Mathematics

Teacher's Manual

Grade 4

Papua New Guinea
Department of Education

From
the People of Japan

JICA

QUIS-ME
We love Mathe and Science !
Department of Education & JICA

Issued free to schools by the Department of Education

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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.

A special acknowledgement is given to the People and the Government of Japan for the partnership and support in funding and expertise through Japan International Cooperation Agency (JICA) - QUIS-ME Project with Curriculum Development Division (CDD).

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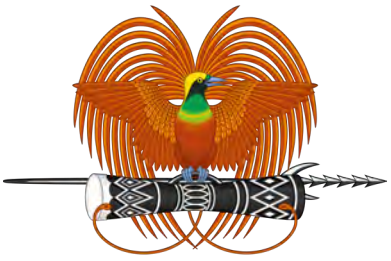

Papua New Guinea
Department of Education

From the People of Japan

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Teacher's Manual Mathematics Grade 4

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.

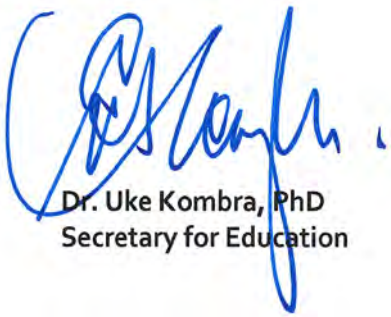
The Teacher's Manual is designed to achieve the implemented curriculum of the content standards outlined in the syllabus. It provides suitable teaching and learning content and concepts for the primary school teachers to promote and maintain standard lessons for daily, termly and yearly teaching and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

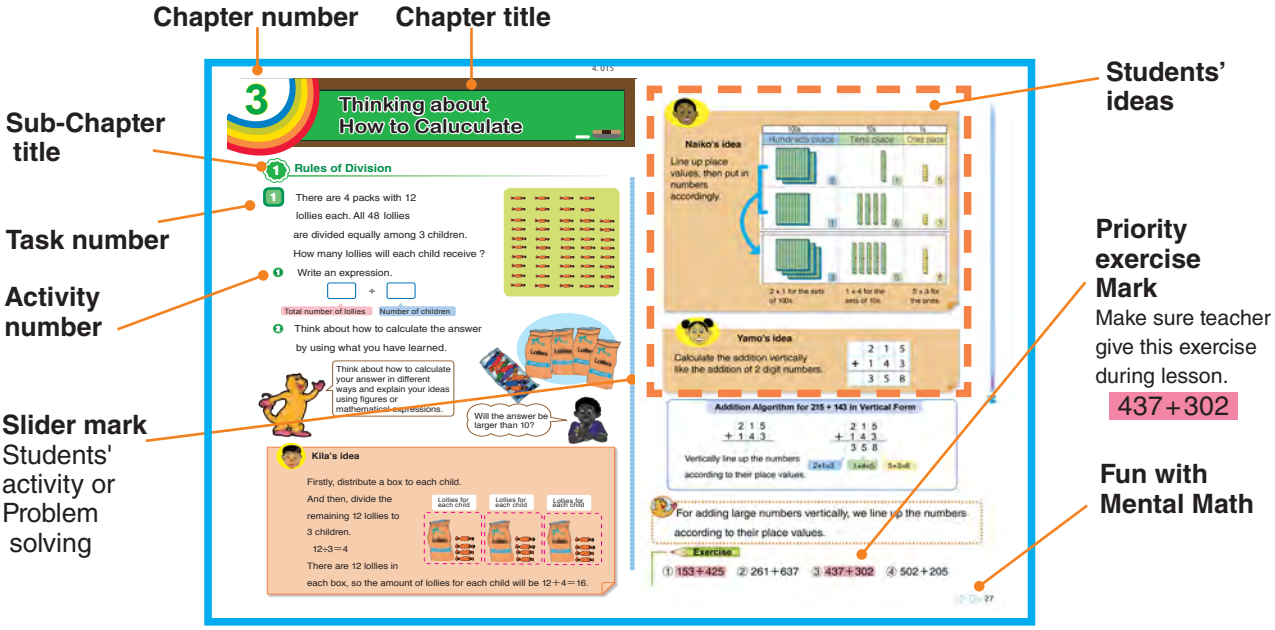
Some chapters have Ice breaking activity as the lead up activity for chapter.

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"

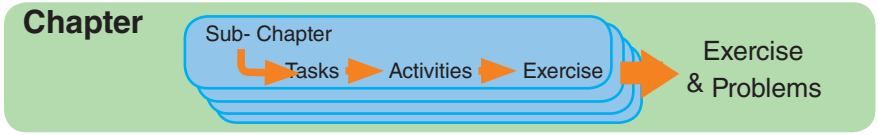
Experimental mathematical activities such as "measure", "compare", "divide", "order", "touch", "pile up" and "throw" are contained in all grades. It is intended to develop the ability and skills to be able to solve various problems logically in daily life by considering many ways.

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

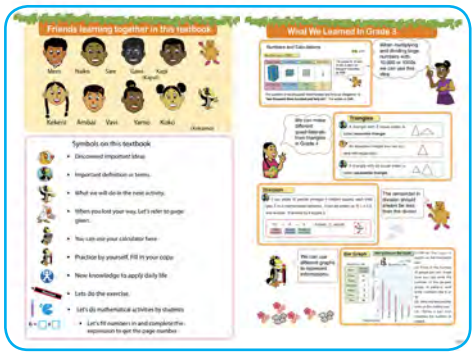
The structure in the Chapter consists of several Sub-Chapters, Tasks, Activities, Exercises and ends with a set of Exercise and Problems.

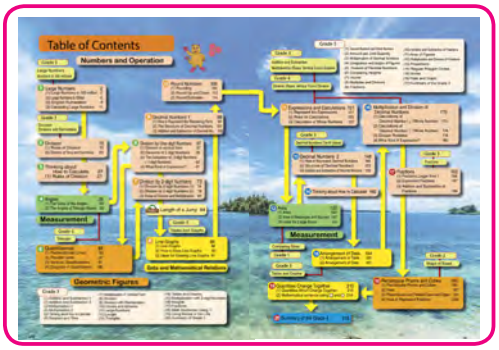


Parts of the Textbook

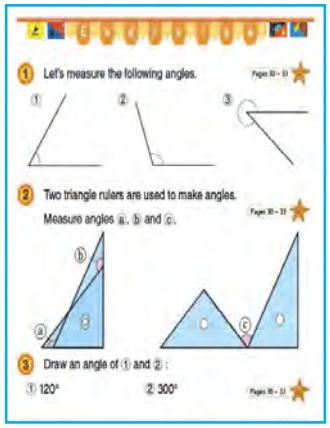
Textbook Introduction Page

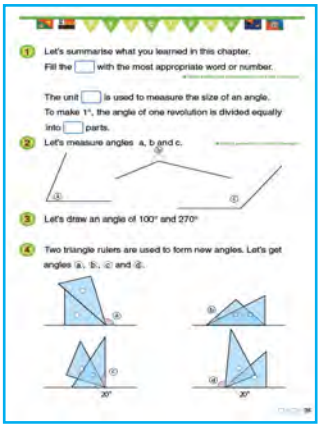
The introduction page consist of two pages which introduces very important information and icons allowing students and teachers to be familiar with what is expected to be encountered in the textbook. It also has chapters learned from previous grade outlined carefully and a table of contents. It promotes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





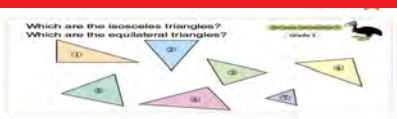
Exercise & Problems





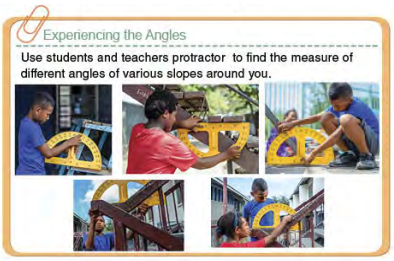
At the end of each chapter, Exercises are set for students to consolidate what has been learnt in a particular chapter. Page numbers indicating specific content found for each exercise is tagged beside each exercise. The Problems are placed after each exercise in each chapter. The problems are more advanced 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.

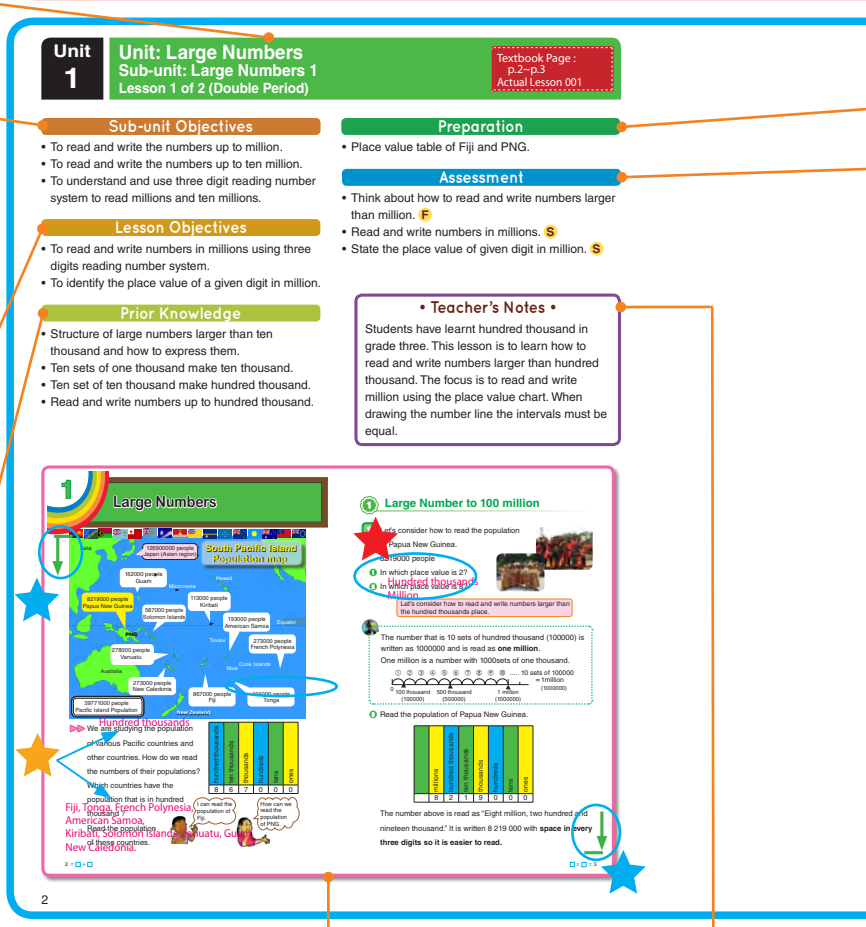
Lesson objective

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


Unit 1
Unit: Large Numbers
Sub-unit: Large Numbers 1
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 learnt 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.
1 Large Numbers
South Pacific Island Population map
Hundred thousands
Large Number to 100 million
Hundred thousands
Million
2

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

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.

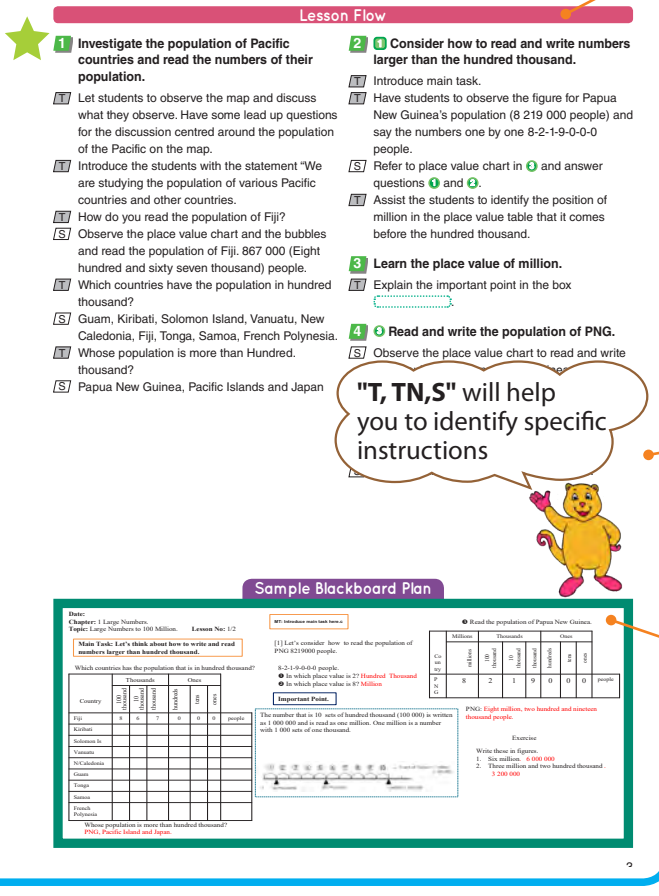
T : What the teacher should do and say during the lesson.

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.

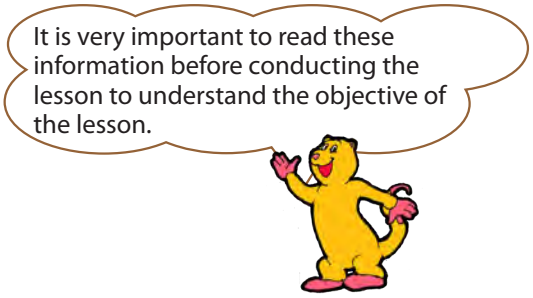


Blackboard Plan

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.



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

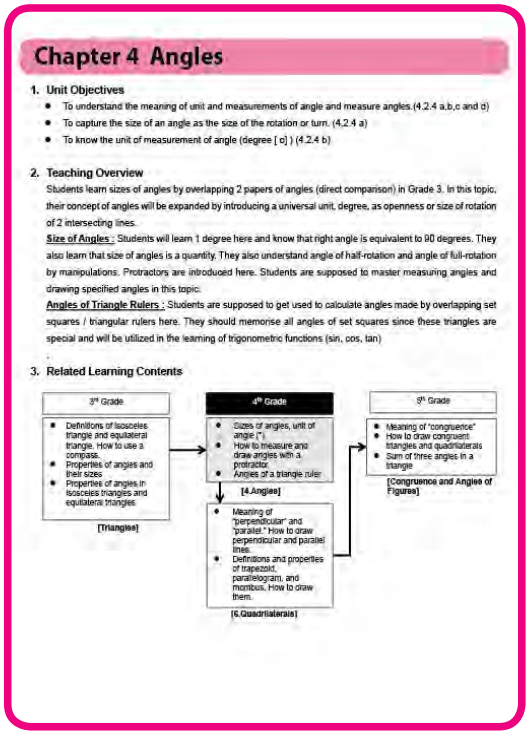
Outlines the key ASK-MT that students are expected to learn or acquire at the end of each unit. There may be one or more unit objectives for each unit depending on the unit capacity and content.

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

3rd Grade
- Definitions of isosceles triangle and equilateral triangle. How to use a compass.
- Properties of angles and their sizes
- Properties of angles in isosceles triangles and equilateral triangles

[Triangles]

4th Grade
- Sizes of angles, unit of angle (°)
- How to measure and draw angles with a protractor.
- Angles of a triangle ruler.

[4.Angles]

- Meaning of "perpendicular" and "parallel." How to draw perpendicular and parallel lines.
- Definitions and properties of trapezoid, parallelogram, and rhombus. How to draw them.

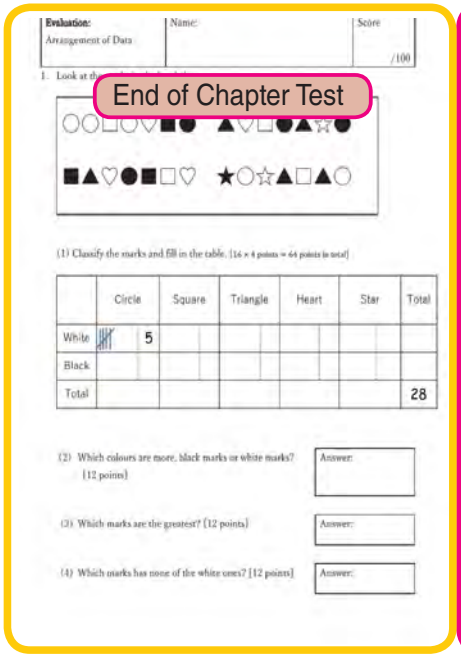
[6.Quadrilaterals]

5th Grade
- Meaning of "congruence"
- How to draw congruent triangles and quadrilaterals
- Sum of three angles in a triangle

[Congruence and Angles of Figures]

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

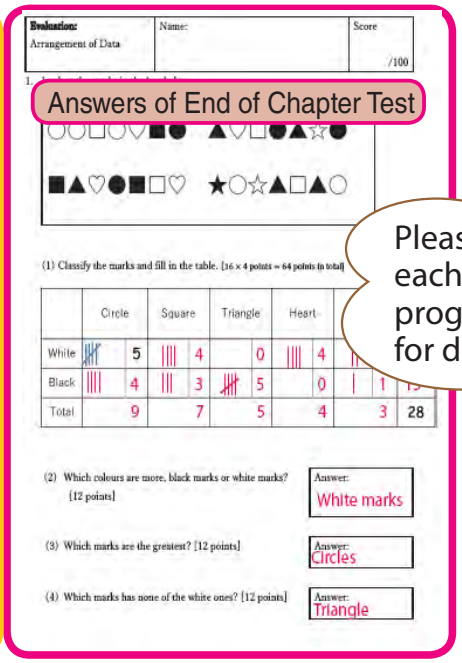
(1) Classify the marks and fill in the table. [16 × 4 points = 64 points in total]

	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]

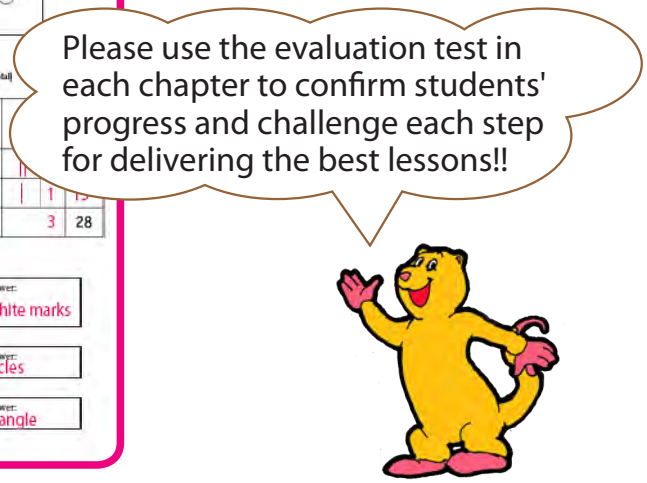
	Circle	Square	Triangle	Heart	
White	5	4	0	4	
Black	4	3	5	0	1
Total	9	7	5	4	3

(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.

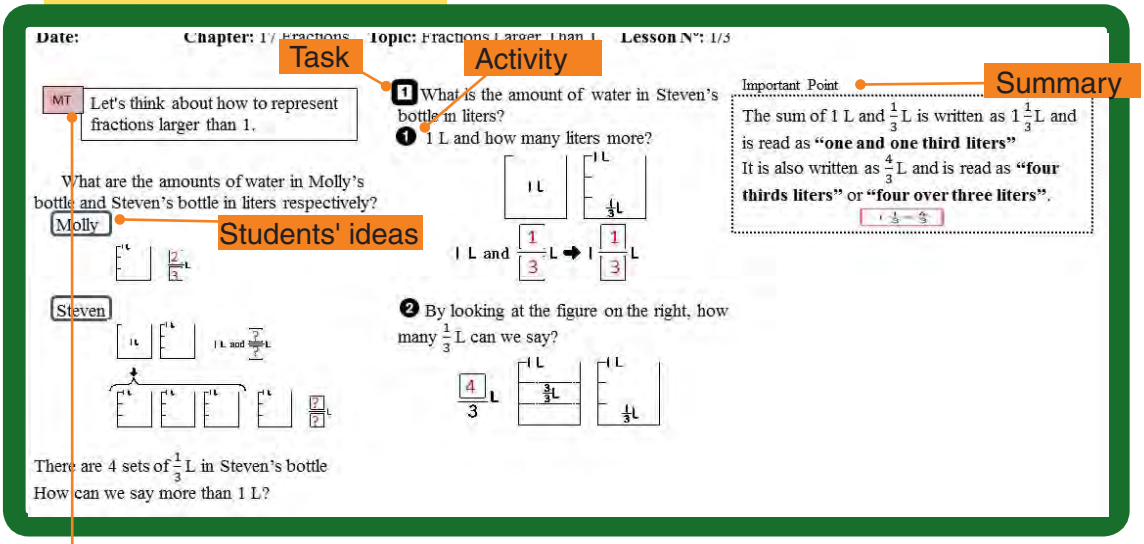
1. Ensure that the whole blackboard is clean.
2. Write Date, Chapter, Topic and lesson number from the top left hand corner to the right.
3. Follow the sequence of the lesson working from left to right according to the blackboard plan including:
   a) Main Task Heading (MT)*
   b) Review(Where necessary)
   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.

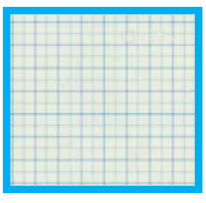
(F) Formative assessment
Formative assessment examples in the TM are:
1. Observation checklists
2. Correction of exercises
3. Analysis of discussions
4. Students' participation.

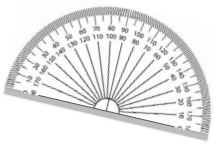
(S) Summative assessment
Summative assessment examples include:
1. Exercise and Problems
2. End of Chapter Test
3. Projects
4. Homework and Assignments.

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

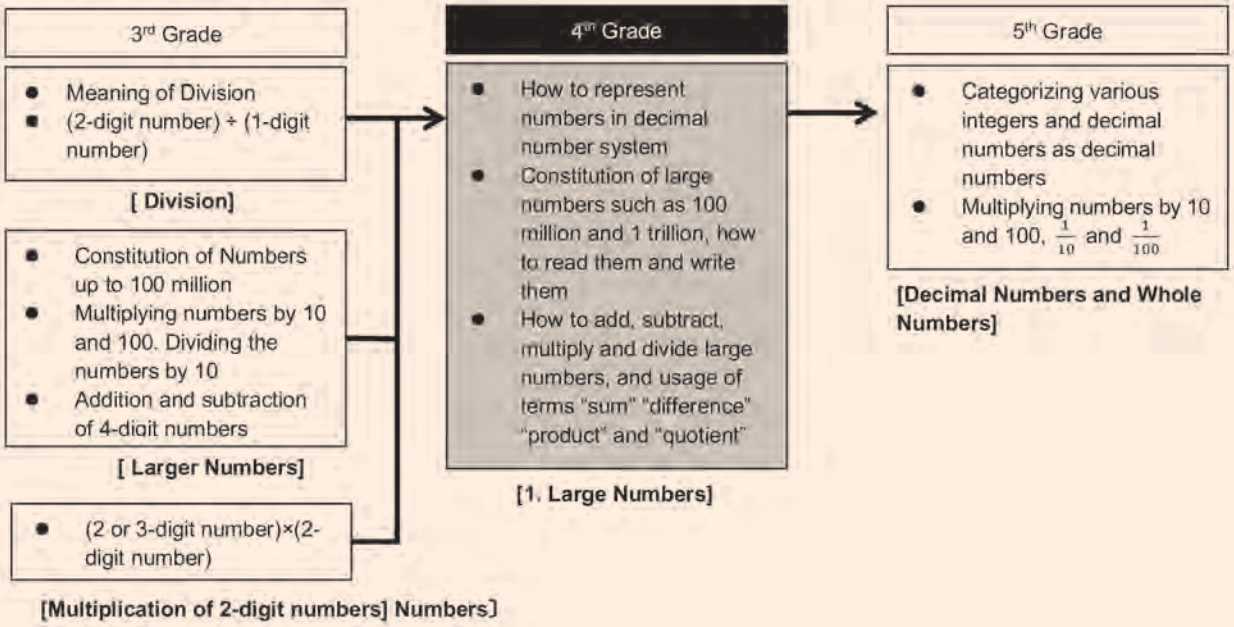
Students consolidate binary notation of base 10 in this unit. Two important things in binary notation is; 1. 10 makes 1 in the next unit/digit, 2. The 1 as the new unit is to be written on the left column. Students will understand any large whole numbers can be expressed in binary notation as the summary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

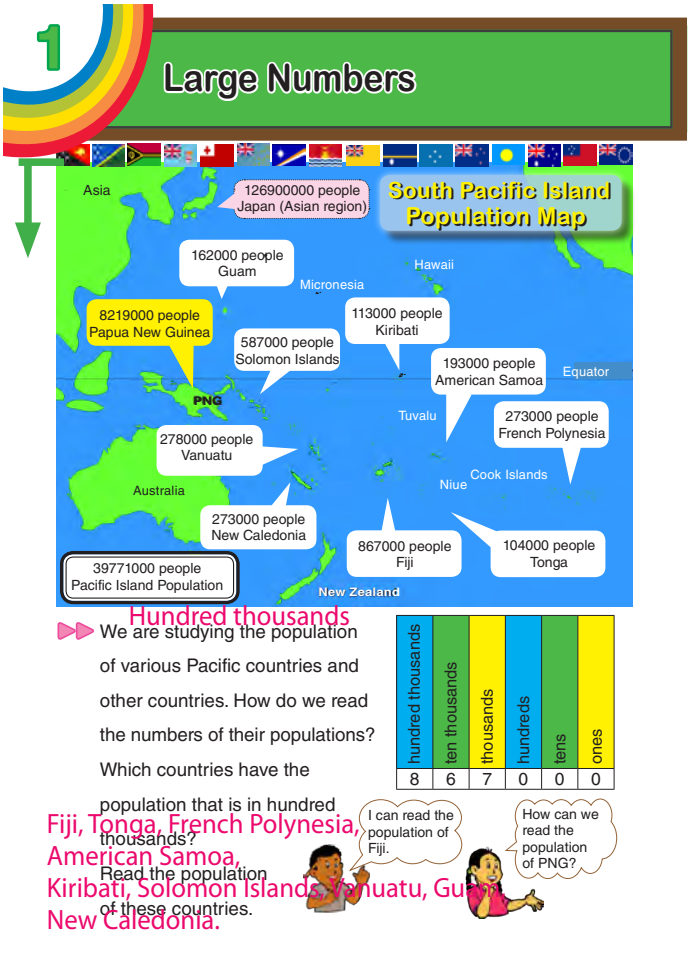
- Place value table of Fiji and PNG

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?

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

Read the population of these countries.

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

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?

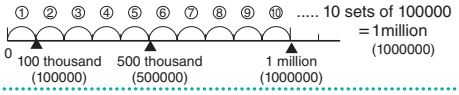
Hundred thousands

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.

