42

① 78 ÷ 3 = 26
② 96 ÷ 8 = 12
③ 38 ÷ 2 = 19
④ 55 ÷ 5 = 11
⑤ 48 ÷ 4 = 12
⑥ 77 ÷ 6 = 12 r 5
⑦ 56 ÷ 3 = 18 r 2
⑧ 90 ÷ 7 = 12 r 6
⑨ 83 ÷ 2 = 41 r 1
⑩ 65 ÷ 3 = 21 r 2
⑪ 98 ÷ 9 = 10 r 8
⑫ 81 ÷ 4 = 20 r 1

**2** Let's calculate. Pages 43 ~ 46

① 548 ÷ 4 = 137
② 259 ÷ 7 = 37
③ 624 ÷ 3 = 208
④ 367 ÷ 9 = 40 r 7
⑤ 457 ÷ 6 = 76 r 1
⑥ 543 ÷ 5 = 108 r 3
⑦ 963 ÷ 8 = 20 r 3
⑧ 728 ÷ 6 = 121 r 2

**3** Salomie and her 5 friends are going to fold 360 paper flowers. If everybody folds the same number of paper flowers, how many paper flowers will each child make? Page 47

360 ÷ 6 = 60
A. 60 flowers

Word problems using 4 operations (+ , − , × , + , ÷ )

**4** There are 436 pencils as prizes for a school competition. The pencils are divided into sets of 3. How many sets of pencils are there? How many more pencils are needed to make 150 sets. Page 47

436 ÷ 3 = 145 remainder 1
A. 145 sets of pencils
3 x 150 = 450
450 - 436 = 14

**5** You are making a square using a 64 cm string. How long is one side? Page 47

64 ÷ 4 = 16
Answer 16cm

48 = □ + □

### Problems

**1** Let's think about how to divide 293 ÷ 3 in vertical form.
● Understanding how to calculate in vertical form.

① The first place of the quotient is the tens.
② The remainder of 2 in the tens place means 2 sets of 10.
③ The calculation in the ones place is 23 ÷ 3.

| | | 9 | 7 |
|---|---|---|---|
| 3 | 2 | 9 | 3 |
| − | 2 | 7 | |
| | | 2 | 3 |
| | | 2 | 1 |
| | | | 2 |

**2** Let's divide in vertical form.
● Understanding how to calculate (2-digit) ÷ (1-digit) and (3-digit) ÷ (1-digit) in vertical form.

① 34 ÷ 4 = 8 r 2
② 50 ÷ 6 = 8 r 2
③ 72 ÷ 5 = 14 r 2
④ 86 ÷ 2 = 43
⑤ 59 ÷ 4 = 14 r 3
⑥ 70 ÷ 5 = 14
⑦ 97 ÷ 6 = 16 r 1
⑧ 67 ÷ 3 = 22 r 1
⑨ 174 ÷ 6 = 29
⑩ 759 ÷ 4 = 189 r 3
⑪ 589 ÷ 7 = 84 r 1
⑫ 177 ÷ 3 = 59
⑬ 828 ÷ 3 = 276
⑭ 240 ÷ 5 = 48
⑮ 914 ÷ 7 = 130 r 4
⑯ 528 ÷ 5 = 105 r 3

**3** There are 125 children who must race in groups of 6.
● Understanding how to make expression and the meaning of remainders.

① How many groups of 6 are there?
125 ÷ 6 = 20 r 5
Answer 20 groups
② If they make a group with the remainder, how many children are there in that group? 5 children

**4** Find all whole numbers in which the quotient will be 8 when divided by 6. □ ÷ 6 = 8
● Understanding the relationship between multiplication and division.
Answer 48, 49, 50, 51, 52, 53

□ × □ = 9

## Lesson Flow

**1** ① **Division of (2-digit)÷(1-digit) with or without remaindar.**

**2** ② **Division of (3-digit)÷(1-digit) with or without remaindar.**

**3** ③ **Word problem of division.**

**4** ④ **Word problem using four operation.**

**5** ⑤ **Word problem of division.**

**6** ① **How to calculate division in vertical form.**

**7** ② **Division of (2-digit)÷(1-digit) and (3-digit)÷(1-digit) in vertical form.**

**8** ③ **Word problem of division.**

**9** ④ **Understand the relation between divisor, dividend, and remainder.**

TN Extended their understanding of the relationships between divisor, dividend and remainder.

**10** **Complete the evaluation sheet.**

T Distribute a evaluation sheet to all students.

S Complete the sheet and submit to the teacher.

| Division by 1- digit No. | Name: | Score |
|---|---|---|
| | | |

(Each question is worth 5 points)

1. Calculate using vertical division.

① 48 ÷ 4 — 12

② 87 ÷ 7 — 12 r 3

③ 62 ÷ 3 — 20 r 2

④ 264 ÷ 2 — 132

⑤ 630 ÷ 9 — 70

⑥ 644 ÷ 4 — 161

2. We want to divide 36 coloured papers equally among 3 people. How many papers will each person receive?

Math sentence: 36 ÷ 3 = 12 Answer: 12 papers

3. We want to divide 484 people into 4 groups. How many people will be in each group?

Math sentence: 482 ÷ 4 = 120 Answer: 120 people

**End of Chapter Test: Chapter 5** **Date:**

| Division by 1- digit No. | Name: | Score |
|---|---|---|
| | | |

(Each question is worth 5 points)

1. Calculate using vertical division.

① 48 ÷ 4 ② 87 ÷ 7 ③ 62 ÷ 3

④ 264 ÷ 2 ⑤ 630 ÷ 9 ⑥ 644 ÷ 4

2. We want to divide 36 coloured papers equally among 3 people. How many papers will each person receive?

Math sentence: _____ Answer: _____

3. We want to divide 484 people into 4 groups. How many people will be in each group?

Math sentence: _____ Answer: _____

# Chapter 6 Quadrilaterals

## 1. Unit Objectives

- To focus on properties and the positional relation of shapes and to deepen an understanding of shapes activities to observe and compose shapes.(4.3.1. a and c)
- To understand relation of parallel and perpendicular line.(4.3.1.b)
- To know parallelogram, rhombus and trapezium.(4.3.1.c)
- To draw patterns using one place of quadrilateral. (4.3.1 d)

## 2. Teaching Overview

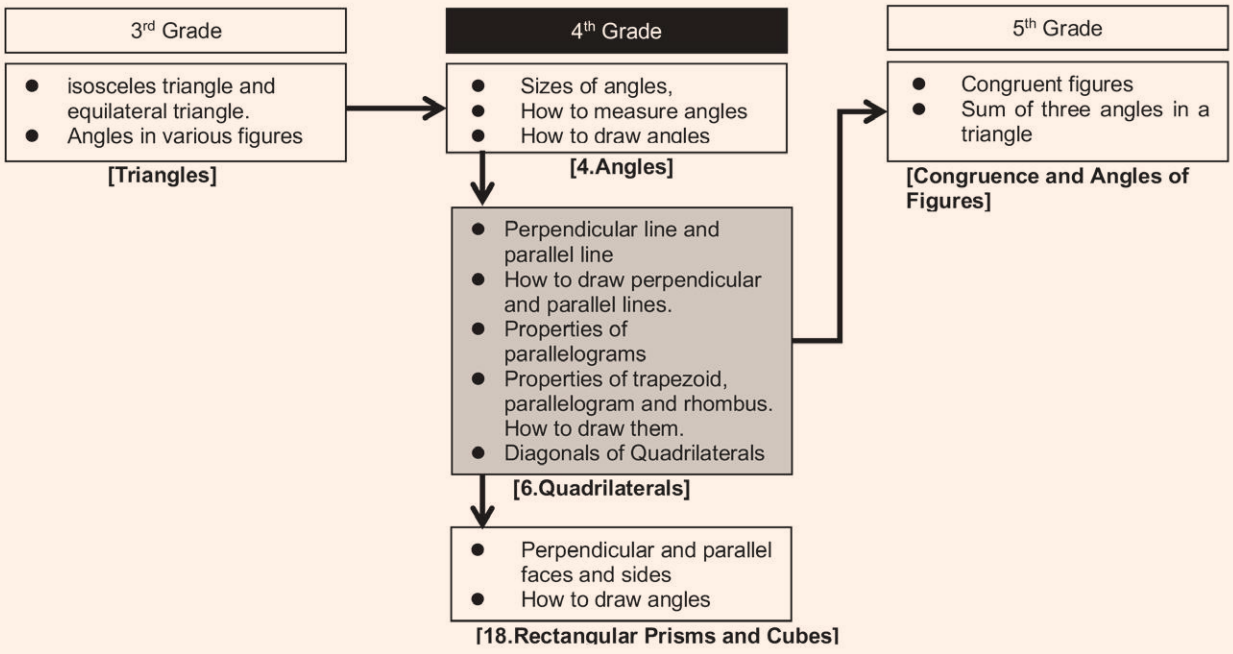
In this topic, learners analytically pay attention to perpendicular and parallel relationships between 2 lines. Then they study quadrilaterals by focusing on sides facing each other and diagonals.

**Perpendicular Lines:** Students should be able to draw accurate perpendicular lines. They should know the difference of 2 perpendicular lines and a right angle.

**Parallel Lines:** Students should be able to draw accurate parallel lines with correct knowledge of definitions. For construction of perpendicular and parallel lines, they should get used to all methods.

**Various Quadrilaterals and Diagonals of Quadrilaterals:** Firstly, student should understand the definitions of each quadrilateral, NOT by looking only. Quadrilaterals should be categorised by focusing on relationships of sides and diagonals. Diagonals bring another perspective of analysing quadrilaterals.

## 3. Related Leaning Contents



# Unit 6

# Unit: Quadrilaterals
## Sub-unit: 1. Perpendicular Lines
## Lesson 1 of 3 (Double Period)

Textbook Page : p.51~p.52
Actual Lesson 029

## Sub-unit Objectives

- To understand a relation of parallel and perpendicular lines.
- To know about parallelogram, rhombus and trapezoid.

## Lesson Objectives

- To make quadrilaterals by using dotted lines.
- To categorise quadrilaterals based on properties of length and angle(90°).

## Prior Knowledge

- Learned knowledge in Grade 2 on Squares, Rectangles and Right Angles
- Meaning and Properties of Squares and Rectangles.
- Understanding the meaning of right angles from characteristics of squares and right-triangles.

## Preparation

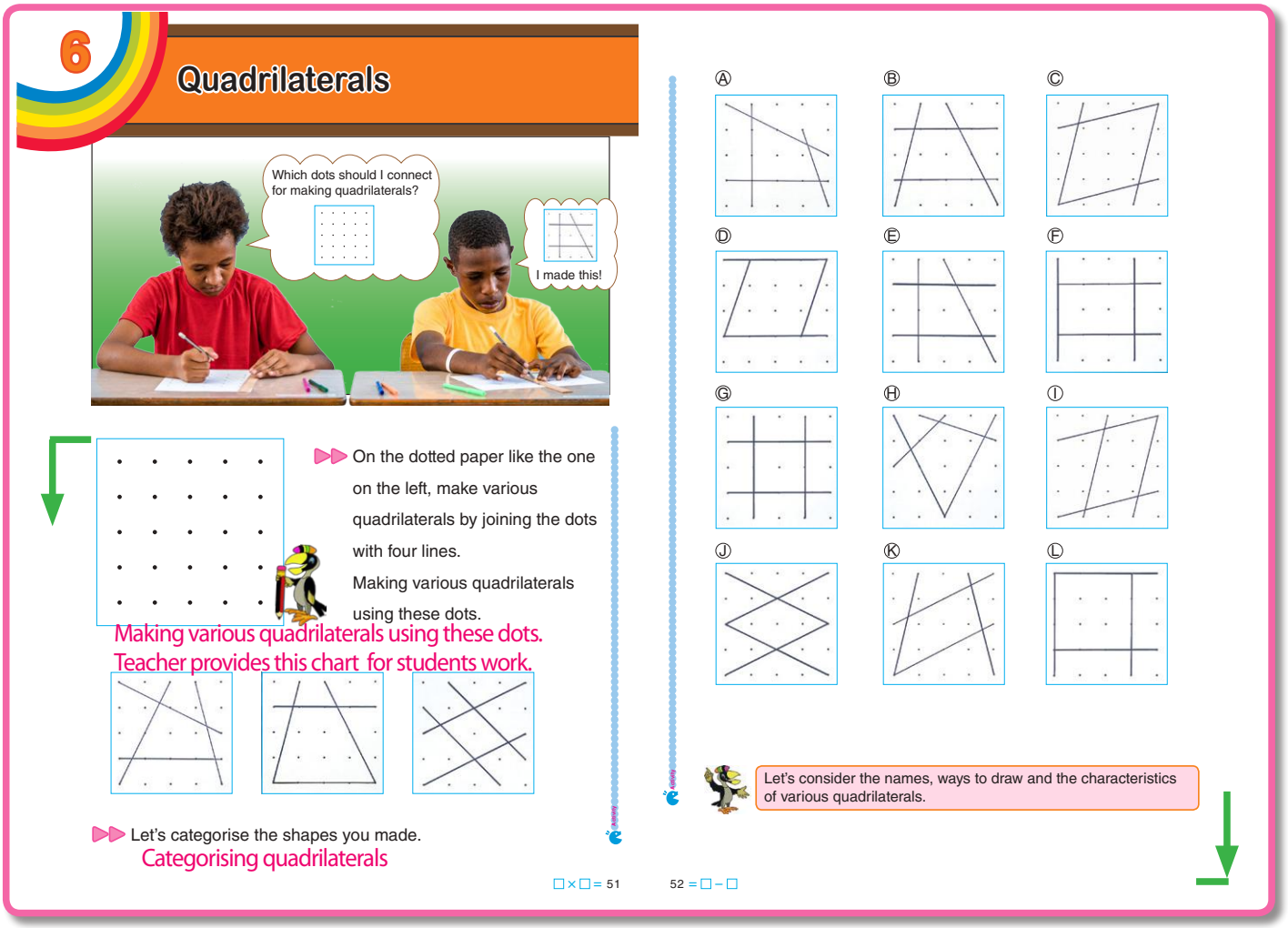
- Cards of dotted diagrams (for students), dotted diagram for putting on the board (for teachers), dotted diagrams on which triangles are drawn for a demonstration, sets of triangle rulers, protractors and compasses.

## Assessment

- Enjoy making quadrilaterals by using dotted line identifying common characteristics of quadrilaterals based on side length and angle size. F
- Categorise quadrilaterals according to their properties of length of sides and angles. S

## • Teacher's Notes •

- Quadrilaterals are said to be shapes fetched in by four lines (sides).
- Remind and emphasise to students that when considering the length of sides, they should not think about the extended lines as part of the length of sides.
- Avoid giving the text books prior to the activities as students may be tempted to copy directly from the book and discourage creativity and thinking.



## Lesson Flow

### 1 Have an interest in making quadrilaterals and draw them using dotted paper.

T Introduce the main task.

S Name the different types of triangles drawn on dotted paper and explain their properties/ definitions as review.

T "Why is it called an Equilateral, Isosceles or Regular/Right triangle?"

TN Briefly review squares and rectangles as quadrilaterals and draw and give an example of a quadrilateral with emphasis on the 4 lines(sides).

- Emphasise that quadrilaterals are 4 sided figures with drawing of 4 straight lines.

S Understand and make various quadrilaterals by joining dots with four lines as sides.

### 2 Draw as many various quadrilaterals as possible in dotted diagrams.

S Draw different quadrilaterals following the example drawn by the teacher.

TN Instruct students to create their own quadrilaterals apart from rectangles and squares.

### 3 Categorise quadrilaterals drawn on p.52 on the blackboard by focusing on lengths of sides and the size of angles.

TN Through comparing pairs of quadrilaterals at a time, the figures can be placed into groups according to similarity.

S Discuss, confirm and categorise the quadrilaterals in the following groups.
Answer:

- Quadrilaterals with all sides having different lengths (A,B,H,E,K)
- Those with lengths of all four sides equal (C,G,L and J)
- Those with sides facing each other equal (C,D,F,G,I,J and L)
- Those with right angles (E,F,G and L)

T "Which group does your quadrilateral belong to? Why?

### 4 Discuss what is understood when categorising quadrilaterals.

S Discuss freely such as, quadrilaterals can be categorised in various ways depending on the properties of sides and angles.

S Discuss and identify that quadrilaterals could also be categorised under more than one group, such as four quadrilaterals with four equal sides and also with right angles.

T 'What do you think are we going to learn in this unit?'

### 5 Summarise learning the lesson.

S Confirm quadrilaterals already learnt (quadrate and rectangle), try to increase in identifying other quadrilaterals also.

T Confirm what is going to be learnt in this unit such as; Names of quadrilaterals, how to draw and characteristics of quadrilaterals.

T Provide opportunities to discuss in groups first then in class.

T Raise such discussions that quadrilaterals could also be categorised under more than one group, such as four quadrilaterals with four equal sides and also with right angles.

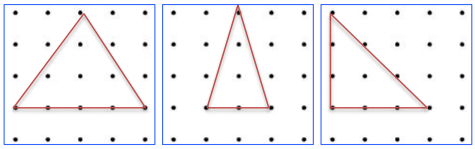
## Sample Blackboard Plan

**Date:** **Chapter:** 6 Quadrilaterals **Topic:** Perpendicular Lines **Lesson Number:** 1/3

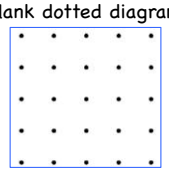
MT Let's categorise quadrilaterals by the length of sides and size of angles

Examples of triangles and dotted diagrams.

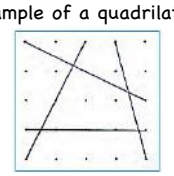
Equilateral Triangle | Isosceles Triangle | Regular or right Triangle



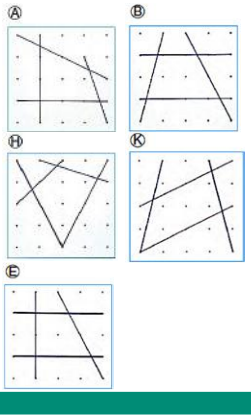
Blank dotted diagram



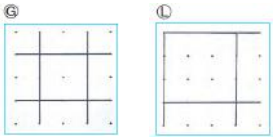
Example of a quadrilateral



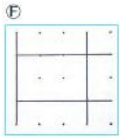
Quadrilaterals with all sides Having different lengths




Quadrilaterals with lengths of all 4 Sides are equal.




Quadrilaterals with right angles



# Unit 6

# Unit: Quadrilaterals
## Sub-unit: 1. Perpendicular Lines
## Lesson 2 of 3 (Double Period)

Textbook Page : p.53-p.54
Actual Lesson 30

## Lesson Objectives

- To understand the meaning of perpendicular
- To investigate perpendicular lines.

## Prior Knowledge

- Various quadrilaterals (Previous lesson)

## Preparation

- Dotted diagrams (for students), dotted diagram E for putting on the blackboard (for teachers), triangle rulers and protractors.

## Assessment

- Think about the perpendicular line. F
- Enjoy finding perpendicular line in their classroom. F
- Identify perpendicular lines. S

## • Teacher's Notes •

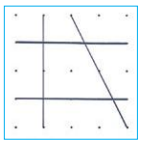
Terms of perpendicular to be learnt in the lesson are terms to express positional relations of two lines. The concept of perpendicular cannot be made only by observation of introduction but through confirming shapes of quadrates and rectangles and a relation of two lines intersected made by folding papers, and through drawing them using protractors and triangle rulers.
Examples of introduction can be thought as to take out two lines from blackboards, window frames and desks, etc for students to observe.
Lines not intersecting are also called perpendicular because lines are determined to be extended infinitely. Perpendicular is expressing a relationship of forming a right angle by two lines.
Use learnt ideas from previous grades on how to make right angles by folding paper or using a set square or protractor to determine 90° as right angle.
Students should understand that perpendicular is expressing a positional relationship of two lines intersecting at a right angle and right angles are the size of angles.

## 1 Perpendicular Lines

How two lines intersect each other.

**1** Let's explore quadrilateral Ⓔ on page 52.

Ⓔ

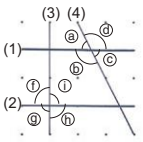


(1) At what angle do the two lines (1) and (4) intersect? 62°and 118°

Measure angles ⓐ, ⓑ, ⓒ and ⓓ.

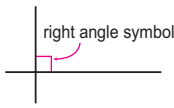
a 62° b 118° c 62° d 118°

(2) At what angle do the two lines (2) and (3) intersect? Right angles (90°): f, g, h, i




Intersecting lines are lines that cross over each other!

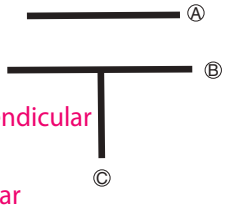
Two lines are **perpendicular**, if they intersect at a right angle. **Perpendicular** lines meet at right angle.




The two lines (2) and (3) are perpendicular.

### Perpendicular of two lines which are not intersecting.

**2** The diagram on the right shows three lines Ⓐ, Ⓑ and Ⓒ.



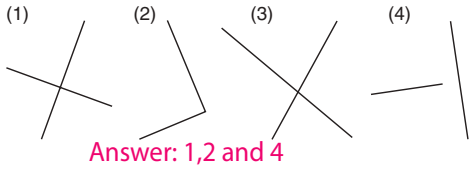

(1) If line Ⓑ and Ⓒ intersect at a right angle, what are they called? Perpendicular

(2) If you extend the line Ⓒ to Ⓐ, line Ⓒ and Ⓐ are Perpendicular

If the extended line of one line intersects perpendicularly with the other line, even if we cannot see the intersection point itself, the two lines are perpendicular.

### Determining perpendicular lines.

**3** Which lines are perpendicular?




Answer: 1,2 and 4

**4** Let's fold a paper to make perpendicular lines.

### Making perpendicular lines using paper.

### Let's Find Perpendicular Lines

Using the folded paper in 4, right angle of exercise books and triangular rulers, let's find perpendicular lines around us.

□ × □ = 53　　54 = □ − □

## Lesson Flow

### 1 Complete exercise 1 1 and 2 to find how lines intersect by using protractors.

T Introduce the main task.

TN Assist students to understand the term “Intersect” also to identify the intersecting points.

S Find the angle of two lines that intersect using protractors.

S Confirm that lines (1) and (4) have angles of 62° and 118°.

S Confirm that four angles are 90° and intersect at right angles for lines (2) and (3).

### 2 Know the term “perpendicular”.

S Students understand that perpendicular is expressing a positional relation of two lines intersecting at a right angle and right angles are the size of angles made when two lines intersect.

### 3 Complete activities 2 1 and 2 by extending line (C) to understand perpendicular.

S Discuss how they can determine and confirm that line (A) and (C) are perpendicular.

T “Why are lines (A) and (C) perpendicular lines?”

TN Some students will see the lines (A) and (C) as not perpendicular. Confirm that the two lines will intersect and be perpendicular by extending line (C).

### 4 Complete activity 3 (1) - (4) to find which lines are perpendicular and discuss why

S Find out whether lines are intersecting at right angles or not by using protractors and triangle rulers in order to determine perpendicular and how to make them.

S Explain why(1), (2) and (4) are perpendicular and (3) is not.

TN For students who do not see (2) and (4) as intersecting, explain that in such cases also, two lines are intersecting and perpendicular by extending the lines.

### 5 Complete activity 4 by folding a paper to make right angle and two lines intersecting at a right angle.

S Discuss why (a) and (b) are called perpendicular and confirm by using protractors.

TN Folded papers can be used as right angles for finding pairs of perpendicular lines.

### 6 Do the activity on “finding perpendicular lines”.

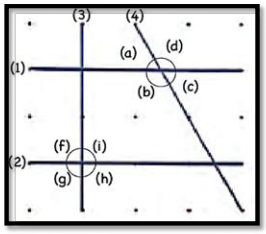
S Find perpendicular lines in the classrooms or playground by using the folded papers and triangle rulers.

## Sample Blackboard Plan

**Date:** **Chapter:** 6 Quadrilaterals **Topic:** Perpendicular Lines **Lesson:** 2/3

MT Let’s find out about angles where two lines intersect

1 Let’s explore quadrilateral Ⓔ on page 52.



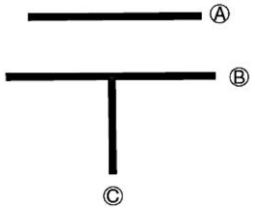

1 At what angle do the two lines (1) and (4) intersect? Angle (a) and (d)

2 At what angle do the two lines (2) and (3) intersect Angle (f) and (i)

Two lines are **perpendicular**, if they intersect at a right angle. **Perpendicular** lines meet at right angle.

the right angle symbol

2




1 If line Ⓑ and Ⓒ intersect at a right angle, what are they called? Perpendicular lines

2 If you extend the line Ⓒ to Ⓐ, line Ⓒ and Ⓐ are Perpendicular.

SUMMARY
If the extended line of one line intersects perpendicularly with the other line, even when we cannot see the intersecting point itself, the two lines are perpendicular

# Unit 6

# Unit: Quadrilaterals
## Sub-unit: 1. Perpendicular Lines
## Lesson 3 of 3 (Double Period)

Textbook Page : p.55~p.56
Actual Lesson 31

## Lesson Objectives

- To understand how to draw perpendicular lines.

## Prior Knowledge

- Definition of perpendicular line (Previous lesson)

## Preparation

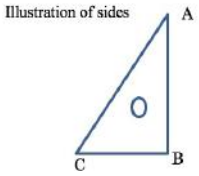
- Worksheets (on which a few lines a-b are drawn), protractors, triangle rulers and grid sheets.

## Assessment

- Explain how to draw perpendicular lines and try to draw it step by step. F
- Draw perpendicular lines using a protractor or triangle ruler through a point on a line or outside of the line. S

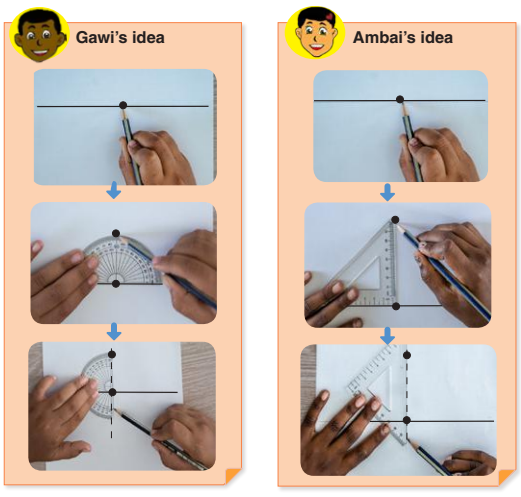
## • Teacher's Notes •

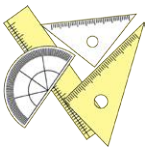
Many students may have difficulty in drawing with Ambai's idea on page 55 because they may not put the side BC of the triangle ruler in the diagram 1 on the right over the line ab correctly. In order to confirm and ensure accuracy, it is important to put the side BC of the set square over the line ab properly. The operation can also be effective if another triangle ruler or ruler is used as a supplementary as shown in diagram 2.
Note that activity 3 illustrates sliding of the protractor to confirm perpendicularity of lines.

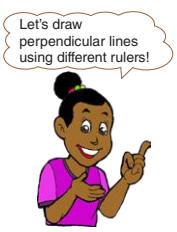



### How to draw perpendicular lines.

**5** Let's explore how to draw a perpendicular line.



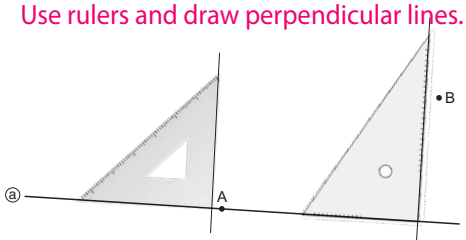



### How to draw a lines passing through a point and perpendicular to the other.

**6** Draw a line that is:

1. Perpendicular to line ⓐ and passes through point A.
2. Perpendicular to line ⓐ and passes through point B.

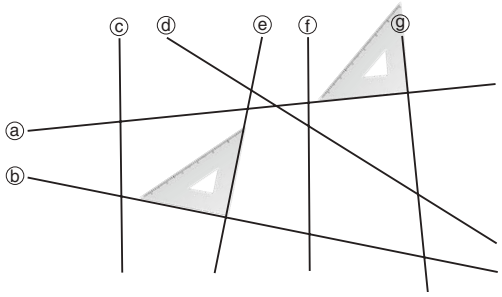
Use rulers and draw perpendicular lines.




Identify perpendicular lines using learning skills by utilising set squares, and rulers.

**Exercise**

Which lines are perpendicular?




Answer: b and e, a and g

□ × □ = 55  56 = □ − □

## Lesson Flow

### 1 5 Think about how to draw perpendicular lines.

T Introduce the main task.

S Draw their own perpendicular lines based on the meaning learned in the previous lesson.

TN Help students to understand that because 90° is to be measured as the definition of perpendicular, it is important to use protractors and triangle rulers.

S Explain how they drew their perpendicular lines. Using the instrument.

### 2 Discuss the three ideas of drawing and explain why the lines are perpendicular.

S Explain the ideas first before the teacher confirms and explains.

1. Gawi's idea First, draw the first line and decide an intersection point. Next, measure 90° with a protractor and decide a direction of the second line. The two lines intersect perpendicularly.
2. Ambai's idea First, draw the first line and decide an intersection point. Next, decide a direction of second line by putting the 90° angle of a triangle ruler to intersect with the first line at 90°. The two lines intersect perpendicularly.

S Discuss how their answers are similar by comparing the 2 ideas.

### 3 Complete activity 6 1 and 2 to explore how to draw a perpendicular line when a point is determined on the line or a point is determined out of the line.

S Think about which of the two ways for drawing in section 5 might be used.

TN Provide students with worksheets when necessary.

### 4 Solve problems of the Exercise.

S Explain correctly why lines ⓐ ⓖ and ⓑ ⓔ are called perpendicular lines.

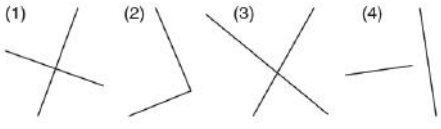
T Confirm with students that they understand how to draw based on the definitions of perpendicular.

## Sample Blackboard Plan

**Date:** **Chapter:** 6 Quadrilaterals **Topic:** Perpendicular Lines **Lesson:** 3/3

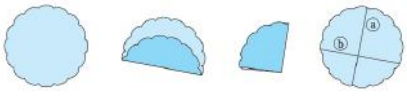
MT Let's think about how to draw perpendicular lines.

3 Which lines are perpendicular?

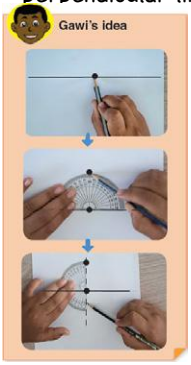



(1) And (4)

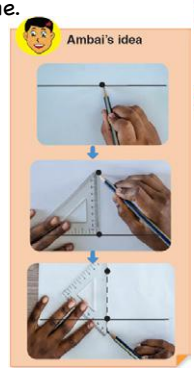
4 Let's fold papers to make perpendicular lines.




5 Let's explore how to draw a perpendicular line.




Which Measuring 90° with a protractor

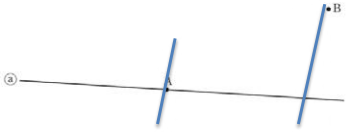



Using right angle of a triangle ruler

6 Draw a line test. That is:

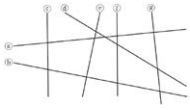
1 Perpendicular to line (a) that passes through point A.

2 Perpendicular to line (a) that passes through point B.




Exercise

Which lines are perpendicular?



(a) And (g)
(b) And (c)

# Unit 6

# Unit: Quadrilaterals
## Sub-unit: 2. Parallel Lines
## Lesson 1 of 2 (Double Period)

Textbook Page : p.57~ p.58
Actual Lesson 032

## Sub-unit Objectives

- To understand the meaning of parallel.
- To understand the characteristics of parallel lines.
- To understand how to draw parallel lines.

## Lesson Objectives

- To understand the meaning of parallel.

## Prior Knowledge

- Definition of perpendicular line.
- Meaning of right angles from characteristics of squares and right-triangles.

## Preparation

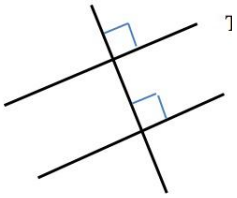
- Triangle rulers, protractors and rulers

## Assessment

- Identify the common characteristics of parallel lines. F
- Determine parallel lines based on angle properties. F
- Do the exercise correctly. S

## • Teacher's Notes •

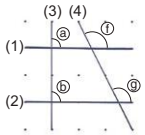
Define the perpendicular relationship first and then define the parallel relation as follows;
(1) If two lines cross at right angles, these two lines are called perpendicular.
(2) When there are two straight lines that are perpendicular to another, these two lines are parallel.
Two lines parallel



## 2 Parallel Lines

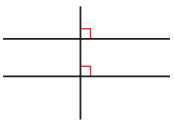
### 1 Definition of parallel lines.

Let's explore quadrilateral Ⓔ on page 52.



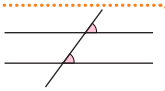

❶ What is the relationship of line (1), (2) and (3) when they intersect?
Perpendicular

Two lines are **parallel** when a third line crosses both lines at right angles.



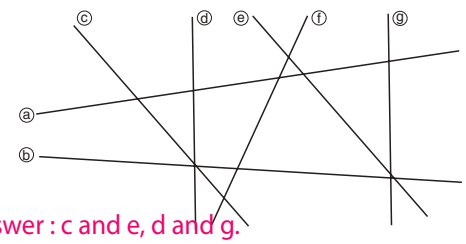
❷ The lines (1) and (2) are parallel lines.
Let's measure angles ⓕ and ⓖ and compare.
Angles (f) and (g) are 118°

Two lines which are intersected by a line at the same angles are parallel.



**Exercise** Use triangle rulers and find out!

Let's choose parallel lines.

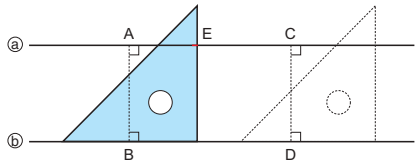



Answer : c and e, d and g.

### 2 Characteristics of Parallel lines.

In the diagram below, line ⓐ and ⓑ are parallel.

Let's consider the following.



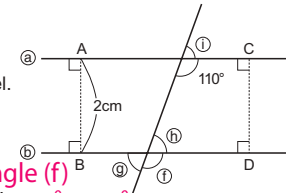

❶ Compare distances of AB and CD.
Both have the same distance of 2.5 cm.
❷ If you extend lines ⓐ and ⓑ, will they intersect?
NO
❸ When you place a triangle ruler on line ⓑ, it intersects line ⓐ at E. If you slide the ruler on line ⓑ, what will happen with point E?
The distance remains the same.

The distance between 2 parallel lines is equal at every point and they never cross no matter how far they are extended.

### 3 Let's find pairs of parallel lines from the quadrilaterals on page 52.

**Exercise**

Line ⓐ and ⓑ are parallel.
Find the sizes of angle ⓕ, ⓖ, ⓗ and ⓘ.
Find the length of line CD.




Angle 110° = Angle (f)
Angle (i) = 180° - 110° = 70°
Angle (i) = Angle (h) = Angle (g)
CD = 2 cm

□×□= 57

58 =□−□

## Lesson Flow

**1 1 1, 2 Investigate how a pair of lines is intersected using a protractor or ruler.**

T Introduce the main task.

T Let's find the angles of 2 lines intersected using protractors.

**2 Read and understand the term parallel.**

S Understand that when two straight lines are perpendicular to another line, they are called parallel lines.

S Know that two lines which are intersected by a line at the same angles are also parallel.

**3 Complete the Exercise by identifying parallel lines.**

T Identify parallel lines according to their angle properties using a protractor.

**4 Complete activity 2 1 2 and 3 to investigate the characteristics of parallel lines.**

S Use rulers, set squares and protractors to explore the characteristics of parallel lines.

T Let students identify and write down what they may discover from the activity.

S Understand that the distance between parallel lines is the same when measured at any point between the lines.

S Know that parallel lines will not intersect when extended.

S Confirm that parallel lines are intersected at the same angle.

T Let students explain the characteristics of parallel lines which have been identified.

**5 Conclude the main points of the characteristics of parallel lines.**

T Get students to understand that parallel lines do not cross when extended and that the distance between the 2 lines always remains the same at different points.

**6 Complete activity 3 to identify parallel lines from the quadrilaterals from page 56.**

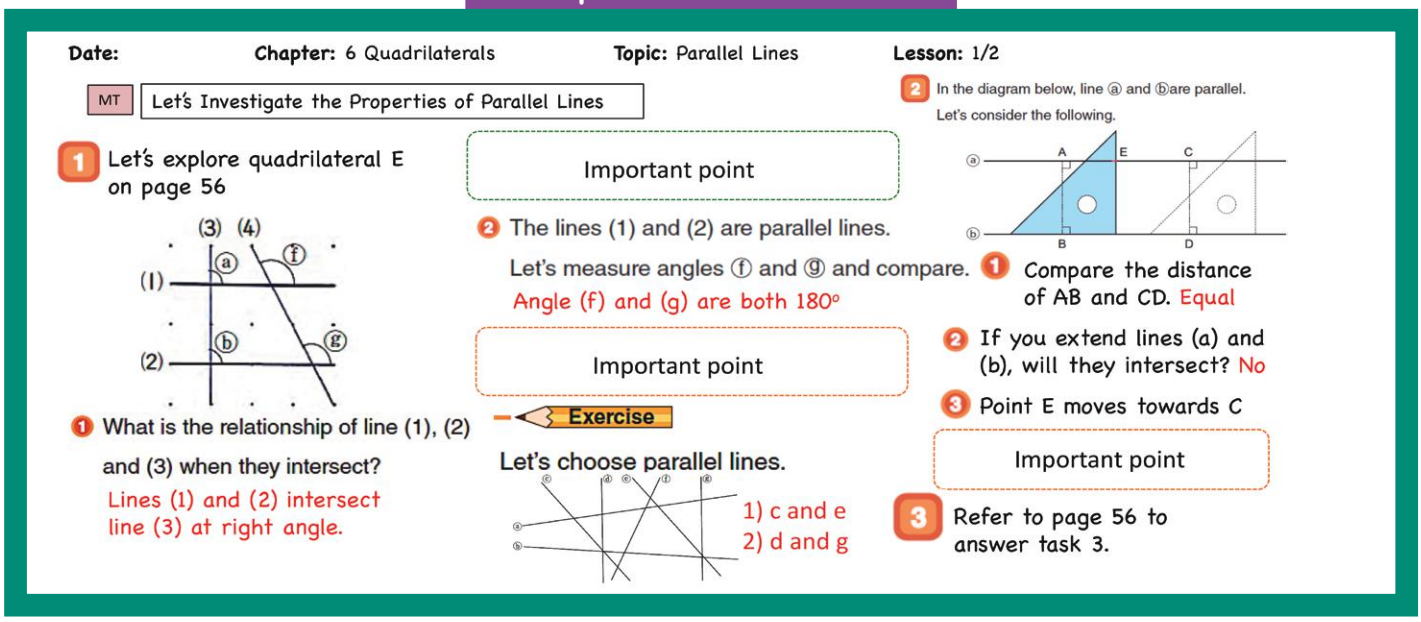
S Identify parallel lines by finding the distance between 2 parallel lines at different points

**7 Complete the Exercise to find angles and distance.**

S Understand that parallel lines are intersected through the same angle.

S Know that the distance between 2 parallel lines are equal at every point.

## Sample Blackboard Plan



# Unit 6

# Unit: Quadrilaterals
## Sub-unit: 2. Parallel Lines
## Lesson 2 of 2 (Double Period)

Textbook Page :
p.59~ p.60
Actual Lesson 033

## Lesson Objectives

- To understand how to draw parallel lines.
- To deepen the understanding of the characteristics and the relationship between parallel and perpendicular lines.

## Prior Knowledge

- Definition of perpendicular line and parallel line

## Preparation

- Set squares (triangle rulers), protractors and rulers

## Assessment

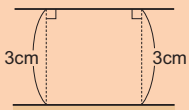
- Draw parallel lines based on angle properties and distance in various ways using protractors, set squares and rulers. F
- Do the exercise correctly. S
- Understand othe characteristics of parallel and perpendicular lines. F S
- Draw parallel and perpendicular lines using skills learned in this unit. F S

**4** Let's explore how to draw parallel lines.
Read Mero and Vavi's methods and explain the reason why their methods are appropriate.

ⓐ

**Mero's idea**

**Vavi's idea**




**5** Let's draw parallel lines.
① ⓐ and ⓑ which are 2 cm apart
② ⓒ and ⓓ which are 4 cm apart

(a)
(b) 2 cm
(c)
4 cm
(d)

**Exercise**

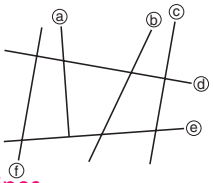
Let's draw lines with the following conditions.
① Draw a line which passes points A and parallel to line ⓐ.
② Draw two lines that are parallel to ⓐ and 2 cm apart.

(2)
(1)
A
2 cm
2 cm
ⓐ

□×□÷2

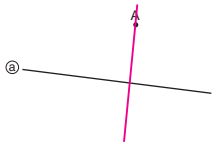
**Exercises**

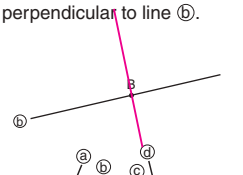
**1** Which lines are perpendicular?
Pages 53 ~ 56
a and e
c and d
d and f



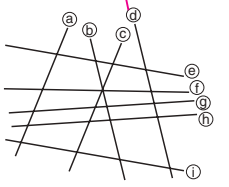

Drawing perpendicular lines

**2** Let's draw lines with the following conditions.
Pages 53 ~ 56
① Passing through point A and perpendicular to line ⓐ.
② Passing through point B and perpendicular to line ⓑ.




**3** Let's identify parallel lines.
Pages 57 ~ 59
a and c
b and d
g and h
e and i




**4** Draw the following lines.
Pages 58 ~ 59
① The line that goes through point A and is parallel to line ⓐ.
② The lines ⓒ and ⓓ that are 1 cm each from line ⓐ and parallel to ⓐ.

(c)
ⓐ
A
(1)
(d)

60 = □ − □

## Lesson Flow

**1 4 Think about how to draw parallel lines using its characteristics.**

T Let the students use rulers, set squares and protractors to explore drawing of parallel lines.

S Remember that the distance between parallel lines is the same at any point.

S Remember that parallel lines will not intersect when extended.

S Remember that parallel lines are intersected at the same angle.

**2 Discuss the 2 ideas of drawing and explain why the lines are parallel.**

T/S Discuss Mero's Idea.
First, draw line (a) by placing a ruler as a guide and use a triangle ruler to draw a line perpendicular (90°) to the ruler. Then move the triangle ruler down and draw another line similar to line (a) that is perpendicular to the ruler.

T/S Discuss Vavi's Idea.
First draw line (a) and mark two different points. Then, measure the distance (3cm) from the two points on line (a) at right angles using a set square and mark these points. Use a ruler to draw the second line parallel to line (a).

S Understand that the two ideas have the characteristics of parallel lines when drawn correctly.

S Compare the two ideas and explain how they are parallel lines.

**3 Complete activity 5 by connecting dots to draw parallel lines.**

S Draw more than one parallel line for each given line. Complete 1 - 2.

**4 Complete the Exercise on Page 59 on drawing parallel lines following conditions.**

S (1) Students should be encouraged to use Vavi's idea for this activity.

S (2) Use both Mero and Vavi's ideas.

T Check to ensure that students are using their rulers and set squares correctly to draw parallel lines.

**Excercise on Page 60**

**1** Find solutions to the given exercise 1 - 4 by applying learned knowledge and skills.

T Let students do the following:

S Do exercise 1 to identify perpendicular lines.

S Do exercise 2 to draw perpendicular lines.

S Do exercise 3 to identify parallel lines.

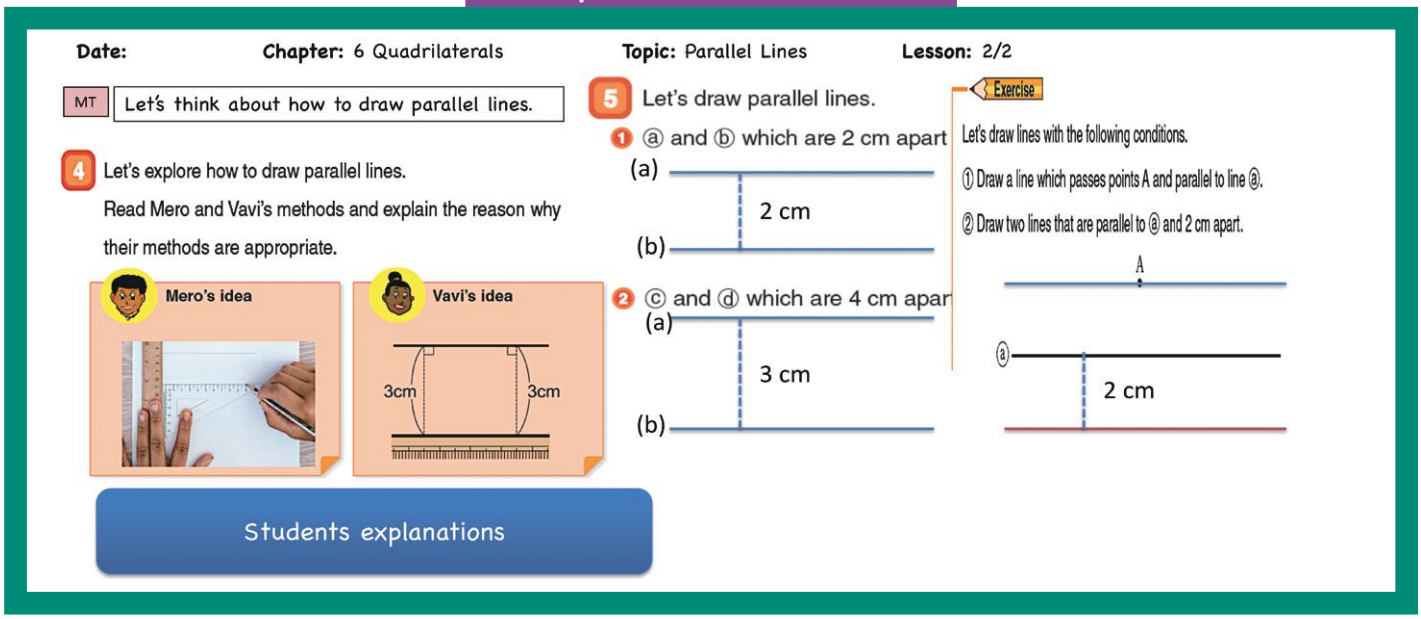
S Do exercise 4 to draw parallel lines.

T Supervise and assist to ensure that students utilise the learned knowledge and skills of parallel and perpendicular lines in completing the exercises given.

**2** Students confirm and check answers for Exercises 1 - 4.

T Check and correct students answers.

## Sample Blackboard Plan



# Unit 6

# Unit: Quadrilaterals
## Sub-unit: 3 Various Quadrilaterals
## Lesson 1 of 6 (Double Period)

Textbook Page : p.61
Actual Lesson 034

## Sub-unit Objectives

- To understand the definition of trapezoids and how to draw it.
- To understand the definitions and characteristics of parallelograms and draw it by making use of the definitions and characteristics.
- To draw parallelogram using the definition and characteristics.
- To understand the definitions and characteristics of rhombus and draw it by making use of the definitions.

## Lesson Objectives

- To know the definition of trapezoids and how to draw it.

## Prior Knowledge

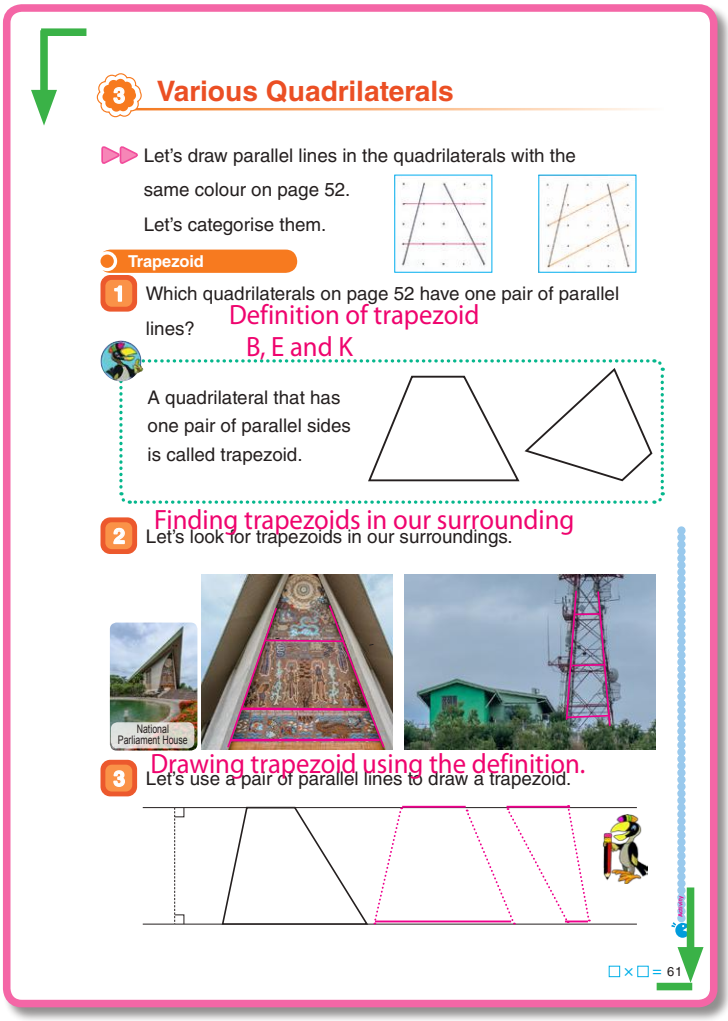
- Characteristics of perpendicular and parallel lines
- Learned skills on drawing perpendicular and parallel lines
- Learned knowledge in Grade 2 on Squares, Rectangles and Right Angles
- Understanding the meaning of right angles from characteristics of squares and right-triangles

## Preparation

- Handouts on which quadrilaterals are printed that were used in the first period (for students), diagrams of B, E and K for the blackboard (for teachers), triangle rulers(set squares) and rulers.

## Assessment

- Identify trapezoids based on its definition. F S
- Draw trapezoids using the definition. F S



3 Various Quadrilaterals

Let's draw parallel lines in the quadrilaterals with the same colour on page 52. Let's categorise them.

Trapezoid

1 Which quadrilaterals on page 52 have one pair of parallel lines?

Definition of trapezoid
B, E and K

A quadrilateral that has one pair of parallel sides is called trapezoid.

2 Let's look for trapezoids in our surroundings.

Finding trapezoids in our surrounding

National Parliament House

3 Let's use a pair of parallel lines to draw a trapezoid.

Drawing trapezoid using the definition.

□×□=61

### • Teacher's Notes •

It is important summarise various shapes from student student's explanation and descriptions of the characteristics of the shapes that they have drawn by themselves.

## Lesson Flow

**1** **1 Confirm that B, E and K are quadrilaterals which have one pair of parallel lines among the quadrilaterals on textbook page 52.**

T Introduce the main task.
T Present quadrilaterals B, E and K again from the previous lesson on page 52.
T What kind of characteristics do these quadrilaterals have?
S They have one pair of parallel lines.

**2** **Read and understand the term "trapezoid" in the exercise book.**

S Write definitions of "trapezoids" in their exercise books based on the characteristics of parrallel lines.
TN Have the students write their own definitions first before defining the term.

**3** **2 Find things from their surroundings that are shaped like trapezoids.**

T Introduce some examples of things which have the shape of trapezoids such as chairs for PE, step - ladders, sides of speakers, etc.
S Find things which have the shape of trapezoids from surroundings.

**4** **3 Understand how to draw trapezoids practically.**

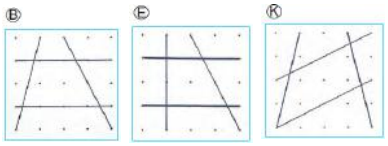
S Draw trapezoids by using parallel lines in the textbook or ruled lines in the exercise book.
TN Students who can draw trapezoids by using parallel lines, should try drawing them on blank papers. For students who forget how to draw parallel lines using triangle rulers should practice how to draw again here.

## Sample Blackboard Plan

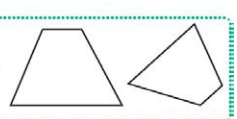
**Date:** **Chapter:** 6 Quadrilaterals **Topic:** Various Quadrilaterals **Lesson:** 1/6

MT Let's explore and construct trapezoid using one pair of parallel lines

1 Which quadrilaterals on page 52 have one pair of parallel lines

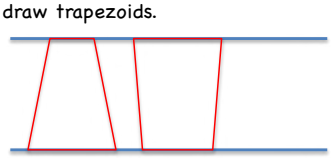



A quadrilateral that has one pair of parallel sides is called trapezoid.



2 Let's look for trapezoids in our surroundings

3 Let's use a pair of parallel lines to draw trapezoids.



SUMMARY
Summarise based on what the students have learnt.

# Unit 6

# Unit: Quadrilaterals
## Sub-unit: 3. Various Quadrilaterals
## Lesson 2 of 6 (Double Period)

Textbook Page : p.62
Actual Lesson 35

## Lesson Objectives

- To understand the definition of parallelograms.

## Prior Knowledge

- Characteristics of perpendicular and parallel lines.

## Preparation

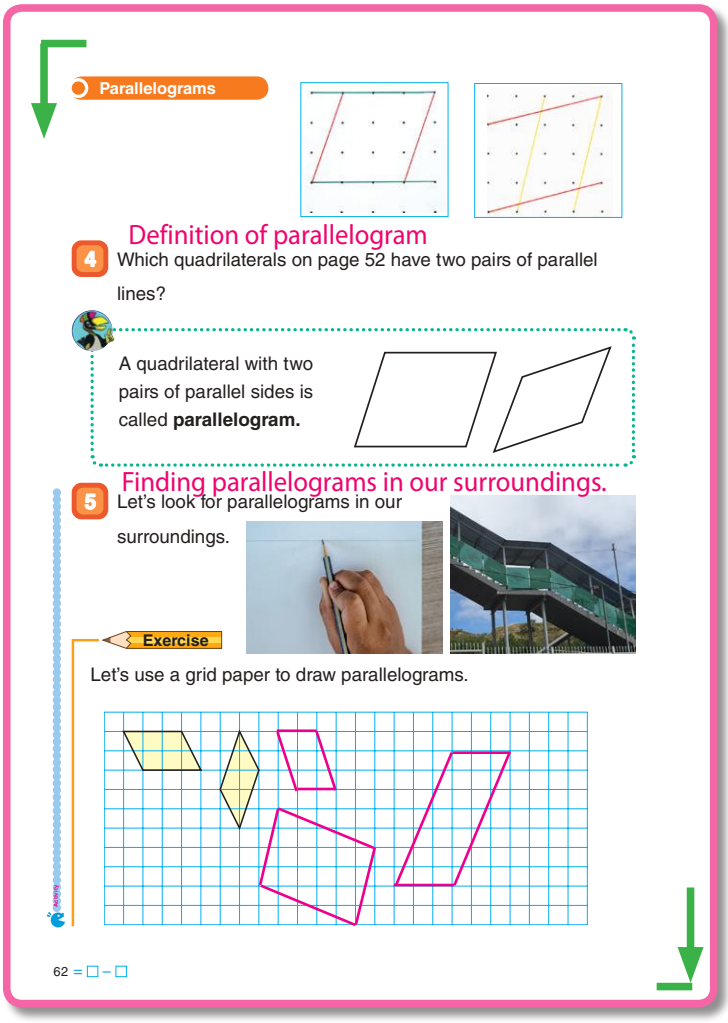
- Triangle rulers (set squares), rulers, handouts of quadrilaterals printed from 1st lesson (for students) and diagrams of C, D, F, G, I, J and L for putting on the board (for teachers).

## Assessment

- Identify parallelograms according to the definition. F
- Sketch parallelograms on dotted points. F S
- Do the exercise correctly. S

### • Teacher's Notes •

Parallelograms have two pairs of parallel sides.



Parallelograms

Definition of parallelogram

4 Which quadrilaterals on page 52 have two pairs of parallel lines?

A quadrilateral with two pairs of parallel sides is called **parallelogram.**

Finding parallelograms in our surroundings.

5 Let's look for parallelograms in our surroundings.

Exercise

Let's use a grid paper to draw parallelograms.

62 = □ − □

## Lesson Flow

### 1 4 Confirm that C, D, F, G, I, J and L are quadrilaterals which have two pairs of parallel lines among the quadrilaterals on textbook page 52.

T Introduce the main task.
T Present quadrilaterals C, D, F, G, I, J and L again from the previous lesson on page 52 .
T What kinds of characteristics these quadrilaterals have?
S Parallelograms have two pairs of parallel sides.

### 2 Read and understand the term "parallelogram" in the exercise book.

S Write definitions of "parallelograms" in their exercise books.
T Let the students understand that although quadrilaterals C and J have different shapes, both have two pairs of parallel lines so they are called parallelograms.

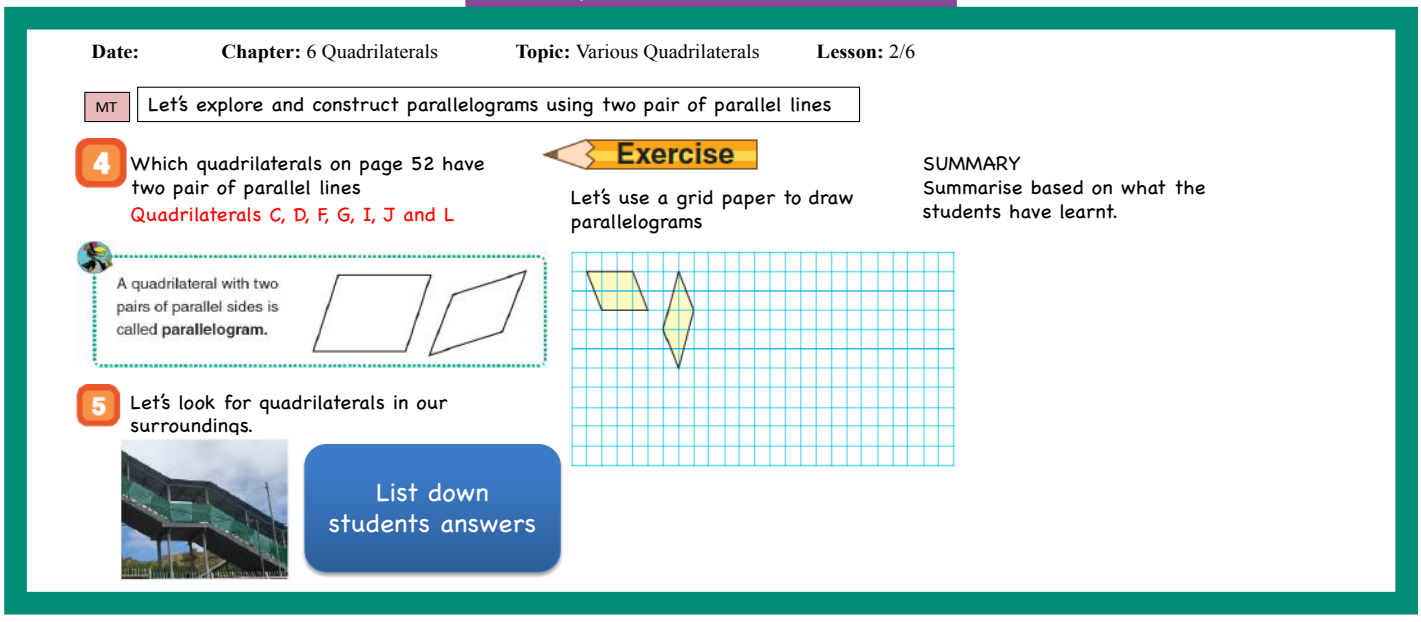
### 3 5 Find things from our surroundings that are shaped like parallelogram.

S Draw trapezoids by using parallel lines in the textbook or ruled lines in the exercise book.
TN Students who can draw trapezoids by using parallel lines, should try drawing them on blank papers. For students who forget how to draw parallel lines using triangle rulers should practice how to draw again here.

### 4 Complete the Exercise by drawing.

S Draw various parallelograms by using grid papers or ruled lines in the grid exercise books.
T Let students think about how to use grids to draw parallel lines and share their ideas with friends.

## Sample Blackboard Plan



# Unit 6

# Unit: Quadrilaterals
## Sub-unit: 3. Various Quadrilaterals
## Lesson 3 of 6 (Double Period)

Textbook Page : p.63
Actual Lesson 036

## Lesson Objectives

- To draw parallelograms.
- To find out the characteristics of parallelograms.

## Prior Knowledge

- Definition of parallelograms

## Preparation

- Triangle rulers (set squares), rulers, diagram for task 7

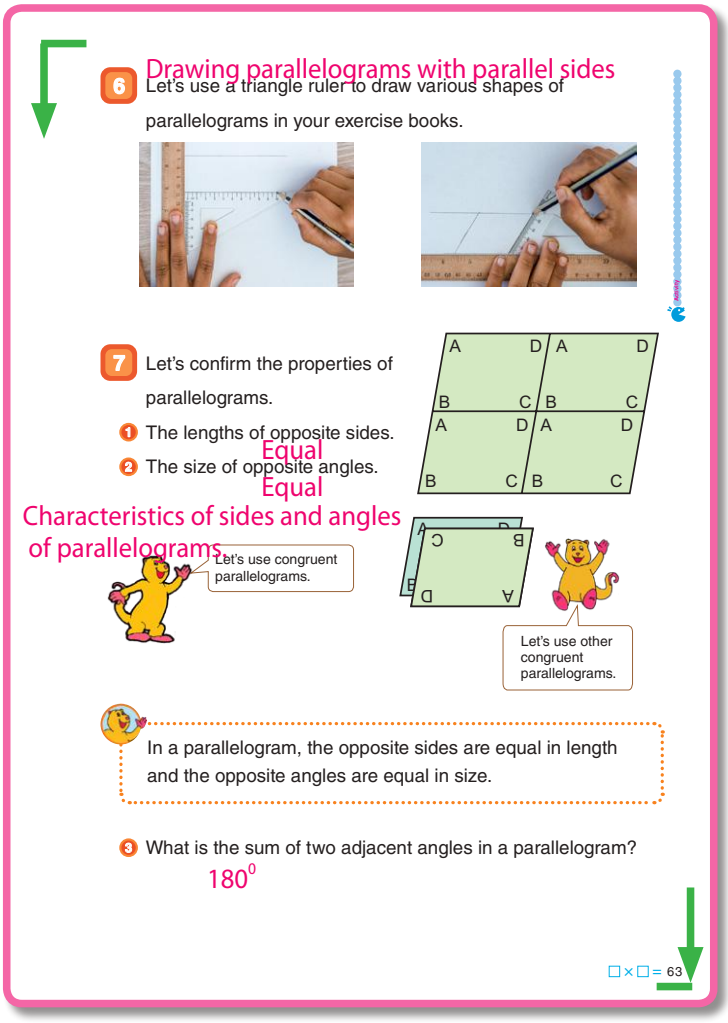
## Assessment

- Sketch parallelograms using parallel lines correctly. F
- Investigate the characteristics of parallelograms. F
- Identify the characteristics and definition of parallelograms based on angle properties. S

## • Teacher's Notes •

Task 7 emphasises the importance of logical thinking rather than comparing in quantitative terms by measuring lengths of sides and size of angles.

Each students is different so many students will understand when numerical numbers become equal after measuring length of sides and angle with rulers and protractors. In diagrams, side AD and side BC are overlapped so they are equal. Angle A and angle C are vertical angles so they are equal. Sum of angle B and angle C are on the same line so it will be 180°. The problem setting is made to encourage logical thinking by being able to view with such ways explained above.



## Lesson Flow

### 1 6 Draw parallelograms.

T Introduce the main task.

TN According to students' situations, it is alright to draw a pair of parallel lines such as ruled lines on the notebook beforehand and set activities to draw parallelograms first.

### 2 7 Investigate the characteristics of parallelograms.

T Present 4 congruent ABCD-parallelograms that are lined up as shown in 7 on textbook page 63 and provide printed handouts of the diagram.

S As for 1, realise that lengths of opposite sides are equal because side AD and BC and side AB and DC are overlapped. Confirm by actually measuring the lengths with rulers.

S As for 2, realise that sizes of opposite angles are equal because angle A and C, and angle B and D are vertical angles (learned). Confirm by actually measuring with protractors.

S As for 3, realise that angle B and C are on the same line and therefore the sum of two adjacent angles is 180°.

### 3 Summarise the characteristics of opposite sides and angles of parallelograms.

T Get students to remember that, In a parallelogram, the opposite sides are equal in length and the opposite angles are equal in size.

## Sample Blackboard Plan

**Date:** **Chapter:** 6 Quadrilaterals **Topic:** Various Quadrilaterals **Lesson:** 3/6

MT Let's draw and confirm the properties of parallelogram using triangle rulers.

6 Let's use a triangle ruler to draw various shapes of parallelograms on your note books.

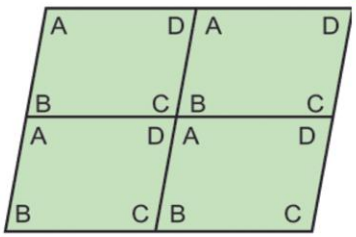
7 Let's confirm the properties of parallelograms.

1 The lengths of opposite sides.

Opposite side lengths are equal.

2 The size of opposite angles.

Opposite side angles are equal.




Placce 4 cards or congruent parallelograms that are movable to explain the properties.

Important point

3 What is the sum of adjacent angles in a parallelogram?

$180^0$

SUMMARY
Summarise based on what the students have learnt.

# Unit 6

# Unit: Quadrilaterals
## Sub-unit: 3. Various Quadrilaterals
## Lesson 4 of 6 (Double Period)

Textbook Page : p.64
Actual Lesson 037

## Lesson Objectives

- To understand how to draw parallelogram by using its definitions and characteristics.

## Prior Knowledge

- Definition of parallelogram
- How to draw parallelogram (Previous lesson)

## Preparation

- Triangle rulers, protractors, rulers, compasses and attached software.

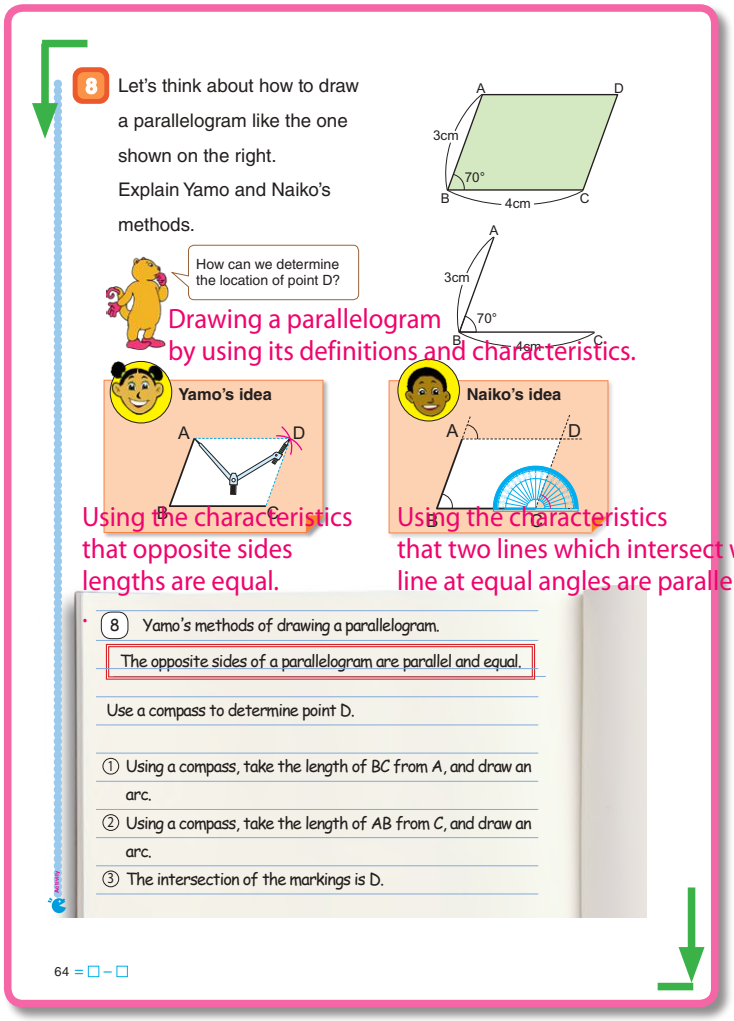
## Assessment

- Think about how to draw parallelograms using protractors and compasses. F
- Draw parallelograms correctly using protractors and compasses. S

## • Teacher's Notes •

Characteristics of parallelograms

1. Two pairs of opposite sides are equal in length.
2. Two pairs of opposite angles are both equal in size.
3. Two diagonal lines intersect each other at their centre point.
4. Parallelogram is a point-symmetric shape where the intersecting point of diagonal lines is the centre of symmetry.



## Lesson Flow

**1** 8 **After drawing 4 cm side, angle of 70° and 3 cm side in order by everyone together, think about how to determine the location for point D.**

T Introduce the main task.
T Provide students with handouts on which the above mentioned sides have already been drawn.
S For the location of point D, mark a point on the handout based on instinct and draw the other two sides.
S Explain that point D should be in a particular location based on definition and characteristics of parallelogram.
- Located 4 cm from point A
- Located 3 cm from point C
- Located where a line is drawn parallel to side BC from point A.

**2** **Explain and discuss Yamo and Naiko's methods of drawing.**

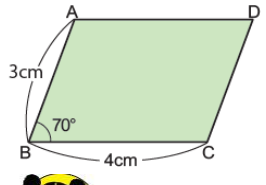
S Think about various ways of drawing using Yamo and Naiko's ideas in the textbook as hints.
T Let students understand that Yamo's idea is to draw by using the characteristic of parallelogram where the lengths of opposite sides are equal and Naiko's idea is to draw by using the characteristic that corresponding angles of parallel lines are equal.
T After explaining Yamo and Naiko's methods of drawing, introduce an activity to summarise one's own way of drawing in a simpler manner as an example shown at the bottom of textbook page 64.

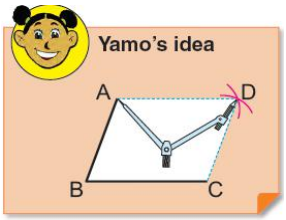
## Sample Blackboard Plan

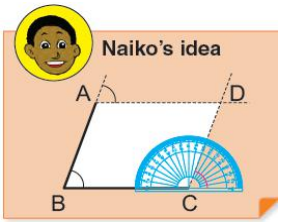
**Date:** **Chapter:** 6 Quadrilaterals **Topic:** Various Quadrilaterals **Lesson:** 4/6

MT Let's think about how to draw parallelograms using its properties.

8 Let's think about how to draw a parallelogram like the one shown.




8 Yamo's methods of drawing a parallelogram.

The opposite sides of parallelogram are parallel and equal.

Use a compass to determine point D.

① Using a compass, take the length of BC from A, and draw an arc.
② Using a compass, take the length of AB from C, and draw an arc.
③ The intersection of markings is D.

# Unit 6

# Unit: Quadrilaterals
## Sub-unit: 3. Various Quadrilaterals
## Lesson 5 of 6 (Double Period)

Textbook Page : p.65-p.66
Actual Lesson 038

## Sub-unit Objectives

- To know definitions of rhombus and think about the relationship among sides and angles.

## Preparation

- Handouts on which quadrilaterals of C and J are printed (for students), those for putting on the blackboard (for teachers), rulers, compasses and protractors.

## Prior Knowledge

- Definition of parallerogram
- How to draw parallerogram

## Assessment

- Think about the characteristics of rhombus. F
- Use appropriate methods to prove characteristics of rhombuses. F
- Understand the definition of rhombuses. S
- Draw rhombuses correctly using its characteristics. S

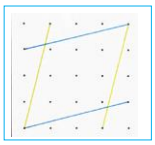
## • Teacher's Notes •

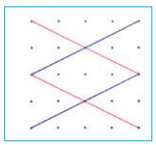
Drawing figures in geometric sense is to draw by only using a ruler and compass, but generally drawing shapes which meet certain conditions is called drawing figures. In primary, it will be dealt with the general meaning which uses grid papers and protractors also. The purpose for drawing figures is not only to be able to draw shapes accurately but also to deepen an understanding of concepts of shapes and use characteristics of shapes and understood through the process.
In drawing parallelogram, many students may have forgotten how to use compasses and protractors. So, in this unit also, it is necessary to instruct how to use them properly again and again. By doing so, increase their ability to draw.

**Characteristics of rhombus**

1.Two pairs of opposite sides are both parallel.
2.Two pairs of opposite angles are both equal in size.
3.Two diagonal lines intersect at right angle at their centre points through each other.
4.Rhombus is a line-symmetric shape in which each of the two diagonal lines is axis of symmetry.
5.Rhombus is a point-symmetric shape which intersection point of two diagonal lines is a centre of symmetry.

### Rhombuses

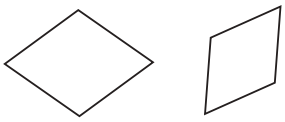
© 

Ⓙ 

Definition of rhombuses. All sides are equal in length.

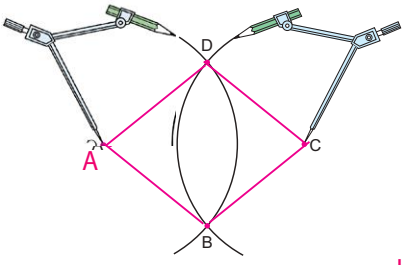
**9** Let's compare the four sides of quadrilaterals © and Ⓙ on page 52.

A quadrilateral with four equal sides is called **rhombus**.



**10** The figure below shows two arcs of circles with their centres at point A and C and the radius is same. The two arcs intersect at B and D.

1. Put needle on A, Using compasses to draw an arc B to D




2. Put needle on C and draw an arc B - D using compasses

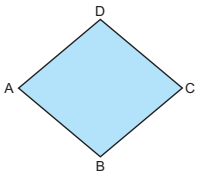
1. Connect the points A B C D A to draw a quadrilateral.
2. Check the lengths of the sides and the angles. What quadrilateral is this?

Length : 3 cm Angle A and C are $80^0$ Angle B and D are $100^0$ Name : Rhombus.

### Definition of rhombuses.

**11** Check the following characteristics of the rhombus that you drew on the previous page.

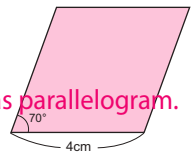
1. Are the opposite angles equal? Equal
2. Are the opposite sides parallel? Parallel




In a rhombus, the opposite angles are equal and the opposite sides are parallel.

**12** Let's think about how to draw a rhombus.

Drawing rhombuses.
Think about the same way as parallelogram.




**Exercise**

Let's look for rhombuses in our surroundings.

□ × □ = 65

66 = □ − □

## Lesson Flow

### 1 (9) Do the task by comparing the lengths of the four sides of quadrilaterals C and J.

T Introduce the main task.

S Realise that lengths of 4 sides are equal by using compasses or rulers.

### 2 Understand the term Rhombus and its definitions.

S Understand that the length of the four sides of a Rhombus are equal.

### 3 (10) Connect the four points in order and find out what kind of quadrilateral is formed.

T Explain what to do step by step following the textbook.

1. Connect point A,B,C and D in order to make a quadrilateral.
2. Measure lengths of sides and sizes of angles.
3. Let students realise that 4 sides are all equal by using compass or rulers.

S Draw and confirm that 4 sides are all equal because they were all drawn using the same radius using a compass.

### 4 (11) Find out characteristics of rhombus from viewpoints of sizes of opposite angles and parallelism of opposite sides.

S Summarise that, sizes of opposite angles are equal.

S Confirm whether opposite sides are parallel or not by actually using triangle rulers, compasses and protractors.

### 5 Summarise the characteristics of rhombus.

S Understand that sizes of opposite angles are equal.

S Understand that all four sides are equal in length.

S Understand that pairs of opposite sides are parallel.

### 6 (12) Think about how to draw a rhombus with sides of 4 cm and one angle of 70°.

S Confirm that the other three sides are also 4 cm because all 4 sides of rhombus are equal.

T After measuring 70° with protractors, let students think about how to draw rhombus based on things learned.

T Give some opportunities to students to explain how to draw a rhombus.

S I drew with a compass because the length of all four sides are equal in a rhombus".

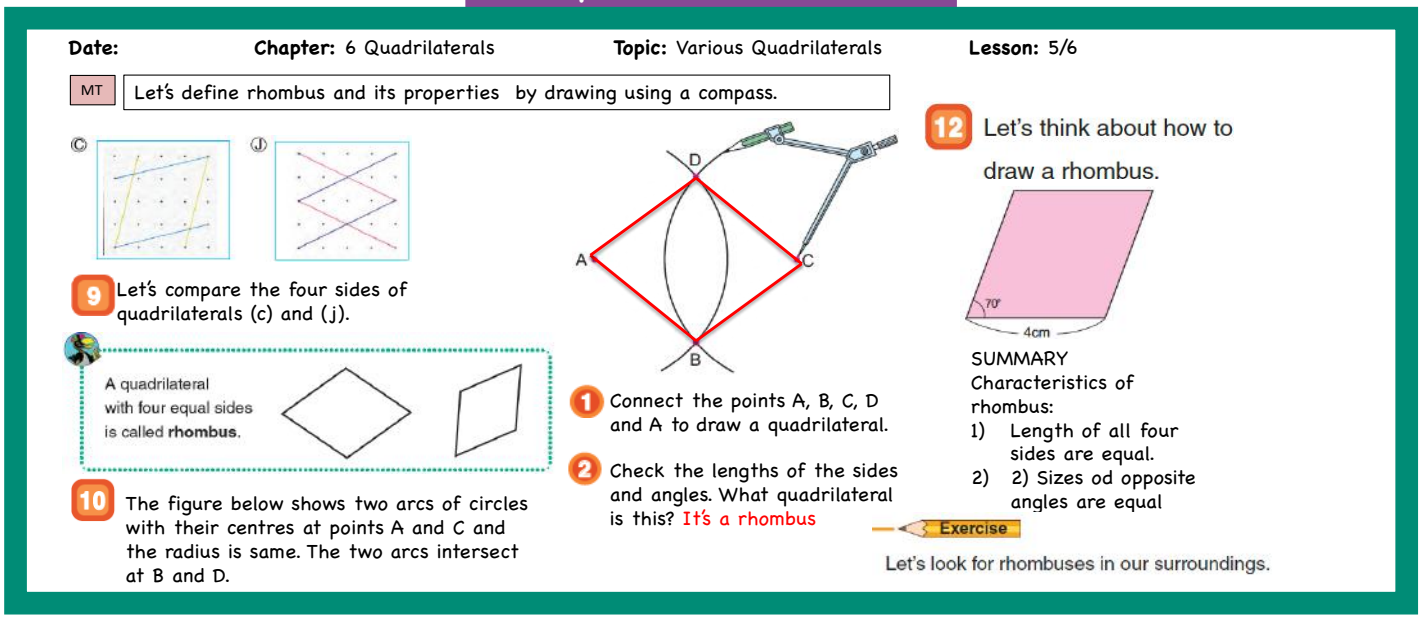
### 7 Complete the exercise.

T Look for rhombuses in our surroundings.

S For example, diamonds in deck of cards and cookies shaped like rhombus.

T Give additional activities for finding rhombuses by using other sources such as; using a library or computers (internet).

## Sample Blackboard Plan



# Unit 6

# Unit: Quadrilaterals
## Sub-unit: 3. Various Quadrilaterals
## Lesson 6 of 6 (Single Period)

Textbook Page : p.67
Actual Lesson 039

## Lesson Objectives

- To investigate the relationships among various quadrilaterals.

## Prior Knowledge

- Definition and how to draw parallelogram and rhombus

## Preparation

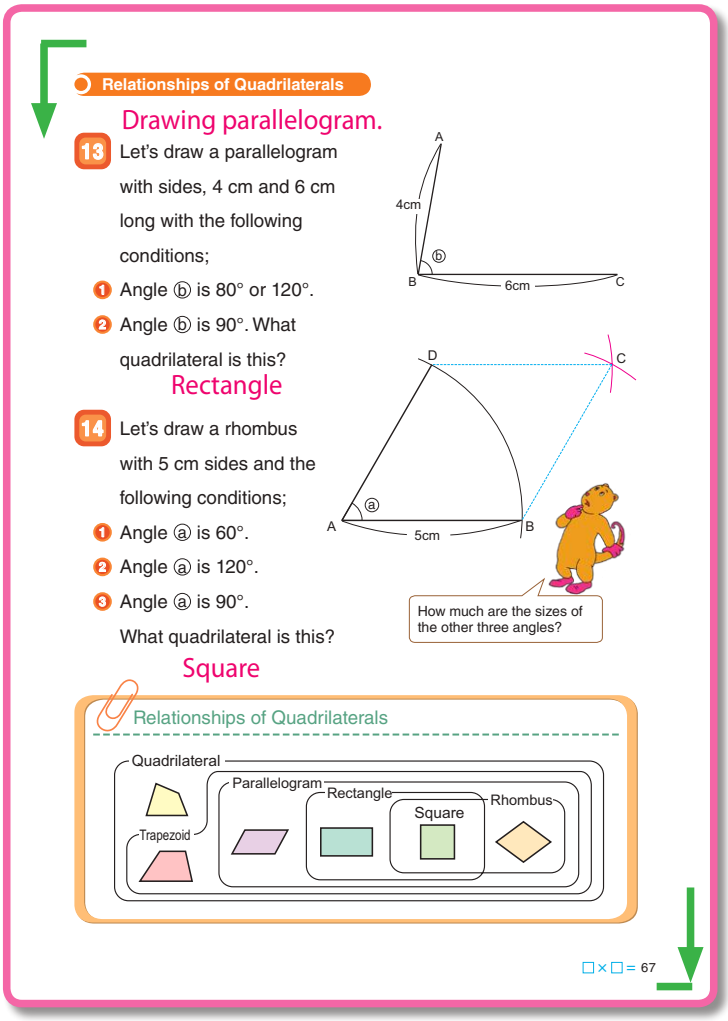
- Triangle rulers (Set squares), protractors and compasses.

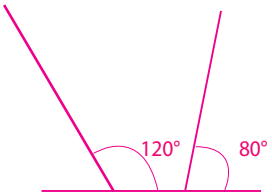
## Assessment

- Investigate relationships among various quadrilaterals by drawing those shapes. F
- Find the relationships by drawing various quadrilaterals. S

## • Teacher's Notes •

For students, it is not easy to understand inclusions of quadrilaterals. It is easier to understand when starting from confirming definitions of quadrilaterals and then confirming that a pair of opposite sides is equal and two opposite sides are equal step by step in order.
Here, it is not necessary to learn inclusions of quadrilaterals deeply in class, so it is recommended to deal with it based on students' interests.



## Lesson Flow

### 1 13 Draw a parallelogram with sides, 4 cm and 6 cm long and think about the quadrilateral it will be when the angle (b) is 90°.

T Introduce the main task.
S Draw two parallelograms with an angle of 80°and 120°.
S Think about what quadrilateral it will be when angle (b) is 90° based on definitions of quadrilaterals.
T As for activity 2, let students think about a quadrilateral which meets the conditions “opposite sides are parallel and equal in length, all four angles are 90°” by having students recall definitions and characteristics of each quadrilateral.

### 2 14 Draw a rhombus with 5 cm sides by changing angles of an intersection of sides (60°, 120°) and discuss things found.

T Confirm that at point C is an intersection point made by drawing a circle with 5 cm radius as point B and D as its centre.
T Have the students to draw by determining a point A as 60° and 120°. For students who have forgotten how to draw, advise them to recall how to draw parallelogram on page 58.
T Have students to realise that a direction of a parallelogram will be opposite depending on whether angle B will be smaller or larger than 90°.

### 3 Draw a rhombus of section 14 in which an angle A is 90° and think about what quadrilateral it will be.

S It is going to be square if the angle A is 90°.
T Why?
S Because all the sides are equal in case of rhombus.

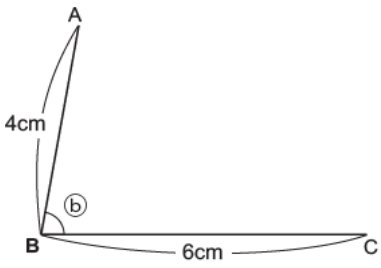
### 4 Discuss the findings in drawing a rhombus and summarise learning.

## Sample Blackboard Plan

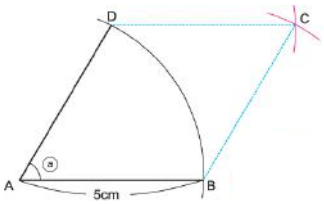
**Date:** **Chapter:** 6 Quadrilaterals **Topic:** Various Quadrilaterals **Lesson:** 6/6

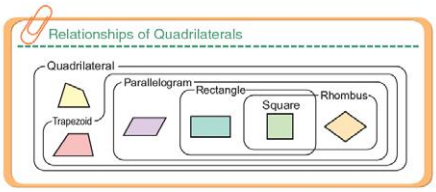
MT Let's find the relationships between quadrilaterals

**13** Let's draw a parallelogram with sides, 4 cm snd 6 cm long with the following conditions;
1 Angle (b) is 80°, or 120°
2 Angle (b) is 90°. What quadrilateral is this? rectangle




**14** Let's draw rhombus with 5 cm sides, and the following conditior
Angle (a
Angle (a
Angle (a hat
quadrilateral is this? Square



# Unit 6

# Unit: Quadrilaterals
## Sub-unit: 4. Diagonals of Quadrilaterals
## Lesson 1 of 2 (Double Period)

Textbook Page :
p.68- p.69
Actual Lesson 040

## Sub-unit Objectives

- To deepen the understanding of characteristics of quadrilaterals focusing on diagonals.

## Lesson Objectives

- To know the definition of diagonals.
- To investigate the diagonals of various quadrilaterals.

## Prior Knowledge

- Characteristics of perpendicular and parallel lines.
- Skills on drawing perpendicular and parallel lines.

## Preparation

- Rulers and set squares

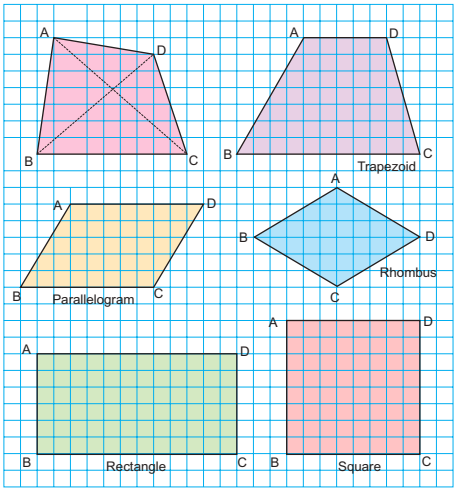
## Assessment

- Use characteristics of diagonal lines to identify quadrilaterals. F
- Use characteristics of diagonal lines to draw quadrilaterals. F
- Understand the meaning and characteristics of diagonal. S

Drawing diagonal lines by connecting opposite vertices in quadrilateral

### 4 Diagonals of Quadrilaterals

**1** Let's connect the opposite vertices of these quadrilaterals.




Each line that you drew by connecting the opposite vertices is called a **diagonal**.
There are 2 diagonals in each quadrilateral.

### Characteristics of diagonals in quadrilateral.

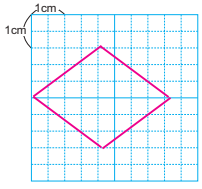
**2** Look at the parallelogram, rhombus, rectangle and square on the previous page 1 and match them with the following characteristics.

1. Quadrilateral(s) with 2 diagonals that have a perpendicular intersection.
   Rhombus, square
2. Quadrilateral(s) with 2 diagonals that are equal in length.
   Rectangle, square
3. Quadrilateral(s) with 2 diagonals that are equal in length and have a perpendicular intersection.
   Square
4. Quadrilateral(s) with 2 diagonals that are divided in half where they intersect.
   Parallelogram, rhombus, rectangle, square

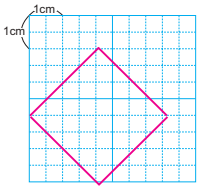
### Drawing quadrilaterals using diagonal lines given

**3** Draw the following quadrilaterals by using the characteristics listed in 2.

1. A rhombus with 4 cm and 3 cm diagonals.




2. A square with 4 cm diagonals.




68 = □ − □

□ × □ = 69

## Lesson Flow

### 1 1 Draw lines to connect the opposite vertices of different quadrilaterals.

T Introduce the main task.

S Understand that lines drawn by connecting the vertices are called diagonal lines.

TN Students should draw their lines and realise that there are two diagonal lines for each of the quadrilaterals.

### 2 2 Identify quadrilaterals based on the characteristics of the diagonal lines.

S Complete exercise 1, 2, 3 and 4 by identifying the quadrilaterals from the previous exercise using the given characteristics.

### 3 3 Draw quadrilaterals using given characteristics.

S Understand that the length of the diagonal lines should be the same measurement to the lengths given.

TN Students should understand the measurement of the squares before drawing their quadrilaterals.

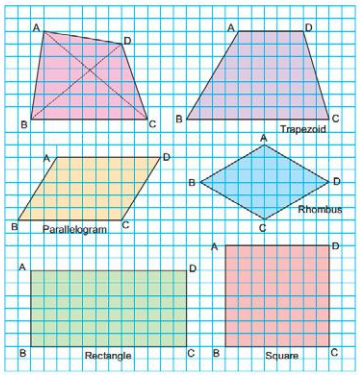
### 4 Discuss things found by drawing a rhombus with each other and summarise learning.

## Sample Blackboard Plan

**Date:** **Chapter:** 6 Quadrilaterals **Topic:** Diagonals of Quadrilaterals **Lesson:** 1/2

MT Let's investigate and identify the properties of diagonal lines in various quadrilaterals.

1 Let's connect the opposite vertices of quadrilaterals.




Each line that you drew by connecting the opposite vertices is called a **diagonal**.
There are 2 diagonals in each quadrilateral.

2 Look at the parallelogram, rhombus, rectangle and square on the previous page 1 and match them with the following characteristics.

1 Quadrilateral (s) with 2 diagonals that have a perpendicular intersection. ( )

2 Quadrilateral (s) with 2 diagonals that are equal in length. ( )

3 Quadrilateral (s) with 2 diagonals that are equal in length and have a perpendicular intersection

4 Quadrilateral (s) with 2 diagonals that are divided in half where they intersect

3 Draw the following quadrilaterals by using the characteristics listed in 2.

1 A rhombus with 4 cm and

2 A square with 4 cm

# Unit 6

# Unit: Quadrilaterals
## Sub-unit: 4. Diagonals of Quadrilaterals
### Lesson 2 of 2 (Single Period)

Textbook Page : p.70
Actual Lesson 041

## Lesson Objectives

- To think about quadrilaterals by focusing on diagonals and diameter of circles.

## Prior Knowledge

- Characteristics of perpendicular and parallel lines.
- Drawing perpendicular and parallel lines.
- Meaning and characteristics of diagonal.

## Preparation

- Rulers, set squares and handouts

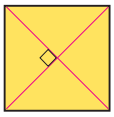
## Assessment

- Use characteristics of diagonal lines to draw quadrilaterals inside a circle. F
- Describe the characteristics of diagonals and its' relation to the circle's diameter. F S

## • Teacher's Notes •

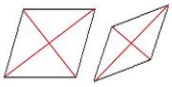
1. Rectangle: length of the diagonals are equal and also same as the diameter of the circle.

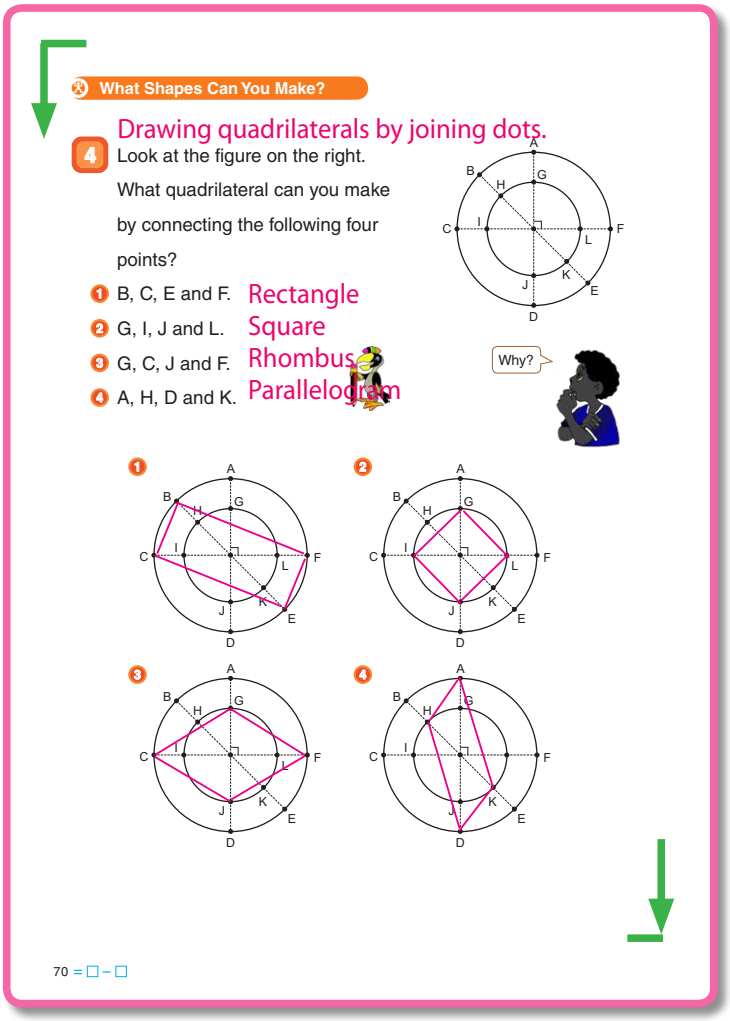
2. Square: diagonal lines are equal and perpendicular (intersect at 90°).



3. Rhombus: diagonal lines are perpendicular (intersect at 90°), one line is equal to the diameter.

4. Parallelogram: diagonal lines are not equal, one line is equal to the diameter.





## Lesson Flow

### 1 ❹ Think about quadrilaterals using the characteristics of diagonals.

T Introduce the main task.

S Think about quadrilaterals by focusing on diagonals and diameter of circles as shown.

TN Students should visualise and discuss the kind of quadrilaterals formed by ❶, ❷, ❸ and ❹ based on characteristics learned previously.

### 2 Draw quadrilaterals using given points.

S Complete exercise ❶, ❷, ❸ and ❹ by joining dots or points to draw quadrilaterals.

TN Ensure to check that students are drawing their quadrilaterals correctly.

### 3 Think about the characteristics of diagonals for each quadrilateral drawn.

S Discuss the characteristics of diagonals for each quadrilateral with reference to length, perpendicularity and diameter of the circle.

S Students should realise that;

❶ Length of the diagonals are equal and also same as the diameter of the circle.

❷ Diagonal lines are equal and perpendicular (intersect at 90°).

❸ Diagonal lines are perpendicular (intersect at 90°).

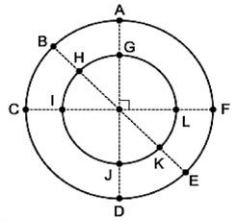
❹ Diagonal lines are not equal.

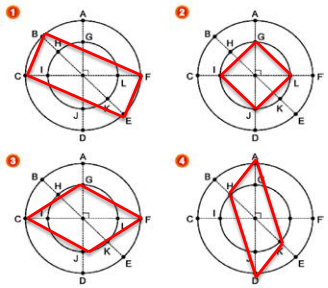
## Sample Blackboard Plan

**Date:** **Chapter:** 6 Quadrilaterals **Topic:** Diagonals of Quadrilaterals **Lesson:** 2/2

MT Let's quadrilaterals in circles and discuss the characteristics of the diagonals and diameter.

4 Look at the figure on the right. What quadrilateral can you make by connecting the following four points?




Discussion Points

❶ Rectangle: length of the diagonals are equal and also same as the diameter of the circle.

❷ Square: diagonal lines are equal and perpendicular (intersect at 90° )

❸ Rhombus: diagonal lines are perpendicular (intersect at 90° ), one line is equal to the diameter

❹ Parallelogram: diagonal lines are not equal, one line is equal to the diameter

# Unit 6

# Unit: Quadrilaterals
## Sub-unit: Exercise & Evaluation
## Lesson 1 of 1 (Double Period)

Textbook Page : p.71-p.72
Actual Lesson 42

## Lesson Objectives

- To deepen the understanding on contents learned in this unit.

## Prior Knowledge

- All the contents in this unit

## Preparation

- Evaluation sheet for the number of the students.

## Assessment

- Solve the exercises considering characteristic of shapes and patterns that are used. F S

## • Teacher's Notes •

Use 30 minutes for the exercise and give the evaluation test after that.

### Exercise

Definition of parallelogram, trapzoid and rhombus

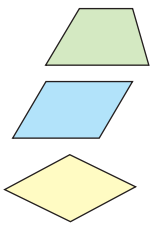
1 Write the correct words in the ☐ by looking at the figures on the right.

Pages 61, 62, 63

① A quadrilateral that has one pair of parallel opposite sides is called a trapezoid.

② A quadrilateral in which the opposite sides are both parallel is called a parallelogram.

③ A quadrilateral in which all 4 sides are equal in length is called a rhombus.

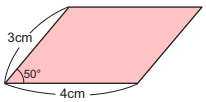


Drawing parallelogram and rhombus

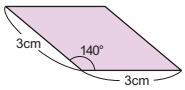
2 Draw parallelograms like the ones shown below.

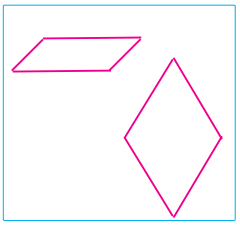
Pages 64

①



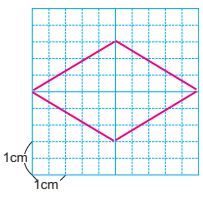

②





3 Draw a rhombus with diagonals that are 5 cm and 3 cm in length.

Pages 66



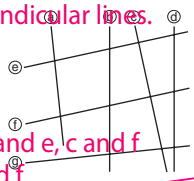

### Problems

To find parallel lies orperpendicular lines.

1 Let's find perpendicular and parallel lines.

Explain why.

Finding perpendicular and parallel lines.




Perpendicular: a and g, c and e, c and f
Parallel lines : b and d, e and f

2 Let's draw perpendicular and parallel lines with reference to line ⓐ and passing through point B.

Drawing perpendicular and parallel lines

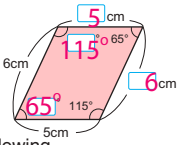
Constructing a perpendicular line and a parallel line.

3 The parallelogram on the right.

Fill in the ☐ with appropriate numbers.

Construct a parallelogram that has the same sides and angles.

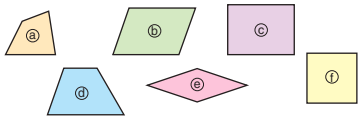
Understanding the key properties of a parallelogram for construction.




4 Which of these quadrilaterals have the following characteristics?

Identifying the types of quadrilateral based on the characteristics.

Identifying quadrilaterals by their characteristics.




① Two pairs of parallel sides. (b,c,e, f)
② Four angles of equal size. (c, f)
③ Diagonals of equal length. (c, f)
④ Opposite sides with equal length. (b,c, e, f)
⑤ Opposite angles with equal size. (b, c, e, f)
⑥ No parallel sides. (a)

☐ × ☐ = 71  72 = ☐ − ☐

## Lesson Flow

**1** **① Solve excercise1.**

TN Let the students explain the definition of trapezoid, parallelogram and rhombus corresponding to the figures.

S Deepen the understanding of the definition of those quadrilaterals by filling in the square.

**2** **② Solve exercise 2.**

S Draw parallelogram and rhombus accurately using compass, protractor and ruler.

S Draw the shapes in various ways using the definition of parallelogram and rhombus.

T Let the students explain how they drew the shapes.

**3** **③ Solve exercise 3.**

S Draw rhombus using the characteristics of diagonals.

S Confirm how two diagonals cross.

T Let the students confirm how diagonals cross in other shapes such as parallelograms, squares, rectangles and so on.

**4** **Solve Problems ①, ②, ③ and ④.**

| Quadrilaterals | Name: | Score |
|---|---|---|
| | | |

(Each question is worth 10 points)

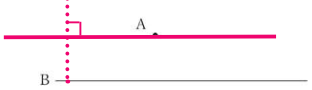
1. Fill in the blanks.

① A quadrilateral in which the opposite sides are equal in length is called Parallerogram

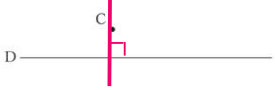
② A quadrilateral that has one pair of parallel opposite sides is called Trapezoid

2. Draw lines with the following conditions.

① Passing through point A and parallel to line B



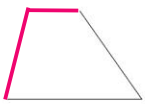

② Passing through point C and perpendicular to line D



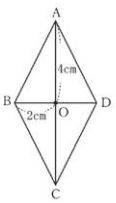

3. Complete the following figures.

① Parallelogram

② Trapezoid



4. The figure is a rhombus. Fill in the blank.




① What is the length of CO? 4 cm .

② What is the length of DO? 2 cm .

③ Line AB is Parallel to line DC.

④ Line BD is Perpendicular to line AC.

**End of Chapter Test: Chapter 6** **Date:**

| Quadrilaterals | Name: | Score |
|---|---|---|
| | | |

(Each question is worth 10 points)

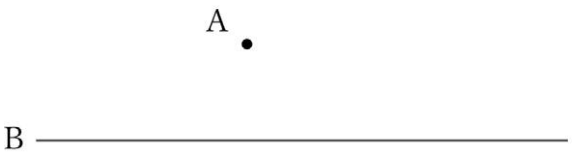
1. Fill in the blanks.

① A quadrilateral in which the opposite sides are equal in length is called _____

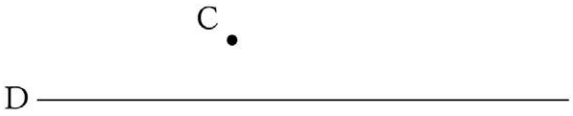
② A quadrilateral that has one pair of parallel opposite sides is called _____

2. Draw lines with the following conditions.

① Passing through point A and parallel to line B

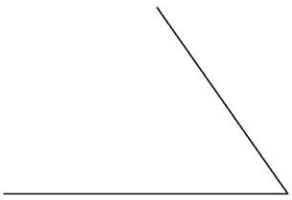



② Passing through point C and perpendicular to line D

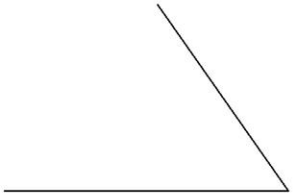



3. Complete the following figures.

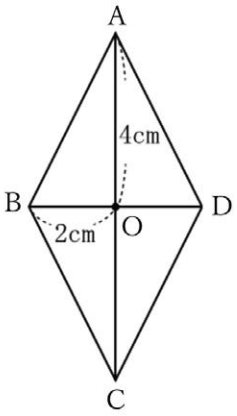
① Parallelogram



② Trapezoid



4. The figure is a rhombus. Fill in the blank.




① What is the length of CO? _____.

② What is the length of DO? _____.

③ Line AB is _____ to line DC.

④ Line BD is _____ to line AC.

# Chapter 7 Division by 2-digit Numbers

## 1. Unit Objectives

- To deepen students understanding on division of whole numbers in vertical form, calculate and extend their ability to use division (4.1.4 a).
- To think of how to calculate division of 2-digit divisor and dividend of 2-digits or more in vertical form (4.1.4 c).
- To use rules of division and multiplication for easier ways of calculation and apply the knowledge appropriately (4.1.4 d).

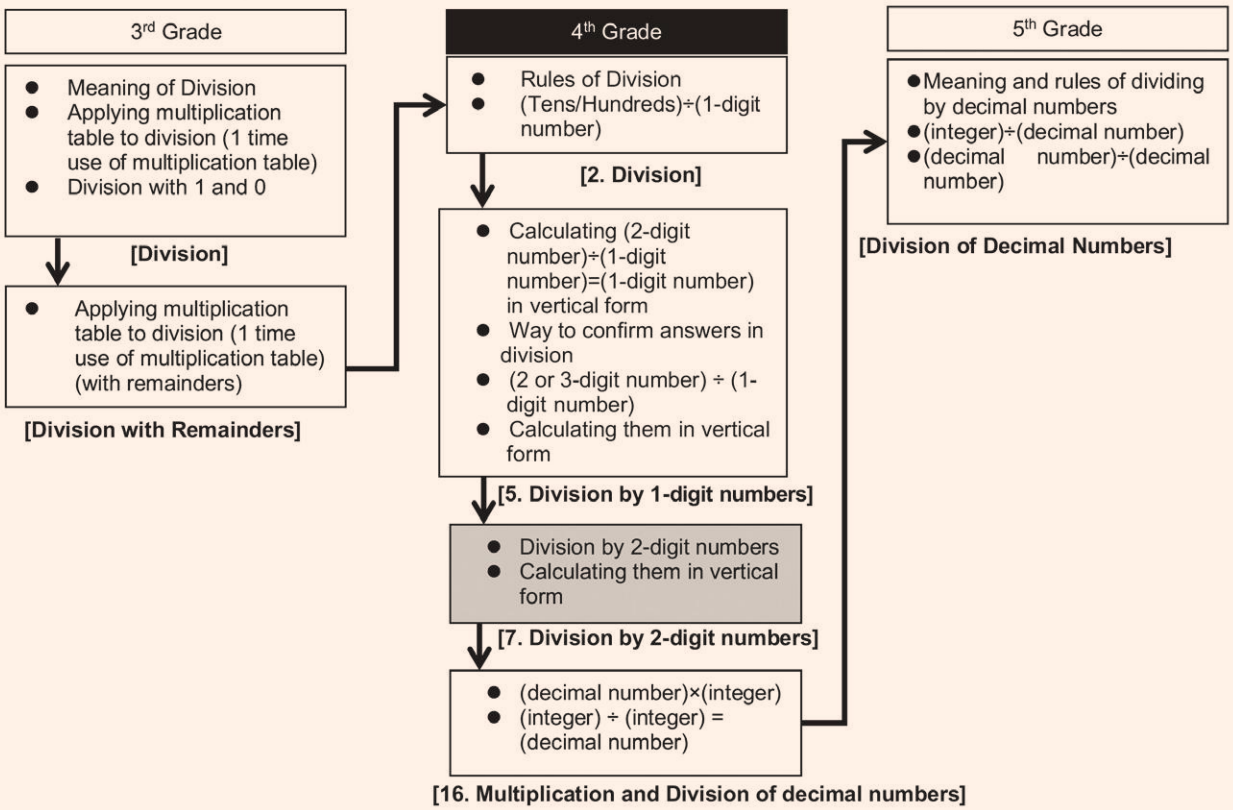
## 2. Teaching Overview

In this unit, students are to master division by 2-digit numbers. When they are given the division, they should estimate the quotients roughly so that they could compare the actual quotient given by vertical division. Teachers should always ask students to estimate the quotient roughly how many digits the quotient is.