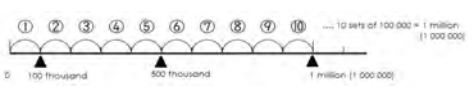
MT: Introduce main task here.c

[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

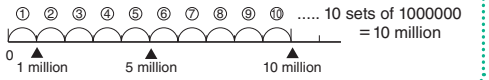
Let's consider how to read and write numbers larger than the millions place.

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.

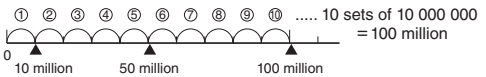
100 sets of 1 million is hundred million.

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	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

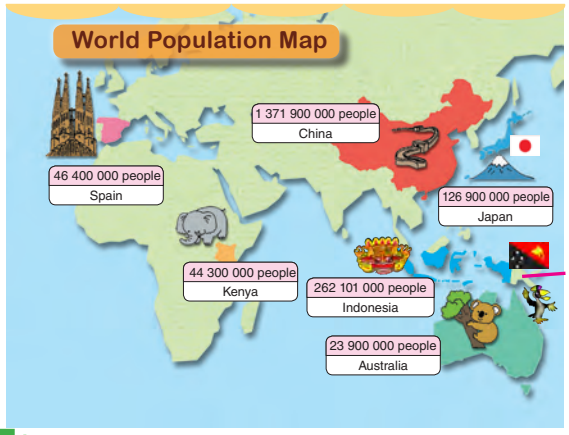
- Place value table and chart

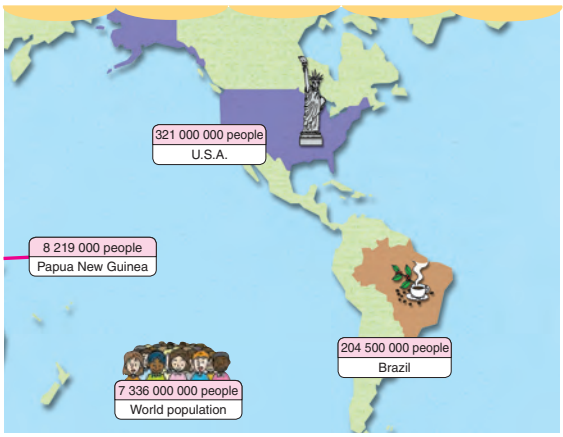
Assessment

- 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.

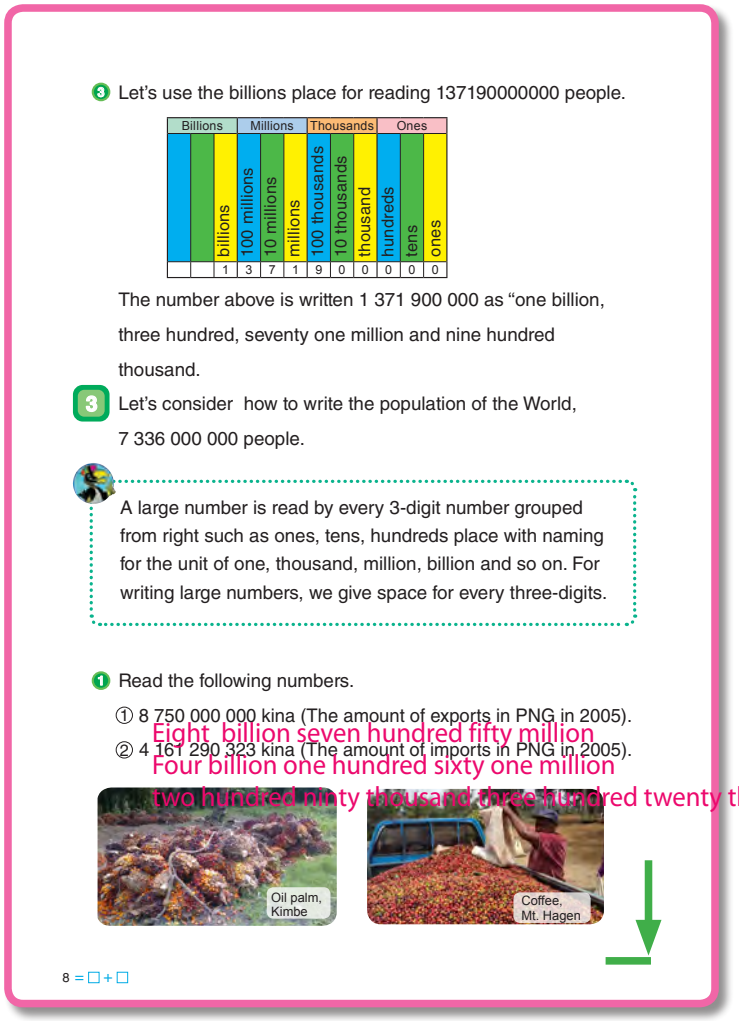
S Write the population of the world 7 336 000 000 people in words.

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.

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

Bicycle

Tripod

Quad Bike

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.

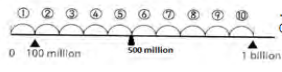
Countries	Billions	Millions			Thousands			Ones			
	Billion	100 million	10 million	million	100 thousand	10 thousand	thousand	hundreds	tens	ones	
PNG				8	2	1	9	0	0	0	people
Australia			2	3	9	0	0	0	0	0	People
Japan		1	2	6	9	0	0	0	0	0	People
Indonesia		2	6	2	1	0	1	0	0	0	People
China	1	3	7	1	9	0	0	0	0	0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

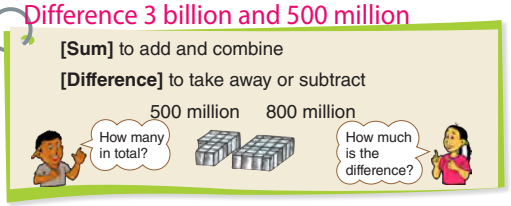
The result of adding numbers is called **sum**. The result of subtracting one number from another is called **difference**.

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



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.

□ × □ = 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.

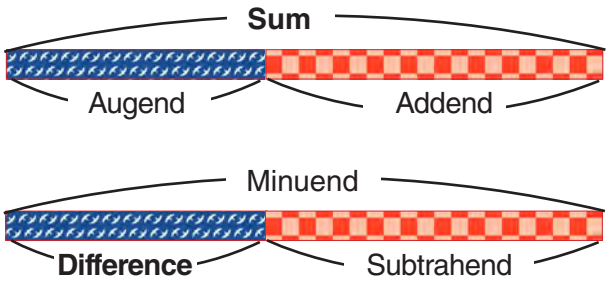
S Solve ① to ④.

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.

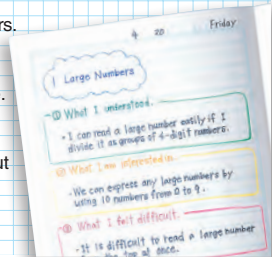
① The number that is 100 times 340 million. 34 000 000 000

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.**

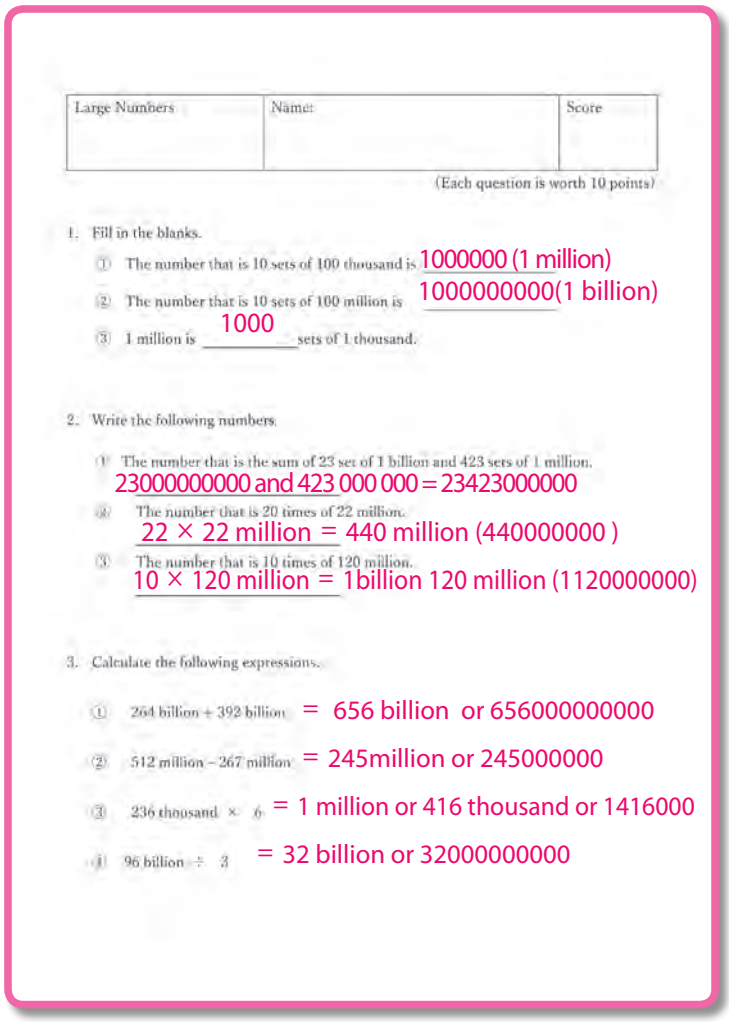
6 ③ **Interpreting the explanations of numbers.**

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)

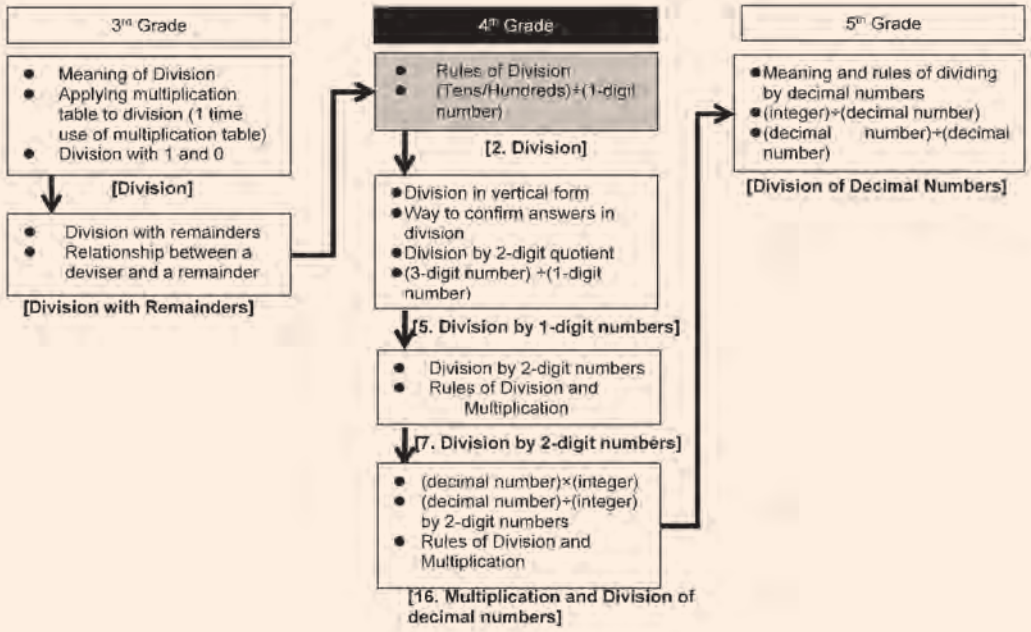
2. Teaching Overview

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

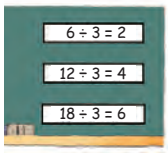
2 Rules of division with the same divisor.

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

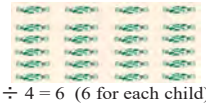
Sample Blackboard Plan

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 × → ÷ 2 → 12÷4=3

12÷3=4 → 2 × → ÷ 2 → 12÷6=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 × → × 2 → 12÷3= 4

18 ÷3= 6 → ÷ 3 → ÷ 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

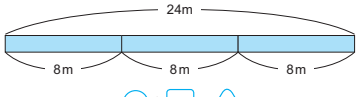
• Teacher's Notes •

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.

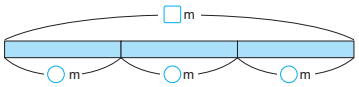
1 There is a 24 m length of tape. If this is cut into parts of 8 m each, how many parts are there?



24 ÷ 8 = 3

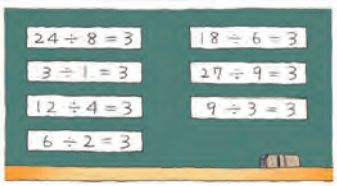
A. 3 parts

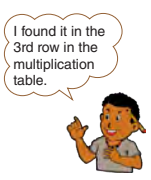
2 Let's write this as a division sentence using the ☐ and the ○. The length can be less than 27 m.



☐ ÷ ○ = 3

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



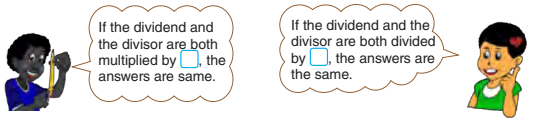


When the quotients are the same, the dividhend is divided by the quotient or the divisor is multiplied by 3.

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.

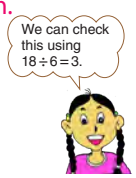
Checking the rules of division.

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.

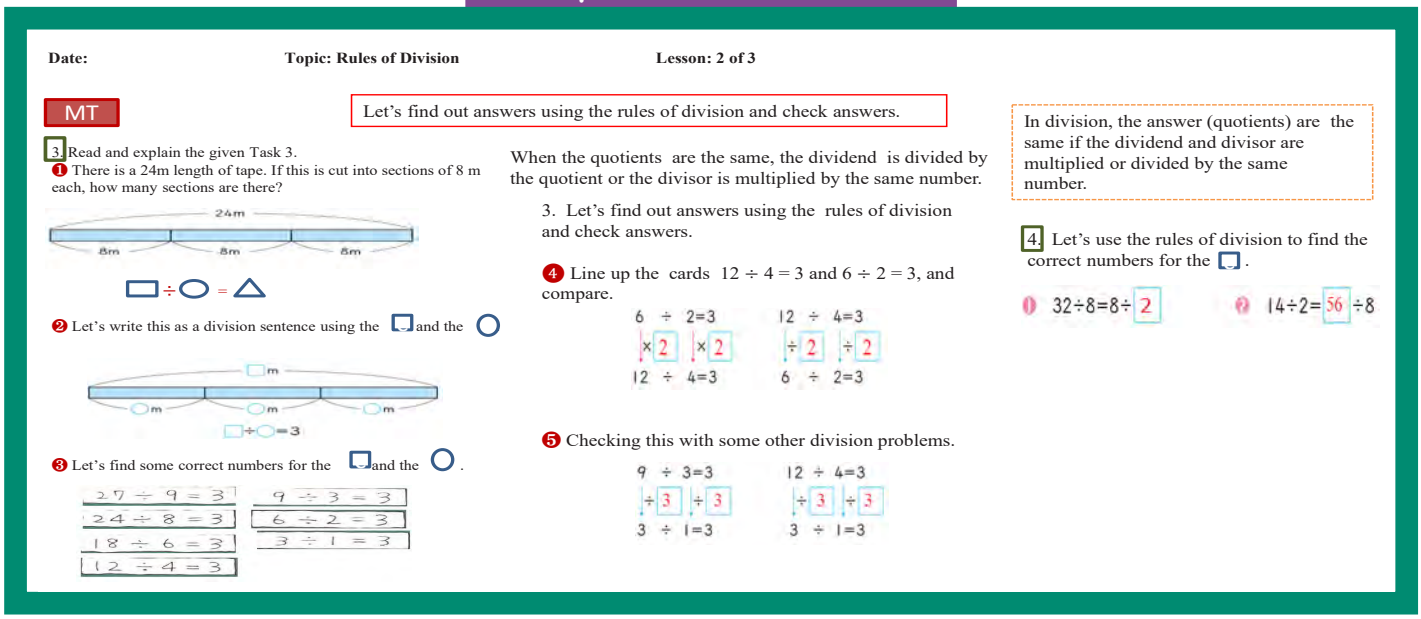
6 Important point.

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 

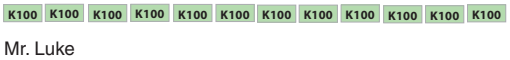
How many times more is Steve's bottle tops compared to Viti? Math expression: 12÷3 Answer : 4 times

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 ❶ 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 ❷ 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

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

MT Let's use the rule of division for cancelling zeros.

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

How many times more bottle tops does Steve has compared to Don?
Mathematical expression: 12 ÷ 3
Answer: 4 times

6. Mr John has 1 200 kina. Mr Luke has 300 kina.
How many times more money does Mr John has compared to Mr Luke.

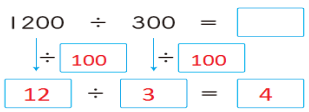
❶ Mr John

(There are 12 notes of hundred kina in 1 200 kina.)
Mr Luke
K100 K100 K100 (Mr Luke has 3 notes of hundred kina in 300 kina.)

Note: Using the example done previously, students group and identify that Mr John has 4 times more hundred kina notes than Mr Luke .

To think about how to calculate problems of division in the case of hundreds where cancelling of zeros is based upon applying the rules of division.

❷ Let's fill the correct numbers in the .



When removing the 0s, we divide by 100, it will help make numbers smaller so calculations are done more easily.

7. How many times is 24 000 kina compared to 4 000 Kina.

Mathematical expression: 24 000 ÷ 4 000
Answer: 6 times

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

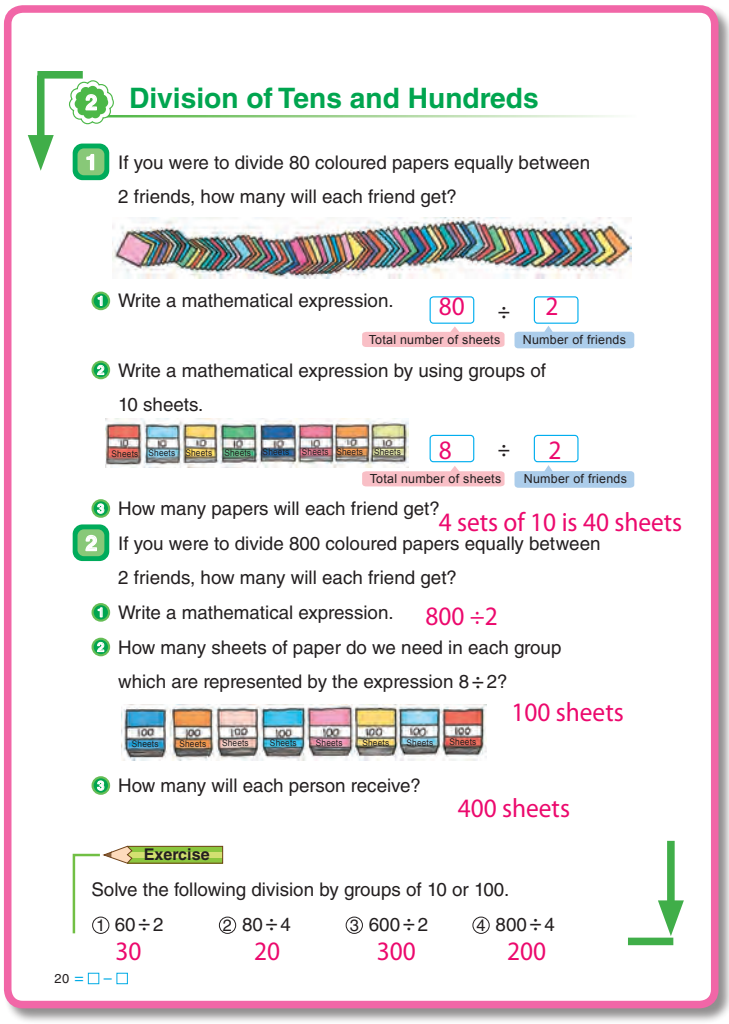
- Prepare according to Blackboard plan

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

② Write a mathematical expression by using groups of 10 sheets. 8 ÷ 2 (Total number of sheets / 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

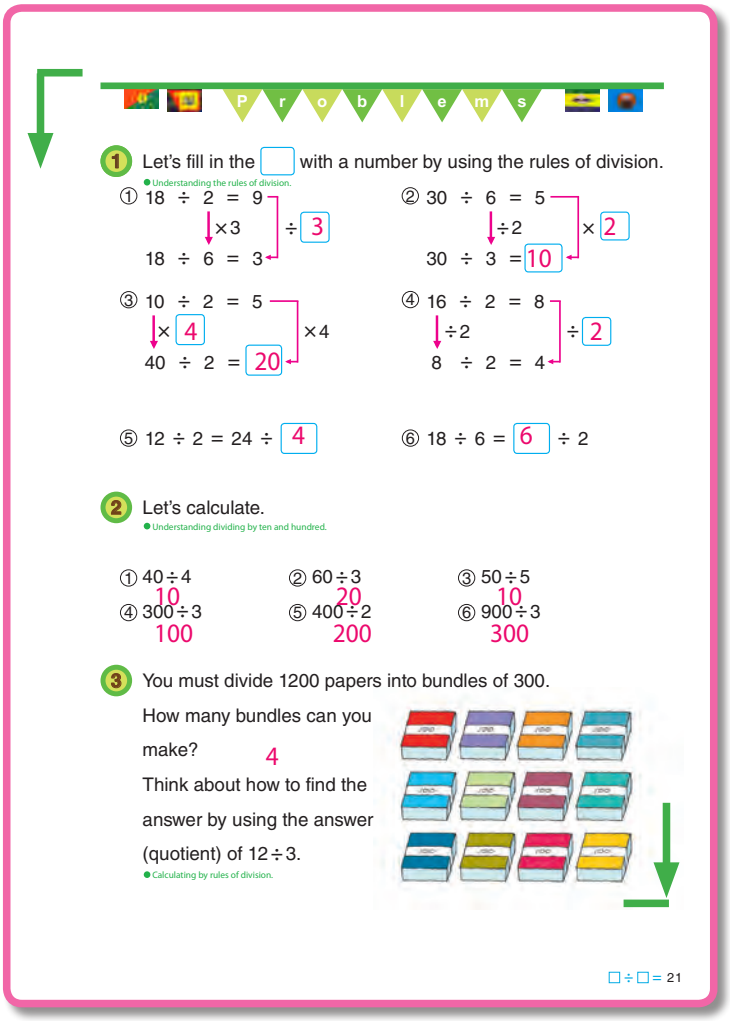
- A4 copy papers, Evaluation sheets

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 → 18 ÷ 6 = 3 → ÷ 3

② 30 ÷ 6 = 5 → ÷2 → 30 ÷ 3 = 10 → × 2

③ 10 ÷ 2 = 5 → × 4 → 40 ÷ 2 = 20 → ×4

④ 16 ÷ 2 = 8 → ÷2 → 8 ÷ 2 = 4 → ÷ 2

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.

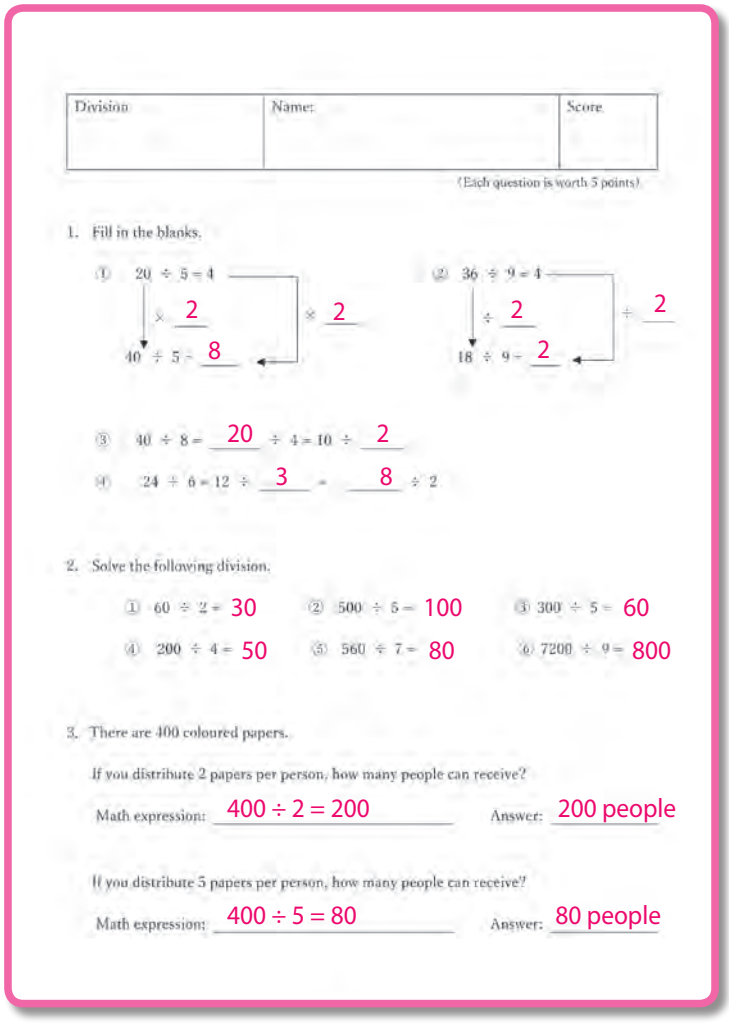
T Check individual work. Is an individual able to understand and apply the rule of division to divide by rules of division and elimination of two zeros when dividing by 100?

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

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 $20 \div 5 = 4$
$\times$ 2 → $\times$ 2
$40 \div 5 =$ 8

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

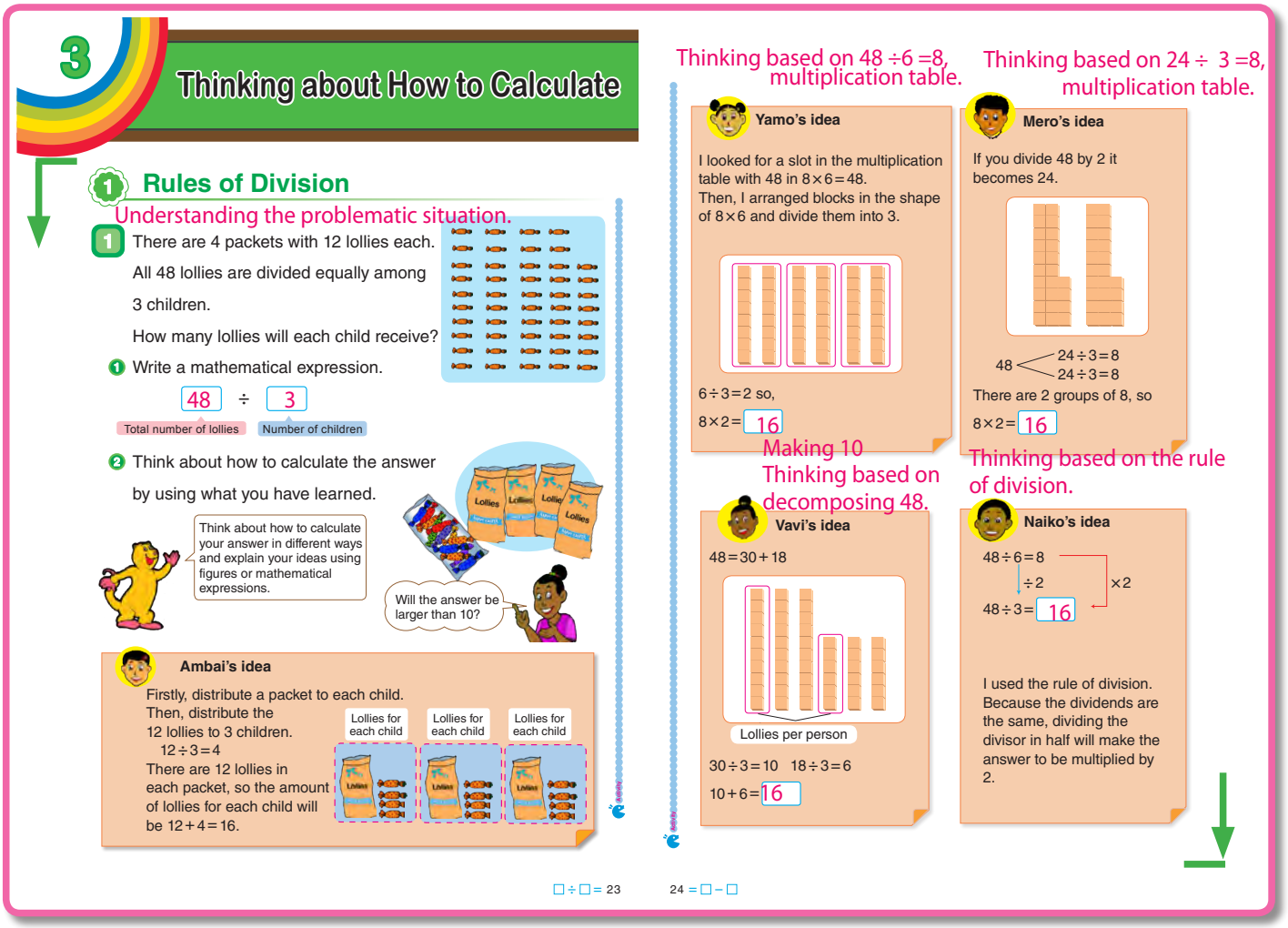
- Pictures of lollies

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 8×6 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.

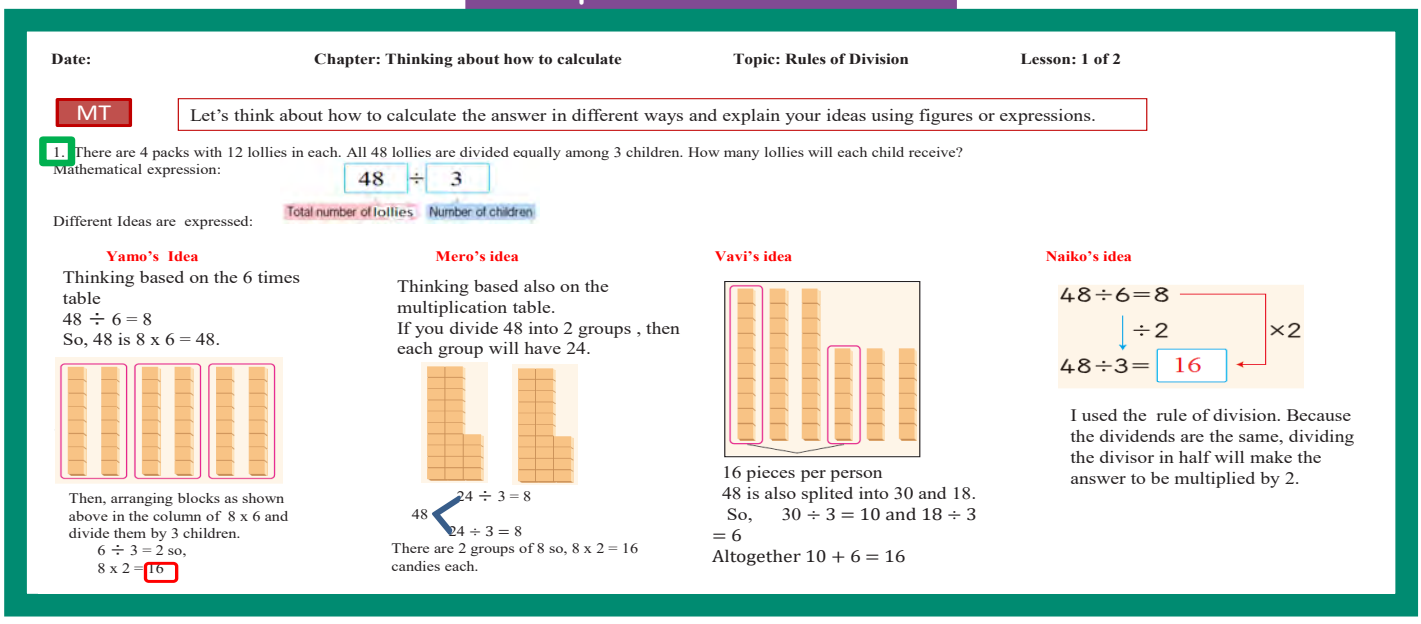
T Naiko's idea was thinking was based on the rule of division for easier calculation of $48 \div 3$.

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 •

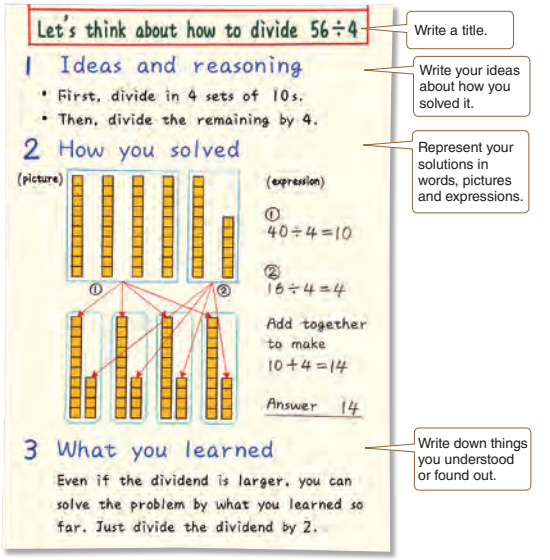
Emphasise to the students to use this format of report writing for an effective presentation in class.

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.

There are many different ways !



Write a title.
Write your ideas about how you solved it.
Represent your solutions in words, pictures and expressions.
Write down things you understood or found out.

□ ÷ □ = 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

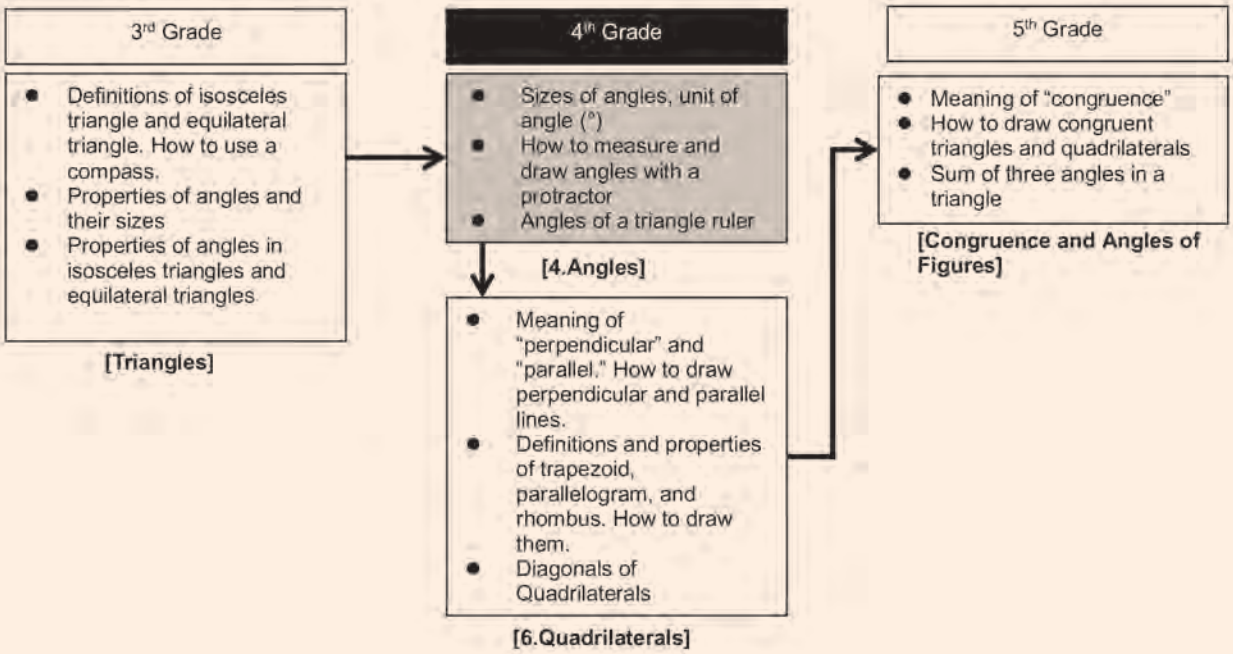
Students learn sizes of angles by overlapping 2 papers of angles (direct comparison) in Grade 3. In this topic, their concept of angles will be expanded by introducing a universal unit, degree, as openness or size of rotation of 2 intersecting lines.

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.

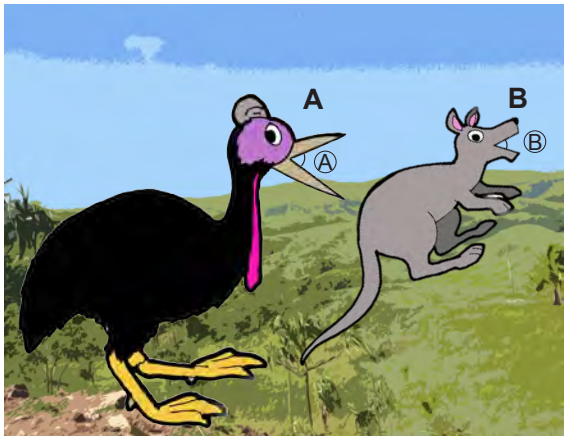
Preparation

- 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

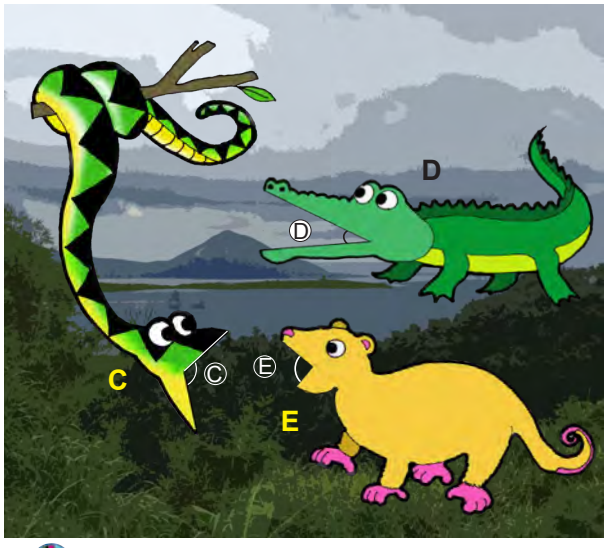
1 Look at the open mouth of the animal from A ~ E.

1 Which animal has opened its mouth the widest? C

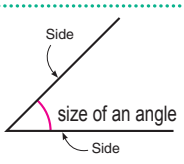
2 Which animal has opened its mouth the narrowest? D

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.

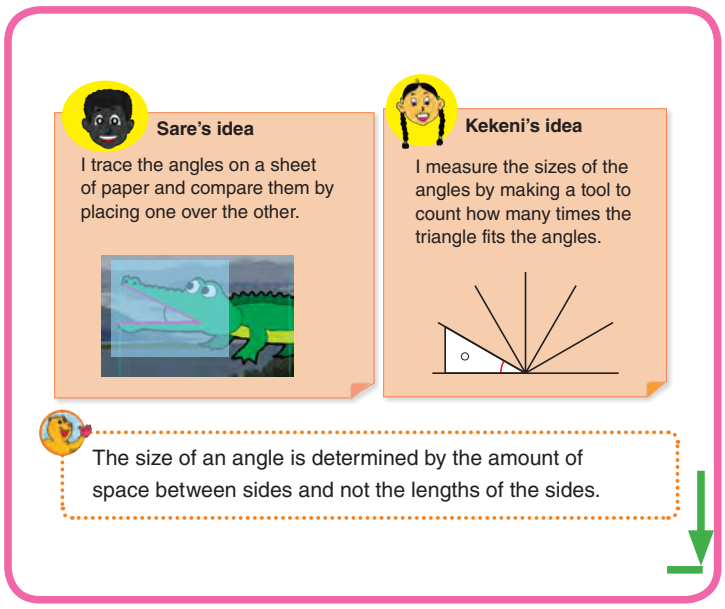
4 Important point.

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)

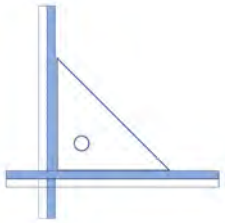
Preparation

- Protractors, Cardboard bars

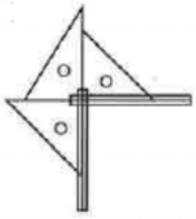
Assessment

- 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

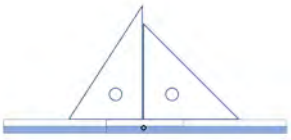
• Teacher's Notes •



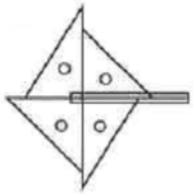
1 Right Angle - 90°



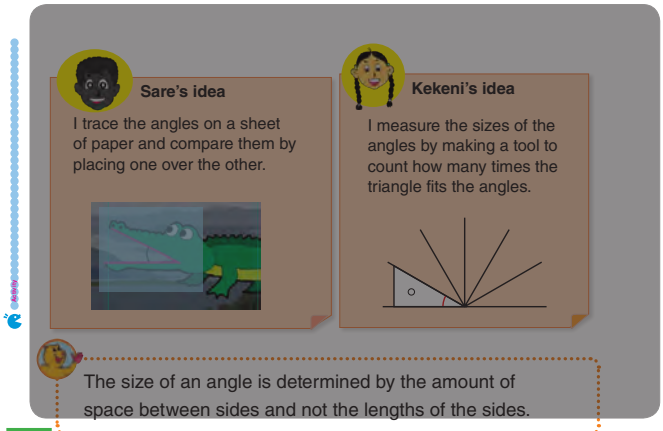
3 right Angles - 270°



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



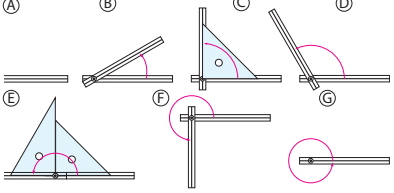
4 Right Angles - Angle of one revolution- 360°



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"**.

28 = □ × □

How to Express the Size of Angles

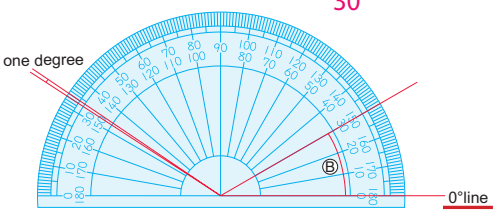
There is a unit to express the size of angles more clearly.

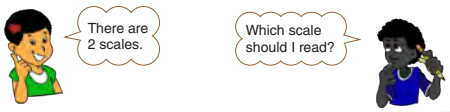
Degree is a unit to express the size of angles. The angle of one revolution is divided into 360 parts. The size of one part is one degree and is written as 1°.

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**.

□ ÷ □ = 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 .

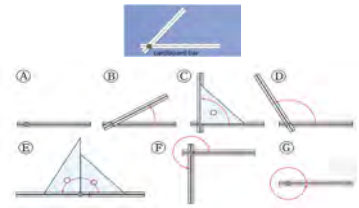
Sample Blackboard Plan

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

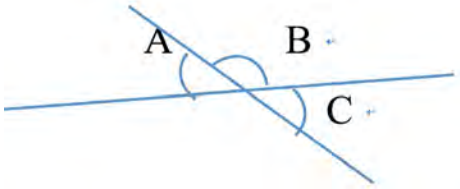
- Protractors

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 •

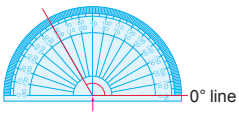
1. Two intersecting lines at 90° create 4 angles where 2 right angles is 180° and 4 right angles is 360°. Therefore;



- 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

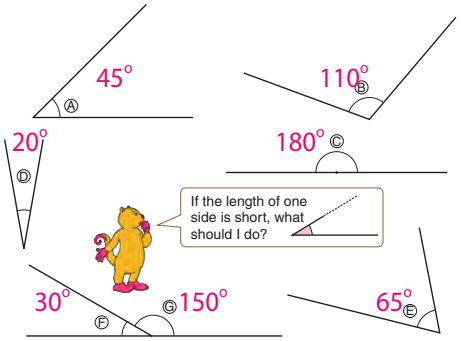
① Put the centre of the protractor over the vertex of the angle.
② Put the 0° line over one side of the angle.
③ Read the scale that is over the other side of the angle.



Vertex of the angle is the centre of the protractor.

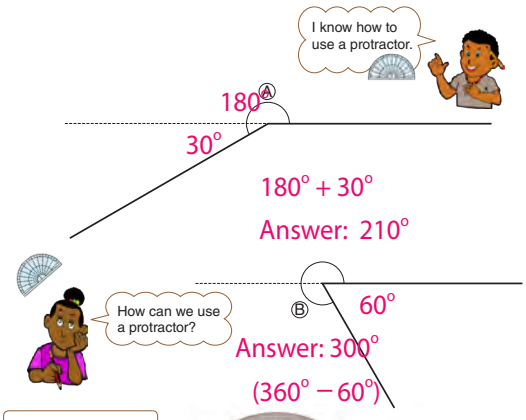
4 Measuring Angles

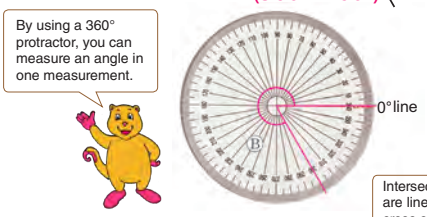
Measure the following angles.



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°.

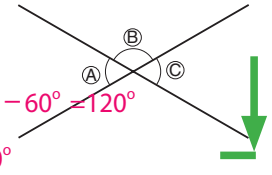




The feature of the angles with 2 lines intersecting

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.

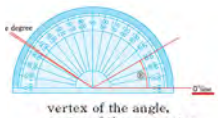
Sample Blackboard Plan

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.

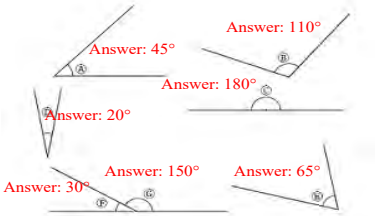
MT: Introduce the main task here.

(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.

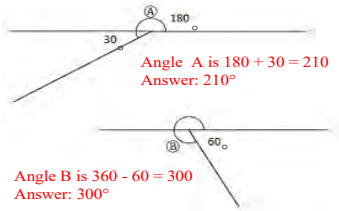


vertex of the angle, center of the protractor

[4] Measure the following angles using a protractor.



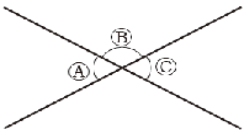
[5] Measuring angles that are larger than 180°.



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)

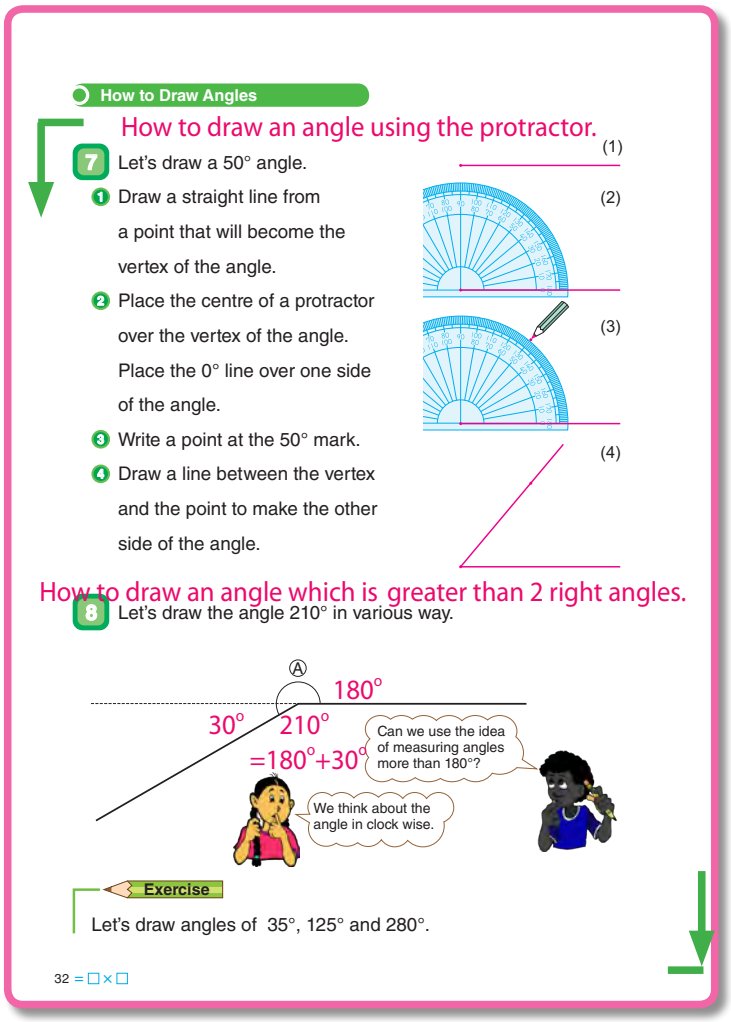
Textbook Page : p.32
Actual Lesson 017

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

Prior Knowledge
- Measuring angles using protractor (Previous lesson)

Preparation
- Protractors, Rulers

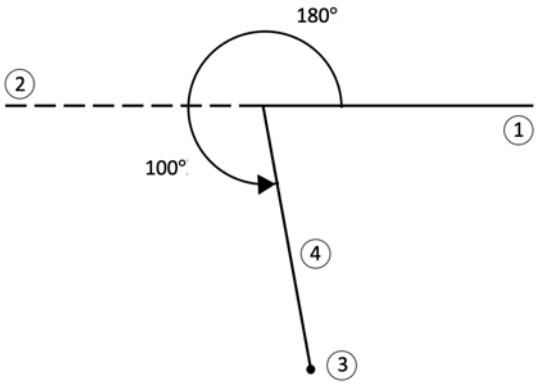
Assessment
- Draw different angle sizes correctly using knowledge of measuring angles more than 180° and the protractor. F
- Think about how to draw an angle more than 180° F
- Do the exercise correctly. S



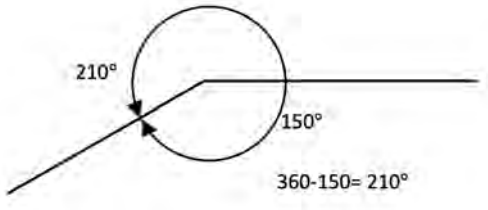
• Teacher's Notes •

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.

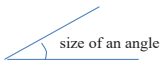
[1] Look at the open mouths of the animals A – E.

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)

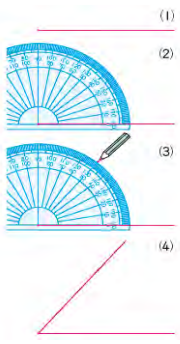
Date:
Chapter: 4 Angles.
Topic: The sizes of the Angles. **Lesson No:** 4/4

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.

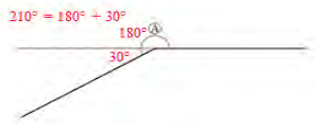
[7] Let's draw a 50° angle.

(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.

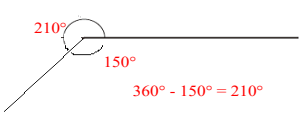


[8] Let's draw the angle 210° in various way.

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)

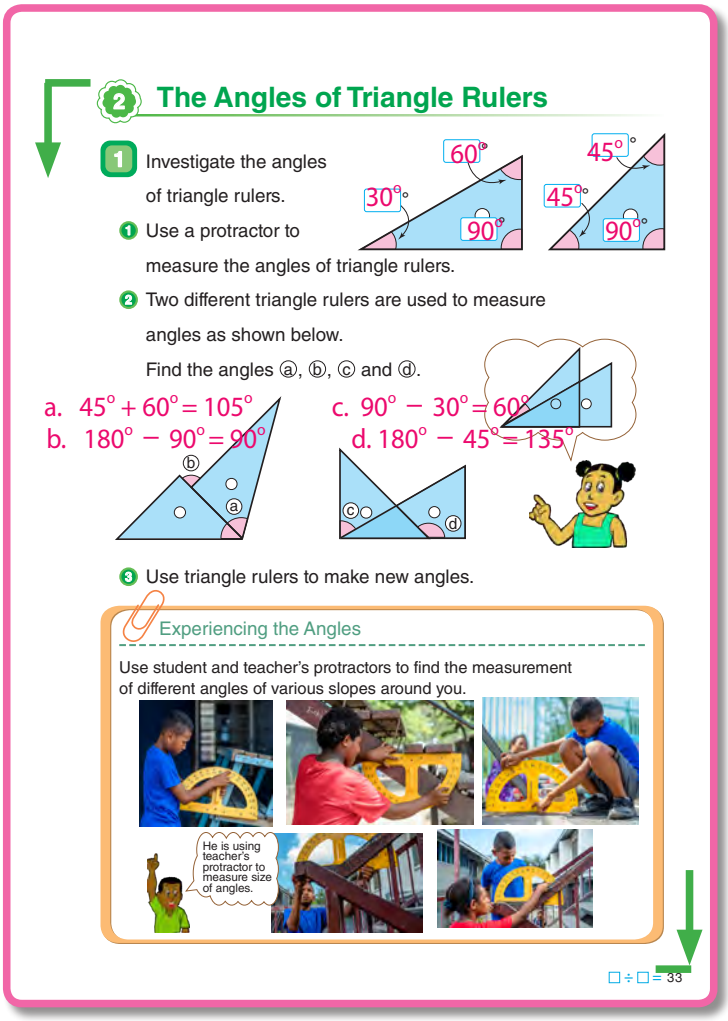
Assessment

- 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

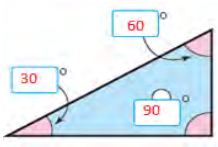
Date:
Chapter: 4 Angles.
Topic: The Angle of Triangle Ruler. **Lesson No:** 1/1

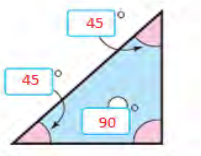
Main Task: Let's investigate the angle size of triangle rulers to make other angles.