**Division by 2-digit numbers :** The algorithm of vertical division should be taught with picture diagrams. It should be taught with the model bunches of 10 or 100 as it was taught before.

**Rules of Division and Multiplication :** They should think with many examples to investigate the relationship among dividend, divisor, quotient and remainder in division and its inverse operation..

## 3. Related Learning Contents



# Unit 7

# Unit: Division by 2-digit Numbers
## Sub-unit: 1. Division by 2-digit Numbers (1)
## Lesson: 1 of 4 (Double Period)

Textbook Page : p.73~p.74
Actual Lesson 43

## Sub-unit Objectives

- To extend their understanding of learned division of 2-digit numbers in vertical form.

## Lesson Objectives

- To think and understand how to divide by stacks of 10.
- To recognise and make sense of the given situation using a math expression and relate it to their everyday life.

## Prior Knowledge

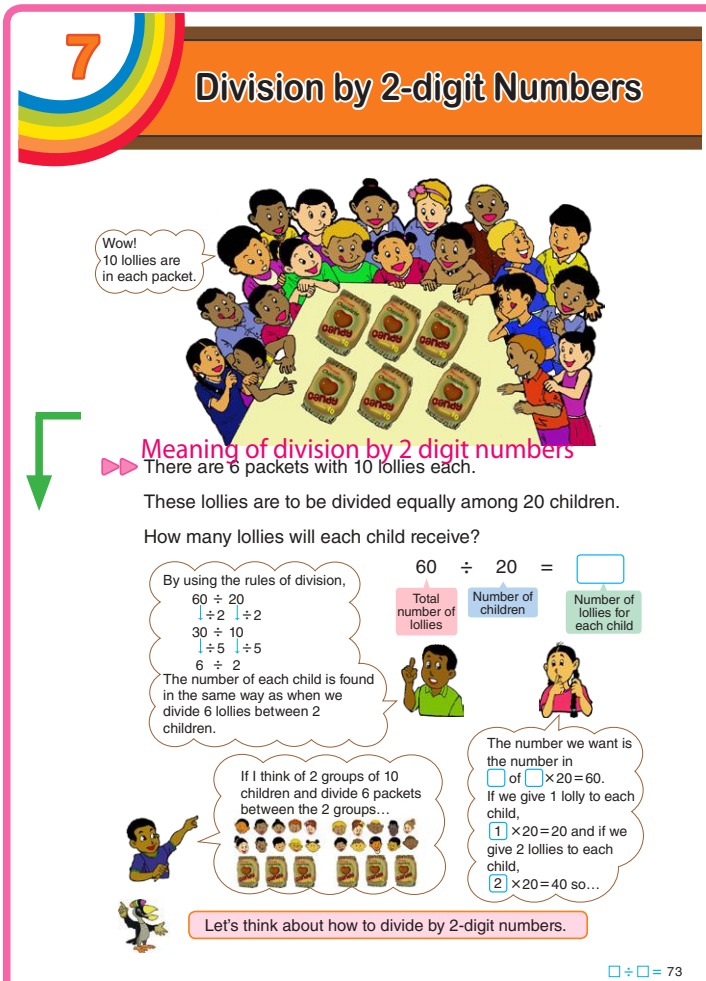
- Division with remainders (Grade 3)
- Rules of Division (Grade 4)
- Division of Tens and Hundreds (Grade 4)
- Division by One-Digit Numbers (Grade 4)
- Division in vertical form (Grade 4)
- Division by 2-digit Quotient (Grade 4)
- The calculation of (3-digit numbers) ÷ (1-digit numbers) (Grade 4)

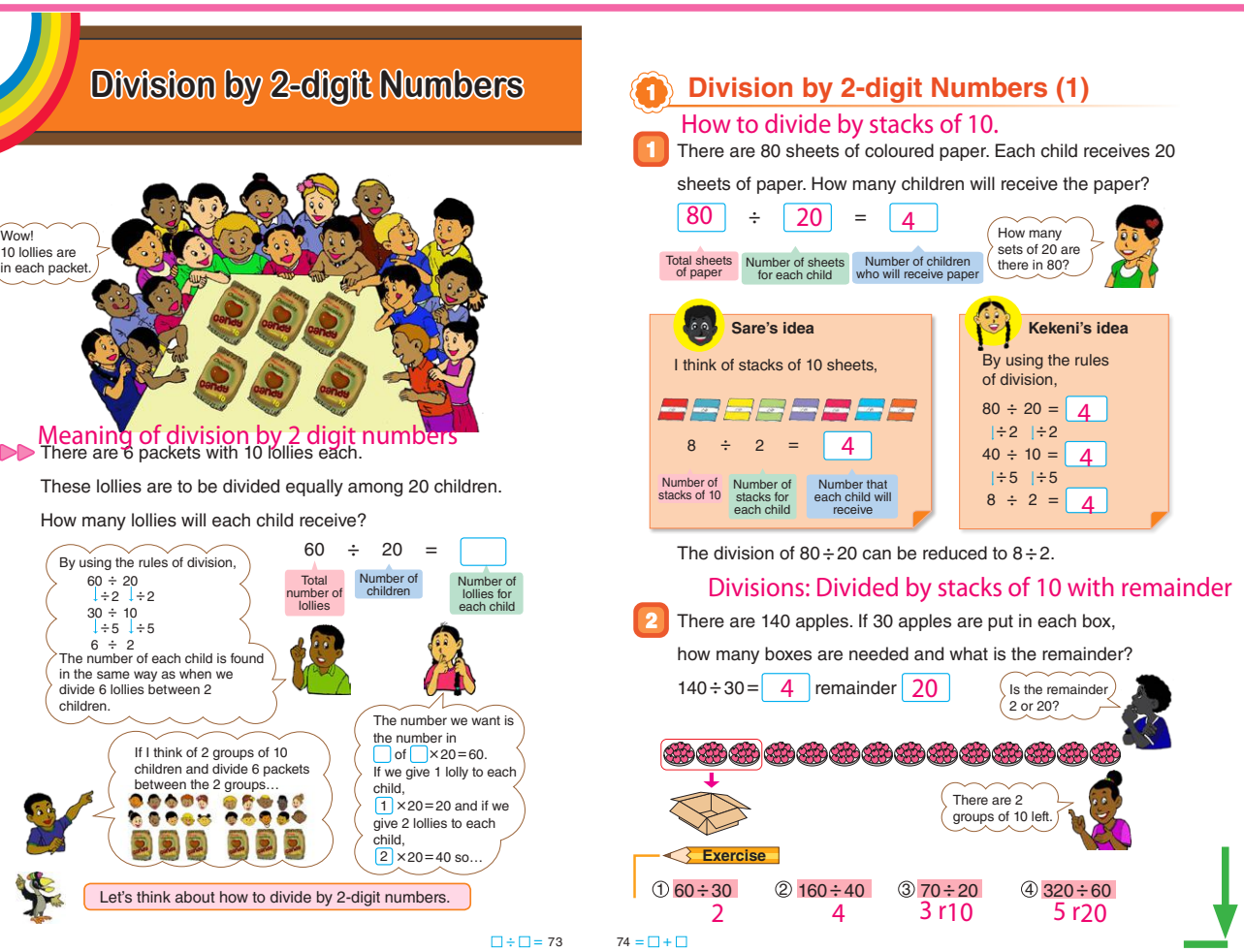
## Preparation

- Blocks/ sheets of paper in stacks/bundles of 10.

## Assessment

- Become interested in explaining how to express the process of a given situation of division by 2-digit numbers. F
- Think about how to divide by 2-digit numbers. F
- Understand how different ideas from their learned knowledge can be applied to calculate the problem. F
- Understand how to calculate (2-digit numbers) ÷ (2-digit numbers) = 1-digit number. S
- Do exercises correctly. S



## Lesson Flow

### 1 ▶▶ Read and understand the given situation and make an expression.

S Make a math expression. 60 ÷ 20

T How do you find the answer?

S Example: Think about how to share the 6 packets into 2 groups of 10 children. Apply rules of division or identify the number in the box to satisfy the multiplication.

T Use the bubbles to explain the ideas.

T Introduce the main task.

### 2 1 Read and understand the problem and make a mathematical expression.

S Read and understand the given situation and confirm mathematical expression 80 ÷ 20

### 3 Think about how to divide by 2-digit numbers.

T Let's divide the actual coloured papers for each child, 80 ÷ 20 and find the answer using the ideas of previous situation.

S Share their ideas or explain Sare and Kekeni's ideas.

T Confirm students idea with Sare and Kekeni's idea.

TN (Sare's idea)
Divide into stacks of 10 sheets and single sheets (if applicable).
8 (Number of stacks of 10) ÷ 2 (Number of stacks for each child) = 4 (Number per child)

(Kekeni's idea)
80 ÷ 20 but when divided using stacks of 10, you can find the answer as 8 ÷ 2.
The division of 80 ÷ 20 can be reduced to 8 ÷ 2.

### 4 2 Read and understand the problem and make a math expression.

T Inform students to apply the two ideas expressed in previous task to solve 140 ÷ 30.

S1 140 ÷ 30 = 4 remainder 2

S2 140 ÷ 30 = 4 remainder 20

T Is the remainder 2 or 20?

S There are 2 groups of 10 left so remainder is 20.

S It is easier to reduce or bring large numbers down to smaller numbers in groups of 10 so that those smaller numbers (divisor or dividend) can be easily divided to find the answer.

### 5 Complete the exercise.

TN Prioritise 1 and 3. 2 and 4 can be given for homework.

## Sample Blackboard Plan

**Unit:** Division by 2 digit Numbers **Sub – Unit:** Division by 2 – digit Numbers (1) **Period:** 1 of 4

Let's think about how to divide 2 – digit numbers with and without remainder.

MT

**≫How many candies will each child receive if 6 packets with 10 pieces of candies each were shared equally among 20 children?**
**Mathematical expression: 60 ÷ 20 = ☐**

Think of different ways:
**1. Think about how to share .**
If I think of 2 groups of 10 children and 6 packet s between the 2 groups…..

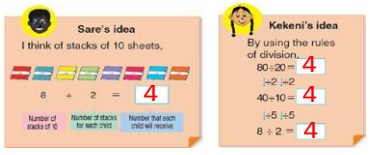
**2. Apply rules of division.**
By using the rules of division.

60 ÷ 20 = 3
↓ ÷ 2 ↓ ÷ 2
30 ÷ 10
↓ ÷ 5 ↓ ÷ 5
6 ÷ 2 = 3

The number of each child is found in the same way as when we divide 6 candies between 2 children.

**1 There are 80 coloured paper. Each child receives 20 sheets of paper. How many children will receive the paper?**

Mathematical expression: 80 ÷ 20
How to divide by stacks of 10.




The division of 80 ÷ 20 can be reduced to 8 ÷ 2 10

**2 Apply the two ideas expressed above to solve Task 2 to solve 140 ÷ 30.**

**Summary:**

It is easier to reduce or bring large numbers down to smaller numbers in groups of 10 so that those smaller numbers ( divisor or dividends) can be easily divided to find the answer.

**Exercise**
Complete the following exercises 1-4.

# Unit 7

# Unit: Division by 2-digit Numbers
## Sub-unit: 1. Division by 2-digit Numbers (1)
## Lesson: 2 of 4 (Double Period)

Textbook Page : p.75
Actual Lesson 44

## Lesson Objectives

- To understand how to calculate (2-digit numbers) ÷ (2-digit numbers).
- To think about how to make a Temporary Quotient.

## Prior Knowledge

- Division in vertical form (Grade 4)
- Division by 2-digit Quotient (Grade 4)
- The calculation of (3-digit numbers) ÷ (1-digit numbers) (Grade 4)

## Preparation

- Chart or cardboard for 'How to divide 84 ÷ 21 in vertical form'

## Assessment

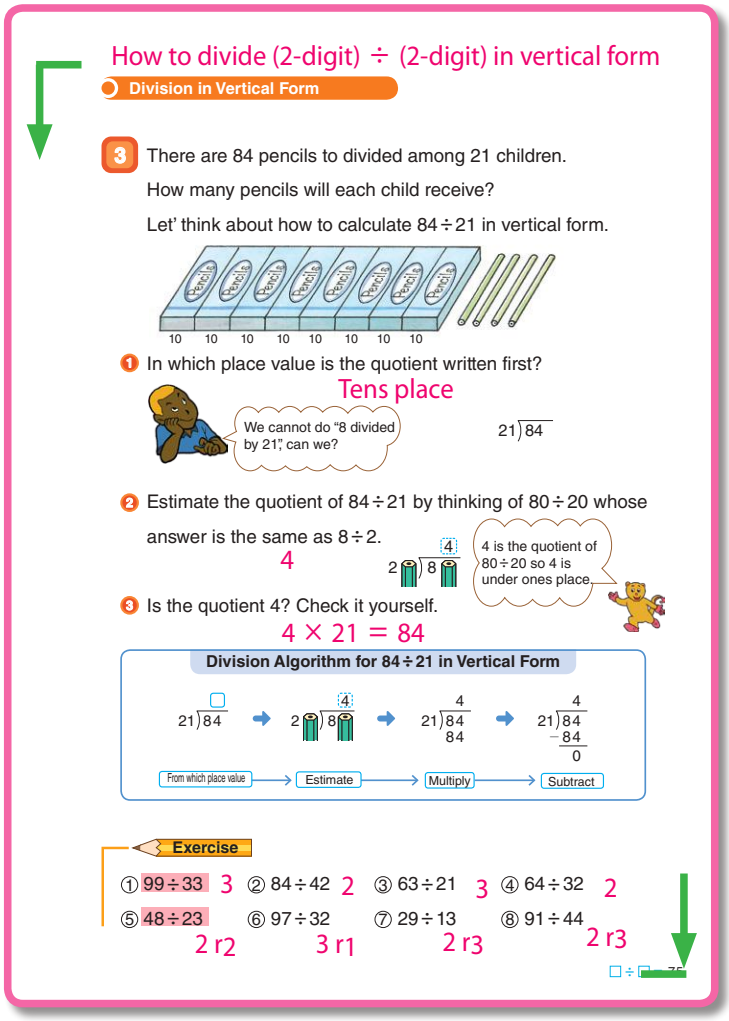
- Think about how to calculate. (2-digit numbers) ÷ (2-digit numbers) considering temporary quotient. F
- Do the exercises correctly. S

## • Teacher's Notes •

**Making a Temporary Quotient**

Many students who have difficulties in division often face difficulties in making a temporary quotient. One reason could be that it uses a way of thinking which is not used often such as thinking of 10 as a unit and investigating a number which is certain times of a certain number.

For those students, although it might be time consuming, it is important to have them conduct enough concrete operations. By actually operating by their own hands such as "making a stack of 10", "dividing into 20 each", etc., these operations and making a quotient in vertical form will gradually be linked.



## Lesson Flow

### 1 Review the Previous lesson.

### 2 ③ Read and understand the given problem.

T How can we share 84 pencils among 21 children?
S Explain different ways based on the experiences.
T Let's think about how to calculate 84÷21 in vertical form.

### 3 Think about how to divide 84÷21 in vertical form and discuss with friends how to calculate.

T ① Can we divide 8 by 21"?
S Give their responses and explain their reasons.
T Confirm that we cannot divide 8 by 21, so the quotient will be in the ones place.
T Introduce the main task.
T ② Ask students to think about calculating 84÷21 in vertical form.
T Let students think of 80÷20 by hiding 4 in 84 and 1 in 21 in vertical form.
TN Teacher demonstrates how to hide 4 and 1 by using hand on the board.
S The quotient is 4.
T ③ How shall we confirm the quotient?
S Calculate and confirm 84÷21 in vertical form.
T Confirm the steps (From which place, divide, multiply and subtract.)
S Confirm if quotient is written and check the answer.
4(Quotient)×21(Divisor)=84(Dividend)

### 4 Summary.

TN Allow students to present the process of calculation using one of the exercises.

### 5 Complete the exercise.

TN Prioritise 1, 2, 5 and 6. The rest can be for homework.

## Sample Blackboard Plan

**Unit:** Division by 2 digit Numbers **Sub – Unit:** Division by 2 digit Number (1) **Lesson:** 2 of 4

Let's think about how to divide 84 ÷ 21 in vertical form by making a temporary quotient.

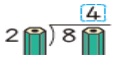
③ **There are 84 pencils to be divided among 21 children. How many pencils will each child receive?**

① **In which place value is the quotient written first? We cannot do "8 divided by 21", can we?**

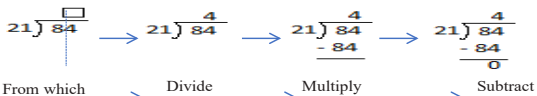
MT

② **Think of 80 ÷ 20 and guess the quotient from 8 ÷ 2.**

③ **Is the quotient 4?**




How to divide 84 ÷ 21 in Vertical Form.




From which place value → Divide (80 ÷ 20) → Multiply → Subtract

**Answer:** 4 Pencils each

**Summary**
Use exercise 6 as the summary of the lesson.

**Exercise**
Complete exercise 1,2,5 and 6.

# Unit 7

# Unit: Division by 2-digit Numbers
## Sub-unit: 1. Division by 2-digit Numbers (1)
## Lesson: 3 of 4 (Double Period)

Textbook Page : p.76
Actual Lesson 45

## Lesson Objectives

- To learn how to modify a temporary quotient if it is too large.
- To understand the order of calculation in vertical division (Quotient → Divide → Multiply → Subtract).

## Prior Knowledge

- The calculation of (2-digit numbers) ÷ (2-digit numbers) (Previous lesson)

## Preparation

- Chart papers Task 4 and Task 5

## Assessment

- Solve the division modifying temporary quotient. F
- Do exercises correctly. S

## • Teacher's Notes •

**From a Temporary Quotient to True Quotient**

A quotient estimated first is called the "temporary quotient" in division. Two steps are needed for this temporary quotient to become the true quotient.

First one is to confirm that (divisor) × (quotient) equals to dividend or smaller than that in the operation of "divide → multiply → subtract."

Second one is to confirm that a number subtracted is smaller than the divisor. When these two are confirmed, then a temporary quotient is said to become a true quotient.

### How to modify the Temporary Quotient in case the quotient is too large

**How to Make a Temporary Quotient (1)**

4 Let's think about how to divide 96 ÷ 33 in vertical form.

Estimate the quotient of 96 ÷ 33 by thinking of 90 ÷ 30 whose answer is the same as 9 ÷ 3.

33)96 → 3)9 → 33)96 (3, 99)

Make the quotient smaller by 1.

We cannot subtract here.

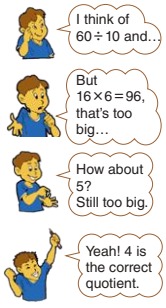
30 is smaller than 33.

33)96 (2, −66, 30)

The first estimation of the quotient is called **temporary quotient**. If the temporary quotient is too large, we have to replace it with a quotient that is smaller by 1.

5 Let's think about how to divide 68 ÷ 16 in vertical form.

1. Make a temporary quotient.
2. Multiply the divisor and the temporary quotient.
3. Replace it with a number that is smaller by 1.
4. Make the temporary quotient smaller by 1 again.




16)68 (6 → 6, 96 Cannot subtract → 5, 80 Still cannot subtract → 4, −64, 4 Can subtract)

**Exercise**

① 56 ÷ 14 (4) ② 60 ÷ 12 (5) ③ 68 ÷ 24 (2 r20) ④ 79 ÷ 13 (6 r1)
⑤ 70 ÷ 14 (5) ⑥ 69 ÷ 15 (4 r9) ⑦ 97 ÷ 16 (6 r1) ⑧ 72 ÷ 15 (4 r12)

76 = □ + □

## Lesson Flow

### 1 Review the previous lesson.

### 2 4 Read and understand the problem and express it in vertical form.

S Read and understand the given situation and think about how to make a temporary quotient in a vertical form.

### 3 Think about how to make a Temporary Quotient.

S Explain the process of making temporary quotient.

T In this case we have to make the temporary quotient smaller by 1 and so we write 2 as our next quotient to do the calculation.

T Check the answer.
33×2+30=96. Now we can see that 30 is smaller than 33, so 30 is the remainder.

T Explain the important point in the box.

T Introduce the main task.

### 4 5 Think about how to calculate 68÷16 in vertical form.

S ❶ Make a temporary quotient of 6 by thinking of 60÷10.

S ❷ 6×16=96 96 is larger than 68.

S ❸ Reduce 6 to 5. 5×16=80, 80 is still larger than 68.

S ❹ Reduce 5 to 4. 4×16=64, 4 is the correct quotient.
Therefore, 68-64=4 remaining.
Check answer: 16×4+4=68

### 5 Summary.

TN Allow students to present the process of calculation using one of the exercises.

### 6 Complete the exercise.

TN Prioritise 1-4. The rest can be given for homework.

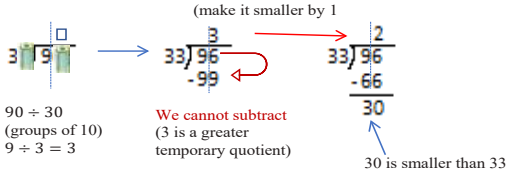
## Sample Blackboard Plan

**Unit:** Division by 2 digit Numbers **Sub – Unit:** Division by 2 – digit Number (1) **Lesson:** 3 of 4

Let's think about how to make a temporary quotient when the quotient is too large.

**4 Let's think about how to divide 96 ÷ 33 in vertical form.**

(make it smaller by 1




90 ÷ 30
(groups of 10)
9 ÷ 3 = 3

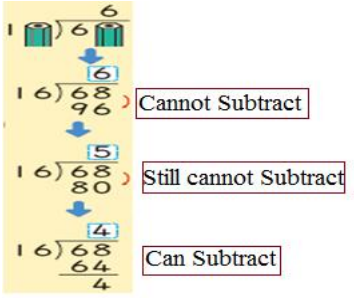
We cannot subtract
(3 is a greater
temporary quotient)

30 is smaller than 33

**Check answer:**

MT

**5 Think about how to calculate 68 ÷ 16 in vertical form by following activities ❶ to ❹ and solve.**




**Summary:**
Use exercise 4 as the summary of the lesson.

**Exercise**
**Complete 1-4.**

# Unit 7

# Unit: Division by 2-digit Numbers
## Sub-unit: 1. Division by 2-digit Numbers (1)
## Lesson: 4 of 4 (Double Period)

Textbook Page : p.77
Actual Lesson 46

## Lesson Objectives

- To think about how to calculate (3-digit) ÷ (2-digit) = (1-digit).
- To think about how to calculate (3-digit) ÷ (2-digit) in case the temporary quotient is 10 or larger.

## Prior Knowledge

- The calculation of (2-digit numbers) ÷ (2-digit numbers.)
- How to make a temporary quotient (Previous lesson)

## Preparation

- Chart papers for Task 6 and Task 7

## Assessment

- Explain the procedures of calculating (3-digit number) ÷ (2-digit number) in vertical form. F
- Calculate (3-digit number) ÷ (2-digit numbers) = (1-digit number) in vertical form using a temporary quotient. F
- Do the exercise correctly. S

### • Teacher's Notes •

If a temporary quotient is larger than 10, replace it with 9.

### In case of (3-digit) ÷ (2-digit) = (1-digit)

**How to Make a Temporary Quotient (2)**

The quotient is not on tens place.

34)170

**6** Think about how to divide 170 ÷ 34 in vertical form.

1. In which place value is the quotient written?
   Ones place

**Division Algorithm for 170 ÷ 34 in Vertical Form**

□ 34)170 → 5 3)17 → 5 34)170 170 → 5 34)170 −170 0

From which place value → Estimate → Multiply → Subtract

**How to Make a Temporary Quotient (3)**

(3-digit) ÷ (2-digit), Temporary Quotient is 10

**7** Think about how to divide 326 ÷ 36 in vertical form.

1. In which place value is the quotient written? 10
2. Think of 320 ÷ 30 and make a temporary quotient.

**Division Algorithm for 326 ÷ 36 in Vertical Form**

□ 36)326 → 10 3)32 → 9 3)32 → 9 36)326 324 → 9 36)326 −324 2

From which place value → Estimate → Reduce → Multiply → Subtract

If a temporary quotient is 10 or larger, replace it with 9.

**Exercise**

① 255 ÷ 51 5
② 284 ÷ 71 4
③ 191 ÷ 24 7 r23
④ 218 ÷ 38 5 r28
⑤ 208 ÷ 21 9 r19
⑥ 217 ÷ 25 8 r17
⑦ 257 ÷ 29 8 r25
⑧ 143 ÷ 18 7 r17

## Lesson Flow

### 1 Review of the previous lesson.

S Complete the question 56 ÷ 14.
S List down at least 2 or 3 to remember how to make a temporary quotient and then check .
TN Place value, estimation of the quotient and order of calculation.

### 2 6 Think about how to calculate by changing 170 ÷ 34 in vertical form.

TN Difference in this lesson is that the dividend is a 3-digit number.
T 1 When 170 is divided by 34, in which place value is the quotient written?
S 34 cannot go into 17 therefore, the first quotient comes in the ones place.
S Make a temporary quotient and from which place value the quotient is written. In vertical form, think of how to calculate.
S Confirm to check the temporary quotient
(Quotient) 5 × (Divisor) 34 = (Dividend) 170. There is no remainder, the quotient is correct.

### 3 Exercise

S Complete the following exercises 1 and 2.
T Introduce the main task.

### 4 7 To think about a Temporary Quotient and calculate.

T 1 and 2 36 cannot go into 32 therefore, the quotient comes in the ones place.
S Observe the calculation and make a temporary quotient.
S Make a temporary quotient of 10, from which place value is the quotient written, if the temporary quotient is 10 or larger then reduce it starting from 9.
T Demonstrate how to divide 326 ÷ 36?

### 5 Summary

T To calculate (3-digit number) ÷ (2-digit number), find the place value of the temporary quotient then calculate.

### 6 Complete the exercise.

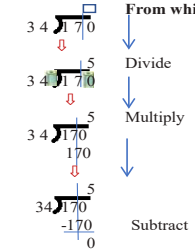
S Complete the next two exercises 3 - 5. The rest can be given for homework.

## Sample Blackboard Plan

**Unit:** Division by 2 digit Numbers **Sub – Unit:** Division by 2 - Digit Number (1) **Lesson:** 4 of 4

Let's think about how to calculate (3- digit) ÷ (2- digit) numbers when the temporary quotient is larger than 10.

**6 Think about how to divide 170 ÷ 34 in vertical form.**
1 In which place value is the quotient written?
Ones place



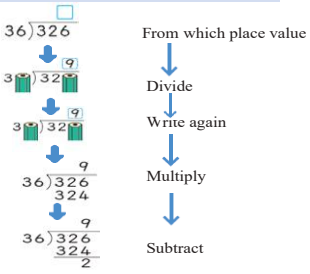

Answer is 5.

**Exercise**
Complete exercise 1 and 2.

MT

**7 Think about how to divide 326 ÷ 36 in vertical form.**
1 In which place value is the quotient written? Ones place
2 Think of 320 ÷ 30 and make a temporary quotient.
10

How to Divide 326 ÷ 36 in Vertical Form




Answer: 9 remainder 2

**Summary**
To calculate 3 digit ÷ 2 digit number find a place of a temporary quotient and then calculate:
1. From which place
2. Divide
3. Write again
4. Multiply
5. Subtract

**Exercise:**
Complete 3-5.

# Unit 7

# Unit: Division by 2-digit Numbers
## Sub-unit: 2. Division by 2-digit Numbers (2)
## Lesson: 1 of 2 (Double Period)

Textbook Page : p.78-p.79
Actual Lesson 47

## Sub-unit Objectives

- To think about how to divide using vertical division of (3-digit numbers) ÷ (2-digit numbers.)
- To think about how to calculate vertical division in which the ones place becomes 0.

## Lesson Objectives

- To think about how to divide using vertical division of (3-digit numbers) ÷ (2-digit numbers.)

## Prior Knowledge

- The calculation of (3-digit numbers) ÷ (2-digit numbers.) (Previous lesson)
- How to make a temporary quotient (Previous lesson)

## Preparation

- Charts of steps of vertical division and identifying quotient

## Assessment

- Think about procedures of calculating (3-digit number) ÷ (2-digit number) in vertical from. F
- Calculate (3-digit number) ÷ (2-digit numbers) = (1 or 2-digit number) in vertical form. F
- Do the exercise correctly. S

## • Teacher's Notes •

Study the steps carefully on how to divide 3-digit numbers ÷ 2-digit numbers in the blue box . The explanation is done horizontally from left to right then to bottom and left to right again.

## 2 Division by 2-digit Numbers (2)

### In case of (3-digit) ÷ (2-digit) = (2-digit)

**1** There are 322 sheets of coloured paper. They are to be divided equally among 14 children. How many sheets of paper will each child receive?

1. Write a mathematical expression.
   322 ÷ 14
2. In which place value is the quotient written?
3. If 3 stacks of 100 are changed into bundles of 10, how many stacks of 10 are there? 32 stacks
4. Divide the stacks of 10 in 3 among 14 children. 32 ÷ 14 = 2 remainder 4
5. If the remainder of the stacks of 10 is changed into single sheets, how many sheets of coloured paper are there altogether? 42 sheets
6. Divide the single sheet of coloured papers among the 14 children.
   42 ÷ 14 3
7. How many sheets of paper will each child receive? 322 ÷ 14 = 23
   23 sheets of paper

Can 3 stacks of 100 sheets of paper be divided among 14 children without dividing the stacks?

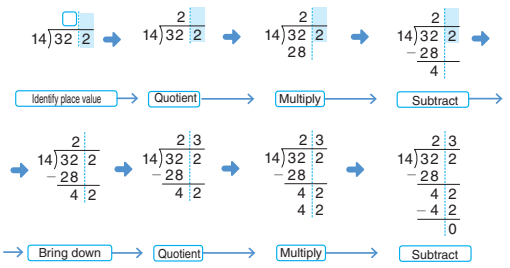
Number of stacks of 10 / Number of single sheets

$$14\overline{)32\,2}\quad -28\quad 4$$

$$14\overline{)32\,2}\quad -28\quad 4\,2$$

78 = □ + □

### Division Algorithm for 322 ÷ 14 in Vertical Form




To do division we decide the place of the quotient, write a number there, multiply, subtract and bring down, then repeat these steps.

**2** Let's divide 980 ÷ 28 in vertical form. In which place value is the quotient written?

$$28\overline{)980}\quad 84\quad 140\quad 140\quad 0$$

Remember to bring down the 0 in the dividend.

**Exercise**

① 736÷16 46 ② 810÷18 45 ③ 851÷26 33 r13
④ 585÷39 15 ⑤ 612÷36 17 ⑥ 578÷23 25 r3

□ ÷ □ = 79

## Lesson Flow

### 1 ① Read the problem and make a mathematical expression.

S ① Read and understand that the problem is division and make a mathematical expression.
S Mathematical expression: 322 ÷ 14.
T ② Assist students to understand that they cannot divide 3 stacks of 100 papers among 14 children.
S Change the 3 stacks of 100 pieces of papers into bundles of 10, so when 32 stacks of 10 are divided by 14 children the quotient is written in the tens place.
T ③ How many stacks of 10 do we have now?
S 32 stacks
T ④ What is the mathematical expression?
S 32 ÷ 14
T Think about how many sheets of paper will each child receive and the remainder.
S 32 ÷ 14 = 2 stacks of 10 and 4 remainder

S ⑤ When 4 stacks are in the tens place, which means 40 single sheets including 2 single sheets giving a total of 42 sheets.
S ⑥ 42 ÷ 14 = 3
T Confirm that 42 sheets ÷ 14 children = 3
S ⑦ If 322 ÷ 14 children then there will be 23 single sheets of crafting paper given to each child.
T Introduce the main task.

### 2 Discuss the steps of vertical division.

T When calculating vertical division, even the quotient is a 2-digit number the steps are the same. Start from, (Identify place value) → (Quotient) → (multiply) → (subtract) → (bring down) → (Quotient) → (multiply) → (subtract).
TN Explain the steps clearly using one vertical demonstration. (Refer to board plan)

### 3 Conclude how to do the vertical division.

T/S Explain the important point in the box ( ).

### 4 ② Solve 980 ÷ 28 in vertical division.

TN The steps of calculation is the same. Pay attention to 0 in the dividend when bringing down and subtracting.
S Check:(Quotient) 35 × (Divisor) 28 = (Dividend) 980, There is no remainder, the quotient is correct.

### 5 Summary

T To calculate (3-digit number) ÷ (2-digit number), find the place value of the temporary quotient then calculate.

### 6 Complete the exercise.

S Complete the next two exercises 1 and 3. The rest can be given for homework.

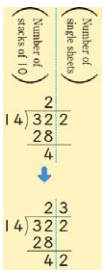
## Sample Blackboard Plan

**Unit:** Division by 2 digit Numbers **Sub – Unit:** Divisions by 2- digit Numbers (2) **Lesson:** 1 of 2

Let's think about which place to place the quotient when dividing (3- digit) ÷ (2- digit) in vertical form.

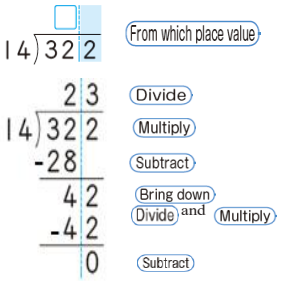
**1 There are 322 sheets o f crafting paper. They are able to be divided equally among 14 children. How many sheets of paper will each child receive?**

1. Mathematical expression: **322 ÷ 14**
2. In which place value is the quotient written?
3. 10 stacks of 32 sheets of crafting papers are shared among 14 children.
4. 32 ÷ 14 = 2 remainder 4.
5. 42 is the remainder of stacks of 10 where it is changed into single sheets .There are 42 single sheets.
6. Divide 42 ÷ 14 = 3
7. 322 ÷ 14 = 23
   Each child will receive 23 sheets of paper




MT

How to divide 322 ÷ 32 in Vertical Form.




To do division we decide the place of quotient, write a number there, multiply, subtract, and bring down, and then repeat these steps.

**2 Let's divide 980 ÷ 28 in vertical form. In which place value is the quotient written?**

| | | | | |
|---|---|---|---|---|
| 2 | 8 | 9 | 8 | 0 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**Summary**
**To calculate 3 digit ÷ 2 digit number decide the place of a quotient, write a number there and then we do normal calculation.**

**Exercise:**
Complete 1 and 3 .

# Unit 7

# Unit: Division by 2-digit Numbers
## Sub-unit: 2. Division by 2-digit Numbers (2)
## Lesson: 2 of 2 (Single Period)

Textbook Page : p.80
Actual Lesson 48

## Lesson Objectives

- To think about how to divide in vertical division 3-digit numbers ÷ 2-digit numbers (Quotient of ones place is 0).

## Prior Knowledge

- The calculation of 3-digit numbers ÷ 2-digit numbers
- How to make a temporary quotient

## Preparation

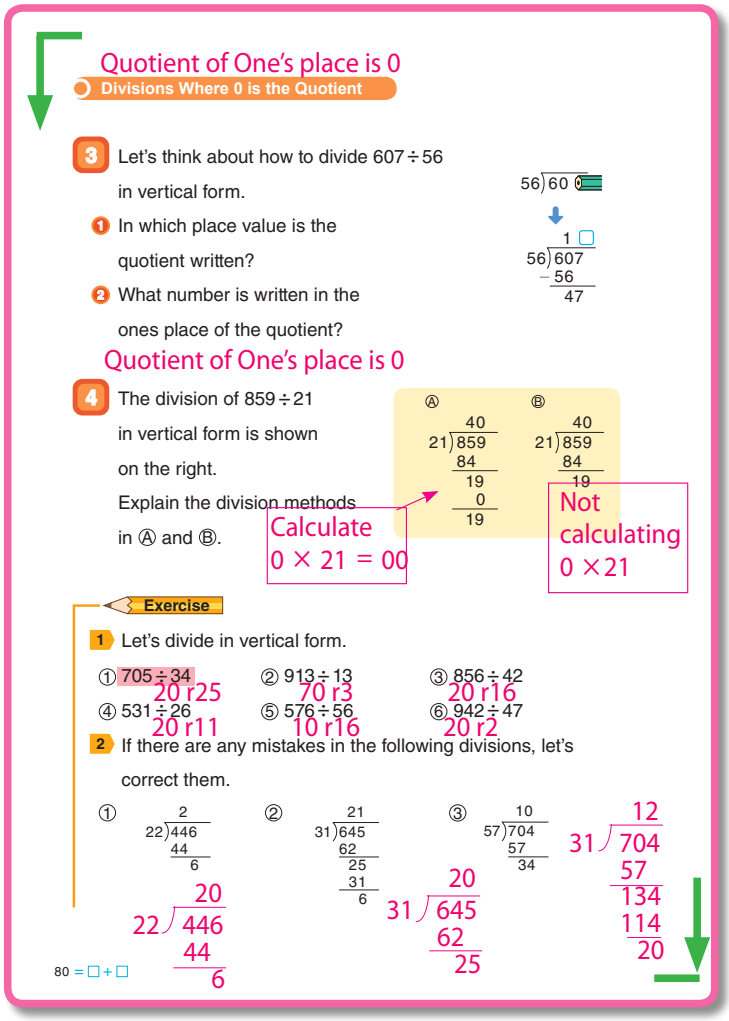
- Charts of steps of vertical division and identifying quotient.

## Assessment

- Think about the steps of calculating 3-digit ÷ 2-digit (Quotient of ones place is 0). F
- Do the exercises correctly. S

## • Teacher's Notes •

In this lesson, it helps us to see the importance of zero (0). Where it can be used effeciently and thus helps in calculation.



## Lesson Flow

### 1 Review the previous lesson.

### 2 3 Think about how to calculate 607 ÷ 56.

T The first quotient has been written in tens place, after that, comparing 56 & 47, quotient cannot be written in the ones place, therefore a 0 is essential to be put there.

T Introduce the main task.

S Complete 1 and 2.

### 3 4 Discuss and explain how to calculate 859 ÷ 21.

S Explain the division methods in A and B.

TN If students cannot explain, the teacher must assist.

Ⓐ

```
   4 0
21)8 5 9
  8 4
  ---
    1 9
  - 0 0
  -----
    1 9
```

Write the first quotient in the tens place, divide 85 ÷ 21
Multiply 4 × 21 = 84
Subtract 85 − 84 = 1
Bring down 9
21 cannot go into 19, therefore, **second quotient is 0** and it's placed at the **ones place**.

**Calculate 0 × 21 = 0** (in this calculation we put 0 as a quotient in the ones place.
Then subtract, 19 − 0 = 19

Ⓑ

```
   4 0
21)8 5 9
  - 8 4
  -----
    1 9
```

Write the first quotient in the tens place, divide 85 ÷ 21
Multiply **4 × 21 = 84**
Subtract 85-84 = 1
21 cannot go into 19, therefore, **second quotient is 0** and its placed at **the ones place**.
For this case there is **NO calculation of 0 × 21**. The answer is only 19.

S Compare the similarities and differences of A and B.

TN Quotient and remainder are the same.
In method A, 0 × 21 = 0 and 19 − 0 are calculated.
In method B, they are not calculated.

### 4 Summary.

S Understand that the method B is easier.

TN When the students get used to doing the process of vertical division, recommend method B which omits process of multiplication and subtraction of 0.

### 5 Complete the exercises.

S Using both methods A and B, complete the next two exercise 1 (1-3) and exercise 2 (1 and 2). The rest can be for homework.

## Sample Blackboard Plan

**Unit:** Division by 2 digit Numbers **Sub – Unit:** Division by 2- Digit Numbers (2). **Lesson:** 2 of 2

Let's explain and calculate division where 0 is the quotient in ones place.

MT

**3 Let's think about how to divide 607 ÷ 56 in vertical form.**

**In which place value is the quotient written?**

**What number is written in the ones place of the quotient?**

```
56)600
   ↓
   1□
56)607
   56
   47
```

**4 The division of 859 ÷21 in vertical form is shown on the right.**
**Explain the division methods in Ⓐ and Ⓑ.**

Ⓐ

```
   40
21)859
   84
   --
   19
   00
   --
   19
```

Ⓑ

```
   40
21)859
   84
   --
   19
```

**Summary:**
Method B is recommended for easier calculation.

**Exercise:**
Using both methods A and B complete exercise 1 (1-3) and exercise 2 (1and 2).

# Unit 7

# Unit: Division by 2-digit Numbers
## Sub-unit: 3. Rules of Division and Multiplication
## Lesson: 1 of 1 (Single Period)

Textbook Page : p.81
Actual Lesson 49

## Sub-unit Objectives

- To understand that in division, multiplying or dividing by the same number with the dividend and the divisor, the quotient dosen't change.
- To investigate the relationship between the multiplicand, multiplier and product in multiplication.

## Lesson Objectives

- To recognise that in division when multiplying or dividing by the same number with the dividend and the divisor, the quotient doesn't change.
- To investigate the relationship between the multiplicand, multiplier and product in multiplication.
- To deepen their understanding of division and what was learned in this unit.

## Prior Knowledge

- Rules of Division (Grade 4)
- Division of Tens and Hundreds (Grade 4)
- Division by One-Digit Numbers (Grade 4)
- Division in vertical form (Grade 4)

## Preparation

Refer to the blackboard plan.

## Assessment

- Investigate the rules of division and multiplication. F
- Recognise the rules and solve the exercises correctly. S

### • Teacher's Notes •

The main idea for the rule is that when multiplying or dividing by the same number with dividend and the divisor, the quotient is the same.

When multiplying or dividing by the same number with dividend and the divisor, the quotient is the same.

### 3 Rules of Division and Multiplication

**1** Do these calculations by using the rules of division.

When we do division problems, the quotient remains the same even if the dividend and divisor are **multiplied** by the same number. The quotient remains the same even if the dividend and divisor are **divided** by the same number.

① 1500 ÷ 500 = 3
÷100 ÷100
15 ÷ 5 = 3

② 24000 ÷ 3000 = 8
÷1000 ÷1000
24 ÷ 3 = 8

### Rules of Multiplication

**2** Let's compare two mathematical sentences to find rules about multiplication.

① 40 × 6 = 240
×2 ÷2
80 × 3 = 240

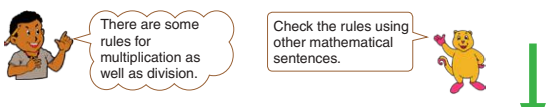
② 80 × 3 = 240
÷2 ×2
40 × 6 = 240

③ 40 × 6 = 240
×2 ×2
80 × 6 = 480

④ 80 × 6 = 480
÷2 ÷2
40 × 6 = 240

⑤ 40 × 6 = 240
×2 ×2
40 × 12 = 480

⑥ 40 × 12 = 480
÷2 ÷2
40 × 6 = 240



## Lesson Flow

### 1 ❶ Think about how to calculate 1500÷500 and 24 000÷3000 using rules of division.

T Introduce the main task.
S Think about ❶ using rules of division.
T By which number should we use to remove the zeros.
S If there are two 0s, then we use 100 to divide.
T When dividing both dividend and divisor by 100 what will be the expression?
S 15÷5
T What is the answer?
S 3
T What is the answer of 1500÷500 by applying rules of division in ❶?
S 3 because if the dividend and divisor are divided by the same number the quotient remains the same.
T/S Do activity ❷ similarly as ❶.
TN In ❷ you have to divide by 1000.

### 2 ❷ Compare two mathematical sentences in one activity to find various relationships about multiplication.

TN The focus is not for identifying the rules but for finding the relationship between two mathematical sentences.
S Complete the activities ❶ to ❻ and explain the relationships according to the following.
Expected responses:
❶: If we multiply 2 times (twice), then we also divide 2 times (twice), the product is the same.
❷: If we divide by 2 , then we also multiply 2 times (twice), the product is the same.
❸ and ❺: If we multiply the multiplier (divisor) by 2 (twice), then the product will increase 2 times (twice).
❶ and ❻: If we divide 2 times (twice) only multiplier, then the product is reduced 2 times (twice).

### 3 Summary

T/S Summarise the important points.

## Sample Blackboard Plan

**Unit:** Division by 2 digit Numbers **Sub – Unit:** Rules of Division and Multiplication **Lesson:** 1 of 1

MT

Let's think about how to calculate 1 500 ÷ 500 and 2 4 000 ÷ 3 000 using rules of division.

**1** Do these calculations by using the rules of division.

When we do division problems, the quotient remains the same even if the dividend and divisor are multiplied by the same number. The quotient remains the same even if the dividend and divisor are divided by the same number.

❶ 1500 ÷ 500 = 3
÷100 ÷100
15 ÷ 5 = 3

❷ 24000 ÷ 3000 = 8
÷1000 ÷1000
24 ÷ 3 = 8

**2** Let's compare two mathematical sentences to find rules about multiplication.

❶ 40 × 6 = 240
×□2 ÷□2
80 × 3 = 240

❷ 80 × 3 = 240
÷□2 ×□2
40 × 6 = 240

❸ 40 × 6 = 240
×□2 ×□2
80 × 6 = 480

❹ 80 × 6 = 480
÷□2 ÷□2
40 × 6 = 240

❺ 40 × 6 = 240
×□2 ×□2
40 × 12 = 480

❻ 40 × 12 = 480
÷□2 ÷□2
40 × 6 = 240

**Summary**
In division problems even we multiply or divide by the same number with the dividend and the divisor, the product remains the same.

# Unit 7

# Unit: Division by 2-digit Numbers
## Sub-unit: Exercise & Evaluation
## Lesson: 1 of 1 (Double Period)

Textbook Page : p.82-p.83
Actual Lesson 50

## Lesson Objectives

- To deepen their understanding of learned content in this Unit.

## Prior Knowledge

- All the contents in this Unit.

## Preparation

- Evaluation sheet for all students

## Assessment

- Solve the exercises to confirm what they learned in the unit. F S

## • Teacher's Notes •

This is the second last lesson of Chapter 7.
In the next lesson, teacher will use an attached evaluation test to conduct assesment for your class after finishing all the exercises.

### Exercise

Division in vertical form

**1** Let's divide in vertical form. Pages 74 ~ 80

① 40 ÷ 20 2
② 240 ÷ 60 4
③ 130 ÷ 40 3 r10
④ 96 ÷ 32 3
⑤ 97 ÷ 27 3 r16
⑥ 738 ÷ 24 30 r 18
⑦ 344 ÷ 43 8
⑧ 385 ÷ 56 6 r 49
⑨ 411 ÷ 45 9 r 6
⑩ 672 ÷ 28 24
⑪ 453 ÷ 17 26 r11
⑫ 85 ÷ 19 4 r 9

**2** There are 113 eggs. If you divide them equally amongst 12 children. How many will each child get and what will be the remainder? Page 73

113 ÷ 12 = 9 remainder 5. Therefore, 9 eggs equally shared and 5 remaining.

**3** From a tape which is 7 m 60 cm long, how many 5 cm long tapes can you take out and how many cm will remain? Page 81

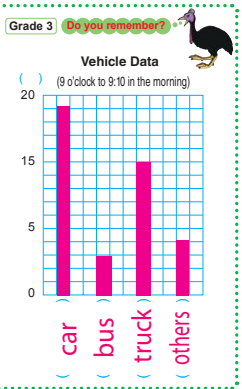
7m 60cm = 760 cm
760 ÷ 5 = 152 tapes and 0 remainder.

Grade 3 Do you remember?

The table below represents the data of vehicles which drove past the front of the school from 9 o'clock to 10 past 9 in the morning. Let's represent it on the bar graph.

**Vehicle Data**
(9:00 am to 9:10 am in the morning)

| Type of Vehicles | Number of vehicles | |
|---|---|---|
| Car | 𝍸 𝍸 \|\|\|\| | 14 |
| Bus | \|\|\| | 3 |
| Truck | 𝍸 \|\|\|\| | 10 |
| Others | \|\|\| | 4 |
| Total | | 31 |




82 = □ + □

### Problems

**1** Let's summarise how to divide by 2-digit numbers.
Understanding division by 2-digit numbers in vertical form.

① The quotient is written from the Tens place value.
② The quotient in the tens place is calculated from 76 ÷ 32.
③ The calculation for the quotient in the ones place is 128 ÷ 32.

32)768

**2** Let's calculate in vertical form.
Understanding division by 2-digit numbers in vertical form.

① 64 ÷ 21 3 r 1
② 74 ÷ 15 4 r14
③ 505 ÷ 55 9 r10
④ 715 ÷ 42 17 r 1
⑤ 567 ÷ 28 20 r 7
⑥ 736 ÷ 36 20 r16

**3** Uncle Stanley bought plywood pieces for his house that cost 75 kina each at the total cost of 900 kina. How many pieces did he buy?
Developing expression from an expression and calculating the answer.

900 ÷ 75 = 12 Answer

**4** Let's explain why the calculation 320 ÷ 40 can be done by 32 ÷ 4.
Explaining using rules of division.

Think about using stacks of 10

**5** Let's find the numbers for each of the empty slots so that the products of all three numbers in each direction, vertical horizontal and diagonal are the same.
Using multiplication and division in different ways.

| | | |
|---|---|---|
| 12 | Ⓐ 9 | 2 |
| Ⓑ 1 | 6 | 36 |
| 18 | Ⓒ 4 | Ⓓ 3 |

□ ÷ □ = 83

# Lesson Flow

## Exercise

### 1 ① Division in vertical form.

T Have students recall how to divide in vertical form in the previous lesson.

S Students solve the problem and explain their answers.

TN Activity 1 - 2. Let them think of stacks of 10 and do mental calculation.
Activity 3 - 6. Think about how to make a temporary quotient using vertical calculation.
Activity 7 - 12 are given as homework.

### 2 ② Read and understand the word problem of division and make a math expression.

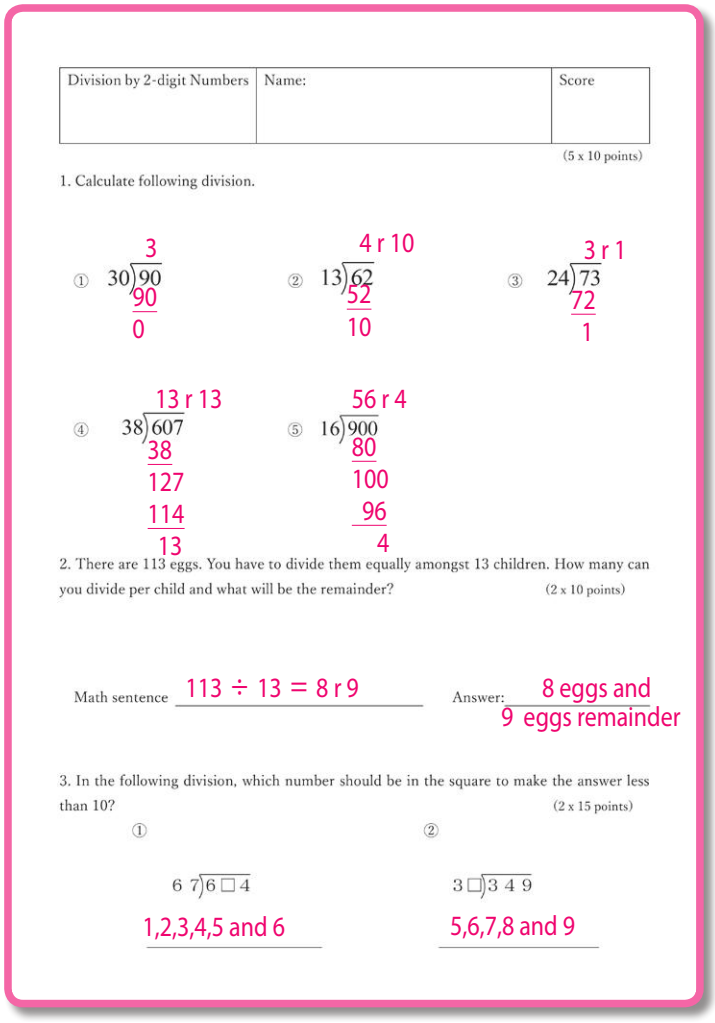
S Confirm to divide the number of eggs so that 113 eggs are divided equally amongst 12 children and then make a mathematical expression.

T Check if students make a temporary quotient appropriately.

### 3 ③ Read and understand the word problem of division.

S Read and understand that it is a division problem

S Notice that it is necessary to change the unit.
7 m and 60 cm is the same as 760 cm.



| Division by 2-digit Numbers | Name: | Score |
|---|---|---|
| | | |

(5 x 10 points)

1. Calculate following division.

① $30\overline{)90}$ → 3, 90, 0

② $13\overline{)62}$ → 4 r 10, 52, 10

③ $24\overline{)73}$ → 3 r 1, 72, 1

④ $38\overline{)607}$ → 13 r 13, 38, 127, 114, 13

⑤ $16\overline{)900}$ → 56 r 4, 80, 100, 96, 4

2. There are 113 eggs. You have to divide them equally amongst 13 children. How many can you divide per child and what will be the remainder? (2 x 10 points)

Math sentence 113 ÷ 13 = 8 r 9 Answer: 8 eggs and 9 eggs remainder

3. In the following division, which number should be in the square to make the answer less than 10? (2 x 15 points)

① $6\,7\overline{)6\,\square\,4}$ 1,2,3,4,5 and 6

② $3\square\overline{)3\,4\,9}$ 5,6,7,8 and 9

### 4 Complete the revision activity of grade 3 "do you remember?"

## Problem

Allow students do the problems for homework.

### 1 ① Understand division by 2-digit numbers in vertical form.

T Let's summarise how to divide by 2-digit numbers.

T Let students explain why the quotient is put in tens place first and confirm the steps of calculation.

### 2 ② Solve division by 2-digit numbers.

S Students use their prior knowledge to understand and calculate (2-digits) ÷ (2-digits) and (3-digits) ÷ (2-digits) in vertical form.

S Calculate and complete the exercise 1 - 6.

TN Let the students remember that reminder must be smaller than divisor.

### 3 ③ Solve word problem.

S Read the given situation and understand that it's a division and make a mathematical expression.

TN This is a division without remainder.

### 4 ④ Understanding and explaining using rules of division.

T Let's explain why the calculation 320 ÷ 40 can be done by 32 ÷ 4.

S Use the rules of division from their prior knowledge to explain their calculations.

S Because both dividend and divisor can be divided by 10.

### 5 ⑤ Apply multiplication and division in different ways.

T Let's find the numbers for each of the empty boxes so that the products of all three numbers in each direction, vertical horizontal and diagonal are the same.

T Calculate 2 × 6 × 18 = 216, so the product should be 216 in every direction.
a. 12 × 2 = 24, 216 ÷ 24 = 9
b. 6 × 36 = 216, 216 ÷ 216 = 1
c. 9 × 6 = 54, 216 ÷ 54 = 4
d. 2 × 36 = 72, 216 ÷ 72 = 3

# Unit 7

# Unit: Division by 2-digit Numbers
## Sub-unit: Length of a Jump
### Lesson: 1 of 1 (Single Period)

Textbook Page : p.84-p.85
Actual Lesson 51

## Lesson Objectives

- In terms of the relation of two amounts, find the other side of the amount when considering the amount of one side is 1.
- To understand the relation of 2 amounts in the diagram expressed by division and multiplication.
- To find the amount of several times of the base using multiplication.

## Prior Knowledge

- Multiplication and division by 2-digit numbers.

## Preparation

- Tape diagram and table

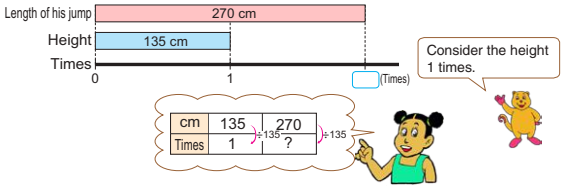
## Assessment

- Solve the problem 1 thinking about the relationship of numbers. F
- Solve problem 2 and 3 correctly. S

Calculation of multiples

### Length of a Jump

**1** Jack is 135 cm tall. He jumped 270 cm.
How many times more than his height did he jump?

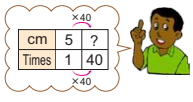



**2** Takale who is an athlete jumped 8 m 50 cm in a long jump competition. His height is 170 cm. How many times more than his height did he jump?

270 ÷ 135 = 2
Answer: 2 times

8m 50 cm = 850 cm
850 ÷ 170 = 5
Answer: 5 times

**3** A frog can jump 40 times of its length.
The length of a frog is 5 cm.
How many m can it jump?
If you are able to jump 40 times your height, how many m and cm can you jump?




5 × 40 = 200 (cm) 200 cm = 2 m
Answer: 2 m

(Example) If your height is 1m 39cm
137 × 40 = 5480 5480 = 54 m 80 cm
Answer: 54 m 80 cm

**4** Ghandi is 135 cm tall.
He jumped twice the amount of his original height.
How many cm did he jump?

| | | |
|---|---|---|
| cm | 135 | ? |
| Times | 1 | 2 |

×2 ×2

135 × 2 = 270
Answer: 270 cm

**5** A grasshopper jumped about 10 cm high.
The distance of the jump was 120 cm.
How many times more than its height did the grasshopper jump? 120 ÷ 10 = 12
Answer: 12 times

| | | |
|---|---|---|
| cm | 10 | 120 |
| Times | 1 | ? |

×12 ×?

**6** Wangi jumped 5 m 40 cm in a long jump using a trampoline during a class game.
His height is 180 cm. How many times more than his height did he jump?

| | | |
|---|---|---|
| cm | 180 | 540 |
| Times | 1 | ? |

×? ×?

5m 40 cm = 540 cm
540 ÷ 180 = 3
Answer: 3 times

84 = □ + □

□ ÷ □ = 85

## Lesson Flow

### 1 ① Solve the the task.

S Read and understand the problem and think about how to solve it.
T What do we notice in the problem?
S Jack's height is 135cm.
S Lenght of his jump is 270cm.
T Let's think about how to solve?
S The height compared to length of his jump.
T What kind of operation shall we use, and why?
S Division, because the question is about how many times of his height, so the length of his jump will be the dividend.
T What will be the divisor in this question?
S The height of the student.
T 270 ÷ 135 = 2, which means his jumped 2 times his height.

### 2 Solve ② and ③

T Check individual work.

### 3 Solve ④, ⑤ and ⑥

T Check individual work.

## Sample Blackboard Plan

**Unit:** Division by 2 digit Numbers **Sub – Unit:** Length of Jump **Lesson:** 1 of 1

Let's compare the length of each Jump by how many times.

MT

**1** Hilda is 135 cm tall.
She jumped 270 cm.
How many times of her height did she jump?

Height 135 : Base length

Length of her jump 270 cm : Length of how many times.

| | Height | Length of Times |
|---|---|---|
| Length (cm) | 135 | 270 |
| | ) ÷ 135 | ) ÷ 135 |
| Number of Times | 1 | 2 |

270 ÷ 135 = 2

Answer: 2 times.

**2** Takale who is an athlete jumped 8 m and 50 cm in a long jump competition. His height is 170 cm. How many times his height did he jump?

Height 170 cm : base length

Length of his jump 8 m 50 cm : Length of how many times

150 ÷ 170 = 5

Answer: 5 times.

**3**

① A frog can jump 40 times of its length.

The length of a frog is 5 cm (that is the base).

If you are able to jump 40 times your height,

5 x 40 = 200

Answer: 200 cm

② how many m and cm can you jump?
Your height x 40 = length of jump.

**End of Chapter Test: Chapter 7** **Date:**

| Division by 2-digit Numbers | Name: | Score |
|---|---|---|
| | | |

(5 x 10 points)

1. Calculate following division.

① $30\overline{)90}$ ② $13\overline{)62}$ ③ $24\overline{)73}$

④ $38\overline{)607}$ ⑤ $16\overline{)900}$

2. There are 113 eggs. You have to divide them equally amongst 13 children. How many can you divide per child and what will be the remainder? (2 x 10 points)

Math sentence _____ Answer:_____

3. In the following division, which number should be in the square to make the answer less than 10? (2 x 15 points)

①

$6\ 7\overline{)6\ \square\ 4}$

_____

②

$3\ \square\overline{)3\ 4\ 9}$

_____

# Chapter 8 Line Graphs

## 1. Unit Objectives

- To investigate and express relationship between two quantities that change simultaneously. (4.4.2.a)
- To express the status of change using line graph and read the state of change. (4.4.2.a)
- To collect and classify the materials according to the purpose, and express those using tables and graphs, and investigate features. (4.4.2.b)
- To know how to read and draw line graph. (4.4.2.b)
- To think about how to draw better ways (4.4.2 c)

## 2. Teaching Overview

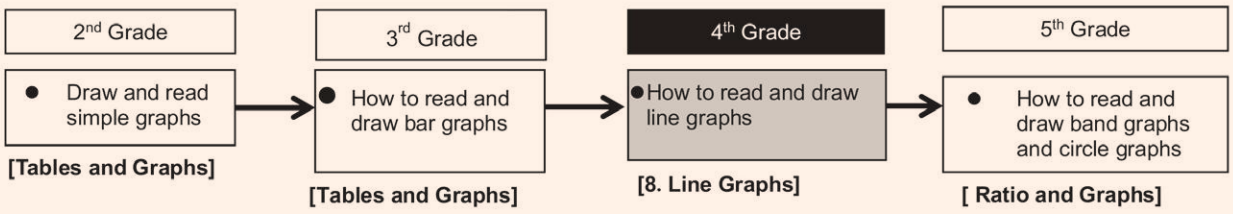
Students learn bar charts in Grade 3. The difference between the original data for bar chart and line graph is single data or time series data. Bar charts enables comparison of the size of data, however, line graphs enable to visualise and help the comparison of periodic change of data.

**Line Graphs:** They should start appreciating line graphs by drawing and discussing on the graphs. Firstly they will appreciate the extents of change of the data by focusing on inclinations and declinations. Secondary they will appreciate that they can estimate the middle value of each period.

**How to Draw Line Graphs:** They should know that each graph needs scales, title of the graph, unit of data and how to plot each data.

**Ideas of Drawing Line Graphs:** They will appreciate the wave lines for omission of scales. Comparison between graphs with and without wave lines will be effective for them to understand the effect.

## 3. Related Learning Contents



# Unit 8

# Unit: Line Graphs
## Sub-unit: 1. Line Graphs
## Lesson 1 of 2 (Single Period)

Textbook Page : p.86~p.87
Actual Lesson 52

## Sub-unit Objectives

- To understand the line graphs and the change of data used in a line graph.
- To understand how the level of slope changes and read the characteristic of changes.

## Lesson Objectives

- To identify and find out how the temperature changes between 2 cities.

## Prior Knowledge

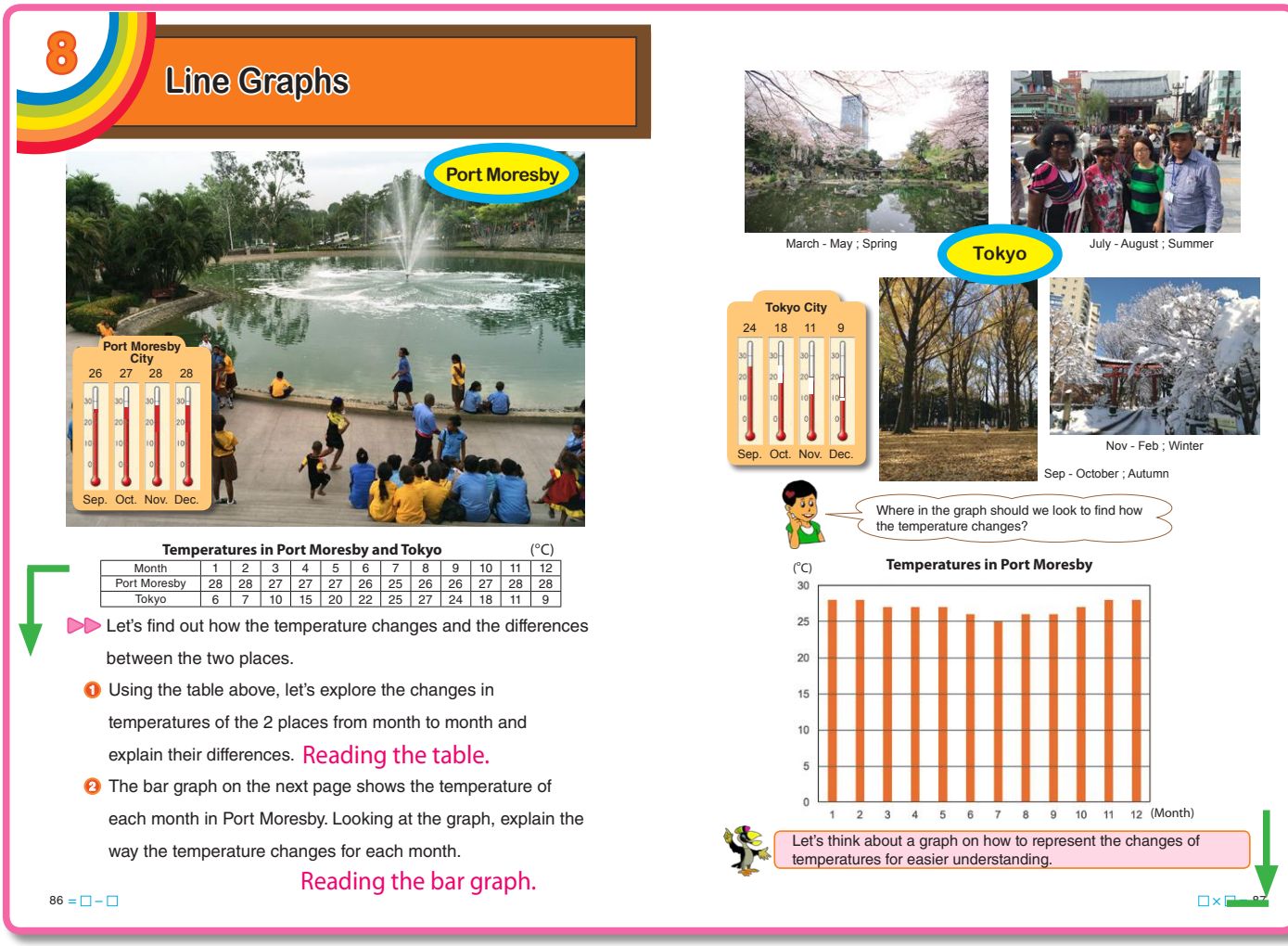
- Reading tables and bar graphs. (Grade 3)
- Comparing tables and Bar graphs. (Grade 3)
- Reading how much is each unit in Graphs (scales). (Grade 3)
- How to draw bar graph. (Grade 3)

## Preparation

- Refer to the blackboard plan.

## Assessment

- Think about the change and difference of the temperatures by observing the bar graph and explain the differences. F
- Identify the change and difference of the temperatures by observing the bar graph and explain the differences. S



## Lesson Flow

### 1 Pose questions about Tokyo and Port Moresby.

T Introduce the main task.
T Pose questions about the two cities by looking at the pictures.

### 2 ❶ Observe the table for Tokyo and Port Moresby with their temperatures.

T Let students look at the table and have general discussions about the temperature reading for Tokyo and Port Moresby.
S Observe the table and share what they identify with various opinions from the table.
TN Write down the students' discussion points.

### 3 ❷ Complete by observing the bar graph.

S Observe the bar graph and explain the way temperature changes for each month in Port Moresby.
T Where should we observe to check the temperature of each month?
S Top of each bar.

### 4 How to represent the change of temperature easily.

T Think about a graph on how to represent the changes of temperatures for easier understanding.
S Discuss in groups.
TN Take note of students' ideas for next lesson.

### • Teacher's Notes •

Observe the two pictures and pose questions to motivate students interest to learn by making comparisons. For interest sake if they would like to visit Tokyo and experience the environment there.
Bring their attention to the temperatures of the two cities.

To think about a graph to represent the changes of temperatures for easier understanding, observe the ideas and points of discussions made by the children.
The answer is Lines connected from the top of the bar graph makes easier understanding about the change of temperatures in slopes which will be looked at in the next lesson.

## Sample Blackboard Plan

**Date:**
**Chapter:** 8 Line Graphs.
**Topic:** Line Graphs. **Lesson No:** 1/2

**Main Task: Let's investigate the difference in temperature for Port Moresby City and Tokyo City.**

MT: Introduce main task here.

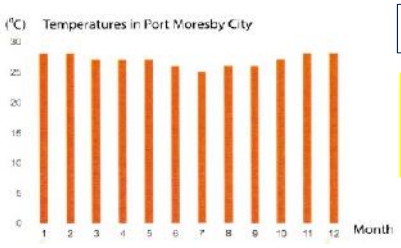
Let's find out the temperature changes and the differences between the two cities.

Temperatures in Port Moresby City and Tokyo City (C°)

| Month | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Port Moresby City | 28 | 28 | 27 | 27 | 27 | 26 | 25 | 26 | 26 | 27 | 28 | 28 |
| Tokyo City | 6 | 7 | 10 | 15 | 20 | 22 | 25 | 27 | 24 | 18 | 11 | 9 |

❶ The differences in temperature for Port Moresby and Tokyo using the above table.
- In December Tokyo is colder than Port Moresby.
- Not much change in the temperature for Port Moresby.
- Port Moresby is hotter than Tokyo.

(These are examples. Write down students discussion points.)




❷ The change of temperature for each month in Port Moresby.
- Port Moresby has almost the same temperature through out the year.
- Most of the temperatures are between 25° and 30°.

Where in the graph should we look to find how the temperature changes? At the top of each bar.

Let's think about a graph on how to represent the changes of temperatures for easier understanding.

Students discussions and their ideas.
Write down their ideas and discussion points on the board.

# Unit 8

# Unit: Line Graphs
## Sub-unit: 1. Line Graphs
## Lesson 2 of 2 (Double Period)

Textbook Page : p.88~p.89
Actual Lesson 53

## Lesson Objectives

- To understand the characteristics of line graph.
- To understand, identify the change of line such as slight increase, significant increase, slight decrease, significant decrease or no change when the slope changes.

## Prior Knowledge

- Reading tables and bar graphs. (Grade 3)
- How to draw bar graph. (Grade 3)

## Preparation

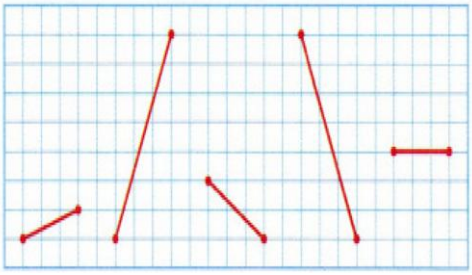
- Refer to the blackboard plan.

## Assessment

- Draw and read line graph and identify the characteristics such as slight increase, significant increase, slight decrease, significant decrease or no change when the slope changes. F
- Do exercises correctly. S

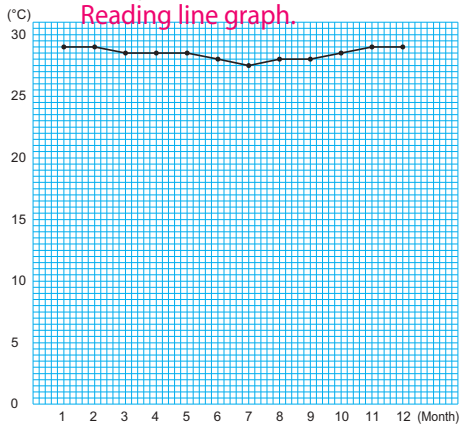
## • Teacher's Notes •

Explain the following slopes for students to observe and can be able to identify them in the line graphs used.



## 1 Line Graphs

**1** The tops of the bars in the page 87 were connected with lines to make the line graph below.




Reading line graph.

1. What is represented by the vertical axis and horizontal axis?

Temperature and month.

A graph that uses lines to show changes like in monthly temperatures is called **line graph**.

2. What is the temperature in March? 27°C
3. In which month is the temperature 26 degree Celsius?

June, August, September.

**2** Let's draw a line graph of the temperature changes of Tokyo into the graph of temperatures in Port Moresby on page 88 and compare them.

Reading line graph.

1. In each place what is the highest temperature and in which month?

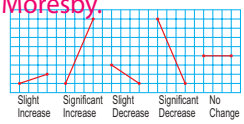
Port Moresby: 28°C January, February, November and December.
Tokyo: 26°C August.

2. How does the temperature change? Compare the differences in the temperature change between Port Moresby and Tokyo.

Tokyo bigger changes than Port Moresby.

3. Between which consecutive months does the temperature change the most and in which place?

Tokyo: March - August.




4. Let's talk about the advantages of using line graphs.

Easy to understand how the level or slope changes in terms of slight increase, significant increase, slight decrease or significant decrease or no change.

**Exercise**

For which of the following situations Ⓐ ~ Ⓕ is it better to use a line graph? A, D and E.

Ⓐ Your body temperature taken at the same time every day.
Ⓑ The types and numbers of vehicles that passed by your school in a period of ten minutes.
Ⓒ The numbers of children in your class with their favourite fruits.
Ⓓ The temperature recorded every hour at one place.
Ⓔ The heights of the children in your class.
Ⓕ Your height that was measured on each birthday.

88 = □ − □

□ × □ = 8

# Lesson Flow

## 1 ❶ Understand how the line graph is drawn.

T Introduce the main task.

T Let students identify that the tops of the bar graph were connected with lines to make the graph.

S Observe the bar graph and identify that the tops of the bar graph were connected with lines to make the line graph.

## 2 Students use the line graph to do ❶~❸.

S ❶ Vertical axis represents temperature and horizontal axis represents months.

T Explain the main point in the box .

S Answer the questions ❷ and ❸.

## 3 ❷ Draw a line graph of the temperature changes in Tokyo on the graph of Port Moresby and compare them.

T Explain to the students that they will use the same line graph of Port Moresby and draw a line graph of temperature in Tokyo on the same graph.

S Draw a line graph of temperature changes for Tokyo on to the same graph.

T Let students put a dot of temperature in January and February and connect 2 dots, and put a dot of temperature in March and connect the dots. Repeat this until December.

## 4 Compare the graph for both cities.

S Compare the temperature of both cities using the line graph after drawing the line graph of Tokyo on to the same graph by doing ❶ to ❸.

## 5 Complete ❹.

T What is the advantage of using a line graph?

S Line graph is adequate for showing the change of quantities.

S Line graph is also good to show how the quantities change such as slight increase, significant increase, slight decrease, significant decrease or no change.

## 6 Complete exercise.

S Write answer to the exercises.

## 7 Summary

T Read and emphasise on the summary points.

# Sample Blackboard Plan

**Date:**
**Chapter:** 8 Line Graphs.
**Topic:** Line Graphs. **Lesson No:** 2/2

**Main Task: Let's think about the a graph on how to represent the changes of temperatures for easier understanding.**

MT: Introduce main task here.

[1] The tops of the bar graph were connected with lines to make the graph below.

❑ Refer to the graph in the text book or you can draw the graph on a chart and paste here.

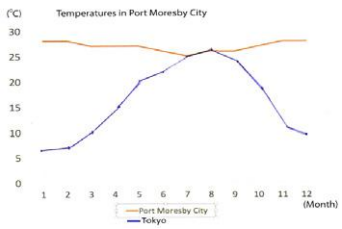
❶ What is represented by the vertical axis and the horizontal axis? Temperature and month.

**Important Point.**

A graph that uses lines to show changes like in monthly temperatures is called **line graph**.

❷ What is the temperature in March? 27°C
❸ In which month is the temperature 26 degrees Celsius ? June, August, September.

[2] Let's draw a line graph of the temperature changes in Tokyo into the graph of temperatures in Port Moresby and compare them.



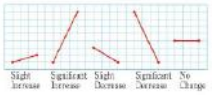

❶ Port Moresby : 28°C in January, February, November and December.
Tokyo: 26°C in August.
❷ Tokyo bigger changes than Port Moresby.
❸ In Tokyo from March to August.
❹ Easy to understand how the level or slope changes in terms of slight increase, significant increase, slight decrease or significant decrease and no change.

**Exercise**

For which of the following aspects (A)~ (F) is it better to use a line graph? Answers: A, D and E.
(A) Your body temperature taken at the same time every day.
(B) The types and numbers of vehicles that passed by your school in a period of ten minutes.
(C) The numbers of children in your class with their favorite fruits.
(D) The temperature recorded every hour at one place.
(E) The heights of the children in your class.
(F) Your height that was measured on each birthday.

**Summary**

- Line graph is a graph that uses lines to show changes like in monthly temperatures.
- Line graph makes easy understanding of how the level of slope changes.



# Unit 8

# Unit: Line Graphs
## Sub-unit: 2. How to Draw Line Graphs
### Lesson 1 of 1 (Double Period)

Textbook Page : p.90
Actual Lesson 54

## Sub-unit Objectives

- To understand how to draw line graphs.

## Lesson Objectives

- Identify how to draw a line graph using given steps.

## Prior Knowledge

- Reading how much is each unit in Graphs (scales). (Grade 3)
- Line graph (Previous lesson)

## Preparation

- Graph paper and Ruler

## Assessment

- Draw a line graph. F
- Do exercise correctly. S

## • Teacher's Notes •

For better understanding on How to Draw a Line Graph it is better for the teacher to go through the individual steps (Steps 1-5) as mentioned and be an aid for the students to fill in the information on the graph for Investigation of the temperature.

For the exercise allow the students to use the steps and complete the graph individually.

How to draw line graph.

## 2 How to Draw Line Graphs

**1** The table on the right shows the data of the temperature in a day. Draw a line graph from this table.

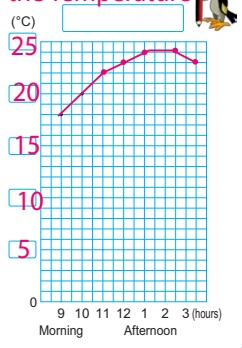
**Temperature** (16th of September)

| Time(hours) | Temperature(°C) |
|---|---|
| 9:00 am | 18 |
| 10:00 am | 20 |
| 11:00 am | 22 |
| 12:00 pm | 23 |
| 1:00 pm | 24 |
| 2:00 pm | 24 |
| 3:00 pm | 23 |

**How to Draw a Line Graph**

### Investigation of the Temperature

(1) On the horizontal axis, write the time with equal spacing.
(2) Write a scale on the vertical axis to express temperatures up to 24 degrees.
(3) Write dots on the table for each temperature and time.
(4) Connect the dots with a line.
(5) Write a title and the units.

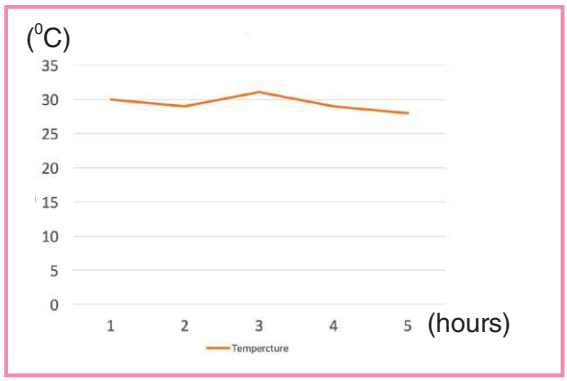



**Exercise**

The table shows daily temperatures at 1 pm for Manus which was recorded for 5 days.
Draw a line graph from this table.

| Temperatures at 1 pm in Manus | |
|---|---|
| Day | Temperature (°C) |
| 1 | 30 |
| 2 | 29 |
| 3 | 31 |
| 4 | 29 |
| 5 | 28 |

90 = □ − □



## Lesson Flow

### 1 1 Observe and read the table for the temperature for a day.

T Introduce the main task.

T Let students read and understand the task.

S Observe and read the table for the temperature for a day and think about how to represent the data on a line graph.

### 2 Understand how to draw a line graph using the steps (1) - (5).

T Have the students to understand the steps (1) to (5) which is the instruction and direction for them to use and draw the line graph.

TN Let students understand the essential componets of the line graph.

I. Contents of vertical and horizontal axes.

II. Quantity of a unit of vertical line.

III. Connecting the dots.

S Draw a line graph using the data in task 1 following the steps (1) - (5).

### 3 Complete the exercise.

T Let students complete the exercise using the knowledge and skills on how to draw a line graph.

S Use the data to draw a line graph.

## Sample Blackboard Plan

**Date:**
**Chapter:** 8 Line Graphs.
**Topic: How to draw line graphs.** **Lesson No:** 1/1

**Main Task: Let's investigate how to draw line graphs.**

MT: Introduce main task here.

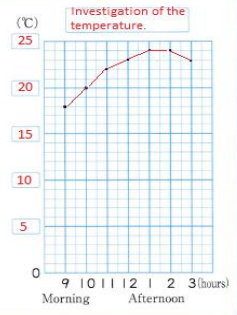
[1] The table shows the data of the temperature in a day. Draw a line graph from this table.

Data (September 16th)

| Time (hours) | Temperature(°C) |
|---|---|
| a.m. 9 | 18 |
| 10 | 20 |
| 11 | 22 |
| 12 | 23 |
| p.m. 1 | 24 |
| 2 | 24 |
| 3 | 23 |

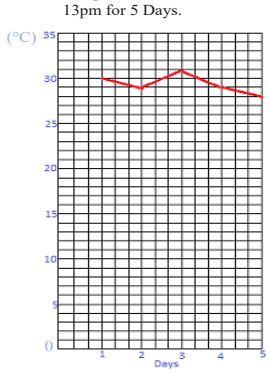
**How to Draw a Line Graph**

(1) On the horizontal axis, write the time with equal spacing.
(2) Write a scale on the vertical axis to express temperatures up to 24 degrees.
(3) Write dots on the table for each temperature and time.
(4) Connect the dots with a line.
(5) Write a title and the units.




**Exercise**

Temperatures for Manus at 13pm for 5 Days.



# Unit 8

# Unit: Line Graphs
## Sub-unit: 3. Ideas for Drawing Line Graphs
## Lesson 1 of 2 (Double Periods)

Textbook Page : p.91~p.93
Actual Lesson 55

## Sub-unit Objectives

- To know the advantage of omitting unnecessary parts of line graphs and read the graph.
- To draw a line graph by omitting unnecessary part.

## Lesson Objectives

- Draw line graph by ommiting unnecessary parts using the appropriate scale.

## Prior Knowledge

- How to draw line graph. (Previous lesson)

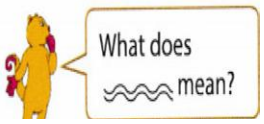
## Preparation

- Graph paper and ruler

## Assessment

- Think about how to draw a line graph by ommiting unnecessary parts using appropriate scale to draw the line graph. F
- Complete the task 2. S

## • Teacher's Notes •

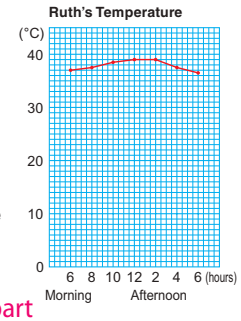



To cut out and omit unnecessary part of the line graph to make scale easier for reading and understanding

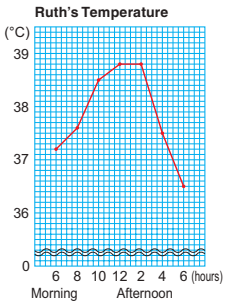
The line graph.

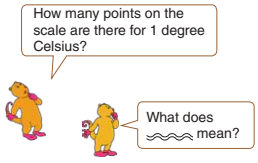
## 3 Ideas for Drawing Line Graphs

**1** Ruth caught a cold. She took her body temperature and expressed it on a line graph.

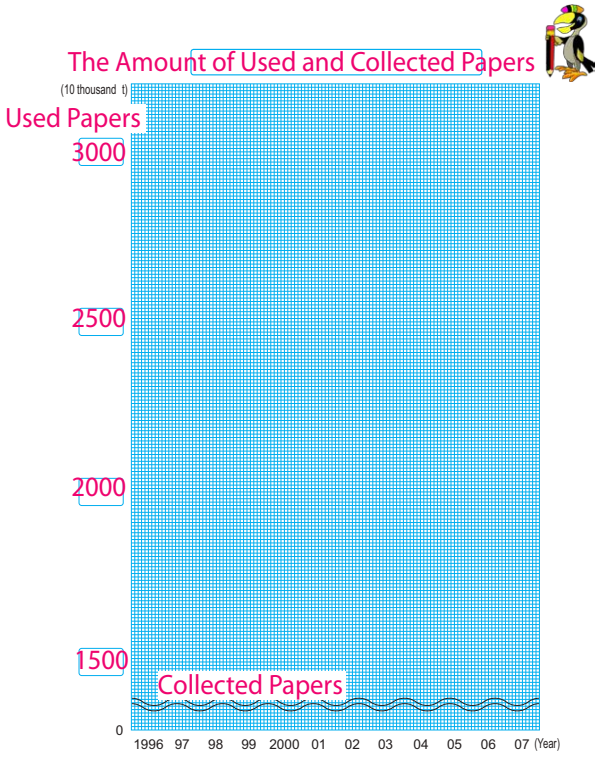



1. What was her temperature in (°C), at 8 o'clock in the morning? About 37.5°C
2. Ruth redrew the graph as shown below to make the change in her temperature easier to see. What was her idea? Cut out the unnecessary part and make one scale 0.1°C.




3. By how many °C did her temperature rise between 6 o'clock in the morning and 8 o'clock in the morning? 0.4°C
4. Between which times did her temperature change the most? 2-4 pm in the afternoon.
5. How did Ruth's temperature change? Increase in the morning and decrease in the afternoon. About 38°C




□ × □ = 91　　92 = □ − □

## Lesson Flow

**1 Review the previous lesson.**

**2 ① Read and understand the task.**

S ① Read the graph and answer.
T What can we read from the graph?
S Vertical axis shows body temperature and horizontal axis shows time.
S It is difficult to read the temperature.
T Why do you think it is difficult?
TN Because vertical axis scale is too small to show the graph clearly.

**3 Compare 1st and 2nd graph, and answer ② to ⑤.**

T Introduce the main task.
T Have students observe, read and compare the graphs and give reasons or opinions of change of the graph from the 1st to the 2nd.
T What is the difference between 1st graph and 2nd graph?
S In the 2nd graph, below 36 degree is cut out.
S In the 2nd graph, it is easier to observe the change because degree in 1 unit is bigger than 1st graph.

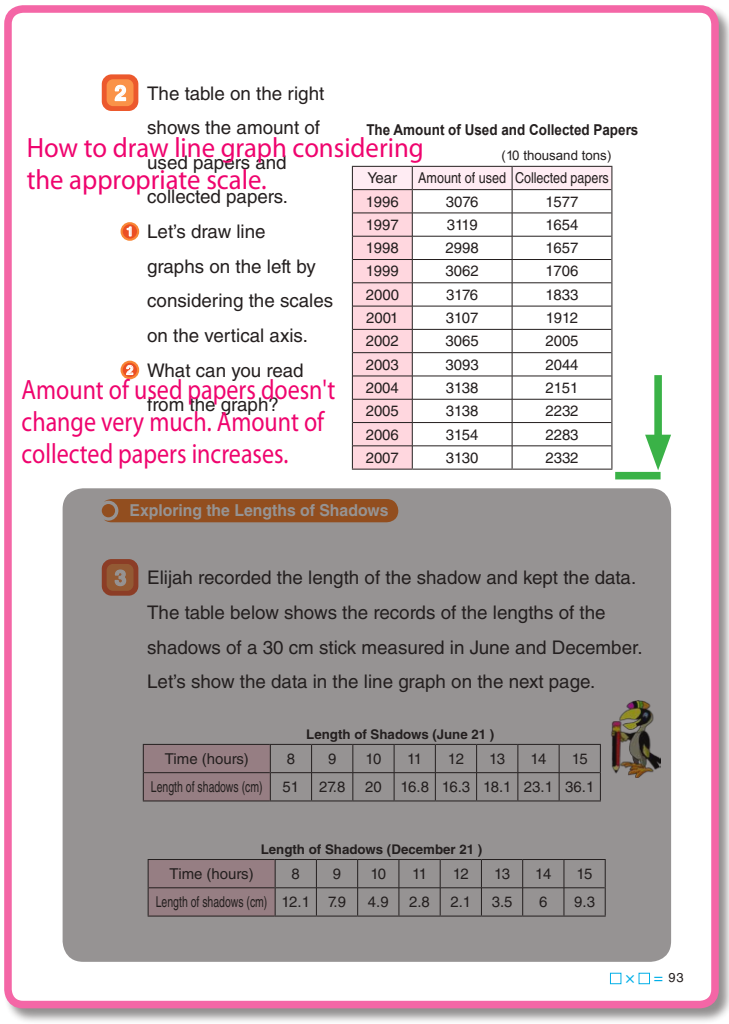
**4 ② Observe the table that shows the amount of used and collected papers.**

T Ask the students to discuss and share what they observe from the table.
S Observe the table and share what they see.

**5 Answer ① and ②.**

S Students draw the line graph using the information from the table on the amount of used and collected papers.
T Have the students to consider the appropriate or correct scale to be used.
T Which range can we use for the graph?
TN When students do not know how to think of the unit, let them think about the range of number(highest and lowest) in the table.
TN There is no number less than 1500 so we can start from 1500.

**6 Summary**



② The table on the right shows the amount of used papers and collected papers.

How to draw line graph considering the appropriate scale.

① Let's draw line graphs on the left by considering the scales on the vertical axis.

② What can you read from the graph?

Amount of used papers doesn't change very much. Amount of collected papers increases.

**The Amount of Used and Collected Papers**

(10 thousand tons)

| Year | Amount of used | Collected papers |
|---|---|---|
| 1996 | 3076 | 1577 |
| 1997 | 3119 | 1654 |
| 1998 | 2998 | 1657 |
| 1999 | 3062 | 1706 |
| 2000 | 3176 | 1833 |
| 2001 | 3107 | 1912 |
| 2002 | 3065 | 2005 |
| 2003 | 3093 | 2044 |
| 2004 | 3138 | 2151 |
| 2005 | 3138 | 2232 |
| 2006 | 3154 | 2283 |
| 2007 | 3130 | 2332 |

Exploring the Lengths of Shadows

③ Elijah recorded the length of the shadow and kept the data. The table below shows the records of the lengths of the shadows of a 30 cm stick measured in June and December. Let's show the data in the line graph on the next page.

**Length of Shadows (June 21 )**

| Time (hours) | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|
| Length of shadows (cm) | 51 | 27.8 | 20 | 16.8 | 16.3 | 18.1 | 23.1 | 36.1 |

**Length of Shadows (December 21 )**

| Time (hours) | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|
| Length of shadows (cm) | 12.1 | 7.9 | 4.9 | 2.8 | 2.1 | 3.5 | 6 | 9.3 |

□×□= 93

## Sample Blackboard Plan

Sample blackboard plan refer to page 125.

# Unit 8

# Unit: Line Graphs
## Sub-unit: 3. Ideas for Drawing Line Graphs
## Lesson 2 of 2 (Double Period)

Textbook Page : p.93~p.94
Actual Lesson 56

## Lesson Objectives

- Draw a line graph using the information from two tables.
- Read and interprete the information from two line graphs.

## Prior Knowledge

- How to draw a line graph (Previous lesson)

## Preparation

- Graph paper and ruler

## Assessment

- Think about how to draw line graph using the information from the two tables. F
- Draw a line graph using the information from the two tables. F S
- Interprete two line graphs. F S

### • Teacher's Notes •

Assist students to draw the line graph correctly using the data from the two tables.

**2** The table on the right shows the amount of used papers and collected papers.

1 Let's draw line graphs on the left by considering the scales on the vertical axis.

2 What can you read from the graph?

**The Amount of Used and Collected Papers**

(10 thousand tons)

| Year | Amount of used | Collected papers |
|---|---|---|
| 1996 | 3076 | 1577 |
| 1997 | 3119 | 1654 |
| 1998 | 2998 | 1657 |
| 1999 | 3062 | 1706 |
| 2000 | 3176 | 1833 |
| 2001 | 3107 | 1912 |
| 2002 | 3065 | 2005 |
| 2003 | 3093 | 2044 |
| 2004 | 3138 | 2151 |
| 2005 | 3138 | 2232 |
| 2006 | 3154 | 2283 |
| 2007 | 3130 | 2332 |

1 Between which consecutive hours is the biggest difference?

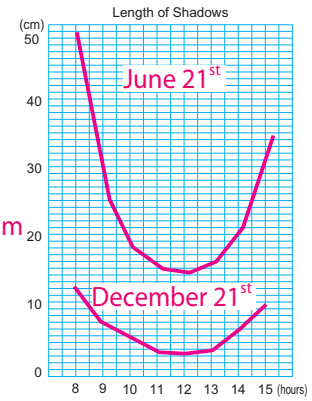
June 21st: 8 am -9 am

2 What can be understood from the graph?

December 21st: 8 am -9 am

The shadow of December is shorter than the shadow of June.

The change of shadow of December is less than the shadow of June.




**Exploring the Lengths of Shadows**

Drawing line graph from reading the two tables.

**3** Elijah recorded the length of the shadow and kept the data. The table below shows the records of the lengths of the shadows of a 30 cm stick measured in June and December. Let's show the data in the line graph on the next page.

**Length of Shadows (June 21 )**

| Time (hours) | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|
| Length of shadows (cm) | 51 | 27.8 | 20 | 16.8 | 16.3 | 18.1 | 23.1 | 36.1 |

**Length of Shadows (December 21 )**

| Time (hours) | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|
| Length of shadows (cm) | 12.1 | 7.9 | 4.9 | 2.8 | 2.1 | 3.5 | 6 | 9.3 |

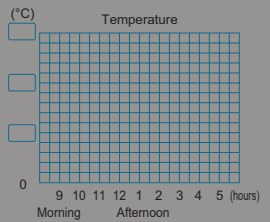
**Exercise**

1 The table below shows how the temperature changed. Draw a line graph from the data in the table.

Page 94

**Temperature**

| Time(hours) | Temperature(°C) |
|---|---|
| 9:00 am | 3 |
| 10:00 am | 4 |
| 11:00 am | 6 |
| 12:00 pm | 7 |
| 1:00 pm | 8 |
| 2:00 pm | 10 |
| 3:00 pm | 10 |
| 4:00 pm | 9 |
| 5:00 pm | 8 |




□ × □ = 93  94 = □ − □

# Lesson Flow

**1 Review the previous lesson.**

**2 ❸ Read and understand the given situation.**

T Introduce the main task.
T Have students read and understand the given situation.
S Observe the two tables on Length of shadows (December 21 and June 21) and share their ideas and data on what they observe from the two tables.
T What did you notice from the tables?
S The length of shadow changes depend on the time.
S The change in June 21 is bigger than that of December 21.
T How should we know the difference easily?
S Draw two line graphs.

**3 ❶ Draw line graph using the data from the two tables.**

S Use the data from the two tables and draw a line graph and answer.

**4 ❷ Use the line graph to answer.**

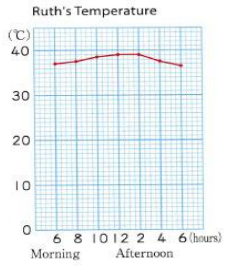
S Solve the activity by presenting and sharing their ideas from what they have noticed from the graph they drew.
T What did you find from two line graphs?
S In both graphs, the length is the longest in the morning and becoming shorter towards noon, again becoming longer in the afternoon.
S The change of length in December is bigger than that of June.

## Sample Blackboard Plan (Lesson 55)

**Date:**
**Chapter:** 8 Line Graphs.
**Topic: Ideas for drawing line graphs. Lesson No:** 1/2

**Main Task: Let's think about how to draw line graphs that are easier to read considering the appropriate scale.**

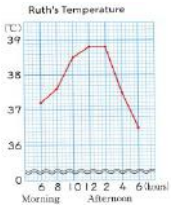
[1] Ruth caught a cold. She took her body temperature and expressed it in a line graph.




❶ What was her temperature in (°C), at 8 o'clock in the morning. About 37.5°C

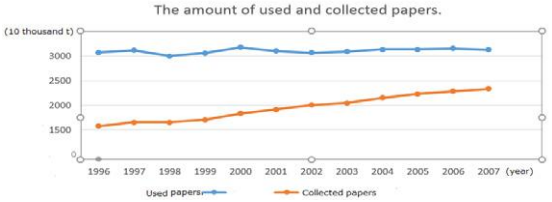
MT: Introduce main task here.

❷ Ruth redrew the graph as shown below to make the change in her temperature easier to see. What was her idea? To cut out the unnecessary part and make one scale 0.1°C




❸ By how many °C did her temperature rise between 6 o'clock in the morning and 8 o'clock in the morning? 0.4°C
❹ Between which times did her temperature change the most? 2-4pm in the afternoon.
❺ How did Ruth's temperature change? Increase in the morning and decrease in the afternoon. About 38°C.

[2] The table shows the amount of used papers and collected papers.
❶ Draw the line graphs by considering the scales.




❷ What can you read from the graph?
The amount of used papers doesn't change very much.
Amount of collected papers increases.

## Sample Blackboard Plan (Lesson 56)

**Date:**
**Chapter:** 8 Line Graphs.
**Topic: Ideas for drawing line graphs. Lesson No:** 2/2

**Main Task: Let's draw the length of the shadow for June and December in the line graph and compare.**

MT: Introduce main task here.

[3] Elijah recorded the length of the shadow and kept the data. The table below shows the records of the lengths of the shadows of a 30 cm stick measured in June and December. Let's show the data in the line graph on the next page.

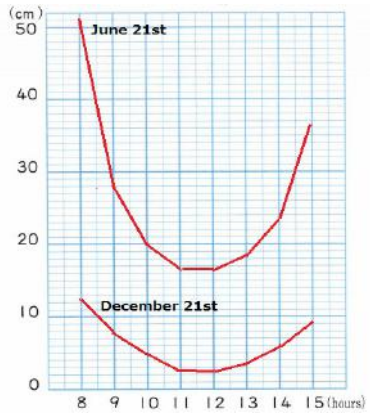
Length of Shadows (June 21 )

| Time (hours) | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|
| Length of shadows (B) | 51 | 27.8 | 20 | 16.8 | 16.3 | 18.1 | 23.1 | 36.1 |

Length of Shadows (Decemberer 21 )

| Time (hours) | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|
| Length of shadows (B) | 12.1 | 7.9 | 4.9 | 2.8 | 2.1 | 3.5 | 6 | 9.3 |

Length of shadows.




❶ Between which consecutive hours is the biggest difference?
June 21st : 8am – 9am

❷ What can be understood by the graph?
The shadow of December is shorter than the shadow of June.

The change of shadow of December is less than the shadow of June.

# Unit 8

# Unit: Line Graphs
## Sub-unit: Exercise and Evaluation
## Lesson 1 of 1 (Double Period)

Textbook Page : p.94-p.95
Actual Lesson 57

## Lesson Objectives

- Deepen their understanding of content learned in this unit.

## Prior Knowledge

- All the contents in this unit

## Preparation

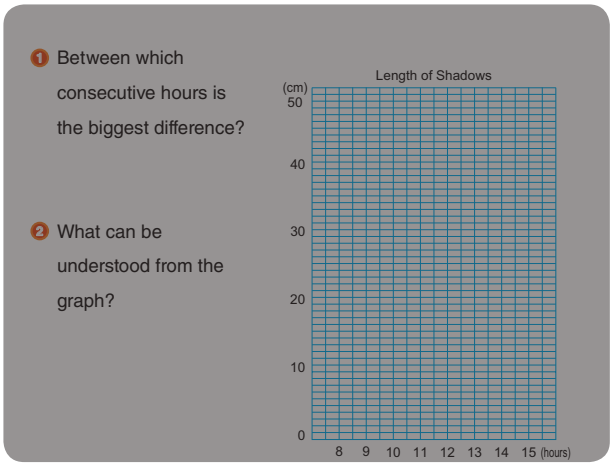
- Evaluation tests

## Assessment

- Solve the problem applying knowledge, skills and mathematical thinking of things learned in this unit. F S

## • Teacher's Notes •

Use 30 minutes for the exercise and give the evaluation test after that.




Exercise

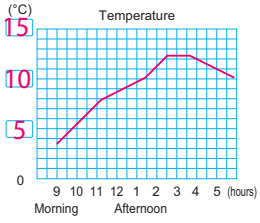
How to draw line graph.

1 The table below shows how the temperature changed.
Draw a line graph from the data in the table.

Page 94

**Temperature**

| Time(hours) | Temperature(°C) |
|---|---|
| 9:00 am | 3 |
| 10:00 am | 4 |
| 11:00 am | 6 |
| 12:00 pm | 7 |
| 1:00 pm | 8 |
| 2:00 pm | 10 |
| 3:00 pm | 10 |
| 4:00 pm | 9 |
| 5:00 pm | 8 |



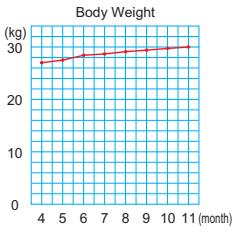

94 = □ − □

Problems

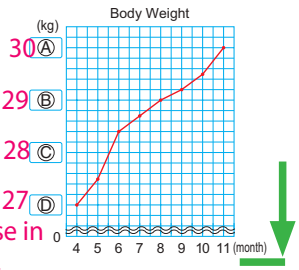
1 Consider the conditions Ⓐ ~ Ⓓ and decide which ones are better expressed as line graphs.
● Understanding the advantages of line graphs.
Ⓐ The heights of the children in your class in April.
Ⓑ Your height as it was measured every April.
Ⓒ The temperature that was recorded at a particular time every day.
Ⓓ Temperatures that were recorded in different places at the same time.

B & C

2 The graph on the right shows how Tau's weight changed.
He redrew it below to make it easier to read.
● Changing graphs that are easier to read.
① Let's fill in Ⓐ ~ Ⓓ.
② How is the second graph different from the first graph?
③ Let's find as many differences as possible.
Between which consecutive months did his weight increase the most? And between which consecutive months did his weight increase the least?




The second graph is different because unnecessary scale cut off and appropriate scale used to make the change of temperature easy to see.




From May to June sharp, big increase in weight. From August to September, small or least increase.

□ × □ = 95

## Lesson Flow

### 1 Find solutions to the given Exercise ① by applying what they learned already.

T Have students to do ① by applying what they have learned.
S Complete the exercise.
T Focus on the highest temperature and middle and the lowest temperature to decide units of vertical axis.
T Let students check the graph among themselves.
T Let the students ask themselves to write what they notice from the graph.
TN Check individual work to observe the correct skills and knowledge applied.

### 2 Complete ① to understand the advantage of the line graphs.

TN Allow students to complete for homework if there is not enough time.
T Have students consider the conditions and choose the better situations that can be expressed using a line graph.
T Have students write the reason to choose as well.
S Complete ①.

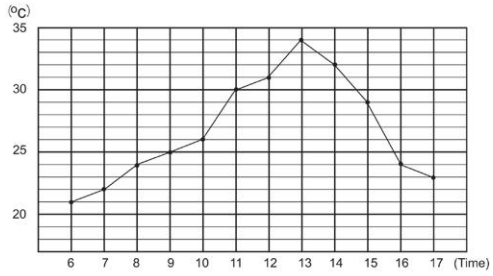
### 3 Complete ② ① ② and ③ to demonstrate the learned skills and knowledge of changing graphs that are easier to read.

T Have students to refer back to changing graphs that are easier to read and complete ① ② ③.
S Do ① by filling in the information for Ⓐ~Ⓓ.
S Do ② to explain the difference comparing the second graph to the first graph.
S Do ③ by finding the consecutive months the weight increase the most and decrease the least.

| Line Graphs | Name: | Score |
|---|---|---|
| | | |

(Each question is worth 10 points)

1. The following line graph shows the temperature of a city every hour. Answer the following questions.



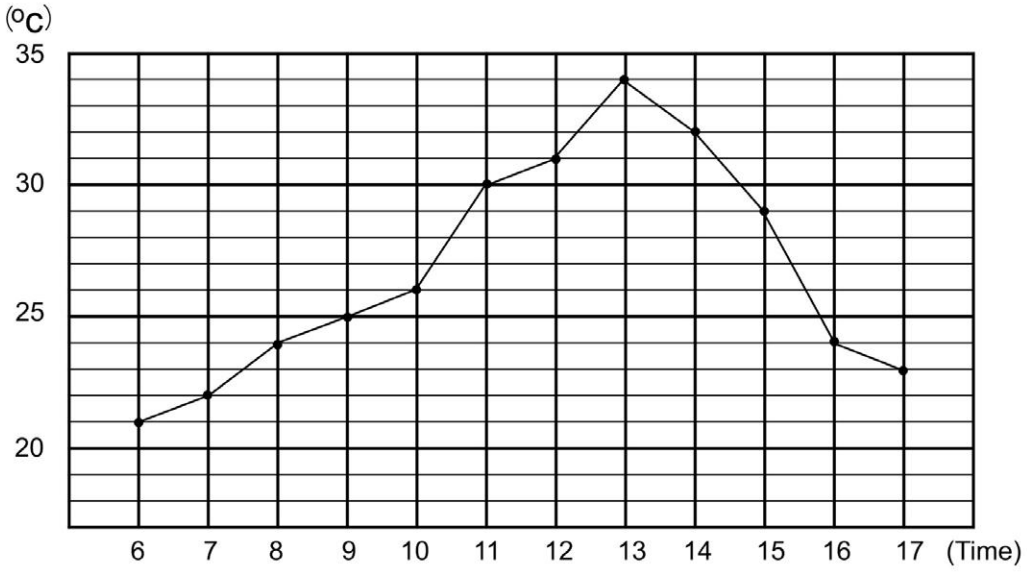

① What does the vertical axis express ? Temperature
② What does the horizontal axis express ? Time
③ At what time is the highest temperature? 13:00
④ At what time is the lowest temperature? 6:00
⑤ Between which times did the temperature increase the most ? From 10:00 to 11:00
⑥ Between which times did the temperature decrease the most? From 15:00 to 16:00
⑦ What is the temperature at 7 o'clock ? 22 °C
⑧ How many hours does it take to increase the temperature from 24°C to 31°C ? 4 hours
⑨ How many °C does it rise from 7 o'clock to 9 o'clock? 4 °C
⑩ Around how many degree is the temperature at 10: 30 ? 25.7 °C

**End of Chapter Test: Chapter 8** **Date:**

| Line Graphs | Name: | Score |
|---|---|---|
| | | |

(Each question is worth 10 points)

1. The following line graph shows the temperature of a city every hour. Answer the following questions.




① What does the vertical axis express ? _____

② What does the horizontal axis express ? _____

③ At what time is the highest temperature? _____

④ At what time is the lowest temperature? _____

⑤ Between which times did the temperature increase the most ? From _____ to _____

⑥ Between which times did the temperature decrease the most? From _____ to _____

⑦ What is the temperature at 7 o'clock ? _____

⑧ How many hours does it take to increase the temperature from 24℃ to 31℃ ?