MT: Introduce the main task here.

[1] Investigate the angles of triangle rulers.

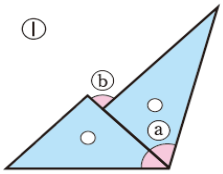
❶ Use a protractor to measure the angles of triangle rulers.





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

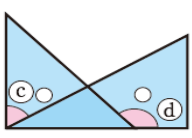
①



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

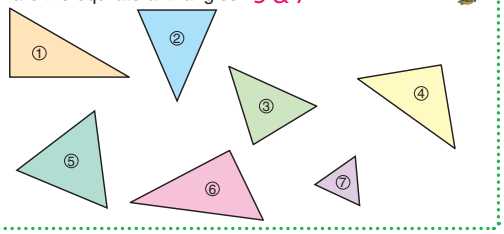
3 Draw an angle of ① and ②. Pages 30 ~ 33

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° $(180^\circ + 40^\circ)$

ⓒ 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°
$180^\circ - (45^\circ + 30^\circ)$

ⓑ 15°
$45^\circ - 30^\circ$

ⓒ 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°.**

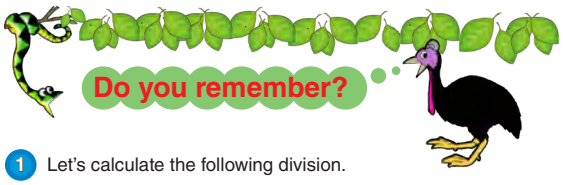
7 ④ **Calculate the angles using the properties of set squares.**

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 □.

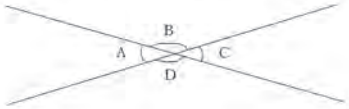
① 3×5=15	② 7×9=63
③ 8×3=24	④ 4×7=28
⑤ 6×7=42	⑥ 9×6=54
⑦ 6×4=24	⑧ 8×8=64

36 = □ × □

Angles	Name:	Score

(Each question: 10 points)

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



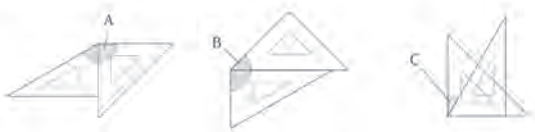
B. 140° C. 40° D. 140°

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?



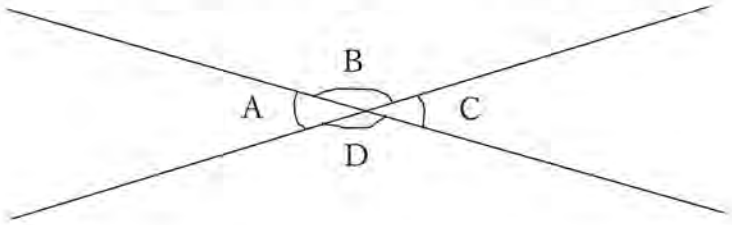
A. 150° B. 135° C. 30°

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 ?



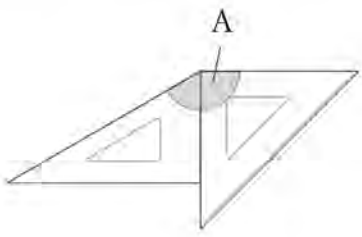
B. _____ C._____ D._____

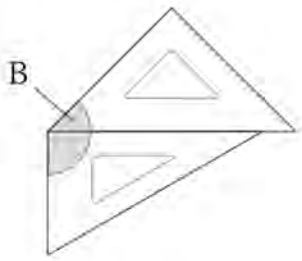
2. Draw an actual angle size of following angles.

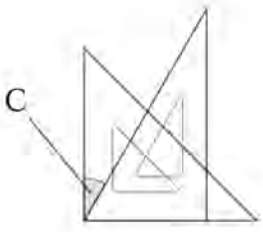
① 30° ② 150°

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)

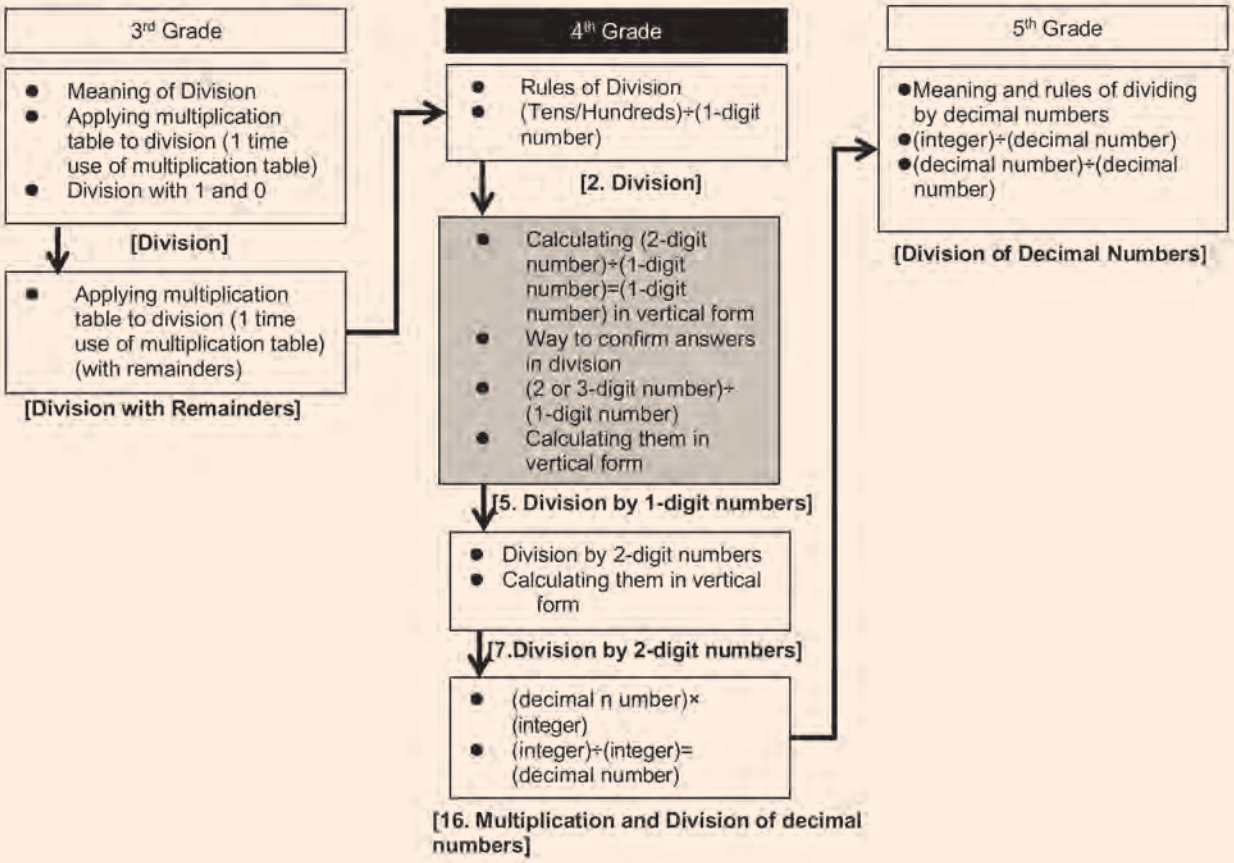
2. Teaching Overview

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.

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 r6, 7×8+6=62,
③ 32 ÷ 5 6 r2 5×6+2=32,
④ 57 ÷ 8 7 r1, 8×7+1=57
⑤ 7 ÷ 3 2 r1, 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 .

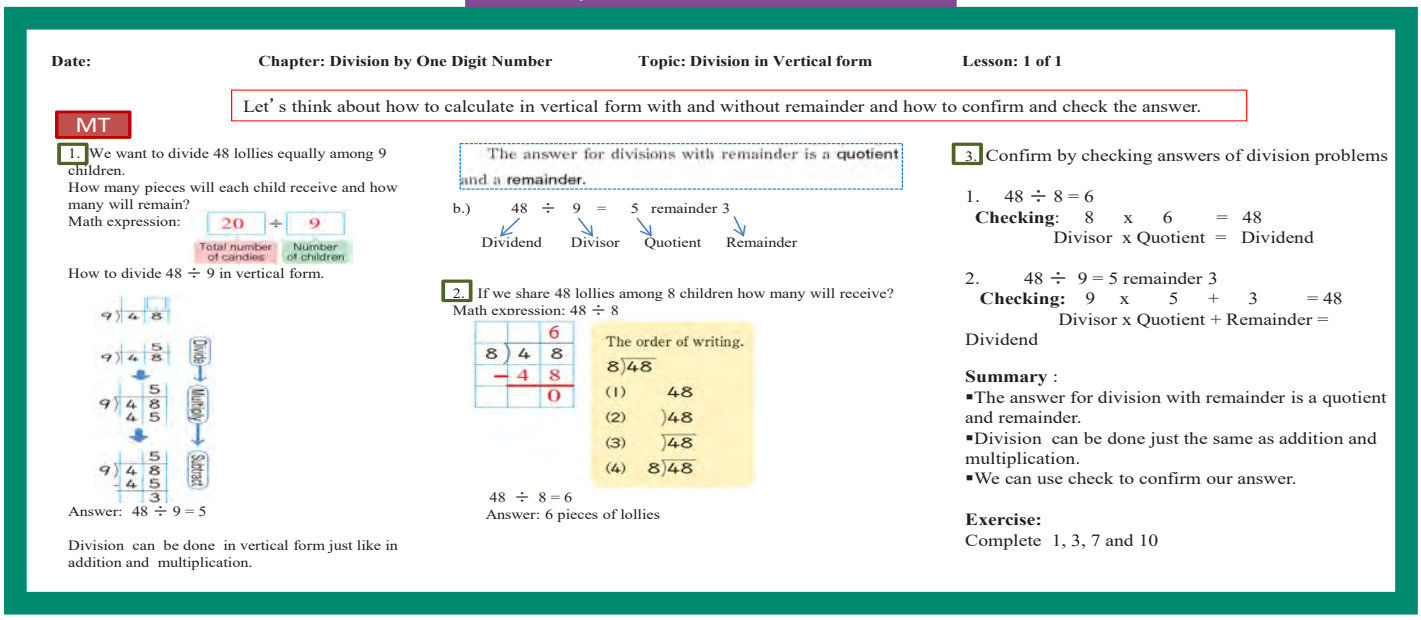
6 3 Check answers of division.

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

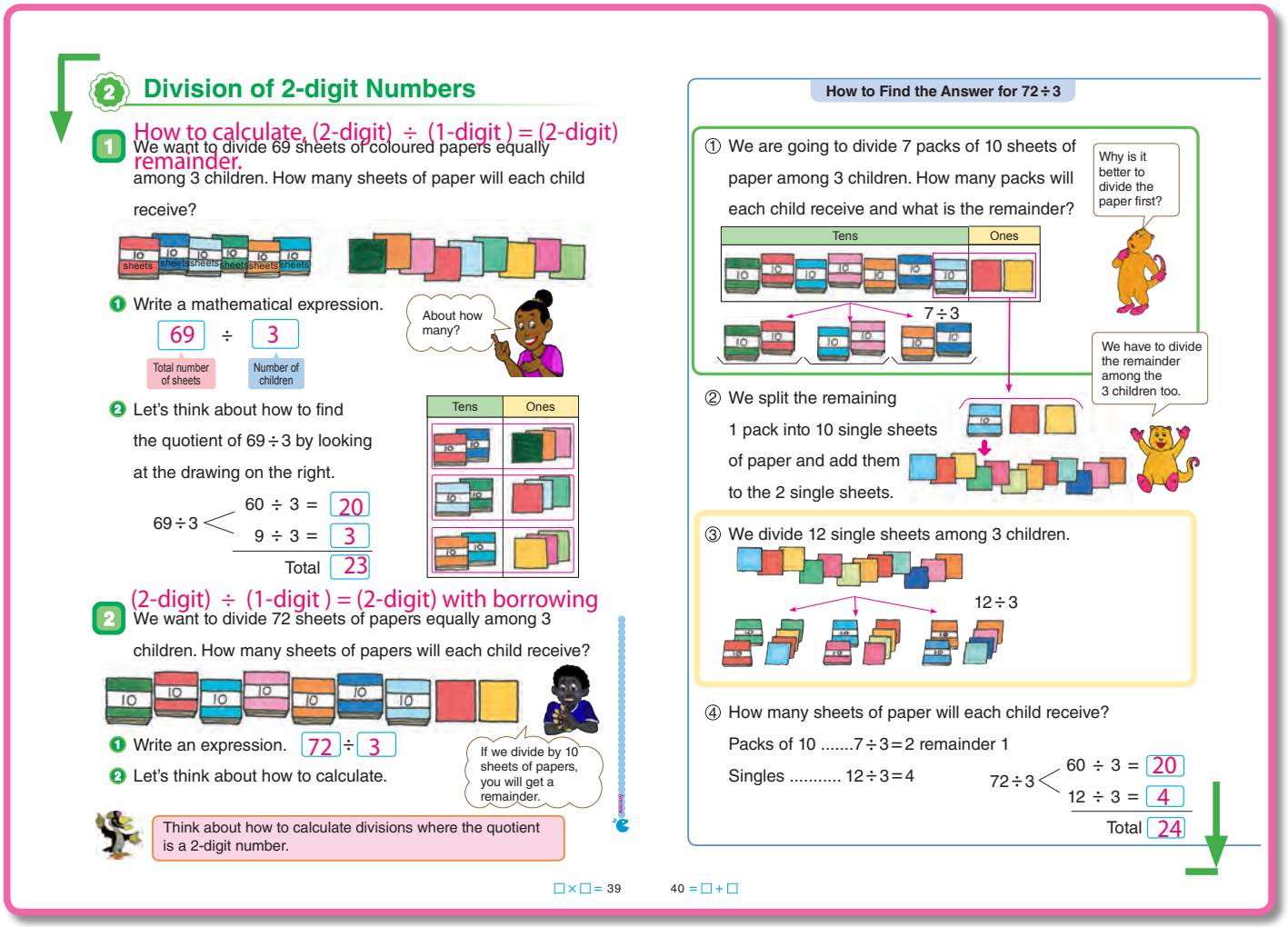
- Refer to board plan.

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	

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

Tens **Ones**

6 sets of 10 packs = 60

1 set of 10 single

Split

10 + 2 pieces = 12 pieces of single sheets)

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

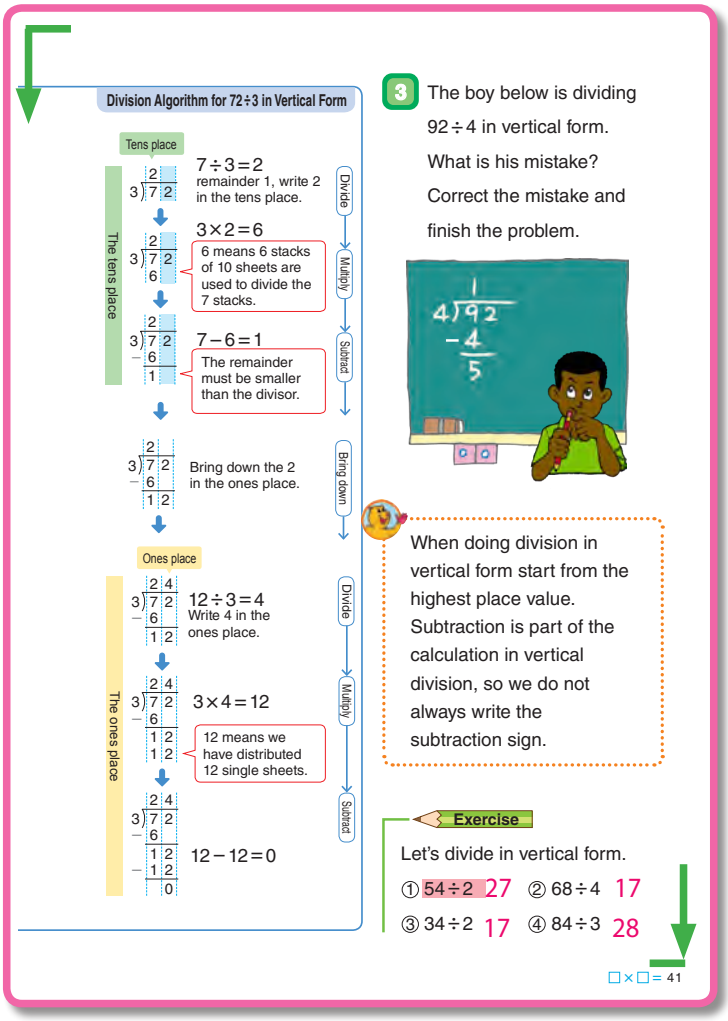
- Cards on which “Divide”, “Multiply”, “Subtract”, “Bring down”, “The ones place”, “The tens place” are written and Blocks/ Sheets of paper sorted out in groups of 10.

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".

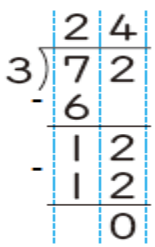
Sample Blackboard Plan

Date: **Topic: Division by 2-digit Number** **Lesson: 2 of 3**

Let's think about how to calculate 72 ÷ 3 in vertical form.

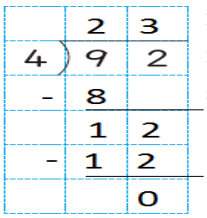
MT

How to calculate 72 ÷ 3 in vertical form.



Divide
Multiply
Subtract
Bring down
Divide
Multiply and Subtract.

3. Calculate 92÷ 4 correctly in vertical form.



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.

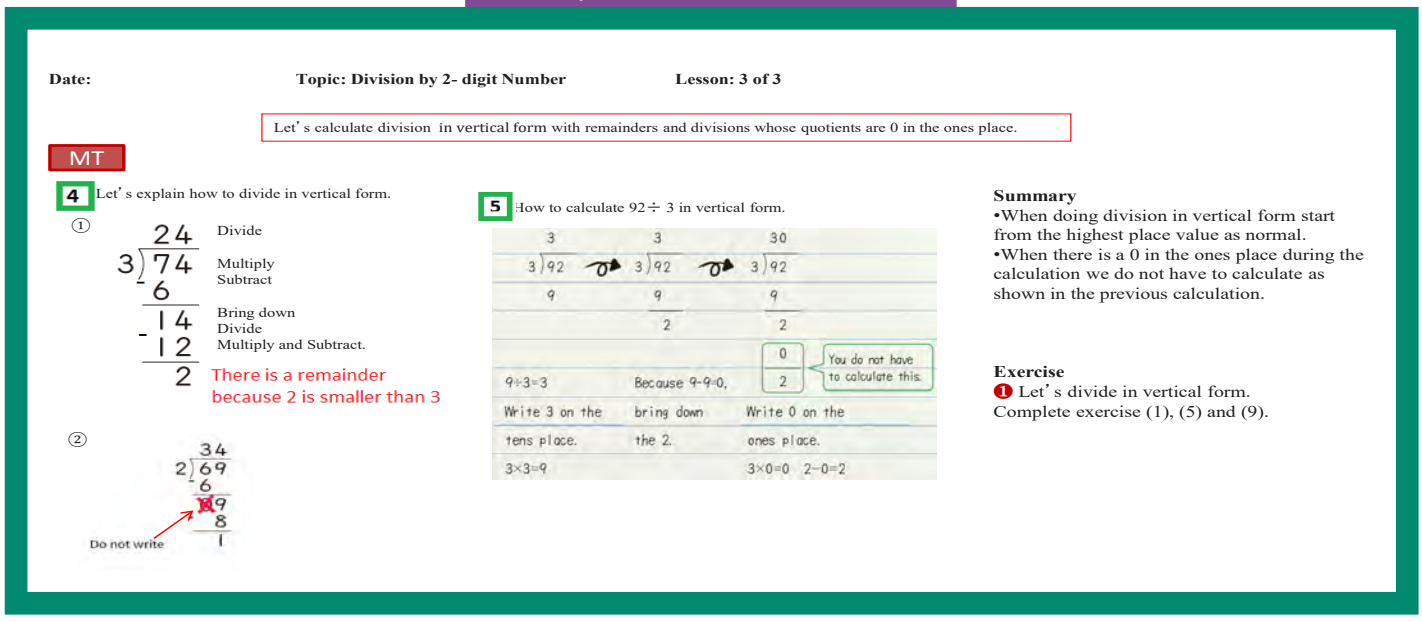
S Explain how to calculate 92÷3 in their exercise book.

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?

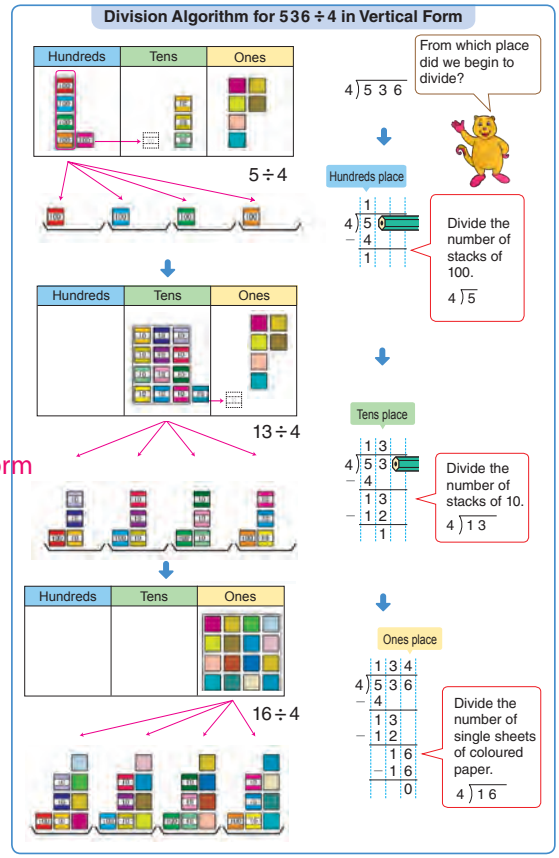
2 Divide the stacks of 10. 13 ÷4=3 Remainder 1

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.

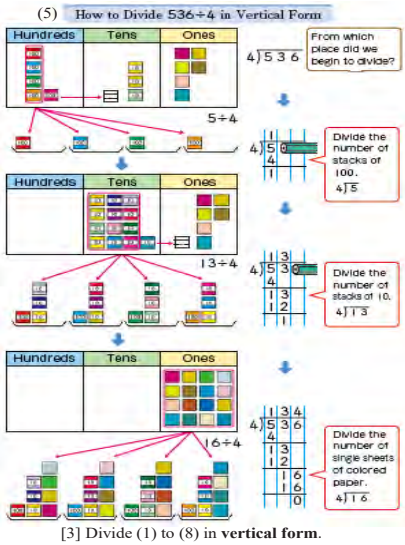
639÷3 <
600÷3 = 200
30÷3 = 10
9÷3 = 3
Total 213

[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

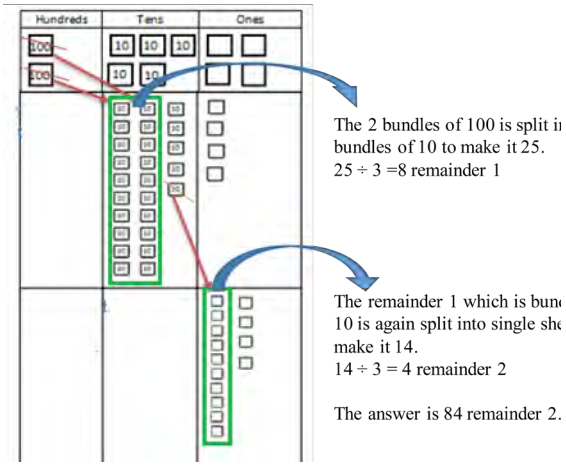
- Pictures of coloured papers of stacks of 100, stacks of 10 and single sheets and blocks.

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.



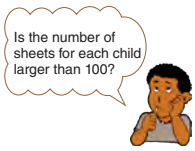
3 Let's divide in vertical form.

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?

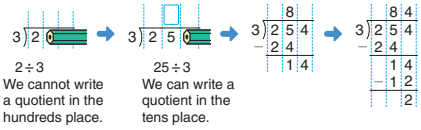
254÷3



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 ② 552÷6 ③ 173÷2 ④ 581÷9
79 92 86 remainder 1 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

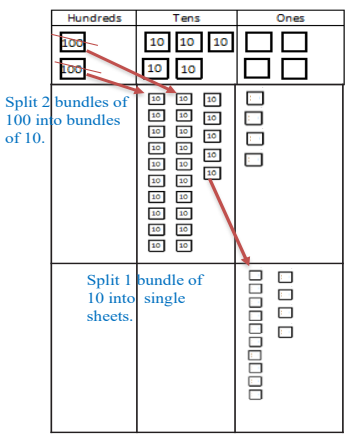
MT: Introduce main task here.

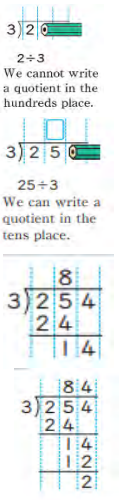
[4] There are 254 sheets of colored paper. If they are divided equally among 3 children, how many sheets will each child receive and what is the remainder?

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

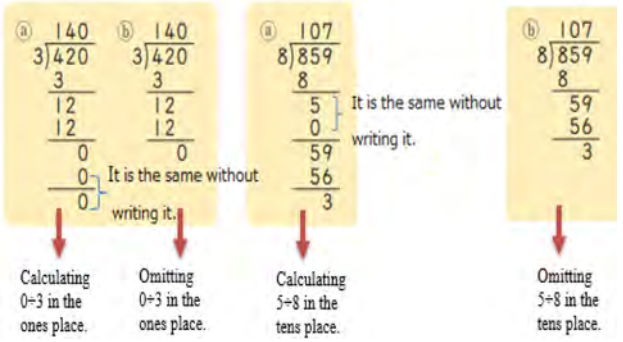
- Refer to board plan.

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 •

Ⓐ 420÷3 Ⓑ 859÷8



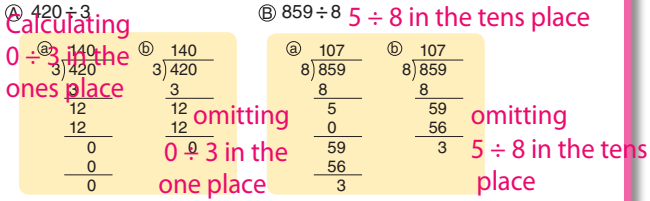
Calculations of (3-digit number) ÷ (1-digit number) = (3-digit number) in vertical from which quotients have empty places.

5 The answers of these 2 division problems were calculated as follows.

Ⓐ 420÷3 Ⓑ 859÷8

Calculating 0 ÷ 3 in the ones place

Calculating 5 ÷ 8 in the tens place



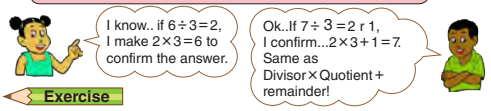
omitting 0 ÷ 3 in the one place

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)



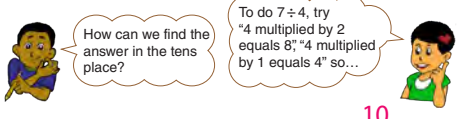
Exercise

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

10

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

Date:
Chapter: 5 Division by One – Digit Number.
Topic: The Calculation of (3- Digit Number) ÷ (1 Digit Number)
Lesson No: 3/3

Main Task: Let's think about how to calculate (3- Digit Number) ÷ (1 Digit Number) which quotient of tens or hundreds place becomes zero.

MT: Introduce main task here.

[5] The answers of 2 division problems were calculated as follows.

Ⓐ 420÷3 Ⓑ 859÷8

ⓐ 140 ⓑ 140 ⓐ 107 ⓑ 107
3)420 3)420 8)859 8)859
3 3 8 8
12 12 5 59
12 12 0 56
0 0 59 3
0 0 56
0 3

It is the same without writing it. It is the same without writing it.

Calculating 0÷3 in the ones place. Omitting 0÷3 in the ones place. Calculating 5÷8 in the tens place. Omitting 5÷8 in the tens place.

Calculations for checking.

Ⓐ 3 x 140 = 420 (Divisor) x (Quotient) = (Divided)

Ⓑ 8 x 107 + 3 = 859 (Divisor) x (Quotient) + (Remainder) = (Dividend)

Exercise

① 740÷2 ② 650÷5 ③ 840÷6 ④ 810÷3
⑤ 742÷7 ⑥ 618÷3 ⑦ 958÷9 ⑧ 825÷4

Mental Arithmetic

72 ÷ 4 40 ÷ 4 = 10
32 ÷ 4 = 8
Total 18

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

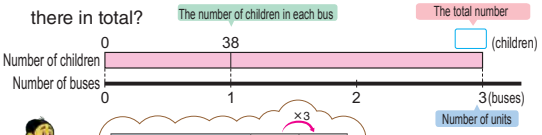
• Teacher's Notes •

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?



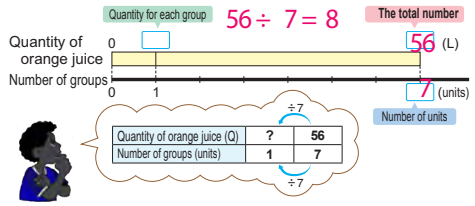
Number of children (children)	38	?
Number of buses (buses)	1	3

×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.

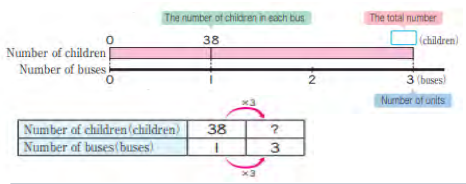
Sample Blackboard Plan

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.

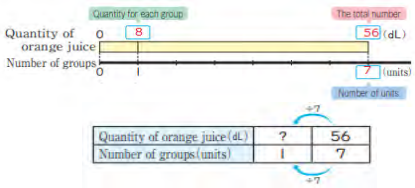
[1] The fourth grade children went for a field trip in 3 buses. There were 38 children on each bus. How many children were there in total?



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?

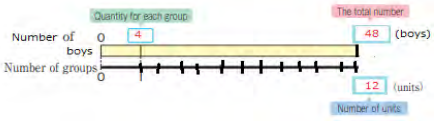
(1)What is known?
▪Word problem to which division is applied.
▪Total amount of juice and number of quantity.
(2) What do you want to know?
▪Amount of juice for a group.
(3) Write what is known in the diagram and find the answer.



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.**

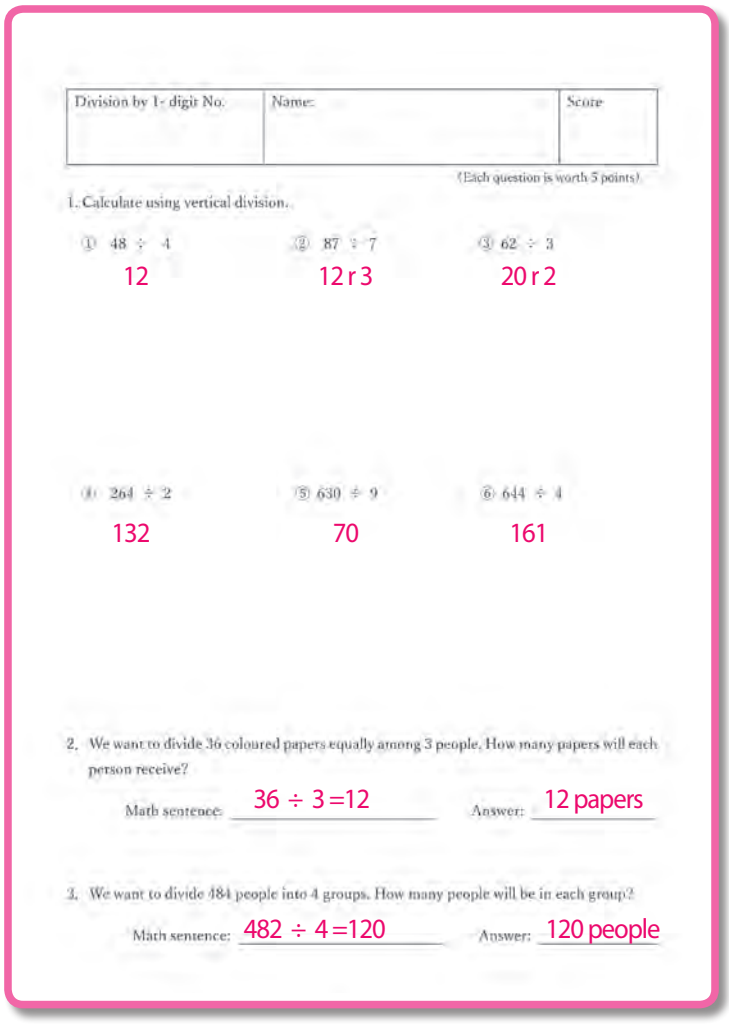
9 ④ **Understand the relation between divisor, dividend, and remainder.**

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

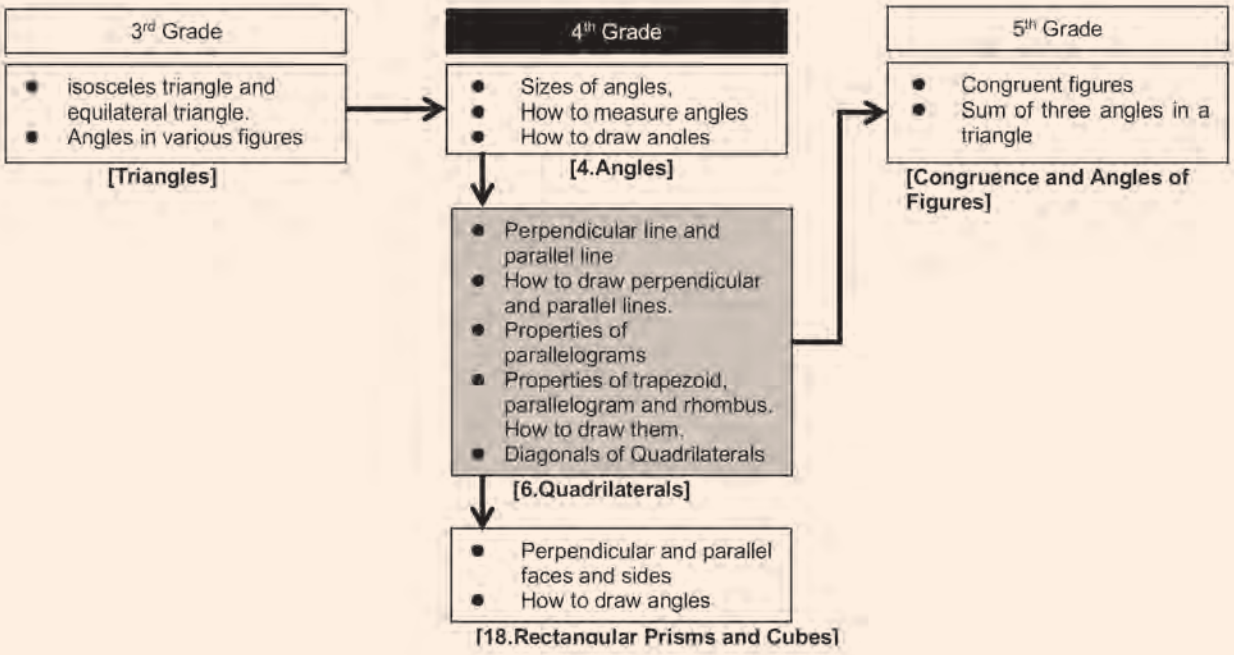
In this topic, learners analytically pay attention to perpendicular and parallel relationships between 2 lines. Then they study quadrilaterals by focusing on sides facing each other and diagonals.

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

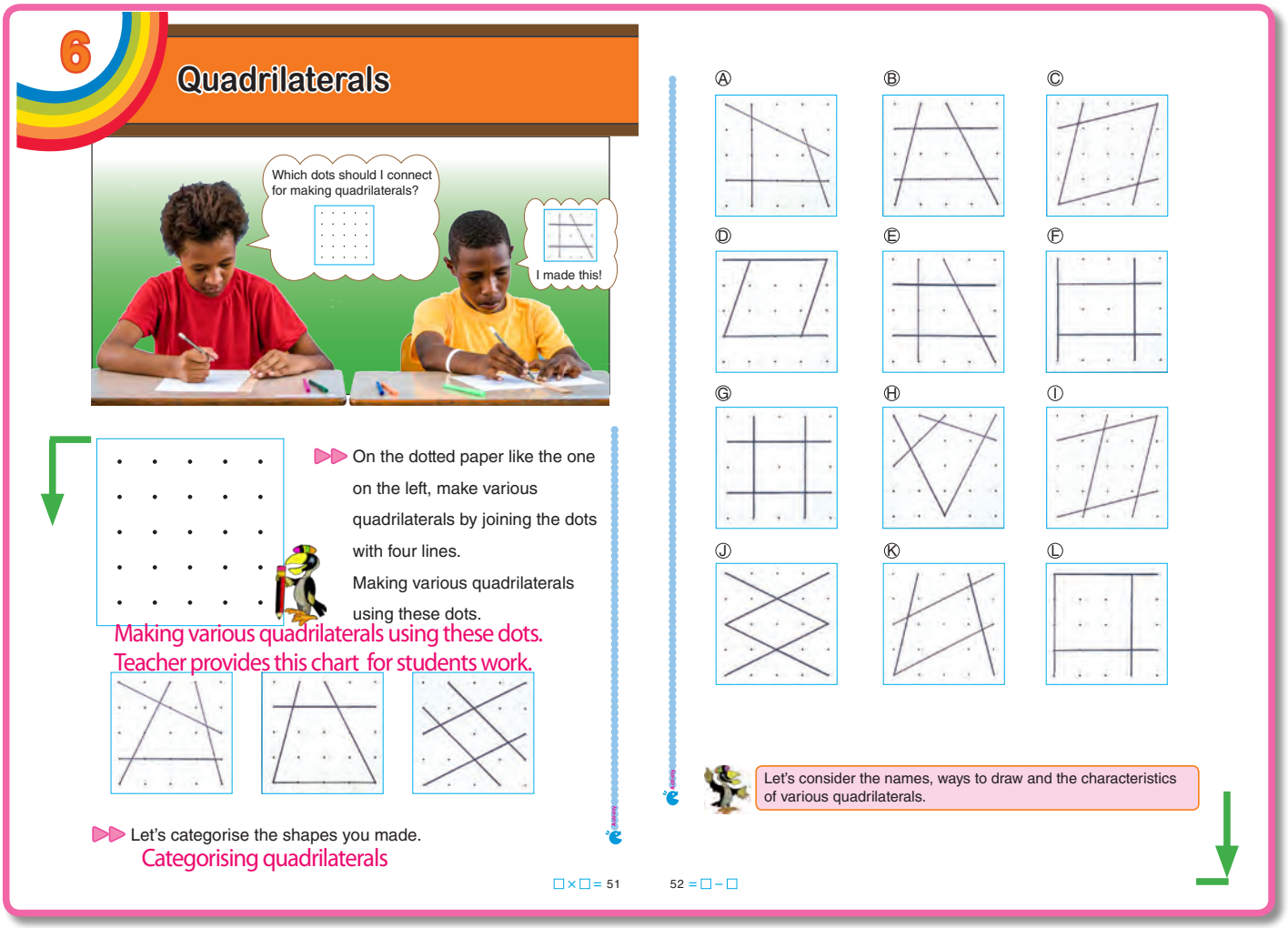
- Cards of dotted diagrams (for students), dotted diagram for putting on the board (for teachers), dotted diagrams on which triangles are drawn for a demonstration, sets of triangle rulers, protractors and compasses.

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.

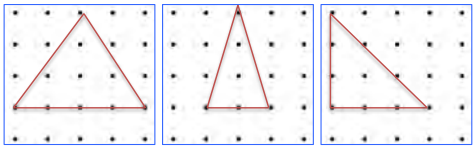
Sample Blackboard Plan

Date: **Chapter:** 6 Quadrilaterals **Topic:** Perpendicular Lines **Lesson Number:** 1/3

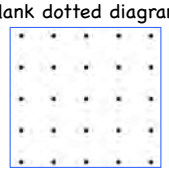
MT Let's categorise quadrilaterals by the length of sides and size of angles

Examples of triangles and dotted diagrams.

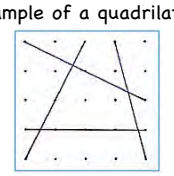
Equilateral Triangle | Isosceles Triangle | Regular or right Triangle



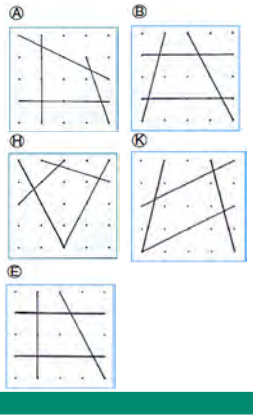
Blank dotted diagram



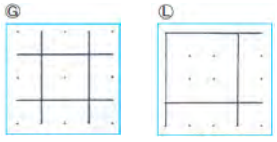
Example of a quadrilateral



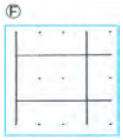
Quadrilaterals with all sides Having different lengths



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 •

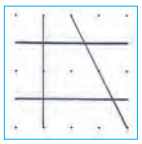
Terms of perpendicular to be learnt in the lesson are terms to express positional relations of two lines. The concept of perpendicular cannot be made only by observation of introduction but through confirming shapes of quadrates and rectangles and a relation of two lines intersected made by folding papers, 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.

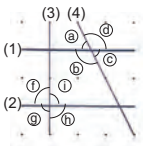
Ⓔ



(1) At what angle do the two lines (1) and (4) intersect? 62°and 118°

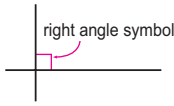
Measure angles ⓐ, ⓑ, ⓒ and ⓓ.
a 62° b 118° c 62° d 118°

(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!

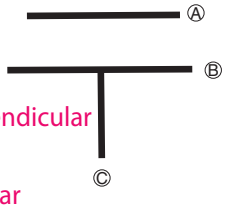
Two lines are **perpendicular**, if they intersect at a right angle. **Perpendicular** lines meet at right angle.



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 Ⓒ.



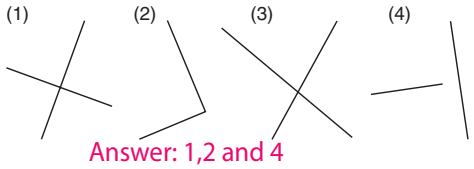
(1) If line Ⓑ and Ⓒ intersect at a right angle, what are they called? Perpendicular

(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”.

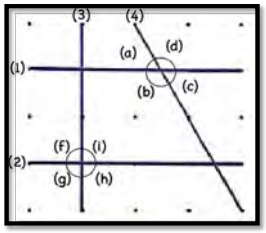
S Find perpendicular lines in the classrooms or playground by using the folded papers and triangle rulers.

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.



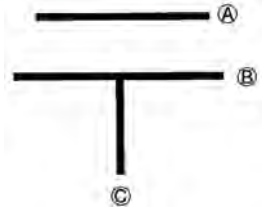
1 At what angle do the two lines (1) and (4) intersect? Angle (a) and (d)

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

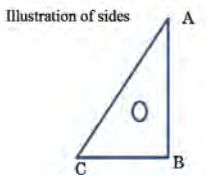
- Worksheets (on which a few lines a-b are drawn), protractors, triangle rulers and grid sheets.

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

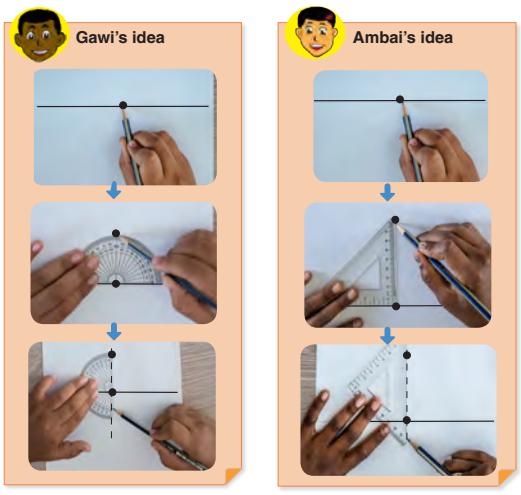
• Teacher's Notes •

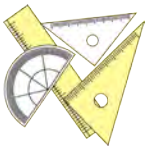
Many students may have difficulty in drawing with Ambai's idea on page 55 because they may not put the side BC of the triangle ruler in the diagram 1 on the right over the line ab correctly. In order to confirm and ensure accuracy, it is important to put the side BC of the set square over the line ab 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.

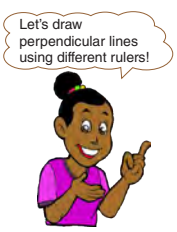


How to draw perpendicular lines.

5 Let's explore how to draw a perpendicular line.





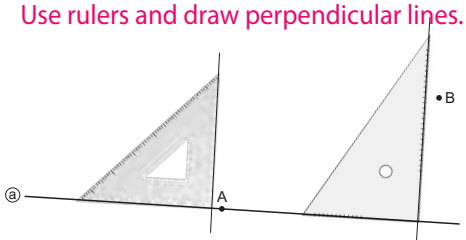


How to draw a lines passing through a point and perpendicular to the other.

6 Draw a line that is:

1. Perpendicular to line ⓐ and passes through point A.
2. Perpendicular to line ⓐ and passes through point B.

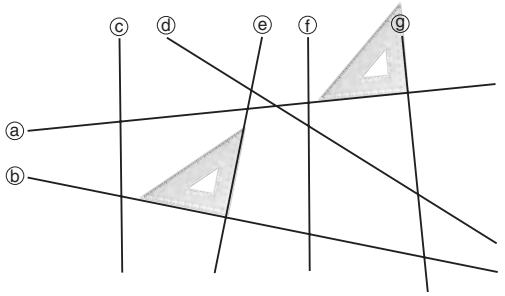
Use rulers and draw perpendicular lines.



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.

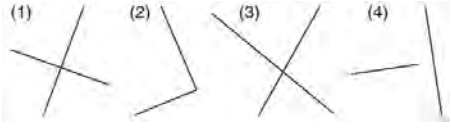
T Confirm with students that they understand how to draw based on the definitions of perpendicular.

Sample Blackboard Plan

Date: **Chapter:** 6 Quadrilaterals **Topic:** Perpendicular Lines **Lesson:** 3/3

MT Let's think about how to draw perpendicular lines.

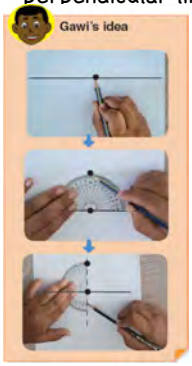
3 Which lines are perpendicular?



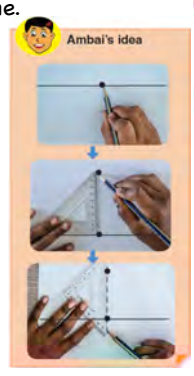
(1) And (4)

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

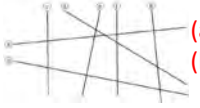
6 Draw a line test. That is:

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

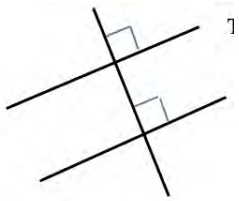
- Triangle rulers, protractors and rulers

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 •

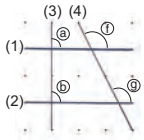
Define the perpendicular relationship first and then define the parallel relation as follows;
(1) If two lines cross at right angles, these two lines are called perpendicular.
(2) When there are two straight lines that are perpendicular to another, these two lines are parallel.
Two lines parallel



2 Parallel Lines

1 Definition of parallel lines.

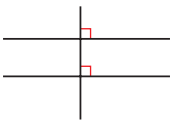
Let's explore quadrilateral Ⓔ on page 52.



❶ What is the relationship of line (1), (2) and (3) when they intersect?

Perpendicular

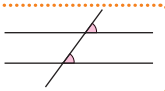
Two lines are **parallel** when a third line crosses both lines at right angles.



❷ The lines (1) and (2) are parallel lines.
Let's measure angles ⓕ and ⓖ and compare.

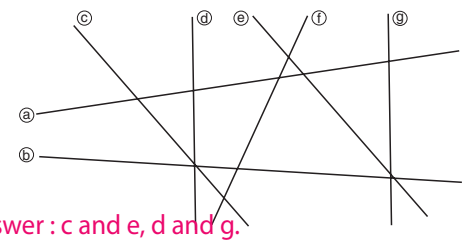
Angles (f) and (g) are 118°

Two lines which are intersected by a line at the same angles are parallel.



Exercise Use triangle rulers and find out!

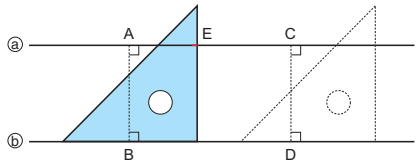
Let's choose parallel lines.



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?

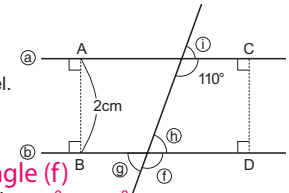
The distance remains the same.

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

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.

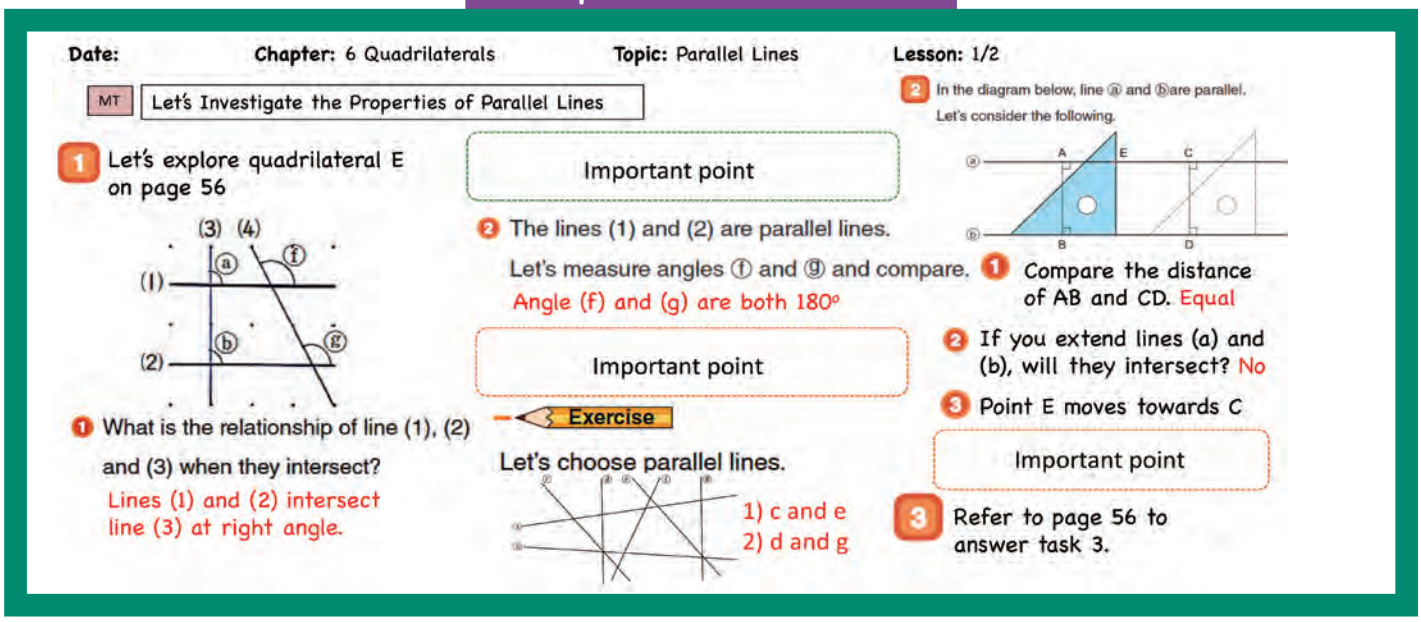
S Identify parallel lines by finding the distance between 2 parallel lines at different points

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

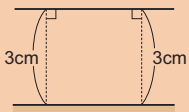
- Draw parallel lines based on angle properties and distance in various ways using protractors, set squares and rulers. F
- Do the exercise correctly. S
- Understand othe characteristics of parallel and perpendicular lines. F S
- Draw parallel and perpendicular lines using skills learned in this unit. 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) 2 cm (b)

(c) 4 cm (d)

Exercise

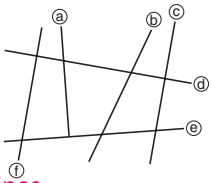
Let's draw lines with the following conditions.
① Draw a line which passes points A and parallel to line ⓐ.
② Draw two lines that are parallel to ⓐ and 2 cm apart.

2 cm A (2) (1)
2 cm ⓐ

□×□=29

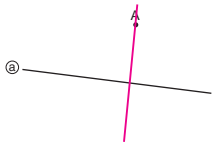
Exercises

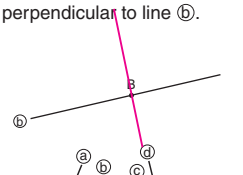
1 Which lines are perpendicular?
Pages 53 ~ 56
a and e
c and d
d and f



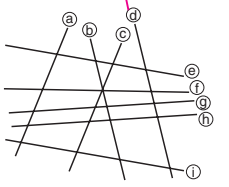
Drawing perpendicular lines

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.