_____

⑨ How many ℃ does it rise from 7 o'clock to 9 o'clock? _____

⑩ Around how many degree is the temperature at 10: 30 ? _____

# Chapter 9 Decimal Numbers 1

## 1. Unit Objectives

- To understand the meaning and how to represent decimal numbers. (4.1.7.a)
- Use decimal numbers for expressing remaining part. (4.1.7.a)
- To understand the meaning of addition and subtraction of decimal numbers up to tenths place. (4.1.7.b,c and d)

## 2. Teaching Overview

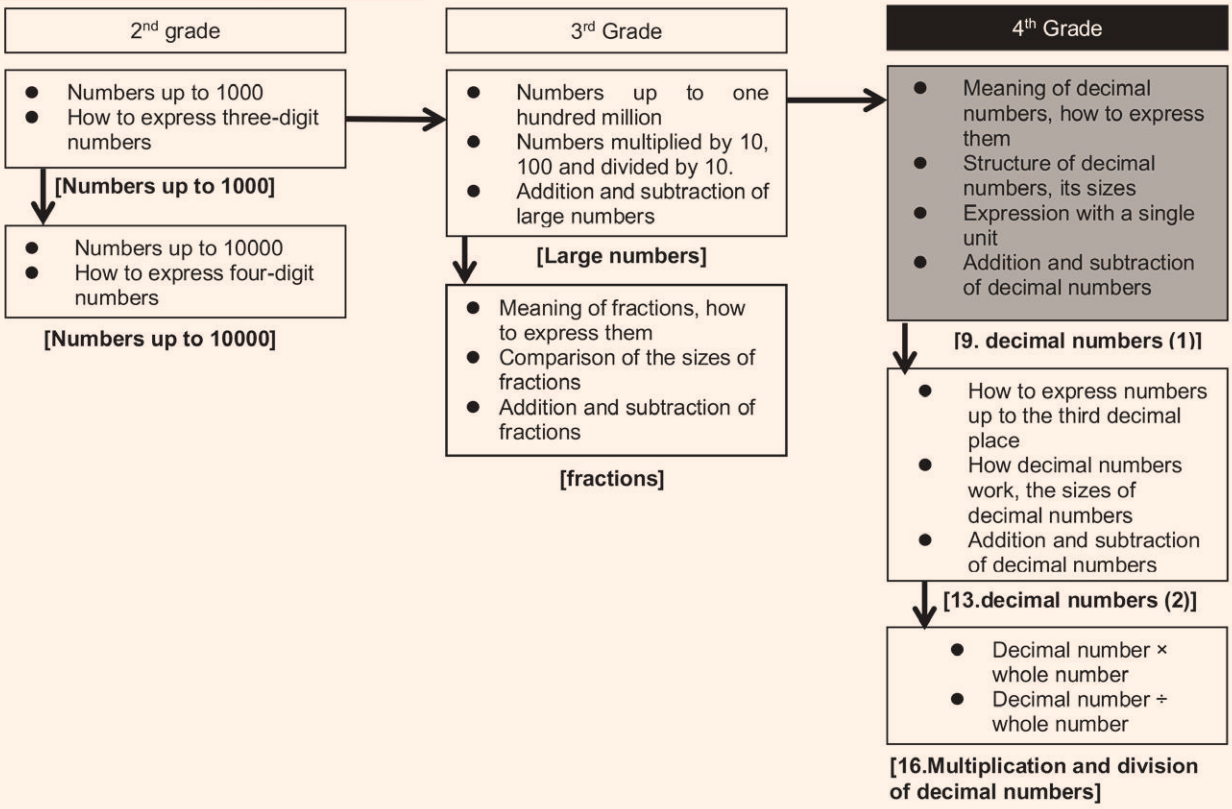
Students are familiar with counting numbers or whole numbers (discrete quantity). In this unit, they learn continuous quantity which are in between 2 consecutive whole numbers. For learning continuous quantities, we deal with length or volume through expressing the remaining part. For example, the length of ropes are rarely found in the quantity of whole numbers. Therefore, students should feel the necessity of expressing the amount of remaining part.

**How To Represent the Remaining Part:** Students are to think how to express the remaining part which are less than dL. They are given the new unit of 0.1 dL and express the remaining part by the number of 0.1 dL. It is also important for students to capture decimal numbers in a structural manner; e.q. 1.3 dL is 1 dL and 3 of 0.1 dL, 1.3 dL is made up with 13 of 0.1 dL, etc.

**The Structure of Decimal Numbers:** They should find the decimal numbers on number lines of whole numbers. It will help students to understand that decimal numbers are also numbers on the same number system. For instance, they should be able to explain 3.2 as a number which is 0.2 greater than 3.

**Addition and Subtraction of Decimal Numbers:** They should understand that decimal numbers can be added or subtracted by arranging the same number places vertically as they are binary notations (base 10).

## 3. Related Learning Contents



# Unit 9

# Unit: Decimal Numbers 1
## Sub-unit: 1. How to Represent the Remaining Parts
## Lesson 1 of 4 (Double Period)

Textbook Page : p.96~p.97
Actual Lesson 58

## Sub-unit Objectives

- To understand the meaning of decimal numbers, how to read decimal numbers and how to express decimal numbers.

## Lesson Objectives

- To Identify how to express the remaining part using decimal number.

## Prior Knowledge

- Measuring water using 1 decilitre measuring cup. (Elementary 2)
- 1 L divided into 10 equal units of amount, the amount of one unit is called 1decilitre. (Elementary 2)
- Measuring amount of water in various containers using 1 dL measuring cups. (Elementary 2)

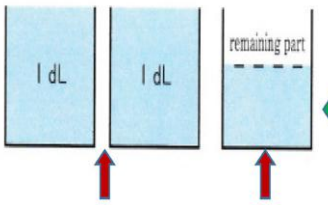
## Preparation

- Cups, 1 dL measuring cup

## Assessment

- Think about how to identify, express and read the remaining part using decimal number. F
- Understand how to identify, express and read the remaining part using decimal number. S

## • Teacher's Notes •



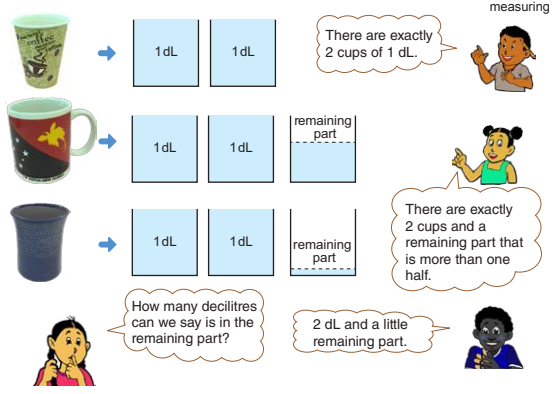

Smaller unit scale developed from 1 dL

Smaller unit scale is develped from the 1 dL by dividing the parts equally into 10 parts

9 Decimal Numbers 1

### Measure the volume using 1 dL cup

Let's investigate the amount of water in different containers by measuring them with a 1 dL measuring cup.




### 1 How to Represent the Remaining Parts

Express the remaining part using decimal numbers.

1 How many dL can we say is the amount of water in a cup?

1 dL is one of 10 equal parts of 1 L. Can we use the same idea?

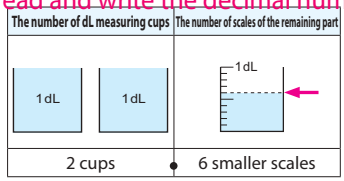
Let's investigate how to represent the remaining part.

### Dividing 1dL into 10 small parts

1 Let's develop the smaller unit scale by dividing a 1 dL measuring cup into 10 equal parts.

2 How can we represent the amount of water in these cups by using dL?

### How to read and write the decimal number of 2.6 dL



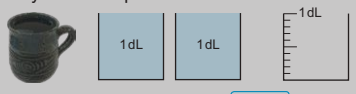
2.6 dL

We separate the two parts by putting a " . " between 2 dL and the remaining part (6).

We read this as **"two point six decilitres".**

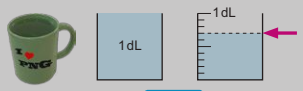
2 How many decilitres of water are there in the following containers?

1 Clay Coffee cup




. dL

2 Ordinary Coffee cup




. dL

96 = □ ÷ □

□ × □ = 97

## Lesson Flow

### 1 Review the previous lesson.

TN 1 L divided into 10 equal units of amount, the amount of one unit is called 1 decilitre (1 dL).

### 2 Measure the volume of various cups using 1 dL cup.

TN Use 1 dL cup to measure the volume of various cups with water as shown in the picture.
T What did you notice about the amount of water of three cups?
S 1st cup is full of 2 dL but the other 2 cups have remaining parts.

### 3 ❶ Think about how to express the volume of water and the remaining part.

T Introduce the main task.
TN Let students think about and discuss how many dL is the amount of water in a cup and notice the remaining part and how to express it. Discuss and take note of their discussion points.
T Have students to understand and know 1 dL is separated or divided into 10 parts. 1 dL is one of 10 equal parts.
T How did you express the remaining part?
S We need smaller unit scale measuring cup.

### 4 ❶❶ Develop 10 equal parts.

S Develop smaller unit scale by dividing 1 dL measuring cup into equal parts. Draw the diagram and explain it.
T Allow students to draw too.

### 5 ❶❷ Understand how to read and represent the decimal number.

S Rread number ❷ and observe the representation.
T Let students know and understand 2 cups and 6 smaller scales is 2.6 dL and read as “two point six decilitres.” Two parts are separated by putting a “ . ” between 2 dL and the remaining part.

### 6 Summary

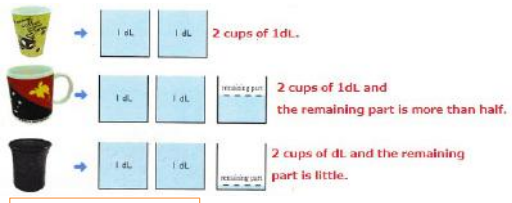
T Read and explain the summary points.

## Sample Blackboard Plan

**Date:**
**Chapter:** 9 Decimal Numbers.
**Topic: How to represent the remaining parts. Lesson No:** 1/4

**Main Task: Let’s think about how to represent the remaining part using decimal number.**

▶▶ Let’s investigate the amount of water in different containers by measuring them with a 1 dL measuring cup.

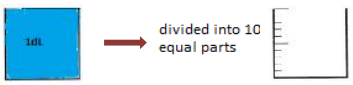



MT: Introduce main task here.

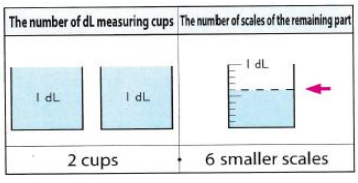
[1] How many dL can we say is the amount of water in a cup?

Students discussions and their ideas.
Write down their ideas and discussion points on the board.

❶ Let’s develop the smaller units scale by dividing a 1 dL measurement cup into 10 equal parts.




❷ How can we represent the amount of water in these cups by using dL?




2.6 dL

We separate the two parts by putting a “ . ” between 2 dL and the remaining part (6).

We read this as “**two point six deciliters**”.

**Summary**

- Remaining part of water is expressed using smaller scale when 1dL is divided into 10 equal parts.
- Then it is read by separating number of dL and smaller scales by putting a decimal point between them.

# Unit 9

# Unit: Decimal Numbers 1
## Sub-unit: 1. How to Represent the Remaining Parts
## Lesson 2 of 4 (Double Period)

Textbook Page : p.97~p.98
Actual Lesson 59

## Lesson Objectives

- To understand the meaning of decimal number and how to represent it .

## Prior Knowledge

- How to represent the remaining part using decimal number.

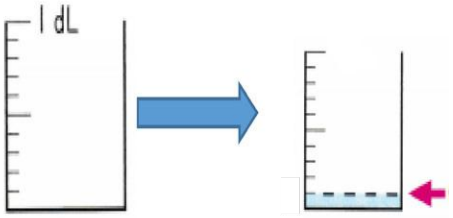
## Preparation

- A cup, 1 dL measuring cup

## Assessment

- Think about how to represent the decimal number with volume more than 1 decilitre and volume less than 1 decilitre. F
- Understand how to represent the decimal number with volume more than 1 decilitre and volume less than 1 deciliter. S

## • Teacher's Notes •

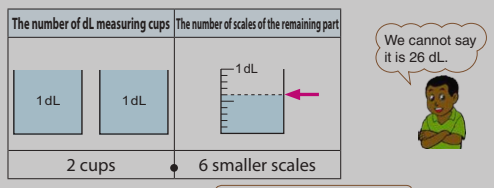



One of 10 equal parts is 0.1 dL.

To make smaller unit scale 1dL is divided into 10 equal parts and one of the 10 equal part is 0.1 dL.

1 Let's develop the smaller unit scale by dividing a 1 dL measuring cup into 10 equal parts.

2 How can we represent the amount of water in these cups by using dL?







2.6 dL

We separate the two parts by putting a " . " between 2 dL and the remaining part (6).

We read this as **"two point six decilitres".**

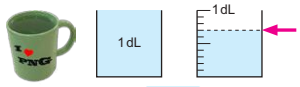
### To confirm how to read and write decimal numbers

**2** How many decilitres of water are there in the following containers?

1 Clay Coffee cup

2.0 dL

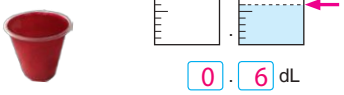
2 Ordinary Coffee cup




1.7 dL

**3** How many decilitres of water are there in the following containers?

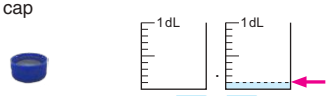
1 Ice block cup




0 . 6 dL

For the amount of water which is less than 1 dL, a number of 1 dL measuring cup is 0 and the number of units of the smaller scales is 6, so we write 0.6 dL and read it as **"zero point six decilitres".**

2 Drink cap




0 . 1 dL

Each unit of the smaller scales is 0.1 dL.
0.1 dL is one of the 10 equal parts of 1 dL.
0.6 dL is 6 sets of 0.1 dL.

Numbers like 2.6, 0.6 and 0.1 are called decimal numbers and " . " is called decimal point. The place to the right of the decimal point is called tenths place. Numbers like 0, 1, 6 and 230 are called whole numbers.

2 . 6
...Ones place
...Decimal point
...Tenths place

□ × □ = 97  98 = □ ÷ □

## Lesson Flow

**1 Review the previous lesson.**

**2 ❷❶❷ Represent the volume of water using decimal number.**

T Have students to observe the pictures and diagram in ❶and ❷ and discuss what they observe.

S One of 1 dL measuring cup is empty.

T Refer to the learned knowledge 1 dL is one of 10 equal parts and how to represent the remaining parts.

S Observe the pictures and diagram in ❶, ❷ and write the volume of water in decilitre using decimal numbers.

**3 ❸❶ Think about how to express volume less than 1 dL using decimal number.**

T Introduce the main task.

T How many dL of water are there in the following containers?

S Using the knowledge of 1 dL is one of 10 equal parts then volume less than 1 dL is remaining smaller scales less than 10.

T Ask students to refer to ❶ and ❷ to observe the diagram focusing on the remaining part 0.1 dL and 0.6 dL and write the answers for ❸❶.

S 0.6 dL

**4 Read and understand the important point in the .....**

S Summarise how to represent the decimal number with volume more than 1 decilitre and volume less than 1 decilitre.

**5 ❸❷ Write the answer by observing the diagram.**

T Have students refer to ❸❶ and use the idea to answer and write the volume in dL using decimal number.

S 0.1 dL

**6 Read and understand the important point in the box .....**

T Decimal unit idea is used in the important point. Explain to the students to deepen their understanding.

**7 Read and understand the important point and conclusion in the box .....**

T Have students to understand decimal numbers, decimal point, tenths place and whole numbers in the conclusion of the important point.

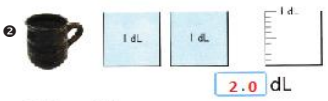
## Sample Blackboard Plan

**Date:**
**Chapter:** 9 Decimal Numbers.
**Topic: How to represent the remaining parts. Lesson No:** 2/4

**Main Task: Let's think about how to represent the amount of water less than 1 dL.**

[2] How many decliters of water are there in the following containers?

❶ Clay Coffee cup

❷ 


Ordinary Coffee cup

**MT: Introduce the main task here.**

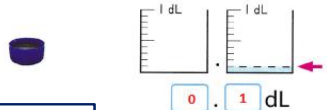
[3] How many deciliters of water are there in the following containers?

❶ Ice block cup

**Important Point.**

For the amount of water which is less than 1dL, since a number of 1 dL measuring cup is 0 and the number f units of the small scale is 6, so we write 0.6 dL and "**read it as zero point six deciliters**"

❷ Drink cap




**Important Point.**

Each unit of the smaller scales is 0.1 dL.
0.1 dL is one of the 10 equal parts of 1 dL.
0.6 dL is 6 sets of 0.1 dL

**Important Point.**

Numbers like 2.6, 0.6 and 0.1 are **called decimal** numbers and '.' is called **decimal point**.
The place to the right of the decimal point is called **tenths place**. Numbers like 0, 1, 6 and 230 are called **whole numbers**.

# Unit 9

# Unit: Decimal Numbers 1
## Sub-unit: 1. How to Represent the Remaining Parts
## Lesson 3 of 4 (Double Period)

Textbook Page : p.99
Actual Lesson 60

## Lesson Objectives

- To understand that expressing decimal numbers is the same as the idea of the whole number system.
- To understand relative size of decimal numbers using decimal unit idea.

## Prior Knowledge

- Meaning and how to represent the decimal number. (Previous lesson)

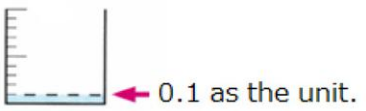
## Preparation

- Chart of task 4 and 5

## Assessment

- Represent decimal numbers using decimal unit ideas on the number line and scale. F
- Do the exercise correctly. S

## • Teacher's Notes •



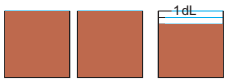

**Sets of 0.1**

1 set of 0.1 is 0.1 0.1 dL
2 sets of 0.1 is 0.2 0.2 dL
3 sets of 0.1 is 0.3 0.3 dL
⋮
8 sets of 0.1 is 0.8 0.8 dL
9 sets of 0.1 is 0.9 0.9 dL
10 sets of 0.1 is 1.0 1 dL

Express the decimal numbers using diagram.

**4** Let's colour in the following amounts of water.

① 2.8 dL




② 0.4 dL

**5** The amount of water in the water container is 2.4 dL.

To express relative size of decimal numbers based on 0.1.

① There are 2 dL and how many decilitres in the remaining parts? 0. 4 dL

② Colour the scale on the right to show the amount of water in the water container.

③ How many units of 0.1 dL are equal to 2.4 dL. 24 dL

**6** On the number line, which amounts are expressed by ①, ②, ③ and ④ in dL? How many sets of 0.1 dL are their amounts of water?

How to read and express the relative sign of decimal numbers on the number lines.

3 sets of 0.1, 12 sets of 0.1, 17 sets of 0.1

① 0. 3 ② 1.2 ③ 1.7 ④ 2.5 25 sets of 0.1

**Exercise**

**1** How many decilitres are the following amounts of water?

Let's answer in decimals.

① 9 sets of 0.1 dL. 0.9 dL ② Amount of 3 dL and 0.5 dL. 3.5dL

**2** Fill in the ☐ with a number.

① 2 dL and 0. 7 dL make 2. 7 dL.

② 1 dL and 0.8 dL make 1.8 dL.

③ 1.6 dL is 16 sets of 0.1 dL.

④ 21 sets of 0.1 dL is equal to 2.1 dL.

⑤ Amount of 2 sets of 1 dL and 3 sets of 0.1 dL make 2.3 dL.

## Lesson Flow

### 1 Review the previous lesson.

### 2 4 1 2 Read decimal number correctly and colour the amount.

T Introduce the main task.

S Observe and read decimal number in 1 and 2 correctly and colour the amount of water using the diagram representation.

### 3 5 1 2 3 Understand 2.4 dL using various representations.

S 1 Identify in 2.4 dL there are 2 dL and 0.4 dL as the remaining part.

T 2 Observe the students understanding to colour 2.4 dL on the scale correctly to show the amount of water in the container.

T 3 Observe their understanding of decimal unit idea by representing 24 dL of 0.1 dL in 2.4 dL. (24 sets of 0.1 dL is 2.4 dL)

TN It is important for the students to understand that 24 sets of 0.1 dL is 2.4 dL. This knowledge not only deepens the understanding of decimals but also become the base for learning addition, subtraction, multiplication and division of decimal number.

### 4 6 Think about the structure and relative size of reading decimal numbers on the number line.

S Use the decimal unit idea with the number line to observe the structure and relative size of decimal numbers by reading and writing.

T Explain to the students to use the number line to find the amounts of water expressed using decimal unit idea by writing the decimal number expressed and how many sets of 0.1 dL in the amounts of water.

T How did you find the 1.7 dL on the number line.

S 1.7 dL is 17 sets of 0.1 dL.

S 1.7 dL is 1 dL and 0.7 dL.

### 5 Complete the exercise.

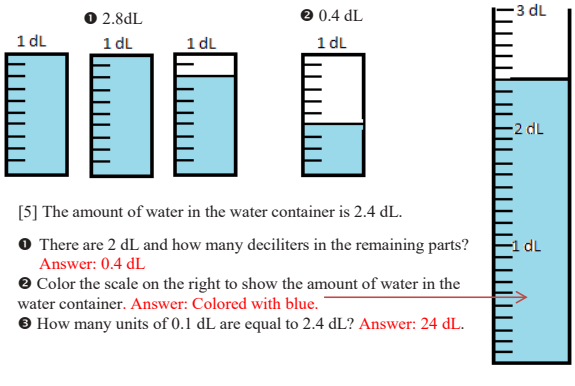
## Sample Blackboard Plan

**Date:**
**Chapter:** 9 Decimal Numbers.
**Topic: How to represent the remaining parts. Lesson No:** 3/4

**Main Task: Let's think about the structure and relative size of reading decimal numbers based on 0.1**

MT: Introduce the main task here.

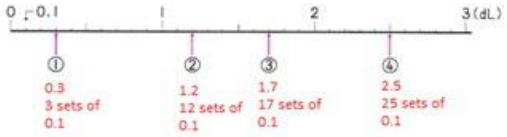
[4] Let's color in the following amounts of water.




[5] The amount of water in the water container is 2.4 dL.

❶ There are 2 dL and how many deciliters in the remaining parts? Answer: 0.4 dL
❷ Color the scale on the right to show the amount of water in the water container. Answer: Colored with blue.
❸ How many units of 0.1 dL are equal to 2.4 dL? Answer: 24 dL.

[6] On the number line, which amounts are expressed by ①, ②, ③ and ④ in dL. How many sets of 0.1 are their amounts of water?




**Exercise**

1. How many deciliters are the following amounts of water? Let's answer in decimals.

(1) 9 sets of 0.1 dL Answer: 0.9 dL (2) Amount of 3dL and 0.5 dL Answer: 3.5 dL

2. Fill in the ☐ with a number.
(1) 2 dL and 0.7 dL make 2.7 dL.
(2) 1 dL and 0.8 lL make 1.8 dL.
(3) 1.6 dL is 16 sets of 0.1 dL.
(4) 21 sets of 0.1 dL is equal to 2.1 dL.
(5) Amount of 2 sets of 1 dL and 3 sets of 0.1 dL make 2.3 dL.

# Unit 9

# Unit: Decimal Numbers 1
## Sub-unit: 1. How to Represent the Remaining Parts
## Lesson 4 of 4 (Single Period)

Textbook Page : p.100
Actual Lesson 61

## Lesson Objectives

- To represent the volume of water using 1 L containers.
- To represent the lengths using decimal numbers with different units.

## Prior Knowledge

- 1 L divided into 10 equal units of amount, the amount of one unit is called 1 decilitre. (Elementary 2)
- Meaning and how to represent the decimal number.

## Preparation

- Bucket, water, 1 Litre container

## Assessment

- Think about how to represent lengths by changing from one unit to another. F
- Understand how to represent lengths by changing from one unit to another. S

## • Teacher's Notes •

**SETS OF 1mm**

1 set of 1mm is 0.1cm
2 sets of 1mm is 0.2cm
3 sets of 1mm is 0.3cm
4 sets of 1mm is 0.4cm
5 sets of 1mm is 0.5cm
6 sets of 1mm is 0.6cm
7 sets of 1mm is 0.7cm
8 sets of 1mm is 0.8cm
9 sets of 1mm is 0.9cm
10 sets of 1mm is 1.0cm which is 1cm

**SETS OF 10cm**

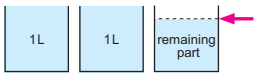
| | |
|---|---|
| 1 set of 10 cm is 0.1m | 10cm |
| 2 sets of 10 cm is 0.2m | 20cm |
| 3 sets of 10 cm is 0.3m | 30cm |
| 4 sets of 10 cm is 0.4m | 40cm |
| 5 sets of 10 cm is 0.5m | 50cm |
| 6 sets of 10 cm is 0.6m | 60cm |
| 7 sets of 10 cm is 0.7m | 70cm |
| 8 sets of 10 cm is 0.8m | 80cm |
| 9 sets of 10 cm is 0.9m | 90cm |
| 10 sets of 10 cm is 1.00m which is 1m | 100cm |

### Express and write using decimal numbers

**7** Measure the amount of water in a bucket.

How many litres are there?

① How can we represent the remaining part in decimal numbers?



② How many litres are there?

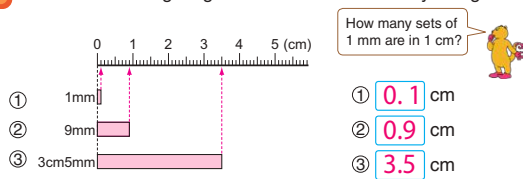
2 L and 8 sets of the smaller scales.

2 . 8 L

The remaining part that we get by measuring with a 1L (litre) measuring cup can also be represented as a decimal number by making smaller scales of 0.1 dL that are made by dividing a 1L measuring cup equally into 10 smaller scales.

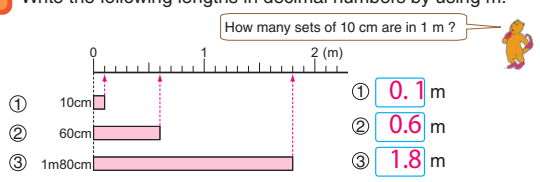
### Express in centimeter using decimal numbers

**8** Write the following lengths in decimal numbers by using cm.




① 0. 1 cm
② 0.9 cm
③ 3.5 cm

**9** Write the following lengths in decimal numbers by using m.




① 0. 1 m
② 0.6 m
③ 1.8 m

100 = □ ÷ □

## Lesson Flow

### 1 Review the previous lesson.

### 2 7 ① ② Express the remaining part of 1 L.

T Introduce the main task.
T Scales are divided into 10 equal parts. 1 L is equal to 10 sets of 1 dL.
TN 1 L is made of 10 sets of 1 dL. Therefore, 1dL is 0.1 L.
S The amount is 2 L and more, so the 1 L container is divided to 10 equal parts.
S 2 L and 8 sets of smaller scale. 2.8 L
T Read and understand the important point in the box .

### 3 8 ① ② ③ Write the lengths in centimetres by using decimal numbers.

S Using the decimal unit idea to write the lengths in centimetres by using decimal numbers changing from millimetres to centimetres.
T Confirm that 1 cm is made of 10 sets of 1 mm. Therefore, 1 mm is 0.1 cm.
S Do 8 ① ② ③.

### 4 9 ① ② ③ Write the lengths in metres by using decimal numbers.

T Using the decimal unit idea let students write the lengths in metres by using decimal numbers changing from centimetres to metres.
T Confirm that 1 m is made of 10 sets of 10 cm. Therefore, 10 cm is 0.1 m.
S Students do 9 ① ② ③.

### 5 Think about the advantages of using decimal numbers.

S Understand that when using decimal numbers there is no need for 2 units to be used.

## Sample Blackboard Plan

**Date:**
**Chapter:** 9 Decimal Numbers.
**Topic: How to represent the remaining parts. Lesson No:** 4/4

**Main Task: Let's express the following quantities in decimal numbers using sets of 0.1 L, 1 mm and 10 cm.**

MT: Introduce the main task here.

[7] Measure the amount of water in a bucket.

❶ How many liters are there?
How can we represent the remaining part in decimal numbers?

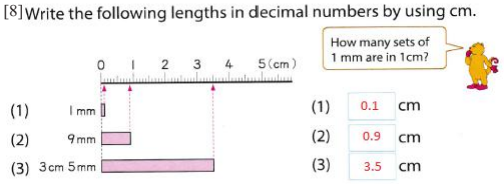
2 . 8 L

❷ How many liters are there?
2 L and 8 sets of the smaller scales.

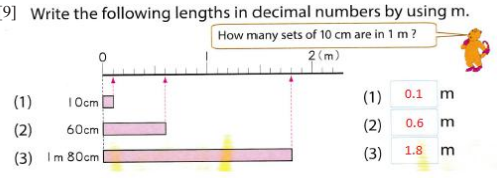
**Important Point.**

The remaining part that we get by measuring with a 1L (liter) measuring cup can also be represented as a decimal number by making smaller scales of 0.1 dL that are made by dividing 1 L measuring cup equally into 10 smaller scales.

[8] Write the following lengths in decimal numbers by using cm.




[9] Write the following lengths in decimal numbers by using m.



# Unit 9

# Unit: Decimal Numbers 1
## Sub-unit: 2. The Structure of Decimal Numbers
## Lesson 1 of 1 (Single Period)

Textbook Page : p.101
Actual Lesson 62

## Sub-unit Objectives

- To understand the structure of decimal numbers and to compare relative size of decimal numbers.

## Lesson Objectives

- Identify and write the decimal numbers represented on the number line.
- Compare relative size of decimal numbers and identify which is larger.

## Prior Knowledge

- How to represent remaining parts using decimal numbers.
- Place value of decimal numbers
- Reading decimal numbers correctly.

## Preparation

- Refer to the blackboard plan.
- Number line for 1 and the exercise.

## Assessment

- Compare relative size of decimal numbers, read and write the decimal numbers represented on the number line. F
- Do the exercises correctly. S

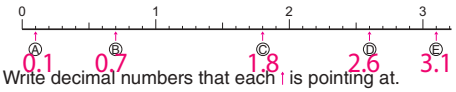
## • Teacher's Notes •

The structure of the decimal number using 0.1 as the unit has been explained in the lessons prior to this lesson so refer to the teachers notes in the previous lessons. The idea and mathematical thinking is the same. In this lesson number line is used to express the same idea.

Reading the decimal numbers on the number line

### 2 The Structure of Decimal Numbers

**1** Let's think about the number line below.




0.1 0.7 1.8 2.6 3.1

1 Write decimal numbers that each ↑ is pointing at.

2 How many sets of 0.1 dL are the decimal numbers expressed in Ⓐ ~ Ⓔ, respectively? A: 1set of 0.1, B: 7 sets of 0.1, C: 18 sets of 0.1, D: 26 sets of 0.1 E: 31sets of 0.1

3 Which is larger, 2.1 or 1.9? Put the arrows ↓ on the number line for comparing two decimal numbers. 2.1 larger

4 Which is larger, 0 or 0.1? 1

**2** What is 10 sets of 0.1 ? 0.1

Sequence of decimal numbers

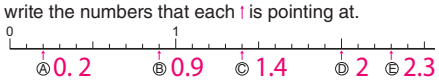
**3** Fill in each box with a number.

1 | 0.6 | 0.7 | 0. 8 | 0.9 | 1.0 | 1.1 |

2 | 5.2 | 5.1 | 5.0 | 4.9 | 4.8 | 4.7 |

Exercise

**1** Let's write the numbers that each ↑ is pointing at.




**2** Fill in the ☐ with a number.

① 2.5 is the sum of 25 sets of 0.1.

② 0.7 is the sum of 7 sets of 0.1.

③ The sum of 18 sets of 0.1 is 1.8.

**3** Which number is larger? Fill in the ☐ with the correct inequality sign.

① 3 < 3.1 ② 4.6 > 3.8 ③ 1.2 > 0.9

□×□= 101

## Lesson Flow

**1 Review the previous lesson.**

**2 ❶❶❷ Express the decimal numbers from Ⓐ to Ⓔ and think about how many sets of 0.1 dL are expressed in Ⓐ to Ⓔ respectively.**

T Introduce the main task.

T Have the students to do ❶ by writing the decimal numbers as represented on the number line and do ❷ by writing the number of sets of 0.1 next to the decimal answers for Ⓐ - Ⓔ respectively.

**3 ❶❸Compare 2.1 and 1.9 on the number line to identify which decimal number is larger.**

S Compare 2.1 and 1.9 by placing the decimal numbers on the number line and compare.

S 2.1 is larger.

T The right side of the number line is larger. Let students to understand that.

**4 ❶❹Compare 0 and 0.1 to identify which is larger.**

T Which is larger, 0 or 0.1?

S Understand 0 is 0 set of 0.1 and 1 is 1 set of 0.1. Therefore 0.1 is larger.

**5 ❷Think about 10 sets of 0.1 becomes 1.**

T Using the decimal unit idea, let students understand 10 is 10 sets of 0.1 which becomes 1.

**6 ❸❶❷Observe the sequence of decimal numbers and think about which decimal number comes between.**

S Do ❶ and ❷.

**7 Do the Exercise 1 - 3.**

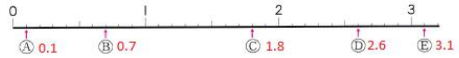
## Sample Blackboard Plan

**Date:**
**Chapter:** 9 Decimal Numbers.
**Topic: The Structure of Decimal Numbers. Lesson No:** 1/1

**Main Task: Let's think about the number line using sets of 0.1.**

**MT: Introduce the main task here.**

[1]Let's think about the number line below.



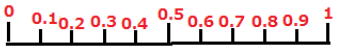

❶ Write decimal numbers that each ↑ is pointing at.

❷ How many sets of 0.1 dL are the decimal numbers expressed in A ~ E, respectively?
A: 1 set of 0.1 D: 26 sets of 0.1
B: 7sets of 0.1 E: 31 sets of 0.1
C: 18 sets of 0.1

❸ Which is larger, 2.1 and 1.9? Put the arrows ↓ on the number line for comparing two decimal numbers. Answer:2.1 is larger.

❹ Which is larger, 0 or 0.1?
0 is 0 set of 0.1 and 1 is 1 set of 0.1. Therefore 0.1 is larger.

[2] What is 10 sets of 0.1?




0, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0 = 1
10 sets of 0.1 becomes 1.

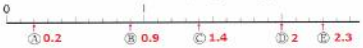
[3] Fill in each box with a number.

❶ 0.6 — 0.7 — 0.8 — 0.9 — 1.0 — 1.1

❷ 5.2 — 5.1 — 5.0 — 4.9 — 4.8 — 4.7

**Exercise**

1 Let's write the numbers that each ↑ is pointing at.




2 Fill the ☐ with a number.
(1) 2.5 is the sum of 25 sets of 0.1.
(2) 0.7 is the sum of 7 sets of 0.1.
(3) The sum of 18 sets of 0.1 is 1.8.

3 Which number is larger? Fill the ☐ with the correct inequality sign.
(1) 3 < 3.1 (2) 4.6 > 3.8 (3) 1.2 > 0.9

# Unit 9

# Unit: Decimal Numbers 1
## Sub-unit: 3. Addition and Subtraction of Decimal Numbers
## Lesson 1 of 2 (Double Period)

Textbook Page : p.102~1p.103
Actual Lesson 63

## Lesson Objectives

- To understand that we can calculate decimal number in the same way as whole number.

## Prior Knowledge

- Decimal number
- Addition of whole numbers in vertical form

## Preparation

- Charts for task 1 and 2

## Assessment

- Think about how to add decimal numbers. F
- Do the exercise correctly. S

## • Teacher's Notes •

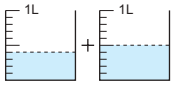
For addition of decimal numbers the application in calculation using vertical from is just like the whole number addition in vertical form.

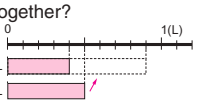
In addition when the sum is 10 or more than 10, carrying is applicable to the next higher place value.

Decimal + decimal without carrying

### 3 Addition and Subtraction of Decimal Numbers

**1** Kua's family drank 0.4 L of milk in the morning and 0.5 L of milk in the afternoon. How many litres of milk did they drink altogether?




How many sets of 0.1L are there?

0.4 + 0.5 = 0.9
Answer 0.9 L

**2** There are 2.5 dL of juice in a large cup and 1.3 dL of juice in a small cup. How many decilitres are there altogether?

Decimal number + Decimal number without carrying

2.5 + 1.3 = 3.8 Answer 3.8 dL

1. Let's think about how to calculate.
2. Let's think about how many sets of 0.1 are there.

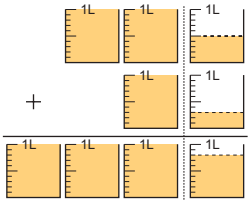
Addition of decimal numbers in vertical form can be done if we line up numbers according to their place value just like whole numbers.

Let's try.

| | Ones place | Tenths place |
|---|---|---|
| | 2 | 5 |
| + | 1 | 3 |
| | 3 | 8 |

In the ones place 2 + 1

In the tenths place 5 + 3




**Exercise**

Let's add in vertical form.

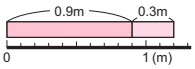
① 0.2 + 0.5 = 0.7 ② 0.8 + 0.1 = 0.9 ③ 3.2 + 1.6 = 4.8 ④ 2.8 + 7.1 = 9.9



Pure decimal + pure decimal with carrying

**3** The 0.9 m tape and the 0.3 m tape are put together.

How long is the tape in m.




0.9 + 0.3 = 1.2 Answer 1.2 m

1. Let's think about how many sets of 0.1 are there.

9 + 3 = 12 12 sets

2. Let's add in vertical form.

| | | | |
|---|---|---|---|
| | 0 | . | 9 |
| + | 0 | . | 3 |
| | 1 | . | 2 |

Since the answer will be more than 1, I will carry up to the ones place.

**4** Let's think about how to add in vertical form.

① 2.3 + 4.8

| | | | |
|---|---|---|---|
| | 2 | . | 3 |
| + | 4 | . | 8 |
| | 7 | . | 1 |

② 0.9 + 7.1

| | | | |
|---|---|---|---|
| | 0 | . | 9 |
| + | 7 | . | 1 |
| | 8 | . | 0 |

③ 5 + 3.4

| | | | |
|---|---|---|---|
| | 5 | . | 0 |
| + | 3 | . | 4 |
| | 8 | . | 4 |

If the number in the last place of the answer is 0, what should we do with the 0?

**Exercise**

**1** There is 5.6 L of water in the container. When we add 0.9 L of water in the container, how much water in L do we have?

5.6 + 0.9 = 6.5 Answer, 6.5 L

**2** Let's add in vertical form.

① 0.4 + 0.8 = 1.2 ② 0.6 + 0.7 = 1.3 ③ 3.2 + 1.9 = 5.1 ④ 4.7 + 3.4 = 8.1
⑤ 2.9 + 0.3 = 3.2 ⑥ 7.3 + 0.7 = 8 ⑦ 0.1 + 0.9 = 1 ⑧ 6 + 3.5 = 9.5

## Lesson Flow

**1 Review the previous lesson.**

**2 ❶ Solve the problems of decimal addition with diagram.**

S Read and understand the situation.
T Which operation (+, −, × or ÷) is used in the situation?
S Recognise that it is addition problem and make mathematical expression.
S Solve the mathematical expression and discuss why the answer is 0.9 L using number line and tape diagram based on sets of 0.1 L.

**3 ❷ Think about how to add decimal number that has whole number.**

S Read and understand the situation.
T What is the mathematical expression?
S 2.5 + 1.3
T ❶ Let's think about how to calculate.
S Change the expression to vertical form.
T Explain the vertical calculation using diagram and numbers.
S Understand that decimal numbers addtion in vertical form is just like whole number addition.
T ❷ How many sets of 0.1 are in 3.8 dL?
S 38 sets of 0.1 dL
T Introduce the main task.
S Recognise that addition of decimal number applies the same system as whole number for vertical addition.
TN It is important to think based on the sets of 0.1 and calculate the numbers in the same place value.

**4 Do the exercises.**

**5 ❸ Think about how to calculate addition of decimal number with carrying.**

S Read and understand the situation.
S ❶ Make mathematical expression.
S ❷ Add in vertical form and confirm the answer with tape diagram.
TN When the addition of remaining part is 10 or more, it is carried to the next place value, which is same as the calculation of whole number.
T How many sets of 0.1 are there?
S 12 sets of 0.1 in 1.2

**6 ❹ Think about how to calculate ❶ ~ ❸.**

TN ❶ and ❷ is addition with carrying.
TN ❸, let the students be aware of the place value when changing to vertical form.

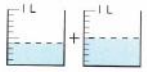
**7 Do the exercises.**

## Sample Blackboard Plan

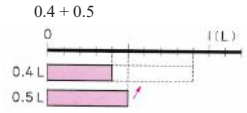
**Date:**
**Chapter:** 9 Decimal Numbers.
**Topic: Addition and Subtraction of Decimal Numbers. Lesson No:** 1/2

**Main Task: Let's think about how to add decimal numbers with and without carrying in vertical form.**

[1] Kua's family drank 0.4 L of milk in the morning and 0.5 L of milk in the afternoon. How many liters of milk did they drink altogether?



0.4 + 0.5




0.4 is 4 sets of 0.1
0.5 is 5 sets of 0.1
4 + 5 = 9 sets of 0.1
0.9 L

[2] There are 2.5 dL of juice in a large cup and 1.3 dL of juice in a small cup. How many deciliters are there altogether?

2.5 + 1.3

❶ Let's think about how to calculate.

Write down their ideas and discussion points on the board.

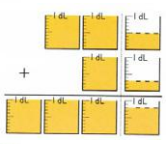
❷ Let's think about how many sets of 0.1 there are.
2.5 is 25 sets of 0.1
1.3 is 13 sets of 0.1
25 + 13 = 38 sets of 0.1
3.8 dL

**MT: Introduce the main task here.**

Vertical Form.

| Tenths place | Ones place |
|---|---|
| | 2.5 |
| + | 1.3 |
| 3 | 8 |

Let's try.



In the ones place 2+1
In the tenths place 5+3

**Exercise**
Let's add in vertical form.
(1) 0.2 + 0.5 = 0.7 (2) 0.8 + 0.1 = 0.9 (3) 3.2 + 1.6 = 4.8 (4) 2.8 + 7.1 = 9.9

[3] The 0.9m tape and 0.3m tape are put together. How long is the tape in m? 0.9 + 0.3

❶ Let's think about how many sets of 0.1 there are.
0.9 is 9 sets of 0.1
0.3 is 3 sets of 0.1
9 + 3 = 12 sets of 0.1

❷ Let's add in vertical form.

| | | |
|---|---|---|
| | 0 | 9 |
| + | 0 | 3 |
| | 1 | 2 |

[4] Let's think about how to add in vertical form.

(1) 2.3 + 4.8

| | | |
|---|---|---|
| | 2 | 3 |
| + | 4 | 8 |
| | 7 | 1 |

(2) 0.9 + 7.1

| | | |
|---|---|---|
| | 0 | 9 |
| + | 7 | 1 |
| | 8 | 0 |

(3) 5 + 3.4

| | | |
|---|---|---|
| | 5 | 0 |
| + | 3 | 4 |
| | 8 | 4 |

Exercise

1 There is 5.6 L of water in the container. When we add 0.9 L of water in the container, how much water in L do we have?
5.6 + 0.9 = 6.5 answer 6.5 L

2 Let's add in vertical form.
(1) 0.4 + 0.8 = 1.2 (2) 0.6 + 0.7 = 1.3 (3) 3.2 + 1.9 = 5.1 (4) 4.7 + 3.4 = 8.1
(5) 2.9 + 0.3 = 3.2 (6) 7.3 + 0.7 = 8 (7) 0.1 + 0.9 = 1 (8) 6 + 3.5 = 9.5

# Unit 9

# Unit: Decimal Numbers 1
## Sub-unit: 3. Addition and Subtraction of Decimal Numbers
## Lesson 2 of 2 (Double Period)

Textbook Page : p.104~p.105
Actual Lesson 64

## Lesson Objectives

- To understand that we can calculate subtraction of decimal number in the same way as addition of decimal number.

## Prior Knowledge

- How to calculate addition of decimal numbers. (Previous lesson)
- Subtraction of whole numbers in vertical form

## Preparation

- Charts for task 5 and 6

## Assessment

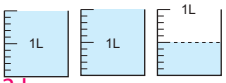
- Solve word problem. F
- Do the exercise correctly. S

## • Teacher's Notes •

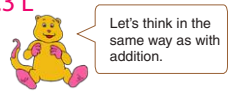
For subtraction of decimal numbers, the application in calculation using vertical from is just like the whole number subtraction in vertical form.
In subtraction when the subtrahend is smaller than the minuend borrowing is applicable to borrow from the higher place values.

### Decimal number − decimal number without borrowing

**5** There is a 2.5 dL of milk. 1.2 dL is used to make soup.
How many litres are left?




2.5 − 1.2 = 1.3 Answer 1.3 L



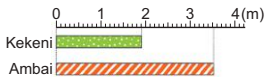

① Think about how many sets of 0.1 are there.

② Let's subtract in vertical form.

| | | |
|---|---|---|
| | 2 | 5 |
| − | 1 | 2 |
| | 1 | 3 |

### Decimal number − decimal number with borrowing

**6** Kekeni has a 1.9 m ribbon and Ambai has a 3.5 m ribbon.
Which ribbon is longer and by how many metres?



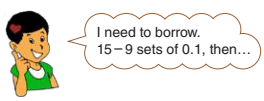

3.5 − 1.9 = 1.6

① Think about how many sets of 0.1 are there.

② Let's calculate in vertical form.

35 − 19 = 16 Answer 16 sets

| | | |
|---|---|---|
| | 3 | 5 |
| − | 1 | 9 |
| | 1 | 6 |




**Exercise**

Let's subtract in vertical form.

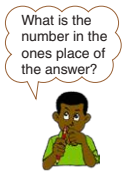
① 0.7 − 0.3 0.4
② 0.9 − 0.6 0.3
③ 3.9 − 1.5 2.4
④ 6.7 − 1.4 5.3
⑤ 2.8 − 0.5 2.3
⑥ 4.1 − 1.7 2.4
⑦ 5.4 − 2.5 2.9
⑧ 2.8 − 0.9 1.9

104 = □ ÷ □

**7** Let's think about how to subtract in vertical form.

① 4.2 − 3.8

| | | |
|---|---|---|
| | 4 | 2 |
| − | 3 | 8 |
| | 0 | 4 |




② 4 − 1.8

| | | |
|---|---|---|
| | 4 | 0 |
| − | 1 | 8 |
| | 2 | 2 |

**Exercise**

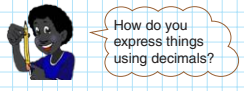
Let's subtract in vertical form.

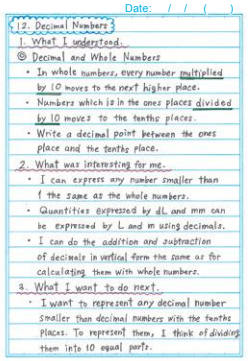
① 2.4 − 1.6 0.8
② 1.5 − 0.9 0.6
③ 3 − 1.2 1.8
④ 2 − 0.7 1.3

### How to Use Your Exercise Book !

Let's write in your exercise book what you have learned about

- the meaning of decimals
- and how to calculate.
- ○ What I understood.
- ○ What was interesting to me.
- ○ What I felt was difficult.
- ○ What was good to me about my friend's ideas.
- ○ What I want to do next.




□ × □ = 105

## Lesson Flow

### 1 Review the previous lesson.

### 2 5 Solve the word problem of subtraction of decimal number without borrowing .

T Introduce the main task.

T ❶ Let the students recognise that it is a subtraction problem and make a mathematical expression.

S ❷ Solve the expression in vertical form.

T How many sets of 0.1 are there?

S 13 sets of 0.1 in 1.3

### 3 6 Think about how to subtract decimal numbers with borrowing.

TN It is important to base thinking on the sets of 0.1 and calculate the numbers in the same place value.

T ❶ What is the mathematical expression?

S 3.5 – 1.9

S ❷ Solve the expression in vertical form.

S Recognise that subtraction of decimal number applies same system as whole number for vertical subtraction.

T How many sets of 0.1 are there ?

S 16 sets of 0.1 is 1.6 dL.

### 4 Do the exercises.

T Ask students to solve 1, 2, 3 and 4. The others can be given as homework.

### 5 7 Think about how to calculate subtraction of mixed number with borrowing.

TN ❶ 4.2 – 3.8

When the answer of ones place becomes 0, you have to write 0 in ones place so that answer is shown as '0.4'.

TN ❷ 4 – 1.8

Some students will be confused that there is no number to subtract in tenth place. In that case, please go back to the meaning of decimal numbers. '4' means 40 sets of 0.1 so you can see the 4 is equal to 4.0.

### 6 Do the exercise.

## Sample Blackboard Plan

**Date:**
**Chapter:** 9 Decimal Numbers.
**Topic: Addition and Subtraction of Decimal Numbers. Lesson No:** 2/2

**Main Task: Let's think about how to subtract decimal numbers with and without borrowing in vertical form.**

MT: Introduce the main task here.

[5] There is 2.5 dL of milk. 1.2 dL is used to make soup. How many liters are left?
2.5 – 1.2 = 1.3 Answer 1.3 L

❶ 2.5 is 25 sets of 0.1
1.2 is 12 sets of 0.1
25 – 12 = 13
13 sets of 0.1

❷

| | | |
|---|---|---|
| | 2 | 5 |
| – | 1 | 2 |
| | 1 | 3 |

[6] Kekeni has a 1.9m ribbon and Ambai has a 3.5m ribbon. Which ribbon is longer and by how many meters?

3.5 – 1.9 = 1.6 Answer 1.6 m

❶ 3.5 is 35 sets of 0.1
1.9 is 19 sets of 0.1
35 – 19 = 16
16 sets of 0.1

❷

| | | |
|---|---|---|
| | 3 | 5 |
| – | 1 | 9 |
| | 1 | 6 |

**Exercise.**

Let's subtract in vertical form.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| (1) | 0.7–0.3 =0.4 | (2) | 0.9–0.6 =0.3 | (3) | 3.9–1.5 =2.4 | (4) | 6.7–1.4 =5.3 |
| (5) | 2.8–0.5 =2.3 | (6) | 4.1–1.7 =2.4 | (7) | 5.4–2.5 =2.9 | (8) | 2.8–0.9 =1.9 |

[7]Let's think about how to subtract in vertical form.

(1) 4.2–3.8 (2) 4–1.8

| | | |
|---|---|---|
| | 4 | 2 |
| – | 3 | 8 |
| | 0 | 4 |

| | | |
|---|---|---|
| | 4 | 0 |
| – | 1 | 8 |
| | 2 | 2 |

**Exercise.**

Let's subtract in vertical form.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| (1) | 2.4–1.6 =0.8 | (2) | 1.5–0.9 =0.6 | (3) | 3–1.2 =1.8 | (4) | 2–0.7 =1.3 |

# Unit 9

# Unit: Decimal Numbers 1
## Sub-unit: Exercise and Evaluation
## Lesson 1of 1 (Double Period)

Textbook Page :
p.106 – p.107
Actual Lesson 65

## Lesson Objectives

- To deepen understanding on contents learned in this unit.
- To calculate addition and subtraction thinking about combination of numbers.

## Prior Knowledge

- All the contents in this unit

## Preparation

- Attached evaluation sheet for the students

## Assessment

- Solve the exercise comfirming what they have learned in this unit. F S

## • Teacher's Notes •

Use 30 minutes for the exercise and give the evaluation test after that.

### Exercise

#### How to express decimal number

1 Let's fill in the ☐ with a number. Pages 98 ~ 101

① The sum of 3 dL and 0.4 dL is 3.4 dL.

② 2.3 dL is 23 sets of 0.1 dL.

③ The sum of 1 m and 0.7 m is 1.7 m.

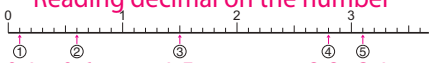
④ 27 sets of 0.1 cm is 2.7 cm.

⑤ 2.5 is the sum of 2 and 0.5.

⑥ 4.3 sets of 0.1 is 4.3.

2 Let's write the numbers that each ↑ is pointing at. Page 101

#### Reading decimal on the number




① 0.1 ② 0.6 ③ 1.5 ④ 2.8 ⑤ 3.1

3 Which number is larger? Fill in the ☐ with a correct inequality sign.

#### Comparision of decimal number

Page 101

① 0.8 < 1.1 ② 2.3 < 3.2 ③ 5.1 > 5

4 Let's calculate. Pages 102 ~ 105

#### Addition and subtraction of decimal number

① 3.4+1.5 = 4.9 ② 0.2+0.9 = 1.1 ③ 5.7+2.6 = 8.3 ④ 4.3+0.7 = 5

⑤ 5.8−3.3 = 2.5 ⑥ 4.6−2.7 = 1.9 ⑦ 6.2−5.8 = 0.4 ⑧ 5−4.1 = 0.9

Grade 3 Do you remember?

Let's draw the following shapes.

① A circle with radius 4 cm.

② A circle with diameter 6 cm.

③ An equilateral triangle with 6 cm sides.

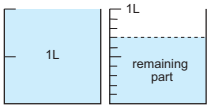
④ An isosceles triangle with sides of 7 cm, 7 cm and 5 cm.

106 = ☐ ÷ ☐

### Problems

#### How to express remaining part

1 When some children measured the amount of water in a bottle with a 1L measuring cup, they found that there was 1 litre and a remaining part.




Fill in the ☐ with a number.

● Understanding how to represent the remaining part.

① When we want to represent the amount of water using L as the unit, we need to divide the 1 L measuring cup equally into 10 parts.

② The amount of water in the remaining part is 0.7 L.

③ The amount of water in a bottle is 1.7 L.

④ This amount is 17 sets of 0.1 L.

#### Structure of decimal number

2 Fill in the ☐ with a number.

● Understanding the system of decimal number.

① 1.4 is 14 sets of 0.1. ② 10 sets of 0.1 is 1.

③ 4.3 is the sum of 4 and 0.3.

#### Addition and subtraction of decimal number

3 Let's calculate.

● Calculating addition and subtraction of decimal numbers.

① 0.6+5.2 = 5.8 ② 1.5+3.8 = 5.3 ③ 3.6+1.4 = 5

④ 4.7−1.6 = 3.1 ⑤ 6.3−5.9 = 0.4 ⑥ 7−0.7 = 6.3

4 There are 0.8 L of coconut oil in a small bottle and 1.1 L of coconut oil in a large bottle. How many litres are there altogether? And how many litres is the difference?

● Write the expression with decimal numbers and find its answer.

0.8 + 1.1 = 1.9 Answer 1.9L 1.1 − 0.8=0.3 Answer 0.3 L

☐ × ☐ =

## Lesson Flow

**1** **① Structure of the decimal number.**

TN Teacher helps the students who have a difficulty of reading.

**2** **② Reading the decimals on the number line.**

**3** **③ Compare the decimal numbers.**

TN Comparing based on ones place or tenth place.

**4** **④ Addition and subtraction of decimal numbers.**

S Change the operation into vertical form and calculate.

TN Let the students be aware to arrange the number neatly on the same place value to prevent mistakes.

**5** **Do the exercises 'Do you remember'.**

**6** **Problem ①**

TN This question is for the meaning and how to express remaining part of decimal number.

**Problem ②**

TN The structure of decimal number is same as whole number, which applies decimal positional system.

**Problem ③**

TN Confirm whether students understand place value and calculation with carrying and borrowing.

**Problem ④**

S Understand the situation, make a mathematical expression and solve the expressions.

TN Let the students calculate accurately not forgetting to put decimal point.

**7** **Complete the test.**

| Decimal Numbers | Name: | Score |
|---|---|---|
| | | |

(5 points each)

1. Fill in the blanks with numbers.

① 4.7 is the sum of 4 sets of 1 and 7 sets of 0.1

② 12.005 is the sum of 1 set of 10, 2 sets of 1 and 5 sets of 0.01.

2. Fill in the blanks with an inequality sign.

① 0.31 > 0.289 ② 1.372 < 1.4

3. Represent the following measurements by using the units shown in the ().
(10 points each)

① 7231g (kg) 7.231 kg ② 320ml (L) 0.32L

③ 2.42 km (m) 2420m

4. Calculate following operations.

① 5.21 + 1.32 = 6.53 ② 4.18 + 0.34 = 4.52

③ 3.67 + 2.4 = 6.07 ④ 9.25 − 3.12 = 6.13

⑤ 7.05 − 3.6 = 6.69 ⑥ 4 − 1.31 = 2.69

5. There are two ropes, 2.17 m and 3.62m If you put the three ropes together, how many metres of rope can you make?

Math sentence 2.17 + 3.62 = 5.79 Answer 5.79 metres

6. From 2.62 m tape, 72 cm was cut off. How many m tape is left?

Math Sentence 2.62 − 0.72 = 1.9 Answer 1.9 metres

**End of Chapter Test: Chapter 9** **Date:**

| Decimal Numbers | Name: | Score |
|---|---|---|
| | | |

(5 points each)

1. Fill in the blanks with numbers.

① 4.7 is the sum of 4 sets of 1 and 7 sets of _____

② 12.005 is the sum of 1 set of _____, 2 sets of _____ and 5 sets of _____.

2. Fill in the blanks with an inequality sign.

① 0.31 _____ 0.289 ② 1.372 _____ 1.4

3. Represent the following measurements by using the units shown in the ().
(10 points each)

① 7231g (kg) _____ ② 320ml (L) _____

③ 2.42 km (m) _____

4. Calculate following operations.

① 5.21 + 1.32 ② 4.18 + 0.34

③ 3.67 + 2.4 ④ 9.25 – 3.12

⑤ 7.05 – 3.6 ⑥ 4 − 1.31

5. There are two ropes, 2.17 m and 3.62m If you put the three ropes together, how many metres of rope can you make?

Math sentence _____ Answer _____

6. From 2.62 m tape, 72 cm was cut off. How many m tape is left?

Math Sentence _____ Answer _____

# Chapter 10 Round Numbers

## 1. Unit Objectives

- To understand and explain the meaning of approximate (rounded) numbers, rounding up or down and do rough estimations for appropriate purposes. (4.1.2 a)
- To express a number as a rounding or round off, greater than or equal to 5, and less than 5 and understand its difference between less and equal to 5 in situations. (4.1.2 b)
- To round whole numbers up or down from ones, tens, hundreds, thousands, etc.… places and recognise their different changes, and discuss their importance. (4.1.2 c and d)

## 2. Teaching Overview

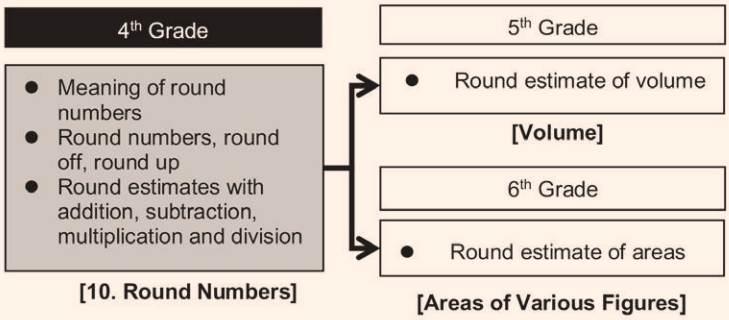
In this unit, students understand significance of rounding numbers and how to round them to enable them to utilise the round numbers in daily situations. Activities based on real life situations will help them to develop the attitude and habit of utilising round numbers. Students may have such misconceptions as round numbers are incorrect numbers or untrusted numbers. However, the idea of round numbers is mathematically useful.

**Rounding :** Teachers should show many useful situations that round numbers are used in daily life. For rounding, they should NOT just remember "for the number less than 5, we round down and equal to or greater than 5, we round up". They should understand why we do so. For them to understand it, to think where the number is on the number line and think about which range should be round up or down.

**Rough Estimates :** Ways of rounding may depend on situations – in some situations, we round down and in other situations we round. Learners should be able to identify the way of rounding according to the purpose. Rich experiences of thinking with various realistic situations will be required.

**Using Round Numbers :** Students should experience and compare 2 ways of calculations; calculating after rounding and calculating accurately and rounding the result to appreciate the 1st way.

## 3. Related Learning Contents



# Unit 10

# Unit: Round Numbers
## Sub-unit: 1. Rounding
## Lesson 1 of 3 (Double Period)

Textbook Page : p.108~109
Actual Lesson 66

## Sub-unit Objectives

- To understand round numbers and use according to purposes.
- To know situations where rounding numbers are used.
- To know about rounding.
- To estimate results of four-function calculations according to purposes.

## Lesson Objectives

- To realise that there are many ways of expressing approximate numbers and to think about how to express them.
- To know about the meaning and term 'round numbers'.

## Prior Knowledge

- Large Numbers. (Grade 4)
- The structure of large numbers. (Grade 3)
- 10 Times, 100 Times, and Divided by 10. (Grade 3)
- Addition and Subtraction. (Grade 3)

## Preparation

- Strip of paper for Number line

## Assessment

- Think about how to express approximate numbers. F
- Understand the meaning and term 'round number'. S

10 Round Numbers

How to express round numbers

The following family members (Father, Mother, Julie and Wally) went to a car dealer yard and had the following discussion. Let's think about the ways in which they are talking about the price of a car selling at 26 300 kina.

Let's buy it, it's about 20 thousand kina.

26 thousand kina is cheaper than other car dealers.

If we have 27 thousand kina, we can buy.

30 thousand kina is an expensive car.

Wally

Julie

Mother

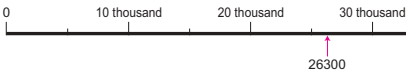
Father

Let's think about how to express and use approximate numbers.

108 = □ − □

Meaning of round numbers
## 1 Rounding

1 In the scale of 10 thousand, is the price of the car, 26300 kina, closer to 20 thousand kina or 30 thousand kina?
How should we express it better? Around 30 thousand kina




An approximate number is also called **round number**.
If a number is more or less than 30 thousand, it is said to be **about 30 thousand**.

How to express round numbers

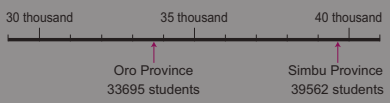
2 The table below shows the total number of students for enrollment to Elementary schools for 3 provinces.
About how many students are there in each province in terms of ten thousands?

Around 70 thousand Around 40 thousand Around 30 thousand

| | Madang Province | Simbu Province | Oro Province |
|---|---|---|---|
| Number of students | 71238 | 39562 | 33695 |

Expressing Numbers as Round Numbers

3 Let's think about how to express the numbers of Elementary school students in 2 as round numbers in the ten thousands place value.




Which place value should we consider?

□ ÷ □ = 109

# Lesson Flow

**1 Review on place value.**

S Find the place value for these underlined numbers.
a.) 5 7**8**0 b.) 40**0** 196 c.) 70 11**3** d.) **3**49

**2 Think about ways of expressing the price of buying a car for a family of four members.**

T Why is everyone talking about a different price even though it's the same car?
S Each person thinks of the price in different ways.
TN Have students to realise that a way of expressing numbers is different depending on a view of each person. Father thinks that the amount K26 300.00 is expensive whereas Wally thinks it is cheap.
T Introduce the main task.

**3 1 Discuss how to express K26 300.00 better.**

T Have students to determine in which place a number of 26 300 will be based on the number line from the blackboard.
S Understand that 26 300 is closer to 30 thousand than 20 thousand.

**4 Know about the term "round numbers" and a way of expression of "about 30 thousand".**

S Read the important point in the box.

**5 2 Think about the number of students to the nearest ten thousands.**

TN Have students think about it by using the number line and determine whether a number is closer to the nearest ten thousand."
T How many students are there in terms of 10 thousand?
S Around 70 thousand, around 40 thousand and around 30 thousand.

## • Teacher's Notes •

The emphasis on the Introduction situation on Round Numbers is to help students realise that different thoughts were expressed to show their viewpoints on how they interpret the situations.
Help students to understand that different views expressed by each family member are decided upon how they interpret the situation and that it is fine.

Meaning of Using Round Numbers

Round numbers are used when an accurate value is not needed or cannot be found out. Following situations are considered concretely.
1. When an accurate value changes by the minute such as population of cities and attendance during games.
2. When an accurate value is not needed or is expressed by a close value such as thinking circular constant as 3.14 or making 3÷7 = 0.42857 as 0.43.

Also, advantages are given as follows:
1. Easy to grasp sizes of numbers.
2. Easy to understand relationship of sizes.
3. Easy to see.
4. Be able to avoid big mistakes.

# Sample Blackboard Plan

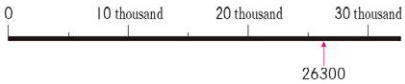
**Date:** **Chapter: Round Numbers** **Topic: Rounding** **Lesson: 1 of 3** **Page: 112 and 113.**

Let's think about how to express and use approximate numbers.

The following family members ( Father, Mother, Julie and Wally) went to a car dealer yard.
Let's think about ways in which they are talking about the price of a car selling at 26 700 kina.

MT

1 How to express 26 300 kina better by using appropriate numbers on the number line.




"26 300 kina" is closer to 30 thousand kina.

An approximate number is also called **round number**. If a number is more or less, than 30 thousand , it is said to be about 30 thousand.

2 The table below shows the number of students for enrolment to elementary school for 3 provinces.
How many people are there in terms of ten thousands?

| Province | Madang Province | Simbu Provine | Oro Province |
|---|---|---|---|
| Number of Students | **71 238** | **39 562** | **33 695** |

Madang : **Around 70 thousand**
Simbu: **Around 40 thousand**
Oro : **Around 30 thousand**

# Unit 10

# Unit: Round Numbers
## Sub-unit: 1. Rounding
## Lesson 2 of 3 (Single Period)

Textbook Page : p.109~111
Actual Lesson 67

## Lesson Objectives

- To understand and express the method of rounding numbers.
- To apply the method in various situations of rounding numbers.

## Prior Knowledge

- Meaning of round number (Previous lesson).

## Preparation

- Number Line, Table in task 2

## Assessment

- Think about and learn how to round numbers F
- Understand how to round numbers and express the rounded number correctly. S

## • Teacher's Notes •

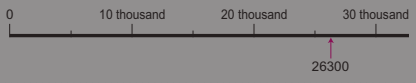
**Rounding and Expression**
Students can understand well on how to make round numbers by rounding itself. However, in actual problems, sometimes students might get confuse and cannot understand which place value they need to round to because various expressions are used in a sentence. For example, following expressions can be taught.

- Let's make 3476 a round number to the nearest one hundred by rounding!
- Let's round 3476 at the hundreds place value!
- Let's round 3476 to the first place from the largest place value!
- Have students to think about the meaning of each expression well and be able to find out round numbers appropriately when asked by any expressions.

**Rounding**
If we remember how to round as (0, 1, 2, 3, 4) → round down and (5, 6, 7, 8, 9 ) → round up formally, students can often make a mistake when asked a range of numbers which certain round numbers are expressed as follows.
"A range of whole numbers which will be 2 000 when rounding to the nearest thousand is whole number from 1 500 to 2 400."

## 1 Rounding

**1** In the scale of 10 thousand, is the price of the car, 26300 kina, closer to 20 thousand kina or 30 thousand kina? How should we express it better?



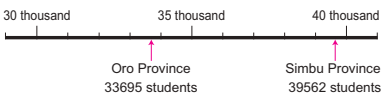

An approximate number is also called **round number**. If a number is more or less than 30 thousand, it is said to be **about 30 thousand**.

**2** The table below shows the total number of students for enrollment to Elementary schools for 3 provinces. About how many students are there in each province in terms of ten thousands?

| | Madang Province | Simbu Province | Oro Province |
|---|---|---|---|
| Number of students | 71238 | 39562 | 33695 |

### Expressing Numbers as Round Numbers

**3** Let's think about how to express the numbers of Elementary school students in 2 as round numbers in the ten thousands place value.




Which place value should we consider?
Thousands place value

### Expressing a Number as a Round Number

When we want to express a number as a round number to the nearest ten thousand, we have to look at the thousands place and the number on the right.

Because 3695 in 33695 is smaller than 5000, we can think of it as 0.

0000
33695 → **30000**
**About 30 thousand**

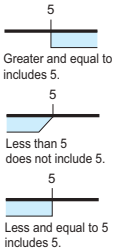
If the number in the thousands place is 0, 1, 2, 3, or 4 as less than 5 we can leave that number unchanged and replace the numbers to the right with 0000.

As 9562 in 39562 is larger than 5000, we can think of it as 10000.

10000
39562 → **40000**
**About 40 thousand**

If the number in the thousands place is 5, 6, 7, 8, or 9 as greater than or equal to 5 we add 1 to the number in the ten thousands place and replace the numbers to the right with 0000.

The method shown above for expressing round numbers is called **rounding or round off**.
Greater than or equal to 5 means "Just 5 or greater (larger or more) than 5".
Less than 5 means "smaller than 5 and not equal to 5".
Less than or equal to 5 means "Just 5 or smaller than 5".




□ ÷ □ = 109　　110 = □ − □

## Lesson Flow

### 1 Review the previous lesson.

S Using a scale of 10 thousand express these following numbers as round numbers on the number line.
A.) 38 000 B.) 9 900 C.) 72 000

### 2 3 Think about how to express the number of Elementary school students in 2

T Which place value do we have to focus on to round the numbers into ten thousands place?
S Thousands place.
TN It is good to use a way to have students focus on the thousands place value by hiding numbers of each place value and showing one by one.
T Introduce the main task.

### 3 Read "Expressing a Number as a Round Number" and summarise how to round.

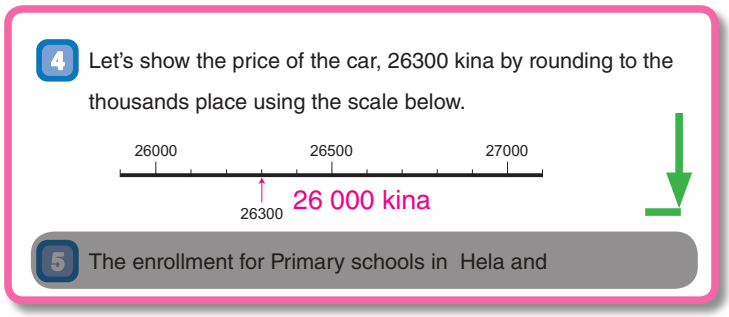
T Confirm that when we want to express a number as a round number to the nearest ten thousand, we need to determine to round down or round up using a digit at the thousands place.

### 4 Understand about the meaning of "rounding" and terms, "greater and equal to" , "Less than and equal to" , "less than" and greater than.

T Explain the meaning of "rounding"
Round down …… Let go of a number,
0, 1, 2, 3, and 4.
Round up ….. Include a number, 5,6,7,8,and 9.

### 5 4 Round 26 300 by the scale of thousand.

T Have students understand the meaning of "round by the scale of thousand" well.
S Think about which place value to be considered.
S Determine that 26 300 is closer to 26 000 based on the number line.




## Sample Blackboard Plan

**Date:** **Topic: Rounding** **Lesson: 2 of 3** **Page: 113- 115.**

Let's think about how to express numbers as round numbers.

3 Let's think about how to express numbers of Oro and Simbu Province students in 2 s round numbers in the ten thousands place.

30 thousand 35 thousand 40 thousand

Oro Province 33695 students

Simbu Province 39562 students

Which place value do we consider?
Thousands place value.

MT

**Expressing a Number as Round Numbers.**

When we want to express a number as a round number to the nearest ten thousand, we have to look at the thousands place and the number on the right.

1. If the number in the thousands place is 0, 1, 2, 3, 4, we can leave that number unchanged and replace the numbers to the right with 0000.

For example
0000
33695 → 30000
About 30 thousand

**2. If the number in the thousands place is 5, 6, 7, 8, 9, we add 1 to the number in the ten thousands place and replace the numbers to the right with 0000.**

For example
10000
39562 → 40000
About 40 thousand

The method shown above for expressing approximate numbers is called **Rounding** or **Round off**.

5 Greater and equal to 5 includes 5.
5 Less than 5 does not include 5.
5 Less and equal to 5 includes 5.

Round down…..If numbers are 0, 1, 2, 3, 4, Let go a number.

4 Let's round the price of a car, 26 300 kina by the scale of thousand.

26000 26500 27000
26300

The price of a car is around 26 000 kina.

**Summary**

▪Greater than or equal to 5 means just 5 or greater (larger or more) than 5.

▪Less than 5 means smaller than 5 and not equal.

# Unit 10

# Unit: Round Numbers
## Sub-unit: 1. Rounding
## Lesson 3 of 3 (Double Period)

Textbook Page : p.111~112
Actual Lesson 68

## Lesson Objectives

- To understand that round numbers are representatives of numbers in a certain range.
- To know about a way of expressing round numbers, “to the ◯ place from the largest place value.”

## Prior Knowledge

- How to express round number (Previous lesson).

## Preparation

- Chart of Number line, Tables

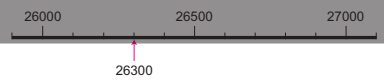
## Assessment

- Solve the problems confirming the method of rounding numbers. F
- Do the exercises correctly. S

## • Teacher’s Notes •

Some students might get confused solving the problem 3. An effective instruction is to set an arbitrary number such as “34 253” and to have students round it at the hundreds place value. By doing so, it will be rounding down when the hundreds place value is 2 and will be a round number of 34 000. From the results, it is good to have students guess cases when the hundreds place value is other numbers. If there is enough time, it is recommended to confirm the meaning of the “phrase” on p.112 and have students understand the meaning of the terms well.

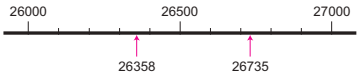
**4** Let’s show the price of the car, 26300 kina by rounding to the thousands place using the scale below.




**5** The enrollment for Primary schools in Hela and New Ireland Provinces are shown in the table.

| | |
|---|---|
| Hela Province | 26358 students |
| New Ireland Province | 26735 students |

1. What is the student population in ten thousand for each province? 30000 people
2. What is the population in thousands for each province?




Which place value should we consider?

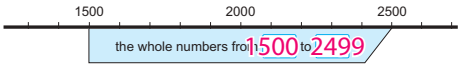
**6** Let’s consider the numbers whose round numbers are 2000 when rounding to the nearest thousands.

1. Round the following numbers to the nearest thousands.

1350, 1499, 1500, 1502, 2001
1000 1500 2000 2000 2000
2499, 2500, 2501, 2570, 2608
2000 3000 3000 3000 3000

Let’s use the number line for representing them.

2. Find the largest and the smallest numbers whose round numbers to the nearest thousands are 2000.




3. Let’s express the range of numbers which can be 2000 after rounding by using the terms of “greater and equal to”and “less than”.

Greater than 1500 to less than 2500

**7** Round the following numbers to the first place and second place from the largest place value. Let’s think about which place value should we round and write the round number in the table below.

The first highest place
7869
The second highest place

| | 7869 | 4139 | 52630 |
|---|---|---|---|
| Round number by the first highest place | 8000 | 4000 | 50000 |
| Round number by the second highest place | 7900 | 4100 | 53000 |

Which place values should I consider to round off?

### Exercise

**1** Let’s round the following numbers to the nearest place value indicated below.

① 361 (Hundreds place) 400
② 4782 (Hundreds place) 4800
③ 53472 (Thousands place) 53000
④ 425000 (Ten thousands place) 43000

**2** Let’s round the following numbers to the nearest ten thousands.

① 46719 50000 ② 570814 570000 ③ 458341 460000

**3** Fill in the ☐ with round numbers.

①The number rounded in the hundreds place become 34000 is larger than ☐ and smaller than ☐.

33500 34500

□ ÷ □ = 111 112 = □ − □

## Lesson Flow

### 1 Review the previous lesson.

S Complete the rule of rounding numbers.
a.) If a number in the thousands place is 5, 6, 7, 8, 9, what do we do?
b.) If a number in the thousands place is 1, 2, 3, 4, what do we do?

### 2 5 Round the enrolment of primary school in two provinces to the nearest ten thousand or thousand.

T ❶ What is the student population in ten thousand for each province?
S Both provinces, 30 thousand.
T ❷ What is the student population in thousand for each province?
S Hela province is 26 thousand students and New Ireland is 27 thousand students.
TN Confirm that round numbers expressed differ depending on which place values to be rounded.
T Which place value is considered to round in thousand place?
S Hundred place.

### 3 6 Find out the whole numbers which will be 2000 by rounding.

T Have students to express numbers given in 6 ❶ as in the number line.
S Express all numbers in 6 ❶ as round numbers to the nearest thousand.
T ❷ Let students think about a range of whole numbers which will be 2 000 by rounding and referring to the number line to be summarised.

### 4 7 Understand how to express a number to "the first place and second place from the largest place value".

T Have students understand the meaning of " a number to the first place and second place from the largest place value" well.
- "a round number to the first place from the largest place value" 7 869 → 8 000
- " a round number to the second place from the largest place value" 7869 → 7 900

S Express each of the 4 139 and 52 630 to "the first place and second place from the largest place value" and write in the table.

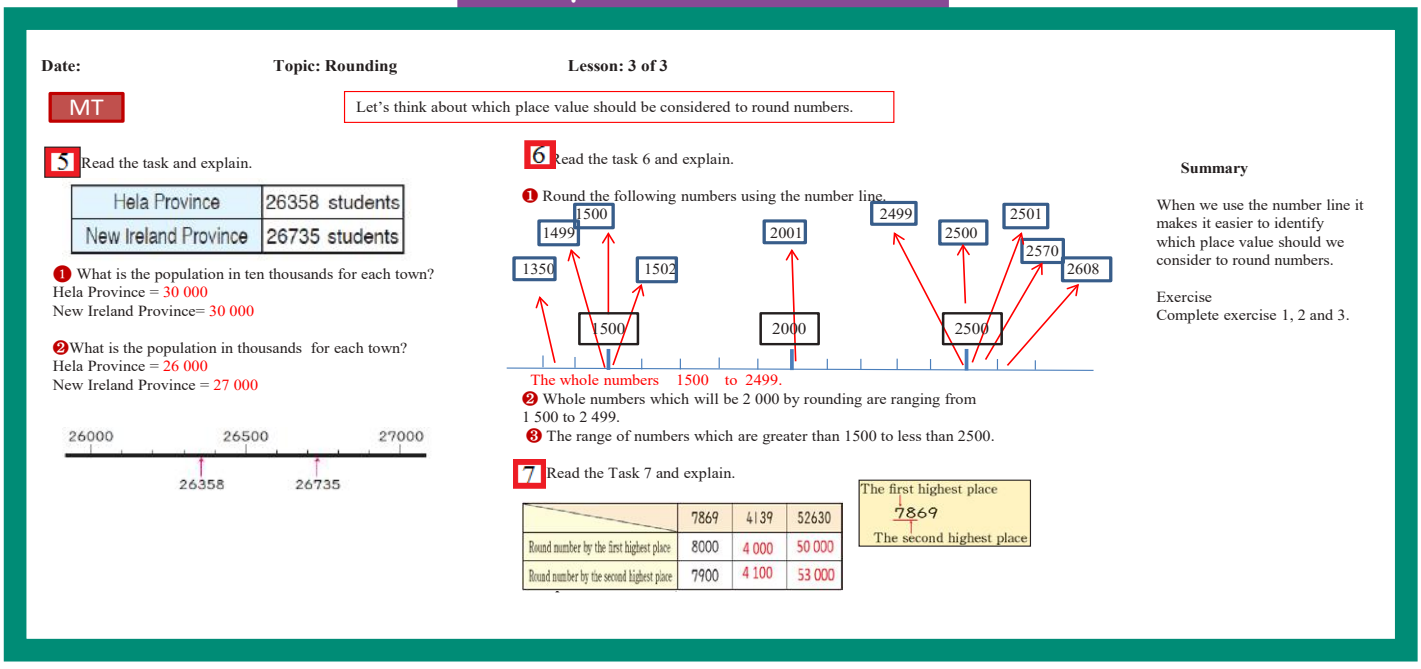
### 5 Summary

T When we use the number line it makes it easier to identify which place value we should consider to round numbers.

### 6 Solve problems of the Exercise.

S Complete exercise 1, 2 and 3.

## Sample Blackboard Plan



# Unit 10

# Unit: Round Numbers
## Sub-unit: 2. Rounding Up and Down
## Lesson 1 of 1 (Double Periods)

Textbook Page : p.113
Actual Lesson 69

## Sub-unit Objectives

- To understand the meaning of rounding up and down.
- To understand the methods of rounding up and down.

## Lesson Objectives

- To understand how to round up and down through the exercises.

## Prior Knowledge

- Rounding and expressing numbers (Previous sub-unit)

## Preparation

- Chart of Number line

## Assessment

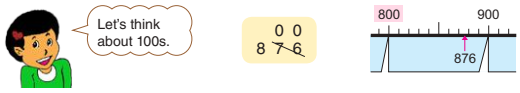
- Understand how to round up and round down to solve problems. F
- Do the exercises correctly. S

## • Teacher's Notes •

In situations where we have things that cannot be easily counted or measured, we round down. An example is seen in Task 1 in this lesson.
Also in other situations where we are estimating the outcome of an answer which is going to be larger or more, we round up. An example is shown in Task 2.

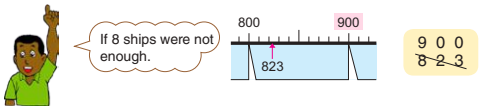
### 2 Rounding Up and Down

**1** There are 876 sheets of papers. If bundling in 100 sheets, how many bundles can we have? 800 sheets




Here, we take down the numbers less than 100, it is called **rounding down** to the 100s place.

**2** 823 people went on a trip. One ship could take 100 people. How many ships are used? 900 people




Here, we consider the rest to add one more 100, it is called **rounding up** to the 100s place.

There are several ways to get to approximate numbers : **rounding numbers, rounding down numbers and rounding up numbers**.

**Exercise**

Let's get the second highest place number by rounding down.

Let's get the first highest place number by rounding up.

① 28138 → 28000 → 30000
② 3699 → 3600 → 4000
③ 42500 → 42000 → 50000
④ 9810 → 9800 → 10000

□ ÷ □ = 113

## Lesson Flow

### 1 ① Rounding down.

T Introduce the main task.
S Read and understand the situation.
S Confirm that the remaining 76 papers cannot be a bundle so the number is rounded down.
T How many bundles can we have?
S 8 bundles
S Learn the term ‘rounding down’ considering the situation.

### 2 ② Rounding up.

S Read and understand the situation.
S Think about the situation that every 100 people get on a ship.
T How should we treat the remaining 23 people?
S They have to get on another ship. (Total of 9 ships)
T Yes, they have to get on another ship so we need one more.
S Learn the term ‘rounding up’ considering the situation.

### 3 Summary

T Read the important point in the box ⬚.

### 4 Do the exercises.

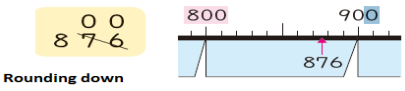
## Sample Blackboard Plan

**Date:** **Topic: Rounding** **Lesson: 1 of 1**

Let’s think about which situations in which we can round up and down.

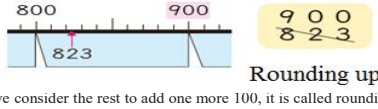
MT

**1. There are 876 sheets of papers. If bundling in 100 sheets, how many bundles can we have?**




Here, we take down the numbers less than 100, it is called rounding

**2. 823 people went on a trip by ship. One ship could carry 100 people. How many ships can we use?**




Here, we consider the rest to add one more 100, it is called rounding up to the 100s place.

Answer: **9 ships**

**Summary**

There are several ways to get to approximate numbers: **rounding numbers, rounding down numbers and rounding up numbers.**

**Exercise**

① 28 138 = 28 138 28 000
28 138 30 000

② 3 699 = 3 699 3 600
3 699 4 000

③ 42 500 = 42 500 42 000
42 500 50 000

④ 9 810 = 9 810 9 800
9 810 10 000

# Unit 10

# Unit: Round Numbers
## Sub-unit: 3. Rough Estimates
## Lesson 1 of 3 (Double Period)

Textbook Page : p.114-p.115
Actual Lesson 70

## Sub-unit Objectives

- To understand how to do rough estimation.

## Lesson Objectives

- To understand how to do rough estimation.

## Prior Knowledge

- Round up and down numbers.

## Preparation

- Charts and tables

## Assessment

- Think about how to do rough estimation through solving problems. F
- Do rough estimation correctly. S

## • Teacher's Notes •

Rough Estimations can be expressed in two ways using Gawi and Vavi's ideas depending on the situation presented.
Also, Gawi and Vavi's ideas present situations where it is current and can be easily counted and measured.
However, in Task 2, the situation presented is based on assumptions whether they'll need to expect more participants for the workshop especially in terms of accommodation. That is why the rough estimation is rounded up.

### 3 Rough Estimates

2018 PNG Games, WNBP

**1** The table on the right shows the number of spectators in the PNG Games in a day in 2018.

**The Number of spectators in the PNG Games**

| | |
|---|---|
| Morning | 2784 |
| Afternoon | 3428 |

(1) About how many people in terms of thousands were spectators on that day? 6000 people

**Gawi's idea**

I add the numbers of people in the morning and afternoon.
2784 + 3428 = 6212
I round the number to the nearest thousands and got 6000 spectators.

**Vavi's idea**

I round the numbers for the morning and afternoon to the nearest thousands.
2784 → 3000
3428 → 3000
Then I add the 2 numbers.
3000 + 3000 = 6000
(Spectators)

A number calculated by using round numbers is called **rough estimate**.

114 = □ − □

(2) How many more people watched the games in the afternoon than in the morning, in terms of hundreds?

To which place value should we round?

3400 - 2800 = 600 Answer: 600 people

**2** Primary school teachers in Madang Province will attend the EQUITV Project workshop together.
Their expected expenses are shown on the right. About how much money should they prepare?

**Expenses**

| Item | Amount (Kina) |
|---|---|
| Transport | 2960 |
| Accomodation | 2250 |
| Meals | 3800 |

3000 + 3000 + 4000 = 10 000 Answer: 10 000 kina

Which approximate methods can we use for a rough estimation?

**3** Rose's family went shopping before going to the camp.
If they spend more than 1500 kina in the store, they can receive a free mobile phone.
The table on the right shows the shopping list.

**Shopping List**

| Item | Amount (Kina) |
|---|---|
| Sleeping bag | 128 |
| Tent | 150 |
| Small generator | 1320 |

100 + 100 + 1300 = 1500 Answer: 1500 kina

Can they receive a free mobile phone?
YES

Which approximation method should we use to determine if they get a free mobile phone or not?

□ ÷ □ = 115

# Lesson Flow

## 1 ① Think about the total number of people by estimation.

T Introduce the main task.
T Ask students to read and understand the situation and the table.
T ① Ask students to give their opinions about how many people went to the games on a particular day.
S There are two games, morning game and afternoon game so we have to add the two numbers.

## 2 Let's compare Gawi's and Vavi's idea.

T What is the difference between the 2 ideas.
S Gawi adds two numbers first and rounds the number to the nearest thousands.
S Vavi rounds the two numbers to the nearest thousand first and adds the numbers.
T What is the good point of Vavi's idea?
S Calculation becomes easy because of rounding first.
S In both cases there are 6000 spectators.
T Have them to remember that a number calculated by using round numbers is called rough estimate.

## 3 ② Let's calculate the difference in the morning and afternoon.

T Let's think of how many people attended the show in the afternoon than morning in terms of hundreds.
T Which place value shall we focus on to round to the nearest hundred?
S Tens place.
T Have students to round - off to hundred place before subtraction.

## 4 Solve problem ②.

T Let the students think about what they have to do to take enough money, round- up or round down.
S We have to round-up the number to take enough money.
TN Transport: 2960 → 3000
Accommodation:2250 → 2300
Meals: 3800 → 3800

## 5 Solve problem ③.

TN Let the students notice that they have to round down to check if they can get free mobile phone for sure.
TN 128 → 100, 150 → 100, 1320 → 1300.
S Even when rounding down the numbers, the total sum is over 1500. Therefore, we can get free mobile phones.

## 6 Summarise the important points.

# Sample Blackboard Plan

**Date:** **Topic: Rough Estimates** **Lesson: 1 of 3**

Let's think about ways in which we can add and subtract round numbers.

MT

**1. The table below shows the number of spectators in the PNG Games in a day in 2017.**

The number of spectators in the PNG Games.

| | |
|---|---|
| Morning | 2784 |
| Afternoon | 3428 |

① About how many people attended the Games that day?
About 6 000 people.

Let's discuss and compare the 2 ideas.
Vavi's idea
Adds two numbers and then round the answer to the nearest thousands.
Kila's idea
Round the two numbers to the nearest thousands first and then add the numbers.

A number calculated by using round numbers is called **rough estimates.**

② 3 400 – 2 800 = 600 people

2.

Expenses

| Items | Amount (Kina) | |
|---|---|---|
| Transport | 2960 | ⇨ 3 000 |
| Accomodation | 2250 | ⇨ 3 000 |
| Meals | 3800 | ⇨ + 3 000 |
| | | 10 000 |

In this situation we have to round- up to thousands place to prepare enough money for the workshop.

3.

Shopping List

| Items | Amount (Kina) | |
|---|---|---|
| Sleeping bag | 128 | ⇨ 100 |
| Tent | 150 | ⇨ 100 |
| Small generator | 1320 | ⇨ +1 300 |
| | | 1 500 |

In this situation even we round down the numbers to hundreds place the total sum is more.

Can they receive a free mobile phone ? Yes, they can receive a mobile.

**Summary**
When we use rough estimate it helps us to see the round number clearly.

# Unit 10

# Unit: Round Numbers
## Sub-unit: 3. Rough Estimates
## Lesson 2 of 3 (Double Period)

Textbook Page : p.116~117
Actual Lesson 71

## Lesson Objectives

- To know how to estimate the product by rounding numbers.
- To know how to estimate the quotient and rounding numbers.

## Assessment

- Think about how to estimate product and quotient by rounding numbers. F
- Do the exercises correctly. S

## Prior Knowledge

- Rounding up and down
- Rough estimation (Previous lesson)

## Preparation

- Calculator

## • Teacher's Notes •

In this lesson the Idea on rough estimation is the same. However, when applying rough estimation it is really based on different situations that are presented.
In this case it will also affect the quotient of the situation.

**4** 315 women from Buka planned to go for a crusade in Rabaul.
Ship tickets cost 190 kina per person.
How much do they need for all the women in terms of ten thousands?
315×190

① In order to approximate the cost, how should we consider 190 kina in terms of hundreds? Around 200
How should we consider 315 women in terms of hundreds?
Around 300

② Let's estimate the cost by approximating numbers.
We will approximate the number to the hundreds place.
315×190 → 300×200 = 60000

③ Calculate 190×315 by using a calculator and compare your answer with the estimation.

3 1 5 × 1 9 0 = 59850

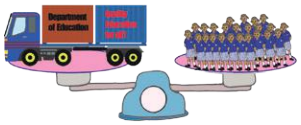
Almost the same

**Exercise**

Let's estimate the product to the highest place value.
① 498×706 350000
② 2130×587 1200000

**5** The weight of a semi-tralier is 6270 kg.
The weight of Ayaki is 38 kg.
By how many times is the weight of a semi-tralier to Ayaki's weight?
6270÷38

① Estimate the size of the quotient by rounding the dividend and divisor to their highest places.
6000 and 40 150
6000 ÷ 40
÷10 ÷10
600 ÷ 4



② Calculate 6270÷38 by calculator.
6270÷38 = 165 Almost same

**Exercise**

① How many times is the Statue of Liberty in New York City to the radio tower? 90÷30= 3
Ans: 3 times

② Let's estimate the quotient.
① 37960÷78 500
② 90135÷892 100

116 = □ − □

□ ÷ □ = 117

## Lesson Flow

### 1 4 Discuss if we can calculate it as it is or not.

T Introduce the main task.
T 1 Have students to discuss the total fare for women for the crusade trip.
S We don't have to calculate as it is because the number we need is around ten thousand.
S 2 We estimate 190 to 200 and 315 to 300.
S 3 Use the calculator and compare the difference of the answer.
S Notice the answer is almost the same as the exact amount.

### 2 Complete the Exercise.

TN Let students estimate numbers as follows.
① 500×700 ② 2000×600

### 3 5 Solve the task.

T 1 Let's think of rounding dividend and divisor before calculation.
S Round off dividend and divisor before finding the quotient.
6270÷38 → 6000÷40

### 4 2 Let's compare the answer of the calculation.

S 6270÷38=165, 6000÷40=150. They are almost same.

### 5 Complete the exercise.

TN Let students estimate numbers as follows.
Exercise 2: ① 40000÷80 ② 90000÷900

## Sample Blackboard Plan

**Date:** **Topic: Rough Estimates** **Lesson: 2 of 3**

MT

Let's think about ways in which we can multiply and divide round numbers.

**4** **315 Women from Buka planned to go for a crusade in Rabaul. Ship tickets cost 190 kina per person.**

**How much do they need for all the women to travel, in terms of ten thousands?**
190 x 315

1 How should we consider 190 kina in terms of hundreds and 315 in terms of hundreds.
190 ≈ 200
315 ≈ 300

2 Let's estimate cost by approximating numbers.
190 x 315 ⟶ 200 x 300 = 60 000

3 Calculate using the calculator.
190 x 315 = 59 850, Almost the same.

**5** **The weight of a semi- trailer is 6 270 kg. The weigh of Ayaki is 38 kg. By how many times is the weight of a semi- trailer to Ayaki's weight?**
**6 270 ÷ 38**

1 Estimate the dividend and divisor to their highest place.
6 270≈ 6 000
38≈ 40

6 000 ÷ 40
↓÷10 ↓÷10
600 ÷ 4 = 150
Answer: 150

2 Calculate using calculator.
6 270 ÷ 38 = 165, Almost the same.

**Exercise**
Complete exercises 1 and 2.

# Unit 10

# Unit: Round Numbers
## Sub-unit: 3. Rough Estimates
## Lesson 3 of 3 (Double Period)

Textbook Page : p.118
Actual Lesson 72

## Lesson Objectives

- To express rounded number in a line graph.

## Prior Knowledge

- How to draw line graph (Unit 8, G4)
- Rough estimation

## Preparation

- Graph paper, Ruler, table

## Assessment

- Round the numbers in the table and draw a graph by using rounded numbers. F
- Draw a graph correctly by using rounded numbers. F S

## • Teacher's Notes •

Refer to page 94 on the TM on steps of drawing a line graph.
This symbol (≈) on the graph means abbreviation. However, in this case of the line graph it means that it is not necessary to read the numbers below the symbol but to start reading above the symbol in the graph.

### Using Rounding Numbers

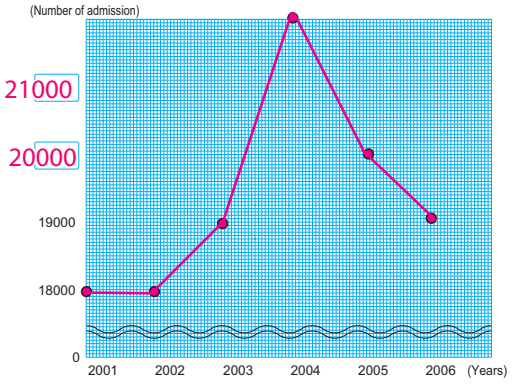
**6** Jane's class discussed about the Malaria cases in PNG. The table below shows the numbers of Malaria admissions for all ages in PNG.
Let's draw a line graph.

1. For drawing, let's round numbers to the nearest thousand on the table.
2. Let's identify the highest and lowest rounded number of cases.
3. Plot the rounded numbers and draw a line graph considering the scale.

**The Number of Malaria admissions (all ages)**

| Years | Number of admission | Rounded Numbers (cases) |
|---|---|---|
| 2001 | 18255 | 18000 |
| 2002 | 18398 | 18000 |
| 2003 | 18602 | 19000 |
| 2004 | 21701 | 22000 |
| 2005 | 19821 | 20000 |
| 2006 | 19030 | 19000 |

**The Number of Malaria admissions (all ages) in PNG**




118 = □ − □

## Lesson Flow

**1 Review the previous lesson.**

T Introduce the main task.

S Round the following numbers to the nearest thousand. a.) 8 972 b.) 4 359 c.) 956

**2 6 Write the number of cases of Malaria admissions in PNG.**

T Let students check the number of cases by looking at the table.

S Confirm that the cases are increasing from “18 255” up to “21 701” as years increased from 2001 to 2004, and decreasing from “21 701” down to “19 030” as years increased from 2004-2006,

S 1 Round the number of cases to the nearest thousand and fill in the table.

S 2 Identify the highest and lowest rounded number of cases.

S 3 Plot the rounded numbers and draw a line graph.

T Check the students work to confirm their answers.

## Sample Blackboard Plan

**Date:** **Topic: Rough Estimates** **Lesson: 3 of 3**

MT

Let’s round the numbers of cases in the table and plot them on the line graph.

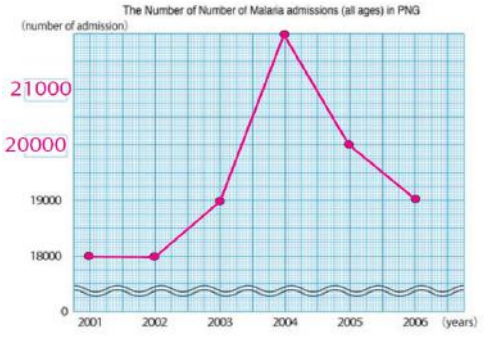
**Jane’s class discussed about Malaria cases in PNG. The table below shows number of Malaria admissions for all ages in PNG.**

**The Number of Malaria admissions (all ages) in PNG.**

1

| Years | Number of Students | Round Number (students) |
|---|---|---|
| 2001 | 18 255 | 18 000 |
| 2002 | 18 398 | 18 000 |
| 2003 | 18 602 | 19 000 |
| 2004 | 21 701 | 22 000 |
| 2005 | 19 821 | 20 000 |
| 2006 | 19 030 | 19 000 |

2 Identify the highest and the lowest rounded number of cases.
Highest = 22 000
Lowest = 18 000



# Unit 10

# Unit: Round Numbers
## Sub-unit: Exercise and Evaluation
## Lesson 1 of 1 (Double Periods)

Textbook Page : p.119~120
Actual Lesson 73

## Lesson Objectives

- To deepen the understanding on how to calculate rounding numbers.
- To understand the appropriate ways of using rounded numbers and express them in certain places.
- To confirm what was learned in this unit.
- To understand appropriate ways of using rounded numbers and express them in certain places.

## Prior Knowledge

- All the contents in this unit

## Preparation

- Prepare papers for students to write their answers in.

## Assessment

- Solve the problems confirming what they learned in the unit. F
- Think about the appropriate ways of using rounded numbers by solving daily situation problem. F
- Solve the exercises of round numbers correctely. S

### • Teacher's Notes •

Use 30 minutes for the exercise and give the evaluation test after that.

### Exercise

**1** Let's do the following rounding problems. Pages 109 ~ 112

① Round the following numbers to the nearest ten thousands.

Ⓐ 47560 Ⓑ 623845 Ⓒ 284999

50000 620000 280000

② Round the following numbers in the hundreds places to thousands.

Ⓐ 38500 Ⓑ 513291 Ⓒ 49781

39000 513000 50000

③ Round the following numbers to the second highest place.

Ⓐ 67325 Ⓑ 748500 Ⓒ 195000

67000 75000 20000

**2** Answer the following questions. Pages 110 ~ 113

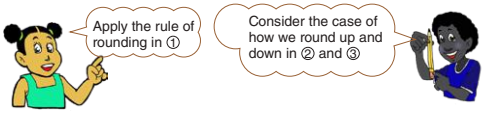
38478, 37400, 38573, 37501

38500, 37573, 38490, 37499

① Which numbers become 38000 when rounded to the nearest thousands? 38478 37573 37501 38490

② Which numbers become 37000 when rounded down to the nearest thousands? 37400 37573 37501 37499

③ Which numbers become 39000 when rounded up to the nearest thousands? 38478 38500 38573 38490




### Problems

**1** Are the following rounded numbers used correctly? Tick the correct sentence.

● Understanding the appropriate ways of using rounded numbers.

① ( x ) My math grade score was 68 points, so I can say it was about 100.

② ( ✓ ) The number of books in the school library is 8725, so we can say there are about 9000.

**2** Round the following numbers to the nearest thousands. And let's round them to the nearest ten thousands.

● Understanding how to express rounded numbers to a certain place.

① 36420 ② 43759 ③ 239500

36000 40000 44000 40000 24000 24000

**3** Round the following numbers to the first highest places. Then round them to the second highest places.

● Expressing round numbers based on given place value.

① 4586 ② 62175 ③ 832760

5000 4600 60000 62000 800000 830000

**4** There are 789 kina. How many bundles can we make if we group the notes in 10 kina? What is the sum of the groups in kina? 78

● Understanding when to use rounding down.

**5** When we rounded the number '85 □ 94' to the thousands, we got 85000.

● Finding the original numbers from a round number.

Which numbers 1 to 9 can we put in the □?

Let's find all possible numbers. 0, 1, 2, 3, 4

□ ÷ □ = 119 120 = □ − □

## Lesson Flow

### 1 ① Complete the exercise.

S Focus on one lower place value of mentioned place value to round the numbers.

### 2 ② Complete exercise.

T Let students to be aware of the difference of rounding, rounding-up and rounding-down.

### 3 ① Solve the problem.

TN Can be done for homework if there is not enough time.

T Have students to solve problem 1 in the first half of the lesson.

T Let students consider which place value should be focused on.

① If you round the number in tens place, it is going to be 100 when rounding up or going to be 0 so you have to focus on the ones place to round the number in Tens place.

### 4 ② Solve the problem.

T Let the students' confirm that they have to focus on a place value less than number they have to round.

### 5 ③ Solve the problem.

T Let the students confirm that they have to focus on the second highest place value when rounding numbers to the first highest place value.

### 6 ④ Solve the problem.

T Let students think about the case where rounding down is needed.

### 7 ⑤ Solve the problem.

T Which place value do we have to look at?

S Hundreds place.

T What number should we insert to be 850000 after rounding.

S 0, 1, 2, 3, 4

| Rounding Numbers | Name: | Score |
|---|---|---|
| | | |

(Each question is worth 10 points)

1. Round the following numbers to the nearest ten thousands.

① 47560 50000 ② 623898 620000

2. Round the following numbers in the hundreds places to thousands,

① 38500 39000 ② 49481 50000

3. Round the following numbers to the second highest place.

① 63325 63000 ② 1972312 200000

4. In a zoo, 2123 people visited in the morning and 1962 visited in the afternoon. About how many thousand people visited the zoo that day.

2123 +1962 = 4085

Answer About 4 thousand people.

5. Answer the following questions.

58428, 57400, 58623, 58502, 58600, 57623, 57477, 58388

① Which numbers become 58000 when rounded to the nearest thousands?

58428, 57623 and 58388

② Which numbers become 57000 when rounded down to the nearest thousands?

57400 and 57477

③ Which numbers become 59000 when rounded up to the nearest thousands?

58623, 58502, 58600 58388

**End of Chapter Test: Chapter 10** **Date:**

| Rounding Numbers | Name: | Score |
|---|---|---|
| | | |

(Each question is worth 10 points)

1. Round the following numbers to the nearest ten thousands.

① 47560 _____ ② 623898 _____

2. Round the following numbers in the hundreds places to thousands,

① 38500 _____ ② 49481 _____

3. Round the following numbers to the second highest place.

① 63325 _____ ② 1972312 _____

4. In a zoo, 2123 people visited in the morning and 1962 visited in the afternoon. About how many thousand people visited the zoo that day.

Answer _____

5. Answer the following questions.

58428, 57400, 58623, 58502, 58600, 57623, 57477, 58388

① Which numbers become 58000 when rounded to the nearest thousands?

_____

② Which numbers become 57000 when rounded down to the nearest thousands?

_____

③ Which numbers become 59000 when rounded up to the nearest thousands?