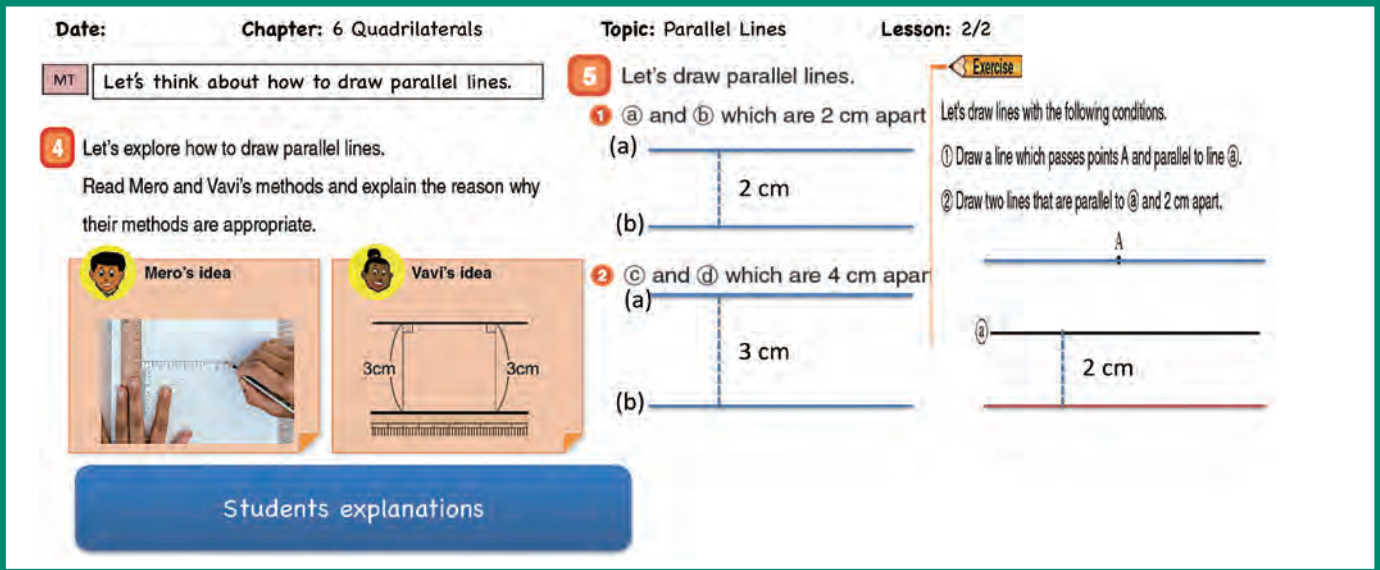
S Do exercise (4) to draw parallel lines.

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

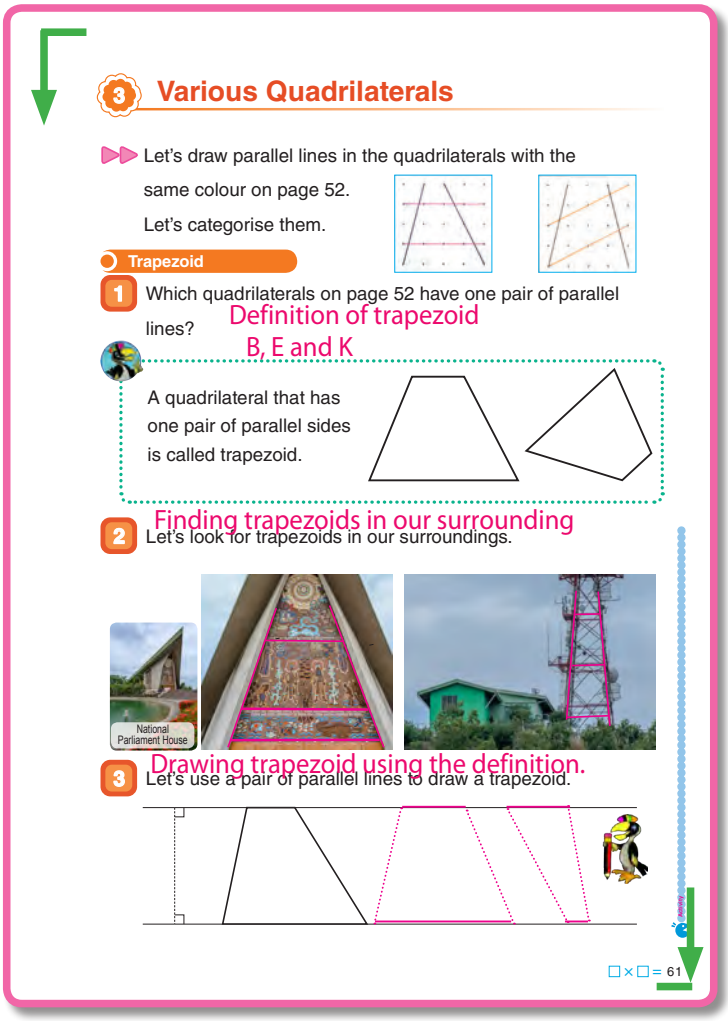
- Characteristics of perpendicular and parallel lines
- Learned skills on drawing perpendicular and parallel lines
- Learned knowledge in Grade 2 on Squares, Rectangles and Right Angles
- Understanding the meaning of right angles from characteristics of squares and right-triangles

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 Finding trapezoids in our surrounding

Let's look for trapezoids in our surroundings.

National Parliament House

3 Drawing trapezoid using the definition.

Let's use a pair of parallel lines to draw a trapezoid.

□×□=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.**

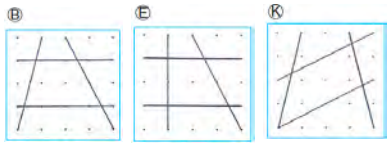
S Draw trapezoids by using parallel lines in the textbook or ruled lines in the exercise book.
TN Students who can draw trapezoids by using parallel lines, should try drawing them on blank papers. For students who forget how to draw parallel lines using triangle rulers should practice how to draw again here.

Sample Blackboard Plan

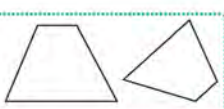
Date: **Chapter:** 6 Quadrilaterals **Topic:** Various Quadrilaterals **Lesson:** 1/6

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

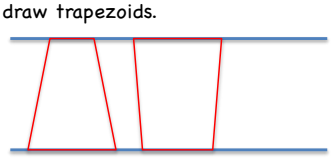


A quadrilateral that has one pair of parallel sides is called trapezoid.



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

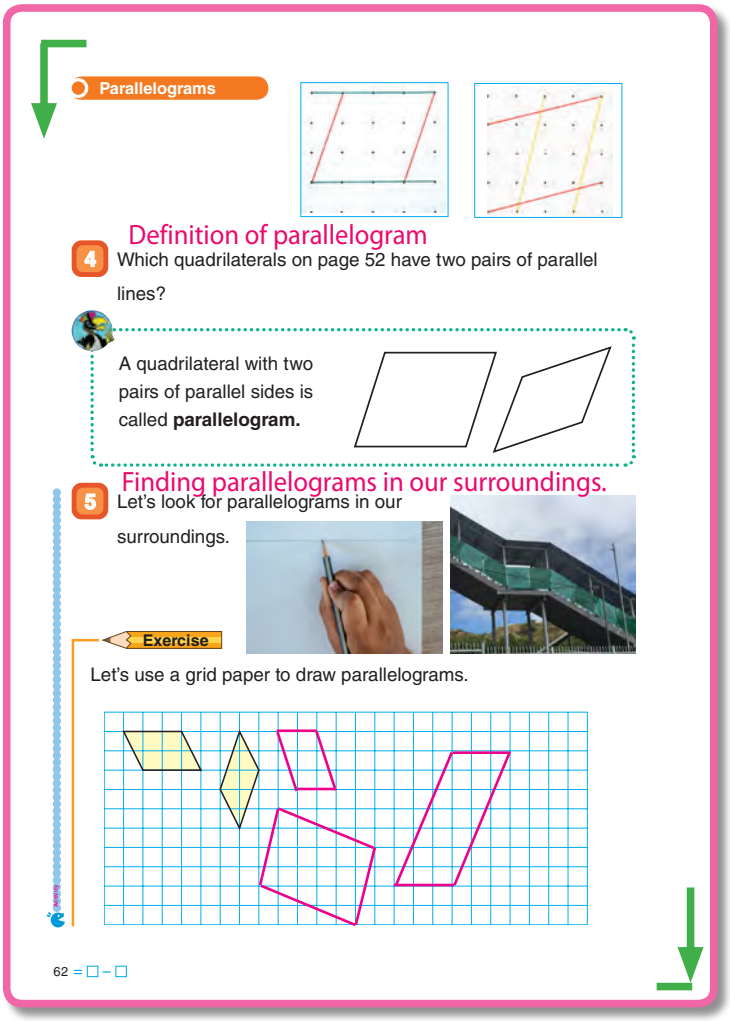
- Triangle rulers (set squares), rulers, handouts of quadrilaterals printed from 1st lesson (for students) and diagrams of C, D, F, G, I, J and L for putting on the board (for teachers).

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.



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.

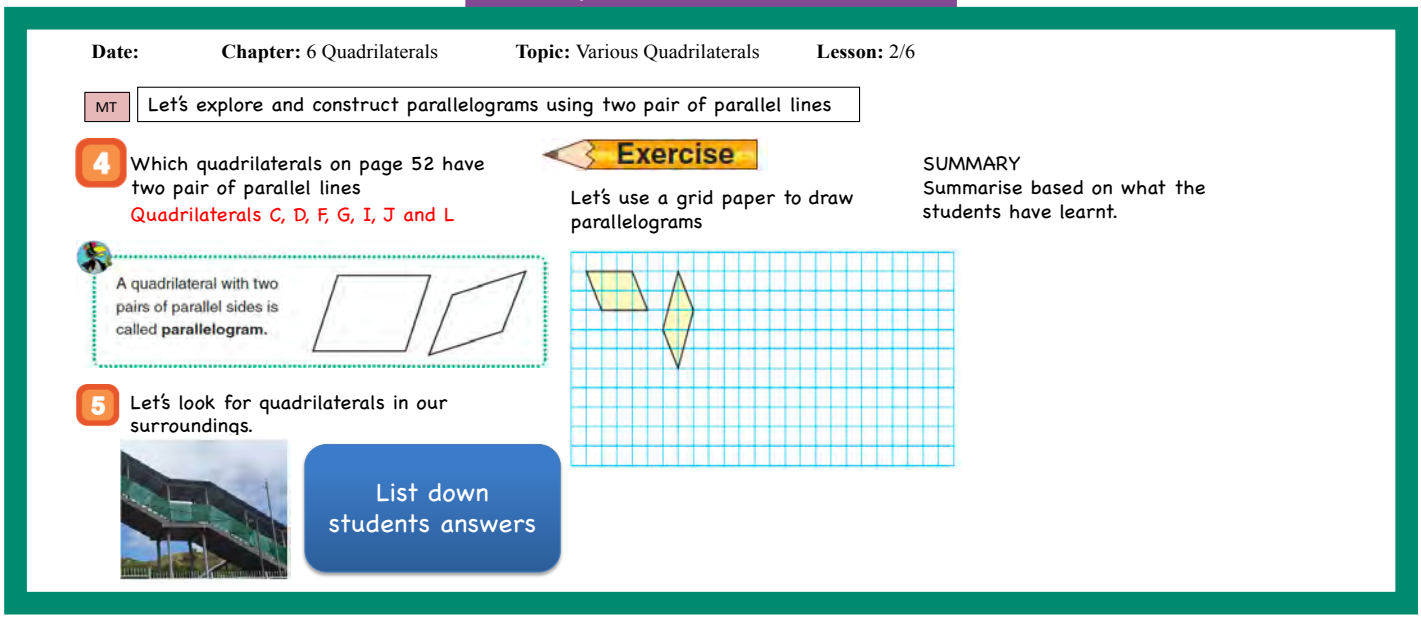
3 5 Find things from our surroundings that are shaped like parallelogram.

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

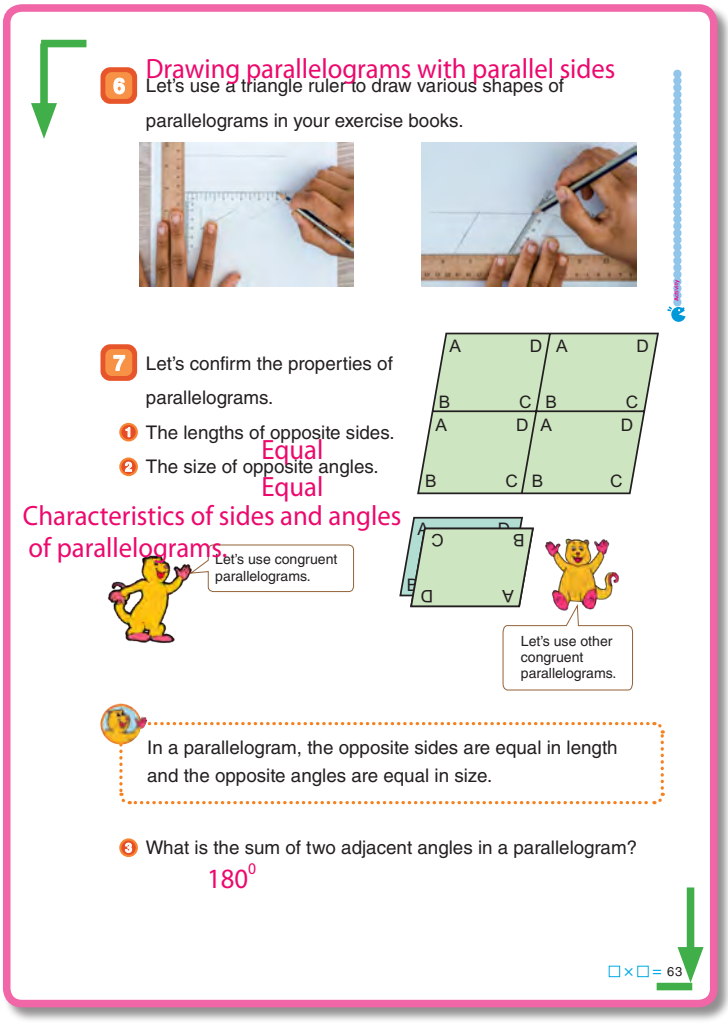
Assessment

- 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.

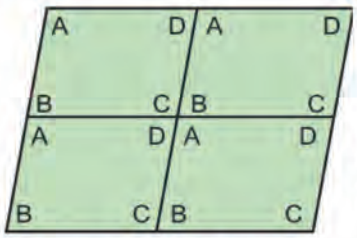
7 Let's confirm the properties of parallelograms.

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.

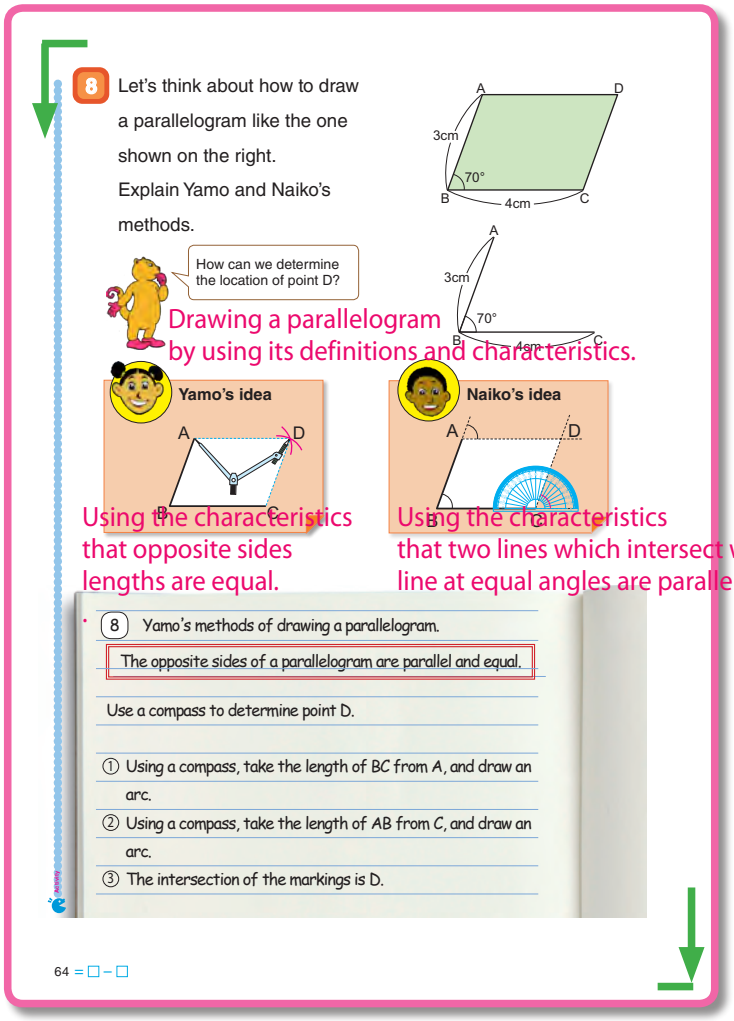
Assessment

- 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.

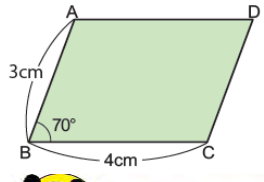
S Think about various ways of drawing using Yamo and Naiko's ideas in the textbook as hints.
T Let students understand that Yamo's idea is to draw by using the characteristic of parallelogram where the lengths of opposite sides are equal and Naiko's idea is to draw by using the characteristic that corresponding 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.

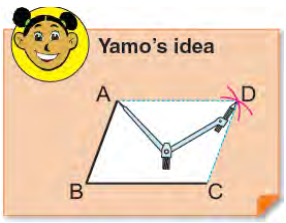
Sample Blackboard Plan

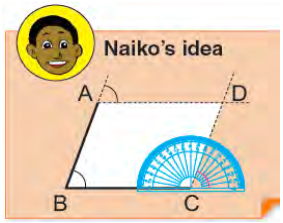
Date: **Chapter:** 6 Quadrilaterals **Topic:** Various Quadrilaterals **Lesson:** 4/6

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

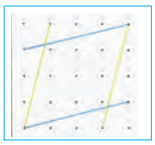
• Teacher's Notes •

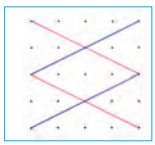
Drawing figures in geometric sense is to draw by only using a ruler and compass, but generally drawing shapes which meet certain conditions is called drawing figures. In primary, it will be dealt with the general meaning which uses grid papers and protractors also. The purpose for drawing figures is 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

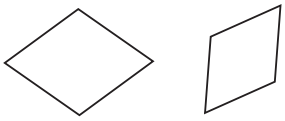
© 

Ⓙ 

Definition of rhombuses. All sides are equal in length.

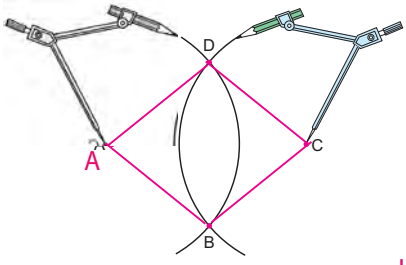
9 Let's compare the four sides of quadrilaterals © and Ⓙ on page 52.

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



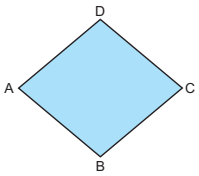
2. Put needle on C and draw an arc B - D using compasses

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.

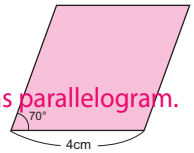


1. Are the opposite angles equal? Equal
2. Are the opposite sides parallel? Parallel

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".

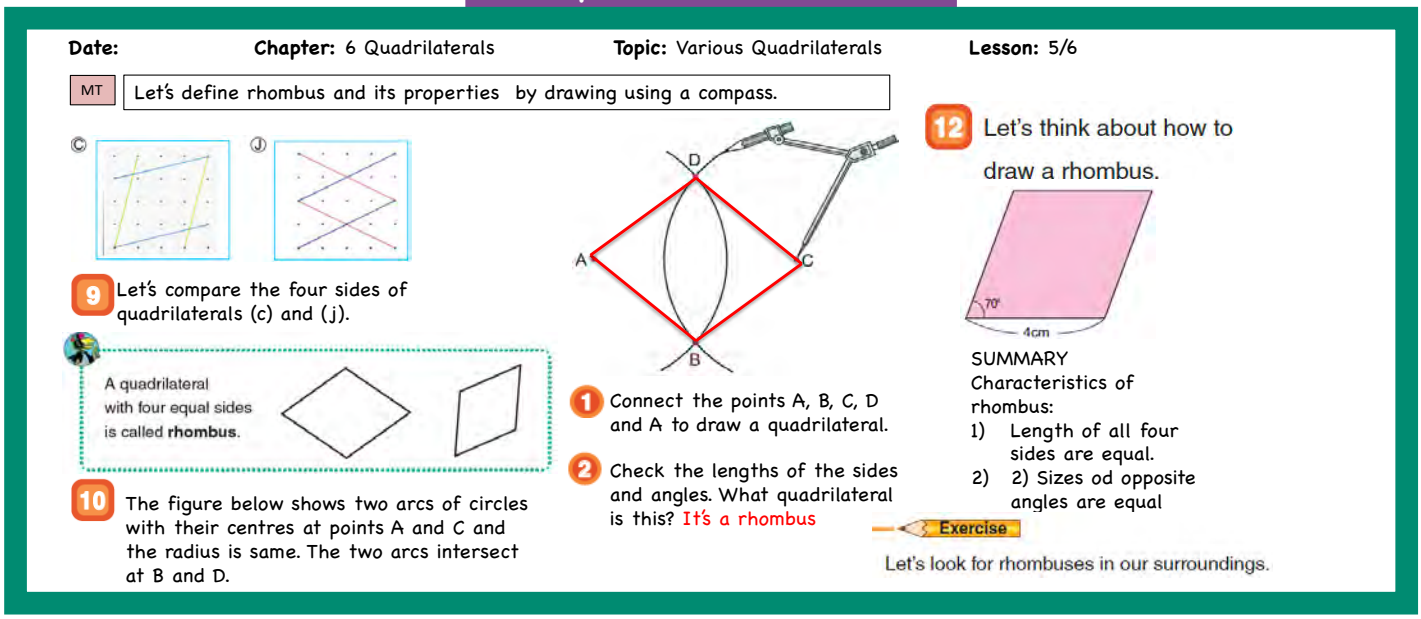
7 Complete the exercise.

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

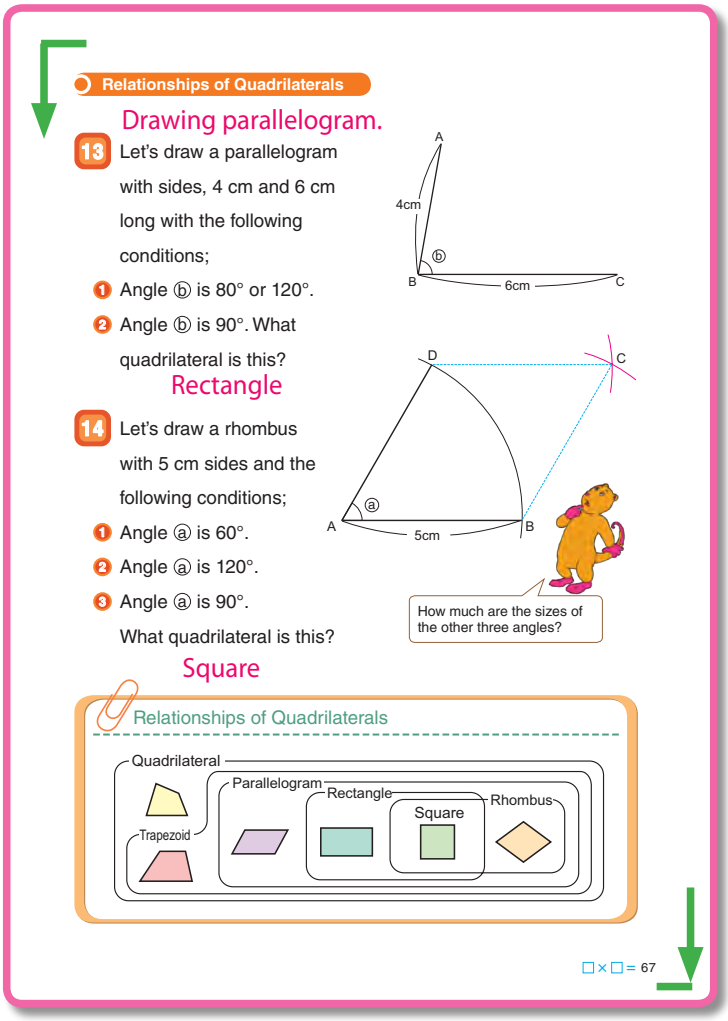
- Triangle rulers (Set squares), protractors and compasses.

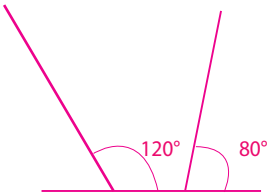
Assessment

- 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.

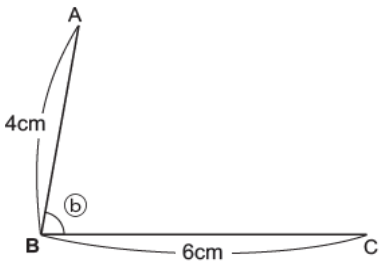
4 Discuss the findings in drawing a rhombus and summarise learning.

Sample Blackboard Plan

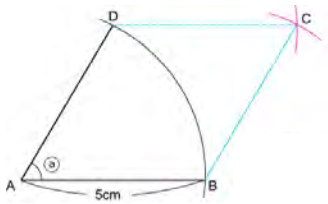
Date: **Chapter:** 6 Quadrilaterals **Topic:** Various Quadrilaterals **Lesson:** 6/6

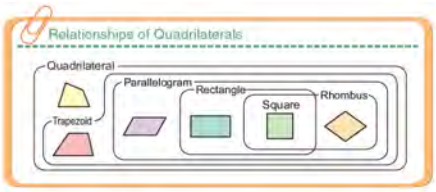
MT Let's find the relationships between quadrilaterals

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

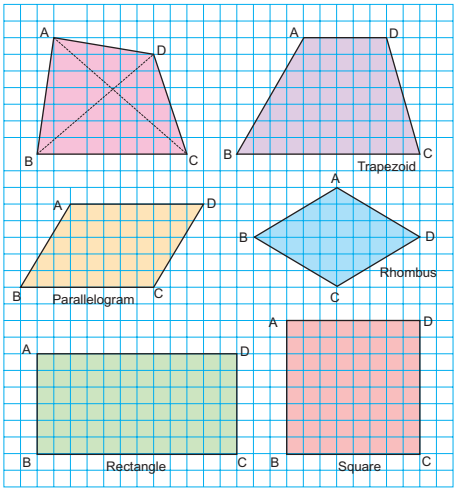
Assessment

- 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.