_____

# Chapter 11 Expressions and Calculations

## 1. Unit Objectives

- To master the skills of calculation and improve the ability of application. (4.1.5.d)
- To understand mathematical expression which shows mathematical relationship. (4.1.5.a,c and d)
- To calculate with 4 mixed operations and operations with parenthesis.(4.1.5.a)
- To deepen understanding of characteristics of 4 operations.(4.1.5.a and d)
- To understand commutative law, associative law and distributive law. (4.1.5.c)

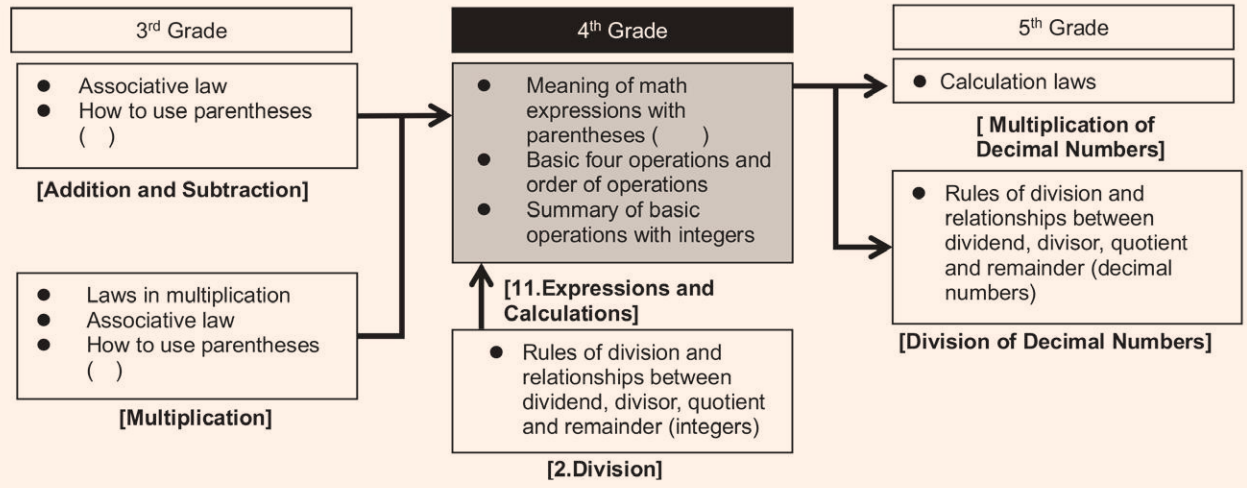
## 2. Teaching Overview

It is difficult for children to form a mathematical expression with combined operations. In this unit, students will be able to form complicated mathematical expressions by understanding orders of calculations. They gradually acquired some ideas about the order and properties/rules of calculations already.

**Representing Expressions:** Both teachers and students may sometimes tend to achieve the result of calculations quickly and forget the meaning of the original expressions. Students should develop the behavior of trying to understand the original meaning of the expressions. It will result in the better learning of functions. **Rules of Calculations:** Students already have learned commutative, associative and distributive laws without knowing the names. In this topic, students will learn the names and organise the known ideas for better utilisations.

**Calculation of Whole Numbers:** They expand the ideas of 2-digit × 2-digit to 3-digit × 3-digit by utilising the rules of calculations.

## 3. Related Learning Contents



# Unit 11

# Unit: Expressions and Calculations
## Sub-unit: 1. Represent the Expressions
## Lesson 1 of 3 (Double Period)

Textbook Page : p.121~p.122
Actual Lesson 74

## Sub-unit Objectives

- To express mathematical relationships in one mathematical sentence using parenthesis.
- To understand how to calculate operations with parenthesis.
- To understand the order of calculation of 4 mixed operations with parenthesis.

## Lesson Objectives

- To express mathematical relationships in one mathematical sentence using parenthesis.
- To understand how to calculate operations with parenthesis.

## Prior Knowledge

- Calculation skill of 4 operations
- Rules of calculation (G3 and 4)

## Preparation

- Pictures with price for making stories

## Assessment

- Think about how to express mathematical relationships in one operation using parenthesis. F
- Understand how to calculate operations with parenthesis. F
- Do the exercises correctly. S

## • Teacher's Notes •

3 Examples: 700 − (500 + 180)
There is a 700 cm long rope. 500 cm was cut out by Jaydan to tie his pig fence. The other 180 cm was used to tie his house step. How much rope in cm is left?
500 − (450 − 40)
Janice bought a 500 mL coke. Her smaller brother drank 450 mL. Her older brother felt sorry and added 40 mL from his drink. How much coke in mL does she have left for her to drink?

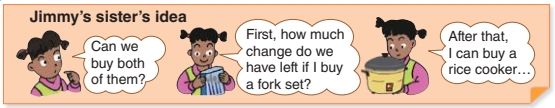
11 Expressions and Calculations

## 1 Represent the Expressions

**1** Jimmy's mother and sister went shopping with 500 kina. They bought a fork set for 120 kina and a rice cooker for 360 kina at a supermarket. How much change do they have left?

1

**Jimmy's sister's idea**




Let's write Jimmy's sister's idea as a mathematical sentence.

2 500 − 120 = 380 380 − 360 = 20

**Jimmy's mother's idea**

Let's write his mother's idea as a mathematical sentence.

120 + 360 = 480 500 − 480 = 20

Let's think about how to represent an expression and the order of calculations.

3 Let's write Jimmy's sister's idea as a mathematical sentence.

500 − 120 − 360 = 20

4 Let's write Jimmy's mother's idea as a mathematical sentence.

500 − ( 120 + 360 ) = 20
(The money that you have / Total cost / Change)

We use ( ) to show a section that is **calculated first**, like the total cost.

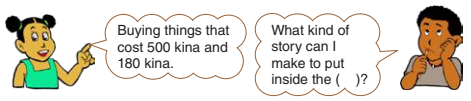
500 − (120 + 360) = 500 − 480
500 − (120 + 360) = 20 Answer: 20 kina

**2** Head sets that cost 35 kina are sold at a 3 kina discount. If uncle David pays 100 kina, how much change will he get? Let's find the answer by representing this question as a mathematical sentence.

100 − ( 35 − 3 ) = 68
(Amount paid / Cost of Head set / Change)

**3** Let's make a mathematical story for the following expressions.

1 700 − (500 + 180) 2 500 − (450 − 40 )




**Exercise**

Let's make mathematical stories for the following expressions.

① 400 − (50 + 300) 50 ② 600 − (150 − 110) 560

□ ÷ □ = 121 122 = □ × □

## Lesson Flow

### 1 ① ① Read the problem and make a mathematical sentence.

T Introduce the main task.

T How much did Jimmy's mother and sister have? What did Jimmy's sister buy first? Make a mathematical expression and calculate it.

S Answer: 500 − 120 = 380  380 kina

T What did she buy next and how much change was left?

S Make mathematical expression and solve.

S Answer: 380 − 360 = 20  20 kina

### 2 ② Think about Jimmy's mother's idea and make a mathematical sentence.

T Let's write Jimmy's mother's idea as a mathematical sentence.

S 120 + 360 = 480, 500 − 480 = 20

### 3 Express Jimmy's mother and sister's idea in one mathematical sentence.

T ③ How can we express Jimmy's sister's idea in a mathematical sentence?

S 500 − 120 − 360 = 20

S ④ Jimmy's mother's idea is shown like this: 500 − (120 + 360) = 20.
500 kina is the money that she had. '120 + 360' is the total cost. 20 kina is the change.

T We have to calculate the expression in parenthesis first (120 + 360) .

S Realise that the answer is same when calculating parenthesis first.

TN Summarise how to use parenthesis and how to calculate operations with parenthesis.

### 4 ② Solve the problem, ① and ②.

TN Teacher and students read and understand the given situation and make mathematical sentences using parenthesis.

S 100 − (35 − 3) = 68

T Confirm the amount paid, cost of head sets and change.

### 5 ③ Solve the problem.

TN Refer to the TN.

### 6 Do the exercise.

TN Give some time for students to work individually, after that students can share ideas with their friends and whole class.

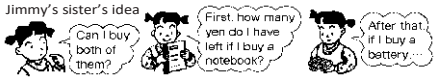
## Sample Blackboard Plan

**Date:** **Chapter:** 11 Expressions and Calculations **Topic:** Represent the Expressions **Lesson Nº:** 1/3

MT Let's think about how to represent an expression and the order of calculation

1 Jimmy's big sister went shopping with K500. She bought a fork set for 120 kina and a rice cooker for 360 kina at a supermarket. How much kina does Jimmy's sister have left?

Jimmy's sister's idea




1 Let's write Jimmy's sister's idea as a mathematical sentence.

500 − [120] = [380]  [380] − 360 = [20]

Jimmy's mother's idea

2 Let's write his mother's idea as a mathematical sentence.

120 + 360 = [480]  500 − [480] = [20]

3 Let's write Jimmy's sister as a mathematical sentence

500 − [120] − [360] = [20]

4 Let's write Jimmy's mother's idea a mathematical sentence.

500 − ( [120 + 360] ) = [20]

The money that you have / Total cost / Remainder

Important point

We use ( ) to show a section that is calculated first, like the total cost.

2 Head sets that cost 35 kina are sold at a 3 kina discount. If uncle David pays 100 kina, how much change does he get? Let's find the answer by representing this question as a mathematical sentence.

[100] − ( [35 − 3] ) = [68]

Amount paid / Head sets / Change

3 Let's make a mathematical story for the following expressions:

1 700 − (500 + 180)

2 500 − (450 − 40)

# Unit 11

# Unit: Expressions and Calculations
## Sub-unit: 1. Represent the Expressions
## Lesson 2 of 3 lessons (Double Period)

Textbook Page : p.123
Actual Lesson 75

## Lesson Objectives

- To understand that mathematical expression of multiplication and division represent one amount.
- To understand how to calculate four mixed operations.

## Prior Knowledge

- How to calculate operations with parenthesis (Previous lesson)

## Preparation

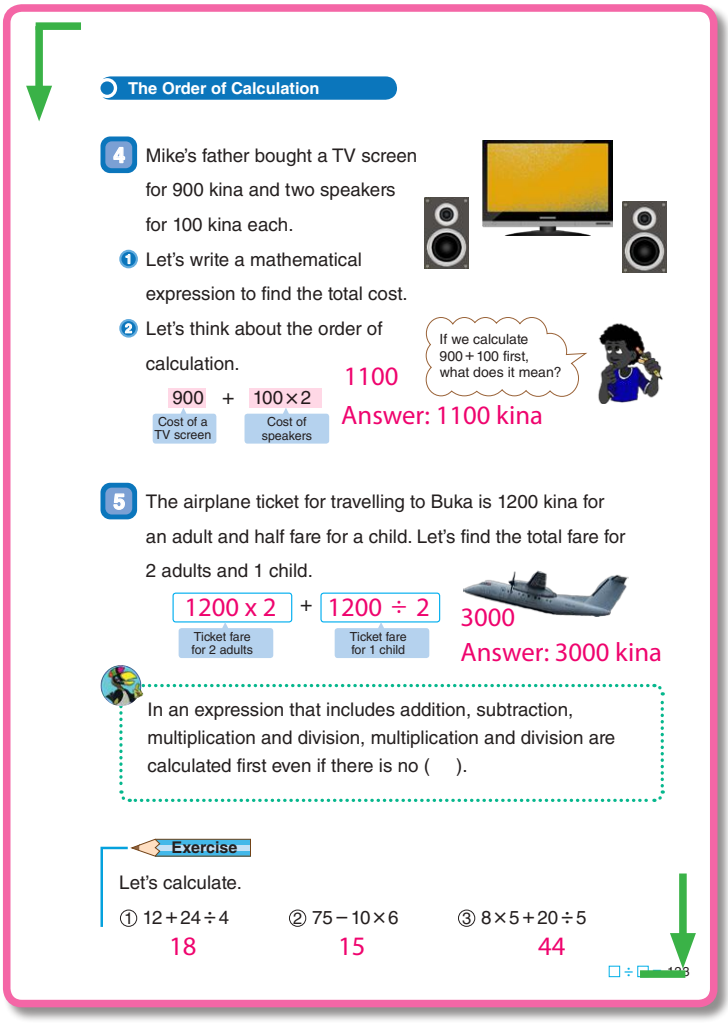
- Order of calculation chart

## Assessment

- Think about how to calculate four mixed operations. F
- Practice to master the skills of calculation of four mixed operations. F
- Do the exercise correctly. S

### • Teacher's Notes •

Be aware of the order of calculation before teaching the actual lesson.
You may want to use the idea of BODMAS to help students remember the order of calculation.



The Order of Calculation

4 Mike's father bought a TV screen for 900 kina and two speakers for 100 kina each.

1 Let's write a mathematical expression to find the total cost.

2 Let's think about the order of calculation.

900 + 100×2
Cost of a TV screen / Cost of speakers

1100

Answer: 1100 kina

If we calculate 900 + 100 first, what does it mean?

5 The airplane ticket for travelling to Buka is 1200 kina for an adult and half fare for a child. Let's find the total fare for 2 adults and 1 child.

1200 x 2 + 1200 ÷ 2
Ticket fare for 2 adults / Ticket fare for 1 child

3000

Answer: 3000 kina

In an expression that includes addition, subtraction, multiplication and division, multiplication and division are calculated first even if there is no ( ).

Exercise

Let's calculate.

① 12+24÷4 = 18
② 75−10×6 = 15
③ 8×5+20÷5 = 44

## Lesson Flow

### 1 (4) Read and understand the situation and make a mathematical expression.

T Introduce the main task.

S (1) Write a mathematical expression to find the total cost.

TN If you do not mention anything, students will write '900 + (100 × 2)', so inform them that multiplication is seen as one amount and calculated before addition so that we do not have to use parenthesis for multiplication.

T 900 + 100 × 2

### 2 (2) Think about the order of calculation and find the answer.

T Which one do we have to calculate first?

S Multiplication. '100 × 2'

T 900 + 100 × 2 = 900 + 200 = 1100 1100 kina.

### 3 (5) Think about calculation order of mixed operations with multiplication and division.

S Read and understand the problem and write a mathematical expression.

T Confirm each expression to find the total fee for adult and children, and put the two operations together.
1200 × 2 + 1200 ÷ 2

S Solve the mathematical expression.

T Confirm that the order of calculation. Multiplication and division must be calculated first.
1200 × 2 + 1200 ÷ 2 = 2400 + 600 = 3000

### 4 Summarise the important point in the box .....

### 5 Do the exercise to master the calculation of four mixed operations.

## Sample Blackboard Plan

**Date:** **Chapter:** 11 Expressions and Calculations **Topic:** Represent the Expressions **Lesson N°:** 2/3

MT Let's think about how to calculate mixed operation of addition, multiplication and division.

4 Mr. Mike bought a TV screen for 900 kina and two speakers for 100 kina each.

1 Let's write an expression to find the total cost.

900 + 100 × 2

Cost of a TV / Cost of speakers

2 Let's think about the order of calculation.
900 + 100 × 2 → Multiplication first
900 + 200 → Then addition
1100
Answer: 1 100 kina.

5 The air plane ticket for travelling to Buka is 1200 kina for an adult and half for a child. Let's make the total fee for two adults and a child.

1200 × 2 + 1200 ÷ 2

Ticket fee for 2 adults / Ticket fee for 1 child

2400 + 1200 ÷ 2 × first from left
2400 + 600 ÷ from left
3000 + from left
Answer: 3000 kina

Important point

In an expression that includes addition, subtraction, multiplication and division, multiplication and division are calculated first even if there is no ( ).

Exercise

Let's calculate.

① 12+24÷4 = 12 + 6 = 18

② 75−10×6 = 75 − 60 = 15

③ 8×5+20÷5 = 40 + 4 = 44

# Unit 11

# Unit: Expressions and Calculations
## Sub-unit: 1. Represent the Expressions
## Lesson 3 of 3 (Single Period)

Textbook Page : p.124
Actual Lesson 76

## Lesson Objectives

- To understand the calculation order of four mixed operations and operations with parenthesis.

## Prior Knowledge

- Order of calculation (Previous lesson)

## Preparation

- Order of calculation chart

## Assessment

- Think about how to calculate the 4 mixed operations with parenthesis. F
- Do the exercise correctly. F

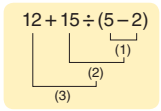
## • Teacher's Notes •

- Even though there may not be brackets or parenthesis in a mathematical expression, we still have to follow the order of calculation (BODMAS) from left to right.
  For example, in $1+4\times3$, calculate $4\times3$ first then add the answer to 1.
- Students are familiar with the term 'brackets' however, the term 'parenthesis' can be used as it's the synonym of brackets.
- Use (BODMAS) from left to right to confirm calculation in a mathematical expression.
  For example, in $15\div5+2\times3$, we look at $15\div5$ as one group and $2\times3$ as the second group to calculate. After calculation of the two groups, then we can add.

**6** Let's find the number, but we must be careful about the order of calculation.

$12+15\div(5-2)$

Let's calculate this expression in numerical order (1), (2) and (3).




$$12 + 15 \div \overset{(1)}{(5-2)} = 12 + \overset{(2)}{15 \div 3}$$
$$= \overset{(3)}{12+5}$$
$$= 17$$

If you write the expressions in order using an equal sign like the above, the calculations can be easier.

**The Order of Calculation**

① An expression is usually calculated in order from the left.
② If a ( ) is included, do the calculation inside the ( ) first.
③ If the +, −, × and ÷ are mixed, do multiplication and division first.

**Exercise**

Let's calculate.

① $12\div2+3$ 18
② $12\div(2+3)$ 2
③ $(5+4)\times(6-2)$ 36
④ $5+4\times(6-2)$ 21
⑤ $90-50\div(4+6)$ 85
⑥ $(90-50)\div4+6$ 16

$124 = \square\times\square$

## Lesson Flow

### 1 6 Think about how to calculate 12 + 15 ÷ (5 − 2).

T Introduce the main task.
S Read and understand the given situation and make a mathematical expression.
T Let's think about which operation should be calculated first.
S Parenthesis (Brackets) is first.
T 12 + 15 ÷ (5 − 2) = 12 + 15 ÷ 3, What is next, '12 + 15' or '15 ÷ 3' ?
S 15 ÷ 3 is next because it's division.
T 12 + 15 ÷ 3 = 12 + 5 = 17.

### 2 Summarise the order of calculation.

S Explain the correct order of calculation as practiced in the lesson.
T Emphasise the correct order of calculation.

### 3 Do the exercise.

## Sample Blackboard Plan

**Date:** **Chapter:** 11 Expressions and Calculations **Topic:** Represent the Expressions **Lesson N°:** 3/3

MT Let's calculate 12 + 15 ÷ (5 − 2) considering the order of calculation.

Let's find the number, but we must be careful about the order of calculations.
12 + 15 ÷ (5 − 2)

12 + 15 ÷ (5 − 2)
(1)
(2)
(3)

Let's calculate this expression in numerical order (1), (2) and (3).

$12+15\div\overset{(1)}{(5-2)}=12+\overset{(2)}{15\div 3}$

$=12+\overset{(3)}{5}$

$=17$

If you write the expression in order using an equal sign like above, the calculations can be easier.

**The Order of Calculation**

(1) An expression is usually calculated in order from the left.
(2) If a ( ) is included, do the section inside the ( ) first.
(3) If the +, −, ×, and ÷ are mixed, do multiplication and division first.

**Exercise**

Let's calculate.

① 12 ÷ 2 × 3
= 6 × 3
= 18

② 12 ÷ (2 × 3)
= 12 ÷ 6
= 2

③ (5 + 4) × (6 − 2)
= 9 × 4
= 36

④ 5 + 4 × (6 − 2)
= 9 × 4
= 5 + 16
= 21

⑤ 90 − 50 ÷ (4 + 6)
= 90 − 50 ÷ 10
= 90 − 5
= 85

⑥ (90 − 50) ÷ 4 + 6
= 40 ÷ 4 + 6
= 10 + 6
= 16

# Unit 11

# Unit: Expressions and Calculations
## Sub-unit: 2. Rules for Calculations
### Lesson 1 of 1 (Double Period)

Textbook Page : p.125 – p.126
Actual Lesson 77

## Sub-unit Objectives

- To understand the commutative law, associative law and distributive law.
- To use the commutative law, associative law and distributive law for calculation.

## Lesson Objectives

- To confirm rules of calculation for commutative law and associative law.
- To understand rule of calculation for distributive law using concrete examples.

## Prior Knowledge

- Calculation skill of four individual operations.
- Order of calculation of four mixed operation and calculation with parenthesis.

## Preparation

- Chart of rules for calculations
- Chart of task 2

## Assessment

- Think about why commutative law and associative law work in any operation. F
- Think about the meaning of distributive law. F
- Do the exercise correctly. S

## • Teacher's Notes •

Distributive Law is when we remove parenthesis. For example in $(2+1)\times 3$ we distribute as

$$(2+1)\times 3 = 2\times 3+1\times 3$$

($1\times 3$ and $2\times 3$)

## 2 Rules for Calculations

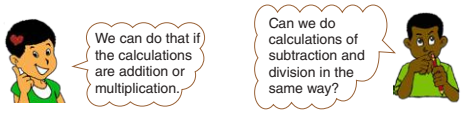
**1** Calculate the following expressions Ⓐ, Ⓑ, Ⓒ and Ⓓ in an easier way. Let's think about why we can calculate them as shown below.

Ⓐ $5+397 \rightarrow 397+5$ 402

Ⓑ $389+234+266 \rightarrow 389+(234+266)$ 889

Ⓒ $55\times 248 \rightarrow 248\times 55$ 13640

Ⓓ $18\times 25\times 4 \rightarrow 18\times(25\times 4)$ 1800




**Addition**

① When 2 numbers are added, the sum is the same even if the order of numbers is reversed.

$\square+\triangle=\triangle+\square$

② When 3 numbers are added, the sum is the same even if the order of addition is changed.

$(\square+\triangle)+\bigcirc=\square+(\triangle+\bigcirc)$

**Multiplication**

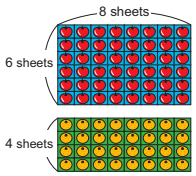
① When 2 numbers are multiplied, the product is the same even if the multiplicand and the multiplier are reversed.

$\square\times\triangle=\triangle\times\square$

② When 3 numbers are multiplied, the product is the same even if the order of multiplication is changed.

$(\square\times\triangle)\times\bigcirc=\square\times(\triangle\times\bigcirc)$

**2** There are 2 sheets of stickers shown on the right.
How many stickers are there altogether?




**Mero's idea**

$6\times$ 8 $+4\times$ 8 $=48+$ 32
$=$ 80

**Yamo's idea**

$(6+$ 4 $)\times 8=$ 10 $\times 8$
$=$ 80

**3** A store sold mattresses for 200 kina each and gives a 20 kina discount for each mattress, so I bought 6 mattresses.
How much is the total cost? Let's represent this as expressions using 2 methods.

Ⓐ (200 x 6) – (20 x 6) = 1080
(Original cost of 6 mattresses; Total discount for 6 mattresses)

Ⓑ (200 − 20) × 6 = 1080
(Discount cost for each mattress; Number of mattress)

Answer: 1080 kina

$(\square+\triangle)\times\bigcirc=\square\times\bigcirc+\triangle\times\bigcirc$
$(\square-\triangle)\times\bigcirc=\square\times\bigcirc-\triangle\times\bigcirc$

**Exercise**

Let's calculate.

① $(4+16)\times 3$ 60
② $5\times(14-9)$ 25
③ $25\times 4+15\times 4$ 160
④ $30\times 7-28\times 7$ 14

$\square\div\square=125$ $126=\square\times\square$

## Lesson Flow

### 1 ① Think about how operations A to D are calculated.

T Introduce the main task.
T Confirm how operations A to D are calculated.
TN A: Order of addition is changed.
B: Order of addition is changed by using parenthesis.
C: Multiplicand and multiplier are changed.
D: Order of multiplication is changed by using parenthesis.

### 2 Understand rules of addition and multiplication.

S Read and understand the important points in the box ( ).
T Which rule is applied to A, B, C and D?
S A is (1), B is (2), C is (3) and D is (4).

### 3 ① Think about the number of stickers in 2 ways.

S Think about the ideas of Mero and Yamo.
i. Mero calculates the number of stickers by sheets and adds the two numbers.
ii. Yamo adds the vertical number of 2 sheets and multiplies the horizontal number.
T What will be the answer? Are they the same or different?
S They are the same.
T Which is easier to calculate?
S Yamo's is easier because you multiply only once.

### 4 ③ Think about how to find the cost of 6 mattresses in 2 different ideas.

S Think about Mero and Yamo's ideas and use them.
TN A: Calculate the total cost of 6 mattress and total discount separately.
B: Calculate cost of a mattress after discount, and multiply the number of mattress.
T What will be the answer? Are they same or different?
S They are the same.
T Which is easier to calculate?
S B is easier because you multiply only once.
S Read the summary point ( ).

### 5 Do the exercise.

S Do the exercise confirming the rules of calculation.

## Sample Blackboard Plan

**Date:** **Chapter:** 11 Expressions and Calculations **Topic:** Rules for Calculation **Lesson N°:** 1/1

MT Let's identify and understand the rule for calculation an apply it.

**1** Why we can calculate A to D as shown on the right?

Ⓐ 5+397 ➡ 397+5
Ⓑ 389+234+266 ➡ 389+(234+266)
Ⓒ 55×248 ➡ 248×55
Ⓓ 18×25×4 ➡ 18×(25×4)

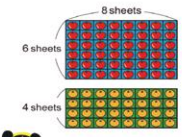
A. Order of addition is changed.
B. Order of addition is changed by using brackets.
C. Multiplicand and multiplier are changed
D. Order of Multiplication is changed by using brackets.

Important point

① When 2 numbers are added, the sum is the same even if the order of numbers is reversed.
■+▲=▲+■
② When 3 numbers are added, the sum is the same even if the order of addition is changed.
(■+▲)+●=■+(▲+●)

① When 2 numbers are multiplied, the product is the same even if the multiplicand and the multiplier are reversed.
■×▲=▲×■
② When 3 numbers are multiplied, the product is the same even if the order of multiplication is changed.
(■×▲)×●=■×(▲×●)

**2** There are 2 sheets of stickers shown on the right.
How many stickers are there altogether?




Mero's idea
6×8+4×8=48+32
=80

Yamo's idea
(6+4)×8=10×8
=80

**3** A store sold mattresses for 200 kina each and gives a discount for each mattress, so I bought 6 mattresses. How much is the total cost?

Ⓐ 200×6 − 20×6 = 1080
(Original cost of 6 fish / Total discount for 6 fish)
Ⓑ (200 − 20) × 6 = 1080
(Discount cost for each fish: mattresses / Number of fish: mattresses)

Important point
(■+▲)×●=■×●+▲×●
(■−▲)×●=■×●−▲×●

Exercise
Let's calculate.
① (4+16)×3 ② 5×(14−9)
③ 25×4+15×4 ④ 30×7−28×7

# Unit 11

# Unit: Expressions and Calculations
## Sub-unit: 3. Calculation of Whole Numbers
## Lesson 1 of 2 (Double Period)

Textbook Page : p.127~p.128
Actual Lesson 78

## Sub-unit Objectives

- To deepen the understanding on the calculation of the four operations of whole numbers.
- To calculate large numbers using the four operations.

## Lesson Objectives

- To deepen the understanding on the calculation of the four operations for whole numbers.
- To think about how to calculate large numbers using the four operations.

## Prior Knowledge

- Calculation skills of four operations and the order of operations.

## Preparation

- Chart for multiplicaiton

## Assessment

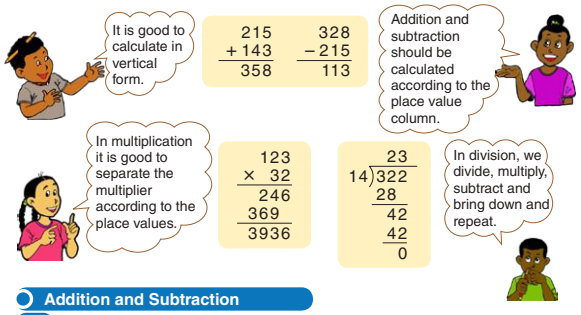
- Remember and summarise how to calculate whole numbers using the four operations. F
- Think about how to calculate large numbers using four operations. F
- Understand how to calculate large numbers using the four operations. S

## • Teacher's Notes •

Even if a whole number is a large number, the method of calculation is the same.
For example, if adding or subtracting larger whole numbers, align the digits in their place value or in division we still apply the method,
Divide → Multiply → Subtract → Bring down

### 3 Calculation of Whole Numbers

Let's summarise how to do calculations of whole numbers.




#### Addition and Subtraction

**1** There are 613681 boys and 586534 girls in grade 4.

How many ten thousand students are there approximately?

(1) What is the total number of children in the fourth grade?

Expression : 613681 − 586534

| | 6 | 1 | 3 | 6 | 8 | 1 |
|---|---|---|---|---|---|---|
| + | 5 | 8 | 6 | 5 | 3 | 4 |
| 1 | 2 | 0 | 0 | 2 | 1 | 5 |

There are many place values. So you should calculate by order according to their place values.

(2) Which is the largest number, boys or girls? What is the difference? Answer: Boys number is larger

Expression : 613681 − 586534 = 27147(Difference)

#### Multipication and Division

**2** Boat fares were given to all 315 children during the school excursion. One return boat fare costs 436 kina for each member.

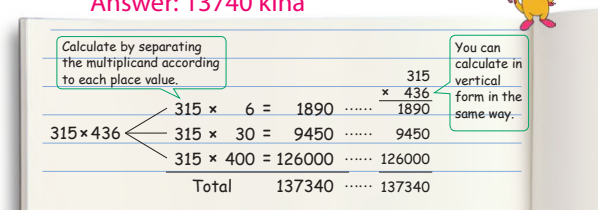
(1) How much is the total cost?

Expression 1 : 513 x 436

Expression 2 : 436 x 513

Answer: 13740 kina

Calculate by separating the multiplicand according to each place value in the same way as multiplying 2-digit numbers.




(2) Let's find the product for 436×315.

**3** A principal wants to buy as many library books as possible with 5000 kina. One science book is sold at 68 kina at a discount store. How many science books can the principal buy? Expression : 5000 ÷ 68

| | | | | 7 | 3 |
|---|---|---|---|---|---|
| 6 | 8 | 5 | 0 | 0 | 0 |
| | | 4 | 7 | 6 | |
| | | | 2 | 4 | 0 |
| | | | 2 | 0 | 6 |
| | | | | 3 | 4 |

How many science books can he buy?

For the quotient which place value should I begin?

I should calculate in the same way as before.

Answer: 73 books

□ ÷ □ = 127  128 = □ × □

## Lesson Flow

### 1 Summarise how to do calculation of whole numbers.

S Summarise how to calculate using the four operations.
T Introduce the main task.

### 2 ① ① Read the problem, make mathematical expressions and calculate in vertical form.

T What is the mathematical expression?
S 613681 + 586534
T How can we calculate?
S We can calculate in vertical form.
TN The method of calculation is the same even if it is a large number. Let the students write the numbers according to the place values.
S Being aware of 'carrying over' when calculating.

### 3 ① ② Understand the problem, make mathematical expressions and calculate in vertical form.

S Being aware of 'borrowing' when calculating.

### 4 ② Read the problem, make mathematical expressions and calculate in vertical form.

T ① What is the mathematical expression?
S 315 × 436
T ② Let's think about how to calculate 315 × 436.
S Separate 436 by each digit and relate each calculation to multiplication in vertical form.
S Notice that (3-digit) × (3-digit) can be calculated by applying the same method of (3-digit) × (2-digit).

### 5 ③ Read the problem, make mathematical expression and calculate in vertical form.

T What is the mathematical expression?
S 5000 ÷ 68
TN It looks difficult because the number is large, but let the students notice that the same method can be applied even when the number of digit increased.
TN Let the students remember how to calculate division in vertical form.
Divide → Multiply → Subtract → Bringing down.

## Sample Blackboard Plan

**Date:** **Chapter:** 11 Expressions and Calculations **Topic:** Rules for Calculation **Lesson N°:** 1/2

Let's calculate whole numbers using the rule for calculation and apply it.

▶▶ Let's summarize how to do calculations of whole numbers.

1. 215 + 143 = 358 ; 328 − 215 = 113

- It is good to calculate in vertical form.
- Addition and subtraction should be calculated according to the place column.

2. 123 × 32 = 246, 369, 3936 ; 322 ÷ 14 = 23 remainder 0 (28, 42, 42, 0)

- In multiplication it is good to separate the multiplier according to the place values
- In division, we divide, multiply, subtract, bring down and repeat.

MT **Addition and Subtraction**

1 There are 613 681 boys and 586 534 girls in grade 4.

① What is the total number of children in the fourth grade?
Expression: 613 681 + 586 534

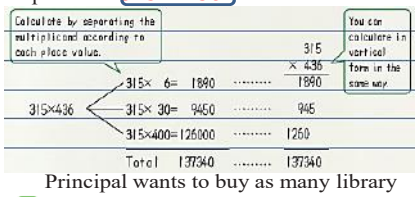
| | 6 | 1 | 3 | 6 | 8 | 1 |
|---|---|---|---|---|---|---|
| + | 5 | 8 | 6 | 5 | 3 | 4 |
| 1 | 2 | 0 | 0 | 2 | 1 | 5 |

② Which is the largest number, boys or girls? And what is the difference?
Answer: Boys number is larger
Expression: 613 681 − 586 534
= 27 147 (Difference)

2 **Multiplication and Division**

Boat fares were given to all 436 children during the school excursion. On return boat fares cost 315 kina from their member. How much is the total cost?

Expression: 315 × 436




3 Principal wants to buy as many library books as possible with 500 kina. One science book sold at 68 kina at a discount store. How many science books can principal buy?
Expression: 500 ÷ 68

| | | | | 7 | 3 |
|---|---|---|---|---|---|
| 6 | 8 | 5 | 0 | 0 | 0 |
| | − | 4 | 7 | 6 | |
| | | | 2 | 4 | 0 |
| | | − | 2 | 0 | 4 |
| | | | | 3 | 6 |

**Answer: 73 books**

# Unit 11

# Unit: Expressions and Calculations
## Sub-unit: 3. Calculation of Whole Numbers
## Lesson 2 of 2 (Double Period)

Textbook Page : p.129
Actual Lesson 79

## Lesson Objectives

- To make various problems(questions) from the story.
- To enjoy exchanging stories among friends and solve them.

## Prior Knowledge

- Calculation of large numbers using the four operations

## Preparation

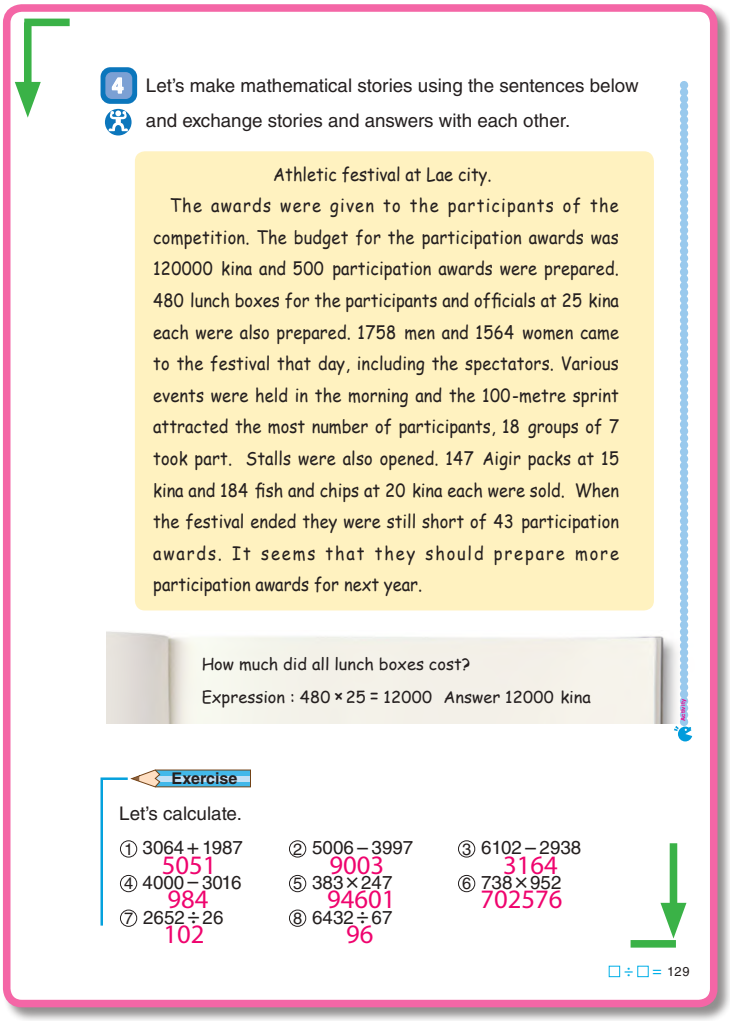
- The story for task 1

## Assessment

- Make various problems(questions) from the story. F
- Enjoy exchanging stories among friends and solving them. F
- Do the exercise correctly. S

## • Teacher's Notes •

- The skills applied in daily life situations.
- Students can recall back to previous lessons for making various situation problems.



4 Let's make mathematical stories using the sentences below and exchange stories and answers with each other.

Athletic festival at Lae city.

The awards were given to the participants of the competition. The budget for the participation awards was 120000 kina and 500 participation awards were prepared. 480 lunch boxes for the participants and officials at 25 kina each were also prepared. 1758 men and 1564 women came to the festival that day, including the spectators. Various events were held in the morning and the 100-metre sprint attracted the most number of participants, 18 groups of 7 took part. Stalls were also opened. 147 Aigir packs at 15 kina and 184 fish and chips at 20 kina each were sold. When the festival ended they were still short of 43 participation awards. It seems that they should prepare more participation awards for next year.

How much did all lunch boxes cost?

Expression : 480 × 25 = 12000 Answer 12000 kina

Exercise

Let's calculate.

① 3064 + 1987 = 5051
② 5006 − 3997 = 9003
③ 6102 − 2938 = 3164
④ 4000 − 3016 = 984
⑤ 383 × 247 = 94601
⑥ 738 × 952 = 702576
⑦ 2652 ÷ 26 = 102
⑧ 6432 ÷ 67 = 96

□ ÷ □ = 129

## Lesson Flow

### 1 4 Read the story and think about what kind of problem we can make.

T Introduce the main task.

T/S Read and understand the story.

S Focus on the numbers and how the numbers are related to the situation.

TN Let students who have difficulty of understanding the story separate the story into paragraphs and focus on one topic such as the number of lunch boxes, the price of the lunch boxes or the numbers of participant etc.

TN Examples

- How much is the total cost of all lunch boxes?
  480×25=1200 1200 kina
- How many people came to the festival in total?
  1758+1564=3322 3322 people
- If all the Aigir packs are sold, how much will be the amount of sales?
  147×15=2205 2205 kina
- What is the difference in men and women participants?
  1758−1564=194 194 participants
- How much will each participant receive from total budget?
  120000÷500=240 240 kina

T Ask students to share the problems among friends and solve.

S Exchange the problems with friends and solve each others problems.

### 2 Do the exercise.

S Solve each operation confirming the steps.

## Sample Blackboard Plan

**Date:** **Chapter:** 11 Expressions and Calculations **Topic:** Rules for Calculation **Lesson N°:** 2/2

MT Let's make various problems from the story using four operations.

4 Let's make math stories using the sentences below, and exchange stories and answer each other.

An athletic festival was held at Lae city. Participation awards were given to the participants of the competition. The budget for the participation awards was 120000 kina and 500 participation awards were prepared. And 480 lunch boxes for the participants and officials at 25 kina each were also prepared. 1758 men and 1564 women came to the festival that day, including the spectators. Various events were held in the morning and the 100-meter sprint attracted the most number of participants, 18 groups of 7 took part. Stalls were also opened. 147 Aigir packs at 15 kina and 184 fish and ships at 20 kina were sold. When the festival ended they were still short of 43 participation awards. It seems that they should prepare more participation awards for next year.

Example:
How much did all lunch boxes cost?
Expression: 480 × 25
480 × 25 = 12 000 Answer: K12 000.

Let few students to share their math stories with the class and teacher write them on the board.

Exercise

Let's calculate.

① 3064+1987 ② 5006+3997 ③ 6102−2938
④ 4000−3016 ⑤ 383×247 ⑥ 738×952
⑦ 2652÷26 ⑧ 6432÷67

# Unit 11

# Unit: Expressions and Calculations
## Sub-unit: Exercise and Evaluation
## Lesson 1 of 1 (Double Period)

Textbook Page : p.130~p.131
Actual Lesson 80

## Lesson Objectives

- To deepen the understanding of what you learned in this unit.

## Prior Knowledge

- All the contents in this unit.

## Preparation

- Evaluation sheets for the students.

## Assessment

- Solve the exercise correctly. F S

## • Teacher's Notes •

Use 30 minutes for the exercise and give the evaluation test after that.

### Exercise

**1** Let's calculate. Pages 121 ~ 129

① 500 − (80 + 250) = 170
② 650 − (430 − 60) = 280
③ (40 + 50) × 7 = 630
④ 6 × (18 − 3) = 90
⑤ 120 ÷ (12 − 4) = 15
⑥ (37 + 18) ÷ 5 = 11
⑦ (11 − 4) × (8 + 7) = 105
⑧ (14 + 22) ÷ (9 − 5) = 9
⑨ 18 × 8 ÷ 4 = 36
⑩ 18 × (8 ÷ 4) = 36
⑪ 28 − 3 × (13 − 8) = 13
⑫ (32 − 18) + 4 × 5 = 34
⑬ 1549 + 79328 = 80877
⑭ 45625 − 3088 = 42537
⑮ 351 × 205 = 71955
⑯ 9792 ÷ 34 = 288

**2** Let's express the following questions as one expression and find the answers. Pages 121 ~ 129

① There were 60 sheets of paper. I used 15 sheets of paper yesterday and 20 sheets of paper today. How many sheets of paper are left?
60 − ( 15 + 20 ) 25 sheets

② There were 5 dozens of pencils. The children used 40 pencils. How many pencils were left?
12 × 5 − 40 20 pencils

③ There are 100 sheets of coloured papers. 18 students received 4 sheets of papers each. How many sheets of papers are left?
100 − 4 × 18 28 sheets

④ Father paid 500 kina for 150 soft drinks that costed 3 kina each. How much is the change in kina?
500 − 150 × 3 50 kina

⑤ Pain killer medicine that costs 20 kina each and a cough medicine that costs 50 kina each make one set. There are 15 sets. How much is the total cost?
( 20 + 50 ) × 15 1050 kina

130 = □ × □

### Problems

**1** Let's find the answers by expressing these problems as one expression.
● Representing a sentence as an expression.

① There were 1000 sheets of paper. Phyl used 250 sheets of paper yesterday and 320 sheets of paper today. How many sheets of paper are left?
1000 − (250 + 370) = 430
Answer: 430 sheets

② Mother is going to buy 150 orange juice that cost 2 kina each and 120 boxes of cookies that cost 2 kina each. If she pays with 600 kina, how much is the change?
1000 − (120 + 150) = 190
Answer: 190 kina

**2** Let's calculate.
● Considering the order of calculations

① 8 + 12 × 3 = 44
② 40 − 12 ÷ (6 ÷ 2) = 36
③ 40 × 8 − 5 × 24 = 200
④ 36 + 6 × 8 ÷ 12 = 40

**3** Fill in the □ with a number.
● Considering how to simplify calculations.

① 25 × 98 = 25 × ( 100 − 2 )
= 25 × 100 − 25 × 2
= 2450

② 25 × 24 = 25 × 4 × 6
= 100 × 6
= 600

③ 105 × 6 = ( 100 + 5 ) × 6
= 100 × 6 + 5 × 6
= 630

④ 99 × 9 = 100 − 1 × 9
= 100 × 9 − 1 × 9
= 891

**4** Make mathematical stories for the following expressions.
● Making a mathematical story for an expression.

① (1000 + 2000) × 4
② (3500 − 350) ÷ 3

□ ÷ □

## Lesson Flow

### 1 ① Complete the Exercise.

T Let the students analyse the questions carefully from ① to ⑯ and calculate using the correct order of operation.

S Calculate applying the correct order of operation.

### 2 ②Complete the Exercise.

S Express questions ① to ⑤ then calculate to find the answer.

### 3 ①Solve the problems.

S Solve problems ① and ② by expression them as one.

### 4 ②Solve the problems.

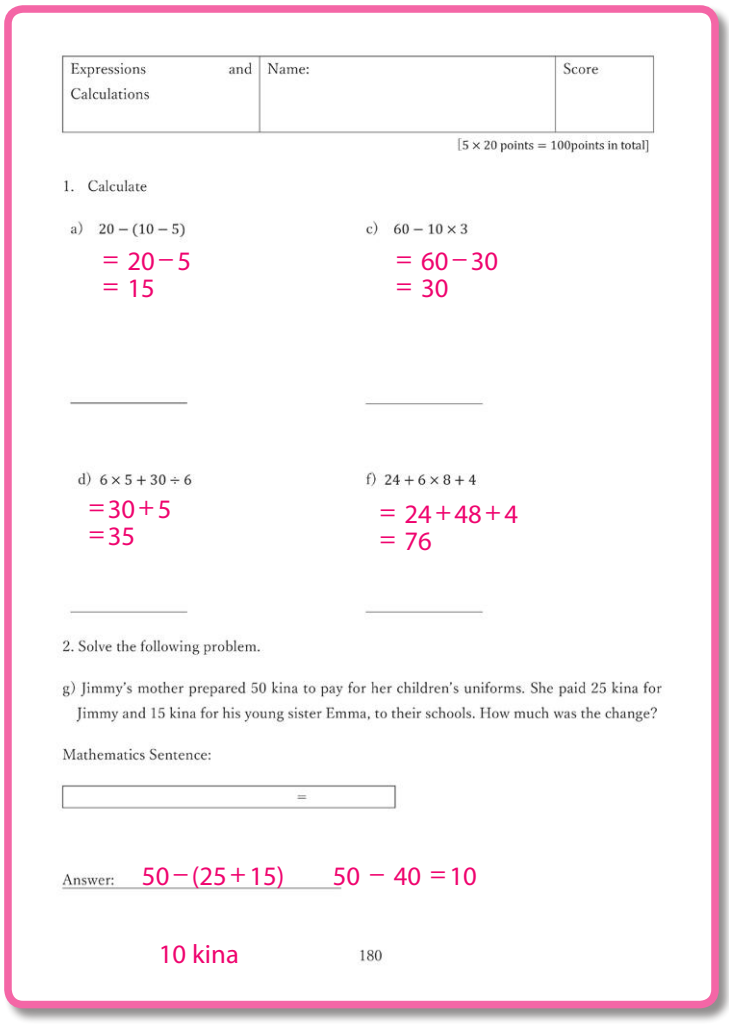
S Solve by calculating ① to ④.

### 5 ③Solve the problems.

S Solve the problems by filling in the ☐ with a number.

### 6 ④Solve the problems.

S Make math stories from the given expressions in ① and ②.



| Expressions and Calculations | Name: | Score |
|---|---|---|
| | | |

[5 × 20 points = 100points in total]

1. Calculate

a) $20-(10-5)$

$= 20-5$
$= 15$

c) $60-10\times3$

$= 60-30$
$= 30$

d) $6\times5+30\div6$

$=30+5$
$=35$

f) $24+6\times8+4$

$= 24+48+4$
$= 76$

2. Solve the following problem.

g) Jimmy's mother prepared 50 kina to pay for her children's uniforms. She paid 25 kina for Jimmy and 15 kina for his young sister Emma, to their schools. How much was the change?

Mathematics Sentence:

=

Answer: $50-(25+15)$ $50-40=10$

10 kina

180

**End of Chapter Test: Chapter 11** **Date:**

| Expressions and Calculations | Name: | Score |
|---|---|---|
| | | |

[5 × 20 points = 100points in total]

1. Calculate

a) $20 - (10 - 5)$

c) $60 - 10 \times 3$

d) $6 \times 5 + 30 \div 6$

f) $24 + 6 \times 8 + 4$

2. Solve the following problem.

g) Jimmy's mother prepared 50 kina to pay for her children's uniforms. She paid 25 kina for Jimmy and 15 kina for his young sister Emma, to their schools. How much was the change?

Mathematics Sentence:

| | = |
|---|---|

Answer: _____

# Chapter 12 Area

## 1. Unit Objectives

- To understand the meaning of unit and measurement of area and how to calculate. (4.2.1 a)
- To understand $cm^2$, $m^2$ and $km^2$
- To think about how to calculate square and rectangle. (4.2.1 a)
- To understand and apply the formula of area for finding the area. (4.1.2 b)
- To understand unit of a and ha. (4.1.2 c)

## 2. Teaching Overview

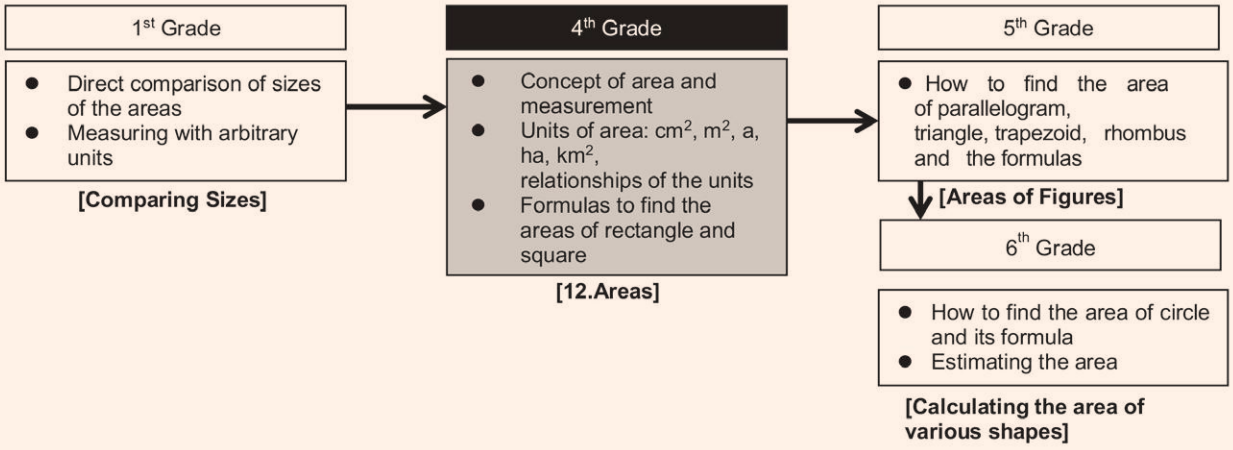
Students have the fundamental ideas of area by direct comparison of papers or paving the same tiles/papers in Grade 1 and 2. In this unit, students are to be introduced universal units to capture areas to compare indirectly.

**Area :** They study the meaning of area and measuring area. Firstly they quantify areas using the same tiles. Then they quantify the area using tiles of 1 cm squares. They also learn that areas are not changed even though the shape get cut off and put on other part (Conservation of Area).

**Area of Rectangles and Squares :** The formulae should be found and understood through enough experimental experiences such that they struggle to find out the number of 1 cm squares without dropping or skipping. Teachers should not just give the formulae. If they learn any formulae without knowing the reasons, they cannot easily recall them.

**Unit for Large Area :** They learn $m^2$, $km^2$, a and ha and their relationships. Since it is difficult for us to remember how to convert areas to another unit. Therefore, visualisation of conversion will be so effective for students to remember and recall it. They also should know what units are used for e.q. field, park, garden, classroom, province, etc.

## 3. Related Learning Contents



# Unit 12

# Unit: Area
## Sub-unit: 1. Area
## Lesson 1 of 2 (Double Period)

Textbook Page : p.132~p.134
Actual Lesson 81

## Sub-unit Objectives

- To understand how to compare area using arbitrary units.

## Lesson Objectives

- To think about how to compare area and to express the area using arbitrary units.

## Prior Knowledge

- Study of area in Grade 1
- Direct comparison of quantities
- Comparing quantities using arbitrary units.

## Preparation

- Square (5 cm×5 cm) and rectangle (6 cm×4 cm) paper for all students.

## Assessment

- Think about how to compare the size of shapes. F
- Understand the meaning of area. S

## • Teacher's Notes •

Direct comparison

When comparing the size of objects, sometimes one can move objects. As for comparing area, when you can overlay one object to another, if one object is completely covered by the other, you can see which is larger.

When comparing the size of objects, sometimes it is difficult to move objects in order to compare them directly. In this case, you can compare the size by using another object as a reference.

Indirect comparison

When you cannot overlay one object to another, you can still compare area by covering the objects with colour tiles and counting the number of the tiles. It is important to make students aware of the meaning of area through such activities as covering with colour tiles or shading individual squares on grid paper.

In this way, we can quantify the attribute of objects using everyday items as units and represent clearly the difference in sizes.

12 Area

Direct comparison

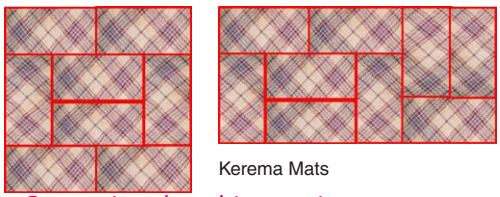
Which one is larger?

1

Scarfs

Comparison by arbitray unit.

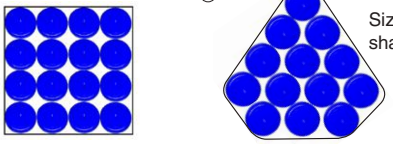
2 Ⓐ Ⓑ



Kerema Mats

Comparison by arbitray unit.

3 Ⓐ Ⓑ



Sizes of two shapes

132 = □ ÷ □

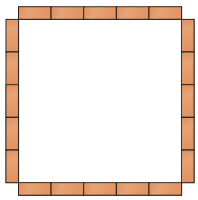
Comparing the area which have the same perimeter.

## 1 Area

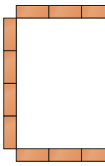
1 We are going to make rectangular and square flower beds with 20 blocks around the edges.

Are the areas same or different?

(a)



(b)



(a) and (b) have 20 blocks around the edges, but are they the same size?

How can we compare the sizes of the rectangles?

Lengh of (a) is longer than the length of (b), but the width of (b) is longer than that of (a).

Let's think about how to compare the areas of rectangles and squares and how to represent the areas with numbers.

□ + □ = 133

## Lesson Flow

### 1 ▶▶ Comparing objects

T Ask students to compare the pictures ①, ② and ③ and make comparison of which is larger.

S Discuss and share ideas.

### 2 Report and Confirm of ①, ② and ③.

S ① B is bigger than A because B covers more space.

T/S A is bigger because B is smaller than A in size.

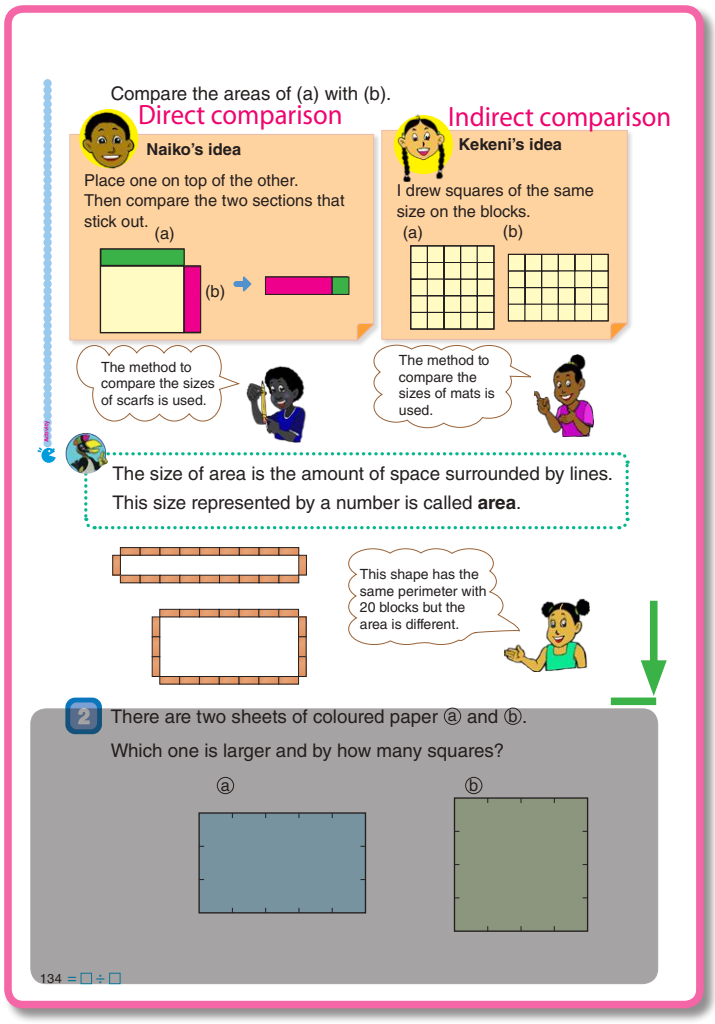
TN Remind students that this is an example of direct comparison based on observation.

T Demonstrate direct comparison using different size of paper.

S ② B is bigger becase the number of rectangles is more than A.

TN Remind students that the comparisons can be done based on the number of units, for example; ② number of rectangles and ③ number of bottle tops as arbitrary units.

T Show other examples of indirect comparison.




### 3 ① Think about and understand the situation of the problem.

T Introduce the main task.

T What do you notice about the flowerbeds?

S Both flowerbeds have 20 blocks.

T Are they the same size?

S Discuss with friends.

### 4 Think about how to compare (a) and (b).

T How can we compare to find which is bigger?

T Distribute square(a) and rectangle(b) papers to all students.

S Think individualy about how to compare the size of area by using prior knowledge.

S Share the ideas with their friends.

### 5 Compare the 2 ideas of Naiko and Kekeni.

S Explain how Naiko compared (a) and (b).

T Based on her explanation, tell the students that Naiko has done direct comparison by superimposing(comparing the 2 parts sticking out).

S Explain how Kekeni compared (a) and (b)?

T Based on their explanation, emphasise that Kekeni did her comparison using arbitrary units by drawing squares of the same size.

TN Students also notice that even the perimeter is the same, the area is different.
(Refer to Teacher's Note)

### 6 Summarise by defining Area as shown in the textbook .

## Sample Blackboard Plan

Sample blackboard plan refer to page 187.

# Unit 12

# Unit: Area
## Sub-unit: 1. Area
## Lesson 2 of 2 (Double Period)

Textbook Page : p.134~p.136
Actual Lesson 82

## Lesson Objectives

- To understand the unit cm² and find the area using the unit.
- To understand that shape changes but area does not.
- To draw various shapes with same area.

## Prior Knowledge

- Comparing area using arbitrary units. (Previous lesson)

## Preparation

- 1 cm² squares, 1 cm² square grid paper

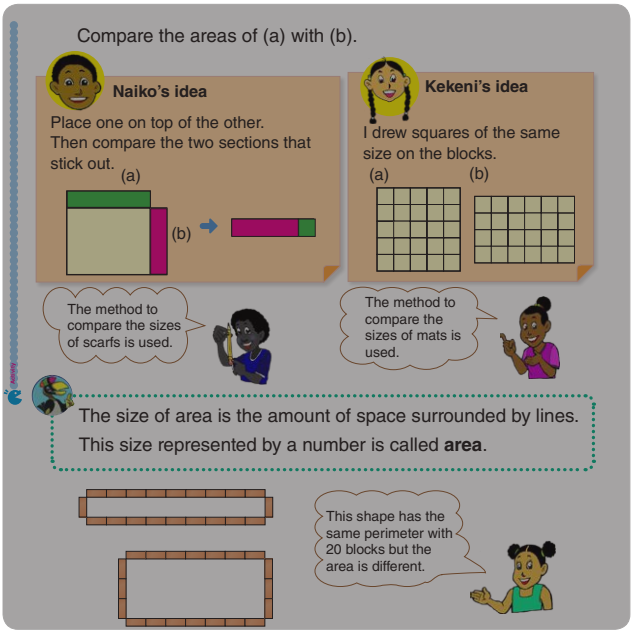
## Assessment

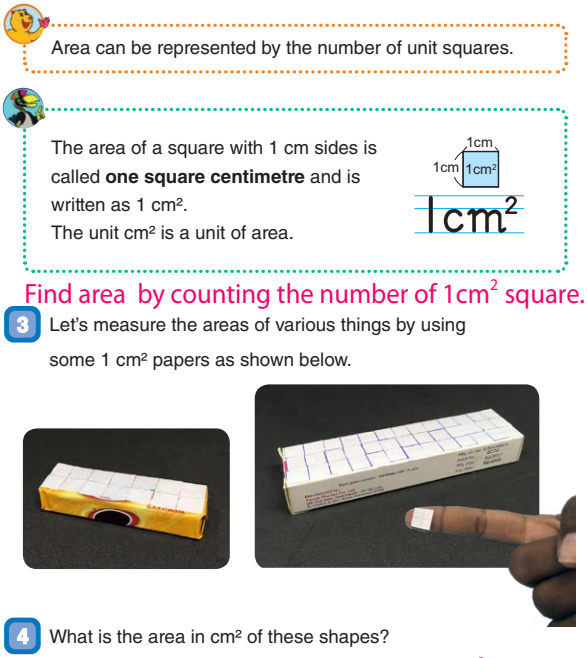
- Understand the unit cm² and find the area using the unit. F
- Draw different shapes with same area in cm² S

## • Teacher's Notes •

Teach students to quantify the size of an area by deciding on a basic unit and counting how many units are there. For example, when measuring area, it is convenient to use a square whose side is 1 centimetre as a unit.

Arbitrary units are samples of things around the environment that can be used to get measurements of certain objects.




2 There are two sheets of coloured paper ⓐ and ⓑ.
Which one is larger and by how many squares?

Comparison by the number of 1cm² square.

ⓐ

15 squares

ⓑ

16 squares

134 = □ ÷ □

4 What is the area in cm² of these shapes?

Find area by counting the number of 1cm² square.

1 1cm 1cm

18 cm²

2 1cm 1cm

15 cm²

□ + □ = 135

## Lesson Flow

**1 Review previous lesson.**

**2 (2) Compare the 2 figures.**

T Introduce the main task.

T Let students draw squares and count the squares.

S Draw squares and count the squares.

T Which one is bigger and by how many squares?

S Explain that (b) is bigger than (a) because (b) has more squares compared to (a) by 1 square.

**3 Understand how to express area by defining it.**

T Explain important point in the boxes ☐ and ☐.

**4 (3) Measure areas by placing 1cm² squares to find area.**

T Get students to measure the area of different items using 1 cm².

S Measure using 1 cm² squares and give their answers in cm² based on the total number of cm² squares.

TN Use different items inside the classroom.

**5 (4) Complete activity by finding the area of the given shapes in cm².**

T Ask students to count the number of squares and write the total in cm² .

S Find the areas of (1) as 18 cm² and (2) as 15 cm²

**6 (5) Complete activity by thinking about the area of figures a,b,c and d.**

S Determine the area of the figures by looking at the 1 cm² squares.

S Figure b,c and d can make 1 cm² when combined to fill a 1 cm² square.

TN All shapes are 1 cm².

**7 (6) Find the areas of (1), (2) and (3) in cm².**

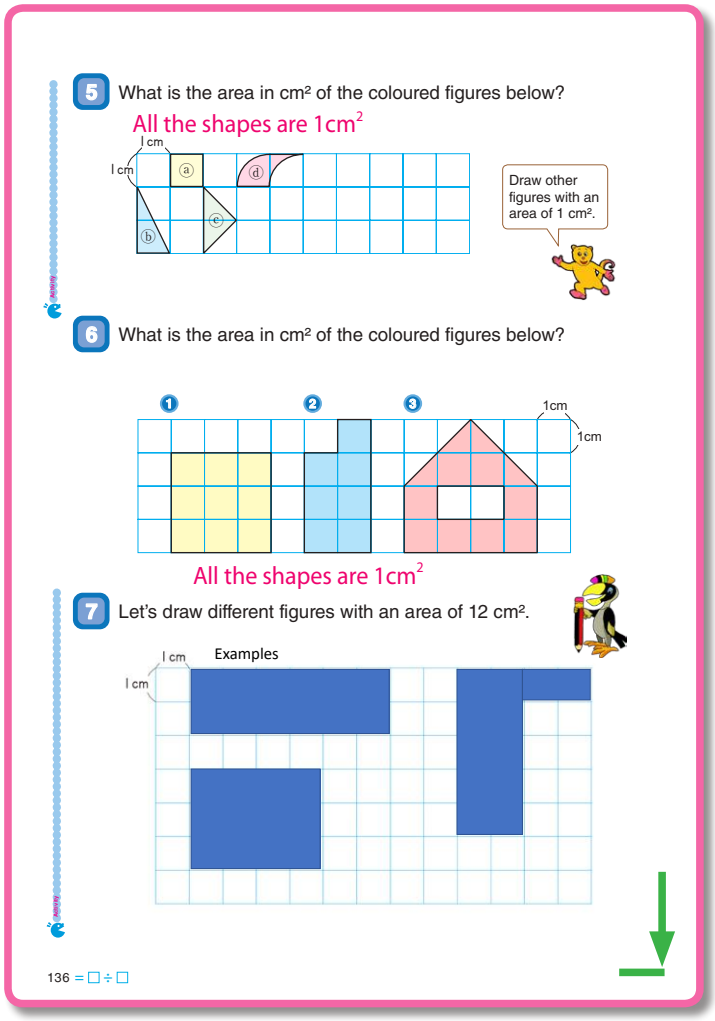
S Use learnt ideas to find the area and share ideas of how to find the area.

**8 (7) Draw different figures with an area of 12 cm².**

S Draw any figures that have an area of 12 cm² on the grid paper.

T Allow students to explore other shapes apart from squares and rectangles as well.

S Share their drawings with others.




### Sample Blackboard Plan

Sample blackboard plan refer to page 187.

# Unit 12

# Unit: Area
## Sub-unit: 2. Area of Rectangles and Squares
### Lesson 1 of 3 (Double Period)

Textbook Page : p.137~p.138
Actual Lesson 83

## Sub-unit Objectives

- To understand how to find the area of rectangle & square and its formula.
- To measure the necessary sides of rectangles and squares and calculate the area.
- To find a side of a rectangle when the area and one side is known.
- To find the area of combined shapes.

## Lesson Objectives

- To think about how to find the area of a rectangle and square.
- To understand the meaning of the formula for the area of rectangles and squares.

## Prior Knowledge

- Direct comparison of quantities
- Comparing quantities using arbitrary units
- Unit squares (1cm²) as arbitrary units to compare

## Preparation

- Images for blackboard display.

## Assessment

- Think about how to find the area of rectangles and squares using multiplication. F
- Understand the formula for the area of rectangle and square. S

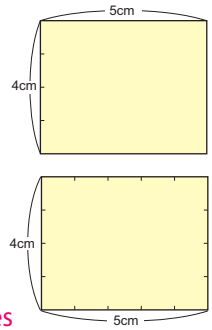
## • Teacher's Notes •

Help the students to understand that the area of the rectangle and square can be calculated if the lengths of its sides are known. To know the area of a rectangle and square, think about the meaning of area and count the number of unit squares(1cm²).
When the length and width of a rectangle or square are measured using 1 centimetre as a unit, the area is represented by **(width)×(length)** or **(length)×(width)** with the unit cm².
This is how we get the formula,
**Area of rectangle = length × width (or width × length)**

**Area of square = 1 side (length) × 1 side (width).**

## 2 Area of Rectangles and Squares

**1** What is the area in cm² of the rectangles on the right?




① The length is 4 cm.
How many 1 cm² are lined up vertically? 4 squares

② The width is 5 cm.
How many 1 cm² are lined up horizontally? 5 squares

③ How many 1 cm² are there in this rectangle? 20 squares
What is the area in cm² of the rectangle?

④ Find the area of the rectangle using multiplication. 20 cm²

In the mathematical sentence on the right, 4 represents the width and 5 represents the length.

Number of 1 cm² squares... 5 × 4 = 20
(Number of length, Number of width, Total number)

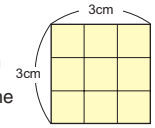
5 × 4 = 20
(Length (cm), Width (cm), Area (cm²))

The area of a rectangle is found using length and width.

**Area of a rectangle = length × width**

The area of any rectangle is expressed as **"Area of a rectangle = length × width"**.
A mathematical sentence like this is called a **formula**.
The area of a rectangle is also expressed as **"width × length"**.

**2** How many square centimetres are there in the area of a square with 3 cm sides? Let's think about this in the same way as with a rectangle.

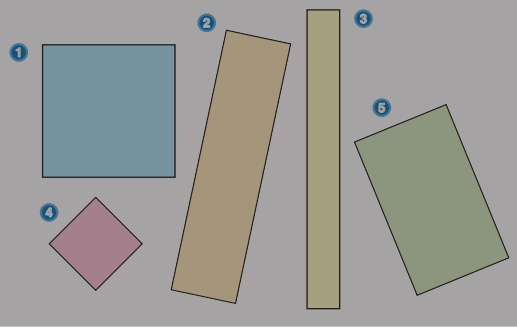



3×3=9 Answer: 9 cm²

The area of a square is expressed in the following formula.

**Area of a square = Side × Side**

**3** Let's find the area of the following squares and rectangles by measuring the lengths of their sides.




□+□=137 138=□÷□

## Lesson Flow

**1** **Review previous lesson.**

**2** **① Think about how to find the area of the rectangle in cm².**

T Based on the previous lesson, ask students how they can find the area of the rectangle.
S "Divide the rectangle into 1 cm² squares"

**3** **① Find the number of 1 cm² squares drawn vertically.**

T "How many 1 cm² squares are drawn vertically?"
S Four(4) 1 cm squares

**4** **② Find the number of 1 cm² squares drawn horizontally.**

T "How many 1 cm² are drawn horizontally?"
S Five(5) 1 cm squares

**5** **③ Find the area using the total number of 1 cm² squares.**

T "How many 1 cm² are there in the rectangle? What is the area in cm²?
S 20 squares so the area is 20 cm²

**6** **④ Find the area of the rectangle by multiplying length × width.**

T Think about finding the area of the rectangle.
S Realise that by multiplying the sides **4 × 5** they get the area **20 cm²**.
T Explain the important point in the 2 boxes ☐ and ☐.

**7** **② Calculate the area of the square.**

T Ask the students to calculate the area of the square using the same principal as that of rectangles.
S Calculate the area of the square by multiplying similar to the rectangle.
T Explain the important point ☐.

**8** **Summary**

T Confirm the formula for calculating rectangles and squares.
S Understand and remember the formula for rectangles and squares as;
Area of rectangle = length × width and Area of square = side × side

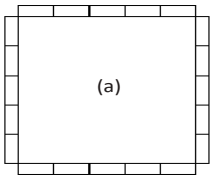
## Sample Blackboard Plan (Lesson 82)

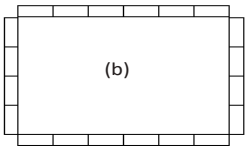
**Date:** **Chapter:** 12 Area **Topic:** Area **Lesson N°:** 1/2

MT Let's think about how to compare the areas of the rectangle and square and how to represent them with same numbers.

Which one is larger?
1 (A) or (B) ? (B) > (A) (Direct comparison)
2 (A) or (B) ? (B) > (A) (Comparing by arbitrary units)
3 (A) or (B) ? (A) > (B) (Comparing by arbitrary units)

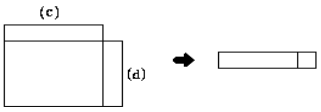
1 We are going to make rectangular and square flower beds with 20 blocks around the edges. Which is larger, (a) or (b)?



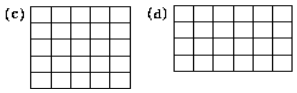

Naiko's idea

Place one on top of the other and then compare the two sections that stick out.




Kekeni's idea

I drew squares of the same size on the blocks.




**Summary**

Important point

The size of area is the amount of space surrounded by lines. The size represented by the number is called **area**.

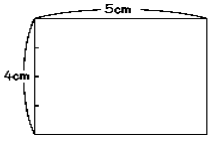
## Sample Blackboard Plan (Lesson 83)

**Date:** **Chapter:** 12 Area **Topic:** Area of Rectangles and Squares **Lesson N°:** 1/3

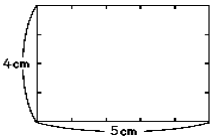
MT Let's think about how to calculate the area of rectangle and squares using **one square centimeter**.

1 What is the area in $cm^2$ of the rectangle on the right?

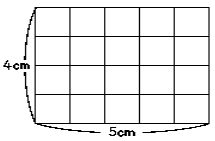
1 How many 1 $cm^2$ are lined up vertically?
4 1 $cm^2$ squares.




2 How many 1 $cm^2$ are lined up horizontally?
5 1 $cm^2$ squares.




3 How many 1 $cm^2$ are there in this rectangle?
20 1 $cm^2$ squares



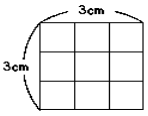

4 Find the area of the rectangle using multiplication.

| | | | | | |
|---|---|---|---|---|---|
| ··· | 4 | × | 5 | = | 20 |
| | Number of length | | Number of width | | Total number |
| | 4 | × | 5 | = | 20 |
| | Length (cm) | | Width (cm) | | Area ($cm^2$) |

Important point

The area of any rectangle is expressed as **"area of a rectangle = length × width".**
The mathematical sentence like this is called a **formula.**
The area of a rectangle is also expressed as **"length × width.**

2 How many $cm^2$ are there in the area of a square with 3 $cm$ sides?
3 × 3 = 9
Answer: 9 $cm^2$




Important point

The area of a square is expressed in the following formula:
**area of a square = one side × one side**

# Unit 12

# Unit: Area
## Sub-unit: 2. Area of Rectangles and Squares
### Lesson 2 of 3 (Single Period)

Textbook Page : p.138~p.139
Actual Lesson 84

## Lesson Objectives

- To measure the sides of shapes and calculate the area.
- To find the length of a side when the area and 1 side is known.

## Prior Knowledge

- Unit squares (1cm²) as arbitrary units to compare
- Formula for calculating area **(A = length × width)**
- Relationship of Multiplication and Division.

## Preparation

- Rulers

## Assessment

- Calculate area using formula (Area = length × width) or (Area = 1 side × 1 side). F
- Find an unknown side using 1 given side and the area by dividing. F
- Do the exercise correctly. S

## • Teacher's Notes •

Help the students to understand that the unknown side of a rectangle can be calculated by doing the inverse of multiplication which is, dividing the area (product) by the known side (multiplicand/multiplier).

For example; Area of rectangle=length × width (or width × length)

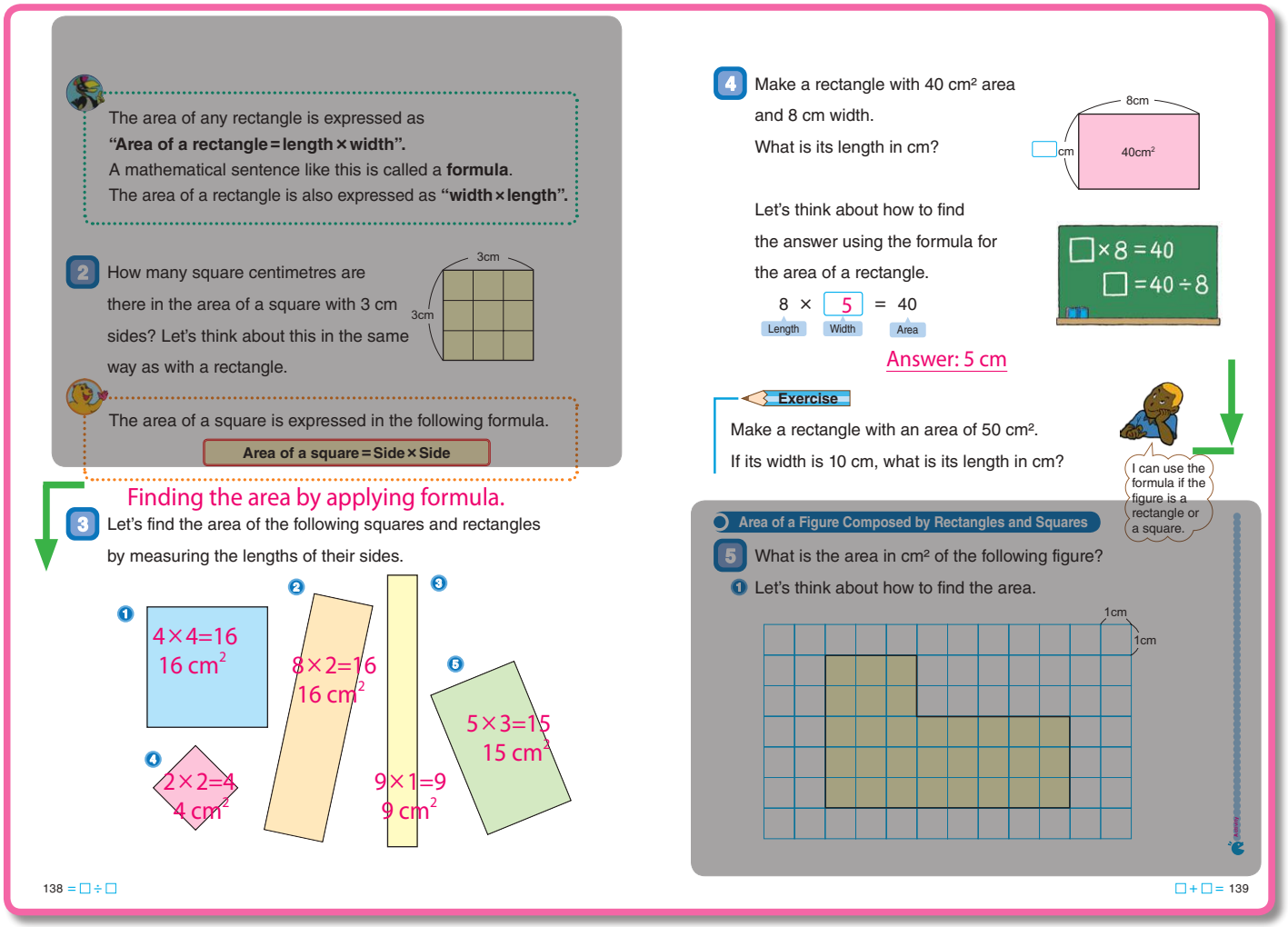
4 × ? = 20

? = 20 ÷ 4

? = 5

5 (Lenght of unknown side)

*The 2 sides (multiplier or multiplicand) are also the factors of the area (product).



# Lesson Flow

**1 Review previous lesson.**

**2 3 Measure the side lengths of the rectangles and squares 1 - 5.**

T Introduce the main task.
T Ask the sutdents to measure the length and calculate the area.
S Measure 2 sides only to represent the lengths and width using a ruler.
S "Find the area of the shapes using the formula for calculating area of a rectangle and square."
TN Remind the students that their answers should be given in cm² when calculating area.
S Calculate answers by multiplying length × width or 1 side × 1 side to get the answers;

1 4×4=16 Area: 16 cm²
2 8×2=16 Area: 16 cm²
3 9×1=9 Area: 9 cm²
4 2×2=4 Area: 4 cm²
5 5×3=15 Area: 15 cm²

T Get the students to present their work on the board and correct the answers.

**3 4 Complete the activity to find the length of the unknown side.**

S Read the problem.
T Emphasise the word problem with the diagram presentation.
T "How can we find the unknown length □ cm? "
S Think about and find □ using the formula for the area, □(length) × 8(width) = 40(area).
S Discuss and find □ by dividing to find the answer

□ = 40 ÷ 8
□ 5

T Emphasise that division as the inverse of multiplication can be used to find the factors (multiplicand × multiplier) of a product, so we divide the product 40 by the factor (multiplier) 8 to find the unknown factor (multiplicand) 5, 8 and 5 are factors (multiplicand or multiplier) of the product 40.

**4 Do the exercise.**

## Sample Blackboard Plan (Lesson 83)

**Date:** **Chapter:** 12 Area **Topic:** Area **Lesson N°:** 1/2

MT Let's represent area using 1 $cm^2$.

2 There are two sheets of coloured paper (a) and (b). Which one is larger and by how many squares?

(a) 15 squares (b) 16 squares

Answer: (b) is larger by 1 square.

Important point
Area can be represented by the number of unit squares.

Important point
The area of a square with 1 cm side is called **one square centimeter** and is written as 1 $cm^2$. $cm^2$ is a unit of area.

3 Let's measure the areas of various things by using some 1$cm^2$.

4 What is the area in $cm^2$ of theses shapes?

❶ 18 $cm^2$ ❷ 15 $cm^2$

5 What is the area in $cm^2$ of the coloured figure below?

Al the shapes are 1 $cm^2$

6 What is the area in $cm^2$ of the coloured figure below?

6 $cm^2$ 7 $cm^2$ 10 $cm^2$

7 Let's draw different figures, each with an area of 12$cm^2$.

## Sample Blackboard Plan (Lesson 84)

**Date:** **Chapter:** 12 Area **Topic:** Area of Rectangles and Squares **Lesson N°:** 2/3

MT Let's find the area and side lengths by applying the formulae for rectangles and squares

3 Let's find the area of the following squares and rectangles by measuring the lengths of their sides.

❶ ❷ ❸ ❹ ❺

1
2
3
4
5

Make a rectangle with 40 $cm^2$ and 8 cm width. What is the length in cm?

8cm, □cm, 40cm²

Using the formula for the area of a rectangle:

□ × 8 = 40
Length Width Area

□ × 8 = 40
□ = 40 ÷ 8
= 5

Answer: Length is 5 cm.

Exercise
Make a rectangle with an area of 50cm².
If its width is 10cm, what is its length in cm?

10 cm, □cm, 50cm²

□ × 10 = 50
□ = 50 ÷ 10
□ = 5

Answer: Length is 5 cm.

# Unit 12

# Unit: Area
## Sub-unit: 2. Area of Rectangles and Squares
### Lesson 3 of 3 (Double Period)

Textbook Page : p.139~140
Actual Lesson 85

## Lesson Objectives

- To find the area of combined shapes composed of rectangles and squares.

## Prior Knowledge

- Formula for calculating area (**A = length × width**)

## Preparation

- Grid paper, rulers

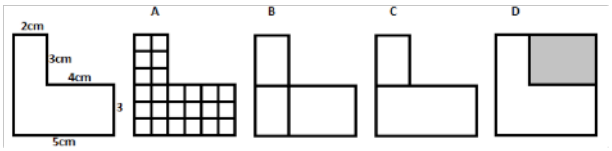
## Assessment

- Think about how to calculate the area of combined shapes using area formula. F
- Find the area of combined shapes accurately. S

## • Teacher's Notes •

Students should be able to use prior knowledge and the formula for the area of rectangles and squares to find the area of figures composed of rectangles and squares, and explain using words, numbers or diagrams.

**Examples of how to find the area of figures composed of rectangles and squares;**

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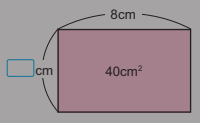
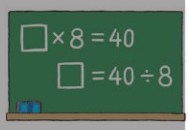
**4** Make a rectangle with 40 cm² area and 8 cm width.
What is its length in cm?




Let's think about how to find the answer using the formula for the area of a rectangle.

8 × □ = 40
Length Width Area




**Exercise**

Make a rectangle with an area of 50 cm².
If its width is 10 cm, what is its length in cm?

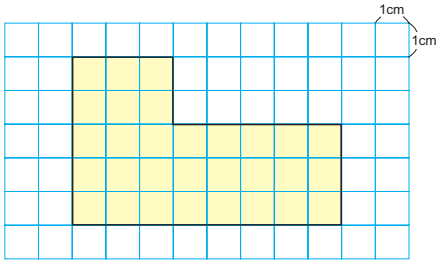
I can use the formula if the figure is a rectangle or a square.

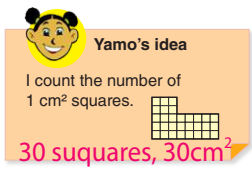
**Area of a Figure Composed by Rectangles and Squares**

How to find the area of composite shape.

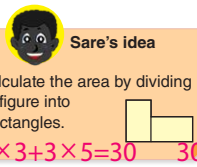
**5** What is the area in cm² of the following figure?

❶ Let's think about how to find the area.

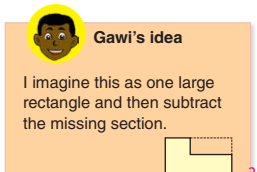


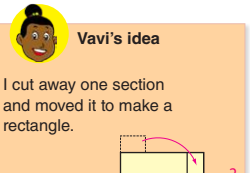
**Yamo's idea**
I count the number of 1 cm² squares.
30 suquares, 30cm²



**Sare's idea**
I calculate the area by dividing the figure into 2 rectangles.
5×3+3×5=30 30cm²



**Gawi's idea**
I imagine this as one large rectangle and then subtract the missing section.
5×8-2×5=30, 30cm²



**Vavi's idea**
I cut away one section and moved it to make a rectangle.
3×10=30, 30cm²

❷ Let's talk about which of the ideas in ❶ can be used for a shape like this.

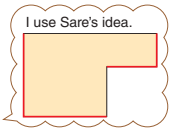
**6** Let's trace the sides of the figure on the right with any colour pencil that is needed to find its area.
Then find the area.

- 5×5+2×3=31
- 2×8+3×5=31
- 5×8-3×3=31

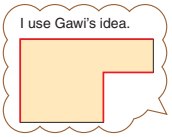
Answer : 31cm²

Which sides are needed?

I use Sare's idea.



I use Gawi's idea.



□+□=139 140=□÷□

## Lesson Flow

### 1 Review previous lesson.

### 2 5 1 Think about finding the area of the shape using various strategies while thinking of the characteristics of the shape.

T Introduce the main task.
T "What is this shape?"
S Realise that it is a composition of 2 shapes.
T Instruct the students to think about and discuss their own ways to find the area of the shape.
S Think of the characteristics of the shapes and find its area.

### 3 Present ideas of how to find the area of this shape on the blackboard.

T Get the students to realise that the shape consists of squares and rectangles and that the formulae (**Area = length × width**) can be used to calculate the area.
S Think about 2 or 3 different ways and explain how to find the area.

### 4 Compare the 4 ideas and discuss how each of them is used.

T Display each idea and ask the students to discuss and explain.
- Yamo's idea: Counting the number of 1 cm² squares (30 cm²)
- Sare's idea: Calculate the area by dividing the figure into 2 rectangles. (5×3)+(3×5)=30 (30 cm²)
- Gawi's idea- Imagine and calculate it as one large rectangle and subtract the missing part. (5×8)−(2×5)=30 (30 cm²)
- Vavi's idea- Cut away one section and move it to make a rectangle and calculate the area. 3×10=30 (30 cm²)

### 5 2 Think about and identify the ideas that can be used to find the area of similar shapes.

T "Who has the same idea/s as the 4 discussed?"
S Understand that there are many ways to find area based on their knowledge and what they have learnt.

### 6 6 Complete the activity by identifying the necessary sides and find the area.

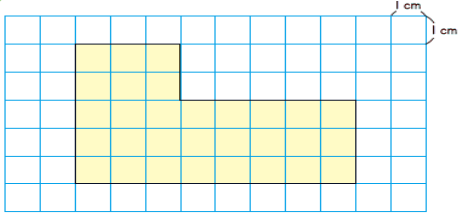
T Get the students to trace the figure indicating the area needed and calculate the area using the ideas discussed.
S Think about which sides to use.
S Divide the figure into a square and rectangle and calculate the area. (5×5)+(2×3)=31 (31 cm²)
S Divide the figure into 2 rectangles and calculate the area. (2×8)+(3×5)=31 (31 cm²)
S Imagine and calculate it as one large rectangle and subtract the missing part. (5×8)−(3×3)=31 (31 cm²)

## Sample Blackboard Plan

**Date:** **Chapter:** 12 Area **Topic:** Area of Rectangles and Squares **Lesson N°:** 3/3

MT Let's think about how to find the area of combined shapes of rectangles and squares.

5 What is the area in cm of the following figure?




Yamo's idea

I count the number of 1 cm² squares.

30 1 cm squares so, 30

Sare's idea

I calculate the area by dividing the figure into 2 rectangles.

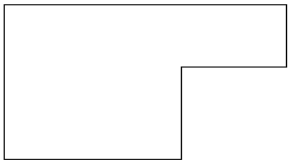
Gawi's idea

I imagine this as one large rectangle and then subtract the missing section.

Vavi's idea

I cut away one section and moved it to make a rectangle.

6 Let's trace the sides of the figure on the right with any coloured pencil to find its area. Then find the area.



# Unit 12

# Unit: Area
## Sub-unit: 3. Units for Large Areas
## Lesson 1 of 3 (Double Period)

Textbook Page : p.141~p.142
Actual Lesson 86

## Sub-unit Objectives

- To know unit of $m^2$, a, ha, $km^2$ and use these units to find area.
- To choose appropriate unit depending on the area.
- To understand the relationship between $m^2$, a, ha, $km^2$.

## Lesson Objectives

- To know the unit of $m^2$.
- To find the area using unit of $m^2$.
- To understand the relationship between $m^2$ and $cm^2$.

## Prior Knowledge

- How to find the area using unit of $cm^2$.

## Preparation

- Area of 1 $m^2$

## Assessment

- Find the area using unit of $m^2$. F
- Think about the relationship between $m^2$ and $cm^2$. F
- Find the areas using various units. S

## • Teacher's Notes •

- Have students to understand and compare the realistic size of 1 $m^2$ with 1 $cm^2$.
- Visualise the comparison of $cm^2$ to $m^2$ by looking at the example.
- Students should have a sense of 1 $m^2$ so teacher must prepare 1 $m^2$ using newspaper or drawing on floor.

Unit of $m^2$

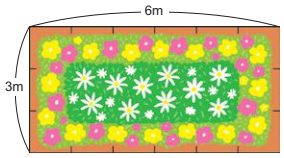
### 3 Units for Large Areas

**1** Let's make a square with 1 m sides.
Let's see how many children can stand on this square.

The area of a square with a side of 1 m is called **one square metre** and is written as **1 m²**.
The unit m² is also a unit of area just like cm².

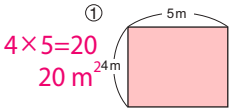
**2**

① What is the area in $m^2$ of a flower garden with a length of 3 m and a width of 6 m?

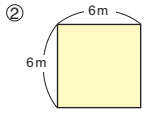



3×6=18, 18 $m^2$

② Let's find the area of the figures below.




4×5=20
20 $m^2$



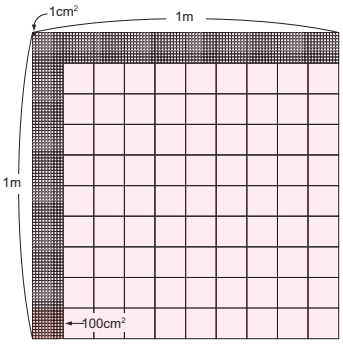

6×6=36
36 $m^2$

Relationship between 1 $m^2$ and 1 $cm^2$

**3** Let's see how many $cm^2$ are there in 1 $m^2$.

① How many 1 $cm^2$ can be lined up vertically?
How about along the width? Length 100, Width 100

② What is 1 $cm^2$ in $m^2$ ? 10000 $cm^2$




1 m = 100 cm
100×100=10000

**1 $m^2$ = 10 000 $cm^2$**

**4** Find the area of different unit.
Make a newspaper poster with a length of 2 m and a width of 80 m.
What is the area of the poster in $cm^2$?
To find the area, we need to express all the lengths using the same unit.
200×80=16000 Answer: 16000 $cm^2$

□+□=141 142=□÷□

## Lesson Flow

**1 Review previous lesson.**

**2 ① Show the 1 $m^2$ and find how many students can stand on the square.**

T Introduce the main task.
T Show the 1 $m^2$ cardboard and ask how many students can stand on the square by prediction.
TN Use 1 m ruler to draw the square on the floor in the classroom if you do not have a mat.
S Do experiment and confirm how many can stand on the cardboard.
TN This activity is very important to help students to enhance the sense of large areas. (Refer to TN)

**3 Understand 1 $m^2$ and practice to read and write $m^2$.**

T Let students read the main point about $m^2$.
T Let students practice writing $m^2$ on their notebook.

**4 ② ① Find the area of the flower bed.**

S Read the problem and understand the situation.
T Let students know that the same formula of the unit of $cm^2$ can be used even if the unit is $m^2$.
S 3×6=18 18 $m^2$ Answer: 18 $cm^2$

**5 ② Find the area of (1) and (2).**

T Confirm to use formula of area of rectangle and square.

**6 ③ Investigate 1 $m^2$ is equal to how many $cm^2$.**

TN Show the relationship of the diagram to the students and explain.
T ① How many 1 $cm^2$ blocks are drawn vertically and horizontally?
S 1 m is equal to 1 cm so 100 blocks.
T 1 m=100 cm, 100×100=10000, 1 $m^2$=100 $cm^2$
S ② 1 $m^2$=10000 $cm^2$

**7 ④ Solve the problem.**

S Read the problem and understand the situation.
T Can we multiply 80 cm×2 m directly?
S No, because the units are different.
T Confirm that you must have the same unit when you use a formula to calculate.
S 2 m=200 cm, 80 cm×200 cm=16000
Answer: 16000 $cm^2$

## Sample Blackboard Plan

**Date:** **Chapter:** 12 Area **Topic:** Unit For Large Areas **Lesson N°:** 1/3

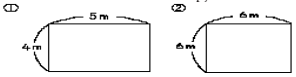
MT Let's think about the relationship between $cm^2$ and $m^2$ and calculate the area.

① Let's make a square with 1m side and see how many children can stand on the square.

The area of a square with a side of 1m is called one meter square and is written as 1 .
The unit is also a unit of area just like .

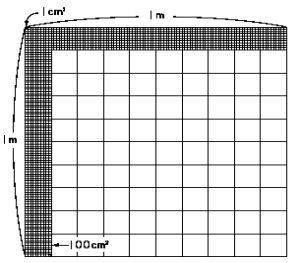
② ① What is the area in of a flower garden with a length of 3m and a width of 6m? How many 1 m can be placed in the flower bed?

② Let's find the area of the figure on the right.




③ ① Let's see how many $cm^2$ are there in 1 $m^2$.
How many 1 $cm^2$ can be lined up vertically? How about along the width?
Both ways we have 100 1 $cm^2$ squares.

② What is 1 $cm^2$ in $m^2$?




1 m = 100 cm
100×100=10 000
1 $m^2$ = 10000 $cm^2$

④ Make a newspaper poster with a length of 80 cm and a width of 2m. What is the area of the poster in $cm^2$?
*To find the area, we need to express all the lengths using the same unit.*

80×200=16 000 *Answer: 16 000 $cm^2$*

# Unit 12

# Unit: Area
## Sub-unit: 3. Units for Large Areas
## Lesson 2 of 3 (Double Period)

Textbook Page : p.143-p.144
Actual Lesson 87

## Lesson Objectives

- To know the unit of 'a' and use 'a' to find area.
- To know 'ha' and use 'ha' to find area.
- To think about relationship between 'a' and 'ha'.

## Prior Knowledge

- How to find the area using unit of $m^2$
- Relationship between $m^2$ and $cm^2$.

## Preparation

- Chart of area

## Assessment

- Find the area using unit of a. F
- Think about the relationship between ($m^2$ and a) and (a and ha). F
- Understand relationship between a and ha. S

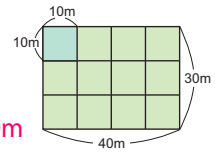
## • Teacher's Notes •

- Realistic aerial view pictures of oil palm plantation for students to visualise on the size of the unit hectare (ha) and compare it with the unit 'a' and '$m^2$'.
- If there are magazines around, find also pictures of 1ha to the students for enhancing their imagination of the relationship of '1 a' and '1 ha'.

### How to show the area using the unit a.

**5** There is a rectangular field with a length of 30 m and a width of 40 m.

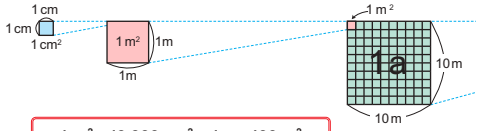
1. How many $m^2$ is the field? $30 \times 40 = 1200$, $1200 m^2$
2. How many 10 m squares can be placed in the field? $3 \times 4 = 12$, 12 squares of 10m




The area of square with a side of 10 m is called **are** and is written as 1 **a**.
The unit "**are**" is used to show the area of a vegetable garden and field.

1a

3. What is the area in a of the field?




**1 $m^2$ = 10 000 $cm^2$ , 1 a = 100 $m^2$**

### Relationship between $m^2$ and a.

**6** What is the area in $m^2$ of the rectangular plaza with a length of 60 m and a width of 80 m? What is this in a?

$60 \times 80 = 4800$ Answer: 4800 $m^2$, 48 a

### Unit of ha

**7** There is a square farm with 600 m sides.

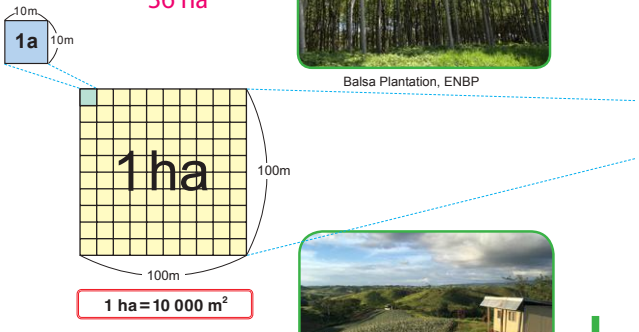
1. What is the area of the farm in $m^2$? $600 \times 600 = 360000$, $360000 m^2$
2. How many squares with 100 m sides can be placed in the farm? $6 \times 6 = 36$ 36squares with 100 msides

The area of a square with a side of 100 m is called **one hectare** and is written as **1 ha**.
The unit **ha** is used to show large areas of plantations, farms and forests.

1ha

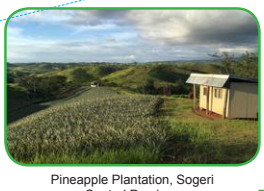
3. What is the area in ha of the plantation? 36 ha

Balsa Plantation, ENBP




**1 ha = 10 000 $m^2$**

**8** What is 1 ha in a? 100 a



Pineapple Plantation, Sogeri Central Province

□ + □ = 143 144 = □ ÷ □

## Lesson Flow

### 1 Review previous lesson.

### 2 5 Find the area of a field.

T 1 Confirm that the unit 'm' is in both width and length so calculate the area.
S 30×40=1200 Answer: 1200 $m^2$
S 2 12 squares of 10 $m^2$.

### 3 Understand the unit 'a' and think about how to express '$m^2$' into 'a'.

T Let students know that 1200 $m^2$ is quite big so it is useful if there is another larger unit to express.
T Explain important point in the box ( ).
S 3 Realise that 1 $m^2$=10000 $cm^2$, 1 a=100 $m^2$ by using diagram.

### 4 6 Find the area using $m^2$ and change $m^2$ to 'a'.

S 60×80=4800 Answer: 4800 $m^2$, 48 a

### 5 7 Solve the problem.

T Confirm that unit 'm' is in both width and length so calculate directly the area.
S 1 600×600=360000 $m^2$.
T 2 600 m=6 of 100 m, so 6×6=36, 36 squares of 100 m sides are placed in this area.
T Explain the important point in the box ( ).

### 6 3 Understand the unit 'ha' change '$m^2$' to 'ha'.

S Understand 1 ha=10000 $m^2$.
T 360000 $m^2$ is equal to how many ha?
S 36 ha.

### 7 8 Think about and understond that 1 ha is equal to how many a.

T 1 ha=10000 $m^2$ and 1 a=100 $m^2$, so 1 ha is equal to how many 'a'?
S Think about the relationship between 'ha' and 'a' based on $m^2$.
S 1 ha=100 a.

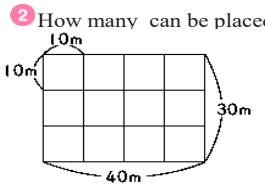
## Sample Blackboard Plan

**Date:** **Chapter:** 12 Area **Topic:** Unit For Large Areas **Lesson N°:** 2/3

MT Let's compare the relationship between **are** and **hectare** based on $m^2$.

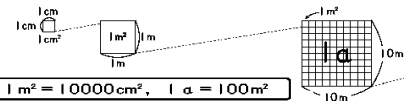
5 There is a rectangular field with a length of 30 m and a width of 40 m.
1 How many is the field?

2 How many can be placed in the field?




The area of square with a side of 10 m is called **are**, and is written as **1 a.**
The unit **are** is used to show the area of vegetable garden and field. 1a

3 What is the area in **a** of the field?




1 $m^2$ = 10000 $cm^2$, 1 a = 100 $m^2$

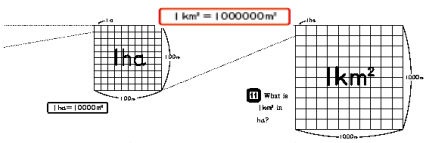
6 What is the area in of the rectangular plaza with a length of 60 m and a width of 80 m? What is this in **a**?

There is a square farm with 600 m side.
7 What is the area in of the farm?
1

2 How many squares with 100 m sides can be placed in the farm?

The area of a square with a side of 100 m is called **one hectare** and is written as **1 ha**.
The unit **ha** is used to show large areas of plantations, farms and forests. 1ha

3 What is the area in ha of the plantation?




30 000 = 36 ha Answer: 36 ha
8 What is 1 ha in a?
1 ha = 10 000 and 1 a = 100
So, 10 000100 = 100 answer: 100 a in 1 ha

# Unit 12

# Unit: Area
## Sub-unit: 3. Units for Large Areas
## Lesson 3 of 3 (Single Period)

Textbook Page : p.145-p.146
Actual Lesson 88

## Lesson Objectives

- To know the unit 'km$^2$' and use 'km$^2$' to find area.
- To deepen understanding of cm$^2$, m$^2$, a, ha and km$^2$.

## Prior Knowledge

- Relationship between ha and m$^2$

## Preparation

- Diagram of 1 km$^2$

## Assessment

- Find the area using unit of km$^2$. F
- Think about the relationship among cm$^2$, m$^2$, a, ha and km$^2$. F
- Investigate the area using appropriate unit. S

## • Teacher's Notes •

It is important that students are able to imagine the size of 1 km$^2$. Therefore, teahcer introduce various examples of 1 km$^2$in your surroundings.

### How to represent the area using km$^2$

**9** The photograph below shows PNG LNG site at Papa village in Central Province. The white line area is a square with 3 km sides.

LNG Plant, Papa, Central Province

① How many squares with 1 km sides can be placed inside the figure?

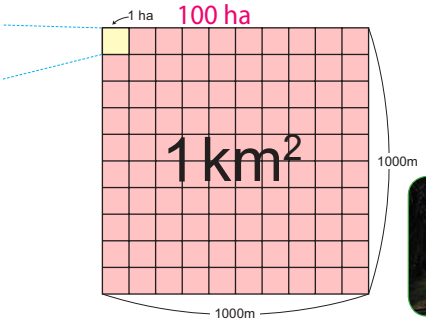
3×3=9 9 squares

The area of a square with a side of 1 km is called **one square kilometre** and is written as **1 km²**.
The unit km² is used to show large areas such as islands, provinces and countries.

② What is the area in km² of the photograph?

### Relationship between km$^2$ = ha

1 ha 100 ha




1 km² = 1 000 000 m²

Palm oil Plantation, Kimbe, WNBP

**10** Which room is the biggest in our school? Let's estimate and investigate.

**11** Let's investigate the areas of various places where we live.

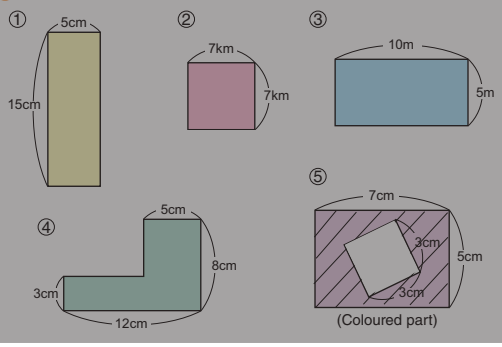
### Exercise

Pages 135, 141, 143~135

**1** Which of the units in ☐ should you use to represent the following areas? cm$^2$, m$^2$, a, ha, km$^2$

① The area of a school yard ② The area of an exercise book
③ The area of PNG ④ The area of a coffee plantation

**2** Let's find the areas of the following figures. Pages 139~147




□+□=145 146=□÷□

## Lesson Flow

**1 Review previous lesson.**

**2 9 Find the area of PNG LNG site which has sides of 3 km.**

S 1 Think about how many 1 km squares can be placed inside the figure.
S $3 \times 3 = 9$ Answer: 9 squares.
T Explain the important points in the box [ ].

**3 2 Think about the area of PNG LNG site in $km^2$.**

S There are 9 squares of 1 km a side, so 9 $km^2$.
S PNG LNG site in papa village is 9 $km^2$.

**4 Think about how many 1 $km^2$ is equal to how many $m^2$.**

T Let students think based on 1 km = 10000 m.
S $1000 \times 1000 = 1\,000\,000$, so 1 km = 1 000 000 $m^2$.
TN Picture in the textbook is Kimbe oil Palm Plantation. Use the picture to imagine the area for 1 ha.

**5 10 Think about 1 $km^2$ is equal to how many 'ha'.**

T Let students think based on the figure and previous knowledge of 1 ha = 10000 $m^2$.
T 1000 m × 1000 m = 1000000 $m^2$.
1 $km^2$ = 1000000 $m^2$, 1 ha = 10000 $m^2$, 1 $km^2$ = 100 ha.

**6 11 Find the area around us.**

T Let students predict the area before measuring.
T Remind students that it is important to use appropriate units.

## Sample Blackboard Plan

**Date:** **Chapter:** 12 Area **Topic:** Unit For Large Areas **Lesson N°:** 3/3

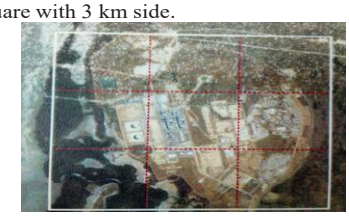
MT Let's think about how to express larger numbers using $km^2$.

The area of a square with a side of 1km side is called **one square kilometer** and is written as . The unit km is used to show large areas such as islands, provinces, and countries

2 What is the area in of the photograph?

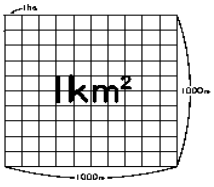
10 Which room is the biggest in our school?

9 The photograph shows PNG LNG site at Papa village in Central Province. The white line area is a square with 3 km side.



1 How many squares with 1 km sides can be placed inside the figure?

Relationship between 1 and 1 ha.




11 Let's investigate the areas of various places where we live.

# Unit 12

# Unit: Area
## Sub-unit: Exercise and Evaluation.
## Lesson 1 of 1 (Double Period)

Textbook Page : p.146-p.147
Actual Lesson 89

## Lesson Objectives

- To deepen the understanding on contents learned in this unit.

## Prior Knowledge

- All the contents in this unit

## Preparation

- Evaluation sheets for the students

## Assessment

- Solve the exercise correctly. F S

### • Teacher's Notes •

Use 30 minutes for the exercise and give the evaluation test after that.

10 Which room is the biggest in our school? Let's estimate and investigate.
11 Let's investigate the areas of various places where we live.

## Exercises

Choose the appropriate unit.

Pages 135, 141, 143~135

1 Which of the units in □ should you use to represent the following areas? $cm^2$, $m^2$, a, ha, $km^2$

① The area of a school yard $m^2$
② The area of an exercise book $cm^2$
③ The area of PNG $km^2$
④ The area of a coffee plantation a

2 Let's find the areas of the following figures.

Pages 139~147

① 5cm, 15cm
15×5=75
75 $cm^2$

② 7km, 7km
7×7=49
49 $km^2$

③ 10m, 5m
5×10=50
50 $cm^2$

④ 5cm, 8cm, 3cm, 12cm
61 $cm^2$

⑤ 7cm, 3cm, 5cm, 3cm, (Coloured part)
5×7-3×3=26, 26 $cm^2$

146 = □ ÷ □

## Problems

1 Let's find the areas of the following figures.
● Getting areas using the formula

① 6cm, 10cm
10×6=60
60 $cm^2$

② 4m, 4m
4×4=16
16 $m^2$

③ 5km, 8km
8×5=40
40 $km^2$

2 There are paths with 1 m width in this rectangle. What is the area of the fields?
● Easier way to find the areas

7m, 4m, 1m, 1m

3 Fill in the □ with a number.
● Finding the length of a side by using the formula of area.

① □ cm, 8cm, 96$cm^2$
(4-1)×(7-1)=18 18 $cm^2$
8×□=96
□=96÷8 □=12

② 33$cm^2$, 5cm, 3cm, □ cm, 2cm
33-5×(3+2)=8
□×2=8
□=8÷2
□=4

4 Let's answer the following questions.
● Understanding the area formula.

① 1 $m^2$ is equal to 10 000 $cm^2$. Let's explain the reason.
1m=100cm so the area is 100×100=10000
② The area of a rectangle with a length of 3 cm and a width of 5 cm can be found by 3×5. Let's explain the reason.
Because there are 12 square of 1$cm^2$ in the rectangle

□+□= 147

## Lesson Flow

### 1 ① Select appropriate unit.

T Let students imagine how big the given area and select the unit.

### 2 ② Find the area.

T Concerning question ④, there are several ways to find area so let the students explain the way.

### 3 ① Find the area of rectangle and square using formula.

### 4 ② Think about the area using various ways.

T Let students explain their way to find area and compare them.

S Compare the way of finding area and understand the difference.

### 5 ③ Find a side from the area.

T ① Confirm applying the formula of area to find a side.

$8 \times \square = 96$, $\square = 96 \div 8$, $\square = 12$

T There are mainly two ways.

① Separate the diagram into two diagram.

② Subtract the small rectangle the from big rectangle.

### 6 ④ Find a side from the area.

T ① Let students explain using 100 cm square.

T ② Let students explain by drawing a rectangle of 3 cm × 5 cm and how many 1 $cm^2$ can be placed in the rectangle.

| Area | Name: | Score /100 |
|---|---|---|

[2 × 20 points = 20 points in total]

Which of the units given in ☐ should you use to represent the following areas?

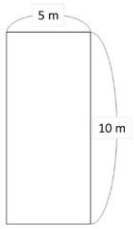
☐ $cm^2$, $m^2$, $km^2$

(1) The area of a blackboard in a classroom $m^2$

(2) The area of Papua New Guinea $km^2$

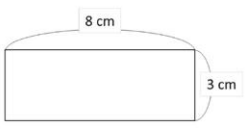
2. Find the areas of the following figures.

(1)



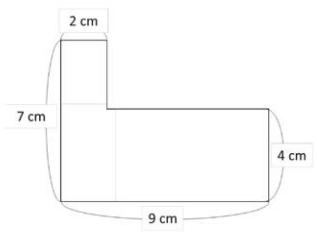

50 $m^2$

(2)




24 $cm^2$

(3)




42 $cm^2$

**End of Chapter Test: Chapter 12** **Date:**

| Area | Name: | Score /100 |
|---|---|---|

[2 × 20 points = 20 points in total]

Which of the units given in [ ] should you use to represent the following areas?

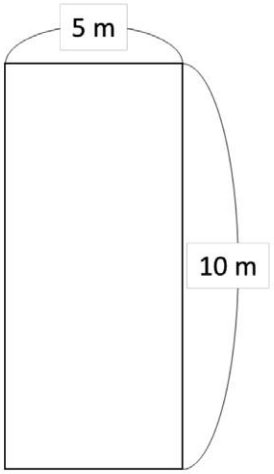
[$cm^2$, $m^2$, $km^2$]

(1) The area of a blackboard in a classroom _____

(2) The area of Papua New Guinea _____

2. Find the areas of the following figures.

(1)

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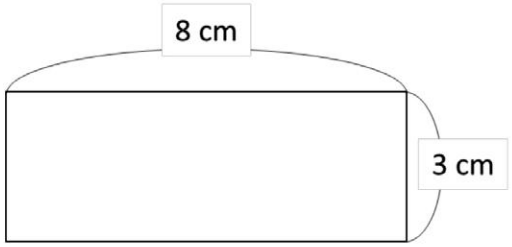
(2)

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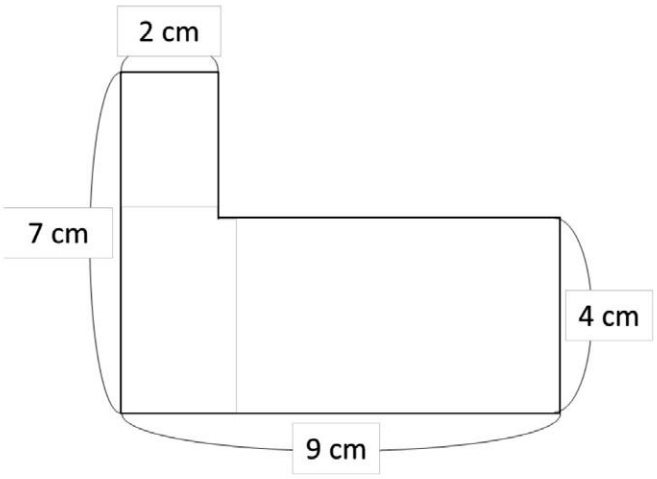
(3)

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# Chapter 13 Decimal Numbers 2
# Chapter 14 Thinking about How to Calculate

## 1. Unit Objectives

- To recognise the structure of decimal number is the same as the structure of the whole number. (4.1.6a)
- To deepen the understanding of relative size of decimal number. (4.1.6b,c and d) (4.1.7a,b and c)
- To deepen the understanding of addition and subtraction of decimals and apply them. (4.1.6e and f)
- To think about how to calculate addition and subtraction of decimal numbers. (4.1.6f) (4.1.7d)

## 2. Teaching Overview

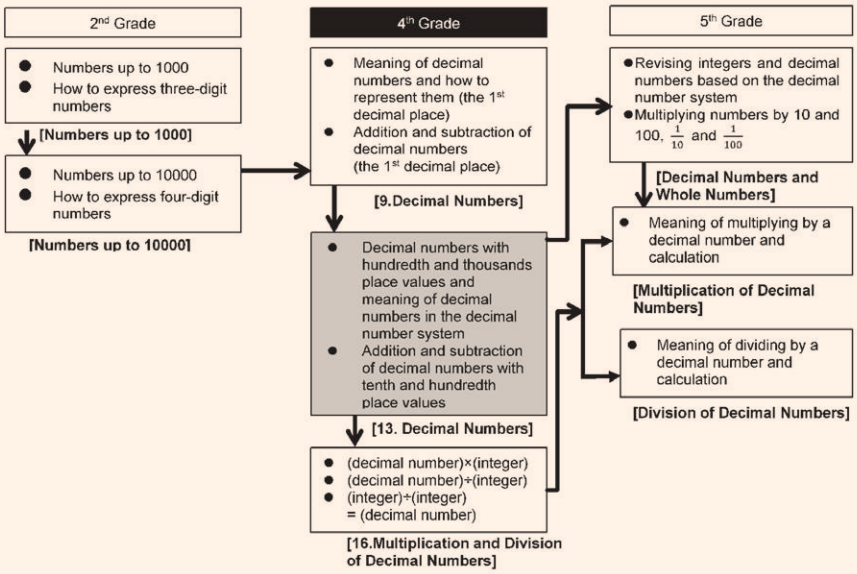
Students are introduced decimals with tenths place only in the earlier part of Grade 4. In this unit, they are to introduced decimals with hundredths ad thousandths places and learn that decimals are also binary (base 10) numbers like whole numbers.

**How to Represent Decimal Numbers :** Students should understand the size of decimal numbers with 100ths and 1000ths relatively such as expressing on number lines or in the manners of addition or multiplication .

**Structure of Decimal Numbers :** They should understand why 0.01 are called hundredth and 0.001 are called thousandth, and also the relationship between them. Teachers should make the newly introduced numbers meaningful for students.

**Addition and Subtraction of Decimal Numbers :** They should know that they can calculate decimal numbers as they learned for whole numbers and decimals with tenths.

## 3. Related Learning Contents




# Unit 14: Thinking about How to Calculate

## 1. Unit Objectives

- To think about how to calculate 'decimal number' x 'whole numbers' and 'decimal number ÷ 'whole numbers' by using prerequisite knowledge.

## 2. Teaching Overview

Students are to find out the meaning of given multiplication and division in discovery manner in this unit. They can use rules of multiplications and divisions learned earlier. In short, they can make multiplier, multiplicand, divisor, dividend 10 times or $\frac{1}{10}$.

In discovery-learning, students should be encouraged to ask classmates questions or try to explain well to convince them. The role of teachers is to facilitate the discussion to make it fruitful to get to the learning points/objectives.

# Unit 13

# Unit: Decimal Numbers 2
## Sub-unit: 1. How to Represent Decimal Numbers
## Lesson 1 of 3 (Double Period)

Textbook Page : p.148~150
Actual Lesson 90

## Sub-unit Objectives

- To understand how to read and write decimal numbers up to hundredths position.

## Lesson Objectives

- To understand how to read and write 0.1 L separated into 10 parts, expressed as 0.01 L.

## Prior Knowledge

- How to represent the remaining parts using the unit decilitres.
- Unit of the smaller scales is 0.1 dL. 0.1 dL is one of the 10 equal parts of 1 dL. 0.6 dL is 6 sets of 0.1 dL.
- How to represent 1 L and remaining part.
- Structure of decimal numbers using sets of 0.1 dL.
- Addition and subtraction of decimal numbers in vertical form. Example (2.5 + 1.3 and 2.5 − 1.2)

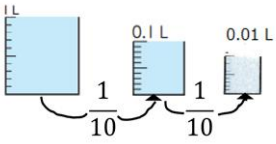
## Preparation

- Refer to the blackboard plan.

## Assessment

- Think about how to represent remaining part using decimal numbers. F
- Express and write 0.1 L into ten parts as 0.01 L. S
- Express the decimal unit idea. S

## • Teacher's Notes •



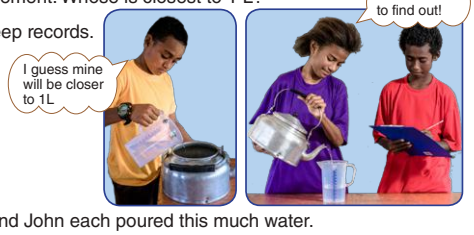

The relationship among 1 L, 0.1 L and 0.01 L. 1 L is broken down into 10 equal parts to make the amount of 1 small unit scale as 0.1 L. To obtain 0.1 L we multiply 1 L times $\frac{1}{10}$.0.1 L is broken down into smaller unit scale by dividing 0.1 L into 10 equal parts to make the amount of 1 samll unit scale as 0.01 L. To obtain 0.01 L we multiply 0.1 L times $\frac{1}{10}$.

13 Decimal Numbers 2

▶▶ How can we express two units as one unit?

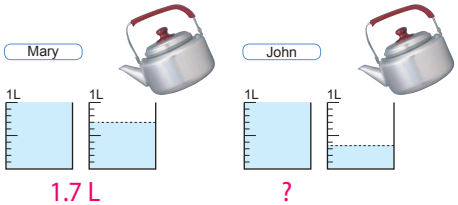
▶▶ Let's try to pour 1 L of water into a kettle without any measurement. Whose is closest to 1 L?

Let's keep records.



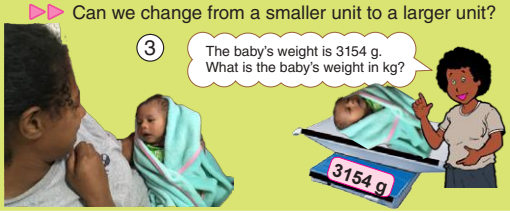

Mary and John each poured this much water.

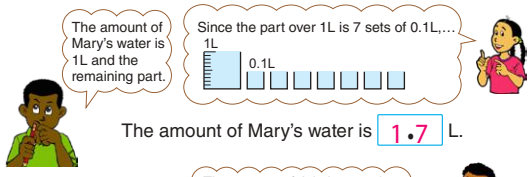
How many litres is in each kettle?




148 = □ + □

▶▶ Can we change from a smaller unit to a larger unit?



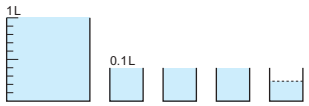



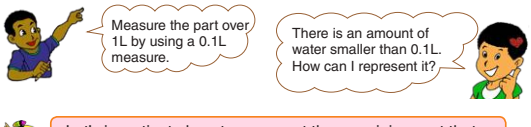

The amount of Mary's water is 1.7 L.

### 1 How to Represent Decimal Numbers

#### The necessity of decimal in hundredths place

1 Let's write the amount of John's water using litre as the unit.




Let's investigate how to represent the remaining part that is smaller than 0.1 L.

□ − □ = 149

# Lesson Flow

## 1 Review decimal number in Unit 9.

## 2 Look at the three pictures and discuss.

T Pose lead up questions about the 3 pictures to guide the discussion to learn decimal numbers.
① How many metres?
② How many kg?
③ How much is the weight of the baby in kg?

T/S discuss the pictures.

## 3 ▶▶ Observe the experiment done by the two students to investigate the amount of water in the kettle.

T Explain the experiment done by the two students focusing on how to express remaining part.

S Discuss and find the amount of water in the kettle when poured into the measuring container.

S (Mary) Identify the amount of water as 1 L and the remaining part by using the unit of Litre and write it as 1.7 L.

S ( John ) The amount of remaining part is between 0.3 and 0.4 L.

## 4 ① Investigate how to represent the remaining part that is smaller than 0.1 L.

T Introduce the main task.

S ① Observe the diagram and think about how to write the scale of 0.1 L and find the remaining part.

TN The remaining part is changed to smaller scale of 0.1 L cup.

S Do ② and ③.

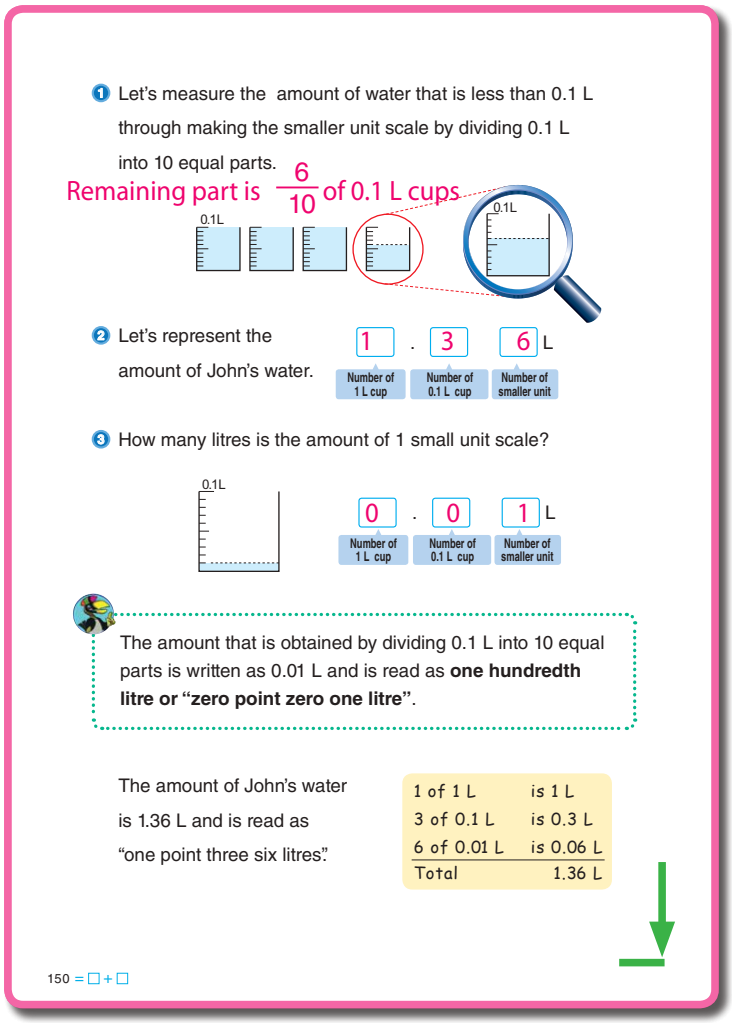
S Read the important point in the box .

S Understand the decimal unit of 1.36 L.

| | |
|---|---|
| 1 of 1 L | is 1 L |
| 3 of 0.1 L | is 0.3 L |
| 6 of 0.01L | is 0.06 L |
| Total | 1.36 L |

S Read 1.36 as “one point three six litres”.

TN Emphasise to students that the digits after the decimal point is read individualy and not read as thirty six.




## Sample Blackboard Plan

Sample blackboard plan refer to page 205.

# Unit 13

# Unit: Decimal Numbers 2
## Sub-unit: 1. How to Represent Decimal Numbers
## Lesson 2 of 3 (Double Periods)

Textbook Page : p.151
Actual Lesson 91

## Lesson Objectives

- To understand, read and write 1 metre separated into 10 parts where one part is called 0.1 metre and 0.1 metre separated into 10 parts where one part is called 0.01 metre.

## Prior Knowledge

- Structure of decimal numbers using sets of 0.1 dL. (Previous lesson)

## Preparation

- Tape diagram

## Assessment

- Think about how to read and write 1 metre separated into 10 parts. F
- Do the exercise correctly. S

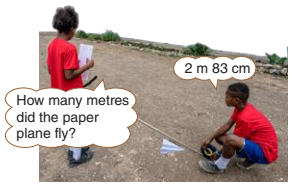
## • Teacher's Notes •

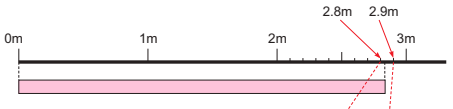
2 m and 83 cm has two units. The two units are separated to make only one unit as metres by putting the ' . ' between 2 m and 83 cm that is read as "two point eight three metres".

For the exercise using the number line, the scale division is divided into 10 equal parts therefore 1 small scale is 0.01.

How to express the distance using decimal up to hundredths place.

**2** Noko flies her paper plane. The length of flying the paper plane is 2 m 83 cm. Write this length by using only metre as the unit.



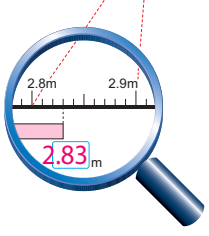




2 of 1 m is 2 m

8 of 0.1 m is 0.8 m

3 of 0.01 m is 0.03 m

Total 2.83 m

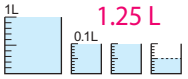



Since 10 cm = 0.1 m, 1 cm = 0.01 m, right?

**Exercise**

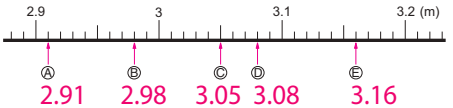
**1** How many litres are the following amounts of water?

① 1.25 L




② 0.42 L

**2** Let's read the following numbers marked by ↑.




Ⓐ 2.91 Ⓑ 2.98 Ⓒ 3.05 Ⓓ 3.08 Ⓔ 3.16

□ – □ = 151

# Lesson Flow

## 1 Review previous lesson.

## 2 2 Observe the picture, think and discuss how to express the distance using unit (metres or centimetres)/numbers.

T Introduce the main task.

S Observe and discuss the picture.

T Help the students with guided questions for discussion such as
What can you observe from the picture?
Which units are used in the situation?
How can we express the distance in metres only?

## 3 Express 2 m 83 cm using only metre as the unit.

S Understand 2 m 83 cm is expressed using two units.

TN It is important for the student to use the unit idea and write 2 m 83 cm using metre as the unit.

T Help students to understand the important point 10 cm = 0.1 m, 1 cm = 0.01 m.

S Students complete the answers to the spaces in the ☐.

## 4 Complete the exercise for more practice and understanding.

TN ② Identiy the scale divison. 1 scale is 0.01

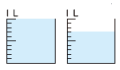
# Sample Blackboard Plan

**Date:**
**Chapter:** 13 Decimal Numbers 2.
**Topic: How to Represent Decimal Numbers. Lesson No:** 1/3

**Main Task: Let's think about how to represent the remaining part that is smaller than 0.1 L.**

MT: Introduce the main task here.

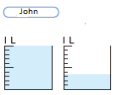
Mary



The amount of Mary's water is 1L and the remaining part.

The remaining part is 7 sets of 0.1L so the amount of Mary's water is 1.7 L

John



The amount of John's water is also 1L and the remaining part. Remaining part is between 0.3 and 0.4 L.

[1] ❶ How to represent the remaining part that is smaller than 0.1L.

The remaining part is $\frac{6}{10}$ of 0.1L cups = 0.06L

❷The amount of John's water.

| 1 | . | 3 | 6 | L |
|---|---|---|---|---|
| Number of 1 L cup | | Number of 0.1 L cup | Number of smaller unit | |

❸How many liters is the amount of 1 small unit scale?.

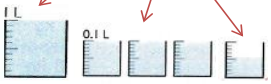
| 0 | . | 0 | 1 | L |
|---|---|---|---|---|
| Number of 1 L cup | | Number of 0.1 L cup | Number of smaller unit | |

**Important Point.**

The amount that is obtained by dividing 0.1 L into 10 equal parts is written as 0.01 L and is read as **one hundred liter** or **"zero point zero one liter".**

The amount of John's water is 1.36 L and is read as "one point three six liters".

| | |
|---|---|
| 1 of 1L | is 1 L |
| 3 of 0.1L | is 0.3L |
| 6 of 0.01L | is 0.06L |
| Total | 1.36L |




# Sample Blackboard Plan

**Date:**
**Chapter:** 13 Decimal Numbers 2.
**Topic: How to Represent Decimal Numbers. Lesson No:** 2/3

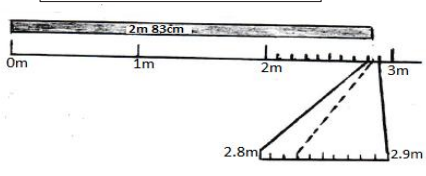
**Main Task: Let's think about how to express the distance using decimal up to hundredths place.**

MT: Introduce the main task here.

[2] Discussion questions.

- What can you observe from the picture?
- Which units are used in the situation?
- How can we express the distance in meters only?

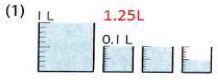
How to express 2m 83cm in meters.




| | | | |
|---|---|---|---|
| 2 of 1 m | is | 2 | m |
| 8 of 0.1 m | is | 0.8 | m |
| 3 of 0.01m | is | 0.03 | m |
| Total | | 2.83 | m |

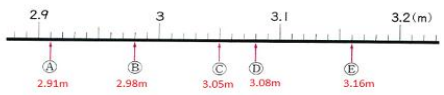
Exercise.

1 How many liters are the following amount of water?

(1) 


(2)


2 Let's read the following numbers marked by ↑.



# Unit 13

# Unit: Decimal Numbers 2
## Sub-unit: 1. How to Represent Decimal Numbers
## Lesson 3 of 3 (Single Period)

Textbook Page : p.152
Actual Lesson 92

## Lesson Objectives

- To understand that 0.01divided by 10, 1 part is called 0.001.
- Read and write the decimal number up to thousandths place.

## Prior Knowledge

- Represent, read and write decimal numbers up to hundredth place.

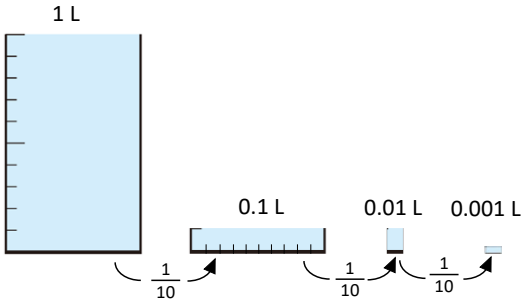
## Preparation

- Chart for task 3

## Assessment

- Think about how to express decimal number up to thousandths place. F
- Do the exercise correctly. S

## • Teacher's Notes •




The relationship among 1 L, 0.1 L and 0.01 L

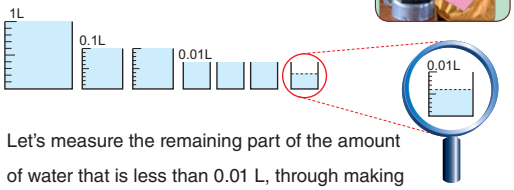
1 L is broken down into 10 equal parts to make the amount of 1 small unit scale as 0.1 L. To obtain 0.1 L we multiply 1 L times $\frac{1}{10}$.

0.1 L is broken down into smaller unit scale by dividing 0.1 L into 10 equal parts to make the amount of 1 small unit scale as 0.01 L. To obtain 0.01 L we multiply 0.1 L times $\frac{1}{10}$.

0.01 L is broken down into smaller unit scale by again dividing 0.01 L into 10 equal parts to make the amount of 1 small unit scale as 0.001 L. To obtain 0.001 L we multiply 0.01 L times $\frac{1}{10}$.

### How to express the volume using decimal up to thousandths place.

3 Let's represent the amount of water that Tukana poured into a water container by using litre as the unit.




Let's measure the remaining part of the amount of water that is less than 0.01 L, through making the smaller unit scale by dividing 0.01 L into 10 equal parts.

1 . 2 3 6 L

Number of 1 L measuring cup | Number of 0.1 L measuring cup | Number of 0.01 L measuring cup | Number of smaller unit scale

The amount that is obtained by dividing 0.01 L into 10 equal parts is written as 0.001 L and is read as one thousandths litre or "zero point zero zero one litre."

### How to express weights using decimal up to thousandths place.

Let's represent 1 kg 264 g by using kilogram as the unit.

1.264 kg

100 g is $\frac{1}{10}$ of 1 kg → 0.1 kg
10 g is $\frac{1}{10}$ of 0.1 kg → 0.01 kg
1 g is $\frac{1}{10}$ of 0.01 kg → 0.001 kg

**Exercise**

Let's represent the following quantities by using the unit shown in ( ).

① 1435 cm (m) 14.35 m
② 42195 m (km) 42.195 km
③ 875 g (kg) 0.875 kg

152 = □ + □

## Lesson Flow

### 1 Review previous lesson.

### 2 ③ Think about and discuss the remaining part of the water less than 0.01 L.

T Introduce the main task.

T Teacher and students discuss about the remaining part of the water less than 0.01 L through making the smaller unit scale by dividing 0.01 L into 10 equal parts.

S Refer to the diagram which is magnified to help students understand that the remaining part or 0.01 L is divided into 10 parts and show the smaller unit scale with the blue colour.

S Fill in the ☐ after the discussions when they have understood.

### 3 How to read and write 0.001 L.

S Read and understand the important point ☐.

T Emphasise to the students that numbers after the decimal point are read individually.

### 4 How to represent and express the weight of tomatoes using kg only.

T Let students to understand 1 kg 264 g is expressed using two units. It is important for the student to use the unit idea and write 1 kg 264 g using kilogram only as the unit.

S 1.264 kg

TN Explain the relationship of 1, 0.1, 0.01 and 0.001 using the unit of kg and g.

### 5 Complete the exercise for more practice and understanding.

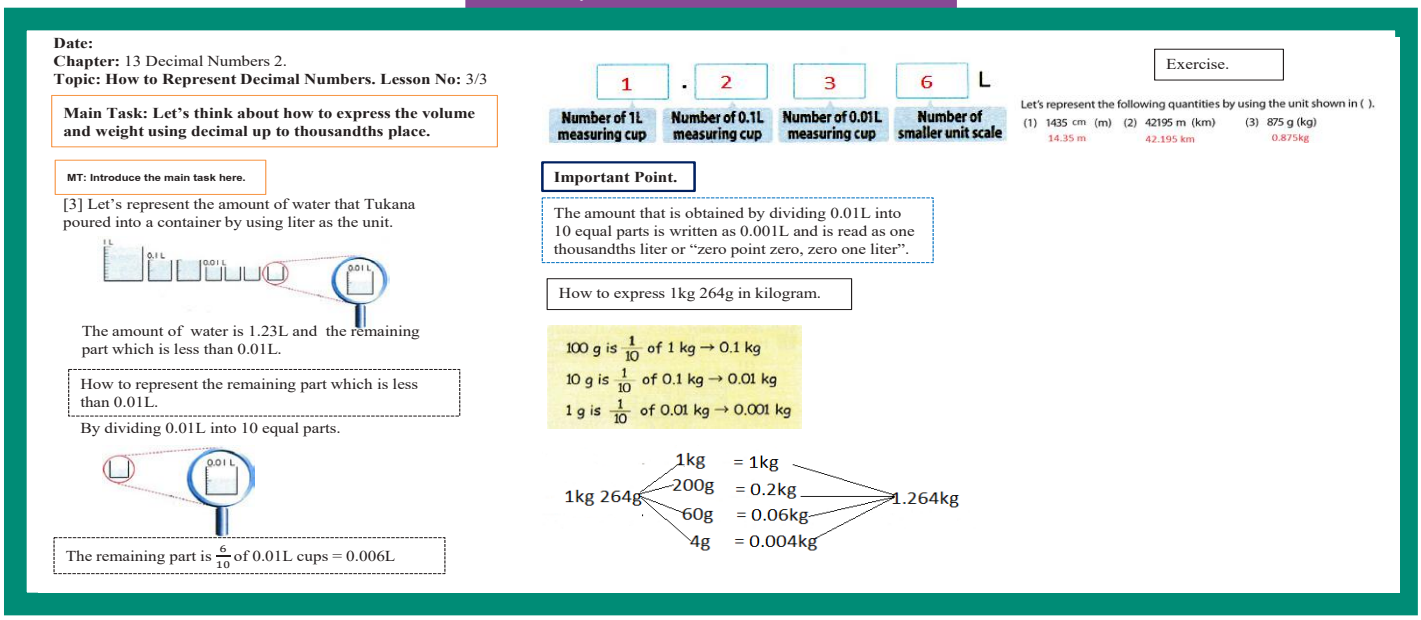
TN Emphasise the following points.

① 100 cm = 1 m

② 1000 m = 1 km

③ 1000 g = 1 kg

## Sample Blackboard Plan



# Unit 13

# Unit: Decimal Numbers 2
## Sub-unit: 2. Structure of Decimal Numbers
## Lesson 1 of 1 (Double Periods)

Textbook Page : p.153~p.154
Actual Lesson 93

## Sub-unit Objectives

- To understand the structure of the decimal number system in decimal numbers.
- To understand the relative size of decimal numbers.

## Lesson Objectives

- To understand the decimal number system in decimal numbers.
- To understand the relative size of decimal numbers.

## Prior Knowledge

- How to read and write decimal numbers up to thousandths. (Previous lesson)
- How to read and write 0.1 and 0.01 separated into 10 parts.

## Preparation

- Place value chart

## Assessment

- Understand the structure and relative size of decimal number.
- Do the exercise correctly.

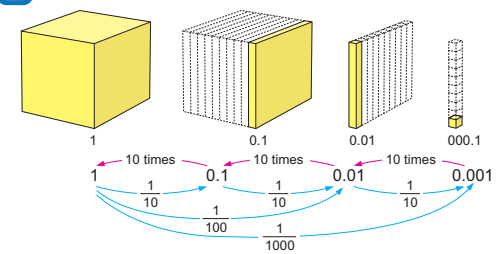
## • Teacher's Notes •

In grade 3 we saw that the the numbers move but the decimal point remains fixed. That was the meaning of what happens to decimal numbers when multiplied or divided by 10, 100 and 1000.
In this lesson, you will notice that the decimal point is moving. However, this is just a technique of solving. You have to remind the students that decimal point still remains fixed.

Relationship of the unit of decimal numbers.

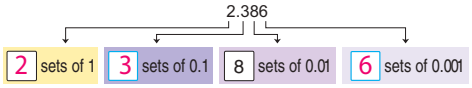
## 2 Structure of Decimal Numbers

**1** Let's look at the relationship among 1, 0.1, 0.01 and 0.001.




Structure of decimal numbers.

**2** Let's investigate the structure of the number 2.386.



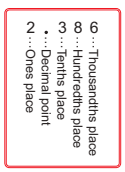

The Place Value in Decimal Numbers from the first place to the right of the decimal point are as follows;

**Tenths place** ($\frac{1}{10}$ place),

**Hundredths place** ($\frac{1}{100}$ place ),

**Thousandths place** ($\frac{1}{1000}$ place)

Decimal numbers are represented by setting their places by ten times or $\frac{1}{10}$ of the place values as in whole numbers.




Structure of decimal numbers.

**3** Let's investigate the number 3.254.

1. 3.254 is the sum of 3 sets of 1, 2 sets of 0.1, 5 sets of 0.01 and 4 sets of 0.001.
2. 3.254 is the sum of 3254 sets of 0.001.

Comparing size of decimal numbers.

**4** Arrange the following numbers from the largest to the smallest.

0.5 5 0.005 0 0.05

5 , 0.5 , 0.05 , 0.005 , 0

Numbers of 10 times

**5** What is the number which is 10 times of 0.039?

Numbers of $\frac{1}{10}$

| 1 | $\frac{1}{10}$ | $\frac{1}{100}$ | $\frac{1}{1000}$ | |
|---|---|---|---|---|
| 0 | 0 | 3 | 9 | ×10 |
| 0 | 3 | 9 | | |

**6** What is the number which is $\frac{1}{10}$ of 0.58?

| 1 | $\frac{1}{10}$ | $\frac{1}{100}$ | $\frac{1}{1000}$ | |
|---|---|---|---|---|
| 0 | 5 | 8 | | $\frac{1}{10}$ |
| 0 | 0 | 5 | 8 | |

Every number multiplied by 10 moves to the next higher place and $\frac{1}{10}$ of every number moves to the next lower place.

**Exercise**

**1** Let's write the number that the sum of 7 sets of 1, 3 sets of 0.1 and 5 sets of 0.001. How many sets of 0.001 make this number?

7.305 7305

**2** Multiply the following numbers by 10 and find $\frac{1}{10}$ of them.

① 0.74 7.4 (×10) 0.074 ($\frac{1}{10}$)
② 1.58 15.8 (×10) 0.158 ($\frac{1}{10}$)
③ 26.95 26.95 (×10) 2.695 ($\frac{1}{10}$)

□ − □ = 153 154 = □ + □

# Lesson Flow

**1 Review previous lesson.**

**2 (1) Investigate the relationship among 1, 0.1, 0.01 and 0.001.**

S Discuss to find the relation among 1, 0.1, 0.01 and 0.001 and how the size of the block changes.

**3 (2) Find the structure of 2.386.**

T Introduce the main task.
S Investigate the number 2.386 to find the structure of decimal number as 2 sets of 1, 3 sets of 0.1, 8 sets of 0.01, 6 sets of 0.001.
T Explain the important point in the box .....

**4 (3) Find the structure of 3.254.**

S Investigate the structure of the number 3.254 by completing (1) and (2).

**5 (4) Compare and arrange the numbers in descending order.**

T Let students focus on the place value to compare the numbers and arrange them in descending order.

**6 (5) Find the number or answer to 10 times 0.039.**

S Observe the place value chart to find the answer and explain their understanding of the place value chart.
T Use the chart to explain 10 times 0.039 as 0.039 multiplied by 10. Each number moves to the next higher place as indicated in the place value chart.

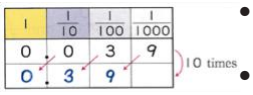
**7 (6) Find the number or answer to $\frac{1}{10}$ of 0.58.**

S Study the place value chart and find the answer.
T Did you find any rule?
S Explain $\frac{1}{10}$ of 0.58 as 0.058 divided by 10.
Each number moves to the next lower place as indicated in the place value chart.
T/S Explain the important point in the box .....

**8 Complete the exercises 1 and 2.**

TN For exercise 2 advice the students to draw and use the place value chart to find their answers.

### ◊ KEY IDEA- Dividing by 10 moves every digit one place to the RIGHT. ◊

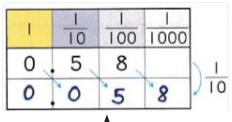



- The place value does not change the number changes.
- Each number divided by 10 moves to the next lower place to the right.
- The answer becomes smaller.

$10 \times 0.039 = 00.39 = 0.39$
Move the decimal point one place to the right. (10 has one zero)

The entire number moved one place to the left on the place value chart.

### ◊ KEY IDEA- Multiplying by 10 moves every digit one place to the LEFT. ◊




- The place value does not change the number changes.
- Each number multiplied by 10 moves to the next higher place to the left.
- The answer becomes bigger.

$0.58 \div 10 = 0.058$
Move the decimal point one place to the left. (10 has one zero)

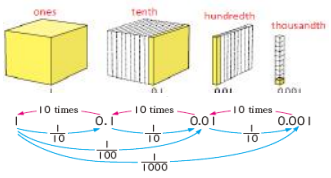
The entire number moved one place to the right on the place value chart.

## Sample Blackboard Plan

**Date:**
**Chapter:** 13 Decimal Numbers 2.
**Topic: Structure of Decimal Numbers. Lesson No:** 1/1

**Main Task: Let's investigate the structure of decimal numbers and represent their place value by ten times or $\frac{1}{10}$**

[1] Relationship among 1, 0.1, 0.01 and 0.001.




The relationship among 1, 0.1, 0.01 and 0.001 is to get to the next higher place value we multiply by 10 and to get to the next lower place value we divide by 10.

MT: Introduce the main task here.

[2] Structure of the number 2.386

**Important Point.**

The Place Value in Decimal Numbers

From the first place to the right of the decimal point, the places are as follows.

Tenths place ($\frac{1}{10}$ place),
Hundredths place ($\frac{1}{100}$ place),
Thousandths place ($\frac{1}{1000}$ place)

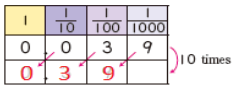
Decimal numbers are represented by setting their places by ten times or $\frac{1}{10}$ of the place values as with whole numbers.

[3] Let's investigate the number 3.254

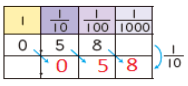
(1) 3.254 is the sum of 3 sets of 1, 2 sets of 0.1, 5 sets of 0.01 and 4 sets of 0.001.
(2) 3.254 is the sum of 3 254 sets of 0.001.

[4] Arrange the following numbers from the largest to the smallest.
5, 0.5, 0.05, 0.005, 0

[5] What is the number 10 times 0.039?




[6] What is the number $\frac{1}{10}$ of 0.58?




**Important Point.**

Every number multiplied by 10 moves to the next higher place, and $\frac{1}{10}$ of every number moves to the next lower place.

**Exercise**

1. The number is 7.305 and 7305 sets of 0.001 make that number.

2. (1) 7.4 (x10) 0.074 ($\frac{1}{10}$)
(2) 15.8 (x10) 1.58 ($\frac{1}{10}$)
(3) 26.95 (x10) 2.695 ($\frac{1}{10}$)

# Unit 13

# Unit: Decimal Numbers 2
## Sub-unit: 3. Addition and subtraction of decimal numbers
## Lesson 1 of 2 (Double Periods)

Textbook Page : p.155-p.156
Actual Lesson 94

## Sub-unit Objectives

- To understand how to add and subtract decimal numbers in vertical form.

## Lesson Objectives

- To think about how to add decimal numbers.
- To understand how to add decimal numbers up to hundredths place.

## Prior Knowledge

- How to read and write decimal numbers up to thousandths place. (G4,U13)
- How to read and write 0.1 and 0.01 separated into 10 parts. (G4, U13)
- Addition and subtraction of decimal numbers (G4,U9)

## Preparation

- Place value chart

## Assessment

- Think about and understand how to add decimal numbers in vertical form.
- Do the exercises correctly.

## • Teacher's Notes •

0 (zero) at the end of decimal number is not significant.
Remove the 0 (zero). Mathematically its ok to keep zero.
Example: 9.23 + 0.47 = 9.70
Answer: 9.7 (zero) at the end of decimal number is not significant. However, Mathematically its ok to keep zero.
In addition of decimal numbers in vertical form the numbers are aligned according to their place values in the same way as in the calculation of addition for whole numbers in vertical form.

Addition of decimal numbers up to hundredths place.

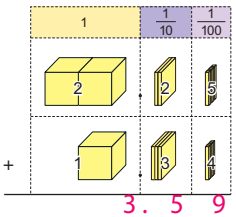
### 3 Addition and Subtraction of Decimal Numbers

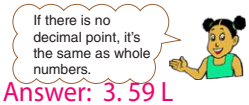
**1** There is 2.25 L of water in a tank. When 1.34 L of water is poured, how much water is there altogether?

① Write a mathematical expression.

2.25 + 1.34

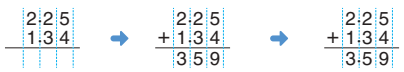
② Let's think about how to add.






3 . 5 9 Answer: 3.59 L

**Addition Algorithm for 2.25 + 1.34 in Vertical Form**




Align the numbers according to their place values.

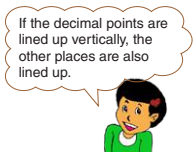
Calculate each place value in the same way as whole numbers.

Put the decimal point of the sum in the same position as the decimal points above.

For adding decimal numbers in vertical form, we align the numbers according to their place values in the same way as whole numbers.

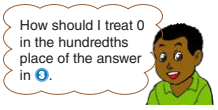
**2** Let's think about how to add the following.

① 2.16 + 0.73




② 5.74 + 2.63

③ 9.23 + 0.47




④ 4.05 + 3.1

**Exercise**

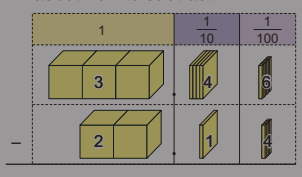
Let's calculate.

① 6.27 + 3.51 9.78 ② 8.46 + 0.32 8.78 ③ 1.54 + 2.38 3.92 ④ 4.72 + 3.49 8.21
⑤ 9.62 + 0.18 9.8 ⑥ 4.25 + 2.75 7 ⑦ 3.21 + 2.5 5.71 ⑧ 2.8 + 0.54 3.34

**3** Raka's older brother threw a paper plane at 3.46 m and Raka threw it at 2.14 m.
How many m more did Raka's brother throw than Raka?

① Write a mathematical expression.

② Let's think about how to subtract.




For subtracting decimal numbers in vertical form, we arrange the numbers according to their place value in the same way as in whole numbers.

3 4 6
− 2 1 4
1 3 2

□ − □ = 155 156 = □ + □

## Lesson Flow

### 1 Review the previous lesson.

### 2 ❶ Read and understand the problem.

T Introduce the main task.
S ❶ Read the problem and write the mathematical expression.
S 2.25 + 1.34

### 3 ❷ Think about how to calculate 2.25 + 1.34.

T/S Explain that the calculation according to the place value is the same as the whole numbers.
TN Emphasise to put decimal point of the answer in the same position of augend and addend.

### 4 Summarise how to add decimal numbers.

T/S Explain how to add decimal numbers step by step in vertical form using the box [ ].
T Explain the important point in the box [ ].

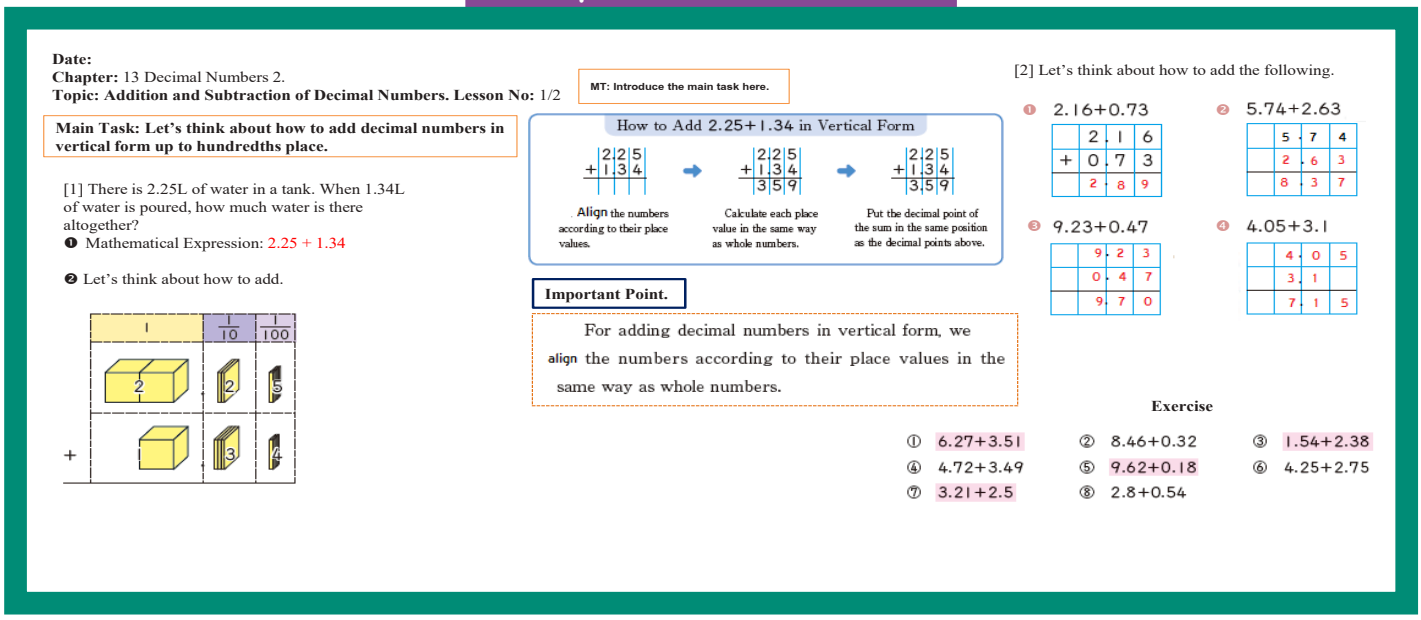
### 5 ❷ Complete the task.

S Do the exercise ❶, ❷, ❸ and ❹.
T Explain that even addition with carrying, calculate using same method as whole numbers.
TN ❸ 0 at the end of decimal number is not significant.
❹ When changing to vertical calculation line up the numbers in its place value.
Hundredths place: Calculate each place value so if there is no number add 0 to the number so 5 + 0 = 5.

### 6 Do the exercise.

TN Complete the highlighted problems in class for consolidation. The rest can be for homework.

## Sample Blackboard Plan



# Unit 13

# Unit: 13 Decimal Numbers 2
## Sub-unit: 3. Addition and subtraction of decimal numbers
## Lesson 2 of 2 (Double Periods)

Textbook Page : p.156~p.157
Actual Lesson 95

## Lesson Objectives

- To think about how to subtract decimal numbers.
- To understand how to subtract decimal numbers up to hundredths.

## Prior Knowledge

- How to read and write decimal numbers up to thousandths place. (G4,U13)
- How to read and write 0.1 and 0.01 separated into 10 parts. (G4, U13)
- Addition and subtraction of decimal number (G4,U9)

## Preparation

- Place value chart

## Assessment

- Think about how to subtract decimal numbers in vertical form. F
- Do the exercise correctly. S

## • Teacher's Notes •

In subtraction of decimal numbers in vertical form the numbers are aligned according to their place values in the same way as in the calculation of subtraction for whole numbers in vertical form.

The rule of calculation in whole numbers can also be applied to decimal numbers.

**2** Let's think about how to add the following.

① 2.16+0.73

| | | | |
|---|---|---|---|
| | 2 | . | 1 6 |
| + | 0 | . | 7 3 |

If the decimal points are lined up vertically, the other places are also lined up.

② 5.74+2.63

| | | | |
|---|---|---|---|
| | 5 | . | 7 4 |

③ 9.23+0.47

④ 4.05+3.1

How should I treat 0 in the hundredths place of the answer in ③.

Exercise

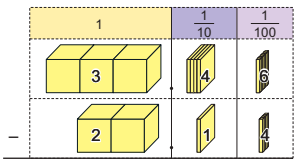
Let's calculate.

① 6.27+3.51 ② 8.46+0.32 ③ 1.54+2.38 ④ 4.72+3.49
⑤ 9.62+0.18 ⑥ 4.25+2.75 ⑦ 3.21+2.5 ⑧ 2.8+0.54

**3** Raka's older brother threw a paper plane at 3.46 m and Raka threw it at 2.14 m.
How many m more did Raka's brother throw than Raka?

① Write a mathematical expression. 3.46−2.14

② Let's think about how to subtract.




For subtracting decimal numbers in vertical form, we arrange the numbers according to their place value in the same way as in whole numbers.

| | | | |
|---|---|---|---|
| | 3 | . | 4 6 |
| − | 2 | . | 1 4 |
| | 1 | . | 3 2 |

**4** Let's think about how to subtract 1.25−0.67.

| | | | |
|---|---|---|---|
| | 1 | . | 2 5 |
| − | 0 | . | 6 7 |
| | 0 | . | 5 8 |

Exercise

Let's calculate.

① 5.78−3.44 2.34 ② 1.54−0.23 1.31 ③ 8.37−2.09 6.28 ④ 6.48−1.92 4.56

**5** Let's think about how to subtract the following.

Subtraction of decimal number up to hundredths place

① 2.32−1.82

| | | | |
|---|---|---|---|
| | 2 | . | 3 2 |
| − | 1 | . | 8 2 |
| | 0 | . | 5 0 |

② 6.71−3.9

| | | | |
|---|---|---|---|
| | 6 | . | 7 1 |
| − | 3 | . | 9 |
| | 2 | . | 8 1 |

③ 6−0.52

| | | | |
|---|---|---|---|
| | 6 | | |
| − | 0 | . | 5 2 |
| | 5 | . | 4 8 |

④ 5.03−4.25

| | | | |
|---|---|---|---|
| | 5 | . | 0 3 |
| − | 4 | . | 2 5 |
| | 0 | . | 7 8 |

**6** There is a 2.15 m tape. Cut off 85 cm of the tape.
How much tape is left? 2.15−0.85= 1.3 A. 1.3m

**7** Let's explain the rules of calculations in decimals and why the following method is appropriate,
when ■=3.8, ▲=2.3 and ●=2.7.

① ■+▲=▲+■ 3.8+2.3 =6.1 2.3+3.8=6.1
② ■+▲+●=■+(▲+●) (3.8+2.3)+2.7=8.8 3.8+(2.3+2.7)=8.8

Exercise

Let's calculate.

① 0.54−0.34 0.2 ② 1.96−0.56 1.4 ③ 7.28−2.4 4.88
④ 9.15−8.6 0.55 ⑤ 4−1.26 2.74 ⑥ 3.4−1.84 1.56
⑦ 7.08−0.29 6.79 ⑧ 4.07−1.98 2.09 ⑨ 2.03−1.65 0.38

156 =□+□

□−□= 157

## Lesson Flow

### 1 Review previous lesson.

### 2 ❸ Read and understand the problem.

T Introduce the main task.

T ❶ Read the problem and write the mathematical expression.

S 3.46 − 2.14

### 3 ❷ Think about how to calculate 3.46 − 2.14.

T/S Explain that the calculation according to the place value is the same as the whole number.

TN Emphasise to put decimal point of the answer in the same position of subtrahend and minuend.

### 4 Summarise how to subtract decimal numbers.

T Explain the main point in the box .....

### 5 ❹ Calculate1.25 − 0.67.

S Calculate 1.25 − 0.67.

TN Emphasise that ones place becomes 0 after subtraction. You have to write 0 in ones place and put decimal point, otherwise it becomes a different number.

### 6 Do the exercise.

TN Ask students to do ① and ③.

### 7 ❺ Calculate ❶ − ❹.

TN The numbers must be placed according to place values when changing to vertical form. Take care especially when the digit of two numbers are different.

TN For ❷ and ❸ calculate each place value if there is no number place in 0 in that place.

### 8 ❻ Solve the word problem.

S 2.15 − 0.85 = 1.3 Answer: 1.3 m

### 9 ❼ Think about the rules of calculation.

S Substitute the shapes for the numbers to calculate ❶ and ❷.

S Recognise that the rules of calculation can be applied to decimal numbers.

### 10 Do the exercise.

T Give the exercise ①, ③, ⑤ and ⑦ and the rest are given as homework.

## Sample Blackboard Plan

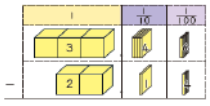
**Date:**
**Chapter:** 13 Decimal Numbers 2.
**Topic: Addition and Subtraction of Decimal Numbers. Lesson No:** 2/2

**Main Task: Let's think about how to subtract decimal numbers in vertical form up to hundredths place.**

[3] Raka's older brother threw paper plane at 3.46m and Raka threw at 2.14m. How long did Raka's brother throw more than Raka did in m?

❶ Mathematical Expression: 3.46 – 2.14

❷Let's think about how to subtract.



**Important Point.**

For subtracting decimal numbers in vertical form, we line up the numbers according to their place value in the same way as whole numbers.

3.46
−2.14
1.32

[4] Let's think about how to subtract 1.25 – 0.67

| | 1 | 2 | 5 |
|---|---|---|---|
| − | 0 | 6 | 7 |
| | | 5 | 8 |

**Exercise.**

① 5.78−3.44 ② 1.54−0.23
③ 8.37−2.09 ④ 6.48−1.92

**MT: Introduce the main task here.**

[5] Let's think about how to subtract the following.

(1) 2.32−1.82

| | 2 | 3 | 2 |
|---|---|---|---|
| − | 1 | 8 | 2 |
| | 0 | 5 | 0 |

(3) 6.71−3.9

| | 6 | 7 | 1 |
|---|---|---|---|
| - | 3 | 9 | |
| | 2 | 8 | 1 |

(2) 6−0.52

| | 6 | | |
|---|---|---|---|
| - | 0 | 5 | 2 |
| | 5 | 4 | 8 |

(4) 5.03−4.25

| | 5 | 0 | 3 |
|---|---|---|---|
| - | 4 | 2 | 5 |
| | 0 | 7 | 8 |

[6] There is a 2.15 m tape, cut off 85 cm length of the tape. How much tape is left?

2.15
- 0.85
1.3 Answer: 1.3 m

[7] Rules of calculation in decimal and why it is appropriate.

(1) 3.8 + 2.3 = 2.3 + 3.8

(2) 3.8 + 2.3 + 2.7 = 3.8 + (2.3 + 2.7)

Rules of calculation can be applied to decimal numbers.

**Exercise**

(1) 0.54 – 0.34 = 0.2
(3) 7.28 – 2.4 = 4.88
(5) 4 – 1.26 = 2.74
(7) 7.08 – 0.29 = 6.79

# Unit 13

# Unit: Decimal Numbers 2
## Sub-unit: Exercise and Evaluation
## Lesson 1 of 1 (Double Period)

Textbook Page : p.158~p.159
Actual Lesson 96

## Lesson Objectives

- To deepen the understanding on contents learned in this unit.

## Prior Knowledge

- All the contents in this Unit

## Preparation

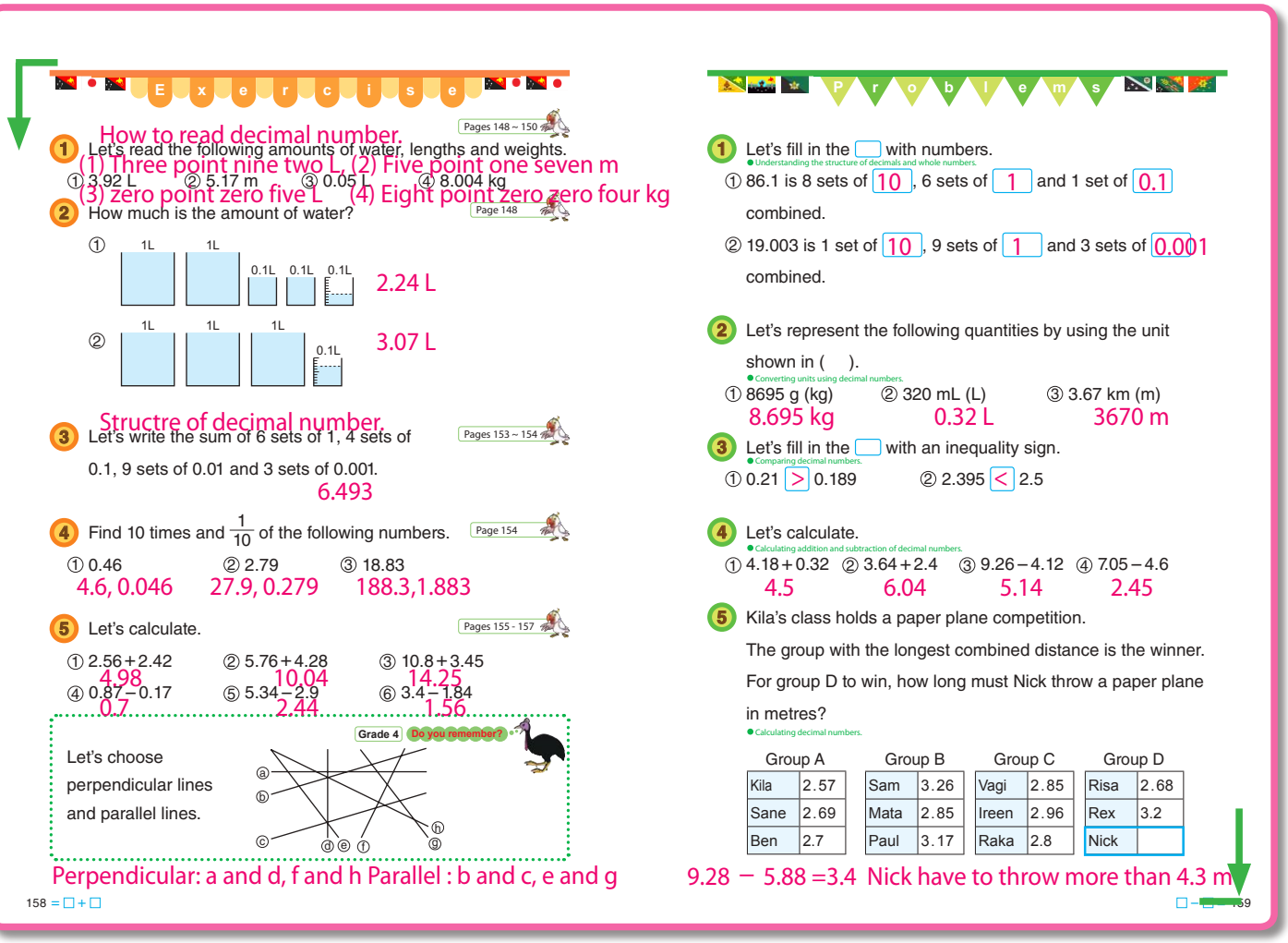
- Evaluation sheets

## Assessment

- Students solve the exercises correctly. F S

### • Teacher's Notes •

Use 30 minutes for the exercise and give the evaluation test after that.



Exercise

Pages 148 ~ 150

1 How to read decimal number.
Let's read the following amounts of water, lengths and weights.
(1) Three point nine two L, (2) Five point one seven m
① 3.92 L ② 5.17 m ③ 0.05 L ④ 8.004 kg
(3) zero point zero five L (4) Eight point zero zero four kg

Page 148

2 How much is the amount of water?
① 2.24 L
② 3.07 L

Pages 153 ~ 154

3 Structre of decimal number.
Let's write the sum of 6 sets of 1, 4 sets of 0.1, 9 sets of 0.01 and 3 sets of 0.001.
6.493

Page 154

4 Find 10 times and $\frac{1}{10}$ of the following numbers.
① 0.46 4.6, 0.046 ② 2.79 27.9, 0.279 ③ 18.83 188.3,1.883

Pages 155 - 157

5 Let's calculate.
① 2.56+2.42 4.98 ② 5.76+4.28 10.04 ③ 10.8+3.45 14.25
④ 0.87−0.17 0.7 ⑤ 5.34−2.9 2.44 ⑥ 3.4−1.84 1.56

Grade 4 Do you remember?
Let's choose perpendicular lines and parallel lines.
Perpendicular: a and d, f and h Parallel : b and c, e and g

158 = □ + □

Problems

1 Let's fill in the □ with numbers.
Understanding the structure of decimals and whole numbers.
① 86.1 is 8 sets of 10, 6 sets of 1 and 1 set of 0.1 combined.
② 19.003 is 1 set of 10, 9 sets of 1 and 3 sets of 0.001 combined.

2 Let's represent the following quantities by using the unit shown in ( ).
Converting units using decimal numbers.
① 8695 g (kg) 8.695 kg ② 320 mL (L) 0.32 L ③ 3.67 km (m) 3670 m

3 Let's fill in the □ with an inequality sign.
Comparing decimal numbers.
① 0.21 > 0.189 ② 2.395 < 2.5

4 Let's calculate.
Calculating addition and subtraction of decimal numbers.
① 4.18+0.32 4.5 ② 3.64+2.4 6.04 ③ 9.26−4.12 5.14 ④ 7.05−4.6 2.45

5 Kila's class holds a paper plane competition.
The group with the longest combined distance is the winner.
For group D to win, how long must Nick throw a paper plane in metres?
Calculating decimal numbers.

| Group A | | Group B | | Group C | | Group D | |
|---|---|---|---|---|---|---|---|
| Kila | 2.57 | Sam | 3.26 | Vagi | 2.85 | Risa | 2.68 |
| Sane | 2.69 | Mata | 2.85 | Ireen | 2.96 | Rex | 3.2 |
| Ben | 2.7 | Paul | 3.17 | Raka | 2.8 | Nick | |

9.28 − 5.88 =3.4 Nick have to throw more than 4.3 m

□ − □ = □ 159

## Lesson Flow

**1** ① Read decimal numbers up to thousandths place.

T Let students read fraction accurately up to thousandths place.

**2** ② Express volume using decimal numbers.

T Concerning question ②, tenth place becomes 0 and must write 0 in the place.

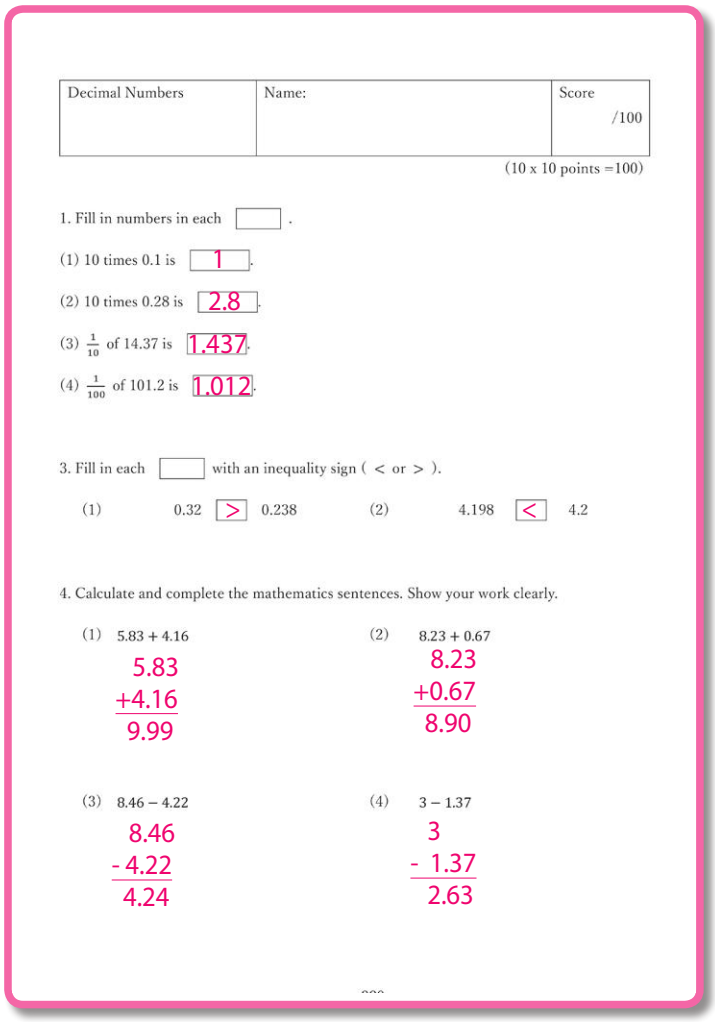
**3** ③ Understand the structure of the decimal number.

**4** ④ Find the number of 10 times and $\frac{1}{10}$.

T Confirm how to move decimal point when multiplying by 10 or $\frac{1}{10}$.

TN It is important not only teaching the technique of moving decimal point but teaching the reason why using place value chart is also important.

**5** ⑤ Calculate addition and subtraction of decimal numbers.



| Decimal Numbers | Name: | Score /100 |
|---|---|---|

(10 x 10 points =100)

1. Fill in numbers in each ☐.

(1) 10 times 0.1 is 1.

(2) 10 times 0.28 is 2.8.

(3) $\frac{1}{10}$ of 14.37 is 1.437.

(4) $\frac{1}{100}$ of 101.2 is 1.012.

3. Fill in each ☐ with an inequality sign ( < or > ).

(1) 0.32 > 0.238 (2) 4.198 < 4.2

4. Calculate and complete the mathematics sentences. Show your work clearly.

(1) 5.83 + 4.16
5.83
+4.16
9.99

(2) 8.23 + 0.67
8.23
+0.67
8.90

(3) 8.46 − 4.22
8.46
- 4.22
4.24

(4) 3 − 1.37
3
- 1.37
2.63

T Let students be aware of the place value when changing to vertical form.

TN Concerning ⑤ and ⑥, the number of digits is different so confirm how to write in vertical form with the whole class.

**6** Do the exercise 'Do you remember?'

**7** ① Structure of decimal number.

T Explain using place value chart for students who do not understand the structure of decimal numbers.

**8** ② Change units applying the knowledge of decimal numbers.

T Confirm that ① 1 kg = 1000 g ② 1 L = 1000 mL ③ 1 km = 1000 m, and let students solve the problems.

**9** ③ Compare the decimal numbers.

T Let the students confirm how to compare the decimal numbers.

1. Compare the number which is in the same place value.

2. In terms of decimal place, a value of number becomes smaller as the place value goes to the right.

Therefore, you have to compare the number from the left.

**10** ④ Calculate addition and subtraction of decimal numbers.

T Let students be aware of the place values when changing to vertical form.

TN Concerning ② and ④, the number of digits is different so confirm how to write in vertical form with whole class.

**11** ⑤ Solve the problem ①.

S Read the problem and understand the situation.

T Confirm that the final rank will be decided by Nick's result, and Team D has to be in the first place.

S Calculate each group's total, and recognise the Team B is leading currently.

T How long does Nick have to throw? Make a math expression.

S 9.28 − 5.88

# Unit 14

# Unit: Thinking about How to Calculate

## Lesson 1 of 2 (Double Periods)

Textbook Page : p.160~p.161
Actual Lesson 97

## Lesson Objectives

- To think about how to calculate 'decimal number' x whole numbers using a table, tape diagram or math expression.

## Prior Knowledge

- Multiplication (2-digit)×(1-digit)
- Decimal number (G4,U13)
- Addition and subtraction of decimal number.

## Preparation

- Tape diagram and table

## Assessment

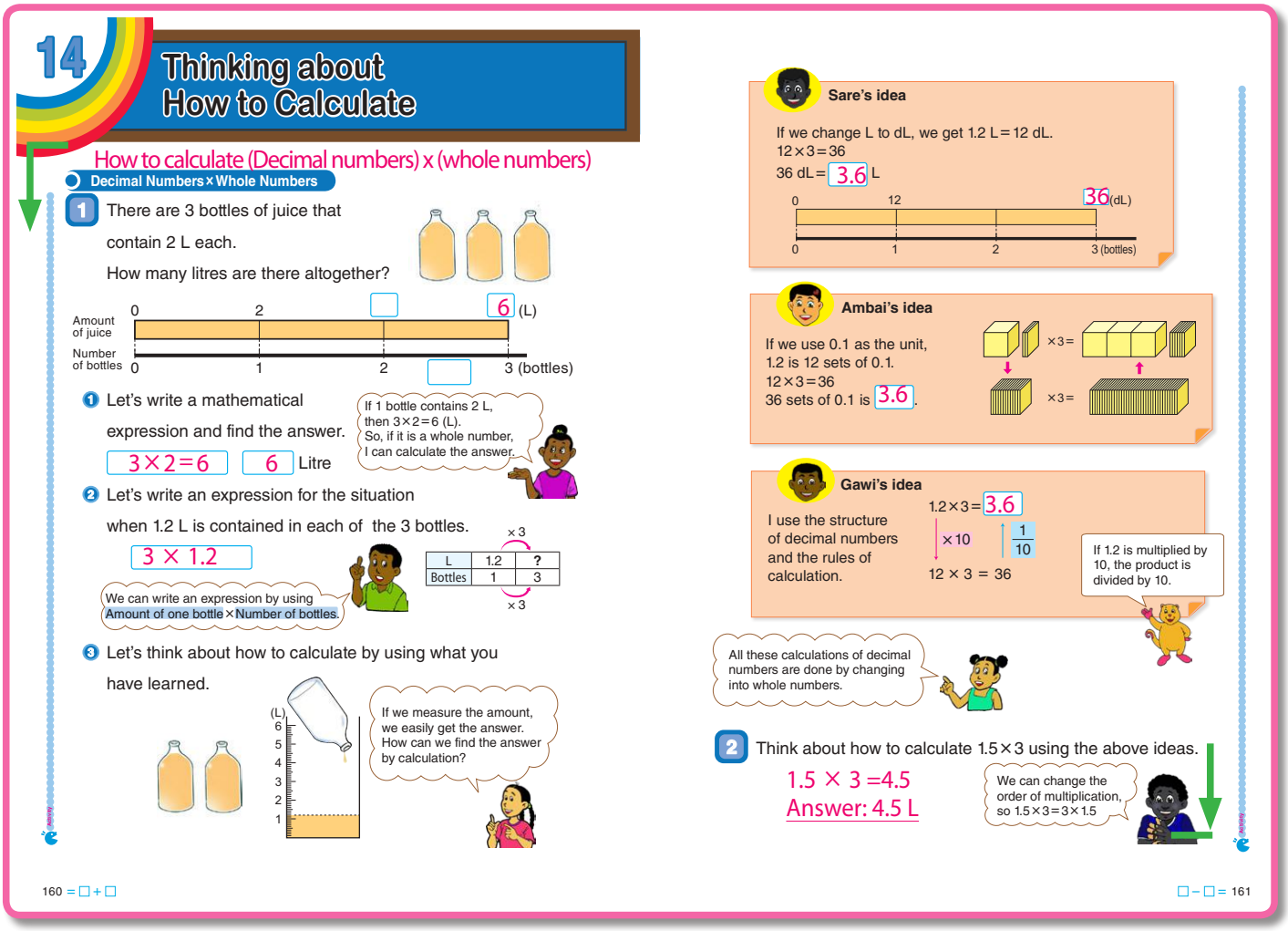
- Think about how to calculate 1.2×3. F
- Solve task ② correctly. F

## • Teacher's Notes •

Decimal Numbers×Whole Numbers is calculated using the three ideas;

- Changing the units
- Using 0.1 as the unit and
- Using rules of calculation.

All the three ideas used are done by changing into whole numbers.



## Lesson Flow

### 1 Introduce objective (Close textbook until Task 2).

T How to calculate (Decimal numbers) × (whole numbers).

### 2 ❶ Read and understand the problem.

T Introduce the main task and explain the situation using the tape diagram.
T ❶ What is the mathematical expression and find the answer?
S 2×3, Answer 6 L
T ❷ If 1.2 L is in each bottle what is the mathematical expression?
S 1.2×3 or 3×1.2
T Explain bubble and table to confirm mathematical expression.

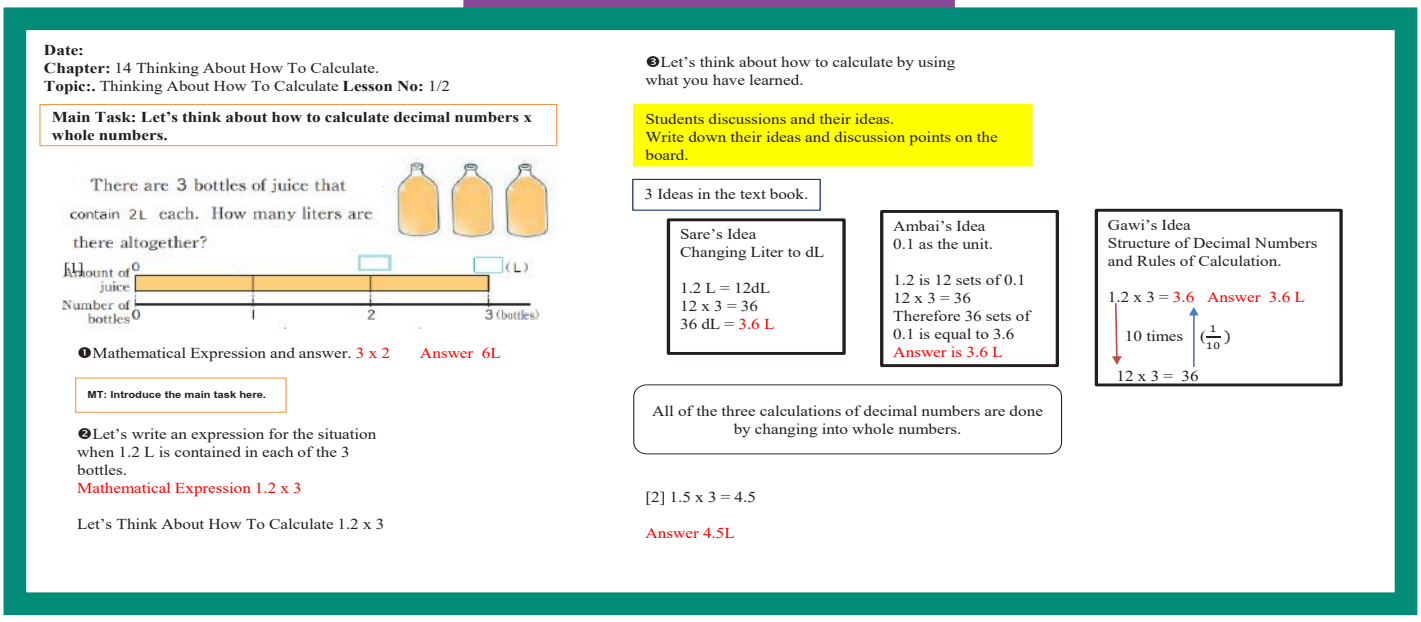
### 3 Let's think about how to calculate 1.2×3.

T ❸ Allow the students (or group) to share their ideas on how to calculate.
Identify students' ideas that similar to textbook ideas.
S Present their ideas.
T Summarise students ideas with Sare, Ambai and Gawi's ideas.
T Introduce and explain Sare, Ambai and Gawi's ideas.
TN Sare's idea:
Changing the unit liter to dL = > 1.2 L = 12 dL, 12×3 = 36 dL, 36 dL = 3.6 L
Ambai's idea:
Thinking 0.1 as the unit, 1.2 is 12 sets of 0.1 so 12×3 = 36, 36 sets of 0.1 is 3.6 Answer 3.6 L
Gawi's idea:
Using rules of calculation and structure of decimal numbers.
1.2 is multiplied by 10, the product is multiplied by $\frac{1}{10}$ to find the answer.
1.2×10 times = > 12, 12×3 = 36, 36× $\frac{1}{10}$ = 3.6 Answer 3.6 L
T Summarise speech bubble. "All three of these calculations of decimal numbers are done by changing into whole numbers."

### 4 ❷ Solve the problem

S Let's think about how to calculate 1.5×3.
T Emphasise on the speech bubble "We can change the order of multiplication, so 1.5×3 = 3×1.5".

## Sample Blackboard Plan



# Unit 14: Unit: Thinking about How to Calculate

## Lesson 2 of 2 (Double Periods)

Textbook Page : p.162~163
Actual Lesson 98

## Lesson Objectives

- To think about how to calculate 'decimal number ÷ 'whole numbers' by using a table, diagram or mathematical expression.

## Prior Knowledge

- Division (2-digit) ÷ (1-digit)
- Decimal number
- Addition and subtraction of decimal number

## Preparation

- Diagram or picture to show the situation in task 3

## Assessment

- Think about how to calculate 5.4 ÷ 4. F
- Solve the task 4. S

## • Teacher's Notes •

Decimal Numbers ÷ Whole Numbers is calculated using the three ideas;

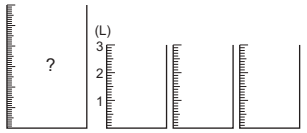
- Changing the units
- Using 0.1 as the unit and
- Using rules of calculation.

All the three ideas used are done by changing into whole numbers.

### How to calculate (Decimal numbers) ÷ (Whole numbers)

**Decimal Numbers ÷ Whole Numbers**

**3** When we divide 5.4 L of juice into 3 bottles equally, how many litres will each bottle contain?



**1** Write a mathematical expression and find the answer.

When we share 9 L, the amount in each bottle is equal to 9 ÷ 3 = 3 (L). But if we share 5.4 L, how can we calculate the answer?

9 ÷ 3 = 3 Answer: 3 L

**2** Let's write a mathematical expression when we put 5.4 L in the blank.

5.4 ÷ 3

| Juice(L) | ? | 5.4 |
|---|---|---|
| Bottles | 1 | 3 |

÷3 ÷3

I can calculate the amount of one bottle by Amount of juice ÷ Number of bottles.

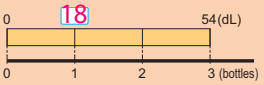
**3** Let's think about how to calculate by using what we have learned.

How can we calculate the answer if we convert L to dL?

Can I calculate the answer by using the division of whole numbers?

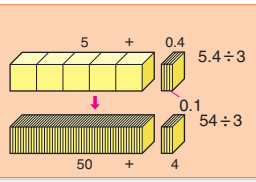
**Mero's idea**

5.4 L = 54 dL
54 ÷ 3 = 18
18 dL = 1.8 L




**Vavi's idea**

5.4 is 54 sets of 0.1.
54 ÷ 3 = 18
18 sets of 0.1 is 1.8.




**Naiko's idea**

I use the structure of decimal numbers and the rules of division.

5.4 ÷ 3 = 1.8
×10 ↑ 1/10
54 ÷ 3 = 18

In division if the dividend is multiplied by 10, the quotient is also multiplied by 10.

All these calculations of decimal numbers are done by changing into whole numbers.

Can you explain these ideas?

**4** Think about how to calculate 5.1 ÷ 3 using the above ideas.

5.1 ÷ 3 = 1.7 Answer: 1.7 L

# Lesson Flow

## 1 Review previous lesson.

## 2 ③ Read the problem and understand the situation. (Close textbook)

T Introduce the main task and explain the situation using diagram.
T ① What is the mathematical expression and find answer?
S 9 ÷ 3, Answer 3 L
T Summarise bubble idea.
T ② If 5.4 L is in each bottle what is the mathematical expression?
S 5.4 ÷ 3
T Explain speech bubbles and table to confirm mathematical expression.

## 3 ③ Let's think about how to calculate 5.4 ÷ 3.

T Allow the students (or group) to share their ideas on how to calculate. (Identify students' ideas that are similar to textbook ideas. And explain speech bubbles.
S Present their ideas.
T Summarise students ideas with Mero, Vavi and Naiko's ideas.
T Introduce and explain Mero, Vavi and Naiko's ideas.
TN Mero's idea:
Changing the unit litre to dL = > 5.4 L = 54 dL, 54 ÷ 3 = 18, 18 dL = 1.8 L
Vavi's idea:
5.4 is 54 sets of 0.1. 54 ÷ 3 = 18. 18 sets of 0.1 is 1.8 Answer 1.8 L
Naiko's idea:
Using rules of calculation and structure of decimal numbers.
5.4 is multiplied by 10, the quotient is multiplied by $\frac{1}{10}$ to find the answer.
5.4 times 10 is 54, 54 ÷ 3 = 18, $18 \times \frac{1}{10} = 1.8$ Answer 1.8 L
T Summarise the speech bubble. "All three of these calculations of decimal numbers are done by changing into whole numbers."

## 4 ④ Solve the problem.

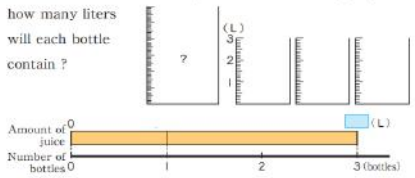
S Think about how to calculate 5.1 ÷ 3.

# Sample Blackboard Plan

**Date:**
**Chapter:** 14 Thinking About How To Calculate.
**Topic:.** Thinking About How To Calculate **Lesson No:** 2/2

**Main Task: Let's think about how to calculate decimal numbers ÷ whole numbers.**

[3] When we divide 9 L of juice into 3 bottles equally, how many liters will each bottle contain ?




❶Mathematical Expression and answer. 9 ÷ 3 Answer 3L

**MT: Introduce the main task here.**

❷Let's write an expression when we share 5.4 L into 3 bottles equally.
Mathematical Expression and answer. 5.4 ÷ 3

| L | ? | 5.4 |
|---|---|---|
| Bottles | 1 | 3 |

(÷3 above, ×3 below)

❸let's think about how to calculate by using what we have learned.

Students discussions and their ideas.
Write down their ideas and discussion points on the board.

3 Ideas in the text book.

Mero's Idea
Changing Liter to dL

5.4 L = 54dL
54 ÷ 3 = 18
18 dL = 1.8 L

Vavi's Idea
0.1 as the unit.

5.4 is 54 sets of 0.1
54 ÷ 3 = 18
18 sets of 0.1 is 1.8
Answer: 1.8 L

Naiko's Idea
Structure Decimal Numbers and Rules of Calculation.

5.4 ÷ 3 = 1.8 Answer: 1.8 L
x 10 ($\frac{1}{10}$)
54 ÷ 3 = 18

All of the three calculations of decimal numbers are done by changing into whole numbers.

[4] 5.1 ÷ 3
5.1 L = 51 dL
51 ÷ 3 = 17
17dL = 1.7 L

- Students can use the other two ideas to find their answers. "0.1 as the unit and rules of calculation".

**End of Chapter Test: Chapter 13&14** **Date:**

| Decimal Numbers | Name: | Score /100 |
|---|---|---|

(10 x 10 points =100)

1. Fill in numbers in each ☐ .

(1) 10 times 0.1 is ☐.

(2) 10 times 0.28 is ☐.

(3) $\frac{1}{10}$ of 14.37 is ☐.

(4) $\frac{1}{100}$ of 101.2 is ☐.

3. Fill in each ☐ with an inequality sign ( $<$ or $>$ ).

(1) 0.32 ☐ 0.238 (2) 4.198 ☐ 4.2

4. Calculate and complete the mathematics sentences. Show your work clearly.

(1) $5.83 + 4.16$ (2) $8.23 + 0.67$

(3) $8.46 - 4.22$ (4) $3 - 1.37$

# Chapter 15 Arrangement of Data

## 1. Unit Objectives

- To collect the data according to the objective. (4.4.3a)
- To arrange the data and the table. (4.4.3b)
- Analyse the data from the table. (4.4.3c)

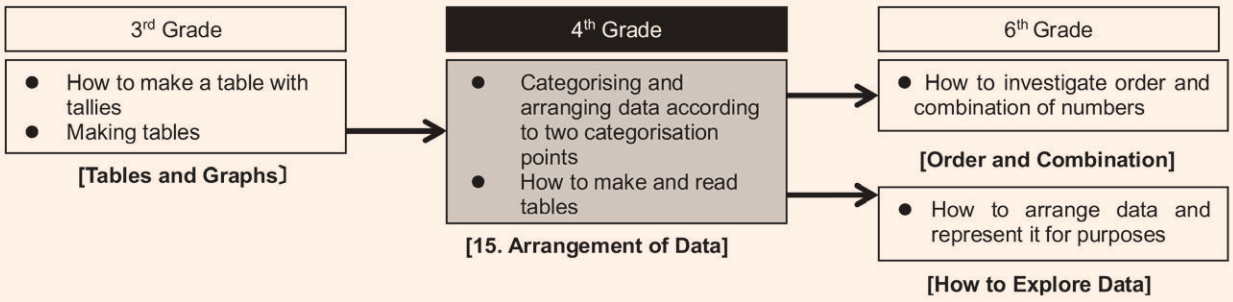
## 2. Teaching Overview

In Grade 3, students learned how to organise data in a table with a single dimension and generate a bar chart. In this unit, they will learn how to organise data in a double dimensional table and capture the features and tendencies of the data.

**Arrangement of Table :** They learn how to organise data by 2 perspectives in the same table (2-dimensional table). 2 perspectives by 2 categories make 4 perspectives. Arrangement of data enables us to capture the tendencies of data for better analysis and they will appreciate it.

**Arrangement of Data :** The utilisation of numbers on the columns for total will be appreciated when students check if the organisation/counting is correct or not.

## 3. Related Learning Contents



# Unit 15

# Unit: Arrangement of Data
## Sub-unit: 1. Arrangement of Table
## Lesson 1 of 2 (Double Period)

Textbook Page : p.164~p.166
Actual Lesson 99

## Sub-unit Objectives

- To arrange the table by focusing on the necessary information collected.
- To analyse the points from the table.

## Lesson Objectives

- To understand how to arrange the data using the table.

## Prior Knowledge

- Arrangement and representation of data in tables. (Grade 3)

## Preparation

- Tables

## Assessment

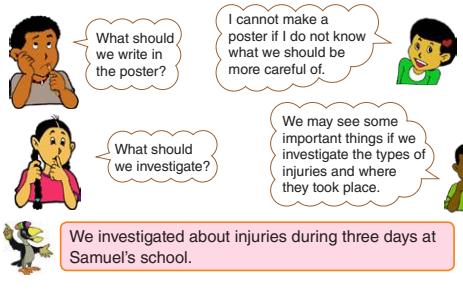
- Arrange the data correctly with correct facts and figures on a table. F S

## • Teacher's Notes •

Data is a general term used to describe a collection of facts, numbers, measurements or symbols.
The arrangement of Data using tables in this lesson is based on two objectives.
1. Number of Children and Locations.
2. Number of Children and Injury.

15 Arrangement of Data

Samuel was injured during sports day. He wants to make a poster to tell children to be more careful.




We investigated about injuries during three days at Samuel's school.

**Record of Injuries**

| Grade | Locations | Type of injury |
|---|---|---|
| 5 | Basketball court | Bruise |
| 4 | Soccer field | Cut |
| 5 | Basketball court | Bruise |
| 7 | Volley ball court | Scratch |
| 3 | Classroom | Scratch |
| 3 | Soccer field | Fracture |
| 6 | Classroom | Scratch |
| 5 | Volley ball court | Cut |
| 4 | Soccer field | Scratch |
| 5 | Classroom | Scratch |
| 3 | Classroom | Bruise |

| Grade | Locations | Type of injury |
|---|---|---|
| 7 | Volley ball court | Scratch |
| 8 | Soccer field | Scratch |
| 6 | Classroom | Cut |
| 6 | Soccer field | Sprained finger |
| 5 | Volley ball court | Sprain |
| 5 | Classroom | Scratch |
| 6 | Basketball court | Bruise |
| 4 | Classroom | Cut |
| 8 | Soccer field | Bruise |
| 6 | Volley ball court | Scratch |
| 4 | Basketball court | Bruise |

Let's think about how to make a table to see the locations and the types of injuries.

Making the table according to the objective

### 1 Arrangement of Table

1 Let's arrange the data in the above table and check the injuries at the school.

1 Check where the injuries happened.

Ⓐ Where do injuries happen most frequently?
Draw a table and check.
Classroom

Ⓑ Tell everyone what you have discovered.

Number of Children and Locations

| Locations of injury | Numbers of children | |
|---|---|---|
| Soccer field | 𝍸 \| | 6 |
| Basketball court | \|\|\| | 4 |
| Volley ball court | \|\|\|\| | 5 |
| Classroom | \|\|\|\|\| | 7 |
| Total | | 22 |

Ex. The least injuries occured in the Basketball court.

164 = □ − □

□ ÷ □ = 165

## Lesson Flow

### 1 Observe the picture and start the discussion.

T Ask the students to observe the pictures and discuss using the hints and questions in the bubbles.

S Participate in the discussion using the hints and questions in the bubbles.

T Your discussions and opinions will now lead us to the investigation about injuries done at Samuel's school.

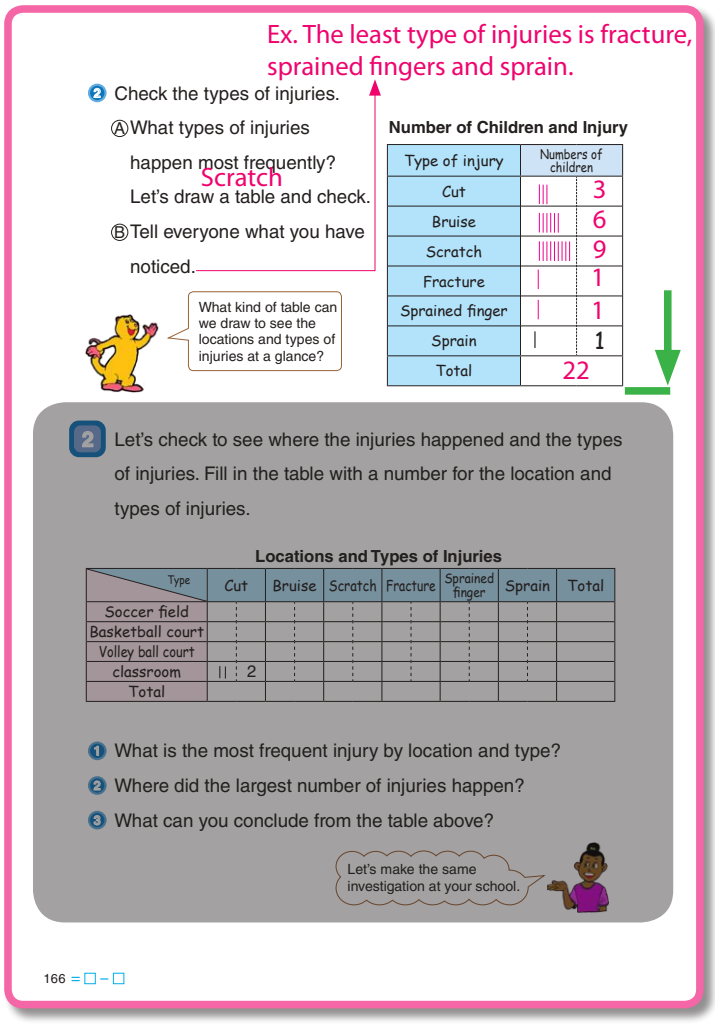
### 2 Record of data on the table for discussion.

S Observe the data on the table for discussion.

T Pose the questions for discussions?

1. What is the table about?
2. Name some of the locations where injuries occur.
3. What kinds of injuries occur at certain locations?

S Observe the table and answer the questions posed by the teacher.




T Explain what data is. **Data is a general term used to describe a collection of facts, numbers, measurements or symbols.** Refer to the table of Record of Injuries as an example.

T Introduce the main task.

### 3 1 Think about how to make a table to see the locations and types of injuries using the table "Number of Children and Locations".

T 1 Explain to the students to arrange the data using the 1st table. The objective is focused on the Number of children and Locations.

S Arrange the data in table by drawing the table as in the textbook.

S Answer 1 Ⓐ Ⓑ.

### 4 Think about how to make a table to see the locations and types of injuries using the table "Number of Children and Injury".

T 2 Explain to the students to arrange the data using the 2nd table. The objective is focused on the Number of children and Injury.

S Arrange the data in table by drawing the table as in the text book.

S Answer 2 Ⓐ Ⓑ.

### 5 What kind of table can be made to see the locations and types of injuries at a glance?

S Think about how to combine the 2 tables and prepare their ideas (Homework).

## Sample Blackboard Plan

Refer to Page 225.

# Unit 15

# Unit: Arrangement of Data
## Sub-unit: 1. Arrangement of Table
## Lesson 2 of 2 (Single Period)

Textbook Page : p.166
Actual Lesson 100

## Lesson Objectives

- To combine two tables to make only one table by filling in the correct information from the data collected.
- To discuss and interpret the information from the table.

## Prior Knowledge

- Arrangement of data in a table.
- Read and write information on and from the table.
- Write the figures in number and tally forms.

## Preparation

- Tables for task 2

## Assessment

- Use the information from the two tables and draw only one table by filling in the correct information. F S
- Think about what is found from the table. F S

## • Teacher's Notes •

The two tables from the 1st lesson were drawn according to objectives as mentioned in the 1st lesson vertically. This 2nd lesson is the combination of the two tables and the objectives into only one table in horizontal arrangement for the students to read and interpret the information.
For task 2 especially 3, the answers may vary depending on students reasons after studying the table.

2 Check the types of injuries.
Ⓐ What types of injuries happen most frequently? Let's draw a table and check.
Ⓑ Tell everyone what you have noticed.

What kind of table can we draw to see the locations and types of injuries at a glance?

**Number of Children and Injury**

| Type of injury | Numbers of children |
|---|---|
| Cut | |
| Bruise | |
| Scratch | |
| Fracture | |
| Sprained finger | |
| Sprain | 1 |
| Total | |

2 Let's check to see where the injuries happened and the types of injuries. Fill in the table with a number for the location and types of injuries.

**Locations and Types of Injuries**

| Type | Cut | Bruise | Scratch | Fracture | Sprained finger | Sprain | Total |
|---|---|---|---|---|---|---|---|
| Soccer field | 1 | 1 | 2 | 1 | 1 | | 6 |
| Basketball court | | 4 | | | | | 4 |
| Volley ball court | 1 | | 3 | | | 1 | 5 |
| classroom | 2 | 2 | 3 | | | | 7 |
| Total | 4 | 7 | 8 | 1 | 1 | 1 | 22 |

**Record of Injuries**

| Grade | Locations | Type of injury |
|---|---|---|
| 5 | Basketball court | Bruise |
| 4 | Soccer field | Cut |
| 5 | Basketball court | Bruise |
| 7 | Volley ball court | Scratch |
| 3 | Classroom | Scratch |
| 3 | Soccer field | Fracture |
| 6 | Classroom | Scratch |
| 5 | Volley ball court | Cut |
| 4 | Soccer field | Scratch |
| 5 | Classroom | Scratch |
| 3 | Classroom | Bruise |

| Grade | Locations | Type of injury |
|---|---|---|
| 7 | Volley ball court | Scratch |
| 8 | Soccer field | Scratch |
| 6 | Classroom | Cut |
| 6 | Soccer field | Sprained finger |
| 5 | Volley ball court | Sprain |
| 5 | Classroom | Scratch |
| 6 | Basketball court | Bruise |
| 4 | Classroom | Cut |
| 8 | Soccer field | Bruise |
| 6 | Volley ball court | Scratch |
| 4 | Basketball court | Bruise |

1 What is the most frequent injury by location and type?
Scratch in the soccer
2 Where did the largest number of injuries happen?
Classroom
3 What can you conclude from the table above?
Ex. Few injuries that happened were fractures, sprained finger and sprain.

Let's make the same investigation at your school.

166 = □ − □

# Lesson Flow

## 1 Check students' homework and ideas from the 1st lesson.

T Before opening the textbook ask the students to share their ideas and sample of the home work given.

S Share their ideas and sample of the homework.

T Praise their efforts and tell them to turn to page 166.

## 2 Observe the table and find the information.

T Ask students to work in groups to draw the table.

S Draw the table and fill in the table with correct information.

TN Horizontal for types of injuries and vertical for the location of injuries.
For each injury in a location, it has two columns. First column is for the tally and second column is for the number.

T Let students know about the combination of the two tables into only one table with the information.

S Observe the table and discuss.

## 3 2 Find answers to 1 2 3.

T Introduce the main task.

S Find answers and share with the others.

# Sample Blackboard Plan (Lesson99)

**Date:**
**Chapter:** 15 Arrangement of Data.
**Topic:** Arrangement of Table. **Lesson No:** 1/2

**Main Task: Let's think about how to make a table to see the locations and the types of injuries.**

MT: Introduce main task here.

[1] Let's arrange the data from the table and check the injuries at the school.
❶Check where the injuries happened.
A. Draw a table and check where do injuries happen most frequently? Classroom

**Number of Children and Locations.**

| Locations of Injury | Numbers of Children | |
|---|---|---|
| Soccer field | 𝍸 | 6 |
| Basketball court | 𝍸 | 4 |
| Volley ball court | 𝍸 | 5 |
| Classroom | 𝍸 | 7 |
| Total | | 22 |

B What you have noticed.
Example: The least injuries occurred in the Basketball Court.

❷Check the types of injuries.
A. Draw a table and check what type of injuries happen most frequently? scratch

**Number of Children and Injury.**

| Type of Injury | Numbers of Children | |
|---|---|---|
| Cut | 𝍸 | 3 |
| Bruise | 𝍸 | 6 |
| Scratch | 𝍸 | 9 |
| Fracture | 𝍸 | 1 |
| Sprained Finger | 𝍸 | 1 |
| Sprain | 𝍸 | 1 |
| Total | | 22 |

B What you have noticed.
Example: The least type of injuries occurred were fracture, sprained fingers and sprained.

Use students ideas to fill in the tables and confirm with the answers given in the manual.

# Sample Blackboard Plan (Lesson100)

**Date:**
**Chapter:** 15 Arrangement of Data.
**Topic:** Arrangement of Table. **Lesson No:** 2/2

**Main Task: Let's think about how to arrange data from 2 (two) separate tables into 1 (one) table.**

MT: Introduce main task here.

Students discussions and their ideas.
Write down their ideas and discussion points on the board from what they have done as their home work.

[2] Let's check to see where the injuries happened and the types of injuries. Fill in the table with a number for the location and types of injuries.

| Location \ Type | Cut | | Bruise | | Scratch | | Fracture | | Sprained Finger | | Sprain | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Soccer field | 𝍸 | 1 | 𝍸 | 1 | 𝍸 | 2 | 𝍸 | 1 | 𝍸 | 1 | | | 6 |
| Basketball Court | | | 𝍸 | 4 | | | | | | | | | 4 |
| Volleyball Court | 𝍸 | 1 | | | 𝍸 | 3 | | | | | 𝍸 | 1 | 5 |
| Classroom | 𝍸 | 2 | 𝍸 | 1 | 𝍸 | 4 | | | | | | | 7 |
| Total | | 4 | | 6 | | 9 | | 1 | | 1 | | 1 | 22 |

❶Where is the most frequent injury by location and time?
Scratch in the soccer field.
❷ Where did the largest number of injuries happen?
Classroom
❸ What can you conclude from the table above?
Example: Few injuries that happened were fracture, sprained fingers and sprained.

Use students responces to fill in the table whilst confirming with the given answers in the manual.

# Unit 15

# Unit: Arrangement of Data
## Sub-unit: 2. Arrangement of Data
## Lesson 1 of 1 (Double Periods)

Textbook Page : p.167
Actual Lesson 101

## Sub-unit Objectives

- To arrange the collected data for easy understanding of the information.
- To read the table and discuss the information.

## Lesson Objectives

- To arrange the data collected and make a table.

## Prior Knowledge

- Arrangement of data in a table.
- Read and write information on and from the table.

## Preparation

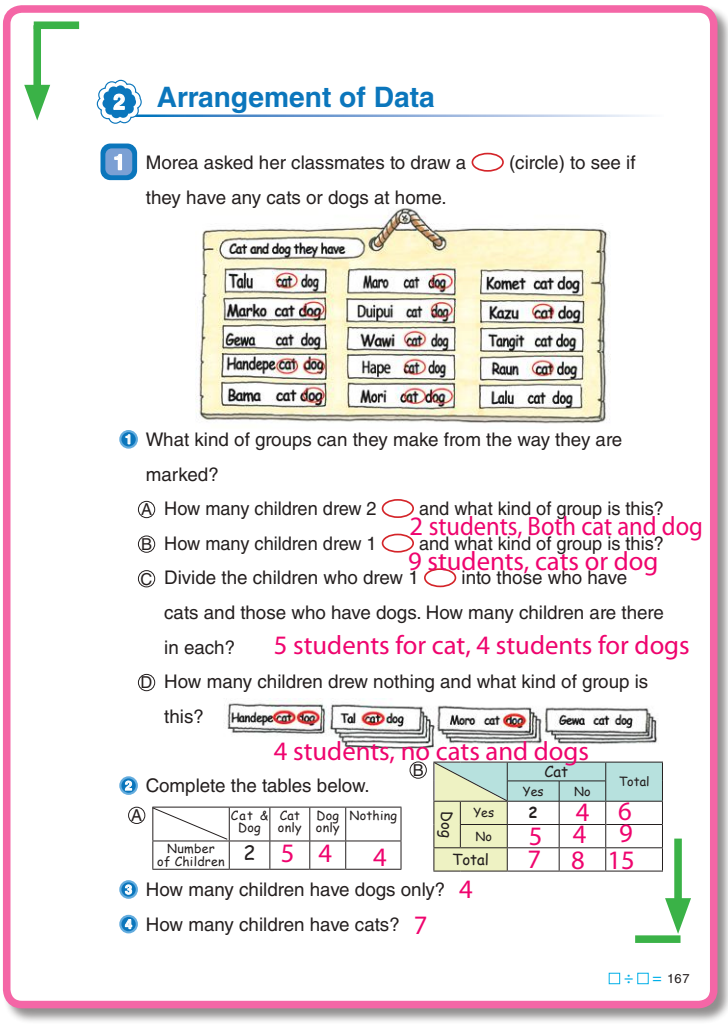
- Table for task 1

## Assessment

- Make a table correctly by arranging the collected data. F S

## • Teacher's Notes •

For the blackboard plan as planned **do not** write the answers typed in red. The children will give the answers as you write on the board.



### 2 Arrangement of Data

1 Morea asked her classmates to draw a ◯ (circle) to see if they have any cats or dogs at home.

Cat and dog they have

| | | |
|---|---|---|
| Talu cat dog | Maro cat dog | Komet cat dog |
| Marko cat dog | Duipui cat dog | Kazu cat dog |
| Gewa cat dog | Wawi cat dog | Tangit cat dog |
| Handepe cat dog | Hape cat dog | Raun cat dog |
| Bama cat dog | Mori cat dog | Lalu cat dog |

1 What kind of groups can they make from the way they are marked?

Ⓐ How many children drew 2 ◯ and what kind of group is this? 2 students, Both cat and dog

Ⓑ How many children drew 1 ◯ and what kind of group is this? 9 students, cats or dog

Ⓒ Divide the children who drew 1 ◯ into those who have cats and those who have dogs. How many children are there in each? 5 students for cat, 4 students for dogs

Ⓓ How many children drew nothing and what kind of group is this? Handepe cat dog, Tal cat dog, Moro cat dog, Gewa cat dog — 4 students, no cats and dogs

2 Complete the tables below.

Ⓐ

| | Cat & Dog | Cat only | Dog only | Nothing |
|---|---|---|---|---|
| Number of Children | 2 | 5 | 4 | 4 |

Ⓑ

| Dog \ Cat | Yes | No | Total |
|---|---|---|---|
| Yes | 2 | 4 | 6 |
| No | 5 | 4 | 9 |
| Total | 7 | 8 | 15 |

3 How many children have dogs only? 4

4 How many children have cats? 7

□ ÷ □ = 167

## Lesson Flow

### 1 Review previous lesson.

### 2 1 Confirm the data collected.

T Ask the students to read through the information collected and confirm the data.

S Read through the information and confirm the data.

Ex: • Who has a cat and a dog in their home is surveyed.

• There are 4 groups, Cats only, Dogs only, Cats and dogs, none.

### 3 Answer questions 1 Ⓐ Ⓑ Ⓒ Ⓓ.

S Answer the questions 1 Ⓐ Ⓑ Ⓒ Ⓓ.

T Ask the students to explain their answers for confirmation with the others.

TN Let sudents understand that there are 4 types of information (Cats only, Dogs only, Cats and dogs and none), and confirm one by one. Use the information to complete the table.

### 4 1 2 Complete the table.

S Complete the table by drawing the table and filling in the correct information.

S Answer activities 3 and 4.

T Check students' work and allow students to share their answers with the others.

## Sample Blackboard Plan

**Date:**
**Chapter:** 15 Arrangement of Data.
**Topic:** Arrangement of Data. **Lesson No:** 1/1

**Main Task: Let's arrange data collected by Morea from her research and represent them on a table.**

MT: Introduce main task here.

[1] ❶What kind of groups can they make from the way they are marked?

Ⓐ How many children drew 2 and what kind of group is this?
2 children and the group is both.
Ⓑ How many children drew 1 and what kind of group is this?
9 children and the group is cats or dogs.
Ⓒ Divide the children who drew 1 into those who have cats and those who have dogs. How many children are there each?
5 children for cats and 4 children for dogs.
Ⓓ How many children drew nothing and what kind of group is this?
4 children and the group is no cats and dogs.

● **Complete the tables.**

A

| | Cat & Dog | Cat only | Dog Only | Nothing |
|---|---|---|---|---|
| Number of children | 2 | 5 | 4 | 4 |

●How many children have only dogs? 4

● How many children have cats? 7

B (children)

| | | Cat | | Total |
|---|---|---|---|---|
| | | Yes | No | |
| Dog | Yes | 2 | 4 | 6 |
| | No | 5 | 4 | 9 |
| Total | | 7 | 8 | 15 |

# Unit 15

# Unit: Arrangement of Data
## Sub-unit: Exercise and Evaluation
## Lesson 1 of 1 (Double period)

Textbook Page : p.168~p.169
Actual Lesson 102

## Lesson Objectives

- To deepen their understanding of what they have learned in this unit.