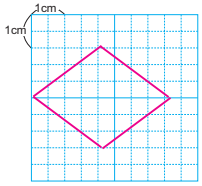
2 Look at the parallelogram, rhombus, rectangle and square on the previous page 1 and match them with the following characteristics.

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

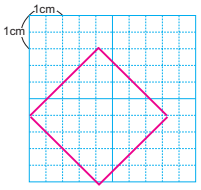
Drawing quadrilaterals using diagonal lines given

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 ❶ 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 ❷ Identify quadrilaterals based on the characteristics of the diagonal lines.

S Complete exercise ❶, ❷, ❸ and ❹ by identifying the quadrilaterals from the previous exercise using the given characteristics.

3 ❸ 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.

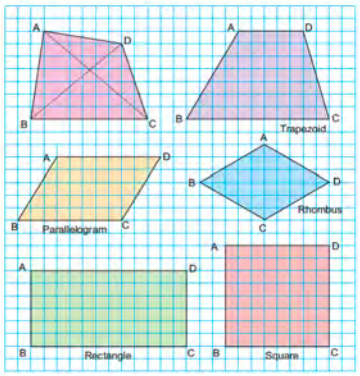
4 Discuss things found by drawing a rhombus with each other and summarise learning.

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.

❶ 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.

❷ Look at the parallelogram, rhombus, rectangle and square on the previous page ❶ and match them with the following characteristics.

❶ Quadrilateral (s) with 2 diagonals that have a perpendicular intersection. ____

❷ Quadrilateral (s) with 2 diagonals that are equal in length. ____

❸ Quadrilateral (s) with 2 diagonals that are equal in length and have a perpendicular intersection

❹ Quadrilateral (s) with 2 diagonals that are divided in half where they intersect

❸ Draw the following quadrilaterals by using the characteristics listed in 2.

❶ A rhombus with 4 cm and

❷ 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

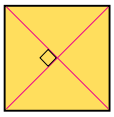
Assessment

- 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 •

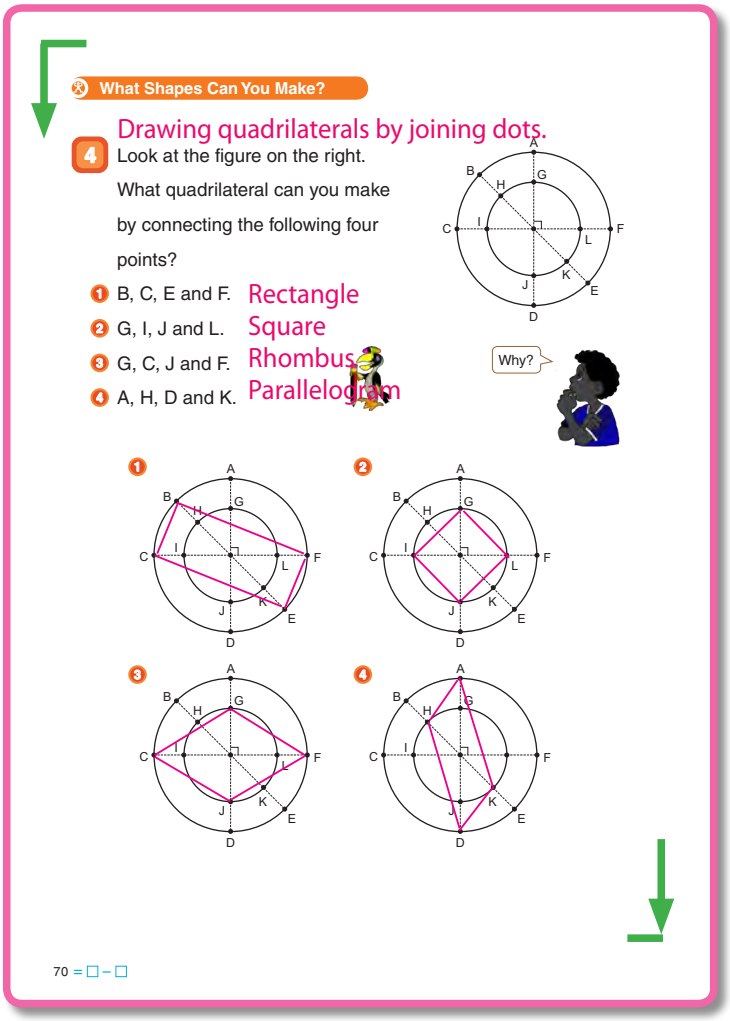
1. Rectangle: length of the diagonals are equal and also same as the diameter of the circle.

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°).

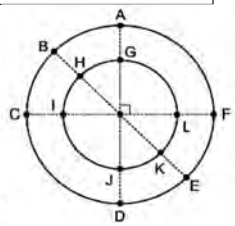
❹ Diagonal lines are not equal.

Sample Blackboard Plan

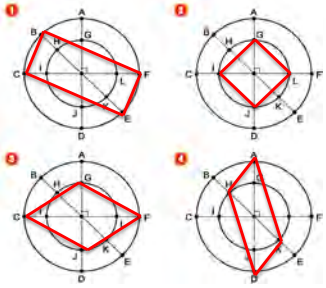
Date: **Chapter:** 6 Quadrilaterals **Topic:** Diagonals of Quadrilaterals **Lesson:** 2/2

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?



❶ ❷ ❸ ❹



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

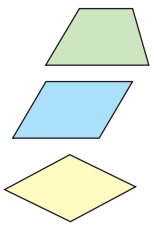
Definition of parallelogram, trapzoid and rhombus

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.

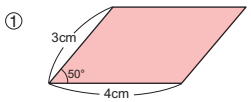
② A quadrilateral in which the opposite sides are both parallel is called a parallelogram.

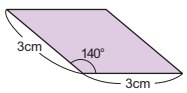
③ A quadrilateral in which all 4 sides are equal in length is called a rhombus.

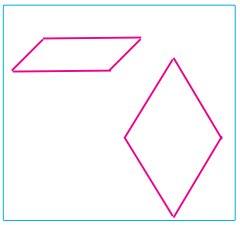


Drawing parallelogram and rhombus

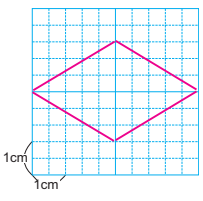
2 Draw parallelograms like the ones shown below. Pages 64







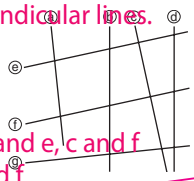
3 Draw a rhombus with diagonals that are 5 cm and 3 cm in length. Pages 66



Problems

To find parallel lies orperpendicular lines.

1 Let's find perpendicular and parallel lines. Explain why. Finding perpendicular and parallel lines.

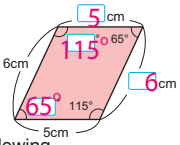


Perpendicular: a and g, c and e, c and f
Parallel lines : b and d, e and f

2 Let's draw perpendicular and parallel lines with reference to line ⓐ and passing through point B. Constructing a perpendicular line and a parallel line.

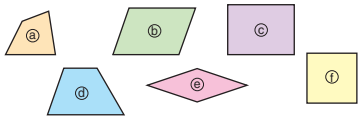
Drawing perpendicular and parallel lines

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 characteristics of quadrilaterals.

Identifying the types of quadrilateral based on the 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.

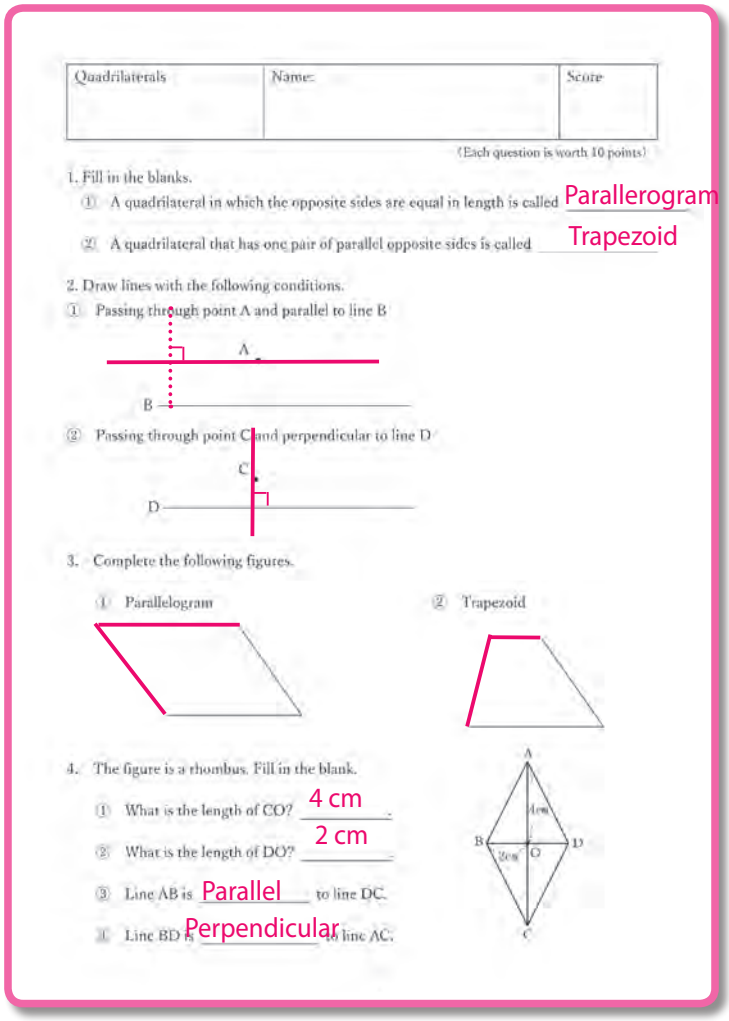
3 **③ Solve exercise 3.**

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

A •

B _____

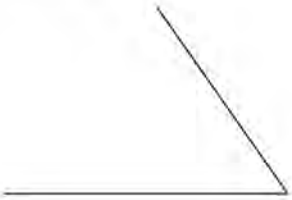
② Passing through point C and perpendicular to line D

C •

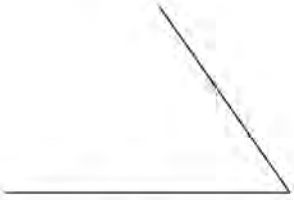
D _____

3. Complete the following figures.

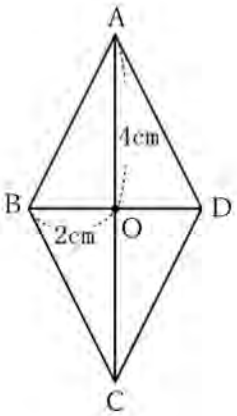
① Parallelogram



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).

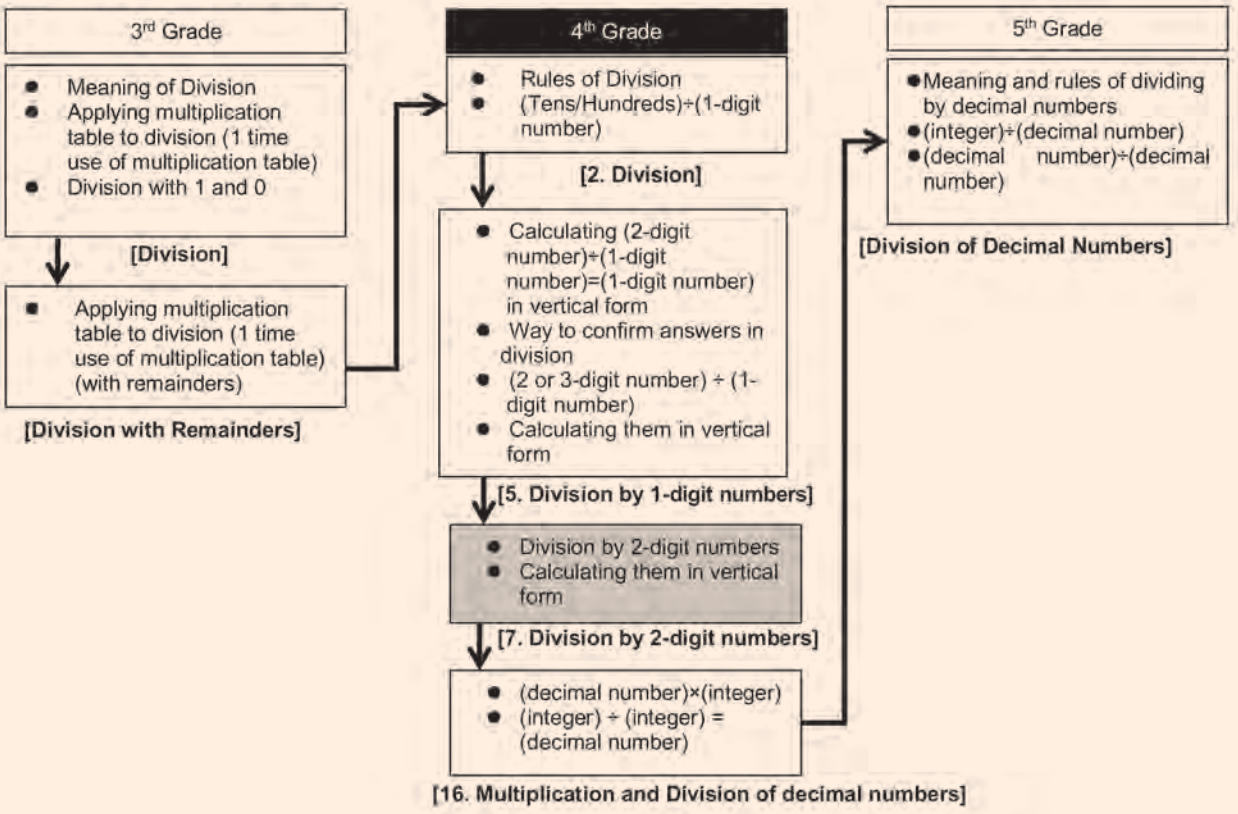
2. Teaching Overview

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

7 Division by 2-digit Numbers

Meaning of division by 2 digit numbers

There are 6 packets with 10 lollies each.

These lollies are to be divided equally among 20 children.

How many lollies will each child receive?

60 ÷ 20 = ☐
(Total number of lollies) (Number of children) (Number of lollies for each child)

By using the rules of division,
60 ÷ 20
÷2 ÷2
30 ÷ 10
÷5 ÷5
6 ÷ 2
The number of each child is found in the same way as when we divide 6 lollies between 2 children.

If I think of 2 groups of 10 children and divide 6 packets between the 2 groups…

The number we want is the number in ☐ of ☐ × 20 = 60.
If we give 1 lolly to each child,
1 × 20 = 20 and if we give 2 lollies to each child,
2 × 20 = 40 so…

Let's think about how to divide by 2-digit numbers.

☐ ÷ ☐ = 73

1 Division by 2-digit Numbers (1)

How to divide by stacks of 10.

1 There are 80 sheets of coloured paper. Each child receives 20 sheets of paper. How many children will receive the paper?

80 ÷ 20 = 4
(Total sheets of paper) (Number of sheets for each child) (Number of children who will receive paper)

How many sets of 20 are there in 80?

Sare's idea
I think of stacks of 10 sheets,
8 ÷ 2 = 4
(Number of stacks of 10) (Number of stacks for each child) (Number that each child will receive)

Kekeni's idea
By using the rules of division,
80 ÷ 20 = 4
÷2 ÷2
40 ÷ 10 = 4
÷5 ÷5
8 ÷ 2 = 4

The division of 80 ÷ 20 can be reduced to 8 ÷ 2.

Divisions: Divided by stacks of 10 with remainder

2 There are 140 apples. If 30 apples are put in each box, how many boxes are needed and what is the remainder?

140 ÷ 30 = 4 remainder 20

Is the remainder 2 or 20?

There are 2 groups of 10 left.

Exercise

① 60 ÷ 30 = 2
② 160 ÷ 40 = 4
③ 70 ÷ 20 = 3 r10
④ 320 ÷ 60 = 5 r20

74 = ☐ + ☐

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…..

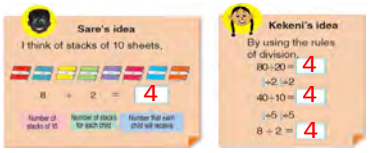
2. Apply rules of division.
By using the rules of division.

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

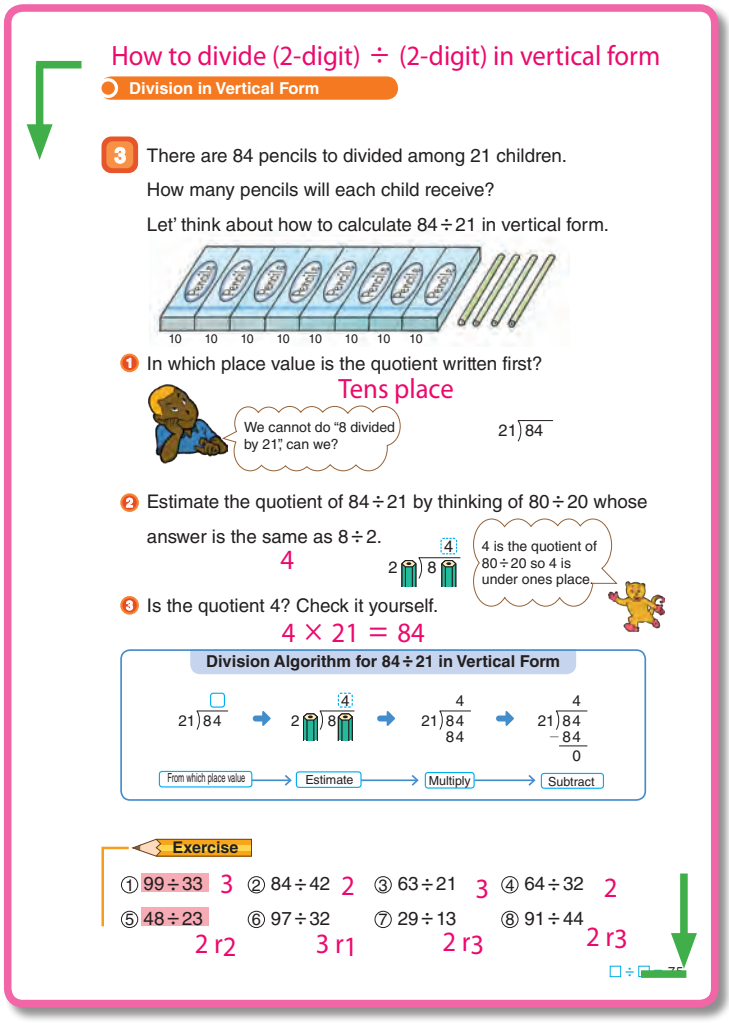
- Think about how to calculate. (2-digit numbers) ÷ (2-digit numbers) considering temporary quotient. F
- Do the exercises correctly. S

• 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.

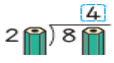
③ **There are 84 pencils to be divided among 21 children. How many pencils will each child receive?**

① **In which place value is the quotient written first? We cannot do "8 divided by 21", can we?**

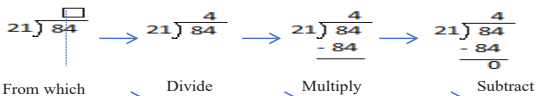
MT

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.

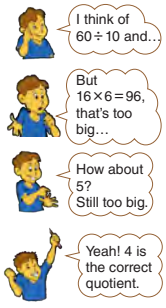
30 is smaller than 33.

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.

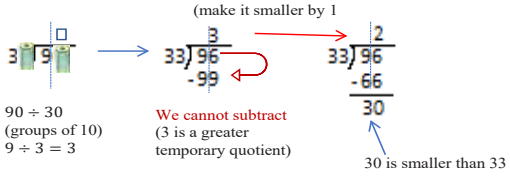
TN Prioritise 1-4. The rest can be given for homework.

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.

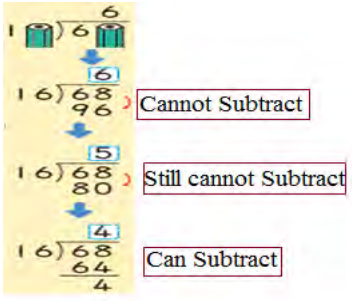
4 Let's think about how to divide 96 ÷ 33 in vertical form.



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 → 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 → 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.

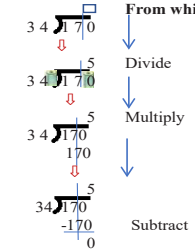
S Complete the next two exercises 3 - 5. The rest can be given for homework.

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



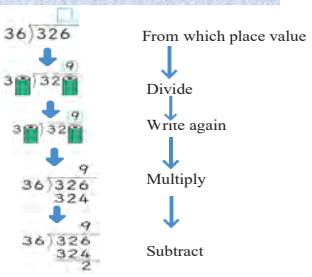
Answer is 5.

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?

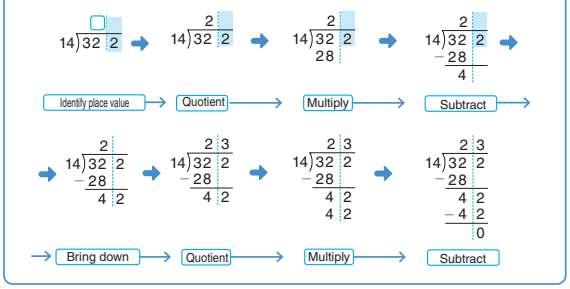
Number of stacks of 10 / Number of single sheets

$$14\overline{)32\,2}\quad -28\quad 4$$

$$14\overline{)32\,2}\quad -28\quad 4\,2$$

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.

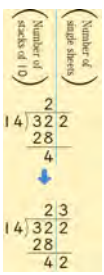
Sample Blackboard Plan

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.

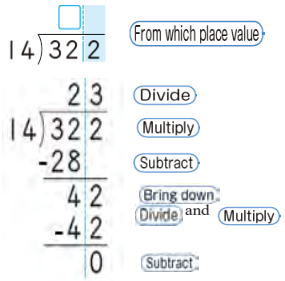
1 There are 322 sheets o f crafting paper. They are able to be divided equally among 14 children. How many sheets of paper will each child receive?

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

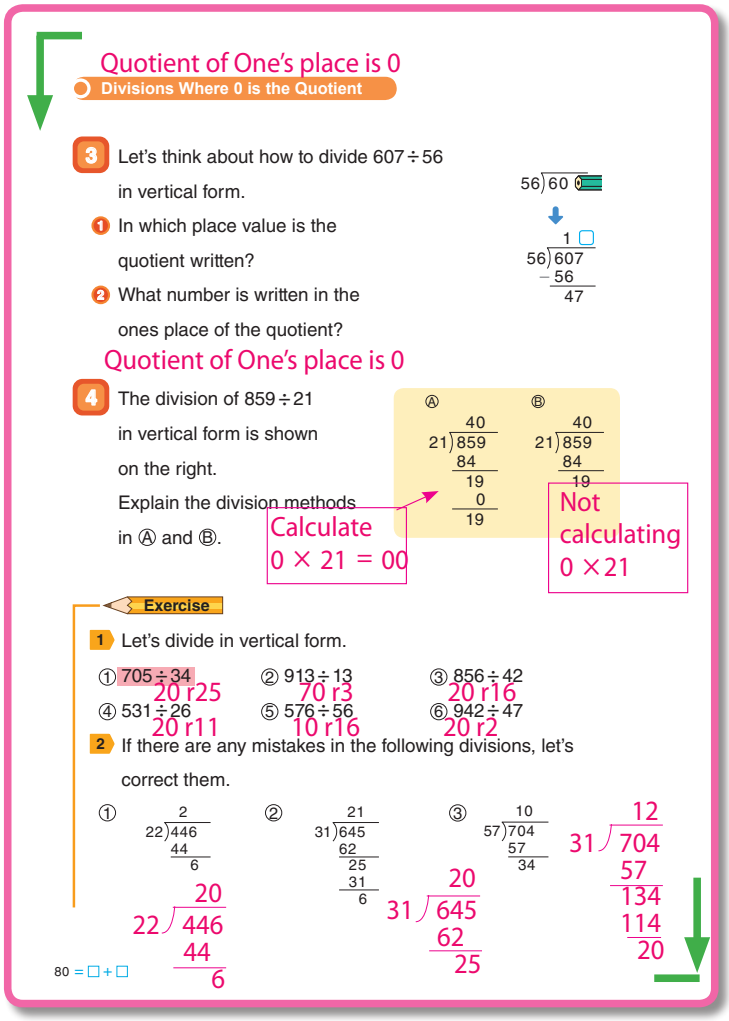
- Charts of steps of vertical division and identifying quotient.

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.



Quotient of One's place is 0

Divisions Where 0 is the Quotient

3 Let's think about how to divide 607 ÷ 56 in vertical form.

56)60

1 □
56)607
−56
47

1 In which place value is the quotient written?

2 What number is written in the ones place of the quotient?

Quotient of One's place is 0

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
0
19

Ⓑ
40
21)859
84
19

Calculate 0 × 21 = 00

Not calculating 0 × 21

Exercise

1 Let's divide in vertical form.

① 705 ÷ 34 — 20 r25
② 913 ÷ 13 — 70 r3
③ 856 ÷ 42 — 20 r16
④ 531 ÷ 26 — 20 r11
⑤ 576 ÷ 56 — 10 r16
⑥ 942 ÷ 47 — 20 r2

2 If there are any mistakes in the following divisions, let's correct them.

①
2
22)446
44
6

20
22)446
44
6

②
21
31)645
62
25
31
6

20
31)645
62
25

③
10
57)704
57
34

12
31)704
57
134
114
20

80 = □ + □

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.

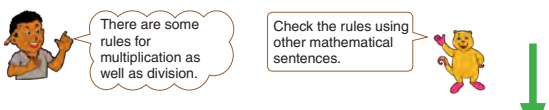
When we do division problems, the quotient remains the same even if the dividend and divisor are **multiplied** by the same number. The quotient remains the same even if the dividend and divisor are **divided** by the same number.

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
×□ ×□
80 × 3 = 240

❷ 80 × 3 = 240
÷□ ÷□
40 × 6 = 240

❸ 40 × 6 = 240
×□ ×□
80 × 6 = 480

❹ 80 × 6 = 480
÷□ ÷□
40 × 6 = 240

❺ 40 × 6 = 240
×□ ×□
40 × 12 = 480

❻ 40 × 12 = 480
÷□ ÷□
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?

113 ÷ 12 = 9 remainder 5. Therefore, 9 eggs equally shared and 5 remaining. Page 73

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?

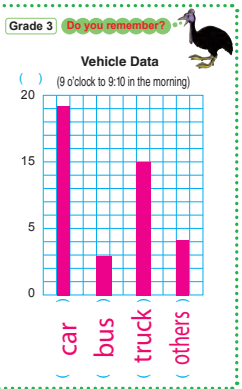
7m 60cm = 760 cm
760 ÷ 5 = 152 tapes and 0 remainder. Page 81

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.