## Prior Knowledge

- All the contents in this unit.

## Preparation

- Evaluation sheets for students

## Assessment

- Solve the exercise correctly. F S

### • Teacher's Notes •

Use 30 minutes for the exercise and give the evaluation test after that.

## Exercises

1 Gima investigated the traffic accidents in her town.
From her data, make the table below and explain what you noticed to your friends.

Pages 164 ~ 166

**Accidents with Primary School Children (Gima's City for One Year)**

| When | Cause | When | Cause |
|---|---|---|---|
| Playing | Running into the street | Playing | Crossing in front of cars |
| On the way to or from friends house | Outside the crosswalk | On the way to or from friends house | Running into the street |
| Playing | Running into the street | Shopping | Running into the street |
| Playing | Running into the street | Playing | Crossing on red light |
| On the way to or from school | Outside the crosswalk | Playing | Running into the street |
| Playing | Crossing on red light | On the way to or from school | Crossing in front of cars |
| Shopping | Crossing in front of cars | On the way to or from school | Running into the street |
| Playing | Running into the street | Playing | Outside the crosswalk |
| On the way to or from school | Running into the street | Playing | Running into the street |
| Shopping | Outside the crosswalk | On the way to or from school | Running into the street |
| Playing | Crossing on red light | On the way to or from school | Outside the crosswalk |

**Accidents with Primary School Children**

| When \ Cause | Running into street | Outside crosswalk | Crossing on red light | Crossing in front of cars | Total |
|---|---|---|---|---|---|
| Playing | 6 | 1 | 3 | 1 | 11 |
| On the way to or from friends house | 1 | 1 | | | 2 |
| On the way to or from school | 3 | 2 | | 1 | 6 |
| Shopping | 1 | 1 | | 1 | 3 |
| Total | 11 | 5 | 3 | 3 | 22 |

## Problems

1 The table below is a record of injuries for the grade 4 children in Robert's school. Complete the table below.

● Understanding how to make a table to show two things at once.

**Record of Children Who Had Injuries**

| Name | Place | Type of injury | Name | Place | Type of injury |
|---|---|---|---|---|---|
| Kara | Soccer field | Scratch | Sasa | Soccer filed | Bruise |
| Ted | Classroom | Cut | Yema | Soccer filed | Cut |
| Wena | Classroom | Scratch | Karo | Volleyball court | Scratch |
| Ziko | Volleyball court | Sprain | Yaga | Volleyball court | Bruise |
| Sete | Basketball court | Bruise | Dada | Classroom | Scratch |
| Nina | Volleyball court | Sprained finger | Manu | Volleyball court | Scratch |

**Locations and Types of Injuries**

| Place \ Type of Injury | Scratch | Cut | Sprain | Bruise | Sprained finger | Total |
|---|---|---|---|---|---|---|
| Soccer field | 1 | 1 | | 1 | | 3 |
| Classroom | 2 | 1 | | | | 3 |
| Volleyball court | 2 | | 1 | 1 | 1 | 5 |
| Basketball court | | | | 1 | | 1 |
| Total | 5 | 2 | 1 | 3 | 1 | 12 |

2 Julie made a record about the brothers and sisters of her classmates. There are 36 children in the class.

● Making and reading a table.

Children who have older brothers…12

Children who have older sisters…6

Children who do not have any older brothers or older sisters…18

Complete the table on the right.

| | | Older brother: Yes | Older brother: No | Total |
|---|---|---|---|---|
| Older sister | Yes | 0 | 6 | 6 |
| | No | 12 | 18 | 30 |
| Total | | 12 | 24 | 36 |

168 = □ − □

□ ÷ □ = 169

## Lesson Flow

### 1 ① Traffic accidents with Elementary School Children.

T Ask students to discuss the traffic accidents as in the table and share what information they find. Pose questions to help and guide the discussions.

S Discuss the traffic accidents and share information with friends in class.

### 2 Making a table for the traffic accidents for Elementary School Children.

S Draw the table for the traffic accidents by analysing the data collected with correct tally, figure and information to be displayed on the table.

### 3 ① Record of injuries for the fourth grade children.

S Discuss the record of injuries for the fourth grade children and share information with friends in class.

S Draw the table by analysing the data collected with correct tally, figure and information to be displayed on the table.

### 4 ② Making and reading the table for brothers and sisters in a class.

S Draw the table with correct figure and information for brothers and sisters in Julie's class.

T Observe students work for checking, correction and evaluation for the unit.

| Arrangement of Data | Name: | Score /100 |
|---|---|---|

1. Look at the figures in the box below.

(1) Classify the figures and fill in the table. [16 × 4 points = 64 points in total]

| | Circle | Square | Triangle | Heart | Star | Total |
|---|---|---|---|---|---|---|
| White | 5 | 4 | 0 | 4 | 2 | 1 |
| Black | 4 | 3 | 5 | 0 | 1 | 13 |
| Total | 9 | 7 | 5 | 4 | 3 | 28 |

(2) Which colours, black or white symbols are more? [12 points]

Answer: White marks

(3) Which symbols are the most? [12 points]

Answer: Circles

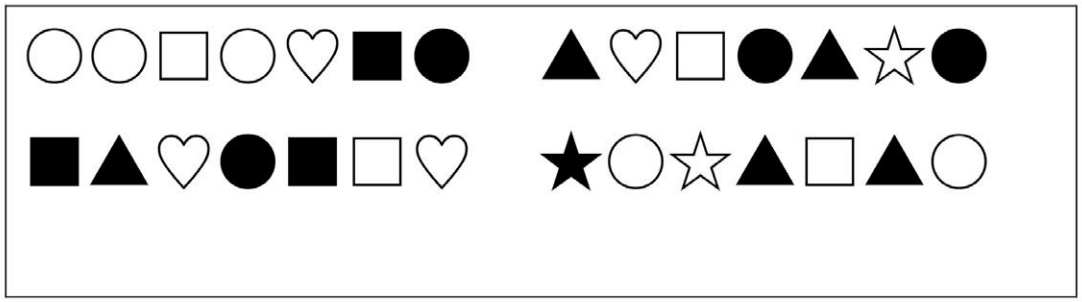
(4) Which symbol has none of the white ones? [12 points]

Answer: Triangle

**End of Chapter Test: Chapter 15** **Date:**

| Arrangement of Data | Name: | Score /100 |
|---|---|---|

1. Look at the figures in the box below.



(1) Classify the figures and fill in the table. [16 × 4 points = 64 points in total]

| | Circle | Square | Triangle | Heart | Star | Total |
|---|---|---|---|---|---|---|
| White | 5 | | | | | |
| Black | | | | | | |
| Total | | | | | | 28 |

(2) Which colours, black or white symbols are more? [12 points]

Answer:

(3) Which symbols are the most? [12 points]

Answer:

(4) Which symbol has none of the white ones? [12 points]

Answer:

# Chapter 16 Multiplication and Division of Decimal Numbers

## 1. Unit Objectives

- To recognise the meaning of multiplication and division of decimal number.(4.1.8a and b)
- To calculate multiplication and division when multiplicand or dividend is a decimal number.(4.1.8c and d)

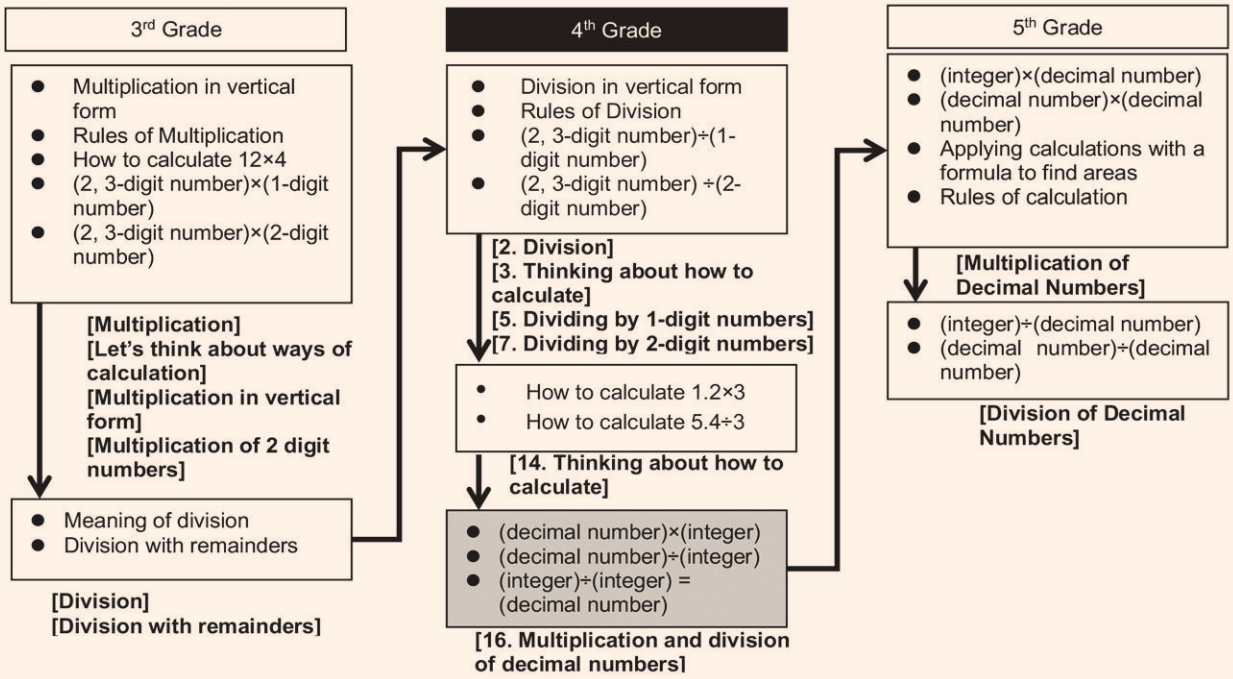
## 2. Teaching Overview

**Calculation of '(Decimal numbers) × or ÷ (Whole numbers)' :** In the learning of decimals multiplied by whole numbers, if they learn it as repeated addition of decimal numbers, they will definitely face a problem in the learning of decimals multiplied by decimals. Therefore, this topic is to make the foundation of learning decimal multiplied by decimal with the use of a diagram with a tape and a number line. They should get used to the utilization of the diagrams and explain their ideas using them. Division is also the same.

**Division Problems :** As they solve word problems, it is important to estimate the quotient before finding accurate answers. They should approximate numbers by rounding numbers before calculating. It may sometimes help them to strategise how to calculate.

**What kind of Expression :** They can strategise and identify the operations by understanding the situations using the diagram with a number line and a tape.

## 3. Related Learning Contents



# Unit 16

# Unit: Multiplication and Division of Decimal Numbers
## Sub-unit: 1. Calculations of (Decimal Number)×(Whole Number)
## Lesson 1 of 3 (Double Period)

Textbook Page : p.170~p.175
Actual Lesson 103

## Sub-unit Objectives

- To understand the meaning of (Decimal number)×(Whole number) based on a number line and table.
- To think about how to calculate (Decimal number)×(Whole number).
- To understand how to calculate (Decimal number)×(Whole number) in vertical form.

## Lesson Objectives

- To understand the meaning of (Decimal number)×(Whole number) based on a number line and table.
- To think about how to calculate (Decimal number)×(Whole number) in vertical form.

## Prior Knowledge

- Decimal numbers 2
- Multiplication of whole number (2-digit)×(1-digit)
- Addition and subtraction of decimal number.

## Preparation

- Refer to the blackboard plan.

## Assessment

- Think about how to calculate (Decimal number)×(Whole number) in vertical form. F
- Do the exercise correctly. S

## • Teacher's Notes •

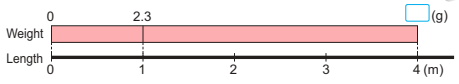
Use the tape diagram and the table of information to explain the concepts. This method will help students to understand better on multiplication and division problems of decimal numbers.

16 Multiplication and Division of Decimal Numbers

### 1 Calculations of (Decimal Number)×(Whole Number)

#### Meaning of (Decimal number) × (Whole number)

1 There is a 1 m wire that weighs 2.3 g.
How many grams does 4 m of the same wire weigh?



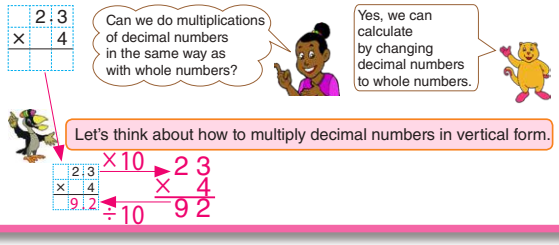

❶ Let's write a mathematical expression.
2.3 × 4

| | | | |
|---|---|---|---|
| g | 2.3 | ? | ×4 |
| m | 1 | 4 | ×4 |

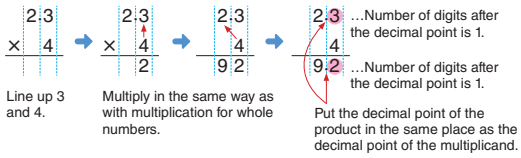
❷ Approximately how many grams does it weigh? 2 × 4=8
❸ Let's think of ways on how to calculate. Approximatelty 8 g

Refer to BB Plan

❹ Let's think about how to multiply in vertical form.



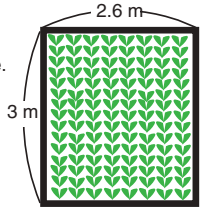

**multiplication Algorithm for 2.3×4 in Vertical Form**




#### Understanding (decimal number)×(1-digit whole number)

2 What is the area of a plant nursery that is 2.6 m wide and 3 m long in m²? 2.6 × 3

❶ Write a mathematical expression.
❷ Let's think of ways on how to calculate.
Refer to BB Plan
❸ Let's multiply in vertical form.




2 6
× 3
7 8

#### How to calculate (Decimal number) × (1-digit Whole number)

3 Let's think about how to multiply in vertical form.

❶ 3.2×6= ❷ 0.8×7=

3 2
× 6
1 9 2

0 8
× 7
5 6

**Exercise**

Let's multiply in vertical form.

① 3.2×3 9.6 ② 3.3×3 9.9 ③ 1.8×2 3.6 ④ 1.4×3 4.2
⑤ 2.4×4 9.6 ⑥ 4.3×6 25.8 ⑦ 0.7×6 4.2 ⑧ 0.8×4 3.2

□×□= 171

## Lesson Flow

### 1 ❶ Read and understand the situation and make a mathematical expression.

S ❶ Read the problem and make mathematical a expression.
T ❷ Predict the answer by rounding number.
TN It is important that students predict the answer to improve their number sense.
S ❸ Think of ways on how to calculate 2.3×4.
T Let students think using learned knowledge and come up with different ways.
TN Refer to the blackboard plan for three possible ways.
T ❹ Let's think about how to calculate in vertical form.
T Confirm by calculating same as whole number and put the decimal point in the same place as in the multiplicand.

### 2 Summarise how to calculate (Decimal number)×(Whole number) in vertical form.

T Explain the steps on calculation using the summary in the textbook.

### 3 ❷ Solving math problem involving (decimal number)×(whole number).

T ❶ Read and understand the problem in ❷ and make a mathematical expression
T Confirm by using the formula (L×W) to find the area.
S ❷ Calculate 2.6×3 using vertical form.
T ❸ Confirm that the way of calculation is same as the whole number even carrying over.

### 4 ❸ Practice multiplying decimal numbers with whole numbers in vertical form.

TN Refer to the blackboard plan.

### 5 Do the exercise.

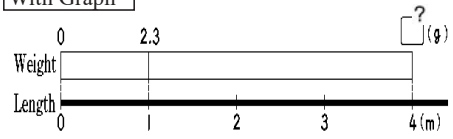
## Sample Blackboard Plan

**Date:** **Chapter:** Multiplication and Division of Decimal Numbers **Topic:** Decimal Number x Whole Number **Lesson N°:** 1/3

MT Let's think about how to multiply decimal numbers × 1-digit whole numbers in vertical form.

1 There is a 1 m wire that weigh 2.3 g. How many grams does the 4 m of the same wire weigh?

With Graph




1 Mathematical expression
**2.3 × 4**

2 Estimate how many grams does it weigh? 2 × 4 = 8…..Approximately 8 g.

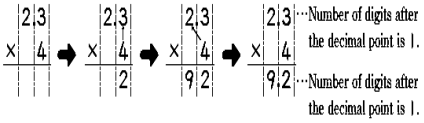
3 Let's think about how to calculate.

By sets
There are 23 sets of 0.1 in 2.3
So, 23 × 4 = 92 sets of 0.1
Hence 92 sets of 0.1 = 9.2 g

By rule of multiplication
2.3 × 4 = 9.2 g
× 10 ↓ ↑ ÷ 10
23 × 4 = 92

By changing units → (optional)
2.3 g = 230 mg
230 mg × 4 = 920 mg.
920 mg = 9.2 g

4 How to multiply 2.3 × 4 in vertical form.



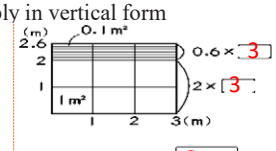

Line up 3 and 4. | Multiply in the same way as with multiplication for whole numbers. | Put the decimal point of the product in the same place as the decimal of the multiplicand.

2 What is the area of a plant nursery that is 2.6 m wide and 3 m long in $m^2$?

1 Expression: 2.6 × 3

2 Multiply in vertical form

| | | |
|---|---|---|
| | 2 | 6 |
| × | | 3 |
| | 7 | 8 |




6 of 1 m² is 6 m²
18 of 0.1 m² is 1.8 m²
Total 7.8 m²

❶ 3.2×6

| | | |
|---|---|---|
| | 3 | 2 |
| × | | 6 |
| 1 | 9 | 2 |

❷ 0.8×7

| | | |
|---|---|---|
| | 0 | 8 |
| × | | 7 |
| | 5 | 6 |

**Exercise**
**1.** 3.2 × 3 = 9.6 **2.** 1.8 × 2 = 3.6

# Unit 16

# Unit: Multiplication and Division of Decimal Numbers
## Sub-unit: 1. Calculations of (Decimal Number)×(Whole Number)
## Lesson 2 of 3 (Double Period)

Textbook Page : p.172
Actual Lesson 104

## Lesson Objectives

- To think and understand how to calculate (Decimal number)×(2-digit whole number).
- To understand operation of zero (0) at the end of any product after decimal point. (2.0=2)

## Prior Knowledge

- Multiplication : (Decimal number)×(Whole number)

## Preparation

- Refer to the blackboard plan.

## Assessment

- Think about how to calculate (Decimal number)×(2-digit whole number). F
- Do the exercises correctly. S

## • Teacher's Notes •

There are three possible ways to solve task 5. Explain all three as students have different understanding for each ways.

It is also best to draw the place value boxes to guide during the calculation.

Product of tenths place is 0 (zero).

**4** Let's think about how to multiply in vertical form.

❶ 2.5×4= 10

| | 2 | 5 |
|---|---|---|
| × | | 4 |
| 1 | 0 | 0 |

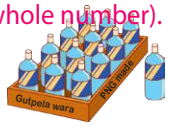
❷ 0.4×5= 2

| | 0 | 4 |
|---|---|---|
| × | | 5 |
| | 2 | 0 |

(Decimal number) × (2-digit whole number).

**5** There are 13 bottles with 1.2 L of water.

How many litres are there altogether?

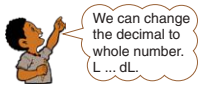


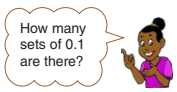

❶ Let's write a mathematical expression.

1.2 × 13

❷ Let's estimate. 1 × 13

❸ Let's think of ways on how to calculate and think about how to multiply in vertical form. Refer to BB Plan




| | 1 | 2 |
|---|---|---|
| × | 1 | 3 |
| | 3 | 6 |
| 1 | 2 | |
| 1 | 5 | 6 |

**6** Let's think about how to multiply in vertical form.

❶ 1.6×14= ❷ 1.5×18=

| | 1 | 6 |
|---|---|---|
| × | 1 | 4 |
| | 6 | 4 |
| 1 | 6 | |
| 2 | 2 | 4 |

| | 1 | 5 |
|---|---|---|
| × | 1 | 8 |
| 1 | 2 | 0 |
| 1 | 5 | |
| 2 | 7 | 0 |

**Exercise**

Let's multiply in vertical form.

| | | | | |
|---|---|---|---|---|
| ① 1.5×6 9 | ② 3.6×5 18 | ③ 4.5×4 18 | ④ 2.5×8 20 | ⑤ 0.6×5 3 |
| ⑥ 0.8×5 4 | ⑦ 0.5×6 3 | ⑧ 0.2×15 3 | ⑨ 2.2×12 26.4 | ⑩ 1.2×31 37.2 |
| ⑪ 1.9×14 26.6 | ⑫ 1.7×15 25.5 | ⑬ 3.4×12 40.8 | ⑭ 4.8×21 100.8 | ⑮ 3.5×18 63 |

172 =□+□

# Lesson Flow

## 1 Review the previous lesson.

## 2 4 Do the exercise (Decimal number) × (Whole number).

T Introduce the main task.

T Confirm that even if deleting 0 in the last decimal place, the number does not change.
10.0 = 10, 2.0 = 2

## 3 5 Read the problem, make mathematical expression and solve.

T ❶ What is the mathematical expression.

S 1.2 × 13

T Confirm that the multiplier is 2-digit in this calculation.

T ❷ Let students estimate the value of 1.2 × 13.

S Estimate as multiplying 1 × 13.

S ❸ Think of ways on how to calculate 1.2 × 13.

TN Refer to blackboard plan for possible ways to solve 1.2 × 13.

T Multiply and explain 1.2 × 13 in vertical form on the blackboard.

## 4 6 Practice (Decimal number) × (2-digit whole number).

T Confirm the process on how to calculate (decimal number) × (2-digit whole number).
1. Calculate same way as whole number.
2. Write decimal point on the same place as multiplicand.

## 5 Summary

T/S Go through summary together.

## 6 Do the exercise.

T Give the priority exercises in class and the rest can be for home work if time does not allow.

# Sample Blackboard Plan

**Date:** **Chapter:** Multiplication and Division of Decimal Numbers **Topic:** Decimal Number x Whole Number **Lesson N°:** 2/3

MT Let's think about how to multiply decimal numbers × whole numbers in vertical form when the product of tenths place is 0(zero)

**4** Let's think about how to multiply in vertical form.

❶ 2.5×4

| | 2 | 5 |
|---|---|---|
| × | | 4 |
| 1 | 0 | 0 |

= 10

❷ 0.4×5

| | 0 | 4 |
|---|---|---|
| × | | 5 |
| | 2 | 0 |

= 2

**5** There are 13 bottles with 1.2 L of water. How many liters are there?

❶ Expression 1.2 × 13

❷ Let's think of ways on how to solve 1.2×13

By Changing Units
1.2 L = 1200 mL
1200 L × 13 = 15 600 mL
15 600 mL = 15.6 L

By Sets
There are 12 sets of 0.1 in 2.3
12×13 = 156 sets of 0.1
156 sets of 0.1 = 15.6
Answer 15.6 L

BY Multiplication rule
1.2 × 13 = 15.6
× 10 ↓ ↑ ÷ 10
12 × 13 = 156
Answer 15.6 L

❸ Multiply 1.2 × 13 in vertical form

| | 1 | 2 |
|---|---|---|
| × | 1 | 3 |
| | 3 | 6 |
| 1 | 2 | |
| 1 | 5 | 6 |

Multiply in the same way as with multiplication with whole number

Number of digits after decimal point is 1

Put the decimal point of the product in the same place as in the multiplicand

**6** Let's think about how to multiply in vertical form.

❶ 1.6×14

| | 1 | 6 |
|---|---|---|
| × | 1 | 4 |
| | 6 | 4 |
| 1 | 6 | |
| 2 | 2 | 4 |

❷ 1.5×18

| | 1 | 5 |
|---|---|---|
| × | 1 | 8 |
| 1 | 2 | 0 |
| 1 | 5 | |
| 2 | 7 | 0 |

= 27

**Summary**

- Even the Multiplier is two digit number, the way of calculation is the same as in whole numbers.
- We put the decimal point of the product in the same place as the decimal point of the multiplicand.

**Exercise**

(1), (4), (5), (8), (11), (13)

# Unit 16

# Unit: Multiplication and Division of Decimal Numbers
## Sub-unit: 1. Calculations of (Decimal Number)×(Whole Number)
## Lesson 3 of 3 (Double Period)

Textbook Page : p.173
Actual Lesson 105

## Lesson Objectives

- To think about how to calculate (Decimal number of hundredth place)×(Whole number).
- To understand how to calculate (Decimal number of hundredth place)×(Whole number).

## Prior Knowledge

- Multiplication : (Decimal number)×(Whole number) (Previous lesson)

## Preparation

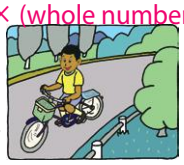
- Refer to the blackboard plan.

## Assessment

- Think about how to calculate (Decimal number of hundredth place)×(Whole number). F
- Do the exercises correclty. S

(Hundredths place decimal number) × (whole number)

**7** There is a 2.35 km long fence around the Golf course in Lae. Steven goes around the Golf course 3 times by bicycle. How many kilometres did he cycle altogether?



❶ Write a mathematical expression.

2.35 ×3

Let's change the order of multiplication from 3×2.35 to 2.35×3, because it is easier to multiply by a whole number.

❷ Let's think of ways on how to calculate. Refer to BB Plan

We can change the unit from km to m.

We can think about how many sets of 0.01 are there.

We can use rules of multiplication.

(Hundredths place decimal number) × (whole number).

❸ Let's think about how to multiply in vertical form.

| | | | |
|---|---|---|---|
| | 2 | 3 | 5 |
| × | | | 3 |
| 7 | 0 | 1 | 5 |

Even if we have hundredth, we can multiply in vertical form in the same way as last time.

**8** Let's think about how to multiply.

❶ 0.24×4= ❷ 0.04×5=

| | | | |
|---|---|---|---|
| | 0 | 2 | 4 |
| × | | | 4 |
| 0 | 9 | 6 | |

| | | | |
|---|---|---|---|
| | 0 | 0 | 4 |
| × | | | 5 |
| 0 | 2 | 0 | |

Exercise

1 Let's multiply.

① 1.87×2 3.74 ② 2.63×5 13.15 ③ 2.23×4 8.92

④ 0.12×7 0.84 ⑤ 0.08×5 0.4 ⑥ 0.15×6 0.9

2 There is a 1 m iron bar that weighs 1.25 kg.

What is the weight of 4 m of this iron bar in kg?

1.25 × 4 =5 Answer: 5kg

□×□=173

## Lesson Flow

### 1 ⑦ Read the problem and make a mathematical expression.

T Introduce the main task.

S ❶ Read the problem and make a mathematical expression.

T Stress and confirm that multiplicand is a decimal of hundredth place.

### 2 Think of ways on how to calculate 2.35×3.

S ❷ Think of ways on how to calculate 2.35×3.

TN Refer to black board plan for 3 possible ways to calculate 2.35×3.

T Let students think about how to calculate 2.35×3 in vertical form.

S Calculate the same way as whole number and write the decimal point in the same place as the multiplicand.

### 3 ⑧ Summary activity on (Decimal number of hundredth place)×(Whole number).

T Confirm the way of calculation in vertical form by solving ❶ and ❷.

1. Calculate same way as whole number.
2. Write a decimal point on the same place as multiplicand.

### 4 Do the exercise.

T Give the priority exercises in class and the rest can be for home work if time does not allow.

## Sample Blackboard Plan

**Date:** **Chapter:** Multiplication and Division of Decimal Numbers **Topic:** Decimal Number x Whole Number **Lesson N°:** 3/3

MT Let's think about how to calculate hundredths place decimal numbers x whole numbers in vertical form.

⑦ There is a 2.35 km long fence around the golf course in Lae. Steven goes around the golf course 3 times by bicycle. How many kilometers did he cycle altogether?

❶ Write an expression $2.35 \times 3$

Estimate calculating if Jimmy made 3 rounds.

If 1 km $1 \times 3 = 3$

If 2 km $2 \times 3 = 6$

If 2.5 km $2.5 \times 3 = 7.5$

If 2.35 km $2.35 \times 3 =$?

❷ Let's think of ways on how to calculate $2.35 \times 3$.

**By changing units**
2.35 km = 2350 m
2350 × 2 = 7050 m
7050 m = 7.05 km
Answer 7.05 km

**By rule of Multiplication**
2.35 × 3 = 7.05
× 100 ↓ ↑ ÷ 100
235 × 3 = 705
Answer 7.05 km

**By sets**
There are 235 sets of 0.01 in 2.35.
235 × 3 = 705 sets of 0.01
705 sets of 0.01 is = 7.05
Answer 7.05 km

❸ Let's multiply in vertical form.

| | | | |
|---|---|---|---|
| | $^{1}2.^{1}3$ | | 5 |
| × | | | 3 |
| | 7 | . 0 | 5 |

⑧ Let's multiply in vertical form.

❶ 0.24×4

| | | | |
|---|---|---|---|
| | 0. | 2 | 4 |
| × | | | 4 |
| | 0. | 9 | 6 |

❷ 0.04×5

| | | | |
|---|---|---|---|
| | 0. | 0 | 4 |
| × | | | 5 |
| | 0. | 2 | 0 |

Answer 0. 2

**Summary**

- We write 0 in ones place when the ones place is 0
- We omit the zero as the last number after decimal point.

**Exercise** 1,3 and 5

# Unit 16

# Unit: Multiplication and Division of Decimal Numbers
## Sub-unit: 2. Calculations of (Decimal Number)÷(Whole Number)
## Lesson 1 of 3 (Double Period)

Textbook Page : p.174~175
Actual Lesson 106

## Sub-unit Objectives

- To understand the meaning of (Decimal number)÷(Whole number) based on the number line and table.
- To think about how to calculate (Decimal number)÷(Whole number).
- To understand how to calculate (Decimal number)÷(Whole number) in vertical form.

## Lesson Objectives

- To understand the meaning of (Decimal number)÷(Whole number) based on the number line and table.
- To think about how to calculate (Decimal number)÷(Whole number) in vertical form.

## Prior Knowledge

- Decimal number
- Division of whole number (2-digit)×(1-digit)
- Addition and subtraction of decimal number

## Preparation

- Refer to the blackboard plan.

## Assessment

- Think about how to calculate (Decimal number)÷(Whole number) in vertical form. F
- Do the exercises correctly. S

## • Teacher's Notes •

Explain carefully in order on how to calculate division in vertical form.
It is also best to draw the place value boxes to guide during calculation.

## 2 Calculations of (Decimal Number)÷(Whole Number)

### 1 (Decimal number) ÷ (whole number)

If we divide a 5.7 m rope equally among 3 children, how many metres will each one receive? 1.9

① Let's write a mathematical expression.

5.7÷3

| | | | |
|---|---|---|---|
| m | ? | 5.7 | ÷3 |
| Children | 1 | 3 | ÷3 |

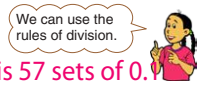
② Approximately how many metres is this?

6÷3=2 Answer: 2 m

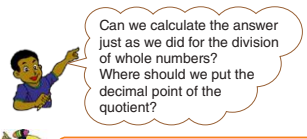
③ Let's think of ways on how to calculate.

Refer to BB Plan

5.7 is 57 sets of 0.1




④ Let's think about how to divide in vertical form.

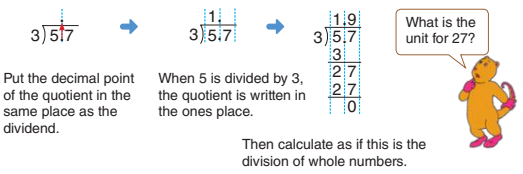



| | | | |
|---|---|---|---|
| | | 1 | 9 |
| 3 | 5 | . | 7 |
| | 3 | | |
| | 2 | 7 | |
| − | 2 | 7 | |
| | | 0 | |

Answer: 1.9 cm

Let's think about how to divide decimal numbers in vertical form.

### Division Algorithm for 5.7÷3 in Vertical Form




### 2

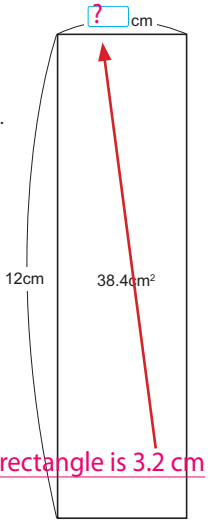
Let's find the width of the rectangle with an area of 38.4 cm² and a length of 12 cm.

① Let's write a mathematical expression.

38.4÷12

② Let's think of some ways of finding the answer.

③ Let's think about how to divide in vertical form.




| | | | | |
|---|---|---|---|---|
| | | | 3 | 2 |
| 1 | 2 | 3 | 8 | 4 |
| | | − | 3 | 6 |
| | | | 2 | 4 |
| | | − | 2 | 4 |
| | | | | 0 |

Answer: Width of the rectangle is 3.2 cm

**Exercise**

Let's divide in vertical form.

① 6.8÷2 3.4 ② 6.4÷4 1.6 ③ 7.5÷5 1.7
④ 52.9÷23 2.3 ⑤ 61.2÷18 3.4 ⑥ 58.8÷42 1.4

## Lesson Flow

### 1 Review the previous lesson.

### 2 ① Understand the situation and make a mathematical expression.

S ① Read the problem in ① and make a mathematical expression.
T ② Predict the answer by rounding number.
TN It is important that students predict the answer before calculating to improve their number sense.
S ③ Think of ways on how to calculate 5.7 ÷ 3.
T Let students think using learned knowledge.
S ④ Think about how to calculate 5.7 ÷ 3 in vertical form.
T Confirm that the calculation is same as whole number and put the decimal point in the same place as dividend.

### 3 Summarise how to calculate (Decimal number) ÷ (Whole number) in vertical form.

T Explain the process on how to calculate in vertical in the box.

### 4 ② Solve word problem involving (Decimal number) ÷ (Whole number) in vertical form.

S ① Read the problem and make a mathematical expression
S ② Think about how to divide 38.4 ÷ 12 in vertical form.
T Confirm by the use a formula to find the area.
□ × 12 = 38.4, □ = 38.4 ÷ 12
S ③ Calculate 38.4 ÷ 12 in vertical form.
T Confirm that the way of calculation is same as the whole number even the divisor is a 2-digit.
T Ask students for the answer of the width of the rectangle.
S Width of the rectangle is 3.2 cm.

### 5 Do the exercise.

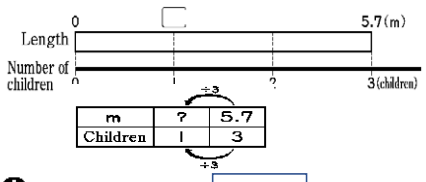
T Let students work on the priority exercises highlighted. The rest can be for homework.

## Sample Blackboard Plan

**Date:** **Chapter:** Multiplication and Division of Decimal Numbers **Topic:** Decimal Number x Whole Number **Lesson Nº:** 1/3

MT Let's think about how to calculate hundredths place decimal numbers x whole numbers in vertical form.

**1** If we divide a 5.7 m rope equally among 3 children, how many meters will each child receive?




❶ Math expression 5.7 ÷ 3

❷ Approximately how many meters is this?
5.7 is closer to 6 so, 6 ÷ 3 = 2
So each child will receive about 2 meters.

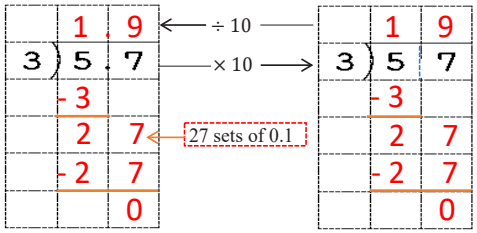
❸ Let's think of ways on how to divide 5.7 ÷ 3.

Changing Units
Answer 1.9 m

Multiplication rule
↓ ↑
Answer 1.9 m

Using the idea of sets
There are 57 sets of 0.1 in 5.7
57 ÷ 3 = 19 sets of 0.1
19 sets of 0.1 is = 1.9
Answer 1.9 m

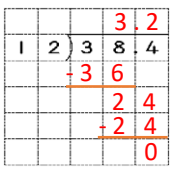
❹ Let's calculate 5.7 ÷ 3 in vertical form.




**2** Let's find the width of the rectangle with an area of 38.4 $cm^2$ and a length of 12 cm.

❶ Mathematical Expression 38.4 ÷ 12

❷ Let's think about how to divide in vertical form.
*Let students to solve using 3 methods in* ❸




**Summary**
- When dividing decimal number with a whole number, we divide vertically as dividing whole numbers
- Put the decimal point of the quotient in the same place as the dividend.

**Exercises** 1,3 and 4

# Unit 16

# Unit: Multiplication and Division of Decimal Numbers
## Sub-unit: 2. Calculations of (Decimal Number) ÷ (Whole Number)
## Lesson 2 of 3 (Double Period)

Textbook Page : p.176
Actual Lesson 107

## Lesson Objectives

- To think about how to calculate division which the divisor is larger than the dividend.
- To understand how to calculate when ones place of quotient is 0.

## Assessment

- Think about how to calculate a division which the divisor is larger than the dividend. F
- Do the exercises correctly. S

## Prior Knowledge

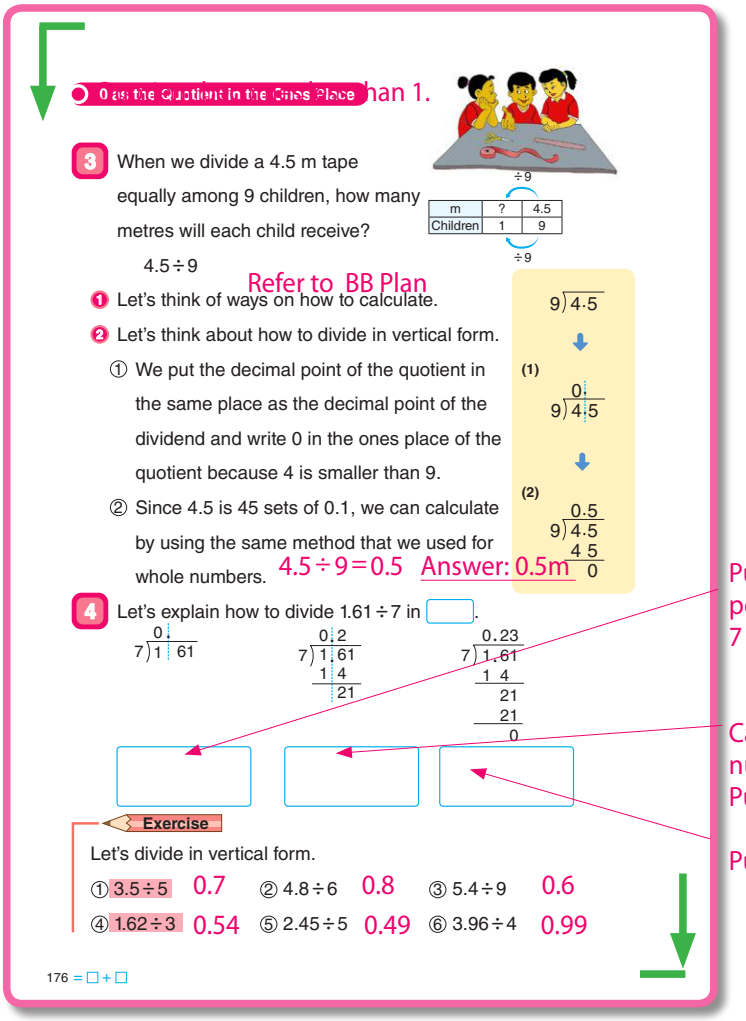
- Division of whole number
  (Decimal number) ÷ (Whole number)

## Preparation

- Refer to the boardplan.

### • Teacher's Notes •

Guide the students on how to derive the mathematical expression by using the table.



0 as the Quotient in the Ones Place han 1.

**3** When we divide a 4.5 m tape equally among 9 children, how many metres will each child receive?

4.5 ÷ 9

Refer to BB Plan

| | | | |
|---|---|---|---|
| m | ? | 4.5 |
| Children | 1 | 9 |

÷9 ÷9

① Let's think of ways on how to calculate.

② Let's think about how to divide in vertical form.

① We put the decimal point of the quotient in the same place as the decimal point of the dividend and write 0 in the ones place of the quotient because 4 is smaller than 9.

② Since 4.5 is 45 sets of 0.1, we can calculate by using the same method that we used for whole numbers.

$9\overline{)4.5}$ → (1) $9\overline{)\begin{array}{r}0\\4.5\end{array}}$ → (2) $9\overline{)\begin{array}{r}0.5\\4.5\\45\\0\end{array}}$

4.5 ÷ 9 = 0.5 Answer: 0.5m

**4** Let's explain how to divide 1.61 ÷ 7 in ☐.

$7\overline{)\begin{array}{r}0\\1.61\end{array}}$ $7\overline{)\begin{array}{r}0.2\\1.61\\1\,4\\21\end{array}}$ $7\overline{)\begin{array}{r}0.23\\1.61\\1\,4\\21\\21\\0\end{array}}$

Exercise

Let's divide in vertical form.

① 3.5 ÷ 5 0.7 ② 4.8 ÷ 6 0.8 ③ 5.4 ÷ 9 0.6

④ 1.62 ÷ 3 0.54 ⑤ 2.45 ÷ 5 0.49 ⑥ 3.96 ÷ 4 0.99

176 = □ + □

Put decimal point of the quotient in the same place as the decimal ponts of the dividend.
7 is larger than 1 so put 0 in ones place.

Calculate by using the same method that we used for whole numbers.
Put 2 in tenths place.

Put 3 in hunderedths place.

## Lesson Flow

### 1 Review previous lesson.

### 2 3 Quotient becomes less than 1.

S 1 Read the problem in 3 and make a mathematical expression.
S 2 Think of ways on how to calculate 4.5 ÷ 9, then calculate in vertical form.
TN Refer to blackboard plan for different ways of solving 4.5 ÷ 9.
T Confirm that the calculation is the same as before considering 0.1 is one unit.
T Where should we place the decimal point?
S Decimal point is written in the same place as the decimal point in the dividend.

### 3 4 Explain how to calculate 1.61 ÷ 7.

S Explain how to calculate 1.61 ÷ 7 by outlining the steps in the box provided.
TN If it is difficult for the students to write the steps, let them explain verbally and fill in the boxes together.

### 4 Do the exercise.

T Let students work on the priority exercises highlighted. The rest can be for homework.

## Sample Blackboard Plan

**Date:** **Chapter:** Multiplication and Division of Decimal Numbers **Topic:** Decimal Number x Whole Number **Lesson N°:** 2/3

MT Let's think about how to multiply decimal numbers × whole numbers in vertical form when the quotient is in the ones place is 0(zero)

**3** When we divide a 4.5 m rope equally among 9 children, how many meters will each child receive?

1. Math Expression 4.5 ÷ 9

- 4. 5 is too large to divide by 9.
- 9 cannot go into 4.5
- However, we can still divide 4.5 ÷ 9

**1** Let's think of ways on how to calculate 4.5 ÷ 9.

By Changing Units
4.5 *m* = 450*cm*
450 ÷ 9 = 50
50 *cm* = 0.5*m*
*Answer* 0.5 *m*

By Rule f Division
4.5 ÷ 9 = 0.5
× 10 ↓ ↑ ÷ 10
45 ÷ 9 = 5
*Answer* 0.5 *m*

By concept of sets
There are 45 sets of 0.1 in 4.5
45 ÷ 9 = 5 sets of 0.1
5 sets of 0.1 = 0.5
Answer 0.5 m

**2** Let's solve 4.5 ÷ 9 in vertical form

$9\overline{)4.5}$

(1) $9\overline{)4.5}$ → $0.$

(2) $9\overline{)4.5}$ → $0.5$, $45$, $0$

(1) We put the decimal point of the quotient in the same place as the decimal point of the dividend and write 0 in the ones place of the quotient because 4 is smaller than 9.

(2) Since 4.5 is 45 sets of 0.1, we can calculate by using the same method that we used for whole numbers.

**4** Let's explain how to divide 1.61 ÷ 7.

$7\overline{)1.61}$ → $0.$

$7\overline{)1.61}$ → $0.2$, $14$, $21$

$7\overline{)1.61}$ → $0.23$, $14$, $21$, $21$, $0$

Put decimal point of the quotient in the same place as the decimal point of the dividend 7 is larger than 1 so put 0 in ones place

Calculate by using the same method that we use for whole numbers Put 2 in tenths place0

Put 3 in hundredths place

Exercises 1 and 4

# Unit 16

# Unit: Multiplication and Division of Decimal Numbers
## Sub-unit: 2. Calculations of (Decimal Number) ÷ (Whole Number)
## Lesson 3 of 3 (Single Period)

Textbook Page : p.177
Actual Lesson 108

## Lesson Objectives

- To think about how to calculate a division which divides continuously.
- To understand how to calculate (Whole number) ÷ (Whole number) = (Decimal number).

## Prior Knowledge

- Division of whole number,
  (Decimal number) ÷ (Whole number)

## Preparation

- Charts for activity 2.

## Assessment

- Think about how to calculate a division which the divisor is larger than dividend. F
- Do the exercises correctly. S

## • Teacher's Notes •

0 is added to the dividend to continue the division.

- 0 is identified as looking at next lowest decimal point as 0.
- E.g. 2.3 becomes 2.30 where 0 added is from the hundredths place making the number as 230 sets of 0.01

Place in additional 0 (for continuous division)

**Dividing Continuously**

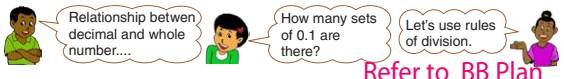
**5** We divide a 7.3 m bilum wool equally among 5 children.
How many metres will each one receive?

7.3 ÷ 5

| | | |
|---|---|---|
| m | ? | 7.3 |
| Children | 1 | 5 |

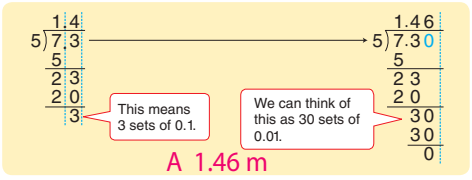
÷5 ÷5

① Let's think of some ways of finding the answer.




Refer to BB Plan

② Let's think about how to divide in vertical form.




A 1.46 m

Division that is continued until the remainder is 0 is called **"dividing continuously".**

**6** Let's calculate 6 ÷ 8 in vertical form.

```
  0.75
8)6.0
  56
  40
- 40
   0
```

**Exercise**

Let's divide continuously.

① 9.4 ÷ 4 = 2.35 ② 8.6 ÷ 5 = 1.72 ③ 7 ÷ 5 = 1.4 ④ 5 ÷ 8 = 0.625

## Lesson Flow

### 1 Review the previous lesson.

### 2 5 Adding 0 to continue dividing.

S Read the problem and make a mathematical expression.
S ❶ Think of ways on how to calculate 7.3 ÷ 5.
TN Refer to black board plan for possible ways to calculate 7.3 ÷ 5.
T ❷ Think about how to calculate 7.3 ÷ 5 in vertical form.
T Explain that when you divide continuously, you have to add 0 to the dividend and bring it down to continue the calculation.

### 3 6 The meaning of 0 in ones place and continuous division.

S Think about how to calculate 6 ÷ 8 applying learned knowledge.
T Calculate 6 ÷ 8 as 6.0 ÷ 8, and write 0 in ones place of quotient.
T Add 0 to the dividend and bring it down for continuing calculation.

### 4 Summary

### 5 Do the exercise.

T Let students work on the priority exercises highlighted. The rest can be done for homework.

## Sample Blackboard Plan

**Date:** **Chapter:** Multiplication and Division of Decimal Numbers **Topic:** Decimal Number x Whole Number **Lesson N°:** 3/3

MT Let's divide continuously in vertical form until the remainder is zero.

Changing units
7.3 *m* = 730*cm*
730 ÷ 5 = 146
146 *cm* = 1.46 *m*
*Answer* 1.46 *m*

The rule of division
7.3 ÷ 5 = 1.46
× 100 ↓ ↑ ÷ 100
730 ÷ 5 = 146
*Answer* 1.46 *m*

The idea of sets
There are 730 sets of 0.01 in 7.3
730 ÷ 5 = 146 sets of 0.01
146 sets of 0.01 = 1.46
Answer 1.46 m

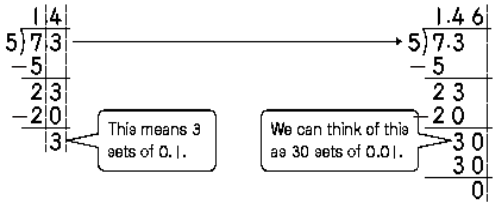
5 When we divide a 7.3 m bilum wool equally among 5children. How many meters will each child receive?

Math Expression 7.3 ÷ 5

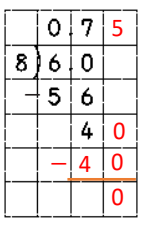
❶ Let's think of ways on how we can solve 7.3 ÷ 5.

We can use the following methods:
- The idea of sets
- The rule of division
- Changing the unit from m to cm.

❷Let's think about how to divide 7.3 ÷ 5 in vertical form




6 Let's calculate 6 ÷ 8 in vertical form




**Summary**
- The zero added in continuous division is by using the sets idea.

e.g. 7.3 to tenths place becomes 7.30 when is to hundredths place.

**Exercises**
1,3 and 4

Exercise (1) - (4)

# Unit 16

# Unit: Multiplication and Division of Decimal Numbers
## Sub-unit: 3. Division Problems
## Lesson 1 of 2 (Double Period)

Textbook Page : p.178-p.179
Actual Lesson 109

## Sub-unit Objectives

- To think about how to calculate division with remainder.
- To understand how to confirm the answer of division with remainder.
- To understand how to round the quotient.

## Lesson Objectives

- To think about how to calculate division of decimal number with remainder.
- To think about how to calculate (Decimal number) ÷ (Whole number) in vertical form.

## Prior Knowledge

- Division of decimal number (previous three lessons.)

## Preparation

- Refer to the blackboard plan.

## Assessment

- Think about how to calculate (Decimal number) ÷ (Whole number) with remainder. F
- Understand how to calculate (Decimal number) ÷ (Whole number) with remainder. S
- Do the exercises correctly. S

## • Teacher's Notes •

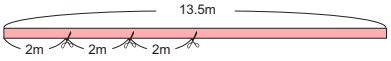
Be careful in explaining the meaning of the remainders. For example, in task 1 the remainder 15 is not exactly 15 as it is. It means 15 sets of 0.1 where it gives 1.5.

### 3 Division Problems

Meaning of reminder

**Division with Remainders**

**1** There is a 13.5 m nylon. Shama makes grass skirts for singsing by using a 2 m nylon tape. How many grass skirts does she make and how many metres are left?




| m | 2 | ÷2 | 13.5 | ÷2 |
|---|---|---|---|---|
| Grass skirts | 1 | | ? | |

① Let's write a mathematical expression.

13.5 ÷ 2

② Let's think of ways on how to calculate.

Refer to BB Plan

③ The calculation is shown on the right.

$$2\overline{)13.5}\quad \begin{array}{l}6.\\ 12\\ \hline 15\end{array}$$

What is the remainder in m?

Ⓐ '15' is 15 sets of what? 0.1

Ⓑ Where should we put the decimal point of the remainder?

Between 1and 5

**Dividend = divisor × quotient + remainder**

13.5 = 2 × 6 + 1.5

Answer: 1.5m

$$2\overline{)13.5}\quad \begin{array}{l}6\\ 12\\ \hline 1.5\end{array}$$

Until which place value should we calculate?

In division of decimal numbers, the decimal point of the remainder is put at the same place as the original decimal point of the dividend.

**Exercise**

There is a 47.6 m of ribbon. If we cut it into 3 m each, how many 3 m ribbon are there and what is the remainder in m?

47.6 ÷ 3 = 15 r 2.6 Anwer: 15 ribbons

**2** We divide a 2.3 L of juice equally among 6 children. How many litres does each one receive?

① Let's write a mathematical expression.

| L | ? | 2.3 |
|---|---|---|
| Children | 1 | 6 |

(÷6 above and below)

② Let's think of ways on how to calculate.

③ On the right, we can divide continuously. How can we say the answer?

④ Round the quotient to the hundredths place and give the answer to the nearest tenths.

$$6\overline{)2.3}\quad \begin{array}{l}0.383\\ 18\\ \hline 50\\ 48\\ \hline 20\\ 18\\ \hline 2\end{array}$$

When the dividend is not divisible by the divisor or when the number of places become too long, the quotient is rounded.

**Exercise**

**1** Let's calculate. Round the quotient to the hundredths place and give the answer to the nearest tenths.

① 5.5 ÷ 8 ② 9.9 ÷ 7 ③ 67.8 ÷ 79 ④ 42.9 ÷ 14

**2** Divide a 16.3 m tape equally into 3 sections. How many metres is one section? Round the quotient to the hundredths place and give the answer to the tenths place.

178 = □ + □

□ × □ = 179

## Lesson Flow

### 1 ❶ The meaning of remainder in (decimal number) × (whole number).

S ❶ Read the problem and make a mathematical expression.
S ❷ Think of ways on how to calculate 13.5 ÷ 2.
TN Refer to blackboard plan on ways to calculate.
T Let students think about how to calculate 13.5 ÷ 2 in vertical form.
S ❸ Solve the problem using the learned knowledge.
T Explain that there is no need to continue calculation when a quotient goes to decimal place.
T Ⓐ 15 is 15 sets of what?
S 15 sets of 0.1.
T Ⓑ Confirm by writing the decimal point of remainder in the same place as in the dividend.
T What is the relationship among dividend, divisor, quotient and remainder?
S Quotient = Dividend × Divisor + remainder. i.e 13.5 = 2 × 6 + 1.5

### 2 Summarise how to calculate (Decimal number) ÷ (Whole number) in vertical form.

T Explain the important point ⬚.

### 3 Do the exercise.

T Let students solve the problem in class and solve it together.

## Sample Blackboard Plan

**Date:** **Chapter:** Multiplication and Division of Decimal Numbers **Topic:** Decimal Number x Whole Number **Lesson N°:** 1/3

MT Let's divide continuously in vertical form until the remainder is zero.

❶ There is a 13.5 m nylon. Shama makes grass skirts for sing-sing by using 2 m nylon tape. How many grass skirts does she make, and how many meters are left?

❶ Math Expression 13.5 ÷ 2

❷ Let's think of ways on how to calculate 13.5 ÷ 2

We can use the following methods:
- Changing the unit from m to cm
- The rule of division.
- The rule for checking remainder

Changing units
13.5 $m$ = 1350$cm$
2$m$ = 200$cm$
1350 ÷ 200$cm$ = 6
6×200=1200
1350-1200=150
150$cm$ = 1.5$m$
Answer 6 grass skirts
1.5m nylon left

The rule of division
13.5 ÷ 2 = 6 r 1.5
× 10 ↓ ↑ ÷ 10
135 ÷ 2 = 60 15
Answer 6 grass skirts 1.5m nylon left

The idea of sets
Dividend = quotient × divisor + remainder
13.5 = 6 × 2 + ☐
☐ = 13. 5 - 12 = 15

❸ Let's calculate using vertical form

```
   6.
2 ) 13.5
    12
    15
```

Ⓐ 15 sets of 0.1
Ⓑ Same place as dividend

**Important point**
In division of decimal numbers, the decimal point of the remainder is put at the same place as the original decimal point of the dividend.

**Summary box**

**Exercise**
There is a 47.6 m of ribbon. Cut 3 m each.

47.6 ÷ 3 = 15 $r$ 2.6
Answer: 15 ribbons

# Unit 16

# Unit: Multiplication and Division of Decimal Numbers
## Sub-unit: 3. Division Problems
## Lesson 2 of 2 (Double Period)

Textbook Page : p.179
Actual Lesson 110

## Lesson Objectives

- To understand the reason why a quotient needs to be rounded.
- To master how to round a quotient.

## Prior Knowledge

- Division of decimal number with remainder. (previous three lessons)

## Preparation

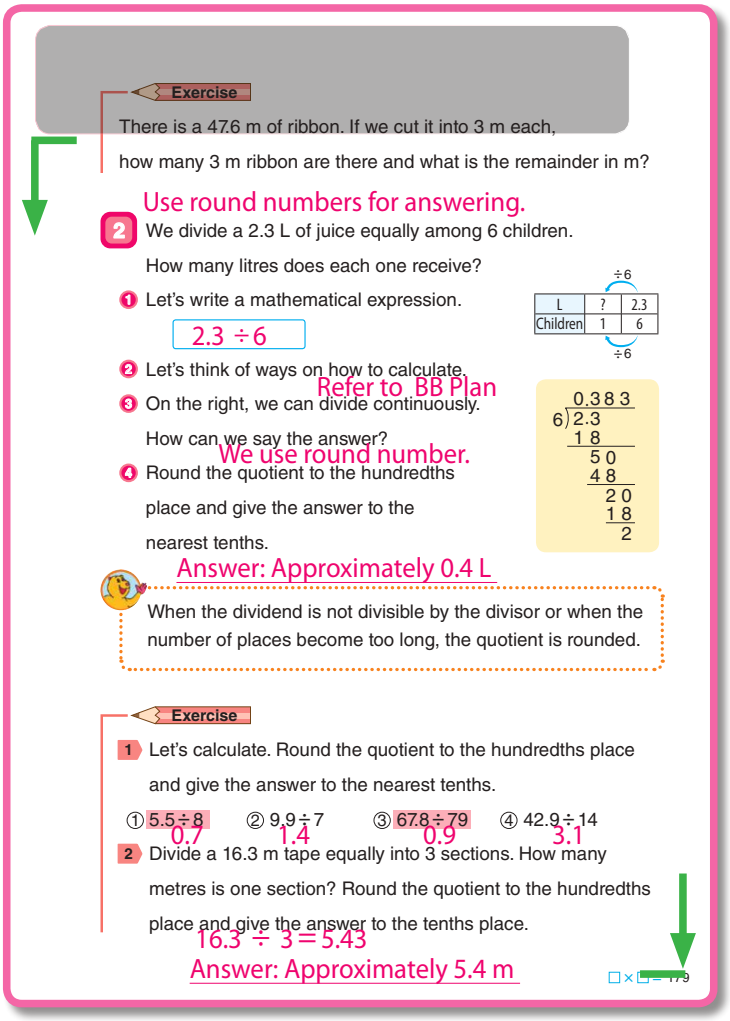
- A chart

## Assessment

- Think about the reason why a quotient is rounded. F
- Understand how to round a quotient. F
- Do the exercise correctly. S

## • Teacher's Notes •

When a calculation in division becomes too long, we can round the quotient. This normally occurs where we have continuous division.



Exercise

There is a 47.6 m of ribbon. If we cut it into 3 m each, how many 3 m ribbon are there and what is the remainder in m?

Use round numbers for answering.

2 We divide a 2.3 L of juice equally among 6 children.

How many litres does each one receive?

1 Let's write a mathematical expression.

2.3 ÷ 6

2 Let's think of ways on how to calculate.

3 On the right, we can divide continuously.

Refer to BB Plan

How can we say the answer?

We use round number.

4 Round the quotient to the hundredths place and give the answer to the nearest tenths.

÷6

| L | ? | 2.3 |
|---|---|---|
| Children | 1 | 6 |

÷6

```
0.383
6)2.3
  18
  50
  48
  20
  18
   2
```

Answer: Approximately 0.4 L

When the dividend is not divisible by the divisor or when the number of places become too long, the quotient is rounded.

Exercise

1 Let's calculate. Round the quotient to the hundredths place and give the answer to the nearest tenths.

① 5.5 ÷ 8 0.7 ② 9.9 ÷ 7 1.4 ③ 67.8 ÷ 79 0.9 ④ 42.9 ÷ 14 3.1

2 Divide a 16.3 m tape equally into 3 sections. How many metres is one section? Round the quotient to the hundredths place and give the answer to the tenths place.

16.3 ÷ 3 = 5.43

Answer: Approximately 5.4 m

□ × □ = 17.9

## Lesson Flow

### 1 ❶ Use round numbers for answering (decimal number) × (whole number).

S ❶ Read the problem and make a mathematical expression.
S ❷ Think of ways on how to calculate 2.3 ÷ 6.
TN Refer to blackboard plan for possible ways.
T ❸ Ask students what can be done next by showing the calculation in the textbook.
S Calculation does not end so need to round the quotient. (continuous calculation)
S ❹ Round the quotient to the hundredth place and give the answer to the nearest tenths.
T Explain that there is no need to continue calculation when a quotient goes to decimal place.

### 2 Summary

T Explain the important point in the box .

### 3 Do the exercise.

T Let students work on the priority exercises highlighted. The rest can be for homework.

## Sample Blackboard Plan

**Date:** **Chapter:** Multiplication and Division of Decimal Numbers **Topic:** Decimal Number x Whole Number **Lesson N°:** 1/3

MT Let's calculate decimal problems by rounding the quotient when the dividend is not divisible by the divisor.

Changing units
2.3 *L* = 2300 *mL*
2300 ÷ 6 = 383.3
383.3 *mL* = 0.383 *L*
*Answer 0.383 L*

The rule of division
2.3 ÷ 6 = 0.383
10 ↓ ↑ ÷10
23 ÷ 2 = 3.83
*Answer* 0.383 *L*

**Summary**
× When the dividend is not divisible by the divisor, or when the number of places become too long, the quotient is rounded.

**Exercise** 1 and 3

❷ We divide 2.3 L of juice equally among 6 children. How many liters does each one receive?

❶ Math Expression 2.3 ÷ 6

❷ Let's think of ways on how to calculate 2.3 ÷ 6.

We can use the following methods:
- The rule of division
- Changing the unit from m to cm.

❸ We can divide 2.3 ÷ 6 continuously.

```
  0.383
6)2.3
  18
   50
   48
    20
    18
     2
```

3 continues so we use round numbers.

❹ Round the quotient to the hundredths place, and give the answer to the nearest tenths.
Answer approximately 0.4 L

# Unit 16

# Unit: Multiplication and Division of Decimal Numbers
## Sub-unit: 4. What Kind of Expression?
## Lesson 1 of 1 (Double Period)

Textbook Page : p.180
Actual Lesson111

## Sub-unit Objectives

- To understand Multiplication and Division of Decimal number, make mathematical expressions and solve.

## Lesson Objectives

- To solve problems by considering what kind of expression should be used.

## Prior Knowledge

- Multiplication and division of decimal number. (Contents of this unit)

## Preparation

- A chart of numberline and table can be used.

## Assessment

- Show the situation in diagram, make math expression and solve. F
- Do exercise ③ correctly. S

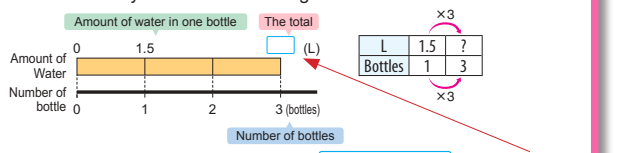
## • Teacher's Notes •

- The tape diagram and the table will paly an important role in deciding what kind of expression should be used.
- Remind the students on how to use the tape diagram and table to write a mathematical expression.

(Decimal number) × (Whole number)

**4 What Kind of Expression?**

**1** There are 3 bottles of water, each bottle contains 1.5 L of water. How many litres are there altogether?




| | | | |
|---|---|---|---|
| L | 1.5 | ? |
| Bottles | 1 | 3 |

×3 ×3

❶ Let's write a mathematical expression. 1.5 × 3 Answer: 4.5 L

❷ Let's think of ways on how to calculate. Refer to BB Plan

❸ Let's think about how to divide in vertical form.

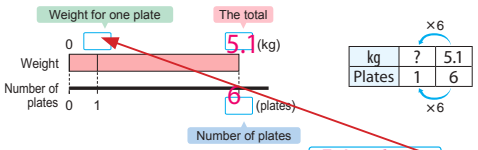
(Decimal number) ÷ (Whole number)

**2** There are 6 plates with the same weight. The total weight is 5.1 kg. How many kg does each plate weigh?

❶ What is known? There are 6 plates. Total weight is 5.1 kg

❷ What do you want to know? Weight of each plate

❸ Write what is known in the diagram and find the answer.




| | | |
|---|---|---|
| kg | ? | 5.1 |
| Plates | 1 | 6 |

×6 ×6

❹ Let's write a mathematical expression. 5.1 ÷ 6

❺ Let's think of ways on how to calculate. Answer: 0.85 kg

❻ Let's think about how to divide in vertical form.

**3** Divide a 9 m rope equally into 5 sections. How many metres is each section?

9 ÷ 5 = 1.8 Answer: 1.8 m

180 = □ + □

## Lesson Flow

### 1 Review the previous lesson.

### 2 ① Solve problem.

T Explain the situation by using tape diagram and 4 tables.
T Confirm that 1 bottle is 1.5 L and there are 3 bottles in total.
S ① Students make mathematical expression. $1.5 \times 3$
S ② Think of ways on how to calculate $1.5 \times 3$.
T ③ Confirm the answer by calculating in vertical form.

### 3 ② Solve problem ②.

S Read the problem and understand the situation.
T ① What is known?
S There are 6 plates. Total weight is 5.1 kg.
T ② What do we want to know?
S Weight of each plate.
S ③ Fill the diagram and ④ make a mathematical expression. $5.1 \div 6$
S ⑤ Think of ways on how to calculate $5.1 \div 6$.
T ⑥ Confirm how to calculate $5.1 \div 6 = 0.85$ in vertical form step by step.

### 4 ③ Solve problem.

T Let students draw diagram and solve by themselves.
TN If it is difficult for students to draw diagrams on their own, teacher can draw on the blackboard and solve the problem together with the students.
T Confirm how to calculate $9 \div 5$ in vertical form and outlining the steps.

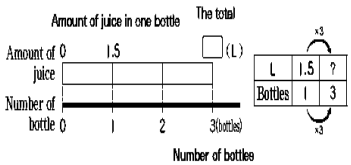
## Sample Blackboard Plan

**Date:** **Chapter:** Multiplication and Division of Decimal Numbers **Topic:** Decimal Number x Whole Number **Lesson N°:** 1/3

MT

Let's think about how to multiply and divide decimal numbers with whole numbers using tape diagrams and tables.

**1** There are 3 bottles of water, each bottle contains 1.5 L of water. How many liters are there altogether?




**1** Using the above diagram, let's write a math expression.

$1.5 \times 3$

**2** Let's think of ways on how to calculate $1.5 \times 3$.

Changing units
$1.5\ L = 1500\ mL$
$1500 \times 3 = 4500\ ml$
$4500\ mL = 4.5\ L$
*Answer* 4.5 L

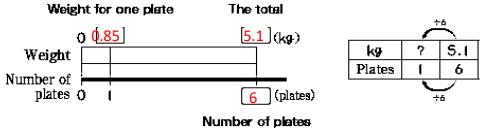
The rule of division
$1.5 \div 3 = 0.5$ ×
10 ↓ ↑ 10
$15 \div 3 = 5$
*Answer* 0.383 L

**3** Let's think about how to divide in vertical form.

$$\begin{array}{r} 1.5 \\ \times\ 3 \\ \hline 4.5 \end{array}$$

**2** There are 6 plates with the same weight. The total weight is 5.1 kg. How many kg does each plate weigh?

**1** What is known? 6 plates weigh 1.5 kg
**2** What is unknown? Weight of each plate
**3** Fill in the blanks in the diagram




**4** Math Expression $5.1 \div 6$

**5** Let students solve using the methods described in task **1** activity **2**.

**6** Let's think about how to divide in vertical form.

$$\begin{array}{r} 0.85 \\ 6\overline{)\ } \\ -48 \\ \hline 30 \\ -30 \\ \hline 0 \end{array}$$

**3** Divide a 9 m rope equally into 5 sections, how many meters is each section?

$$\begin{array}{r} 1.8 \\ 5\overline{)\ 9\ } \\ -5 \\ \hline 40 \\ -40 \\ \hline 0 \end{array}$$

# Unit 16

# Unit: Multiplication and Division of Decimal Numbers
## Sub-unit: Exercise and Evaluation
## Lesson 1 of 1 (Double Period)

Textbook Page : p.181~p.182
Actual Lesson 112

## Lesson Objectives

- To deepen understanding what they have learned in this unit.

## Prior Knowledge

- All the contents in this unit

## Preparation

- Evaluation sheets for the students

## Assessment

- Solve the exercises correclty. F S

### • Teacher's Notes •

Use 30 minutes for the exercise and give the evaluation test after that.

### Exercise

**1** Let's calculate in vertical form. Pages 170 ~ 173, 174 ~ 177

① 5.3×7 = 37.1　② 9.2×49 = 450.8　③ 70.5×73 = 5146.5

④ 6.52×4 = 26.08　⑤ 0.26×8 = 2.08　⑥ 0.46×5 = 2.3

⑦ 6.5÷5 = 1.3　⑧ 12.6÷7 = 1.8　⑨ 8.1÷9 = 0.9

⑩ 49.4÷19 = 2.6　⑪ 65.61÷27 = 2.43　⑫ 15.36÷32 = 0.48

**2** Let's calculate. Round the quotient to the hundredths place and give the answer to the tenths. Page 179

① 2.63÷3 = 0.9　② 40.4÷6 = 6.7　③ 30.42÷14 = 2.2　④ 5.6÷39 = 0.1

**3** There is a rectangular flowerbed with an area of 17.1 m$^2$. The length is 3 m. Let's find the width of this flowerbed. Page 178

17.1÷3=5.7　Answer: 5.7 m

**4** There is 9 L of rice that weighs 8 kg. How many kg does 1 L of this rice weigh? Round the quotient to the hundredths place and give the answer to the tenths. Page 179

8÷9=0.88　Answer: Approximately 0.9 m

**5** There are 25 books. Each book weighs 14 g. How many kg are there altogether? Page 180

14 g=0.14 kg　25 x 0.14=3.5　Answer: 3.5 kg

Let's draw the following parallelogram and rhombus. Grade 4 Do you remember?

① 4cm, 3cm, 120°

② 5cm, 3cm

□×□= 181　182 =□+□

### Problems

**1** Let's summarise the multiplication and the division of decimal numbers.
● Understanding how to calculate multiplication and division of decimal numbers.

① Since 2.7×5 represents 27×5=135 as the unit of 0.1, the answer 2.7×5 is 13.5.

② Since 6.48÷9 represents 648÷9=72 as the unit of 0.01, the answer 6.48÷9 is 0.72.

③ Since 13 in Ⓐ means 13 sets of 0.1 shown on the right, 9.3÷4=2 remainder 1.3.

4)9.3 → 2. → 8 → 13 ← Ⓐ

**2** Let's calculate in vertical form.
● Calculating multiplication and division of decimal numbers in vertical form.

① 2.4×3 = 7.2　② 2.8×12 = 33.6　③ 0.12×5 = 0.6

④ 7.2÷4 = 1.8　⑤ 41.6÷26 = 1.6　⑥ 3.78÷6 = 0.63

**3** There is a book with a length of 14.8 cm and width of 21 cm. What is the area of this book's cover in cm$^2$?
● Understanding the situation of division problem.

14.8 × 21=310.8 A. 310.8 cm$^2$

**4** Divide 36.5 cm of wool equally into 5 sections. How long in metres is each section?
● Understanding the situation of division problem.

36.5÷5=7.3　A. 7.3 m

**5** Sophie and Alfie divided the area into two areas shown on the right. When the two areas are the same, fill in the □ with a number.
● Understanding the situation and answer.

□ m, 8 m, Sophie, Alfie, 9.5 m, 12 m

All areas 9.5×12=114
1 person's area 114÷2=57
57 ÷8 =7.125 A. 7.125 m

## Lesson Flow

**1** **① (Decimal number × (Decimal number) and (Decimal number) ÷ (Decimal number) in vertical form.**

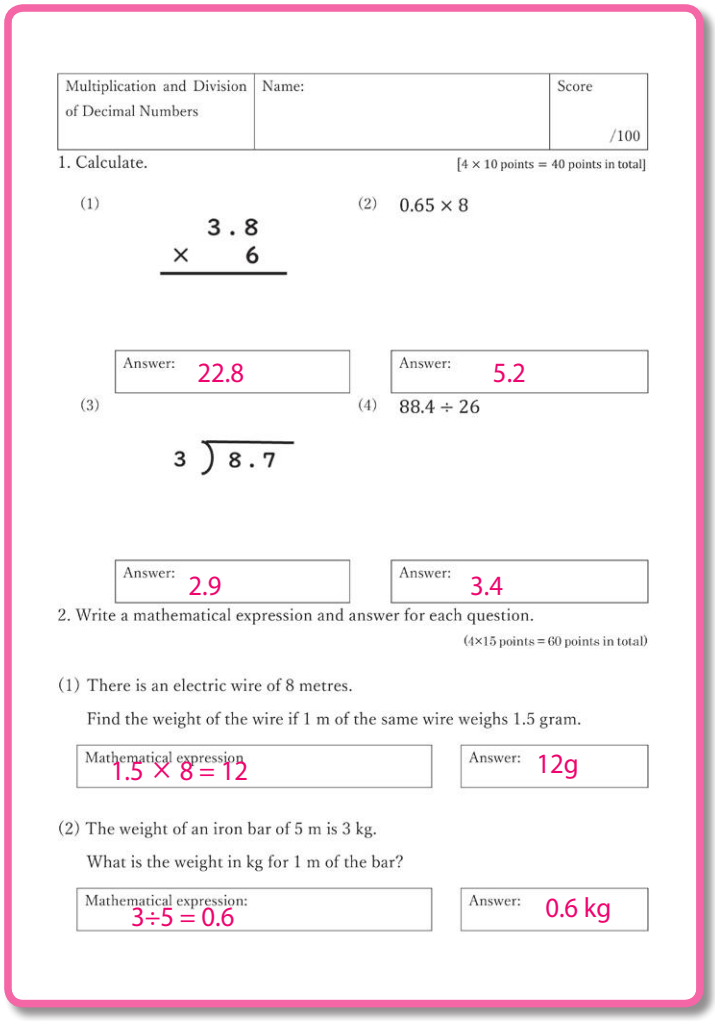
TN ①-③ (Decimal number up to tenth place) × (Whole number)
④-⑥ (Decimal number up t hundredth place) × (Whole number)
⑦-⑨ (Decimal number up to tenth place) ÷ (Whole number)
⑩-⑫ (Decimal number up to hundredth place) ÷ (Whole number)

T Confirm how to calculate step by step especially how to place decimal point in the answer.

**2** **② Round the quotient to the nearest hundredths place and give the answer to the nearest tenths place.**

**3** **③ Find the side of the rectangle by using formula of the area of a rectangle.**

T Confirm that (Length) × (Width) = (Area), and find the side by inserting numbers in the formula.



| Multiplication and Division of Decimal Numbers | Name: | Score /100 |
|---|---|---|

1. Calculate. [4 × 10 points = 40 points in total]

(1) 3.8 × 6 — Answer: 22.8

(2) 0.65 × 8 — Answer: 5.2

(3) 3 ) 8.7 — Answer: 2.9

(4) 88.4 ÷ 26 — Answer: 3.4

2. Write a mathematical expression and answer for each question. (4×15 points = 60 points in total)

(1) There is an electric wire of 8 metres.
Find the weight of the wire if 1 m of the same wire weighs 1.5 gram.
Mathematical expression: 1.5 × 8 = 12 — Answer: 12g

(2) The weight of an iron bar of 5 m is 3 kg.
What is the weight in kg for 1 m of the bar?
Mathematical expression: 3÷5 = 0.6 — Answer: 0.6 kg

**4** **④ (Whole number) × (Whole number) = (Decimal number), and dividing continuously.**

S Divide continuously up to hundredth place and give the answer to tenth place by rounding the quotient.

**5** **⑤ Multiplication of decimal number by whole number.**

**6** **Solve "Do you remember".**

**7** **① How to calculate (Decimal number) × (Whole number) and (Decimal number) ÷ (Whole number).**

TN ① (Decimal number up to tenth place) × (Whole number) based on the unit of 0.1
② (Decimal number) ÷ (Whole number) based on the unit of 0.001
③ Decimal point of remainder

**8** **② Multiplication and division in vertical form.**

TN ① (Decimal number up to tenth place) × (1-digit whole number)
② (Decimal number up to tenth place) × (2-digit whole number)
③ (Decimal number up to hundredth place) × (1-digit whole number)
④ (Decimal number up to tenth place) ÷ (1-digit whole number)
⑤ (Decimal number up to tenth place) ÷ (2-digit whole number)
⑥ (Decimal number up to hundredth place) ÷ (1-digit whole number)

**9** **③ Find the area of rectangle.**

S Find the area of rectangle by using the formula.

**10** **④ Quotative division and partitive division.**

S Recognise that there are two meaning even the math expressions are same.

**11** **⑤ Solve the problem.**

S 1. Find the area of whole rectangle and divide by half to find the area of each.
9.5 × 12 = 114, 114 ÷ 2 = 57
2. Apply the formula of area to find the width of Sophie's shape.
8 × □ = 57, 57 ÷ 8 = 7.125
Answer: 7.125 m

**End of Chapter Test: Chapter 16** **Date:**

| Multiplication and Division of Decimal Numbers | Name: | Score /100 |
|---|---|---|

1. Calculate. [4 × 10 points = 40 points in total]

(1)

$$\begin{array}{r} 3.8 \\ \times \quad 6 \\ \hline \end{array}$$

Answer:

(2) $0.65 \times 8$

Answer:

(3)

$$3 \overline{)\, 8.7}$$

Answer:

(4) $88.4 \div 26$

Answer:

2. Write a mathematical expression and answer for each question.

(4×15 points = 60 points in total)

(1) There is an electric wire of 8 metres.

Find the weight of the wire if 1 m of the same wire weighs 1.5 gram.

| Mathematical expression | Answer: |
|---|---|

(2) The weight of an iron bar of 5 m is 3 kg.

What is the weight in kg for 1 m of the bar?

| Mathematical expression: | Answer: |
|---|---|

# Chapter 17 Fractions

## 1. Unit Objectives

- To deepen their understanding of various fraction and their representations based on unit fractions.
- To understand fractions larger than 1 and equivalent fractions concept. (4.1.9 a, b )
- To add and subtract fractions having same denominators. (4.1.9 c, d)

## 2. Teaching Overview

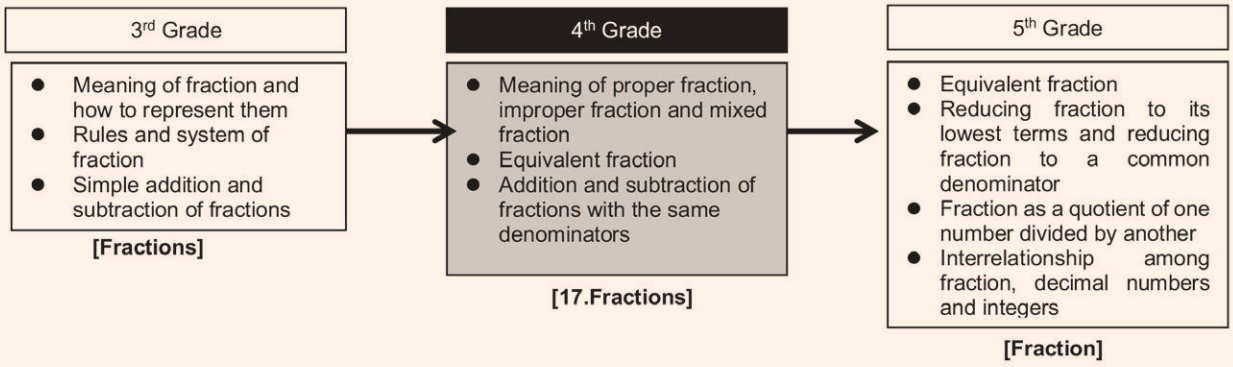
In Grade 3, students learn simple fractions and their addition and subtraction. In this unit, students learn fractions greater than 1, fractions as numbers on the same number system of whole numbers and addition and subtraction of various fractions.

**Fractions Larger than 1:** Students learn how to express the amount of water which is more than one bottle in improper and mixed fractions. The visualisation will help them to understand both ways of expressions are for the same amount. It is also important for students to express the fractions by the number of unit fractions.

**Equivalent Fractions :** The diagram with number lines will help students understand the relationship among equivalent fractions and relative size of the number to whole numbers.

**Addition and Subtraction of Fractions :** Teachers should avoid to impart that they should add/subtract numerators only in addition or subtraction of fractions with the same denominator. Firstly, they should think based on a concrete example. They can think each fraction in the calculation as the number of unit fractions and calculate the number of them. If they think like this, they would not have any problem even though the fractions in the calculation are mixed with improper, mixed fractions or whole numbers.

## 3. Related Learning Contents



# Unit 17

# Unit: Fractions
## Sub-unit: 1. Fractions Larger than 1
## Lesson 1 of 3 (Double Period)

Textbook Page : p.183~184
Actual Lesson 113

## Sub-unit Objectives

- To think of ways on how to express fractions larger than 1 based on prior knowledge.

## Lesson Objectives

- To recognise the given situation and think about how to express fractions larger than 1.

## Prior Knowledge

- Fractions representing sizes less than 1 through understanding denominator and numerator.
- The structure of fractions by understanding the unit fraction.
- Addition and subtraction of fractions with the same denominator using number line and 1 L diagram representations.

## Preparation

- Thermos, 2×1 L containers, 8×1 L diagrams (coloured for fractional parts).

## Assessment

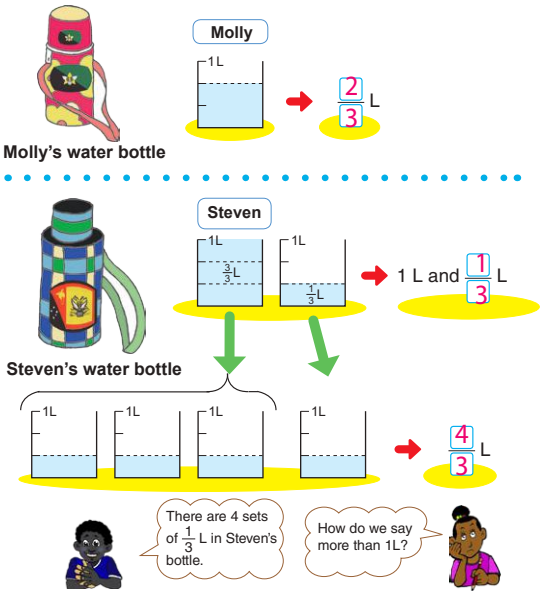
- Using ideas of unit fractions. F
- Understand and express mixed fractions, improper fractions and fractions greater than 1. S
- Have the ability to draw fractions greater than 1 in diagram. S

## • Teacher's Notes •

- Misconceptions of content: Students should clearly understand that $\frac{3}{3}$ L is equivalent to 1. The fractional parts must be equal to avoid misconception.
- Background/improvise materials: Clearly drawn 1 L representation using charts.
- Stress on prior knowledge about fractions.

17 Fractions

What are the amounts of water in Molly's bottle and Steven's bottle in litres, respectively?




Let's think about how to represent fractions larger than 1 and how to calculate.

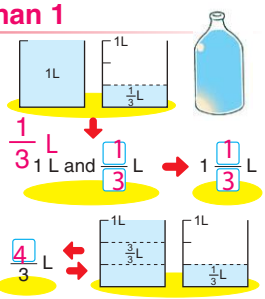
How to express and read mixed fractions and improper fractions.

### 1 Fractions Larger than 1

1 What is the amount of water in Steven's bottle in litres?

1 1 L and how many litres more?

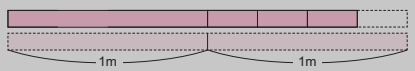
2 By looking at the figure on the right, how many $\frac{1}{3}$ L can we say?




The sum of 1 L and $\frac{1}{3}$ L is written as $1\frac{1}{3}$ L and is read as **"one and one third litres"**.
It is also written as $\frac{4}{3}$ L and read as **"four third litres" or "four over three litres"**.

$1\frac{1}{3} = \frac{4}{3}$

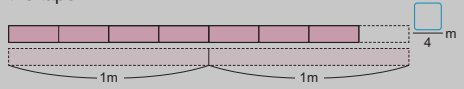
2 How many metres is the length of the tape below?




1 1 m and how many metres more?

1 m and $\square$ m → 1 $\square$ m

2 By looking at the figure below, how many $\frac{1}{4}$ m are there in the tape?




$\square \div \square =$ 183　　184 $= \square \times \square$

## Lesson Flow

### 1 Review

T Identify and interpret the diagrams represented by the fractions that are displayed in front of you.
1. $\frac{3}{5}$ 2. $\frac{1}{2}$ 3. 1 Whole 4. $\frac{2}{3}$

S Draw their own interpretations of the fractions mentioned above and explain their diagrams.

### 2 Read and understand the given situation and constructively represent the description given.

T Show the amount of water in Molly's container and Steven's container in a diagram on the blackboard or have a container to represent $\frac{2}{3}$ L of water.
Molly – $\frac{2}{3}$ L
Steven – 1 L and $\frac{1}{3}$ L

S Read the display/diagram and recall their previous knowledge to think about the representation.

T Ask the students to identify and call out the representation of the diagram and explain why?

S Using their previous knowledge, they could say that the representation for Molly's container is $\frac{2}{3}$ L and it is made of 2 sets of $\frac{1}{3}$ L.
However, Steven's container is 1L and $\frac{1}{3}$ L and it is made of 4 sets of $\frac{1}{3}$ L which is $\frac{4}{3}$ L.

T Show a $\frac{3}{3}$ L diagram on the board.

S Read the display and identify that the representation of $\frac{3}{3}$ L is equivalent to 1 L.

S Express the idea of unit fraction and identify that $\frac{3}{3}$ L is made of 3 parts of $\frac{1}{3}$ L.

### 3 ❶ Think about how to express and represent fractions larger than 1 and calculate.

T Introduce the main task.

T ❶ ❷ Shows/displays the $\frac{1}{3}$ L and 1 L diagram together on the blackboard and ask students to think about how to express both as one fraction.

S Students share their ideas.
Steven: The amount of water is 1 L and a remaining part. The remaining part is $\frac{1}{3}$ so we say 1 and $\frac{1}{3}$ L. The amount of water which is 1 L is $\frac{3}{3}$ L. There are 4 of $\frac{1}{3}$ L so the amount of water is $\frac{4}{3}$ L

### 4 Summarise the lesson.

T Explain important point in the box .

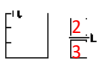
## Sample Blackboard Plan

**Date:** **Chapter:** 17 Fractions **Topic:** Fractions Larger Than 1. **Lesson N°:** 1/3

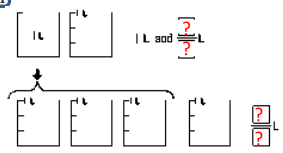
MT Let's think about how to represent fractions larger than 1.

What are the amounts of water in Molly's bottle and Steven's bottle in liters respectively?

Molly



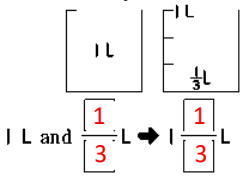
Steven



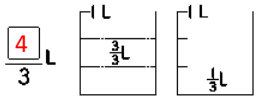
There are 4 sets of $\frac{1}{3}$ L in Steven's bottle
How can we say more than 1 L?

❶ What is the amount of water in Steven's bottle in liters?

❶ 1 L and how many liters more?



❷ By looking at the figure on the right, how many $\frac{1}{3}$ L can we say?



Important Point

The sum of 1 L and L is written as L and is read as **"one and one third liters"**
It is also written as L and is read as **"four thirds liters"** or **"four over three liters"**.

# Unit 17

# Unit: Fractions
## Sub-unit: 1. Fractions Larger than 1
## Lesson 2 of 3 (Double Period)

Textbook Page : p.184~p.185
Actual Lesson 114

## Lesson Objectives

- To identify proper fraction, improper fraction and a mixed fraction.
- To express fraction which is more than one by using improper fraction and a mixed fraction.

## Prior Knowledge

- Fractions Larger than 1 (previous lesson)
- How to express and read mixed fractions and improper fractions.

## Preparation

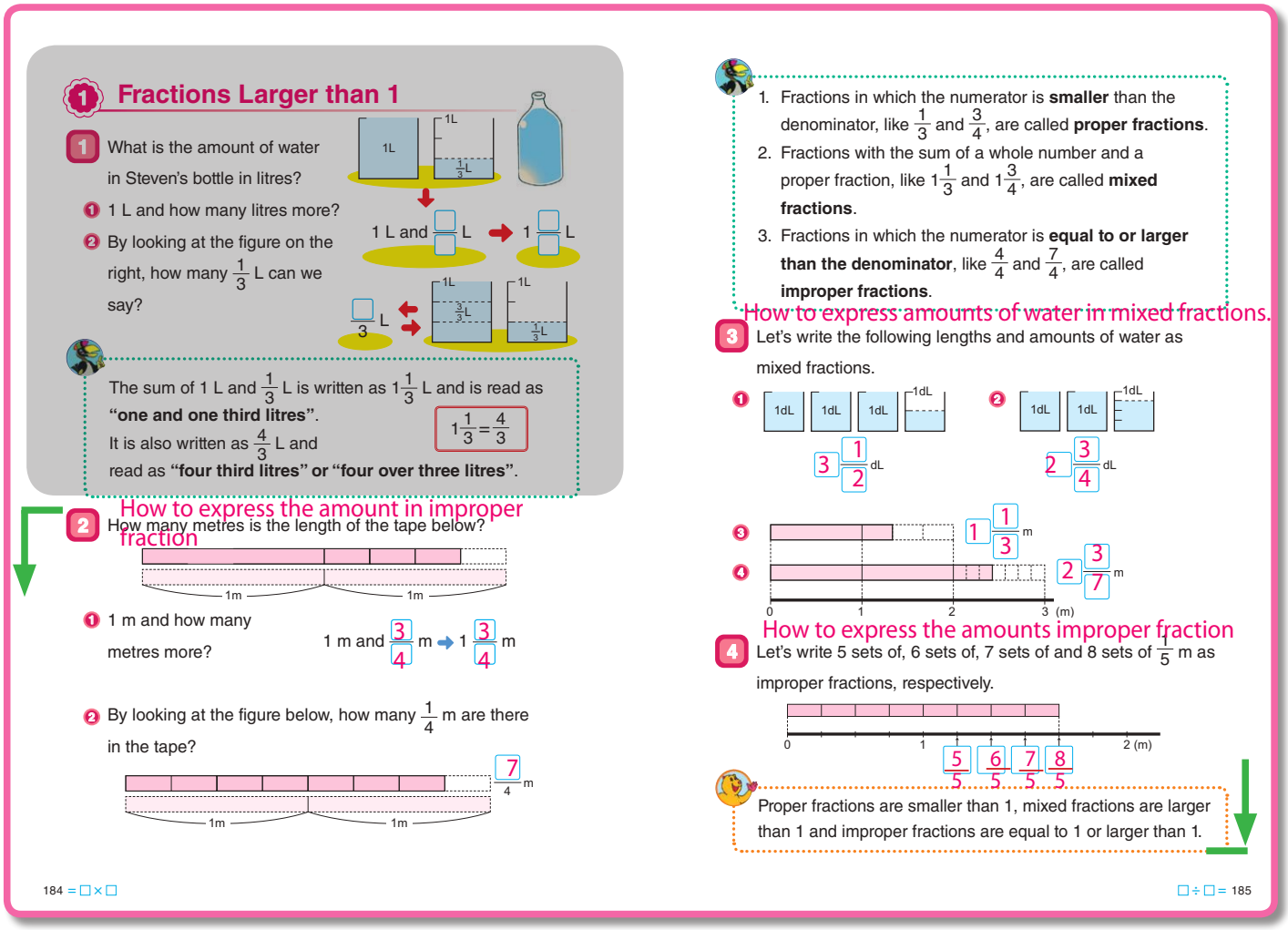
- Coloured paper strips, coloured chalks, ruler, white/black board, markers.

## Assessment

- Identify proper fraction, improper fraction and a mixed fraction and their meaning. F
- Do task 3 and 4 correctly confirming the term and meaning of improper fraction and mixed fraction. S

## • Teacher's Notes •

- Misconceptions of content
- Mixed fractions are bigger than improper fractions in fact they are the same.
- Whole number is not a fraction.



## Lesson Flow

### 1 Review previous lesson.

T Show fractions using objects. 1) $\frac{2}{2}$ 2) $\frac{4}{5}$ 3) 1and $\frac{1}{4}$

S Read the objects and call out the fraction numerically.

### 2 ❷ Express the lengths larger than 1.

T Introduce the main task.

TN The number line allows students to recall their work from yesterday and apply the knowledge to solve the problem situation.

S Express the lengths larger than 1.

❶ 1 m and $\frac{3}{4}$ m $1\frac{3}{4}$ m

❷ $\frac{7}{4}$ m

### 3 Explain the important point in the box .

### 4 Think about how to express fractions as mixed fractions and improper fractions .

T ❸ Explain the exercise and remind students that same as the one done previously.

S Read and understand the given situation and answer in groups of 3 or 4.

T ❹ Using the number line interprete carefully the next exercises to show the questions on how to write sets of $\frac{1}{5}$ as improper fractions, respectively.

S Show and explain their answers on the blackboard.

T Confirm with the students the right answers.

### 5 Summary

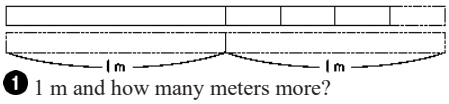
S Explain the important point in the box .

## Sample Blackboard Plan

**Date:** **Chapter:** 17 Fractions **Topic:** Fractions Larger Than 1. **Lesson N°:** 2/3

MT Let's think about how to express the lengths and volume in fraction which are larger than 1.

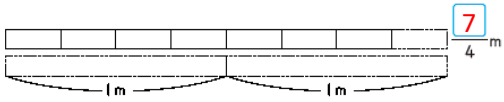
❷ How many meters is the length of the tape below?




❶ 1 m and how many meters more?

1 m and $\frac{3}{4}$ m ➡ 1 $\frac{3}{4}$ m

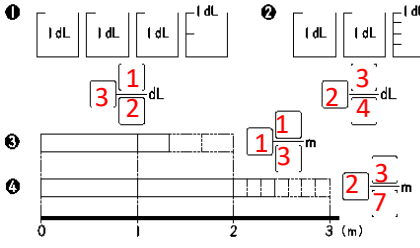
❷ By looking at the figure below, how many $\frac{1}{4}$ m are there in the tape?



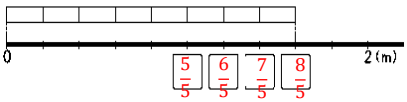

There are 7 of $\frac{1}{4}$ m tapes.

1. Fractions in which the numerator is smaller than the denominator, like and , are called **proper fractions**.
2. Fractions that are sum of a whole number and a proper fraction, like and are called **mixed fractions**.
3. Fractions in which the numerator is equal to or larger than the denominator, like and , are called **improper fractions**.

❸ Let's write the following lengths and amounts of water as mixed fractions




❹ Let's write 5, 6, 7 and 8 sets of $\frac{1}{5}$ m as improper fractions, respectively.




Important Point

- Proper fractions are smaller than 1m
- Mixed fractions are larger than 1
- Improper fractions are equal to or larger than1.

# Unit 17

# Unit: Fractions
## Sub-unit: 1. Fractions Larger than 1
## Lesson 3 of 3 (Double Period)

Textbook Page : p.186
Actual Lesson 115

## Lesson Objectives

- To think of ways of changing mixed fractions to improper fractions and vice-versa, and change improper fractions to mixed fractions or whole numbers, and vice-versa.
- To understand the relationship between mixed fractions and improper fractions.
- Count sets of units.

## Prior Knowledge

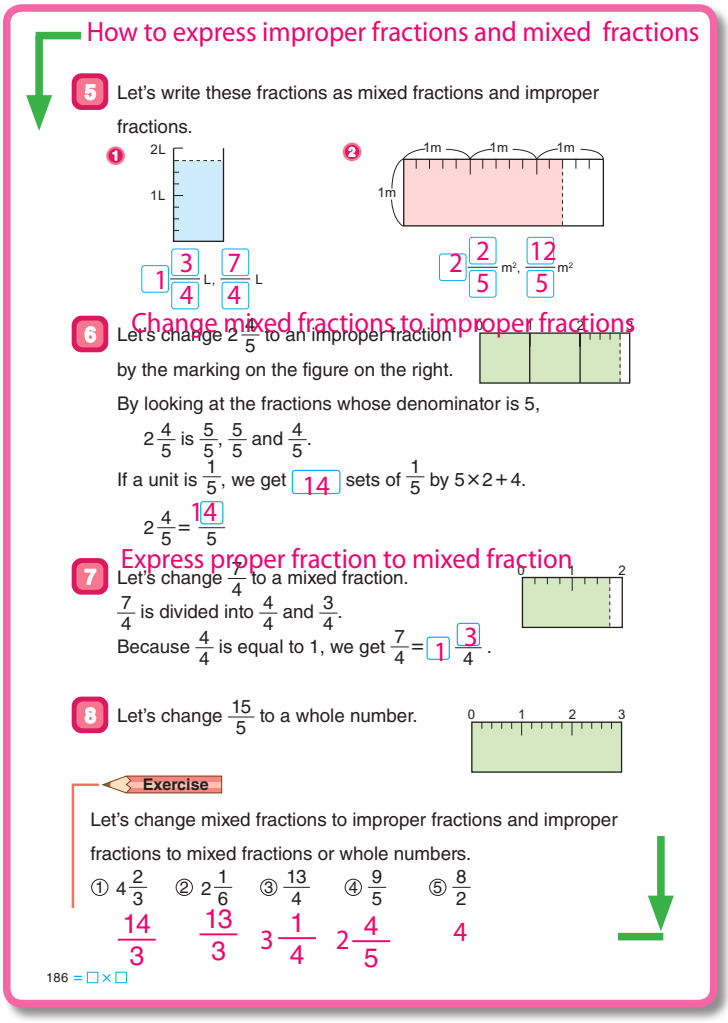
- How to express the lengths larger than 1.
- Definition of proper fraction, mixed fraction and improper fraction.
- How to express amounts of water in mixed fractions using containers and tape diagram.
- How to express the amount in improper fraction using tape diagram.

## Preparation

- Colour paper strips, colour chalk, ruler, white/ blackboard, markers charts.

## Assessment

- Change mixed fractions to improper fractions, and improper fractions to mixed fractions or whole numbers. F
- Think and explain the conversion steps of mixed and improper fractions using the idea of unit fractions. F
- Understand the meaning of proper, mixed and improper fractions and the relationships between mixed fractions and improper fractions. S
- Do the exercises correctly at the end of the lesson. S




## • Teacher's Notes •

**Misconceptions of content : Example:**

*Change mixed fraction to improper fraction:

$1\frac{3}{2}=3$ which is wrong. Correct is $\frac{5}{3}$.

*Change improper fraction to mixed fraction:

$=3\frac{3}{2}$ sets of $\frac{3}{2}$

$=3\frac{3}{2}$ which is wrong. Correct is $4\frac{1}{2}$

## Lesson Flow

### 1 Review previous lesson.

T Ask students to define and give examples of proper, improper or mixed fractions using their prior knowledge.

S Define and give examples of proper, improper and mixed fractions.

### 2 Think about how to express and change improper fraction to mixed fraction and vice- versa.

T Introduce the main task.

S 5 Using the situations from the two problems on a chart to help students visualise the diagram to explain how to express improper fractions and mixed fractions.

S Solve 6 - 8.

S Read the questions and think of a way to get the correct answers individually or in groups.

TN Allow students to show and explain their answers on the board and then confirm with the students the correct procedures and answers.

### 3 Do the exercise.

S Do the exercise and give a summary of the lesson with the teachers support.

## Sample Blackboard Plan

**Date:** **Chapter:** 17 Fractions **Topic:** Fractions Larger Than 1. **Lesson N°:** 3/3

MT Let's express improper fractions as mixed fractions or vise versa.

**5** Let's write these fractions as mixed fractions and improper fractions.

❶ 2 L, 1 L → 1 3/4 L, 7/4 L

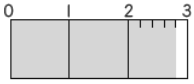
❷ 1 m, 1 m, 1 m; 1 m → 2 2/5 m², 12/5 m²

**6** Let's change $2\frac{4}{5}$ to an improper fraction.

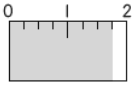
$2\frac{4}{5}$ is $\frac{5}{5}$, $\frac{5}{5}$ and $\frac{4}{5}$

If a unit is $\frac{1}{5}$, we get 14 sets of $\frac{1}{5}$ by $5 \times 2 + 4$.

Answer: $2\frac{4}{5} = \frac{14}{5}$



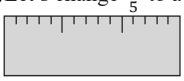

**7** Let's change $\frac{7}{4}$ to a mixed fraction.




$\frac{7}{4}$ is divided into $\frac{4}{4}$ and $\frac{3}{4}$.

Because $\frac{4}{4}$ is equal to 1, we get $\frac{7}{4} = 1\frac{3}{4}$.

**8** Let's change $\frac{15}{5}$ to a whole number.



15 sets of $\frac{1}{5}$ gives us 3 sets of $\frac{5}{5}$.

Because $\frac{5}{5}$ is equal to 1, we have 3 sets of 1

3 sets of 1 is equal to 3.

**Exercise**

Let's change mixed fractions to improper fractions, improper fractions to mixed fractions or whole numbers.

① $4\frac{2}{3}$ → $\frac{14}{3}$ ② $2\frac{1}{6}$ → $\frac{13}{6}$ ③ $\frac{13}{4}$ → $3\frac{1}{4}$ ④ $\frac{9}{5}$ → $1\frac{4}{5}$ ⑤ $\frac{8}{2}$ → 4

# Unit 17

# Unit: Fractions
## Sub-unit: 2. Equivalent Fractions
## Lesson 1 of 2 (Single Period)

Textbook Page : p.187
Actual Lesson 116

## Sub-unit Objectives

- To understand that there are fractions that are equivalent in size but have different denominators and numerators.
- To think about the ways in how to express equivalent fractions based on prior knowledge.

## Lesson Objectives

- To use a fraction wall to understand that there are equivalent fractions having different denominators and numerators.
- To compare sizes of fractions.

## Prior Knowledge

- Using tape diagram and a container to express improper fractions and mixed fractions.
- Change mixed fraction to improper fraction.
- Express proper fraction to mixed fraction.
- Meaning and size of unit fractions

## Preparation

- Teacher: $\frac{1}{2}$ m, $\frac{2}{4}$ m, 4.8 m, and 1 m tape diagrams, fraction wall diagram.
- Students: 1 m paper tape (3 pieces)

## Assessment

- Identify fractions that are equal in size but have different denominators and numerators. F
- Understand that there are fractions that are equal in size but have different denominators and numerators. S
- Identify the relationship between the numerator and denominator of fractions that are equal in size. S

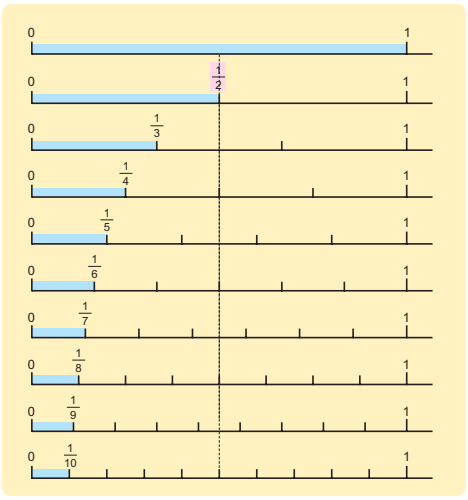
### • Teacher's Notes •

Misconceptions of content: Misidentification of fractions with large denominator on the number line. (Example $\frac{8}{9}$ is not less to $\frac{9}{10}$)

To understand the size of unit fractions.

### 2 Equivalent Fractions

1 Let's investigate the following by using this fraction wall.




1 Let's read out the following fractions $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{6}$, $\frac{1}{7}$, $\frac{1}{8}$, $\frac{1}{9}$ and $\frac{1}{10}$ from smallest to largest. $\frac{1}{10}, \frac{1}{9}, \frac{1}{8}, \frac{1}{7}, \frac{1}{6}, \frac{1}{5}, \frac{1}{4}, \frac{1}{3}, \frac{1}{2}$

2 Let's replace the numerators in 1 with 2 and read them again from the smallest to the largest.

When the numerator is the same and the denominators become larger, the fraction becomes smaller.

$\frac{2}{10}, \frac{2}{9}, \frac{2}{8}, \frac{2}{7}, \frac{2}{6}, \frac{2}{5}, \frac{2}{4}, \frac{2}{3}, \frac{2}{2}$

□ ÷ □ = 187

## Lesson Flow

### 1 ❶ Discuss freely about the fraction wall.

T Introduce the main task.
T Look at this diagram of fraction wall. What do you notice? (Show a chart of Fraction wall.)
S Lines are divided into increasingly smaller scales.
S Size of space on a given fraction wall becomes smaller as the value decreases.
S But the difference gradually decreases as well.
S Some fractions are in the same place.

### 2 ❶ Read and understand the size of unit fractions.

T Remind students to investigate the sizes of unit of fractions using the Fraction Wall.
S Discuss in groups of 2 or 3 and use the number line to understand the relation between the sizes of the unit fraction.
S $\frac{1}{2}$ has a bigger size than $\frac{1}{5}$ or $\frac{2}{10}$ just by looking at the size of the shape or colour .

### 3 Investigate using fraction wall the relationships between the numerator and denominator of fractions that are equal in size.

T Assist students to read out with accuracy and identify the relationships of sizes of each unit fraction from the smallest to the largest.
S Identify together each fraction size and read from the smallest to the largest.
$\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \frac{1}{6}, \frac{1}{7}, \frac{1}{8}, \frac{1}{9}$ and $\frac{1}{10}$.

### 4 ❷ Replace the numerators with 2.

T Replace the numerators in the above exercise with 2 and read them again from the smallest to largest.

### 5 Summarise the lesson.

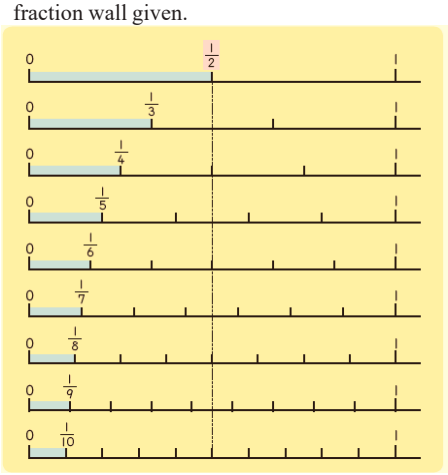
S Give a summary of the lesson with the teachers support.
S Fractions become smaller when their denominators become bigger.

## Sample Blackboard Plan

**Date:** **Chapter:** 17 Fractions **Topic:** Equivalent Fractions **Lesson Nº:** 1/2

MT Let's investigate the size of unit fraction using the fraction wall.

❶ Let's investigate the following by using the fraction wall given.




❶ Let's read out the following fractions $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \frac{1}{6}, \frac{1}{7}, \frac{1}{8}, \frac{1}{9}$, and $\frac{1}{10}$ from smallest to largest.

$\frac{1}{10}, \frac{1}{9}, \frac{1}{8}, \frac{1}{7}, \frac{1}{6}, \frac{1}{5}, \frac{1}{4}, \frac{1}{3}, \frac{1}{2}, \frac{1}{1}$

❷ Let's replace the numerators in ❶ with 2 and read them again from smallest to largest.

$\frac{2}{10}, \frac{2}{9}, \frac{2}{8}, \frac{2}{7}, \frac{2}{6}, \frac{2}{5}, \frac{2}{4}, \frac{2}{3}, \frac{2}{2}, \frac{2}{1}$

**Summary**
When the numerator is the same, and the denominator becomes larger, its fraction becomes smaller.

# Unit 17

# Unit: Fractions
## Sub-unit: 2. Equivalent Fractions
## Lesson 2 of 2 (Single Period)

Textbook Page : p.188
Actual Lesson 117

## Lesson Objectives

- To recognise the given fraction and think about how to find its equivalent fractions using a fraction wall.

## Prior Knowledge

- Equivalent fractions
- Understanding of the size of unit fractions. (Previous lesson)

## Preparation

- Enlarged fraction wall showing unit fractions, $\frac{1}{2}$ ..... $\frac{1}{10}$ (Fraction Board/Wall).

## Assessment

- Write equivalent fractions of a given fraction. F
- Explore and find equivalent fractions. F
- Use fraction wall to find equivalent fractions of a given fraction. F
- Do the exercise correctly. S

### • Teacher's Notes •

Students should clearly understand why some fractions have the same size even if their numerators and denominators are different.

❸ Let's look at the number line on the previous page, write the fractions that are equal to the following fractions.

Ⓐ $\frac{1}{2}=\frac{2}{4}=\frac{3}{6}=\frac{4}{8}=\frac{5}{10}$

Ⓑ $\frac{1}{3}=\frac{2}{6}=\frac{3}{9}$

Ⓒ $\frac{3}{4}=\frac{6}{8}=\frac{9}{12}$

❹ Let's look at the number line and find other fractions that are equal to the fractions in ❸. $\frac{2}{3}=\frac{4}{6}=\frac{6}{9}$, $\frac{1}{4}=\frac{2}{8}$, $\frac{1}{5}=\frac{2}{10}$

❺ Let's talk about what you have learned and summarise the results.

In fractions;

① When the denominators are the same, they become larger as the numerator increases. $\frac{1}{4}<\frac{2}{4}<\frac{3}{4}$

② When the numerators are the same, they become smaller as the denominator increases. $\frac{4}{2}>\frac{4}{4}>\frac{4}{8}$

③ Some fractions have the same size even if both their denominators and numerators are different.

**Exercise**

Which is larger? Let's fill in the ☐ with equal or inequality signs.

① $\frac{3}{5}$ [>] $\frac{3}{8}$ ② $\frac{3}{7}$ [<] $\frac{5}{7}$ ③ $\frac{1}{2}$ [=] $\frac{4}{8}$

188 = □ × □

## Lesson Flow

**1 Review the previous lesson.**

T Displays the fraction wall with $\frac{1}{2}$ to $\frac{1}{10}$ on the blackboard.

S Read the display and recall their previous knowledge to think about the representation.

T Allow students to read from the smallest to the largest fraction and explain why?

S Read from the smallest to the largest fraction $\frac{1}{10}$ to $\frac{1}{2}$ and explain the reason.

**2 ③ Think about how to find fractions that are equal to $\frac{1}{2}$, $\frac{1}{3}$ and $\frac{3}{4}$ using the fraction wall.**

T Introduce the main task.

S Use the previous knowledge and fraction wall to think about the fractions equivalent to $\frac{1}{2}$, $\frac{1}{3}$ and $\frac{3}{4}$.

T Supervise and check student's ideas and discussions.

**3 ④ Look for other fractions which are equal to fractions in ③.**

T Look at the fraction wall again and look for other equivalent fractions. Teacher and students look together at the fraction wall on the blackboard.

S $\frac{2}{5}$ and $\frac{4}{10}$ are the same size and etc.

S $\frac{2}{3}$, $\frac{4}{6}$ and $\frac{6}{9}$ and etc.

**4 ⑤ Discuss what the students learnt about fraction.**

S Explain what was noticed.

**5 Summary**

S Read and understand the important point in the box .

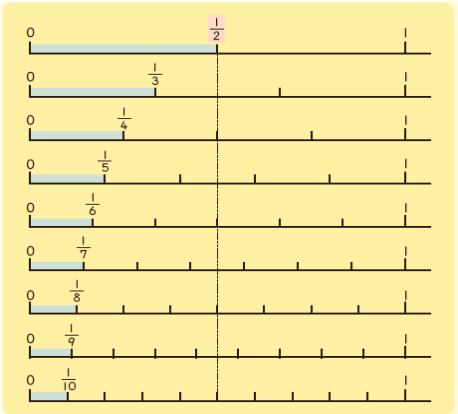
**6 Do the exercise.**

## Sample Blackboard Plan

**Date:** **Chapter:** 17 Fractions **Topic:** Equivalent Fractions **Lesson N°:** 2/2

MT Let's think about how to find the equivalent fractions using the fraction wall.

③ Using the fraction wall on the previous page, write the fractions that are equal to the following fractions.




A $\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8} = \frac{5}{10}$

B $\frac{1}{3} = \frac{2}{6} = \frac{3}{9}$

C $\frac{3}{4} = \frac{6}{8}$

④ Let's look at the fraction wall and find other fractions that are equal to the fractions in ③.

i. $\frac{2}{3} = \frac{4}{6} = \frac{6}{9}$

ii. $\frac{1}{4} = \frac{2}{8}$

iii. $\frac{1}{5} = \frac{2}{10}$

⑤ Let's talk about what you have learnt and summarize the results.

**Summary**

1. When the denominators are the same, they become larger as the numerator increases.
2. When the numerators are the same, they become smaller as the denominator increases
3. Some fractions have the same size even if both their denominators and numerators are different.

**Exercise**

Which is larger? Let's fill in the ☐ with equal or inequality signs.

① $\frac{3}{5} \square \frac{3}{8}$ ② $\frac{3}{7} \square \frac{5}{7}$ ③ $\frac{1}{2} \square \frac{4}{8}$

# Unit 17

# Unit: Fractions
## Sub-unit: 3. Addition and Subtraction of Fractions
## Lesson 1 of 4 (Double Period)

Textbook Page : p.189
Actual Lesson 118

## Sub-unit Objectives

- To think of ways to add and subtract fractions with the same denominator.
- To understand the meaning of addition and subtraction of fractions
- To explain how to add and subtract a fraction with the same denominator.

## Lesson Objectives

- To add fraction with the same denominator
- To explain how to add fractions with the same denominator using a diagram, fraction wall and the idea of unit fraction.

## Prior Knowledge

- Using fraction wall to identify equivalent fractions for various fractions.
- Equal and Inequality signs

## Preparation

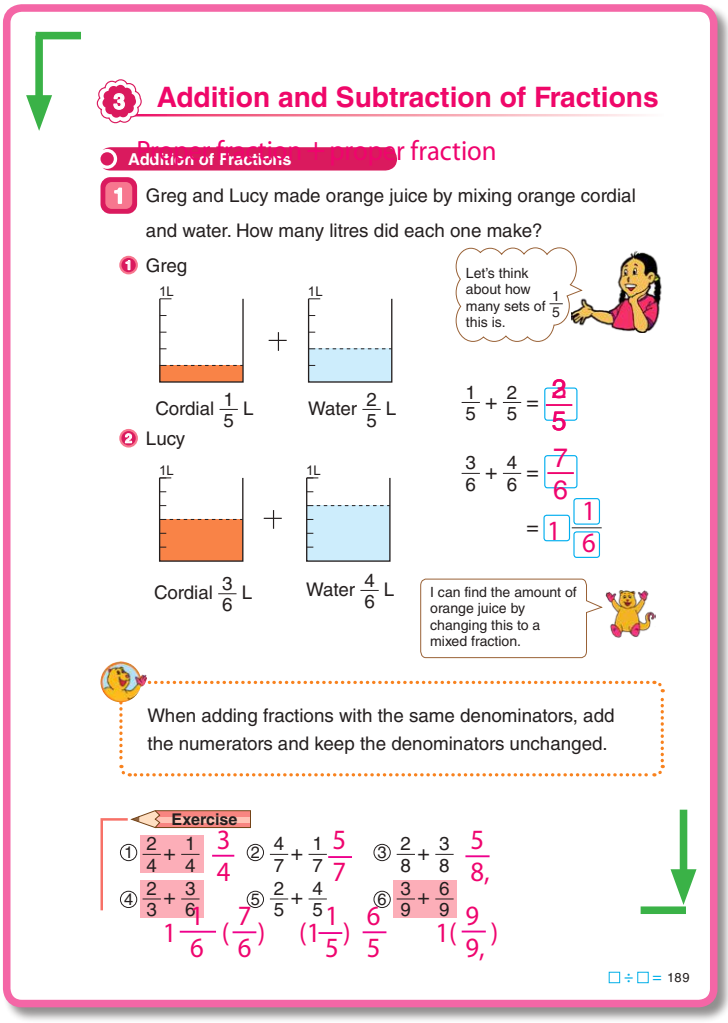
- Coloured water eg. Cordial, clear plastic container with measurement units written on, number line on stripes of paper.

## Assessment

- Calculate addition of fractions with same denominator. F
- Think about and understand how to calculate addition of fractions with same denominator. F
- Do the exercise correctly. S

## • Teacher's Notes •

In a fraction, the denominator tells us how many parts the whole is divided into, and the numerator tells us how many of those parts we're dealing with.
Add the numerators of the fractions when the denominators are the same.
Simplify your answer, if needed.



3 Addition and Subtraction of Fractions

Addition of Fractions

1 Greg and Lucy made orange juice by mixing orange cordial and water. How many litres did each one make?

1 Greg

Cordial $\frac{1}{5}$ L  Water $\frac{2}{5}$ L

Let's think about how many sets of $\frac{1}{5}$ this is.

$\frac{1}{5} + \frac{2}{5} = \frac{3}{5}$

2 Lucy

Cordial $\frac{3}{6}$ L  Water $\frac{4}{6}$ L

$\frac{3}{6} + \frac{4}{6} = \frac{7}{6} = 1\frac{1}{6}$

I can find the amount of orange juice by changing this to a mixed fraction.

When adding fractions with the same denominators, add the numerators and keep the denominators unchanged.

Exercise

① $\frac{2}{4} + \frac{1}{4}$ $\frac{3}{4}$  ② $\frac{4}{7} + \frac{1}{7}$ $\frac{5}{7}$  ③ $\frac{2}{8} + \frac{3}{8}$ $\frac{5}{8}$,

④ $\frac{2}{3} + \frac{3}{6}$ $1\frac{1}{6}$ $(\frac{7}{6})$  ⑤ $\frac{2}{5} + \frac{4}{5}$ $(1\frac{1}{5})$  ⑥ $\frac{3}{9} + \frac{6}{9}$ $\frac{6}{5}$ $1(\frac{9}{9},)$

□÷□= 189

## Lesson Flow

### 1 Review previous lesson.

T Review prior learning of adding simple fractions with the same denominator as
1) $\frac{1}{3}+\frac{1}{3}$ and 2) $\frac{2}{4}+\frac{2}{4}$

S Solve the problems using a diagram or fractions.

### 2 ❶ Read and understand the given situation and think about how many sets are there.

T Introduce the main task.

S ❶ Write a mathematical expression and think about how to calculate it.

S Notice that since adding one $\frac{1}{5}$ and two $\frac{1}{5}$, adding only numerator (1 + 2) and the answer will be $\frac{3}{5}$.

T ❷ Let students solve same way as ❶.

S Realise that if the answer becomes improper fraction, it can be changed to mixed fraction.

### 3 Summary

T Explain the important point in the box .

### 4 Do the exercise.

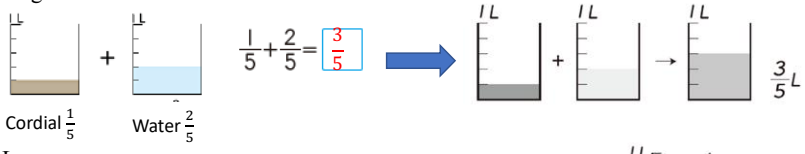
## Sample Blackboard Plan

**Date:** **Chapter:** 17 Fractions **Topic:** Addition and Subtraction of Fractions **Lesson N°:** 1/4

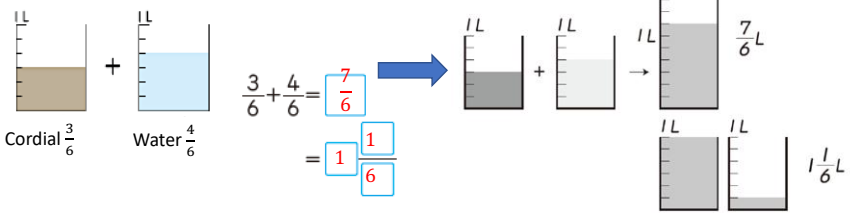
MT Let's think about how to add proper fractions with same denominator.

❶ Greg and Lucy made orange juice by mixing orange cordial and water. How many liters did each one make?

❶ Greg




❷ Lucy




Important Point

When adding fractions with the same denominators, add the numerators and keep the denominators unchanged.

Exercise

① $\frac{2}{4}+\frac{1}{4}=\frac{3}{4}$ ② $\frac{4}{7}+\frac{1}{7}=\frac{5}{7}$ ③ $\frac{2}{8}+\frac{3}{8}=\frac{5}{8}$

④ $\frac{2}{3}+\frac{2}{3}=1\frac{1}{3}\left(\frac{4}{3}\right)$ ⑤ $\frac{2}{5}+\frac{4}{5}=1\frac{1}{5}\left(\frac{6}{5}\right)$ ⑥ $\frac{3}{9}+\frac{6}{9}=1\left(\frac{9}{9}\right)$

# Unit 17

# Unit: Fractions
## Sub-unit: 3. Addition and Subtraction of Fractions
## Lesson 2 of 4 (Double Period)

Textbook Page : p.190
Actual Lesson 119

## Lesson Objectives

- To think about how to calculate (Mixed fraction) + (Mixed fraction) or (Mixed fraction) + (Proper fraction) with carrying.
- To master the skill of calculation of (Mixed fraction) + (Mixed fraction) or (Mixed fraction) + (Proper fraction) with carrying.

## Prior Knowledge

- Addition of fraction without carrying over.
- Addition of fraction if it is an improper fraction change to a mixed fraction.

## Preparation

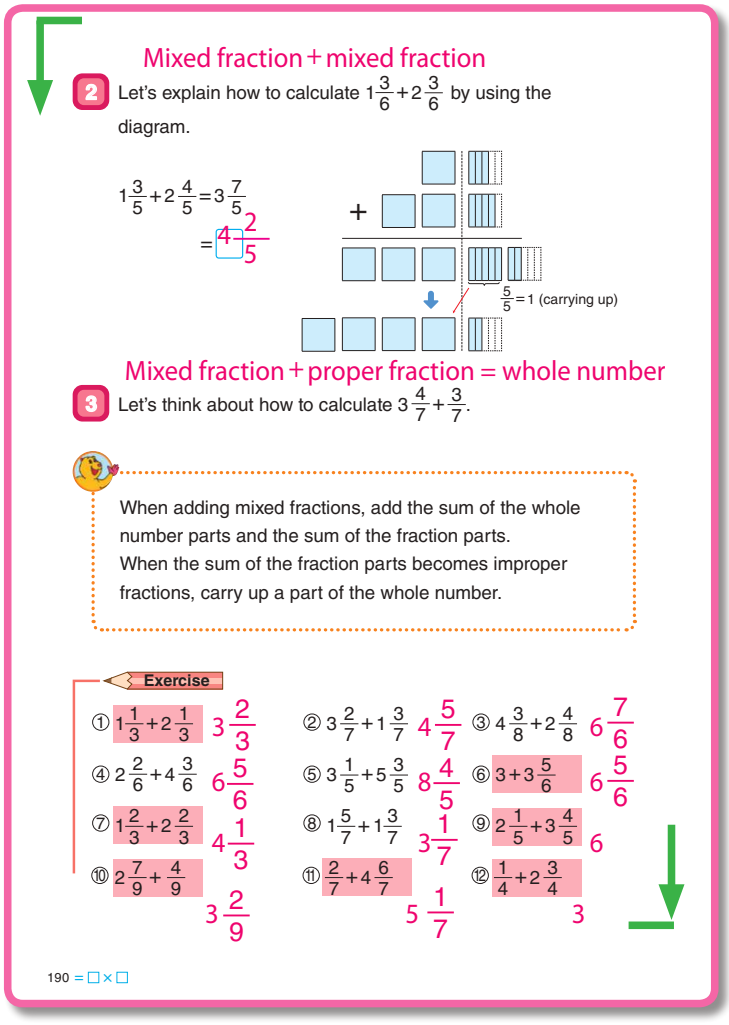
- Card diagram, work sheets

## Assessment

- Think about how to calculate (Mixed fraction) + (Mixed fraction) or (Mixed fraction) + (Proper fraction) with carrying. F
- Do the exercise correctly. S

## • Teacher's Notes •

- The basic ideas of adding fraction with same denominator is to think about how many unit fractions are there.
- Integer is a whole number.'
- Where there is an improper fraction as an answer, we change it to sets or reduce the fraction. (Simplifying fraction)



Mixed fraction + mixed fraction

2 Let's explain how to calculate $1\frac{3}{6}+2\frac{3}{6}$ by using the diagram.

$1\frac{3}{5}+2\frac{4}{5}=3\frac{7}{5}$

$=4\frac{2}{5}$

$\frac{5}{5}=1$ (carrying up)

Mixed fraction + proper fraction = whole number

3 Let's think about how to calculate $3\frac{4}{7}+\frac{3}{7}$.

When adding mixed fractions, add the sum of the whole number parts and the sum of the fraction parts.
When the sum of the fraction parts becomes improper fractions, carry up a part of the whole number.

Exercise

① $1\frac{1}{3}+2\frac{1}{3}$ $3\frac{2}{3}$

② $3\frac{2}{7}+1\frac{3}{7}$ $4\frac{5}{7}$

③ $4\frac{3}{8}+2\frac{4}{8}$ $6\frac{7}{6}$

④ $2\frac{2}{6}+4\frac{3}{6}$ $6\frac{5}{6}$

⑤ $3\frac{1}{5}+5\frac{3}{5}$ $8\frac{4}{5}$

⑥ $3+3\frac{5}{6}$ $6\frac{5}{6}$

⑦ $1\frac{2}{3}+2\frac{2}{3}$ $4\frac{1}{3}$

⑧ $1\frac{5}{7}+1\frac{3}{7}$ $3\frac{1}{7}$

⑨ $2\frac{1}{5}+3\frac{4}{5}$ 6

⑩ $2\frac{7}{9}+\frac{4}{9}$ $3\frac{2}{9}$

⑪ $\frac{2}{7}+4\frac{6}{7}$ $5\frac{1}{7}$

⑫ $\frac{1}{4}+2\frac{3}{4}$ 3

190 = □ × □

## Lesson Flow

### 1 Review previous lesson.

T Give the question "How many m tapes do you get if you combine a $\frac{4}{5}$ m tape and $\frac{3}{5}$ m tape?

S Explain how to combine a $\frac{4}{5}$ m tape and $\frac{3}{5}$ m tape using the diagram.

TN when the sum is improper fraction convert to mixed number.

### 2 2 Explain how to calculate $1\frac{3}{5}+2\frac{4}{5}$ (mixed fraction + mixed fraction) using the diagram.

T Introduce the main task.

T How can we calculate the expression given?

S Try to explain observing the diagram.

S When adding mixed fractions we add whole number parts and then fractional parts, and when the sum of the fractional part becomes an improper fraction, carry up the part of the whole number.

TN Remind students that when the sum is improper fraction convert to mixed number that is the sum of an integer and a proper fraction.

### 3 3 Think about how to solve $3\frac{4}{7}+\frac{3}{7}$.

S Calculate by adding the whole number part. When the sum of fraction part becomes improper fraction, carry up to the whole number part.

### 4 Summarise the important point.

T Explain the important point in the box .

### 5 Do the exercise.

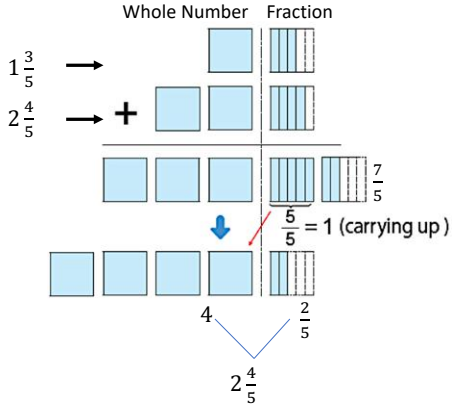
S Copmplete exercises 1, 6, 7, 9, 10, 11 and 12.

## Sample Blackboard Plan

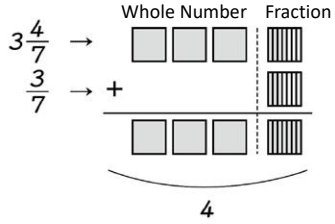
**Date:** **Chapter:** 17 Fractions **Topic:** Addition and Subtraction of Fractions **Lesson Nº:** 2/4

MT Let's think about how to add mixed fractions with same denominator with carrying.

2 Let's explain how to calculate $1\frac{3}{5}+2\frac{4}{5}$ by using the diagram.




3 Let's think about how to calculate $3\frac{4}{7}+\frac{3}{7}$




$3\frac{4}{7}+\frac{3}{7}=3+\frac{4}{7}+\frac{3}{7}$
$=3+\frac{7}{7}$
$=3+1$
$=4$

Important Point

- When adding mixed fractions, add the sum of whole number parts and the sum of fraction parts.
- When the sum of fractions parts becomes improper fractions, carry up a part of whole number.

Exercise

① $1\frac{1}{3}+2\frac{1}{3}=3\frac{2}{3}$ ② $3\frac{2}{7}+1\frac{3}{7}=4\frac{5}{7}$ ③ $4\frac{3}{8}+2\frac{4}{8}=6\frac{7}{8}$

④ $2\frac{2}{6}+4\frac{3}{6}=6\frac{5}{6}$ ⑤ $3\frac{1}{5}+5\frac{3}{5}=8\frac{4}{5}$ ⑥ $3+3\frac{5}{6}=6\frac{5}{6}$

⑦ $1\frac{2}{3}+2\frac{2}{3}=4\frac{1}{3}$ ⑧ $1\frac{5}{7}+1\frac{3}{7}=3\frac{1}{7}$ ⑨ $2\frac{1}{5}+3\frac{4}{5}=6$

⑩ $2\frac{7}{9}+\frac{4}{9}=3\frac{2}{9}$ ⑪ $\frac{2}{7}+4\frac{6}{7}=5\frac{1}{7}$ ⑫ $\frac{1}{4}+2\frac{3}{4}=3$

# Unit 17

# Unit: Fractions
## Sub-unit: 3. Addition and Subtraction of Fractions
## Lesson 3 of 4 (Double Period)

Textbook Page : p.191
Actual Lesson 120

## Lesson Objectives

- To think about how to calculate (Proper fraction) − (Proper fraction) and (Mixed fraction) − (Mixed fraction) without borrowing.
- To master the skill of calculation of (Proper fraction) − (Proper fraction) and (Mixed fraction) − (Mixed fraction) without borrowing.

## Prior Knowledge

- Subtraction of fractions with carrying up/over and without carrying.
- Subtraction of fraction with same denominator and idea of unit fraction.

## Preparation

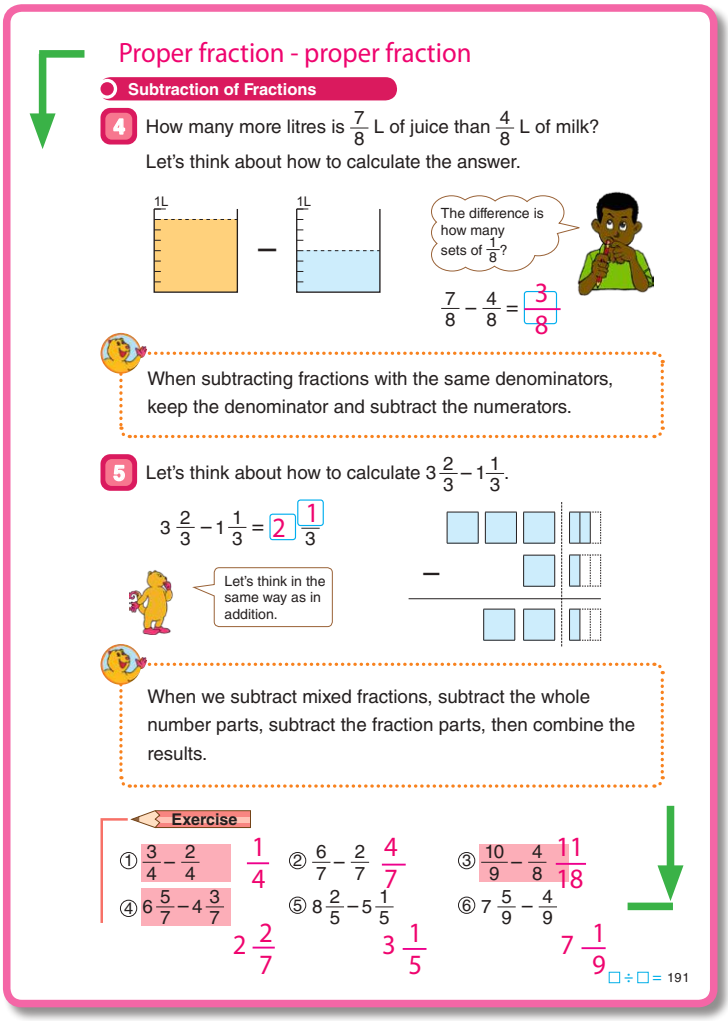
- Diagrams on a chart

## Assessment

- Think about how to solve subtraction of fractions with the same denominator based on the idea of unit fractions. F
- Calculate subtraction of fractions with the same denominator. F
- Do the exercises correctly. S

## • Teacher's Notes •

Misconceptions of content:
Sometimes students might calculate (adding or subtracting) without considering the denominator. Remind students if the denominators are the same only calculate the numerators.



Proper fraction - proper fraction

Subtraction of Fractions

4 How many more litres is $\frac{7}{8}$ L of juice than $\frac{4}{8}$ L of milk?

Let's think about how to calculate the answer.

1L 1L

The difference is how many sets of $\frac{1}{8}$?

$\frac{7}{8} - \frac{4}{8} = \frac{3}{8}$

When subtracting fractions with the same denominators, keep the denominator and subtract the numerators.

5 Let's think about how to calculate $3\frac{2}{3} - 1\frac{1}{3}$.

$3\frac{2}{3} - 1\frac{1}{3} = 2\frac{1}{3}$

Let's think in the same way as in addition.

When we subtract mixed fractions, subtract the whole number parts, subtract the fraction parts, then combine the results.

Exercise

① $\frac{3}{4} - \frac{2}{4}$ $\frac{1}{4}$

② $\frac{6}{7} - \frac{2}{7}$ $\frac{4}{7}$

③ $\frac{10}{9} - \frac{4}{8}$ $\frac{11}{18}$

④ $6\frac{5}{7} - 4\frac{3}{7}$ $2\frac{2}{7}$

⑤ $8\frac{2}{5} - 5\frac{1}{5}$ $3\frac{1}{5}$

⑥ $7\frac{5}{9} - \frac{4}{9}$ $7\frac{1}{9}$

□÷□= 191

## Lesson Flow

**1 Review the previous lesson.**

**2 4 Read and understand the given situation.**

T What operation should be used to find the?
S Find the answer. $\frac{7}{8}$ L − $\frac{4}{8}$ L = $\frac{3}{8}$ L.
S Present their answers and then confirm in the class.
T Explain the important point in the box ( ).

**3 5 Think about how to calculate $3\frac{2}{3}-1\frac{1}{3}$.**

T Let students to present their ideas with diagram, vertical calculation.
S Think of how to solve $3\frac{2}{3}-1\frac{1}{3}$ by displaying ideas with diagram, vertical calculation.
S I subtracted the whole number parts and then the fraction parts and finally my answer is $2\frac{1}{3}$.
T Assist the students to summarise the important point in the box.

**4 Summary**

T Explain the important point in the box ( ).

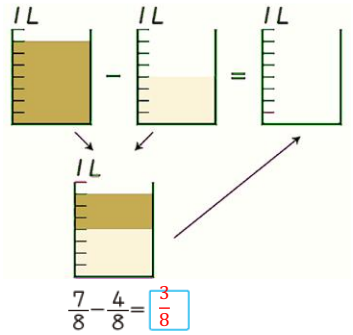
**5 Do the exercise.**

## Sample Blackboard Plan

**Date:** **Chapter:** 17 Fractions **Topic:** Addition and Subtraction of Fractions **Lesson N°:** 3/4

MT Let's think about how to subtract fractions with same denominator.

**4** How many more liters is $\frac{7}{8}$ L of juice than $\frac{4}{8}$ L of milk?

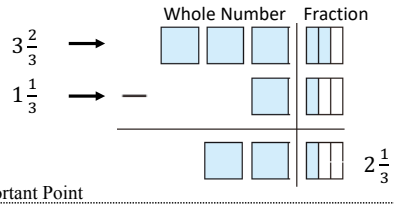



$\frac{7}{8}-\frac{4}{8}=\frac{3}{8}$

Important Point

When subtracting fractions with the same denominators, keep the denominators and subtract the numerators.

**5** Let's think about how to calculate $3\frac{2}{3}-1\frac{1}{3}$.




Important Point

When we subtract mixed fractions, subtract the whole number parts, subtract the fraction parts, then combine the results.

Exercise

① $\frac{3}{4}-\frac{2}{4}=\frac{1}{4}$ ② $\frac{6}{7}-\frac{2}{7}=\frac{4}{7}$ ③ $\frac{10}{9}-\frac{8}{9}=\frac{2}{9}$

④ $6\frac{5}{7}-4\frac{3}{7}=2\frac{2}{7}$ ⑤ $8\frac{2}{5}-5\frac{1}{5}=3\frac{1}{5}$ ⑥ $7\frac{5}{9}-\frac{4}{9}=7\frac{1}{9}$

# Unit 17

# Unit: Fractions
## Sub-unit: 3. Addition and Subtraction of Fractions
## Lesson 4 of 4 (Double Period)

Textbook Page : p.192
Actual Lesson 121

## Lesson Objectives

- To think about how to calculate (Mixed fraction) − (Mixed fraction) with borrowing and (Whole number) − (Mixed fraction).
- To master the skill of calculation of (Mixed fraction) − (Mixed fraction) with borrowing and (Whole number) − (Mixed fraction).

## Prior Knowledge

- Subtraction of fractions without borrowing.
- Addition of fractions with carrying up/over and without carrying.
- Addition of fraction with the same denominator and idea of unit fraction.

## Preparation

- Cardboard cuttings- divide into fractions of $\frac{1}{5}$ and $\frac{1}{3}$.

## Assessment

- Become interested in explaining how to subtract mixed fractions using diagrams. F
- Think about how to subtract mixed fractions with borrowing. F
- Do the exercises correctly. S

## • Teacher's Notes •

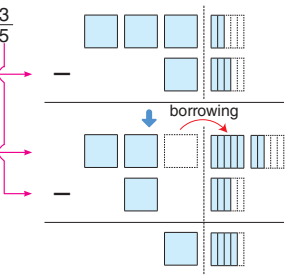
**Misconceptions**

- In the event of solving a mixed fraction students might just subtract the whole number without considering the numerators that cannot be subtracted, but in order for them to solve these types of problems they would need to borrow 1 from the whole number part of the subtracted number.
- Students must be reminded to solve their problem using the vertical calculation method
- The number that is borrowed must be stressed out clearly in vertical calculation and at the same time highlighted using a different chalk colour or putting it in a box for students to see clearly.
- Integer means a whole number, e.g. 1, 2, 3....

### 6 Mixed fraction - mixed fraction (with borrowing)

Let's explain how to calculate $3\frac{2}{5}-1\frac{3}{5}$ by using the diagram.

$3\frac{2}{5}-1\frac{3}{5}=2\frac{7}{5}-1\frac{3}{5}$




$=1\frac{4}{5}$

When the numerators of the fractional parts cannot be subtracted, calculate by regrouping from the whole number parts of the minuend.

### 7 Whole number - mixed fraction

Let's think about how to calculate $3-1\frac{1}{4}$.

$3-1\frac{1}{4}=2\frac{4}{4}-1\frac{1}{4}$

$=1\frac{3}{4}$

❶ $1\frac{2}{4}-\frac{3}{4}$ $\frac{3}{4}$ ❷ $1\frac{4}{9}-\frac{8}{9}$ $\frac{5}{9}$ ❸ $1\frac{1}{4}-\frac{1}{4}$ $1$

❹ $6\frac{2}{7}-4\frac{5}{7}$ $1\frac{4}{7}$ ❺ $9\frac{1}{4}-3\frac{1}{4}$ $6$ ❻ $7\frac{1}{4}-4\frac{1}{4}$ $3$

❼ $1-\frac{1}{6}$ $\frac{5}{6}$ ❽ $8-1\frac{2}{7}$ $6\frac{5}{7}$ ❾ $4-2\frac{1}{5}$ $1\frac{4}{5}$

192 = □ × □

## Lesson Flow

### 1 Review previous lesson.

S Solve $3\frac{2}{3}-2\frac{1}{3}$.

TN When subtracting mixed fractions with the same denominators we subtract the integers first and then subtract the numerators.

### 2 6 Think about how to calculate $3\frac{2}{5}-1\frac{3}{5}$ by using the diagram.

S Think of how to calculate $3\frac{2}{5}-1\frac{3}{5}$ individually and present ideas with the class.

T Reminds the students to use diagram and do calculations to solve mixed fractions based on using their prior knowledge.

S Subtract with integers to identify where the borrowing of a number will take place.

S Understand that the subtraction of numerators cannot be done in subtraction of mixed fractions but calculate by borrowing 1 from the whole number part of the subtracted number.

### 3 7 Think about how to calculate $3-1\frac{1}{4}$.

S Change a whole number to $\frac{4}{4}$ and calculate.

T If students do not understand the process very well, explain using diagram same as in 6.

### 4 Summary

T Explain the important point in the box .

### 5 Do the exercise 1 - 9.

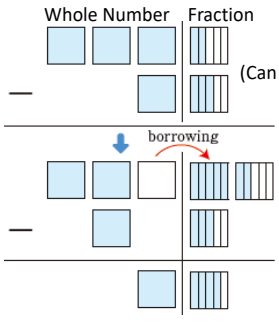
S Complete exercises 1, 4, 7 and 8.

## Sample Blackboard Plan

**Date:** **Chapter:** 17 Fractions **Topic:** Addition and Subtraction of Fractions **Lesson N°:** 3/4

MT Let's think about how to subtract mixed fractions with borrowing.

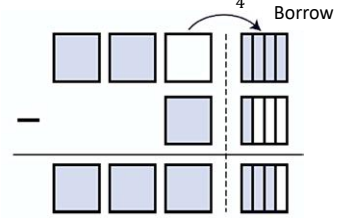
6 Let's explain how to calculate $3\frac{2}{5}-1\frac{3}{5}$ by using the diagram.




$3\frac{2}{5}-1\frac{3}{5}=2\frac{7}{5}-1\frac{3}{5}$

$=1\frac{4}{5}$

7 Let's think about how to calculate $3-1\frac{1}{4}$.




$3-1\frac{1}{4}=2\frac{4}{4}-1\frac{1}{4}$

$=1\frac{3}{4}$

Important Point

When the numerator of the fraction parts cannot be subtracted, calculate by regrouping 1 from the whole number parts of the minuend.

Exercise

① $1\frac{2}{4}-\frac{3}{4}=\frac{3}{4}$ ② $1\frac{4}{9}-\frac{8}{9}=\frac{5}{9}$ ③ $1\frac{1}{6}-\frac{2}{6}=\frac{5}{6}$

④ $6\frac{2}{7}-4\frac{5}{7}=1\frac{3}{4}$ ⑤ $9\frac{3}{5}-3\frac{4}{5}=5\frac{5}{9}$ ⑥ $7\frac{3}{8}-4\frac{7}{8}=2\frac{5}{6}$

⑦ $1-\frac{1}{6}=\frac{5}{6}$ ⑧ $8-1\frac{2}{7}=6\frac{5}{7}$ ⑨ $4-2\frac{1}{5}=1\frac{4}{5}$

# Unit 17

# Unit: Fractions
## Sub-unit: Exercise and Evaluation
## Lesson 1of 1 (Double Periods)

Textbook Page : p.193~p.194
Actual Lesson 122

## Lesson Objectives

- To deepen understanding by applying the mathematical skills and knowledge learned in this unit to complete the exercise and problem.

## Prior Knowledge

- All the contents in this unit

## Preparation

- Assessment sheets for the students

## Assessment

- Solve the exercises correctly. F S

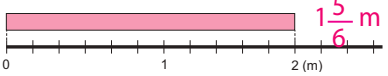
### • Teacher's Notes •

Use 30 minutes for the exercise and give the evaluation test after that.

### Exercise

Proper fraction + proper fraction

**1** Let's represent the following length as mixed fractions and improper fractions. Pages 183 ~ 186




$1\frac{5}{6}$ m $\frac{11}{6}$ m

**2** Let's answer using the following fractions. Pages 183 ~ 186

1 $\frac{2}{5}$ $\frac{1}{6}$ $\frac{10}{7}$ $\frac{3}{3}$ $2\frac{1}{8}$ $\frac{1}{2}$ $\frac{9}{8}$

① Divide these fractions into proper fractions, improper fractions and mixed fractions. $\frac{1}{6}, \frac{1}{2}$ $1\frac{2}{5}, 2\frac{1}{8}$ $\frac{10}{7}, \frac{9}{8}$

② Let's change mixed fractions to improper fractions and change improper fractions to mixed fractions or whole numbers. $1\frac{2}{5}=\frac{7}{5}$ $\frac{10}{7}=1\frac{3}{7}$ $2\frac{1}{8}=\frac{17}{8}$ $\frac{9}{8}=1\frac{1}{8}$

**3** Let's arrange the fractions in ( ) from the largest to the smallest. Pages 187 ~ 188

① $\left(\frac{2}{7}, \frac{5}{7}, \frac{6}{7}, \frac{4}{7}\right)$ $\frac{6}{7}, \frac{5}{7}, \frac{4}{7}, \frac{2}{7}$ ② $\left(\frac{1}{6}, \frac{1}{8}, \frac{1}{5}, \frac{1}{10}\right)$ $\frac{1}{5}, \frac{1}{6}, \frac{1}{8}, \frac{1}{10}$

③ $\left(2\frac{1}{8}, 2\frac{5}{8}, 2\frac{7}{8}, 2\frac{3}{8}\right)$ ④ $\left(3\frac{2}{9}, 1\frac{5}{9}, 2\frac{7}{9}, 4\frac{1}{9}\right)$ $4\frac{1}{9}, 3\frac{2}{9}, 2\frac{7}{9}, 1\frac{5}{9}$

$2\frac{7}{8}, 2\frac{5}{8}, 2\frac{3}{8}, 2\frac{1}{8}$

**4** Let's calculate. Pages 193 ~ 196

① $\frac{3}{5}+\frac{2}{5}$ 1 ② $2\frac{5}{9}+\frac{8}{9}$ $7\frac{1}{9}$ ③ $1\frac{2}{7}+2\frac{2}{7}$ $3\frac{4}{7}$ ④ $4\frac{2}{3}+2\frac{2}{3}$ $7\frac{1}{3}$

⑤ $3\frac{4}{8}-1\frac{3}{8}$ $2\frac{1}{8}$ ⑥ $1\frac{5}{9}-\frac{7}{9}$ $\frac{7}{9}$ ⑦ $1-\frac{1}{10}$ $\frac{3}{10}$ ⑧ $4\frac{1}{5}-2\frac{3}{5}$ $1\frac{3}{5}$

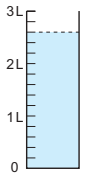
**5** Ani ran $1\frac{2}{5}$ km on Sunday morning and $1\frac{4}{5}$ km in the evening. How many kilometres did she run altogether? What is the difference in km?

$1\frac{1}{3}$ $(\frac{4}{3})$ $(1\frac{1}{5})$ $\frac{6}{5}$ $1(\frac{9}{9})$

### Problems

**1** Let's summarise fractions larger than 1.
● Understanding the meaning of fractions and calculating addition of fractions

① Represent the amount of water shown on the right as mixed fractions and improper fractions.




② About $2\frac{3}{7}$, 2 means 2 sets of 1L and 3 means 3 sets of $\frac{1}{7}$ L

③ $\frac{17}{7}$ means 17 sets of $\frac{1}{7}$ L

④ Let's explain how to calculate $2\frac{3}{7}+1\frac{5}{7}$.

**2** Let's change improper fractions to mixed fractions and change mixed fractions to improper fractions.
● Understanding the relationship between improper fractions and mixed fractions

$\frac{4}{7}$ $\frac{11}{5}$ $\frac{7}{2}$ $2\frac{3}{4}$ $3\frac{5}{6}$ $4\frac{4}{9}$ $2\frac{1}{5}$ $3\frac{1}{2}$ $\frac{11}{4}$ $1\frac{3}{4}$ $\frac{23}{6}$ $\frac{40}{9}$

**3** Let's calculate.
● Calculating addition and subtraction of fractions

① $\frac{3}{4}+\frac{2}{4}$ $1\frac{1}{4}$ ② $2\frac{1}{3}+1\frac{1}{3}$ $3\frac{2}{3}$ ③ $2\frac{2}{7}+3\frac{5}{7}$ $6$ ④ $1\frac{5}{8}+1\frac{6}{8}$ $3\frac{3}{8}$

⑤ $\frac{11}{9}-\frac{4}{9}$ $\frac{5}{9}$ ⑥ $3\frac{5}{6}-1\frac{4}{6}$ $2\frac{1}{6}$ ⑦ $5\frac{7}{15}-3\frac{7}{15}$ $2$ ⑧ $4\frac{2}{7}-1\frac{3}{7}$ $2\frac{6}{7}$

**4** Moses' family drank $1\frac{3}{5}$ L of milk yesterday morning and $\frac{4}{5}$ L in the evening.
● Understanding the situation and finding the answer.

① How many litres did they drink altogether? $2\frac{2}{5}$

② They drank $1\frac{2}{5}$ L today. Which is the biggest amount of milk drank and by how many litres more?

Yesterday morning by 1 L more.

□÷□= 193 194 =□×□

## Lesson Flow

### 1 Exercise ①, ②, ③

S The exercises ①, ②, ③ by referring to their notes or pages given as reference and guide when they encounter difficulties.

T Guide and give ample time to the students to complete their exercises. Encourage students to share and explain their answers with others.

### 2 Exercise ④, ⑤

S Complete the exercises ④ and ⑤ by referring to their notes or pages given as reference and guide when they encounter difficulties.

T Guide and give ample time to the students to complete their exercises. Encourage students to share and explain their answers with others.

### 3 Problem ①, ②

TN Let students who have difficulty use number line for comparing.

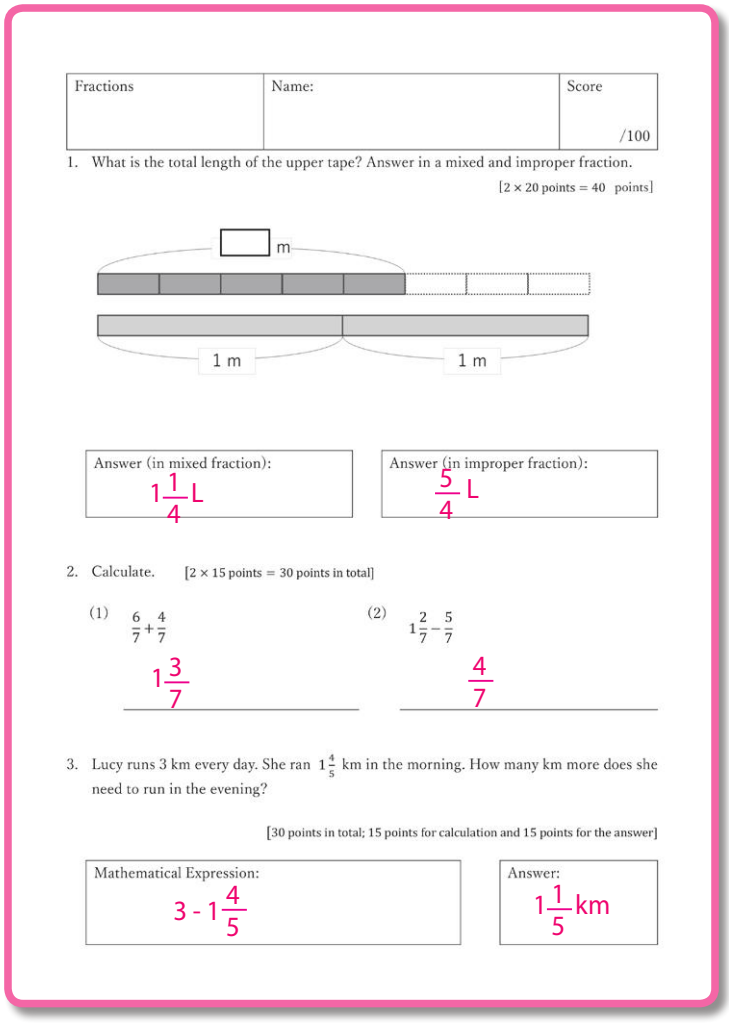
S Complete the problem ① and ② by referring to their notes or pages given as reference and guide when they encounter difficulties.

T Guide and give ample time to the students to complete their exercises.

### 4 Problem ③, ④

S Complete the problem ③ and ④ by referring to their notes or pages given as reference and guide when they encounter difficulties.

T Guide and give ample time to the students to complete their exercises. Encourage students to share and explain their answers with others.



| Fractions | Name: | Score /100 |
|---|---|---|

1. What is the total length of the upper tape? Answer in a mixed and improper fraction.

[2 × 20 points = 40 points]



| Answer (in mixed fraction): | Answer (in improper fraction): |
|---|---|
| $1\frac{1}{4}$ L | $\frac{5}{4}$ L |

2. Calculate. [2 × 15 points = 30 points in total]

(1) $\frac{6}{7}+\frac{4}{7}$ = $1\frac{3}{7}$

(2) $1\frac{2}{7}-\frac{5}{7}$ = $\frac{4}{7}$

3. Lucy runs 3 km every day. She ran $1\frac{4}{5}$ km in the morning. How many km more does she need to run in the evening?

[30 points in total; 15 points for calculation and 15 points for the answer]

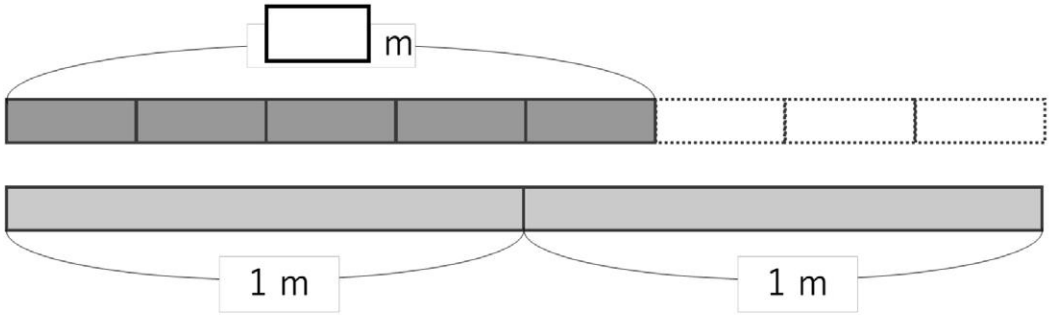
| Mathematical Expression: | Answer: |
|---|---|
| $3 - 1\frac{4}{5}$ | $1\frac{1}{5}$ km |

**End of Chapter Test: Chapter 17** **Date:**

| Fractions | Name: | Score /100 |
|---|---|---|

1. What is the total length of the upper tape? Answer in a mixed and improper fraction.

[2 × 20 points = 40 points]




| Answer (in mixed fraction): | Answer (in improper fraction): |
|---|---|

2. Calculate. [2 × 15 points = 30 points in total]

(1) $\frac{6}{7}+\frac{4}{7}$

(2) $1\frac{2}{7}-\frac{5}{7}$

3. Lucy runs 3 km every day. She ran $1\frac{4}{5}$ km in the morning. How many km more does she need to run in the evening?

[30 points in total; 15 points for calculation and 15 points for the answer]

| Mathematical Expression: | Answer: |
|---|---|

# Chapter 18 Rectangular Prisms and Cubes

## 1. Unit Objectives

- To investigate rectangular prisms and cubes by observing and manipulating them. (4.3.2a,c)
- To know about the structure of rectangular prism and cube. (4.3.2c)
- To understand the relationship of face and side of rectangular shape such as perpendicular or parallel. (4.3.2c)
- To draw a net or sketch. (4.3.2b)
- To represent the position of plane and space. (4.3.2c)

## 2. Teaching Overview

In Grade 2, students analytically observed shapes of boxes focusing on the faces, edges and vertices by literally observing from various angles, disassembling and assembling.

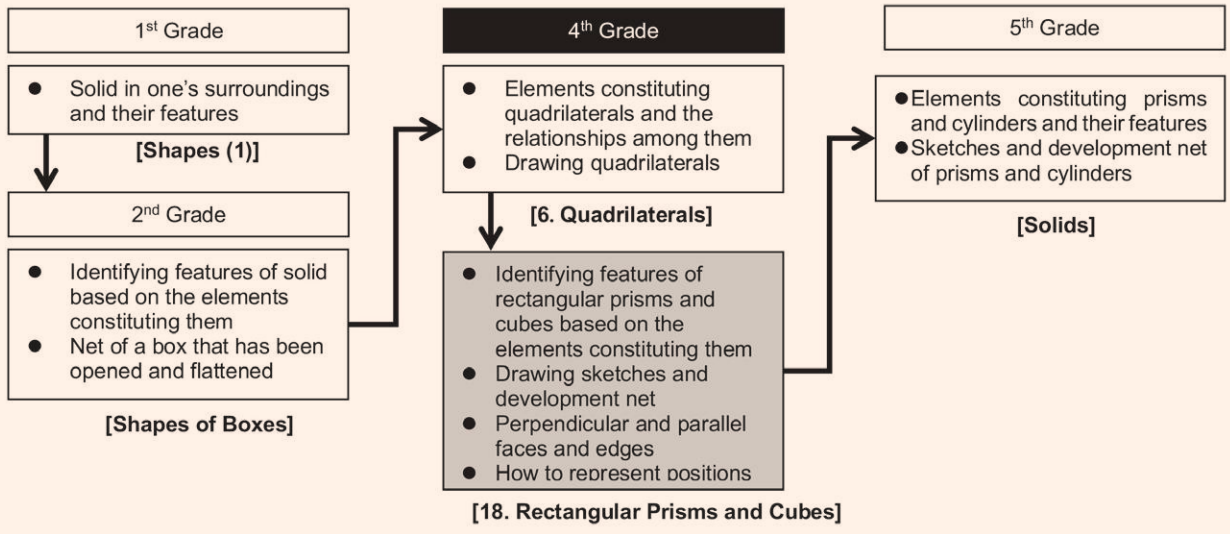
**Rectangular Prisms & Cubes:** Students analyse them by focusing on the number and sizes of edges, faces, vertices and shapes and relationships of faces.

**Nets:** They will understand the positions and their relationships by drawing, assembling the net and disassembling the box. This activity will develop student's imaginative skill of geometry.

**Perpendicular and Parallel Faces and Edges:** Students will develop the skill of capturing 3-dimensional space and properties by careful observation of the parallel and perpendicular relationship between edges and faces.

**How to Represent Positions:** They learn how to represent positions by a pair of 2 numbers on a plane. It will be expanded to the way how to represent positions by a set of 3 numbers in a space.

## 3. Related Learning Contents



# Unit 18

# Unit: Rectangular Prisms and Cubes
## Sub-unit: 1. Rectangular Prisms and Cubes
## Lesson 1 of 1 (Double Period)

Textbook Page : p.195~p.196
Actual Lesson 123

## Sub-unit Objectives

- To understand the definition and elements of rectangular prisms by categorising the boxes.

## Lesson Objectives

- To think about and understand the definition of rectangular prisms and cubes through categorising boxes focusing on the shape of faces.
- To identify face, edge and vertex as elements of rectangular prisms and cubes.
- To find the characteristics of each element.

## Prior Knowledge

- Shape of rectangle and square
- Shape of boxes (Elementary)

## Preparation

- Various solid shapes (rectangular prisms and cubes)

## Assessment

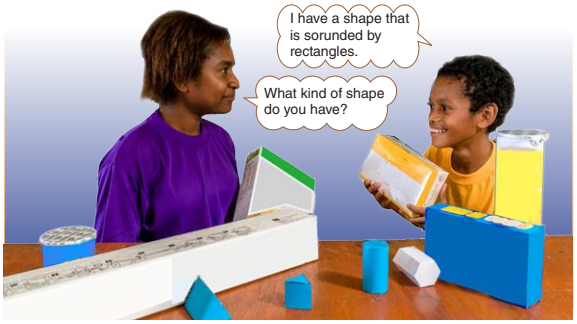
- Think about how to categorise boxes. F
- Think about the structure of the rectangular prisms and cubes by observing and manipulating them. F
- Summarise the characteristic of rectangular prism and cube. S

## • Teacher's Notes •

When categorising the solid shapes in task 1, get rid of the other solid shapes then use only the rectangular prisms and cubes to define them.

18 Rectangular Prisms and Cubes

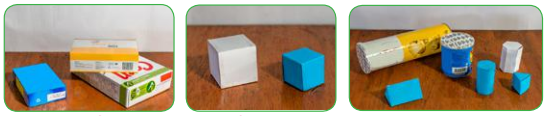
Let's look for various types of solid shapes in our daily lives.
Categorise them by investigating the faces of the solid shapes.




### 1 Rectangular Prisms and Cubes

Definition of cubes and rectangular prism based on the above activity.

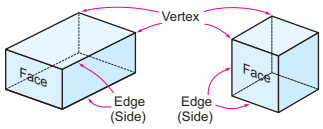
1 Joyce categorised them as follows.
How did she categorise them?



It has rectangular faces  All the faces are square.  Other

Let's investigate the characteristics of the solid shapes and how to make them.

A shape covered only by rectangles or by squares and rectangles is called **rectangular prism**.
A shape covered only by squares is called **cube**.




**Rectangular Prism** **Cube**

A flat face like the faces of a rectangular prism and cube is called **plane**.

Elements for construction of rectangular prism and cube.

2 About Rectangular Prisms and Cubes. Fill in the blanks in the table below with numbers or words.

| | | Rectangular prism | Cube |
|---|---|---|---|
| Face | Shape | Rectangle or square | Square |
| | Number of faces | 6 | 6 |
| Edge | Length | Pair of opposite sides are same | All are the same |
| | Number of edges | 12 | 12 |
| Vertex | Number of vertices | 8 | 8 |

□ + □ = 195  196 = □ ÷ □

## Lesson Flow

### 1 ▶▶ Build interest to learn rectangular prisms and cubes.

T Display the various solid shapes, pose lead up questions.
- What kind of solid shapes can you see here?
- What are their uses?
- What shapes can you find?

S Observe and manipulate the solid shapes, and discuss to build their interest to learn rectangular prisms and cubes.

### 2 1 Categorise solid shapes.

T Introduce the main task.

T Ask the students to group the solid shapes according to the shapes used.

S Arrange the solid shapes which have shapes of rectangles and square, rectangles only, squares only and others.

T/S Explain the main point in the solid shapes.
- Definition of rectangular prism and cube.
- Name the parts of a rectangular prism and cube.

### 3 Summarise the characteristic of a rectangular prism and cube.

S Complete the table observing the rectangular prism and cube.

S Share their ideas in the class.

T Lead the discussion and complete the table summarising the characteristic of two shapes.

## Sample Blackboard Plan

**Date:** **Chapter:** Rectangular Prisms and Cubes **Topic:** Rectangular Prisms and Cubes **Lesson N°:** 1/1

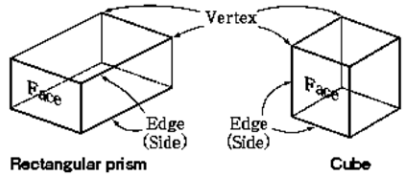
MT

Let's categorize solid shapes and investigate the characteristics of rectangular prism and cube.

**1** Lets investigate the characteristics of the solid shapes and how to make them.

Important Point

A shape covered only by rectangles or by squares and rectangles is called **rectangular prism**.
A shape covered only by squares is called **cube**.




A flat face like the faces of a rectangular prism and cube is called a **plane**.

**2** Fill the blanks in the table below with numbers or words about rectangular prisms and cubes.

| | | Rectangular prism | Cube |
|---|---|---|---|
| Face | Shape | Rectangle or square | Square |
| | Number of faces | 6 | 6 |
| Edge | Length | 3 sets of 4 edges are not the same | Same |
| | Number of edges | 12 | 12 |
| Vertex | Number of vertices | 8 | 8 |

Findings
Similarities;
Both have 6 faces, 12 edges and 8 vertices.
Differences;
Shape of faces and Length of edges are not same.

Summary
- Faces, edges and the number of vertices are the same
- The shapes of faces and the length of the edges are not the same.

# Unit 18

# Unit: Rectangular Prisms and Cubes
## Sub-unit: 2. Nets
## Lesson 1 of 4 (Double Period)

Textbook Page : p.197
Actual Lesson 124

## Sub-unit Objectives

- To explore and understand how to make a net of a rectangular prism and cube.
- To draw a net of rectangular prism and cube.

## Lesson Objectives

- To trace faces of rectangular prism to create a net and make a rectangular prism.

## Prior Knowledge

- Definition of rectangular prism and cube (Previous lesson)

## Preparation

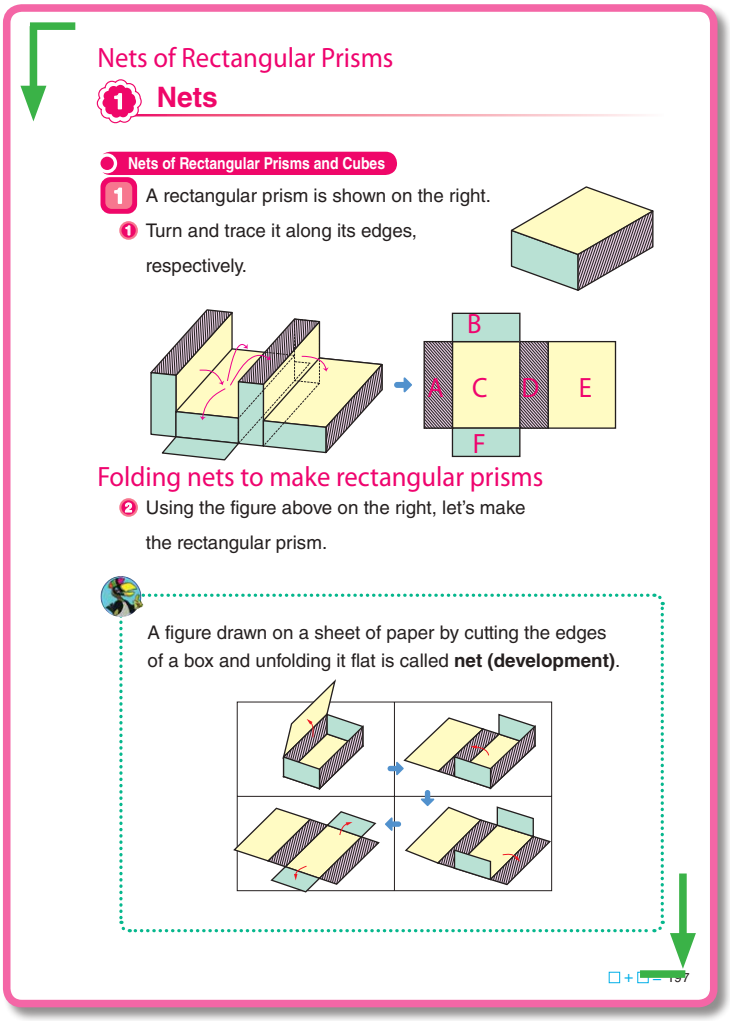
- Rectangular prism, Tracing paper (A4 paper), Scissors

## Assessment

- Trace the solid shape correctly and make a rectangular prism. F
- Understand what net (or development) is. S

## • Teacher's Notes •

- Making a net also means that to 'construct' a net. The term 'construct' can be used in place of make.
- Students may take time to understand how to draw a net diagram. Therefore, the teacher can demonstrate first then let the students work on their own.



Nets of Rectangular Prisms

1 Nets

Nets of Rectangular Prisms and Cubes

1 A rectangular prism is shown on the right.

1 Turn and trace it along its edges, respectively.

B A C D E F

Folding nets to make rectangular prisms

2 Using the figure above on the right, let's make the rectangular prism.

A figure drawn on a sheet of paper by cutting the edges of a box and unfolding it flat is called **net (development)**.

## Lesson Flow

**1 Review previous lesson.**

**2 ① Think about how to make rectangular prism.**

T Introduce the main task.
T Show a rectangular prism and ask students how we can make the same box.
S Measure all the side and draw all face and they assemble them.
S Trace all faces by rolling the box.

**3 ① Trace all faces by rolling the rectangular prism.**

S Trace the sides of all faces by turning the rectangular prism.
TN Close observation is necessary for correct tracing of the figure.

**4 ② Construct a rectangular prism.**

S Cut the traced diagram and make a rectangular prism.

**5 Understand the term and meaning of 'net (development)' .**

S Explain about 'net (development)' based on what they did in the lesson.

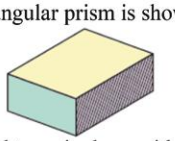
## Sample Blackboard Plan

**Date:** **Chapter:** Rectangular Prisms and Cubes **Topic:** Rectangular Prisms and Cubes **Lesson N°:** 1/4

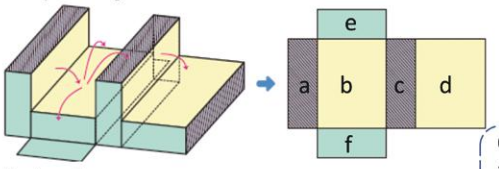
MT

Let's trace and make various types of nets for rectangular prism.

① A rectangular prism is shown below.



① Roll and trace it along with its edges, respectively.




Instructions:
1. Roll along the edges and trace each face.
2. Draw each of the 6 faces and cut around the traced figure.
3. Fold along the sides and stick them together to form a prism.

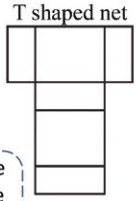
Opposite faces are same Example: a&c, b&d and e&f

② Using the figure on the left, make the regular prism.

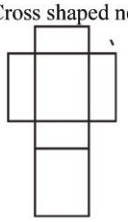
A figure drawn on a sheet of paper by cutting the edges of a box and unfolding it flat is called **net** (or **development**).

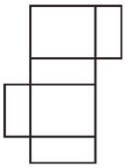
Examples:

T shaped net



Cross shaped net





Others

Summary
- Opposite faces are the same
- There are various rectangle shapes in a rectangular prism.

# Unit 18

# Unit: Rectangular Prisms and Cubes
## Sub-unit: 2. Nets
## Lesson 2 of 4 (Single Period)

Textbook Page : p.198
Actual Lesson 125

## Lesson Objectives

- To draw a net of rectangular prism and think about the relationship of faces and edges.

## Prior Knowledge

- Definition of rectangular prism and cube
- Meaning of net and how to draw it. (Previous lesson)

## Preparation

- Net for 2 3 A,B and C. Net for 3, A4 papers Scissors

## Assessment

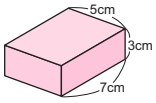
- Draw a net of rectangular prism and explain the relationship of faces and edges. F
- Do the task 3 correctly. S

## • Teacher's Notes •

3 3, use the idea of direct comparison to identify where the overlapping edges are and colour them.

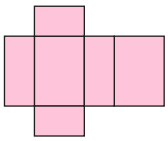
### Draw 6 faces, and assemble a box of Rectangular Prisms

2 Let's make a rectangular prism box for storing cards.



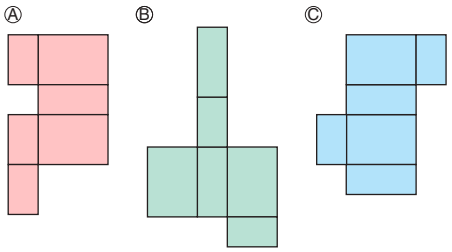

1 Draw six faces and arrange them for folding.

2 Let's fold the shape.



B and C

3 Which is the appropriate net?



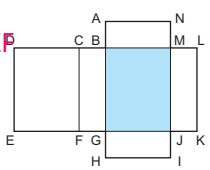

### Nets of Rectangular Prisms

3 Let's fold the net as shown on the right.

1 Colour the face opposite to the blue face BGJM. Face CDEF

2 Circle the points that overlap point L. Point D

3 Colour the side that overlaps with the edge EF. Side IH




198 = □ ÷ □

## Lesson Flow

**1 Review previous lesson.**

**2 ② Draw a net of rectangular prism and construct a rectangular prism.**

T ① Introduce the maint task.
S ② Draw various nets of rectangular prism.
S Cut the nets and make a rectangular prism.
T/S Confirm if the nets are appropriate to make a triangular prism.

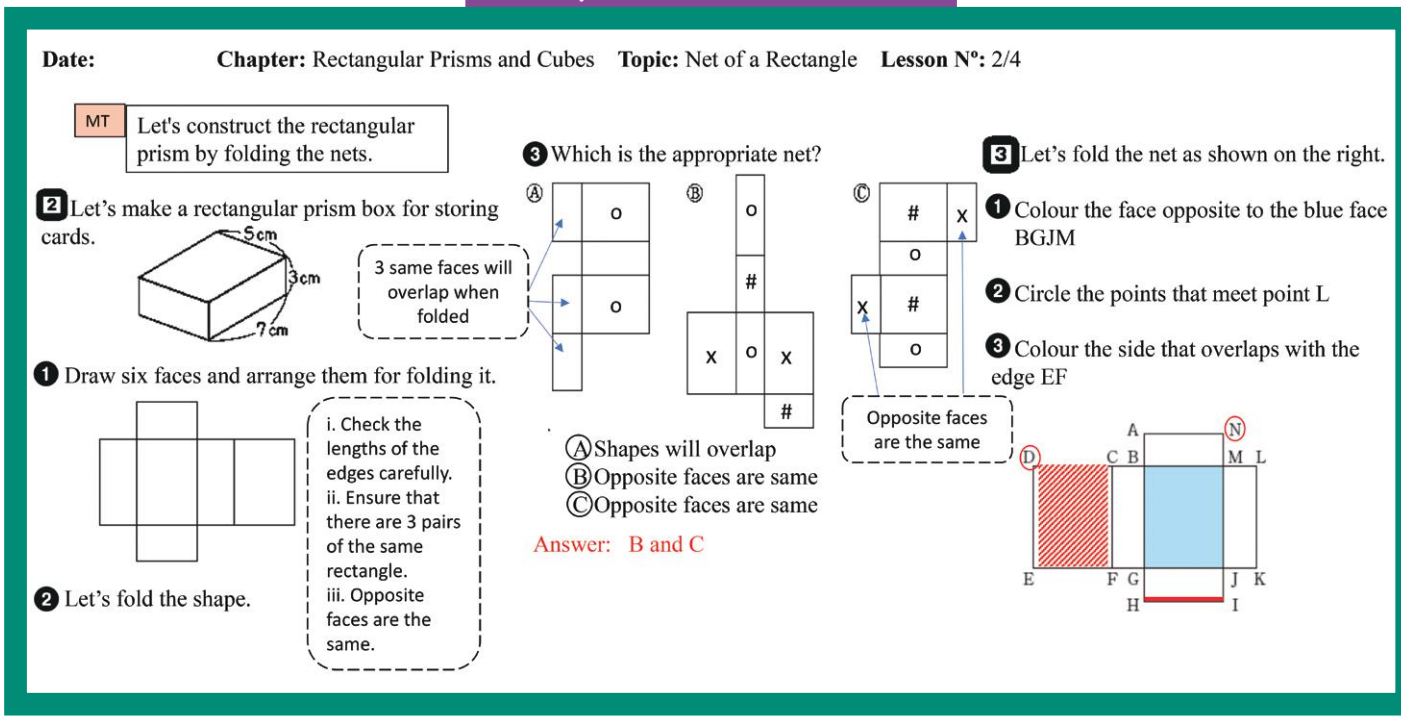
**3 ③ Find appropriate net of rectangular prism.**

T Which are the appropriate net of rectangular prism?
S B and C
TN Concerning A, some faces overlap.
S Explain which faces are overlapping.

**4 ③ Recognise the relationship of opposite faces, vertex and edges which are overlapping.**

S ① ② ③ Solve them through imagining a process to make a rectangular prism .
T Confirm the answer by constructing a rectangular prism from the net.

## Sample Blackboard Plan



# Unit 18

# Unit: Rectangular Prisms and Cubes
## Sub-unit: 2. Nets
## Lesson 3 of 4 (Single Period)

Textbook Page : p.199
Actual Lesson 126

## Lesson Objectives

- To draw a net of rectangular prism.

## Prior Knowledge

- Definition of rectangular prism and cube
- Meaning of net and how to draw it. (Previous lesson)

## Preparation

- Square grid paper for students, Scissors, Sticky tape

## Assessment

- Draw a net of rectangular prism correctly. F S

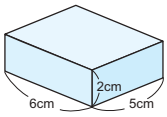
## • Teacher's Notes •

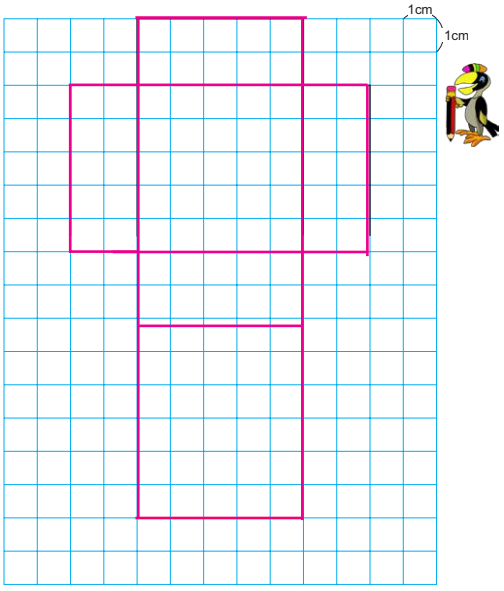
- Teacher should prepare the nets first before the lesson.
- Notice that the opposite faces are equal as shown in activity 2.

Draw a net of a rectangular prism and assemble it.

4 Let's make a rectangular prism box as shown on the right.

1 Draw the rest of the net as shown below.




2 Copy the net on a sheet of paper and fold it.

## Lesson Flow

### 1 Review previous lesson.

### 2 4 1 Complete the net of rectangular prism.

T Introduce the main task.
S Draw a net of rectangular prism on the square paper.
T Confirm that there are three types of rectangle.
TN There are some students who might draw same rectangles consecutively. Confirm that another rectangle is needed between opposite two faces.

### 3 2 Make rectangular prism.

S Cut the net and make a rectangular prism.
T Confirm how to draw the net correctly.

### 4 Draw various types of nets of rectangular prism.

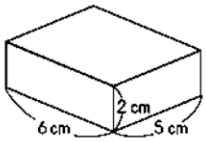
T Distribute square paper for drawing another net.
S Draw various type of net of rectangular prism by themselves.
T Let students compare what they made in altogether.

## Sample Blackboard Plan

**Date:** **Chapter:** Rectangular Prisms and Cubes **Topic:** Net of a Rectangle **Lesson N°:** 3/4

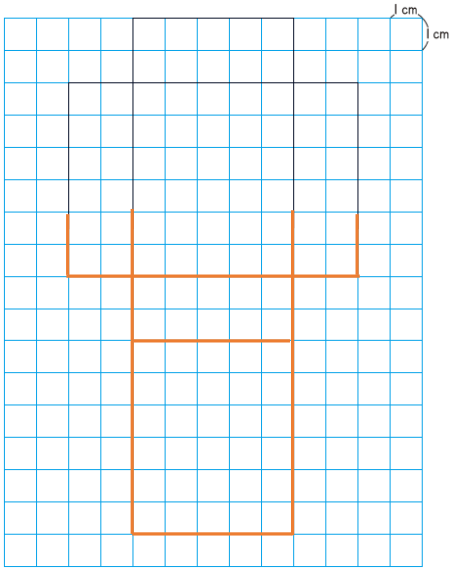
MT Let's draw the rest of the net and fold to make a rectangular prism.

4 Let's make a rectangular prism box as shown on the right.

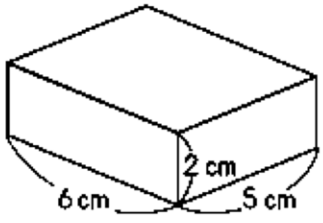



The rectangular prism has 3 different sizes of rectangles
1. 2cm x 5cm
2. 2cm x 6cm
3. 5cm x 6cm
} x 2 rectangles

1 Draw the rest of the net as shown below.




2 Copy the net on a sheet of paper and fold it.



# Unit 18

# Unit: Rectangular Prisms and Cubes
## Sub-unit: 2. Nets
## Lesson 4 of 4 (Single Period)

Textbook Page : p.200
Actual Lesson 127

## Lesson Objectives

- To draw various nets of cubes imagining a completed cube.

## Prior Knowledge

- Definition of cube
- Meaning of net and how to draw it.

## Preparation

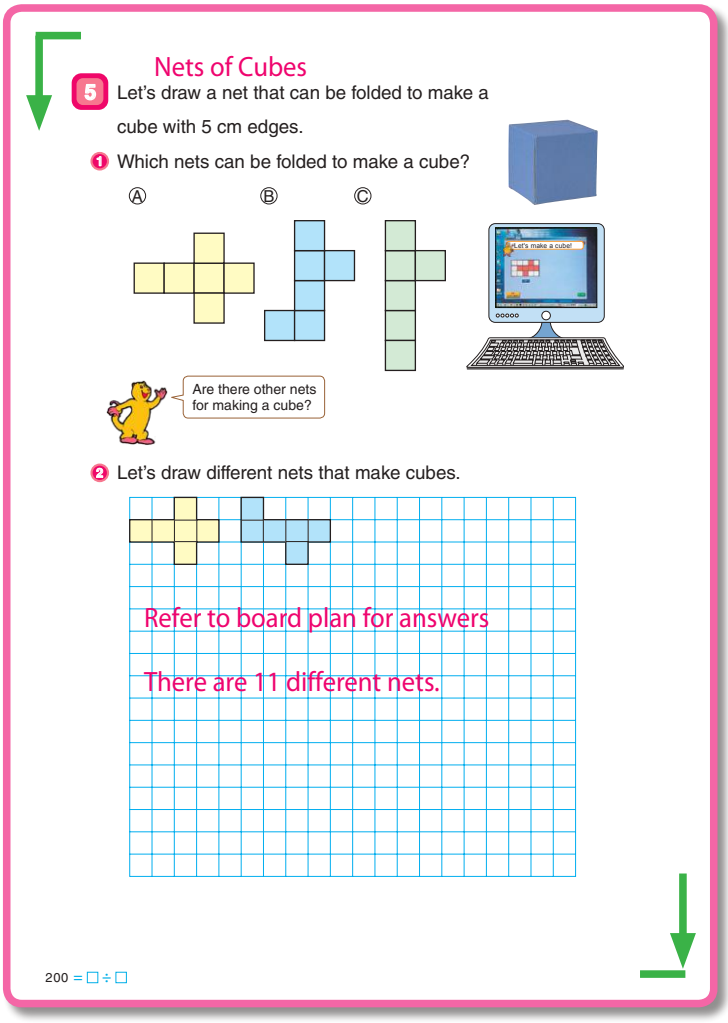
- Square grid paper for students, Scissors, Sticky tape

## Assessment

- Draw various nets of cubes correctly. F S

### • Teacher's Notes •

To confirm that a net constructed produces a cube, cut out the net and fold it to see if a cube is formed.



Nets of Cubes

5 Let's draw a net that can be folded to make a cube with 5 cm edges.

1 Which nets can be folded to make a cube?

Ⓐ Ⓑ Ⓒ

Are there other nets for making a cube?

2 Let's draw different nets that make cubes.

Refer to board plan for answers

There are 11 different nets.

200 = □ ÷ □

## Lesson Flow

### 1 Review previous lesson.

### 2 5 Think about the nets of cubes.

T 1 Introduce the main task.
T Which of the nets can be folded to make a cube?
S A and B can be folded to make a cube.
S For C, two faces will be overlapping.
TN Let students imagine how to fold a net to get a completed cube.

### 3 2 Draw various nets of cubes.

T How many types of nets can we draw?
S I drew 5, I drew 7, etc.
TN Let students try to draw as many as possible.

### 4 Share students' idea.

T Ask students to share the nets that they drew.
T If you are not sure cut and fold the net to confirm.
S Recognise that there are 11 types of net for making cube.

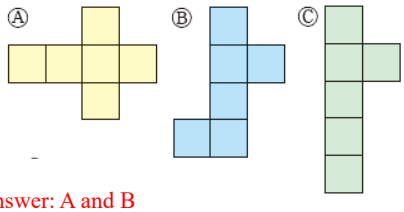
## Sample Blackboard Plan

**Date:** **Chapter:** Rectangular Prisms and Cubes **Topic:** Net of a Cube **Lesson N°:** 4/4

MT Let's think about a net of cube and draw different nets that make a cube.

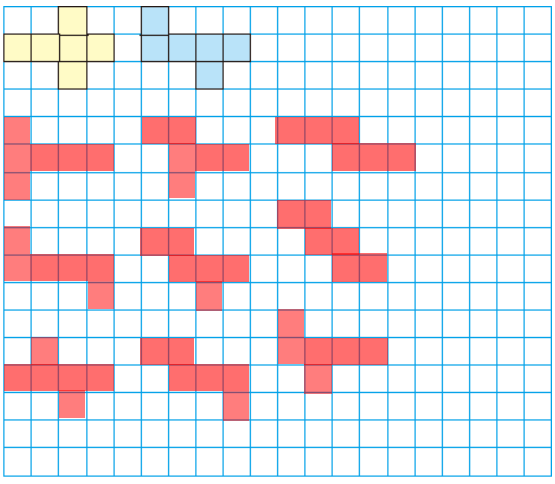
5 Let's draw a net that can be folded to make a cube with 5 cm edge.

1 Which net can be folded to make a cube?




Answer: A and B

2 Let's draw different nets that make cubes.



There are total of 11 types of nets for cubes.

# Unit 18

# Unit: Rectangular Prisms and Cubes
## Sub-unit: 3. Perpendicular and Parallel Faces and Edges
## Lesson 1 of 3 (Double Period)

Textbook Page : p.201~202
Actual Lesson 128

## Sub-unit Objectives

- To understand the relationship of faces and edges which are perpendicular and parallel in terms of rectangular prism and cube.
- To observe and understand a sketch of rectangular prism and cube in view of a 3-dimensional form.
- To draw a sketch of rectangular prism and cube.

## Lesson Objectives

- To understand the relationship of faces which are perpendicular and parallel in rectangular prism and cube.
- To understand the relationship of edges which are perpendicular and parallel in rectangular prism and cube.

## Prior Knowledge

- Definition of rectangular prism and cube
- Definition of parallel and perpendicular

## Preparation

- Big box of rectangular prism and cube. Set Squares

## Assessment

- Think and explain the relationship of faces and edges which are perpendicular and parallel in rectangular prism. F S

## • Teacher's Notes •

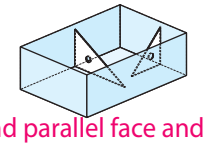
- 3-dimension is another way of viewing objects. It is used in the representation of solid shapes.
- For each task the teacher can demonstrate practically by having the materials prepared in advance.
- Even if opposite sides, faces or edges are not connected in a cube or rectangular prism, they can still be regarded as perpendicular or parallel.

### 3 Perpendicular and Parallel Faces and Edges

Faces of rectangular prism and their perpendicular face and edges

Relationships between Faces and Faces, Edges and Edges

**1** Take off the top of a rectangular prism and put the right angle of a set-square against the inner faces.



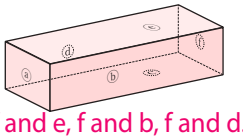
Faces of cube and their perpendicular and parallel face and edges.

**2** Place a tool to measure the right angles on the outer faces of a cube as shown on the right.

Any adjacent two faces of a rectangular prism and cube are **perpendicular** to each other.

Faces of rectangular prism and their perpendicular and parallel face and edges

**3** Look at the rectangular prism on the right.



① Which faces are perpendicular to one another?

a and c, a and e, a and b, a and d, f and c, f and e, f and b, f and d.

② Which faces are not perpendicular to one another?

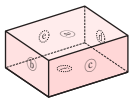
a and f, b and d, c and e

Two faces are parallel when they never intersect each other such as ⓑ and ⓓ, and ⓒ and ⓔ.

**4** The figure on the right shows a rectangular prism box.

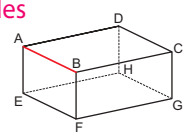
a and f, b and d, c and e

Let's find the pairs of parallel faces.



Perpendicular and parallel sides

**5** The figure on the right shows a rectangular prism box.

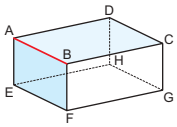


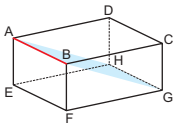
① Which edges are perpendicular to edge AB?.

AE, BF, DH, CG, AD, BC, EH, FG

② Which edges are parallel to edge AB?

CD, GH and EF





**6** Let's check the cubes in the same way as you did in 3, 4 and 5.

Faces of rectangular prism and their perpendicular and parallel, face and edges.

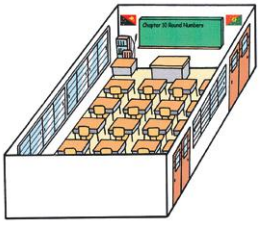
**Exercise**

Look for the following in the classroom.

① Faces that are parallel to the floor. Ceiling (top)

② Faces that are perpendicular to the floor.

All sides of the classroom.



□ + □ = 201  202 = □ ÷ □

## Lesson Flow

**1 Review previous lesson.**

**2 1 Investigate the relationship of faces in a rectangular prism.**

T Introduce the main task.
T Put a triangle ruler on the edge between two faces.
S Realise that two faces are perpendicular.

**3 2 Investigate the relationship of faces in a cube.**

T Put a triangle ruler on the edge between two faces.
S Realise that two faces are perpendicular.
T Explain the important point in the box ( ).

**4 3 Investigate faces which are perpendicular and parallel.**

T 1 Which faces are perpendicular?
TN Confirm one by one using a box of rectangular prism.
S Recognise that there are 8 perpendicular faces.
S 2 There are 3 pairs that are not perpendicular.
T Explain the important point in the box ( ).

**5 4 Find parallel faces in rectangular prism.**

S Think about parallel faces in rectangular prism.
S Recognise that 3 pairs of opposite faces are parallel.

**6 5 Find parallel and perpendicular edges on edge AB.**

T Solve 1 2.

**7 6 Do the same as 3 4 and 5 concerning a cube.**

**8 Do the exercise.**

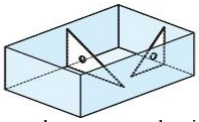
S Solve (1) and (2).

## Sample Blackboard Plan

**Date:** **Chapter:** Rectangular Prisms and Cubes **Topic:** Perpendicular and Parallel Faces and Edges **Lesson N°:** 1/3

MT Let's think about perpendicular and parallel faces and edges of a rectangular prism and a cube.

1 Take off the top of rectangular prism and put the right angle of a set square against the inner face.

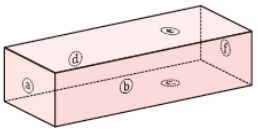


2 Place a tool to measure the right angles on the outer faces of a cube as shown.

Important Point

Any adjacent two faces of a rectangular prism and cube are perpendicular to each other.

3



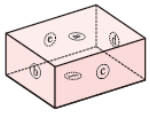

1 Which faces are perpendicular?
ⓐ- ab, ac, ad and ae ⓑ- ba, bc, bd, bf
ⓒ- ca, cb, ce, cf ⓓ- da, db, de, df

2 Which faces are not perpendicular ?
a and f
b and d (opposite faces are parallel)
c and e

Important Point

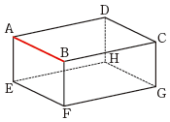
Two faces are parallel when they never intersect each other such as ⓑ and ⓓ, and ⓒ and ⓔ.

4



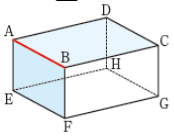

Lets find the pairs of parallel faces.
b and d, c and e, a and f.

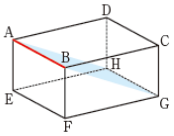
5




1 Which edges are perpendicular to edge AB?
AE, BF, AD, EH, BC, FG, DH and CG.
2 Which edges are parallel to edge AB?
EF, CD, and GH

6 Let's check the cubes in the same as you did in 3, 4 and 5.



# Unit 18

# Unit: Rectangular Prisms and Cubes
## Sub-unit: 3. Perpendicular and Parallel Faces and Edges
## Lesson 2 of 3 (Single Period)

Textbook Page : p.203
Actual Lesson 129

## Lesson Objectives

- To understand the relationship of perpendicular and parallel between faces and edges in rectangular prism.

## Prior Knowledge

- Definition of rectangular prism and cube
- Parallel and perpendicular edges and faces in rectangular prism and cube.

## Preparation

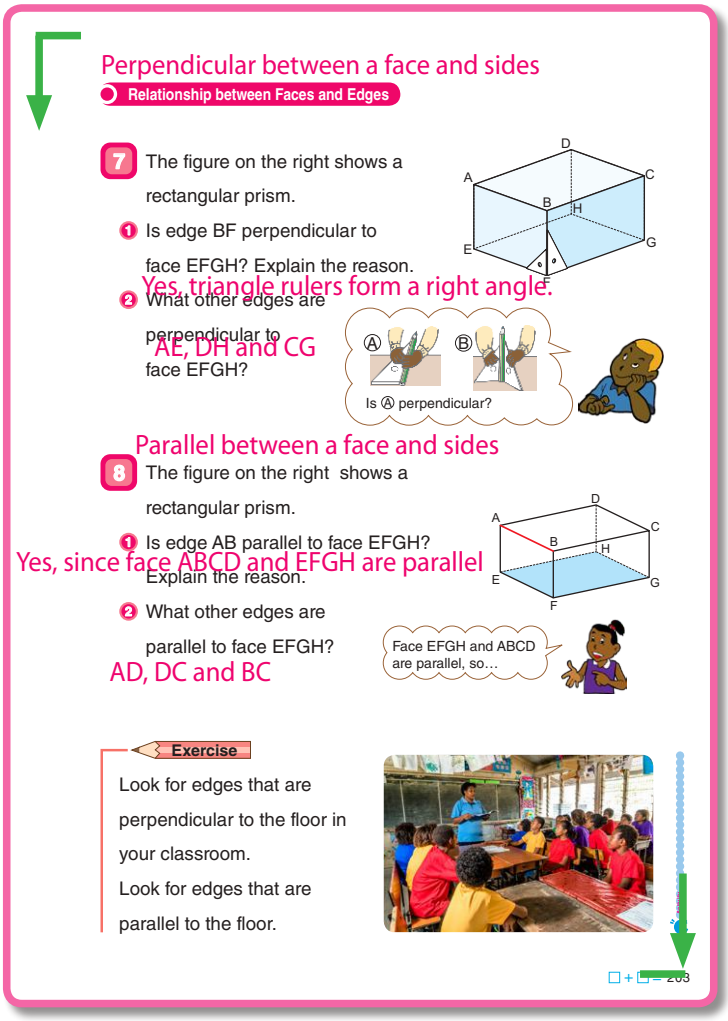
- Big box of rectangular prism and cube

## Assessment

- Think about and explain the relationship of perpendicular and parallel between faces and edges in rectangular prism. F S
- Enjoy finding parallel and perpendicular in the classroom. F
- Do the exercises correctly. S

## • Teacher's Notes •

- 3-dimension is another way of viewing objects. It is used in the representation d solid shapes.
- For each task teacher can demonstrate practically by having the materials prepared in advance.
- Even if opposite sides, faces or edges are not connected in a cube or rectangular prism, they can be still regarded as perpendicular or parallel.



## Lesson Flow

### 1 Review previous lesson.

### 2 7 Investigate the relationship of faces and edges in a rectangular prism. (Perpendicular)

T Introduce the main task.
T ❶ Is the edge BF perpendicular to face EFGH?
S Yes. because when two triangle rulers on the edge BF, they fit the edge BF and face EFGH. Therefore, Edge BF is perpendicular to face EFGH.
T ❷ What other edges are perpendicular to face EFGH?
S Edge AE, CG and DH

### 3 8 Investigate the relationship of faces and edges in a rectangular prism.(Parallel)

T ❶ Is the Edge AB Parallel to face EFGH?
S Yes, because face EFGH and face ABCD are parallel so edge AB and face EFGH are also parallel.
T ❷ What other edges are parallel to face EFGH?
S Edge BC, Edge CD and Edge AD

### 4 Do the exercise

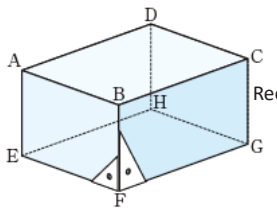
S Find edges which are parallel and perpendicular to the floor in the classroom. Side of blackboard, desks, chairs, windows, etc.
S Share their ideas in class.

## Sample Blackboard Plan

**Date:** **Chapter:** Rectangular Prisms and Cubes **Topic:** Perpendicular and Parallel Faces and Edges **Lesson N°:** 2/3

MT Let's investigate the relationship between faces and edges of rectangular prism.

7

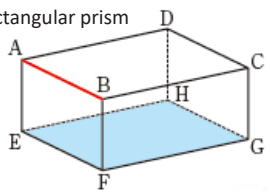



Rectangular prism

❶ Is edge BF perpendicular to face EFGH?
Yes, edge BF is Perpendicular to side EFGH.

❷ What other edges are perpendicular to face EFGH?
Edges: AE, DH and CG.

8 Rectangular prism




❶ Is edge AB parallel to face EFGH?
Yes, edge AB is parallel to face EFGH.

❷ What other edges are parallel to face EFGH?
Edges: EF, CD and GH.

**Exercise**

Look for edges that are perpendicular to the floor in your classroom.

And look for edges that are parallel to the floor.

# Unit 18

# Unit: Rectangular Prisms and Cubes
## Sub-unit: 3. Perpendicular and Parallel Faces and Edges
## Lesson 3 of 3 (Single Period)

Textbook Page : p.204
Actual Lesson 130

## Lesson Objectives

- To understand the sketch of rectangular prisms and cubes.
- To think about how to draw a sketch of rectangular prism and cube.

## Prior Knowledge

- Definition of rectangular prism and cube
- Parallel and perpendicular edges and faces in rectangular prism and cube.

## Preparation

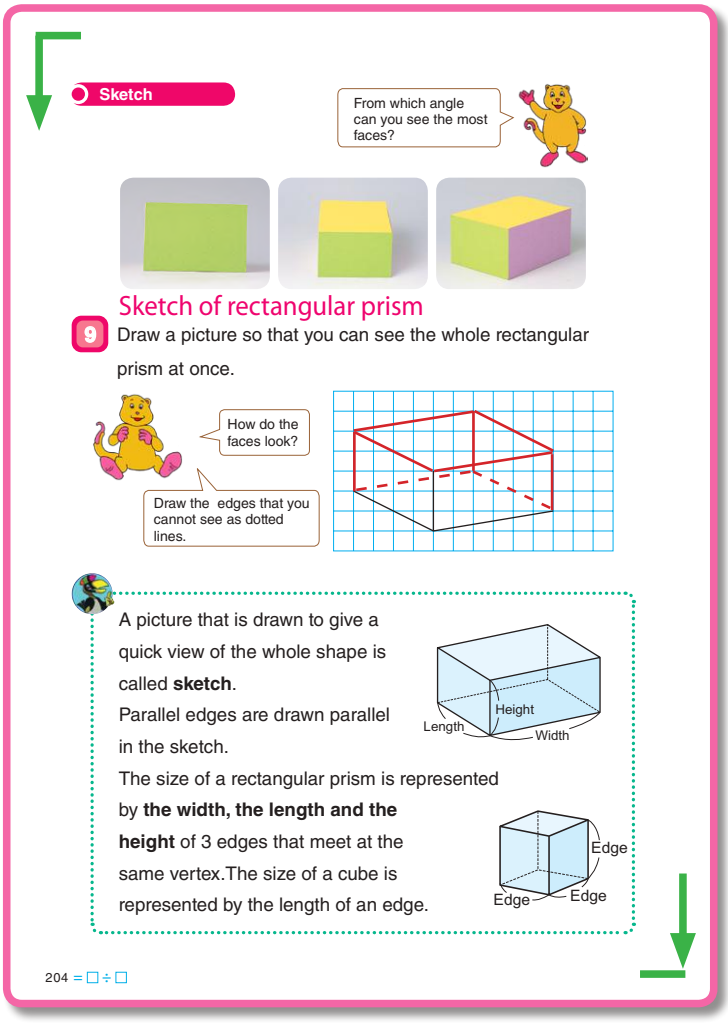
- Box of rectangular prism and cube, square paper for the students.

## Assessment

- Think about how to draw a sketch of rectangular prism. F
- Draw a sketch of rectangular prism correctly. F S
- Understand the word 'sketch' and its meaning. S

## • Teacher's Notes •

Prisms can be sketched in 3 different ways. However, it is best to represent the prisms in 3-D form for clear visualisation.



## Lesson Flow

**1 Review previous lesson.**

**2 Recognise and understand that the rectangular prism can be observed with three faces.**

T Look at the three pictures, which pictures are rectangular prisms?
S Middle and right pictures are rectangular prisms, but we cannot judge the left picture whether it is rectangle or rectangular prism.
T Why?
S Because only one face can be observed.

**3 9 Draw a sketch of rectangular prism.**

T Introduce the main task.
S Draw a sketch of a rectangular prism.
T • Opposite edges are drawn parallel.
• Opposite edges are drawn with same length.
• Edges which cannot be seen are drawn with dotted line.
S Practice more in their exercise book.
T Explain the important point in the box .

**4 Summarise how to draw a sketch of rectangular prism and cube.**

## Sample Blackboard Plan

**Date:** **Chapter:** Rectangular Prisms and Cubes **Topic:** Perpendicular and Parallel Faces and Edges **Lesson N°:** 3/3

MT Let's draw a rectangular prism that can be seen as a whole shape.

From what angle can you see the whole rectangular prism at once?

1 2 3

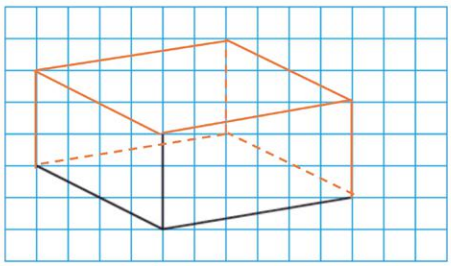
Only one face can be seen from the front when parallel to the prism

Only 2 faces can be seen from the front when looking down from the top.

3 faces can be seen from the front when looking down at the vertex from the top.

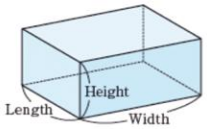
Answer: 3

9 Draw a picture so that you can see the whole rectangular prism at once.

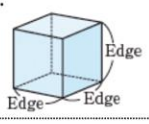


Hints:
- Parallel lines should have the same length.
- Edges that are not visible should be drawn with dotted lines.

A picture that is drawn to give a quick view of the whole shape is called **sketch**.
Parallel edges are drawn parallel in the sketch




The size of the rectangular prism is represented by the width, the length and the height of the 3 edges that meet at the same vertex.
The size of cube is represented by the length of an edge.



# Unit 18

# Unit: Rectangular Prisms and Cubes
## Sub-unit: 4. How to Represent Positions
### Lesson 1 of 3 (Single Period)

Textbook Page : p.205
Actual Lesson 131

## Sub-unit Objectives

- To understand that pair of two numbers are needed to express the position in two dimension.
- To understand that pair of three numbers are needed to express the position in three dimension.

## Lesson Objectives

- To understand that pair of two numbers are needed to express the position in two dimension.

## Prior Knowledge

- Parallel line and perpendicular line
- Rectangular prism
- Net and sketch of rectangular prism

## Preparation

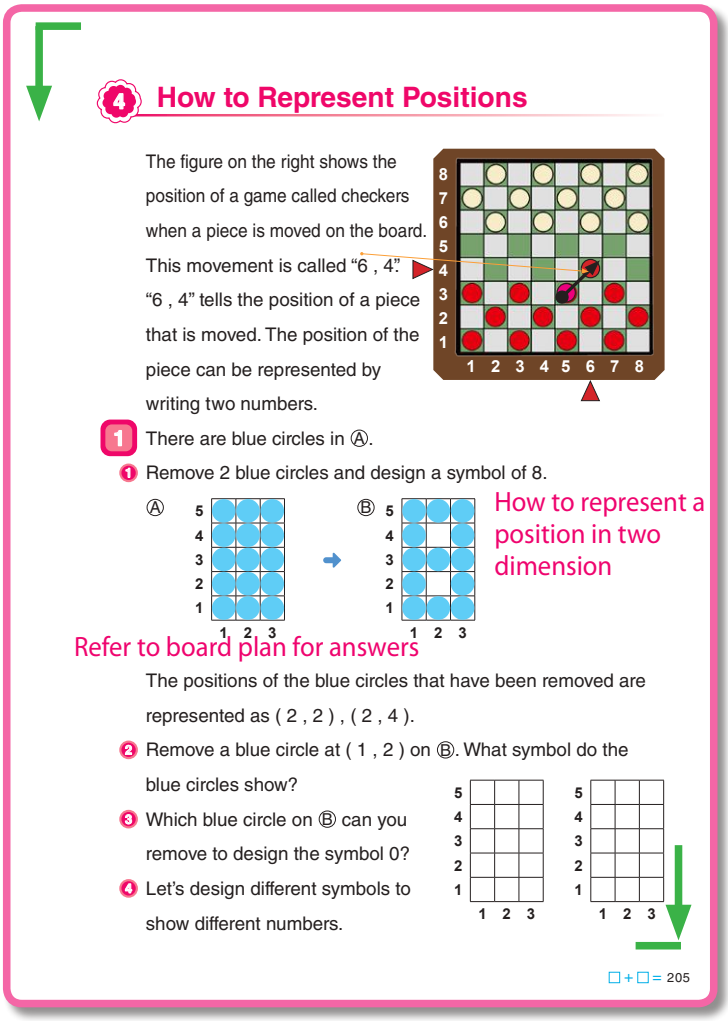
- Squared grid paper

## Assessment

- Think about how to express the position in two dimension by pair of numbers. F
- Express the position in two dimension correctly by pair of numbers. S

## • Teacher's Notes •

2-dimension in this lesson is referring to two numbers read to give the position of an object. It is similar process in reading of graphs where we have vertical and horizontal axes.



4 How to Represent Positions

The figure on the right shows the position of a game called checkers when a piece is moved on the board. This movement is called "6 , 4." "6 , 4" tells the position of a piece that is moved. The position of the piece can be represented by writing two numbers.




1 There are blue circles in Ⓐ.

1 Remove 2 blue circles and design a symbol of 8.

Ⓐ Ⓑ

How to represent a position in two dimension

Refer to board plan for answers

The positions of the blue circles that have been removed are represented as ( 2 , 2 ) , ( 2 , 4 ).

2 Remove a blue circle at ( 1 , 2 ) on Ⓑ. What symbol do the blue circles show?

3 Which blue circle on Ⓑ can you remove to design the symbol 0?

4 Let's design different symbols to show different numbers.

□ + □ = 205

## Lesson Flow

### 1 Review previous lesson.

### 2 Think about how to represent the position of a piece of checker.

T How can you express the position of checker when it moves from one place to the another place?
T Where was the previous position of the piece of checker?
S It was on (5. 3).
T Where is the position of the checker now?
S (6. 4)
S Practice more on how to tell the position by using pair of numbers.

### 3 ① Make a number by removing circles.

T Introduce the main task.
T Draw 5×3 squares and circles in each square.
T ① Ask students to remove circles (2, 2) and (2, 4) to make number 8.
T ② When removing a circle (1, 2) from b, which number can we make?
S 9
T ③ Which blue circleon B can you remove to design a symbol O?
S (2, 3)

### 4 ④ Make various numbers and express how to make it.

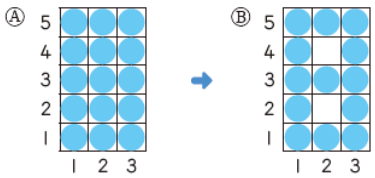
S I can make number 5 by removing (3, 4) from number 9.
S I can make number 6 by removing (3, 4) from number 8.

## Sample Blackboard Plan

**Date:** **Chapter:** Rectangular Prisms and Cubes **Topic:** How to Represent Position **Lesson N°:** 1/3

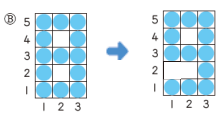
MT Let's think about how to represent position writing two numbers.

❶ There are blue circles in A.
❶ Remove 2 blue circles in A and design a symbol of 8.

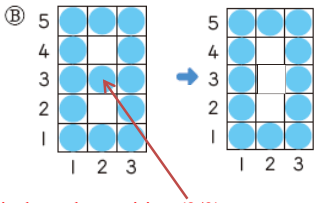



The positions of the blue circles removed are represented by : (2/2) and (2/4)

❷ Remove a blue circle at 1/2 on B, what symbol do the blue circles show?
Symbol of 9.

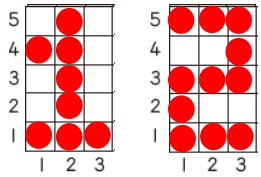


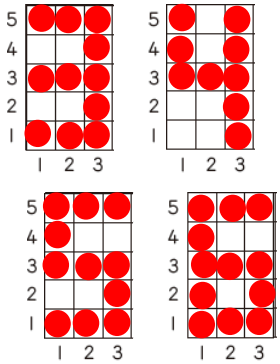

❸ Which blue circle on B can you remove to design a symbol of 0?




Circle at the position (2/3)

❹ Let's design different symbols to show different numbers.





# Unit 18

# Unit: Rectangular Prisms and Cubes
## Sub-unit: 4. How to Represent Positions
## Lesson 2 of 3 (Single Period)

Textbook Page : p. 206
Actual Lesson 132

## Lesson Objectives

- To understand how to express position on the grid paper.
- To enjoy connecting points to create pictures on the grid papers.

## Prior Knowledge

- How to express a position on plane by using pair of two numbers.

## Preparation

- Square grid paper

## Assessment

- Enjoy making picture by connecting points. F
- Draw the picture correctly. S

### • Teacher's Notes •

In order to plot the points using the pair of numbers in the brackets, we read the first given number horizontally, and then we read the second number vertically. Where the two numbers meet, we plot the point.

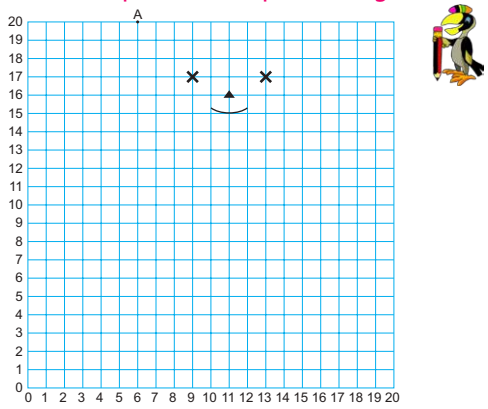
### How to represent a position on a grid paper.

2 On the grid paper, the vertical and horizontal axis are numbered as follows.

Point A is represented as ( 6 , 20 ). Let's plot the points below in order and connect them with lines.

| | | | |
|---|---|---|---|
| ( 6 , 20) A → | (14 , 20) B → | (14 , 15) C → | (16 , 12) D |
| (18 , 12) E → | (18 , 10) F → | (16 , 0) G → | (14 , 12) H |
| (13 , 12) I → | (13 , 0) J → | (11 , 0) K → | (11 , 7) L |
| (9 , 7) M → | (9 , 3) N → | (7 , 3) O → | (3 , 5) P |
| (5 , 6) Q → | (7 , 5) R → | (7 , 12) S → | (6 , 12) T |
| (6 , 7) U → | (4 , 7) V → | (4 , 15) W → | (6 , 15) X |
| (6 , 20) Y | | | |

Refer to board plan for completed diagram






206 = □ ÷ □

## Lesson Flow

**1 Review previous lesson.**

**2 ② Understand and enjoy connecting position on a grid paper.**

T Introduce the main task.

T Let's plot the points in order and connect with lines.

TN In order to plot the points using the pair of numbers in the brackets we read the first given number horizontally, and then we read the second number vertically.

TN Where the two numbers meet plot the point.

S Point A is shown as (6, 20) and next point is (14, 20). Connect first point and second point. Continue up to the last point.

T Let students work 2, 3 or 4 points and share the drawing with friends. If it is ok let them continue.

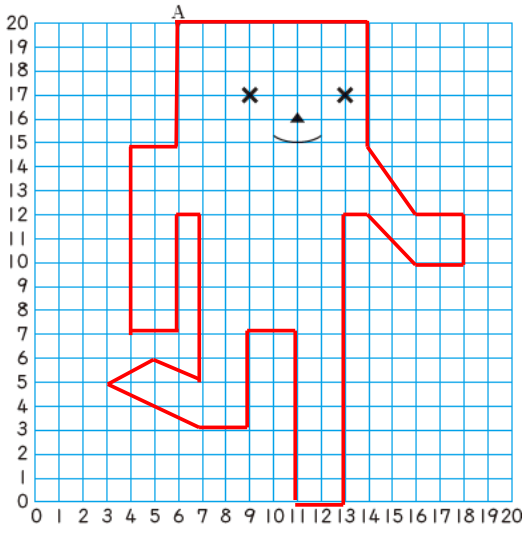
## Sample Blackboard Plan

**Date:** **Chapter:** Rectangular Prisms and Cubes **Topic:** How to Represent Position **Lesson N°:** 2/3

MT Let's draw a picture by plotting and connecting points with a line.

**2** On the grid paper, the vertical and horizontal axises are numbered as follows. Point A is represented as (6 and 20). Let's put the points below in order and connect them with lines.

(6 and 20) ➡ (14 and 20) ➡ (14 and 15) ➡ (16 and 12) ➡ (18 and 12) ➡ (18 and 10) ➡ (16 and 10) ➡ (14 and 12) ➡ (13 and 12) ➡ (13 and 0) ➡ (11 and 0) ➡ (11 and 7) ➡ (9 and 7) ➡ (9 and 3) ➡ (7 and 3) ➡ (3 and 5) ➡ (5 and 6) ➡ (7 and 5) ➡ (7 and 12) ➡ (6 and 12) ➡ (6 and 7) ➡ (4 and 7) ➡ (4 and 15) (6 and 15) ➡ (6 and 20)



# Unit 18

# Unit: Rectangular Prisms and Cubes
## Sub-unit: 4. How to Represent Positions
### Lesson 3 of 3 (Single Period)

Textbook Page : p.207
Actual Lesson 133

## Lesson Objectives

- To understand how to express positions in three dimensions.

## Prior Knowledge

- How to express a position in space by using pair of two numbers.

## Preparation

- Refer to the board plan

## Assessment

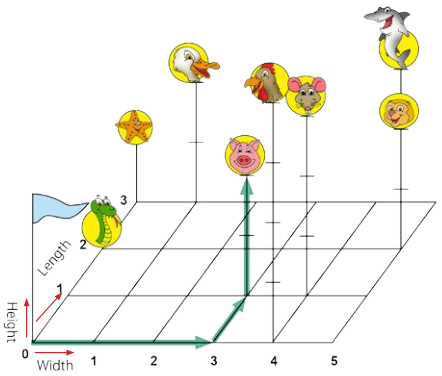
- Think about how to express a position in the space by solving the problems. F
- Understand how to express a position in space. S

## • Teacher's Notes •

To plot the points, read the width first, the length second, then the height.

### How to represent a position in three dimension

**3** Based on the standing position of the flag, let's represent the position of animals using numbers.




Every position in the space is represented by a list of three numbers.

The position of the pig is Width 3, Length 1 and Height 2.

We represent it by (3 , 1 , 2).

**1** Let's express the position of the animals below.

( 0, 3, 1 )

( 0, 2, 0 )

( 4, 0, 4 )

**2** What animal is at position (4 , 1 , 3)?

Rat/Mouse

## Lesson Flow

### 1 ❸ Think about how to represent a position in three dimension.

T Introduce the main task.
T What is the position of the Kapul and the shark?
S Both are (5, 2), but the heights are different.
S The height of Kapul is 2 and shark is 3.
T Explain that every position in the space is represented by a list of three numbers. The position of pig is 3 Width, 1 Length and 2 Height. It is represented by (3, 1, 2).

### 2 ❶ ❷ Express the position of other animals.

T Let's find the position of starfish, snake and rooster.
S The starfish is (0, 3, 1). The snake is (0, 2, 0). The rooster is (4, 0, 4).
T What animal is at position (4, 1, 3)?
S Mouse.

### 3 Summarise the lesson.

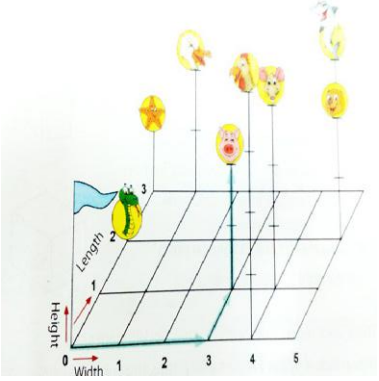
T Recap on how to read the positions of the animals.

## Sample Blackboard Plan

**Date:** **Chapter:** Rectangular Prisms and Cubes **Topic:** How to Represent Position **Lesson N°:** 3/3

MT Let's express the position of animals using 3 numbers.

❸ Based on the standing position of the flag, represent the position on the animals using numbers.




Every position in the space is represented by a list of three numbers. The position of the pig is 3 Width, 1 Length and two Height. We represent it by (3, 1, 2).

❶ Let's represent the position of the animals below.

(5, 2, 3)

(0, 2, 0)

(4, 0 4)

❷ What animal is at position (4, 1, 3)?
Rat

# Unit 18

# Unit: Rectangular Prisms and Cubes
## Sub unit: Exercise and Evaluation
## Lesson 1 of 1(Double Period)

Textbook Page : p.208-p.209
Actual Lesson 134

## Lesson Objectives

- To deepen the understanding of what they learned in the Unit.

## Prior Knowledge

- All the contents in this unit

## Preparation

- Evaluation sheets for students

## Assessment

- Solve the exercises correctly. F S

### • Teacher's Notes •

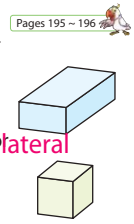
Use 30 minutes for the exercise and give the evaluation test after that.

### Exercises

1 Let's summarise rectangular prisms and cubes. Pages 195 ~ 196

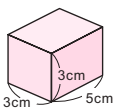
① Rectangular prisms and cubes are categorised by the shape of Faces

② Rectangular prisms are covered only by Quadrilateral by both rectangles and squares.
Cubes are covered only by Squares.

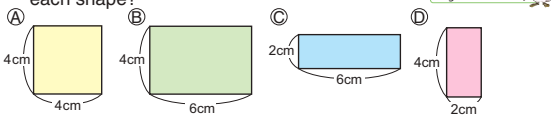


③ The number of edges for both rectangular prism and cubes is 12. The number of vertices for both rectangular prism and cubes is 8.

2 Let's draw the net of a rectangular prism on the right. Pages 196 ~ 200




3 There are a number of sheets of papers of different sizes shown below. Make rectangular prisms and cubes by using them. How many sheets of papers of each size are there in each shape? Pages 196 ~ 200




Roku bought 6 pigs and paid 1440 kina. What is the cost of one pig? Grade 3 Do you remember?

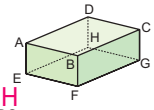
① Let's write a mathematical sentence with words.
cost for 1 pig × 6 pigs = 1 440 kina

② Represent a mathematical sentence by putting an unknown number to □, and find the answer by filling in the □.
□ x 6 = 1 440
□ = 1 440 ÷ 6 = 240 kina per pig

208 = □ ÷ □

### Problems

1 The picture on the right is a rectangular prism box.
● Understanding relationships between both faces, both edges and face and edge.




① Which edges are perpendicular to edge AE?
BF, CG and DH

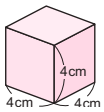
② Which edges are parallel to edge AE?
AD, AB, EF, EH, CD, GH, BC and FG

③ Which face is parallel to face ABCD?
Face EFGH

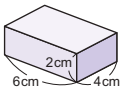
④ Which edges are perpendicular to face AEFB?
Face ABCD, EFGH, BCFG and ADEH

2 Let's draw the nets of the rectangular prism and cube shown below.
● Drawing the nets of rectangular prisms and cubes.

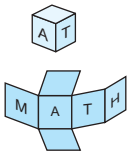
① A cube with 4 cm edge.

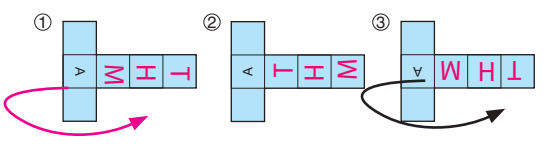



② A rectangular prism with 6 cm length, 4 cm width and 2 cm height.




3 We designed a net to make a cube with side faces that spell out the word "MATH." Let's write the characters in the nets below.
● Understanding the relationship between face and face.




□ + □ = 209

## Lesson Flow

**1** ① **Summarise rectangular prism and cube.**

S Solve the exercises by imagining the both shapes.

TN Do not let students memorise the number of each elements but imagine the shape and think of the characteristics.

**2** ② **Draw a net of rectangular prism.**

S Draw a net of rectangular prism.

T Let students draw a net correctly by using ruler.

**3** ③ **Think about the structure of the rectangular prism and cube.**

T Confirm the structure of the rectangular prism and cube.

S Both rectangular prism and cube have 6 faces.
All 6 faces are same in cube.
Rectangular prism has 3 pairs of two same faces.

**4** **Do the exercise 'Do you remember'.**

**5** ① Think about the relationship between face and face, edge and edge, and face and edge.

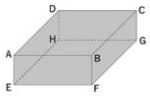
**6** ② Draw a net of rectangular prism and cube.

**7** ③ Understand the relationship between face and face of a cube.

TN It is recommended that students make a cube by paper and confirm the relationship using the cube.

| Rectangular Prisms and Cubes | Name: | Score /100 |
|---|---|---|

1. Look at the rectangular prism below and answer each question. [3 × 20 points = 60 points]

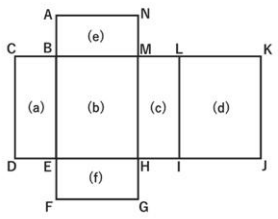



(1) Find all edges that are parallel to side AB. Answer : EF, GF, CD

(2) Find all edges which are perpendicular to side AB. Answer : AE, EH, AD, BC, BF, FG, DH, CG

(3) Find all edges which are perpendicular to plane ABFE. Answer : ABCD, EFGH, ADEH, BCFG

2. The diagram below is a net of a rectangular prism. Given that AB=2 cm, BM=4 cm and KJ=5 cm; [2 × 20 points = 40 points]



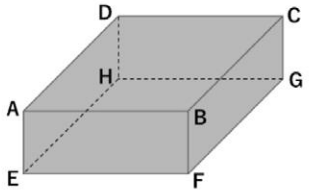

(1) What is the length of the edge HI? Answer : 2 cm

(2) Which edge overlaps edge CD after building the net into a prism? Answer : JK

**End of Chapter Test: Chapter 18** **Date:**

| Rectangular Prisms and Cubes | Name: | Score /100 |
|---|---|---|

1. Look at the rectangular prism below and answer each question. [ 3 × 20 points = 60 points]

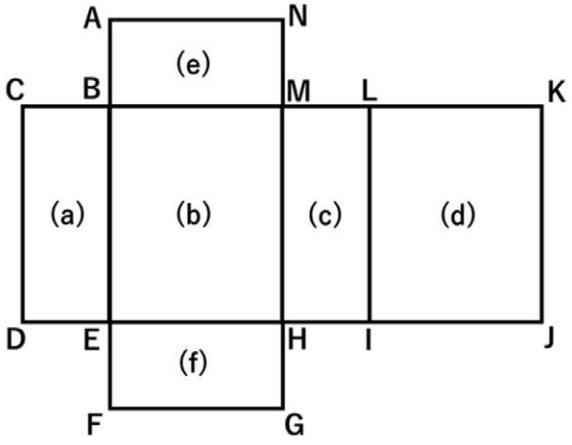



(1) Find all edges that are parallel to side AB. Answer :

(2) Find all edges which are perpendicular to side AB. Answer :

(3) Find all edges which are perpendicular to plane ABFE. Answer :

2. The diagram below is a net of a rectangular prism. Given that AB=2 cm, BM=4 cm and KJ=5 cm; [2 × 20 points = 40 points]




(1) What is the length of the edge HI? Answer :

(2) Which edge overlaps edge CD after building the net into a prism? Answer :

# Chapter 19 Quantities Change Together

## 1. Unit Objectives

- To investigate and express the 2 numbers which change together. (4.4.1a)
- To express the changes by using line graph and read the characteristics. (4.4.1c)
- To understand and express the relationship of numbers using mathematical sentences. (4.4.1b)
- To understand and use the formula. (4.4.1b)
- To express the amount by using ☐ and ○, and make mathematical sentences. (4.4.1.d)

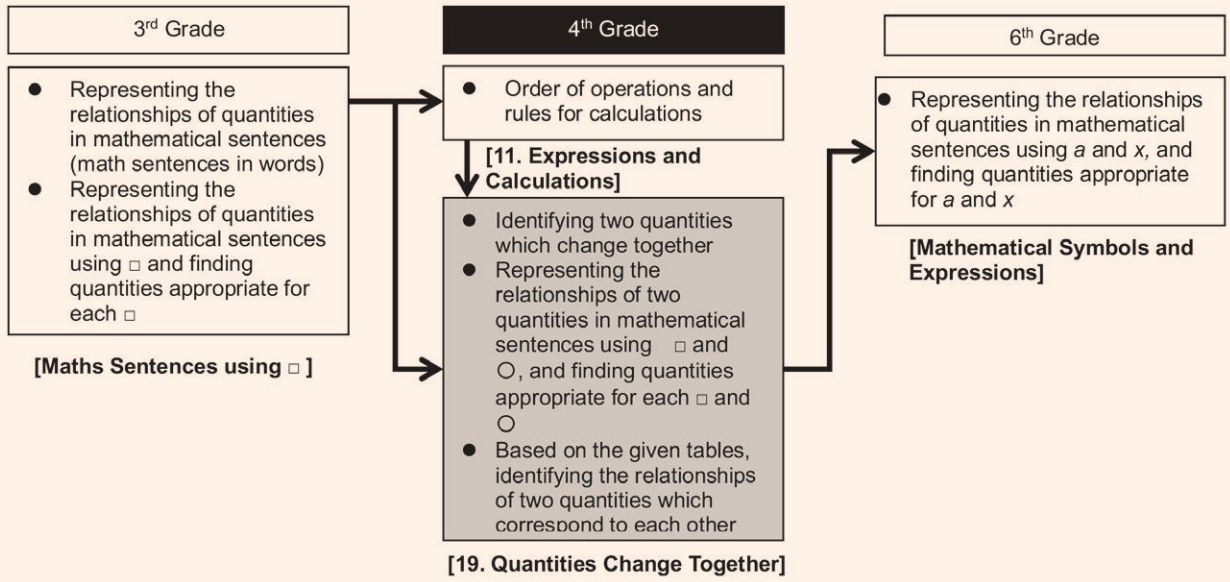
## 2. Teaching Overview

Functional perspectives are gradually developed in the previous grades. In this unit, students pay attention to 2 quantities change together and find the patterns of changes or correspondences of the 2 quantities.

**2 Quantities Change Together :** Students organise the change of the numbers of triangles and straws in a table. They also appreciate graphs when they see the visualised change of 2 quantities and that it is easy to compare the changes.

**Mathematical Sentences Using ☐ and ○ :** They express the relationship for the 2 quantities changing together in a mathematical sentences. This will be the foundation for learning linear function in the further grades.

## 3. Related Learning Contents



# Unit 19

# Unit: Quantities Change Together
## Sub-unit: 1. Quantities Which Change Together
## Lesson 1 of 3 (Single Period)

Textbook Page : p.210~p.211
Actual Lesson 135

## Sub-unit Objectives

- To find out quantities which change together in our daily life.
- To express a relationship between two numbers by making table or graph.

## Lesson Objectives

- To notice that when one quantity changes another quantity changes together.

## Prior Knowledge

- Quanities (L,dL)
- Representation and expression of matehmatical sentence using using □ and ○ (G4,U11).

## Preparation

- Pictures of textbook page 210 and 211 Table

## Assessment

- Think about the quantities which change together and how they change in different situation. F
- Summarise on their own what they learned at the end of the lesson. S

### • Teacher's Notes •

- One quantity changes causes the other quantity to change also. So both quantities change simultaneously (at the same time).

19 Quantities Change Together

Ⓐ

April 21 30 cm　April 26 130 cm　April 28 190 cm

Ⓑ

Ⓒ

Ⓓ

Let's look for quantities that change together in the photographs Ⓐ, Ⓑ, Ⓒ and Ⓓ. Let's discuss how they are changing at the same time.

Quantities are the numbers such as length, time, amount of water, weight, angles and area that you have learned.

Let's investigate the relationships of 2 quantities which change together.

| | Things which change together | | How they changed |
|---|---|---|---|
| Ⓐ | Height | and time | both increase |
| Ⓑ | Height | and time | height decreases as time increases |
| Ⓒ | Amount of water in the bucket | and amount of water in the container | |
| Ⓓ | Height | and Steps | both increase |

### 1 Quantities Which Change Together

1 Let's look for quantities that change together in Ⓐ, Ⓑ, Ⓒ and Ⓓ. How are they changing together?

In our surroundings, there are some quantities that change as another quantity changes.

210 = □ − □　　□ ÷ □ = 211

## Lesson Flow

### 1 Find quantities which change together in our daily life.

T Let the students think about and find quantities which change together.

### 2 ▶▶ Find and discuss the quantities which change together in pictures A, B, C and D.

T In picture A, what quantity is changing?
S Height of bamboo plants and date.
T What about picture B?
S The height of the candle and time
T What quantity changes in picture C?
S The amount of water in two containers.
T What about picture D?
S Number of steps and height from the ground.
TN Let students feel a sense that something is changing.

### 3 1 Think about the relationship between two quantities which changes together.

T Introduce the main task.
T Let them complete the table in the textbook.
T In picture A, how do the quantities change?
S The height of bamboo plants increase as the day passes.
T How about picture B?
S The height of candle decreases as the time passes.
T How about picture C?
S Amount of water in the bucket decreses as the amount of water in the container increases.
T How about picture D?
S The number of steps increases, as the height from the ground increases.
T Explain the important point in the box .
S Summarise in their exercise book on their own what they learned.

## Sample Blackboard Plan

**Date:** **Chapter:** 19 Quantities Change Together **Topic:** Quantities which Change Together **Lesson N°:** 1/3

MT Let's identify two quantities which change together.

Pictures of A, B, C and D

1 Let's Look for quantities that change together in the photographs A, B, C and D. How are they changing together?

A. Height of plant is increasing.
B. Length of candle decreases as time goes by
C. Depth of water increasing
D. The height from the ground increasing.

Important Point

In our surrounding, there are some quantities that change as another quantity change.

Fill in the table below.

| | Things which change together | How they change |
|---|---|---|
| A | Height and time | Height of bamboo and time increases |
| B | Length and time | Length of candle decreases as time increases |
| C | Depth and time | Depth of water increases as time passes by |
| D | Height and number of steps | The height from the ground increases as the number of steps increases. |

# Unit 19

# Unit: Quantities Change Together
## Sub-unit: 1. Quantities Which Change Together
## Lesson 2 of 3 (Double Period)

Textbook Page : p.212
Actual Lesson 136

## Lesson Objectives

- To draw a table of two quantities which change together and investigate their relationship.

## Prior Knowledge

- Quantities change together (Previous lesson)

## Preparation

- Sticks or straws (around 5 cm, 20 for each group)

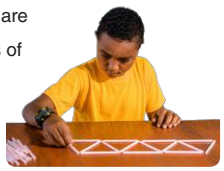
## Assessment

- Think about the relationship of two quantities through an activity. F
- Draw a table to show the change of two quantities. F
- Understand how two quantities change by solving problem 3 and 4. S

## • Teacher's Notes •

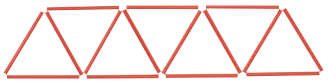
- When one quantity changes, it causes the other quantity to change. The change in other quantity is bound by rules.
- To identify the rule on how one quantity affects the other quantity to change, we draw a table.
- Using the table, the rule can be identified easily.

**2** Let's make equilateral triangles that are lined up horizontally by using straws of the same length.



Ⓐ

Ⓑ

Ⓒ 

1 Let's look for two quantities which change together from the above. Number of straws and number of triangles

2 Let's investigate how to change the number of equilateral triangles and straws.

**Number of Equilateral Triangles and Straws**

| Number of equilateral triangles | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Number of straws | 3 | 5 | 7 | 9 | 11 | 13 | 15 | 17 |

When we look for the rule on how 2 quantities change together, we draw the table to find the rule easily.

3 When the number of equilateral triangles increases by 1, by how many does the number of straws increase? 2 times

4 When we make 10 equilateral triangles, how many straws do we need? 21 straws

212 = □ − □

## Lesson Flow

**1 Review the previous lesson.**

**2 ❷ Make equilateral triangles by using same length straws.**

T Introduce the main task.

T Let the students manipulate with actual straws to make triangles so that students notice which quantity and how it changes.

TN You can substitute straws to sticks, however If both cannot be prepared let students draw the triangles A,B and C in their exercise book.

**3 ❶ Find the quantities which change together by looking at the diagram.**

T Which quantities are increasing when comparing A,B and C?

S The number of triangle, the number of straws, length of perimeter and so on.

**4 ❷ Investigate the relationship between the number of triangles and the number of straws.**

T Let students fill in the table starting from 1 triangle.

S Draw a table in their exercise book referring to the textbook.

T What do you notice?

S When the number of triangle increase by 1, the number of straw increases by 2.

T/S Summaries using the .....

**5 Solve ❸ and ❹ and find any rules of increase.**

S When the number of triangle increase by 1, the number of straw increases by 2.

S When making 10 triangles 21 straws are needed.
Ex: 17+2+2=21, 9×2+3=21

## Sample Blackboard Plan

**Date:** **Chapter:** 19 Quantities Change Together **Topic:** Quantities which Change Together **Lesson N°:** 2/3

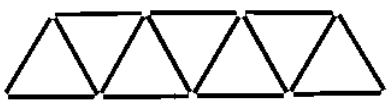
MT Let's identify two quantities which change together.

❷ Let's make equilateral triangles that are lined up horizontally by using straws of the same length.

Ⓐ

Ⓑ

Ⓒ



❶ Let's look for two quantities which change together from the above.
1. Number of straws
2. Number of triangles

❷ Let's investigate how to change the number of equilateral triangles and straws.

**Number of Equilateral Triangles and straws**

| Number of equilateral triangles | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | |
|---|---|---|---|---|---|---|---|---|---|
| Number of straws | 3 | 6 | 9 | 12 | 15 | 18 | 21 | 22 | |

Important Point

When we look for the rule how two quantities change together, we draw the table for finding the rule easily.

❸ When the number of equilateral triangles increase by 1, by how much does the number of straws increase?
When the number of equilateral triangles increase by1, the number of straws increase by 2

❹ When we make 10 equilateral triangles, how many straws do we need?

17 + 2+ 2 =21
9 × 2 + 3 = 21

Answer: 21 straws

# Unit 19

# Unit: Quantities Change Together
## Sub-unit: 1. Quantities Which Change Together
## Lesson 3 of 3 (Double Period)

Textbook Page : p.213
Actual Lesson 137

## Lesson Objectives

- To draw a line graph of the two quantities and read how they change.

## Prior Knowledge

- Draw a table of two quantities which change together. (Previous lesson)
- Line graph (G4,U8)

## Preparation

- Graph paper, Tables for task 3

## Assessment

- Draw a line graph of two quantities and read how they change. F
- Solve activity 5 correctly. S

## • Teacher's Notes •

- The other way in which we can find the rule between two different quantities is by using graphs.
- In a graph, we can easily see the relationship on how the two quantities change.
- The graph gives the behavior on how two quantities change. E.g. in task 3, the graph leans towards the right therefore, we say that when one quantity increases as the other increases also.

**Changing Quantities and Graphs**

**3** The table below shows how the amount of water and the time change as a small water tank is filled.

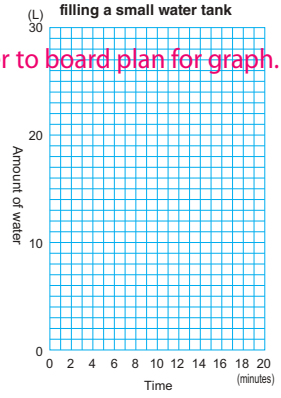
**Time and amount of water when filling a small water tank**

| Time (minutes) | 0 | 2 | 4 | 6 | 8 | 10 | 12 | 14 | |
|---|---|---|---|---|---|---|---|---|---|
| Amount of water (L) | 0 | 3 | 6 | 9 | 12 | 15 | 18 | 21 | |

1. Let's plot the points on the graph by using the numbers on the table.
2. Let's connect the points with a line.
3. What is the amount of water in 7 minutes after filling the water tank? 10.5 L
4. How many litres of water will there be after 20 minutes? 30 L

**Time and amount of water when filling a small water tank**

Refer to board plan for graph.




5. Another water tank was filled with water as shown in the table on the right. Let's draw a graph by using the information from the table above. Compare the 2 graphs and tell everyone what you observed.

**Time and amount of water when filling a water tank**

| Time (minutes) | 0 | 4 | 8 | 12 | 16 | |
|---|---|---|---|---|---|---|
| Amount of water (L) | 0 | 3 | 6 | 9 | 12 | |

□ ÷ □ = 213

## Lesson Flow

**1 Review previous lesson.**

**2 ③ Understand that the amount of water increases as the time passes.**

T Introduce the main task.
T Which quantities are changing together in the situation?
S Time and amount of water.

**3 ① ② Draw a line graph using the data in the table.**

T Let the students review on how to draw a line graph.
T What does the horizontal axis shows?
S Time in minute.
T How many minutes in one scale?
S 1 minute
T What does the vertical axis shows?
S Amount of water in L
T How many L in one scale?
S 1 L
S Draw a line graph.
1. Plot the points
2. Connect the points

**4 ③ Solve the activity by reading graph.**

TN The amount is between 10 L and 11 L.

**5 ④ Predict the amount of water after 20 minutes.**

S Extend the line after 14 minutes and read the graph.
T Let the students notice that it is good to draw a graph because they can predict the amount even if they have not measured.

**6 ⑤ Draw a graph.**

S Draw a graph using same steps of the previous graph.
TN Students draw the graph in the same graph paper.

**7 Compare the two graphs and discuss the differences.**

T What is the difference between A and B?
S Amount of water A increases faster than that of B.

## Sample Blackboard Plan

**Date:** **Chapter:** 19 Quantities Change Together **Topic:** Quantities which Change Together **Lesson Nº:** 3/3

MT Let's draw a line graph to represent the relationship between time and amount of water.

**3** The table below shows how the amount of water and time change as a small water tank is filled.

**Time and Amount of Water When Filling a** small water tank

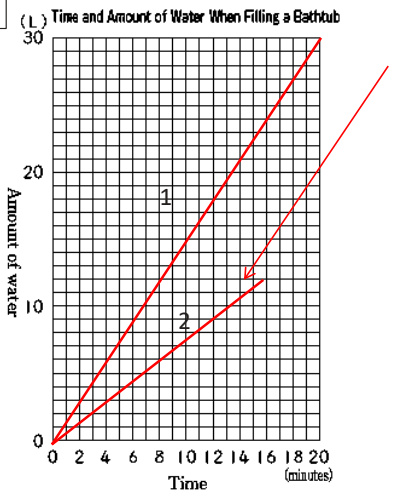
| Time (minutes) | 0 | 2 | 4 | 6 | 8 | 10 | 12 | 14 | |
|---|---|---|---|---|---|---|---|---|---|
| Amount of water (L) | 0 | 3 | 6 | 9 | 12 | 15 | 18 | 21 | |

**1** Let's write points on the graph by using the numbers on the table.

**2** Let's connect the points with a line

**3** What is the amount of water in 7 minutes after starting to fill the water tank? 10.5 L

**4** How many liters of water will there be after 20 minutes? 30 L




**5** Another water tank was filled with water as shown below.

**Summary**
Compare the two graphs and write down what you have noticed.
1. 1st graph is steeper than the 2nd graph
2. 1 has more water than 2.
3. The slope of the graphs are different.
4. _____
5. _____

# Unit 19

# Unit: Quantities Change Together
## Sub-unit: 2. Mathematical Sentence Using □ and ○
## Lesson 1 of 2 (Single Period)

Textbook Page : p. 214
Actual Lesson 138

## Sub-unit Objectives

- Express 2 quantities which change together in mathematical sentence using □ and ○.

## Lesson Objectives

- Express 2 quantities which change together in mathematical sentence using □ and ○.

## Prior Knowledge

- Quantities which change together (Previous sub-unit)

## Assessment

- Think about the relationship between 2 quantities and express with mathematical sentence. F
- Find answer inserting numbers in the sentence. F
- Understand the meaning of the mathematical sentence. S

## • Teacher's Notes •

- We can use symbols like □ and ○ to find the relationship between two quantities changing.
- The symbols also helps us in identifying the rule that is found between the two changing quantities.

### 2 Mathematical Sentence Using □ and ○

1 Shama's school has stairs to go to the playground. The children decided to use the stairs to measure the height at ground level to the top of the stairs.

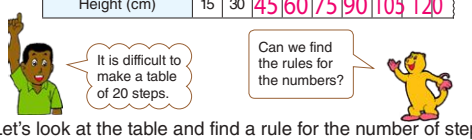
1. As the number of steps increases, how does the height from the playground change?

height from the playground decreases

2. There are 20 steps from the playground to the classroom. Let's write the number of steps and the height of the classroom in the table.

**Number of Steps and Height**

| Number of steps (steps) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | |
|---|---|---|---|---|---|---|---|---|---|
| Height (cm) | 15 | 30 | 45 | 60 | 75 | 90 | 105 | 120 | |




3. Let's look at the table and find a rule for the number of steps and height.

When the number of steps is □ and its height is ○, let's write a mathematical sentence by using □ and ○.

Height of each step × Number of steps = Height from floor

15 × □ = ○

4. Let's find the height when there are 20 steps.

300 cm ( 3m )

214 = □ − □

## Lesson Flow

**1 Review the previous lesson.**

**2 ❶ Understand the situation and what to do by observing the picture.**

T Introduce the main task.
S Read and understand the situation.

**3 ❶ Solve the activity.**

T When increasing the steps how does the height from the playground change?
S The height from the playground increases.

**4 ❷ Make a table and find the relationship between the number of steps and the height from the playground.**

T What is the height of a step?
S 15 cm
T How many cm will increase in each step?
S 15 cm
T Fill in the blank of the table.

**5 Think about how to find the height of 20 steps.**

T Is it very hard to draw a table until 20 steps. Did you find any rules in the table?
S Start with fifteen and when increasing one step the height increases 15 cm.

**6 ❸ Think about the relationship using ○ & □.**

T Express the number of stairs as □ and the height from the playground as ○.
S (The height of a step, 15) × (The number of stairs, □) = (The height from the playground, ○)

**7 ❹ Find the height of 20 steps using the mathematical sentence.**

T What is the height of 20 steps? Use the mathematical sentence you made.
S 15 × 20 = 300 <u>300 cm (3 m)</u>

## Sample Blackboard Plan

**Date:** **Chapter:** 19 Quantities Change Together **Topic:** Mathematical Sentences Using □ and ○ **Lesson N°:** 1/2

MT Let's investigate the relationship between the number of stairs and the height from the ground using □ and ○.

❶ Shama's classroom was on the third floor. The children decided to use the stairs to measure the height from the floor on the first floor to the floor on the third floor.

❶ As the number of steps increases, how does the height of the first floor change? Height increases by 15 cm.

❷ There are 40 steps between the first and third floors. Let's fill in the table below.

Number of Steps and Height

| Number of steps (steps) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | |
|---|---|---|---|---|---|---|---|---|---|
| Height (cm) | 15 | 30 | 45 | 60 | 75 | 90 | 105 | 120 | |

❸ Let's look at the table and find a rule for the number of steps and height.
When the number of steps is □ and its height is ○, let's express mathematical sentence by using □ and ○.

Height of each step × number of steps = height

15 × □ = ○

❹ Let's find the height when there are 40 steps.
15 × 20 = ○
= 300 *cm*

# Unit 19

# Unit: Quantities Change Together
## Sub-unit: 2. Mathematical Sentence Using □ and ○
## Lesson 2 of 2 (Single Period)

Textbook Page : p.215
Actual Lesson 139

## Lesson Objectives

- To think about the rules and relationship between the number of square and stairs.
- To generalise the rule and relationship between the number of squares and stairs.

## Prior Knowledge

- Mathematical sentence using □ and ○. (Previous lesson)

## Preparation

- Figures and a table for task 2.

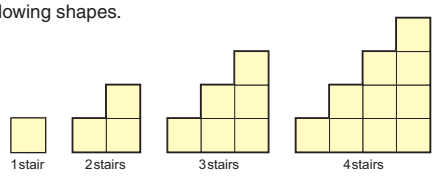
## Assessment

- Think about the relationship between 2 quantities and express them with mathematical sentence. F
- Do the exercises correctly. S

## • Teacher's Notes •

- The length around the stairs is referring to the perimeter of the shapes in the stairs.
- In this lesson, we are using the idea of symbols □ and ○ from the previous lesson to show the relationships.
- We'll show the relationship by writing mathematical sentences.

**2** Arrange a square paper with 1 cm side and make the following shapes.




1. How many cm are the length around 1 stair and 2 stairs?
   4 cm and 8 cm
2. Let's study how the number of stairs and the length around the stairs change.

**Number of Stairs and the Length Around the Stairs**

| Number of stairs | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| Length around the stairs (cm) | 4 | 8 | 12 | 16 | 20 | 24 | 28 |

3. When the number of stairs increases by 1, how long does the length around the stairs increase?
   increases by 4 times
4. When the number of stairs is □ and the length around the stairs is ○, let's show the relationship by a mathematical sentence.
   4 × □ = ○
5. When the number of stairs is 8, how many cm is the length around the stairs? When the length around the stairs is 40 cm, what is the number of stairs?
   1) 4 × 8 = 32 cm
   2) 4 × □ = 40
   □ = 40 ÷ 4 = 10 steps

**Exercise**

Belinda bought a ream of drawing paper for 20 kina. When the number of reams is □ and the cost is ○. Let's express the relationship between □ and ○ in a mathematical sentence.

20 × □ = ○

□ ÷ □ = 215

## Lesson Flow

**1 Review previous lesson.**

**2 ❷ Observe the picture of the squares and share what students notice.**

T Introduce the main task.
T Observe the picture of the square. What did you notice?
S Stairs are increasing one by one.
S The number of squares are increasing.

**3 ❶ Draw a table of the relationship between the number of squares and the length around stairs.**

T What are the lengths around 1 stair and 2 stairs?
S 4cm and 8cm.

**4 ❷ ❸ Draw a table of the relationship between the number of steps and the length around the stairs.**

T What is the length around 1 stair?
S 4 cm
T How many cm will the height increase in 1 stair?
S 4 cm
S Complete the table.
TN When the number of stairs increases by 1, the length around the stairs increase by 4 cm.

**5 ❹ Make a mathematical sentence using □ (The number of stairs) and ○ (Length around stairs).**

T Let students understand that length around stairs increase 4 cm by 4 cm.
TN Let the students think of the mathematical sentence with words.
S (Increased length) × (The number of stairs) = (Length around stairs)
$4 \times \square = \bigcirc$
T ❺ Where would we put 8 in the mathematical sentence?
S □, so $4 \times 8 = 32$ 32 cm
T Where shall we put 40 in the mathematical sentence?
S ○, so $40 \div 4 = 10$ 10 stairs

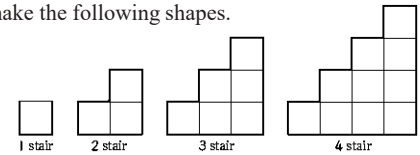
**6 Do the exercise.**

## Sample Blackboard Plan

**Date:** **Chapter:** 19 Quantities Change Together **Topic:** Mathematical Sentences Using □ and ○ **Lesson N°:** 2/2

MT Let's investigate the relationship between the number of stairs and the length around the stairs using □ and ○.

❷ Arrange a square paper with 1 cm side and make the following shapes.




❶ How many cm are the length around 1 stair and 2 stairs?
4 cm around 1 stair and 8 cm around 2 stairs.

❷ Let's study how the number of stairs and length around the stairs change.

Number of Stairs and the Length Around the Stairs

| Number of stairs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
|---|---|---|---|---|---|---|---|---|
| Length around stairs(cm) | 4 | 8 | 12 | 16 | 20 | 24 | 28 | |

❸ When the number of stairs increase by 1, how long does the length around the stairs increase?
Increase 4 times.

❹ When the number of stairs is □ and the length of around stairs is ○, let's show the relationship by a mathematical sentence.
○ □

❺ When the number of stairs is 8, how many cm is the length around the stairs? And when the length around stairs is 40cm, what is the number of stairs?
1. ○
2. □

Answer: 10 stairs

**Exercise**
I buy sheets of drawing paper at 20kina each. When the number of sheets I buy is □ and the cost is ○, let's express the relationship between □ and ○ as a mathematical sentence.

*Number of sheets × cost of one sheet = cost*

× = cost

□ ○

# Unit 19

# Unit: Quantities Change Together
## Sub-unit: Exercise and Evaluation
## Lesson 1 of 1 (Double Period)

Textbook Page : p. 216~p.217
Actual Lesson 140

## Lesson Objectives

- To deepen understanding on contents learned in this Unit.

## Prior Knowledge

- All the contents in this unit

## Preparation

- Evaluation sheets of students

## Assessment

- Solve the problems remembering what they learned in this unit. F
- Complete the exercise correctly. S

### • Teacher's Notes •

Use 30 minutes for the exercise and give the evaluation test after that.

### Exercises

**1** Let's look at the relationships between the 2 quantities written below. In which one is "both increasing" and in which one is "one increasing and one decreasing?"

Pages 210 ~ 211

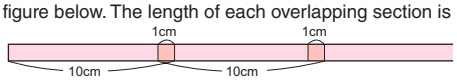
① The distance that a car travels and the quantity of fuel used.
distance increases as fuel decreases

② The time that you are riding on the bus that started at one bus stop and the distance from the bus to the next bus stop.
both time and distance increases

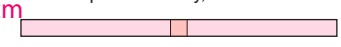
③ The quantity of orange juice consumed and the remaining amount.
quantity consumed increases as remaining decreases

Page 212

**2** The children are going to connect 10 cm tapes as shown in the figure below. The length of each overlapping section is 1 cm.




① If we connect 2 pieces of tape in this way, what is the total length in cm?
19 cm



② Write the numbers in the table below.

**Number of Pieces of Tape and Total Length**

| Number of piece of tape | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| Total length(cm) | 10 | 19 | 28 | 37 | 46 | 55 | 64 | 73 | 82 |

③ If we connect 10 pieces of tape, what is the total length in cm? 91 cm

Let's calculate. Grade 4 Do you remember?

① 8.6×68 584.8 ② 24.8×65 1612 ③ 0.79×5 3.95
④ 5.1÷3 1.7 ⑤ 32.2÷7 4.6 ⑥ 45.6÷48 0.95
⑦ $\frac{5}{9}+\frac{8}{9}$ $1\frac{4}{9}$ ⑧ $1\frac{3}{4}+\frac{3}{4}$ $2\frac{1}{2}$ ⑨ $6\frac{1}{5}+3\frac{4}{5}$ 10
⑩ $\frac{5}{6}-\frac{1}{6}$ $\frac{2}{3}$ ⑪ $3\frac{5}{8}-1\frac{7}{8}$ $1\frac{3}{4}$ ⑫ $2-1\frac{2}{3}$ $\frac{1}{3}$



### Problems

**1** Let's look at the relationships between the 2 quantities shown below. In which, are "both increasing" and in which is "one increasing and one decreasing?"

● Understanding the relationship between 2 quantities.

① Day time and night time in a day.
One increase while the other decrease

② The number of times phone calls are made and the fees.
Both increase

**2** Summarise the 2 quantities that change together.

● Understanding the relationship between 2 quantities from a table.

A string is cut at several points. Check the relationship between the number of cuts and the pieces of string.

① When the number of cuts increase, what else increases?
Pieces of strings

② Make a table and find the relationship.

**Number of Cuts and Pieces of String**

| Number of cuts | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Pieces of string | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

③ How many times should we cut the string to make 10 pieces?
9 times

**3** Let's investigate the relationship between the length of one side and the perimeter of a square.

● Understanding the relationship between 2 quantities from a table.

① Let's fill in the table.

**Length of One Side and Perimeter of a Square**

| Length of one side (cm) | 1 | 1.5 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| Perimeter (cm) | 4 | 6 | 8 | 12 | 16 | 20 |

② Let's represent the relationship by the mathematical sentence when one side is □ cm and the perimeter is ○ cm.
4 × □ = ○

③ What is the length of the side of the square when the perimetre is 36 cm?
4 × □ = 36
□ = 36 ÷ 4 = 9cm

## Lesson Flow

### 1 ① Understand the relationship between 2 quantities which change together.

S Understand each situation and consider when one quantity increases the other quantity increases or decreases.

### 2 ② Understand the relationship between the length of tape and overlapping section.

T Let the students notice that there is overlapping section when two tapes are connected.

TN Relationship between number of tapes and overlapping section.
1 tape : Overlapping section is 0
2 tapes: Overlapping section is 1
3 tapes: Overlapping section is 2
The number of overlapping section
＝The number of tape－1

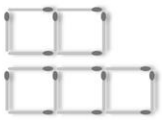
T If we connect 10 pieces of tape, what is the total length in cm?

S 10×10－1×9＝91

### 3 Do the exercise of 'Do you remember?'

| Quantities Change Together | Name: | Score /100 |
|---|---|---|

1. Jack made squares using matches as shown below.



(1) Fill in the table for the number of matches and number of squares below. [5 × 8 points = 40 points]

**Number of squares and matches**

| Number of squares | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Number of matches | 4 | 7 | 10 | 13 | 16 |

(2) How many matches does Jack need if the number of boxes are 7? [6 points] Answer: 22

(3) How many matches increase as the number of square increases by 1. [6 points] Answer: 3

2. The table shown below represents length of a chain and its price at a shop. Answer each question. [20 points]

| Length of chain (m) | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Price (K) | 3 | 6 | 9 | 12 | 15 |

(1) Write an expression if the length of the chain is □m and the price is △.

Answer: △ = □ × 3

### 4 ① Understand the relationship between 2 quantities which change together.

S Think about each situation and consider when one quantity increases the other will increase or decrease.

### 5 ② Understand the relationship between 2 quantities based on the table.

T How many times should we cut the string to make 10 pieces?

S (The number of cut)＋1＝10 (The number of string)
10－1＝9 9 times

### 6 ③ Make a mathematical sentence of the relationship between 2 quantities.

T How many sides are there in a square?

S 4

T When a side is 1.5 cm, how many cm is the perimeter?

S 1.5×4＝6 cm

T Complete the table.

T Let's make a mathematical sentence when one side is □ cm and the perimeter is ○ cm.

S □×4＝○

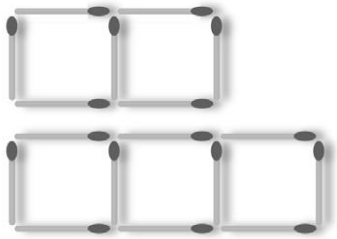
T What is the length of the side of the square when the perimeter is 36cm?

S □×4＝36, □＝36÷4＝9, 9 cm

**End of Chapter Test: Chapter 19** **Date:**

| Quantities Change Together | Name: | Score /100 |
|---|---|---|

1. Jack made squares using matches as shown below.



(1) Fill in the table for the number of matches and number of squares below.

[5 × 8 points = 40 points]

**Number of squares and matches**

| Number of squares | 1 | 2 | | | |
|---|---|---|---|---|---|
| Number of matches | | | | | |

(2) How many matches does Jack need if the number of boxes are 7? [6 points]

Answer:

(3) How many matches increase as the number of square increases by 1. [6 points]

Answer:

2. The table shown below represents length of a chain and its price at a shop. Answer each question. [20 points]

| Length of chain (m) | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Price (K) | 3 | 6 | 9 | 12 | 15 |

(1) Write an expression if the length of the chain is □m and the price is △.

Answer:

# Chapter 20 Summary of the Grade 4

**This chapter is a summary of all the contents in Grade 4.**
**It is important for the students to acquire a procedural fluency in mathematics. That is not just understanding facts or procedures but using various procedures depending on the situation.**
**Various problems learned in Grade 4 are included in this chapter, so please give sufficient time to students to solve all the problems.**

# Unit 20

# Unit: Summary of Grade 4
## Sub-unit: Summary of Grade 4
## Lesson 1 of 4 (Single Period)

Textbook Page : p.218
Actual Lesson 141

## Lesson Objectives

- To read a table and draw a graph correctly.

## Prior Knowledge

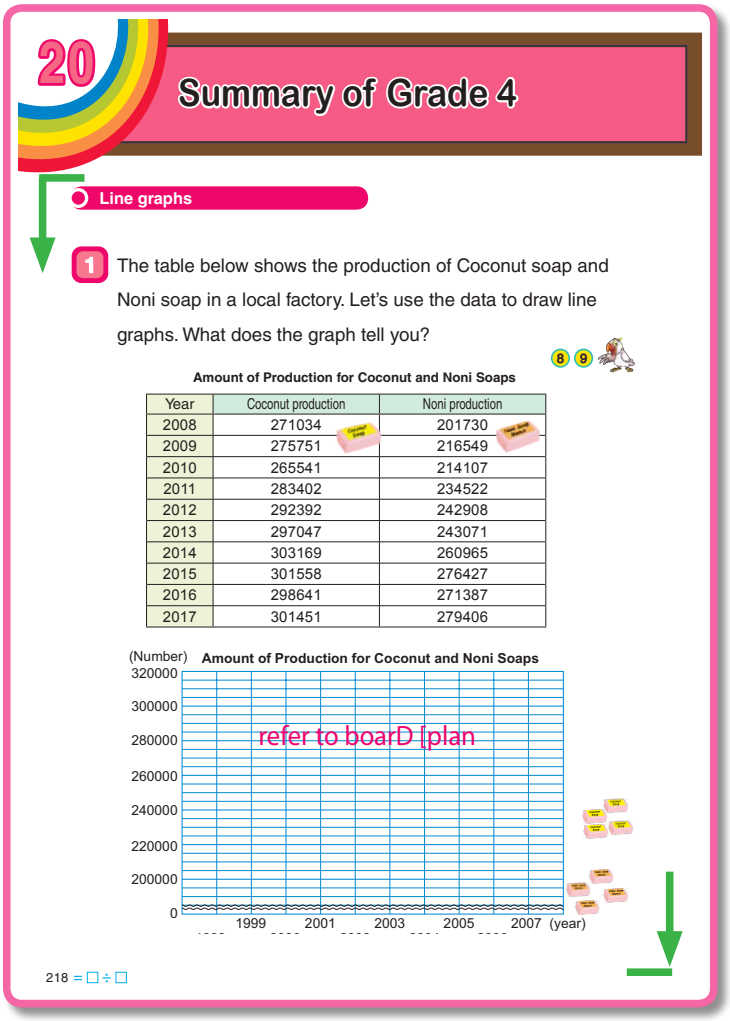
- Data and mathematical relations in grade 4

## Preparation

- Graph sheets

## Assessment

- Solve the problems remembering what they learned in Grade 4. F
- Complete the exercise correctly. S



# Lesson Flow

## 1 ① Draw line graphs.

T Confirm that 4 unit shows 20000.
T 1 unit shows how many?
S 5000
TN Drawing the line graph the numbers can be rounded off to the nearest 10 thousands
S Draw two graphs, production of coconuts and noni soaps.

## 2 Share the finding from the graph.

T What did you find from the graph?
S The amount of coconuts is always higher than the amount of noni soaps.
S The both production are increasing.
S The difference between amount of coconuts and amount of noni soap is becoming less.
TN Whatever students identify can be added on.

# Sample Blackboard Plan (Lesson 141)

Date: Chapter 20: Summary of Gr 4 Topic: Summary of Grade 4 Lesson Number: 1 out of 4

**Main Task:** Let's review how to arrange and represent data.

**Line graphs**

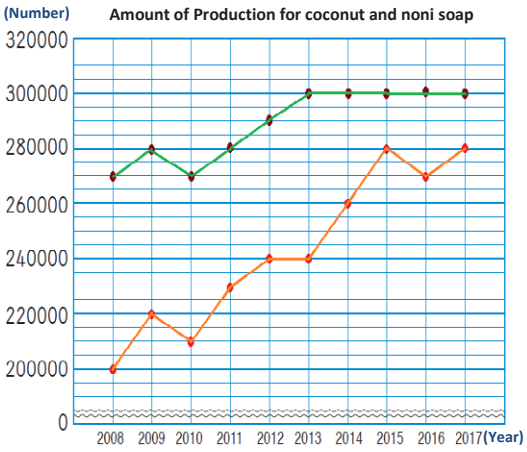
1 The table below shows the production of coconut soap and noni in a local factory.

**Amount of Production for coconut and noni soap**

| Year | Coconut production | Noni production |
|---|---|---|
| 2008 | 271034 | 201730 |
| 2009 | 275751 | 216549 |
| 2010 | 265541 | 214107 |
| 2011 | 283402 | 234522 |
| 2012 | 292392 | 242908 |
| 2013 | 297047 | 243071 |
| 2014 | 303169 | 260965 |
| 2015 | 301558 | 276427 |
| 2016 | 298641 | 271387 |
| 2017 | 301451 | 279406 |

MT: Introduce main task here.

1 Let's use the data to draw line graphs.




2 What does the line graph tell you?

1. The graph is about the production of coconut and noni soap in a local factory.
2. There are two lines graphs
3. The line graph tells us that the amount of coconuts is always higher than the amount of noni soaps.
4. Both productions are increasing.
5. The difference between the amount of coconuts and noni soap is becoming less.

3 **Summary**

- The horizontal axis shows the year of production and the vertical axis shows figures of the amount of produce for coconut and noni .
- The scale of 1 unit is 5000 and the scale of 4 units is 20000.
- In order to draw the line graph , the numbers were rounded off to the nearest 10 thousands.

Exercise

# Sample Blackboard Plan (Lesson 142)

Date: Chapter 20: Summary of Gr 4 Topic: Summary of Grade 4 Lesson Number: 2 out of 4

**Main Task:** Let's think about how to calculate and solve.

MT: Introduce main task here.

**Numbers and Calculations**

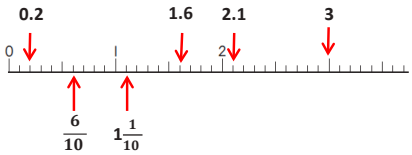
1 Let's read the following numbers and round to the place as shown in the ().

1. 3 824 901 ➡ 3 820000
2. 64 098 172 ➡ 64 000 000
3. 2 715 205 860 432 ➡ 2 720 000 000 000

2 Let's write the following numbers in numerals.

1. 300 sets of100 million and 68 sets of 10 thousand.
   300 ×100= 300 000 and 68×10=180
   Ans: 300 billion and Ans: 180 thousand
2. 100 times 80 billion ➡ 100 ×80= 8000 Ans: 8 trillion
3. 250 million divided by 10 ➡ 250÷10=25 Ans: 25 million
4. 5 sets of1and 3 sets of 0.1 ➡ 5.3
5. 12 sets of 0.1 ➡ 1.2
6. 4 sets of ➡ 4× =
7. Mixed fractions and improper for 11 sets of ➡ 11× = =1

3 Let's write the following numbers on the number line.




4 Let's arrange these numbers from the largest to the smallest.
8, 0, 0.8, .0.08, 0.808

5 Let's calculate.

1. 7.84 + 4.32 = 12.16
3. 8.40 − 2.01 = 6.39
4. 
6. 
8. 
9. 

10. 106 × 247 = 26482 + 3242 = 8382
11. 0.61 × 8 = 4.88
13. 12)96 = 8, 96

Exercise

1. Try to complete the activities not done as well as task 6,7, 8, 9, 10, 11 and 12 as homework.

# Unit 20

# Unit: Summary of Grade 4
## Sub-unit: Summary of Grade 4
## Lesson 2 of 4 (Single Period)

Textbook Page : p.219-221
Actual Lesson 142

## Lesson Objectives

- To review and confirm number and calculation in Grade 4.

## Prior Knowledge

- Number and calculation in grade 4

## Preparation

- Refer to each task and teacher can improvise.

## Assessment

- Solve the problems remembering what they learned in Grade 4. F
- Solve the exercise correctly. S

### Numbers and Calculations

**1** Let's read the following numbers. Round them to the place as shown in ( ).

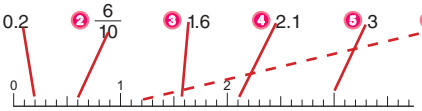
1. 3 824 901 (ten thousand) 3 820 000
2. 64 098 172 (million) 64 000 000
3. 2 715 205 860 432 (ten billion) 2 720 000 000 000

**2** Let's write the following numbers in numerals.

1. 300 sets of 100 million and 68 sets of 10 thousand. 300 068 000
2. 100 times 80 billion. 8 000 000 000 000
3. 250 million divided by 10. 25 000 000
4. 5 sets of 1 and 3 sets of 0.1. 5.3
5. 12 sets of 0.1. 1.2
6. 4 sets of $\frac{1}{5}$. $\frac{4}{5}$
7. Mixed fractions and improper fractions for 11 sets of $\frac{1}{7}$. $\frac{11}{7}$ $1\frac{4}{7}$

**3** Let's write the following numbers on the number line.

1. 0.2
2. $\frac{6}{10}$
3. 1.6
4. 2.1
5. 3
6. $1\frac{1}{10}$




**4** Let's arrange these numbers from the largest to the smallest.

0.08 8 0.8 0.808 0

8, 0.808, 0.8, 0.08, 0

**5** Let's calculate.

1. 7.84 + 4.32 12.16
2. 16.89 + 5.3 22.19
3. 8.4 − 2.01 10.41
4. $\frac{3}{8}+\frac{7}{8}$ $1\frac{1}{4}$
5. $2\frac{2}{7}+\frac{6}{7}$ $3\frac{1}{7}$
6. $1\frac{7}{9}+4\frac{7}{9}$ $6\frac{5}{9}$
7. $1\frac{1}{3}-\frac{2}{3}$ $\frac{2}{3}$
8. $8\frac{1}{5}-2\frac{3}{5}$ $5\frac{3}{5}$
9. $3-\frac{5}{6}$ $2\frac{1}{6}$
10. 106 × 247 26 182
11. 0.61 × 8 4.88
12. 0.24 × 75 18
13. 96 ÷ 12 8
14. 864 ÷ 36 24
15. 080 ÷ 72 1.1
16. 75.2 ÷ 8 9.4
17. 3.68 ÷ 16 0.23
18. 45 ÷ 36 1.25

**6** There are 144 packages that must be put on 3 trucks, with each truck carrying the same number of packages. How many packages are placed on each truck?

144 ÷ 3 = 48 48 packages

**7** Look at the following calculations. Find the errors and correct them.

1. $10-3\times2=7\times2$ $= 10-6$
   $=14$ $=4$
2. $21+80\times(13-7)=101\times6$ $= 21+480$
   $=606$ $=501$

**8** 127 grade 4 children are going to Loloata Island by boat. Only 25 children can go at a time.

1. How many trips will it take to carry all children to the Island? 6 trips
2. We want to carry the same number of children in 6 trips. How should the number of children be divided?

5 trips of 23 students and a trip of 22 students

□ × □ = 219 220 = □ ÷ □

## Lesson Flow

### 1 ① Round the numbers.

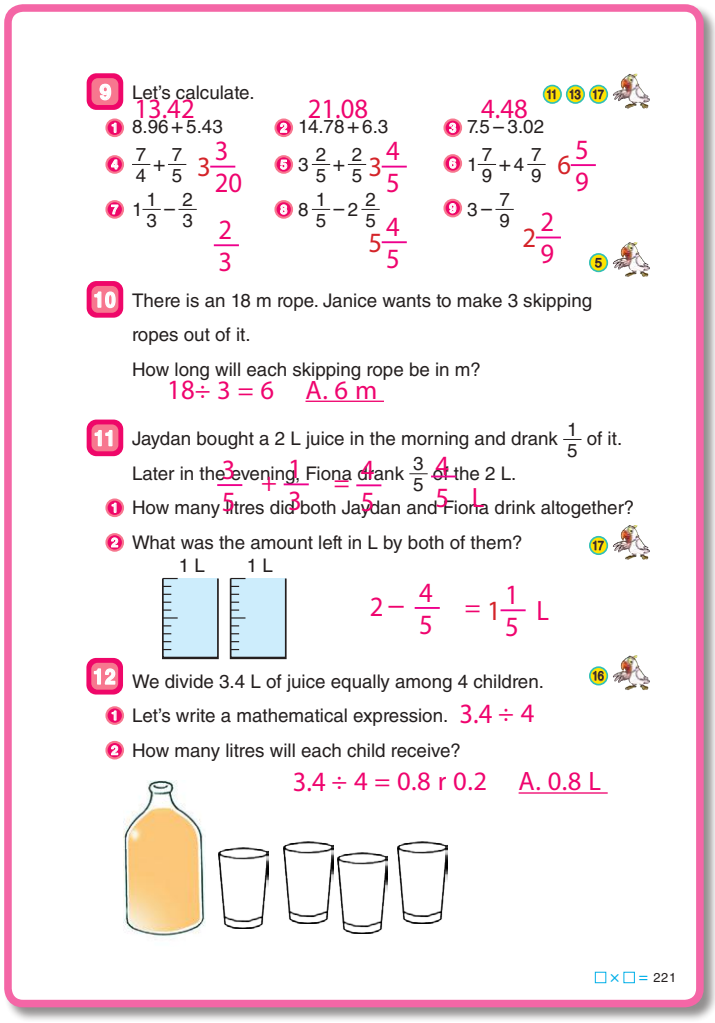
T Confirm how to read numbers.
T Confirm the meaning of rounding.
S Think of which place should be focused to round in indicated place.

### 2 ② Confirm the structure of whole number, fraction and decimal.

T Summarise the decimal system using place value chart.
T Summarise how the number after multiplying 10, 100 or $\frac{1}{10}$.
T Confirm the relationship between improper fraction and mixed fraction.

### 3 ③ Deepen understanding of numbers by expressing them on the number line.

T What is 1 scale unit on the number line?
S 0.1
T Let the students focus on the denominator of fraction first and then think about where the numerator should be expressed on the number line.



9 Let's calculate.

① 8.96 + 5.43 = 13.42
② 14.78 + 6.3 = 21.08
③ 7.5 − 3.02 = 4.48
④ $\frac{7}{4}+\frac{7}{5}=3\frac{3}{20}$
⑤ $3\frac{2}{5}+\frac{2}{5}=3\frac{4}{5}$
⑥ $1\frac{7}{9}+4\frac{7}{9}=6\frac{5}{9}$
⑦ $1\frac{1}{3}-\frac{2}{3}=\frac{2}{3}$
⑧ $8\frac{1}{5}-2\frac{2}{5}=5\frac{4}{5}$
⑨ $3-\frac{7}{9}=2\frac{2}{9}$

10 There is an 18 m rope. Janice wants to make 3 skipping ropes out of it.
How long will each skipping rope be in m?
18 ÷ 3 = 6 A. 6 m

11 Jaydan bought a 2 L juice in the morning and drank $\frac{1}{5}$ of it.
Later in the evening, Fiona drank $\frac{3}{5}$ of the 2 L.
① How many litres did both Jaydan and Fiona drink altogether? $\frac{3}{5}+\frac{1}{5}=\frac{4}{5}$ L
② What was the amount left in L by both of them?
1 L 1 L
$2-\frac{4}{5}=1\frac{1}{5}$ L

12 We divide 3.4 L of juice equally among 4 children.
① Let's write a mathematical expression. 3.4 ÷ 4
② How many litres will each child receive?
3.4 ÷ 4 = 0.8 r 0.2 A. 0.8 L

□ × □ = 221

S Solve the task.

### 4 ④ Compare the numbers

T To compare numbers, from which place value do we have to compare, the largest or smallest ?
S Largest place value
TN When it is difficult to compare the numbers, use a place value chart.

### 5 ⑤ Do 4 operations of decimal number and addition and subtraction of fraction.

T Confirm the method of each calculation.
TN In case when most students face difficulty, explain the method step by step on the black board.

### 6 ⑥ Solve word problem of division.

S Read and understand the problem.
T Which operation should we use?
S Division.
S Make mathematical expression and solve it.

### 7 ⑦ Find and correct mistakes.

T Let students focus on the order of calculation.
- Multiplication and division are calculated first.
- When there are parentheses, calculate the expression in the parenthesis first.

### 8 ⑧ Solve word problems of division with remainder.

T Confirm how to treat remainder.
(1) Remainder (Children) also go to the top of the mountain.
(2) The remainder (Children) has to be added for a cable car.

### Sample Blackboard Plan

Sample blackboard plan refer to page 317.

# Unit 20

# Unit: Summary of Grade 4
## Sub-unit: Summary of Grade 4
## Lesson 3 of 4 (Single Period)

Textbook Page :
p.222-224
Actual Lesson 143

## Lesson Objectives

- To review and confirm geometry and measurement in Grade 4.

## Prior Knowledge

- Geometry and measurement in Grade 4.

## Preparation

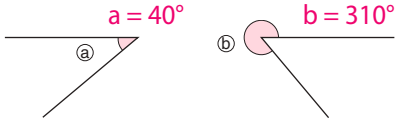
- Protractor

## Assessment

- Solve the problems remembering what they learned in Grade 4. F
- Solve the exercise correctly. S

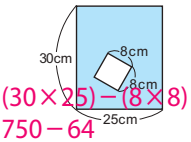
### Measurement and Shapes

**1** How many degrees are the angles ⓐ and ⓑ? 4

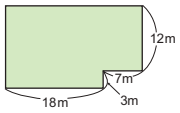



**2** Let's draw angles of 70° and 123°. 4

**3** Let's find the areas of the shaded parts. 12



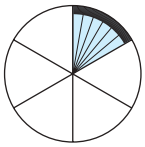

$(30 \times 25) - (8 \times 8)$
$750 - 64$
$686\ cm^2$




$(18 \times 12) - (7 \times 3)$
$216 - 21$
$195\ cm^2$

### Why Are the Degrees of a Circle Equal to 360 Degrees?

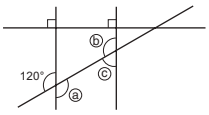
About 6000 years ago in ancient Babylonia, people divided a circle into 6 equal sections and then divided each part into 60 equal parts that they called "one degree."
The degrees of a circle equal 360°.
At that time in Babylonia, people used a method of counting that was based on 60. They defined a circle as 360 degrees because 1 year is approximately 360 days.



### Quadrilaterals and Net

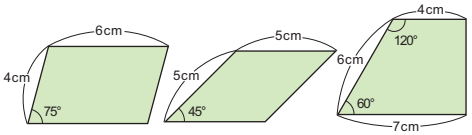
**1** How many degrees are the angles ⓐ, ⓑ and ⓒ on the right? 6

a = 120° b = 120° c= 60°

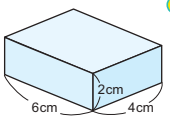



**2** Let's draw the following quadrilaterals. 6

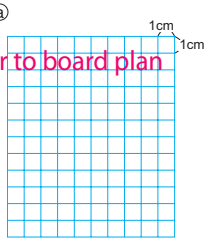
❶ Parallelogram ❷ Rhombus ❸ Trapezoid



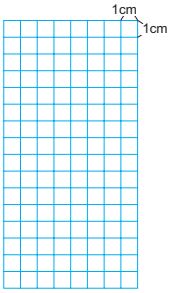

**3** We made a rectangular prism box shown on the right. Let's draw its nets on the graph below. 18




ⓐ refer to board plan




ⓑ




222 = □ ÷ □

□ × □ = 223

## Lesson Flow

### 1 ① Measure the angle using protractor.

T Confirm how to use protractor correctly.
1. Put the center of protractor on the vertex of angle.
2. Align the 0° with one side of the angle.
3. Read the degree which overlap the other side of the angle.

T To find angle b, measure the smaller angle first and subtract the angle from 360°.

S Solve the task.

### 2 ② Draw the angle using protractor.

T Confirm the steps to draw the angle.

S Solve the task.

T Let the students measure the angle to check whether it is drawn accurately.

### 3 ③ Find the area of combined figure

T Let students explain how to find the area.

S There are 3 ways to find the area in figure 2.

$12\times25+3\times18=354\ (m^2)$
$15\times18+12\times7=354\ (m^2)$
$15\times25-3\times7=354\ (m^2)$

### 4 ① Find angles using definition of parallel and perpendicular lines.

T Let students remember the definition of parallel and perpendicular lines.

T Confirm that straight line is 180°.

S Understand that angles can be found using the definition of parallel and perpendicular lines instead of using protractor.

S Solve the task.

### 5 ② Draw various quadrilaterals.

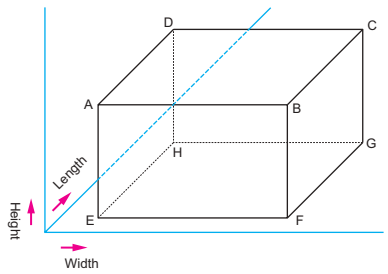
S Explain how to draw each quadrilateral.

### 6 ③ Draw the nets of rectangular prism.

S Think of two nets focusing on the connection of faces.

**4** A rectangular prism box is set as follows. ⑱

Let's answer the questions.




① Vertices A, E, F, G and H are represented as follows;

A (1, 1, 3) E (1, 1, 0)
F (6, 1, 0) G (6, 5, 0)
H (1, 5, 0)

Let's write the positions of vertices B, C and D. Explain why.

B (6, 1, 3) C (6, 5, 3) D (1,5, 3)

② When the unit scale is 1 cm for the length, the width and the height. Find the area of figure below.

Ⓐ Rectangle EFGH

Ⓑ Rectangle AEFB $4\times5=20$ $20cm^2$

Ⓒ Rectangle BFGC $5\times5=25$ $25cm^2$
$4\times3=12$ $25cm^2$

224 = □ ÷ □

### Sample Blackboard Plan

Sample blackboard plan refer to page 323.

# Unit 20

# Unit: Summary of Grade 4
## Sub-unit: Summary of Grade 4
## Lesson 4 of 4 lesson (Single Period)

Textbook Page : p.225
Actual Lesson 144

## Lesson Objectives

- To review and confirm about mathematical relations in Grade 4.

## Prior Knowledge

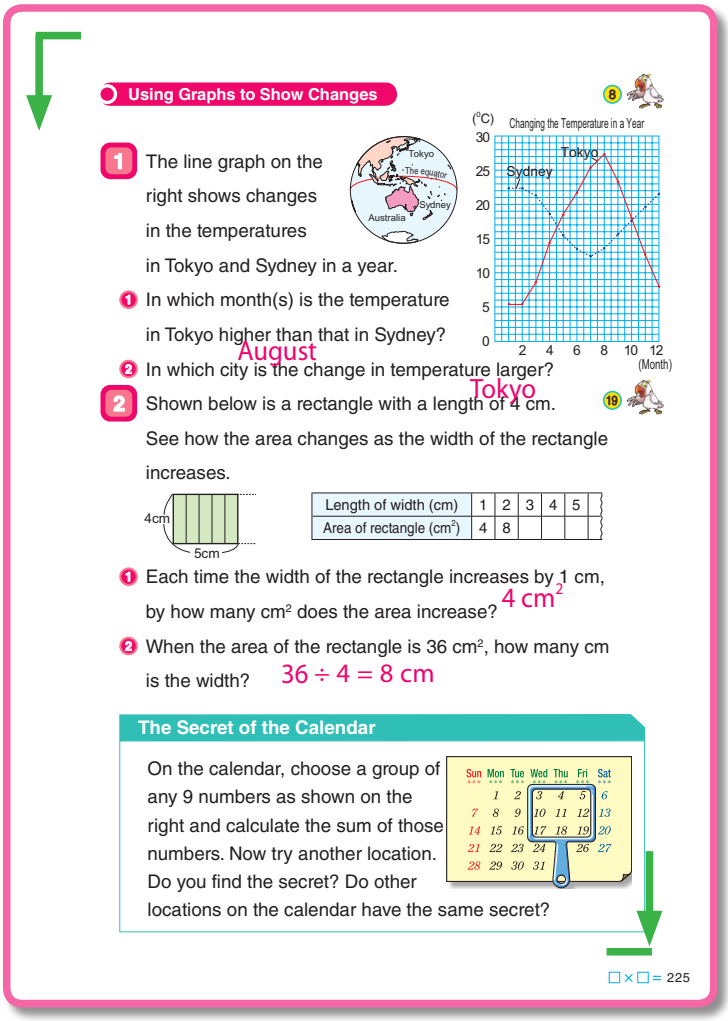
- Data and mathematical relations in grade 4.

## Preparation

- Refer to the tasks and teacher may improvise.

## Assessment

- Solve the problems remembering what they learned in Grade 4. F
- Complete the exercise correctly. S



Using Graphs to Show Changes

8

1 The line graph on the right shows changes in the temperatures in Tokyo and Sydney in a year.







1 In which month(s) is the temperature in Tokyo higher than that in Sydney? August

2 In which city is the change in temperature larger? Tokyo

19

2 Shown below is a rectangle with a length of 4 cm. See how the area changes as the width of the rectangle increases.




| Length of width (cm) | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| Area of rectangle ($cm^2$) | 4 | 8 | | | | |

1 Each time the width of the rectangle increases by 1 cm, by how many $cm^2$ does the area increase? $4\ cm^2$

2 When the area of the rectangle is 36 $cm^2$, how many cm is the width? $36 \div 4 = 8$ cm

The Secret of the Calendar

On the calendar, choose a group of any 9 numbers as shown on the right and calculate the sum of those numbers. Now try another location. Do you find the secret? Do other locations on the calendar have the same secret?



| Sun | Mon | Tue | Wed | Thu | Fri | Sat |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | | 26 | 27 |
| 28 | 29 | 30 | 31 | | | |

□ × □ = 225

# Lesson Flow

## 1 Using Graphs to show changes

T Introduce task 1.
S Read and understand the situation given.
T 1 In which month is the temperature in Tokyo higher than that in Sydney?
S In the month of August.
T 2 In which city is the change in temperature larger?
S Tokyo

## 2 Using Table to show changes

T Introduce task 2.
S Read and understand the situation given.
T Each time the length of the rectangle increases by 1 cm, by how many $cm^2$ does the area increase?
S 4 $cm^2$
T When the area of the rectangle is 36 $cm^2$, how many cm is the width?
S $36 \div 4 = 8$ cm

## 3 The Secret of the Calendar

T Let the students work on the secret in the calender.
TN Guide the students carefully with the instructions given in the textbook.

# Sample Blackboard Plan (Lesson 143)

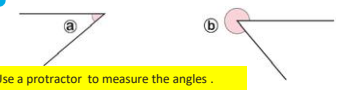
Date: Chapter 20: Summary of Gr 3 Topic: Summary of Grade 3 Lesson Number: 3 out of 4

**Main Task:** Let's think about how to calculate and solve.

MT: Introduce main task here.

Measurement and Shapes

1 Let's find how many degrees do these angles measure.

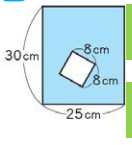



Use a protractor to measure the angles .

2 Let's draw angles of and .

Use a protractor to draw the angles .

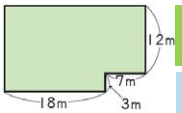
3 Let's find the area of the shaded parts.




L × W
30 ×25 = 750
Ans: 750cm2

S × S
8 × 8 = 16
Ans: 16cm2

Area of shaded part
750 – 16 = 734
Ans:734cm2

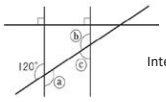



L × W
18 ×12 = 216
Ans: 216cm2

L × W
12 ×7 = 84
Ans: 84cm2

Area of shaded part
216 + 84 = 300
Ans:300cm2

4 Let's find how many degrees are these angles.




opposite angles are the same

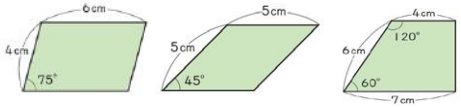
Intersected lines crosses at same angles

Supplementary to angle *b*

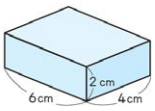
Two lines which are intersected by a line at the same angles are parallel.

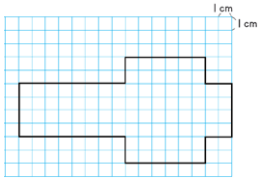
5 Let's draw the following quadrilaterals and explain

1. Parallelogram
2. Rhombus
3. Trapezoid




Let's draw the net of the rectangular prism on the grid.




Exercise

1. Try to complete task 4 on shapes as homework.

# Sample Blackboard Plan (Lesson 144)

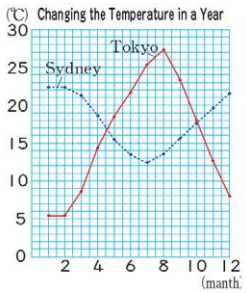
Date: Chapter 20: Summary of Gr 4 Topic: Summary of Grade 4 Lesson Number: 4 out of 4

**Main Task:** Let's review how to arrange and represent data.

MT: Introduce main task here.

Using graphs to show changes

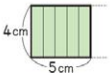
1 The lie graph show changes in temperatures.




1 Let's find which months are the temperatures higher in Tokyo than in Sydney? 5th to the 9th month.

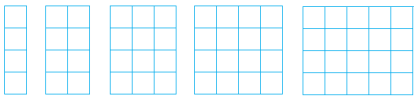
2 Which city is the change in temperature larger? Tokyo

2 Let's investigate how the area changes as the width of the rectangle changes.




| Length of width (cm) | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Area of rectangle ($cm^2$) | 4 | 8 | | | |

1 If the width of the rectangle increases by 1cm, by how many cm2 does the area increase? It increases by 2 times 4m2



When the length of width is □ and its area is ◯, let's write a mathematical sentence by using □ and ◯.

Area of rectangle × Length of width = Size of rectangle

4 × □ = ◯

Let's find the area when the length is 3? The area increases together by 3 times therefore 4×3=12

2 When the area of the rectangle is 36m2, how many cm is the width?

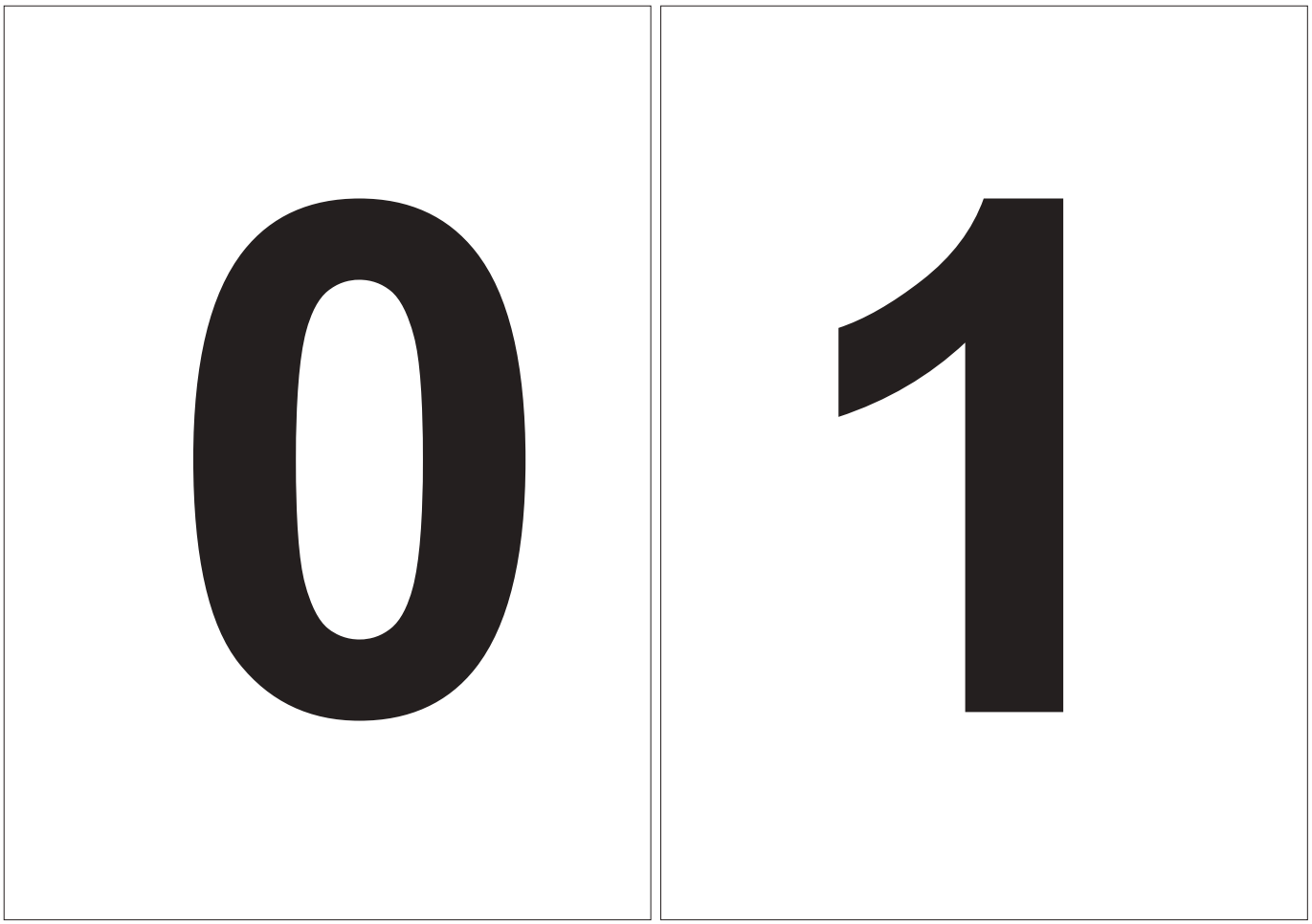
4 × □ = 36

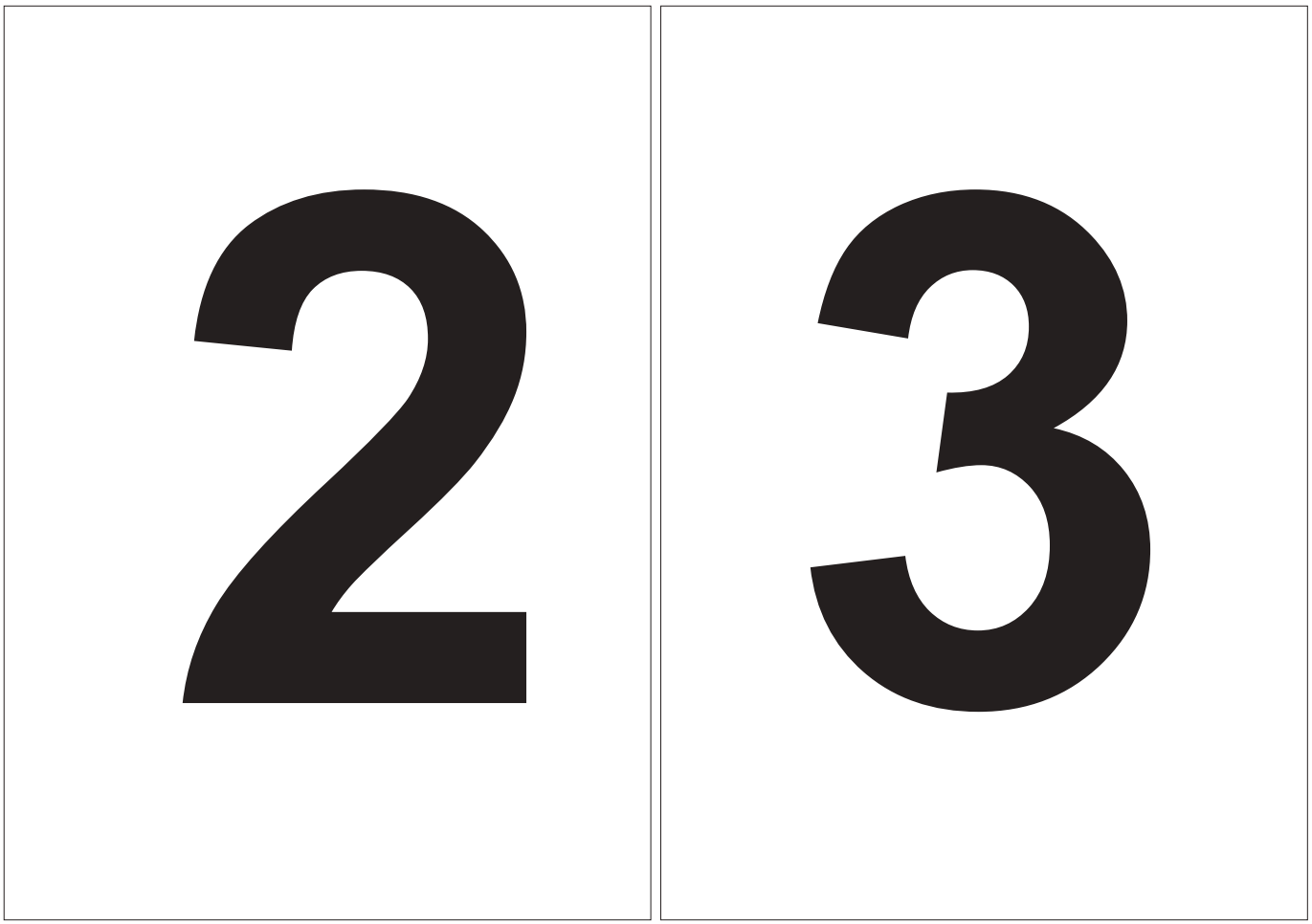
Exercise

Let's think about the multiplication table!

| Multiplier \ Multiplicand | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 2 | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 |
| 3 | 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 |
| 4 | 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 |
| 5 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
| 6 | 6 | 12 | 18 | 24 | 30 | 36 | 42 | 48 | 54 |
| 7 | 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 |
| 8 | 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 |
| 9 | 9 | 18 | 27 | 36 | 45 | 54 | 63 | 72 | 81 |
| 10 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 |
| 11 | 11 | 22 | 33 | 44 | 55 | 66 | 77 | 88 | 99 |
| 12 | 12 | 24 | 36 | 48 | 60 | 72 | 84 | 96 | 108 |

Let's have fun for improving Math skills!
Number cards sample, 0 - 9 (Refer to page XIV)



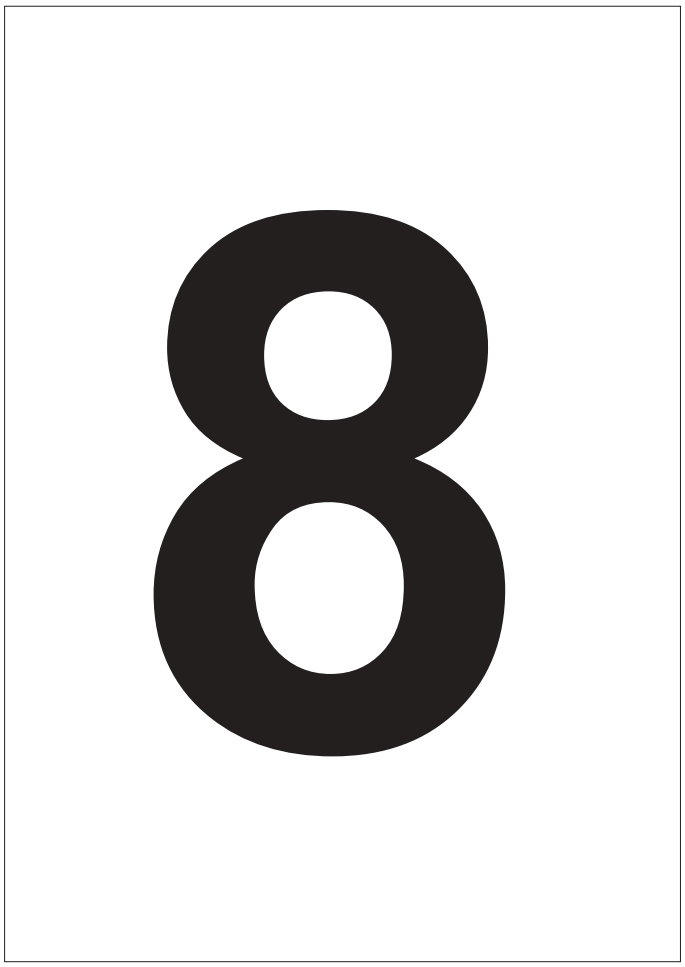



4

5

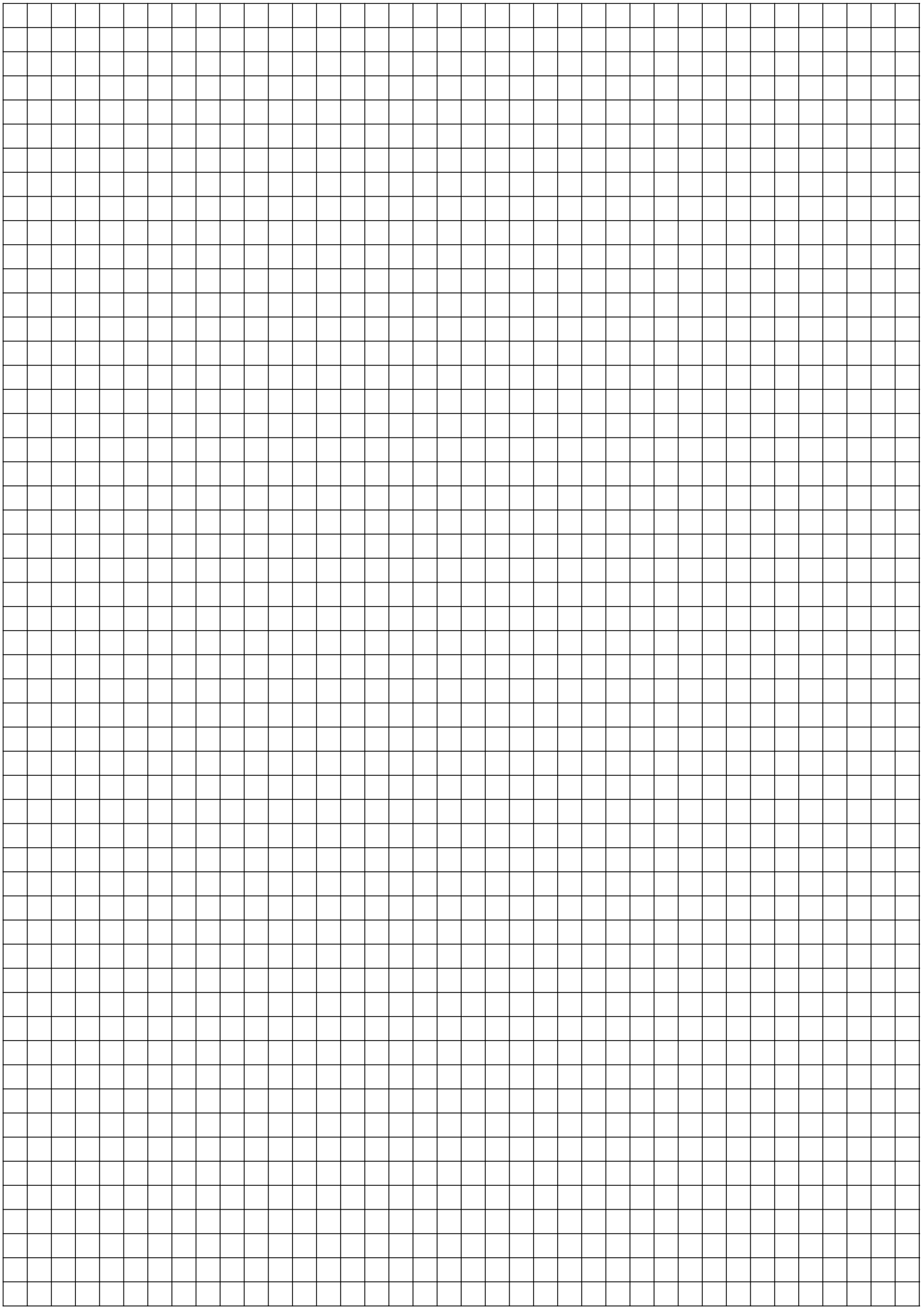
6

7

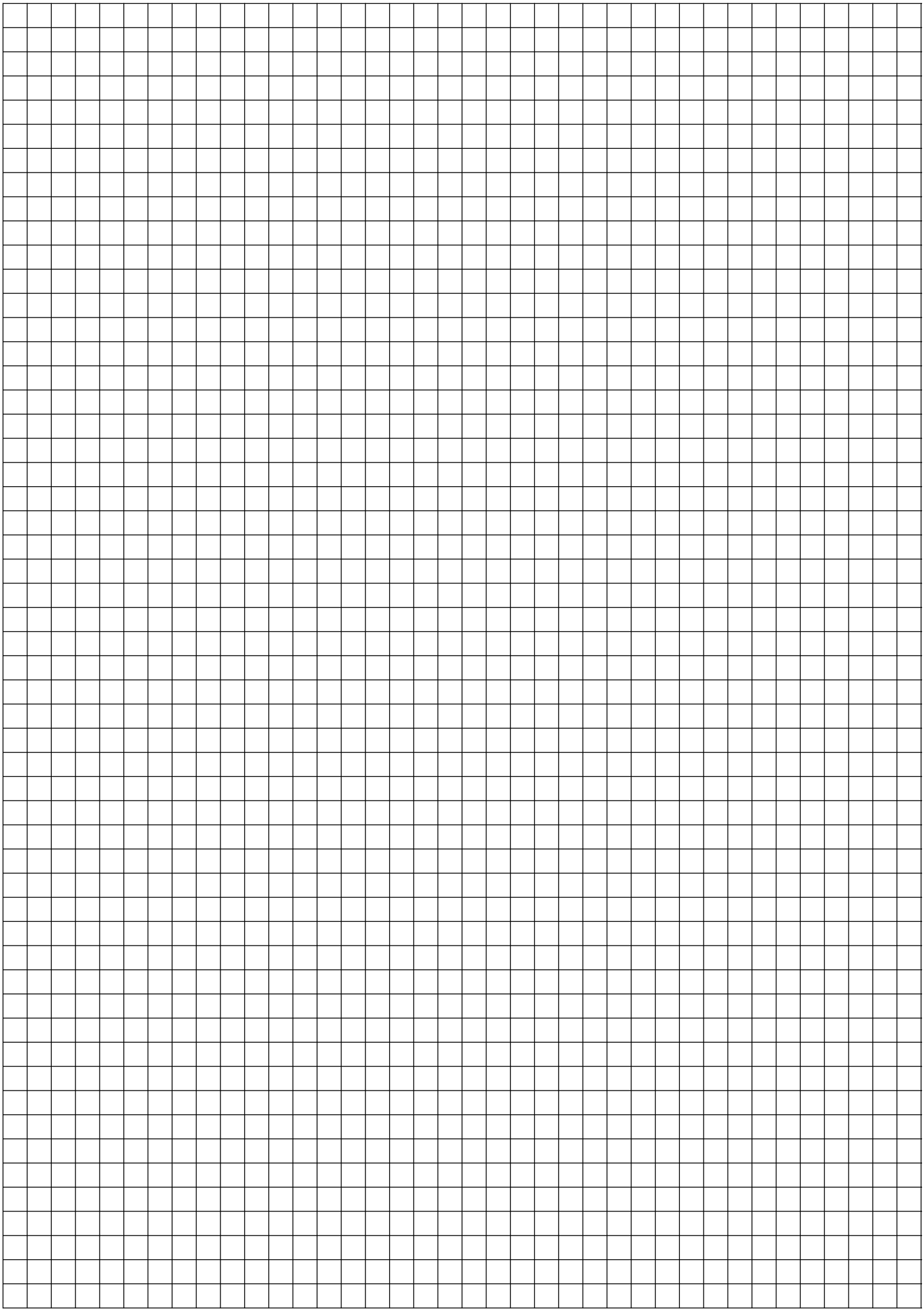

8

9

# 5mm$^2$ grid



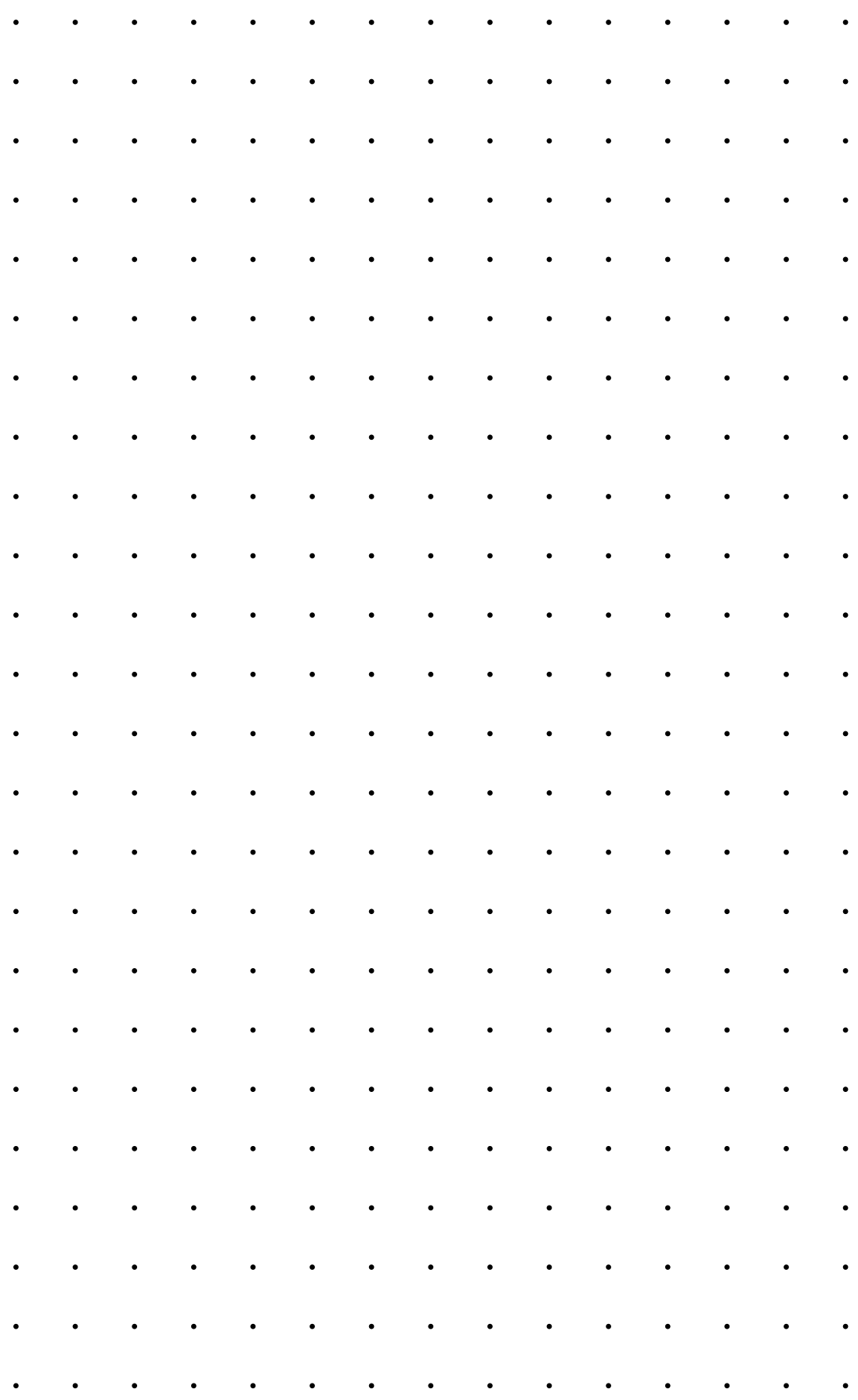
5mm$^2$ grid



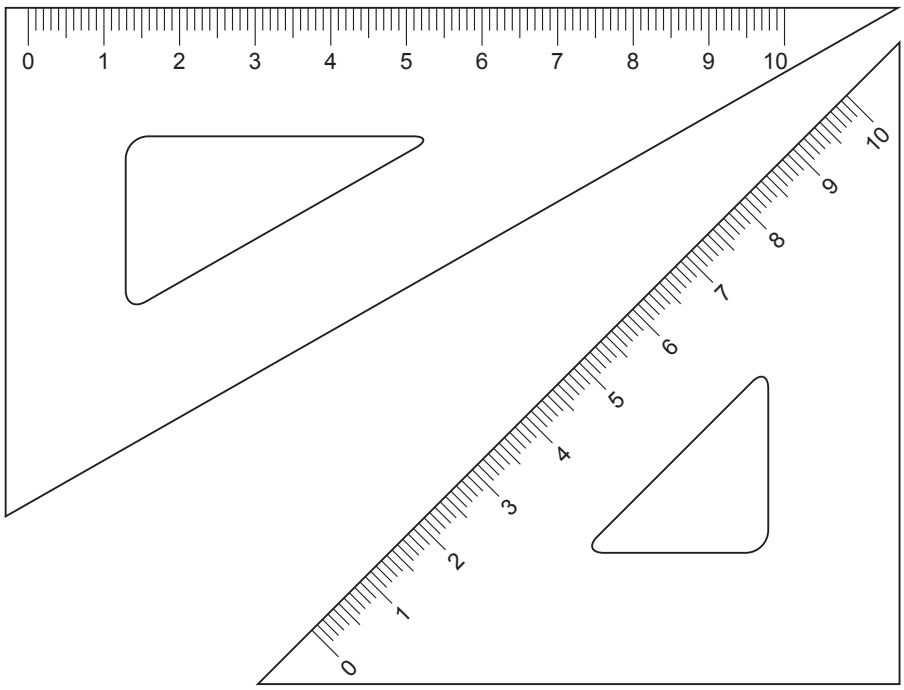
# 1cm$^2$ grid

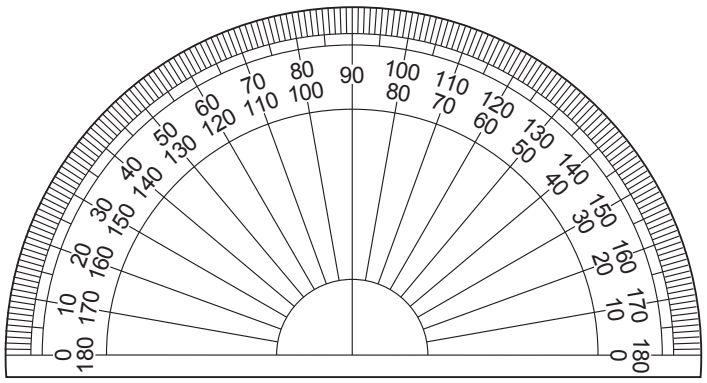
# 1cm$^2$ grid

# 1cm$^2$ dotted grid



# Triangle rulers and protractor



# Structure of learning contents in Mathematics from Elementary Prep to Grade 8
## Number and Operation

### *Elementary Prep - Elementary 2*

**Elementary Prep**

+ Natural numbers up to 120

+ Additions and subtractions of one digit numbers
+ Additions and subtractions of simple 2 digit numbers

**Elementary 1**

+ Natural numbers up to 1000

+ Simple fractions

+ Additions and subtractions of 2 digit numbers
+ Additions and subtractions of simple 3 digit numbers

**Elementary 2**

+ Natural numbers up to 10000

+ Meaning of multiplication
+ Multiplication table.
+ Multiplication of simple 2 digit numbers

### *Grade3 - Grade4*

**Grade 3**

+ Natural numbers less than 100 000
+ Addition and subtraction of natural numbers (with carrying & borrowing)
+ Multiplication of natural numbers
+ Meaning of division
+ Division in the simple case where divisors are 1 digit numbers

+The meaning and the representations of decimal numbers
+ Addition and subtraction of decimal numbers (the tenths place)
+The meaning and the representation of fractions
+ Simple addition and subtraction of fractions with same denominator less than 1

**Grade 4**

+ Natural numbers less than billion
+ Round numbers, round up and round down
+ Division in the case where divisors are 2 digit numbers
+ Acquisition and utilization of 4 operations of natural numbers

+ Addition and subtraction of decimal numbers (the tenths and the hundredths places)
+ Multiplication and division of decimals by whole numbers
+ Addition and subtraction of fractions with same denominators(proper fraction, mixed numbers)

### *Grade5 - Grade6*

**Grade 5**

+ Even and odd numbers, prime numbers,multiples and divisors
+ Numeration system for decimals, fraction and whole numbers

+ Multiplications and divisions by decimals (tenths and hundredths place, etc)
+ Addition and subtraction of fractions with different denominators

**Grade 6**

+ Multiplication and division of fractions
+ Calculations that involve both fractions and decimals
+ Consolidation and utilization of the 4 basic operations of decimals and

### *Grade7 - Grade 8*

**Grade 7**

Positive numbers, negative numbers
+ Necessity and meaning of positive and negative numbers (set of numbers and the 4 fundamental operations)
+ Four basic operations with positive and negative numbers

Algebraic expressions using letters
+ Necessity and meaning of using letters
+ How to express multiplication and division
+ Addition and subtraction with linear expressions
+ Representing with algebraic expressions with letters (representations in inequality)

Linear equations with one unknown
+ Meaning of equations and their solutions
+ Property of equality and how to solve equations
+ Solving and using linear equations (proportional expressions)

**Grade 8**

Calculations of 4 basic operations with expressions using letters
+ Calculations of addition and subtractions with simple polynomials, as well as multiplication and division with monomials

Simultaneous linear equations with two unknowns
+ Necessity and meaning of simultaneous linear equations with two unknowns and the meaning of their solutions
+ Meaning of simultaneous equations and their solutions
+ Solving simultaneous equations and applying them

# Quantities and Measurements

## Elementary Prep - Elementary 2

### Elementary Prep

+ Comparing amount of length, area, volume (arbritrary)

+ Telling clock times ( O'clocks)

### Elementary 1

+Unit of length (cm, mm, m)

+ Reading times

### Elementary 2

+Unit of volume(L, dL, mL)

+Unit of time (day, hour, minute, second)

## Grade3 - Grade4

### Grade 3

+Unit of length (km)
+Unit of weight (g, kg, t)

+Calculations with time

### Grade 4

+Unit of area (square cm, square m, square km, a, ha)
+Finding area of rectangle and square
+Unit of angle (degree)

## Grade5 - Grade6

### Grade 5

+Area of triangles, rectangles, parallelograms, trapeziums and rhombi
+Unit of volume (cubic cm, cubic m, mL, kL)
+Volume of cuboids and cubes

+Mean of measurements
+Per unit quantity

### Grade 6

+Area of approximate shape
+Area of a circle
+Volume of prisms

+Metric system

+Speed

## Grade7 - Grade 8

### Grade 7

+Volume cylinders

# Geometrical figure

## Elementary Prep - Elementary 2

### ELementary Prep

+Observing and composing the shapes of planer figures and solid figures

### Elementary 1

+Triangles, quadrilaterals, rectangles, squares, right triangles

+shape of a box

### Elementary 2

+Circle, sphere

## Grade3 - Grade4

### Grade 3

+Isosceles triangle, equilateral triangle
+Angle

### Grade 4

+Perpendicular and parallel
+Parallelogram, rhombus, trapezium

+Cube, cuboid

## Grade5 - Grade6

### Grade 5

+Polygons and regular polygons,(irregular polygons)
+Congruence of triangles and quadrilaterals
+Circular constant

+Prisms, cylinders, sketches, nets

### Grade 6

+Line symmetry, point symmetry
+Enlarged and reduced figures

## Grade7 - Grade 8

### Grade 7

**Plane figures**
+Fundamental methods for constructing of figures and their applications
+Moving figures (parallel translation, symmetric transformation, rotation)

**Space figures**
+Positional relationship between straight lines and planes
+Structure of space figures and their representation on the plane (sketches, nets, projection drawings)
+Length of arc of a sector and area of the sector
+Surface area and volume of prisms, cones and spheres

### Grade 8

**Basic plane figures and properties of parallel lines**
#Properties of parallel lines and angles
#Properties of angles of polygons

**Congruence of plane figures**
+Congruence of plane figures and conditions of congruence of triangles
+Necessity, meaning and methods of proof
+Basic properties of triangles and parallelograms

# Mathematical relations

## Elementary Prep - Elementary 2

### Elementary Prep

+Representing the number of objects using pictures and figures

### Elementary 1

+Relationship between addition and subtraction

+Basic table and graphs

### Elementary 2

+Representing situations where multiplication is used

+Tables and bar graphs in pictorial /symbols

## Grade3 - Grade4

### Grade 3

+Representing the situations where divisions are used by using algebraic expressions
+Making connections between algebraic expressions and diagrams. Algebraic expressions that use empty boxes

+Tables and graphs(Bar +Columus) in numerical representation

### Grade 4

+Algebraic expressions that contain some of the 4 basic operations and
expressions with brackets and formulas.
+Expressions with empty boxes and empty triangles

+Relationship between two numbers/quantities as they vary simultaneously

+Points, broken line graphs

## Grade5 - Grade6

### Grade 5

+ Simple proportional relations
+Relations of two quantities that are expressed by simple algebraic relations

+Percentage, pie charts

### Grade 6

+Algebraic expressions using letters such as x or a

+Proportional relationship

+Proportion and inverse proportion

+The Average of data, frequency distribution, histgram

## Grade7 - Grade 8

### Grade 7

Direct proportion and Inverse proportion
+Meaning of functional relationship
+Application of direct proportion and inverse proportion
Dispersion of data and representative value of data
+ Necessity and meaning of histogram and representative values
+ Applying histogram and representative values

### Grade 8

Linear functions
+ Phenomena and linear functions
+ Tables, algebraic expressions and graphs of linear functions
+ Linear equations with two unknowns and functions
+ Using linear functions

Probability
+ Necessary and meaning of probability and finding the probability

# Mathematics Grade 4 Teacher's Manual Development Committee

The Mathematics Teacher's Manual was developed by Curriculum Development Division (CDD), Department of Education in partnership with Japan International Cooperation Agency (JICA) through the Project for Improving the Quality of Mathematics and Science Education (QUIS-ME Project). The following stakeholders have contributed to manage, write, validate and make quality assurance for developing quality Textbook and Teacher's Manual for students and teachers of Papua New Guinea.

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