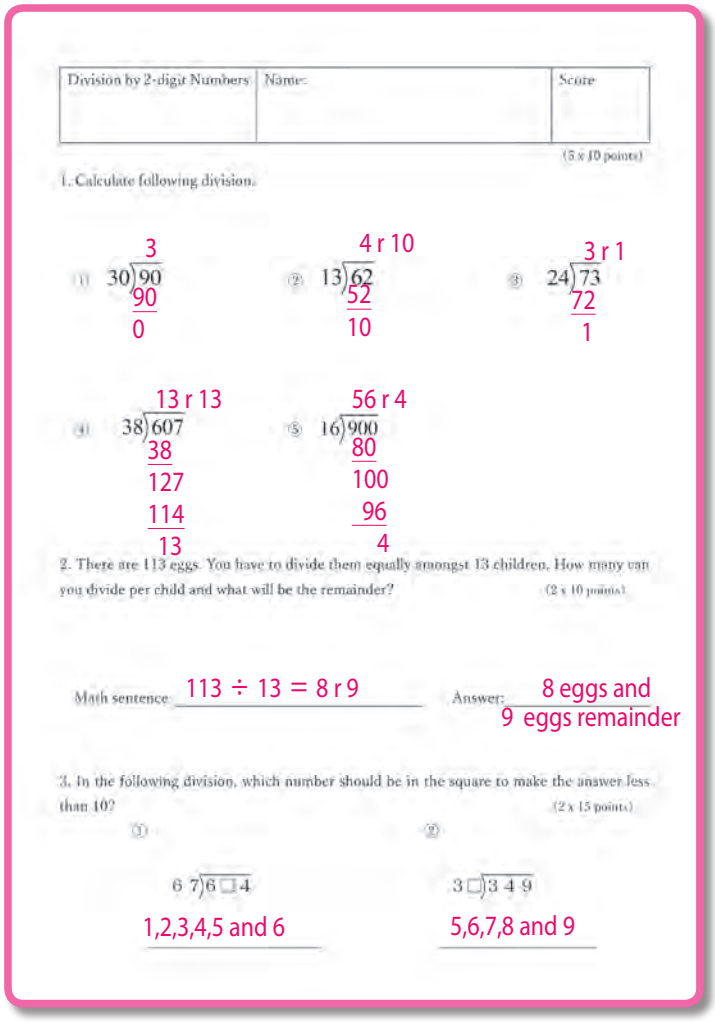
S Confirm to divide the number of eggs so that 113 eggs are divided equally amongst 12 children and then make a mathematical expression.

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)90 → 3, 90, 0

② 13)62 → 4 r 10, 52, 10

③ 24)73 → 3 r 1, 72, 1

④ 38)607 → 13 r 13, 38, 127, 114, 13

⑤ 16)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 67)6□4 → 1,2,3,4,5 and 6

② 3□)349 → 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

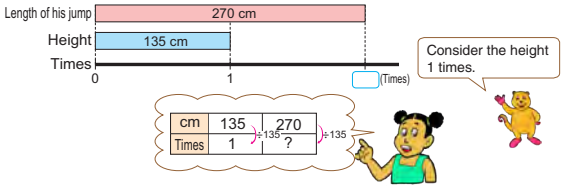
Assessment

- 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?

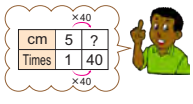


2 Takale who is an athlete jumped 8 m 50 cm in a long jump competition. His height is 170 cm. How many times more than his height did he jump?

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

$6\square\overline{)6\square4}$

_____

②

$3\square\overline{)349}$

_____

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

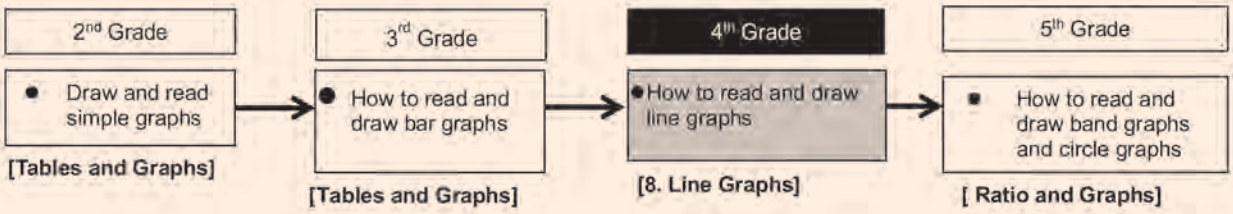
Students learn bar charts in Grade 3. The difference between the original data for bar chart and line graph is single data or time series data. Bar charts enables comparison of the size of data, however, line graphs enable to visualise and help the comparison of periodic change of data.

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

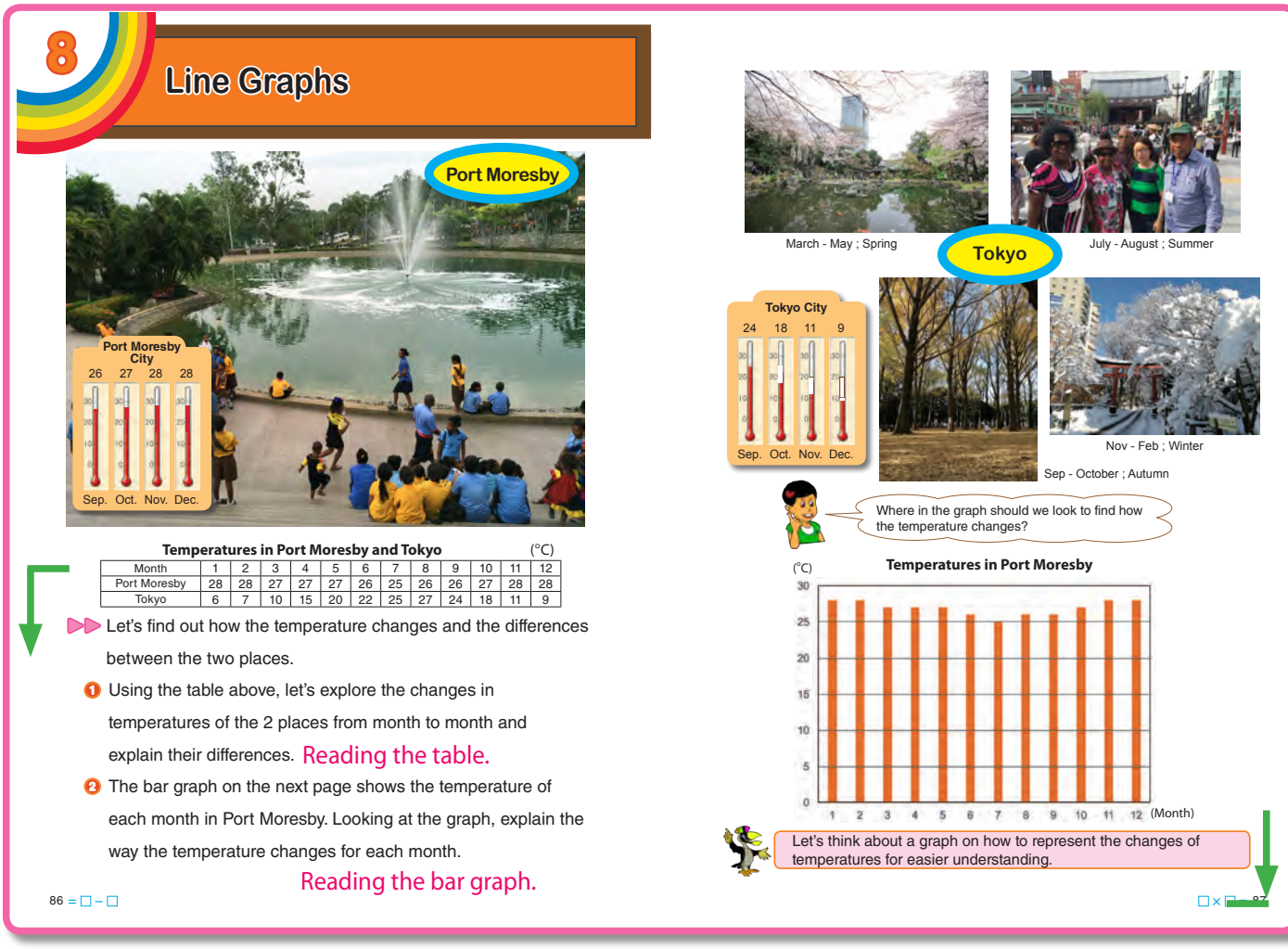
- Reading tables and bar graphs. (Grade 3)
- Comparing tables and Bar graphs. (Grade 3)
- Reading how much is each unit in Graphs (scales). (Grade 3)
- How to draw bar graph. (Grade 3)

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.

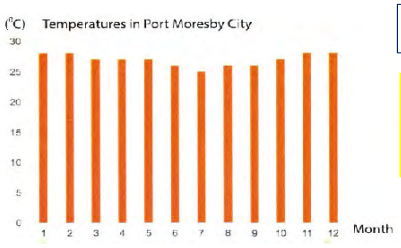
Let's find out the temperature changes and the differences between the two cities.

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

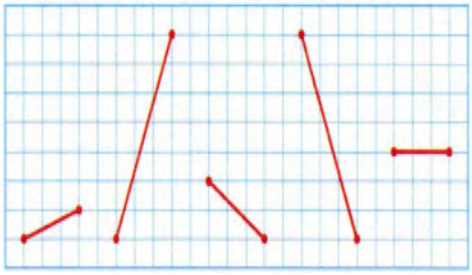
- Refer to the blackboard plan.

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

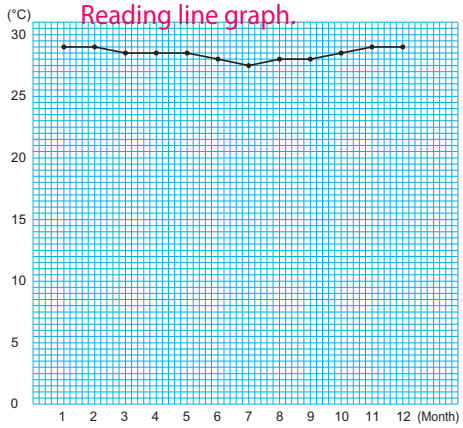
• Teacher's Notes •

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?

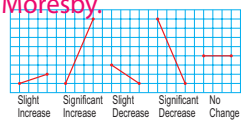
Port Moresby: 28°C January, February, November and December.
Tokyo: 26°C August.

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.

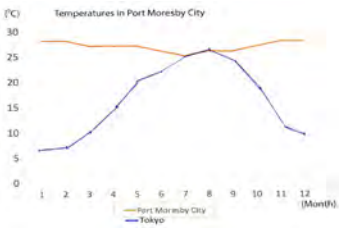
❶ What is represented by the vertical axis and the horizontal axis? Temperature and month.

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.

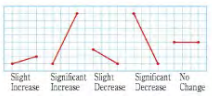
Exercise

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.

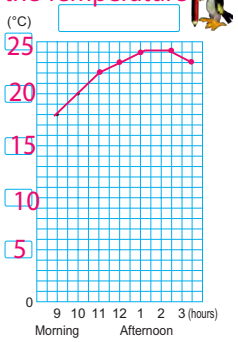
Temperature (16th of September)

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.



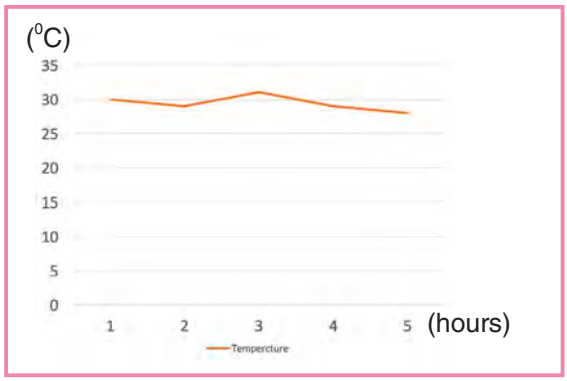
Exercise

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.

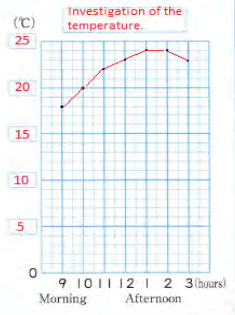
[1] The table shows the data of the temperature in a day. Draw a line graph from this table.

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)

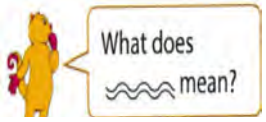
Preparation

- 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 •

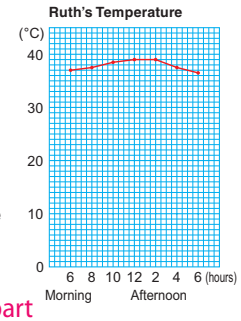


To cut out and omit unnecessary part of the line graph to make scale easier for reading and understanding

The line graph.

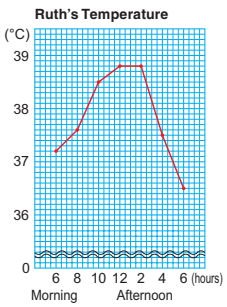
3 Ideas for Drawing Line Graphs

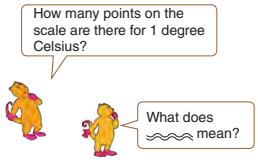
1 Ruth caught a cold. She took her body temperature and expressed it on a line graph.



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.

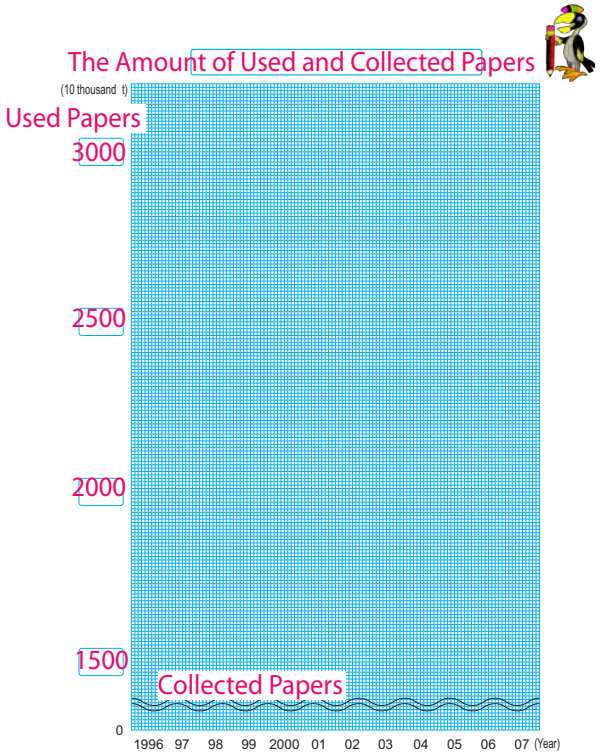




3 By how many °C did her temperature rise between 6 o'clock in the morning and 8 o'clock in the morning?
0.4°C

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.

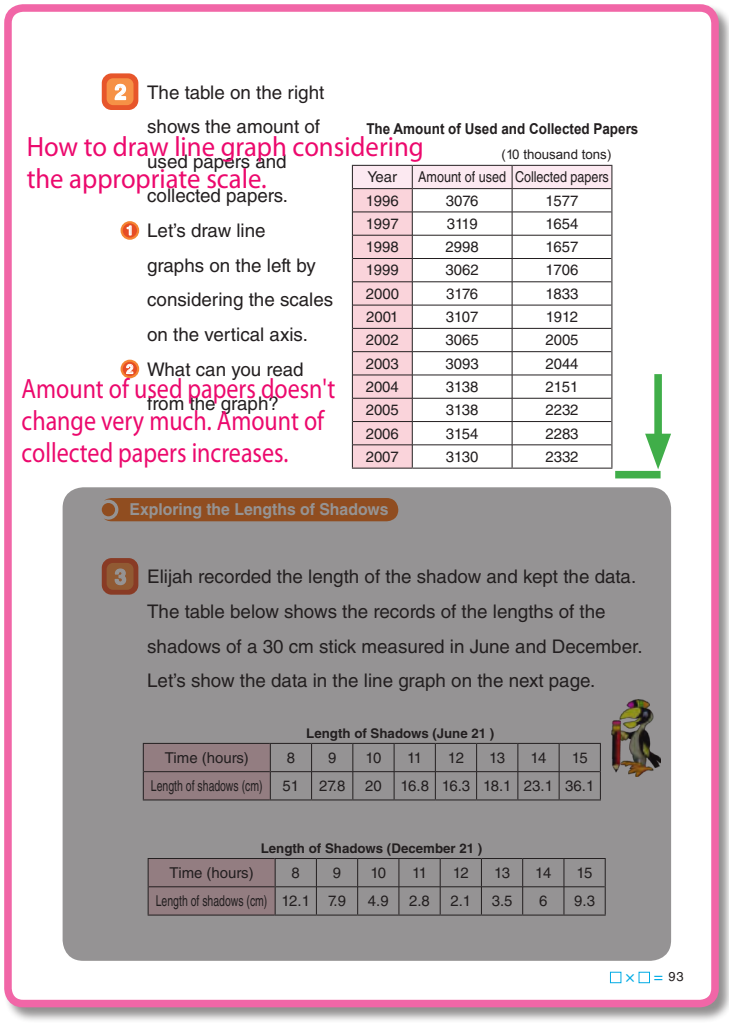
4 2 Observe the table that shows the amount of used and collected papers.

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?

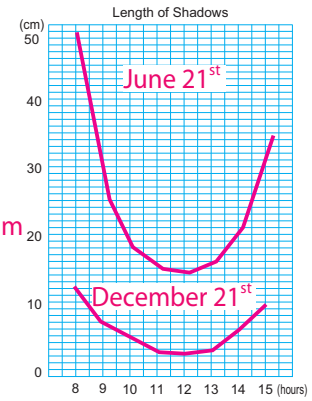
June 21st: 8 am -9 am

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

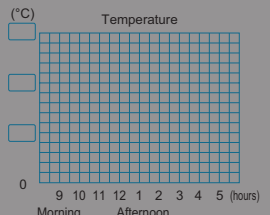
Exercise

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.

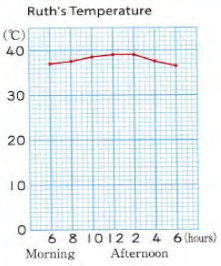
S Solve the activity by presenting and sharing their ideas from what they have noticed from the graph they drew.
T What did you find from two line graphs?
S In both graphs, the length is the longest in the morning and becoming shorter towards noon, again becoming longer in the afternoon.
S The change 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.

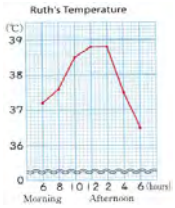
[1] Ruth caught a cold. She took her body temperature and expressed it in a line graph.



❶ What was her temperature in (°C), at 8 o'clock in the morning. About 37.5°C

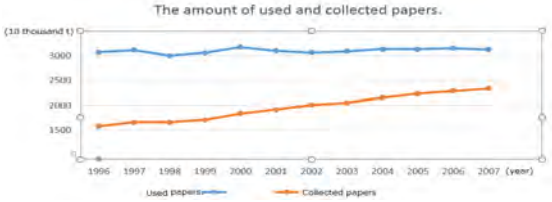
MT: Introduce main task here.

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.

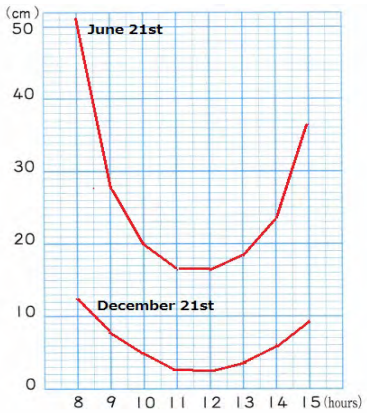
Length of Shadows (June 21)

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

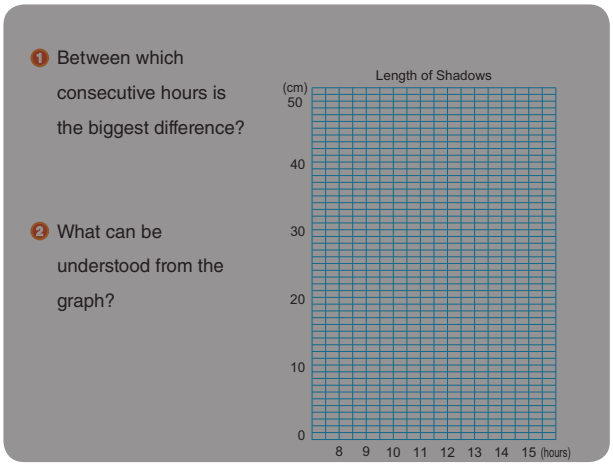
Assessment

- 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

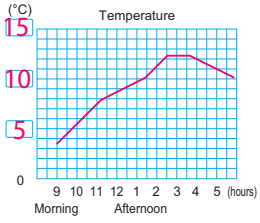
How to draw line graph.

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



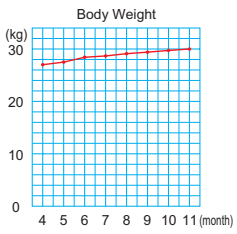
94 = □ − □

Problems

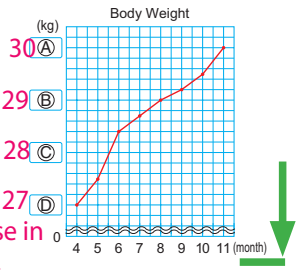
1 Consider the conditions Ⓐ ~ Ⓓ and decide which ones are better expressed as line graphs.
● Understanding the advantages of line graphs.
Ⓐ The heights of the children in your class in April.
Ⓑ Your height as it was measured every April.
Ⓒ The temperature that was recorded at a particular time every 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.

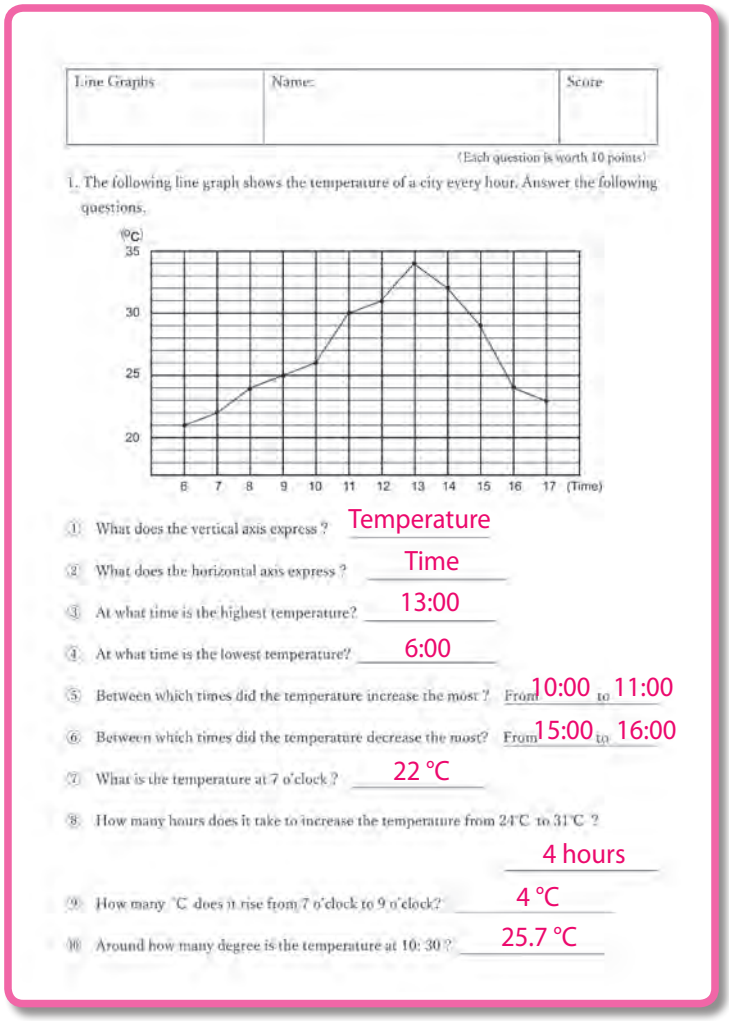
T Have students to do ① by applying what they have learned.
S Complete the exercise.
T Focus on the highest temperature and middle and the lowest temperature to decide units of vertical axis.
T Let students check the graph among themselves.
T Let the students ask themselves to write what they notice 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.

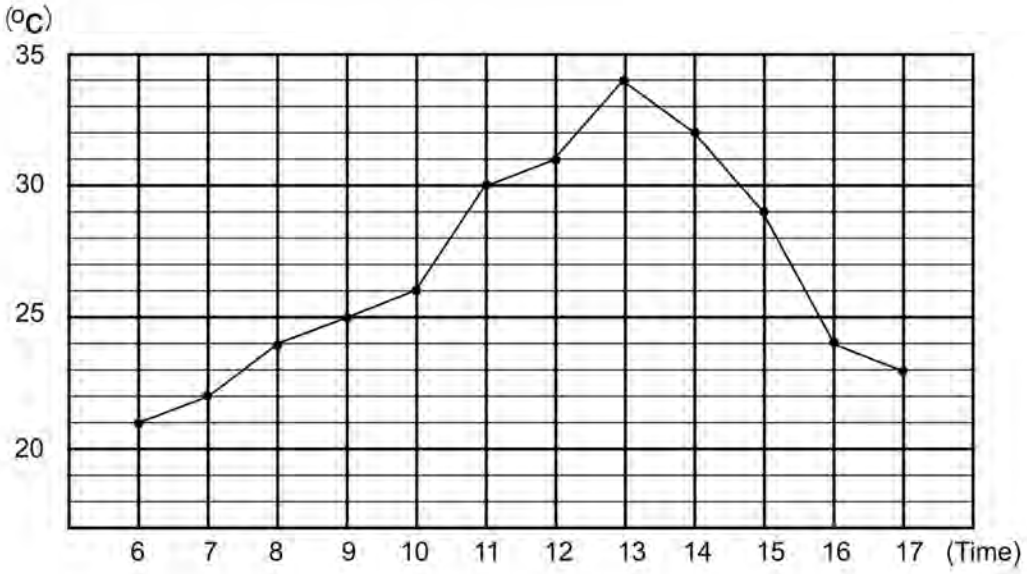
① What does the vertical axis express ? Temperature
② What does the horizontal axis express ? Time
③ At what time is the highest temperature? 13:00
④ At what time is the lowest temperature? 6:00
⑤ Between which times did the temperature increase the most ? From 10:00 to 11:00
⑥ Between which times did the temperature decrease the most? From 15:00 to 16:00
⑦ What is the temperature at 7 o'clock ? 22 ℃
⑧ How many hours does it take to increase the temperature from 24℃ to 31℃ ? 4 hours
⑨ How many ℃ does it rise from 7 o'clock to 9 o'clock? 4 ℃
⑩ Around how many degree is the temperature at 10: 30 ? 25.7 ℃

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°C to 31°C ?

_____

⑨ How many °C 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

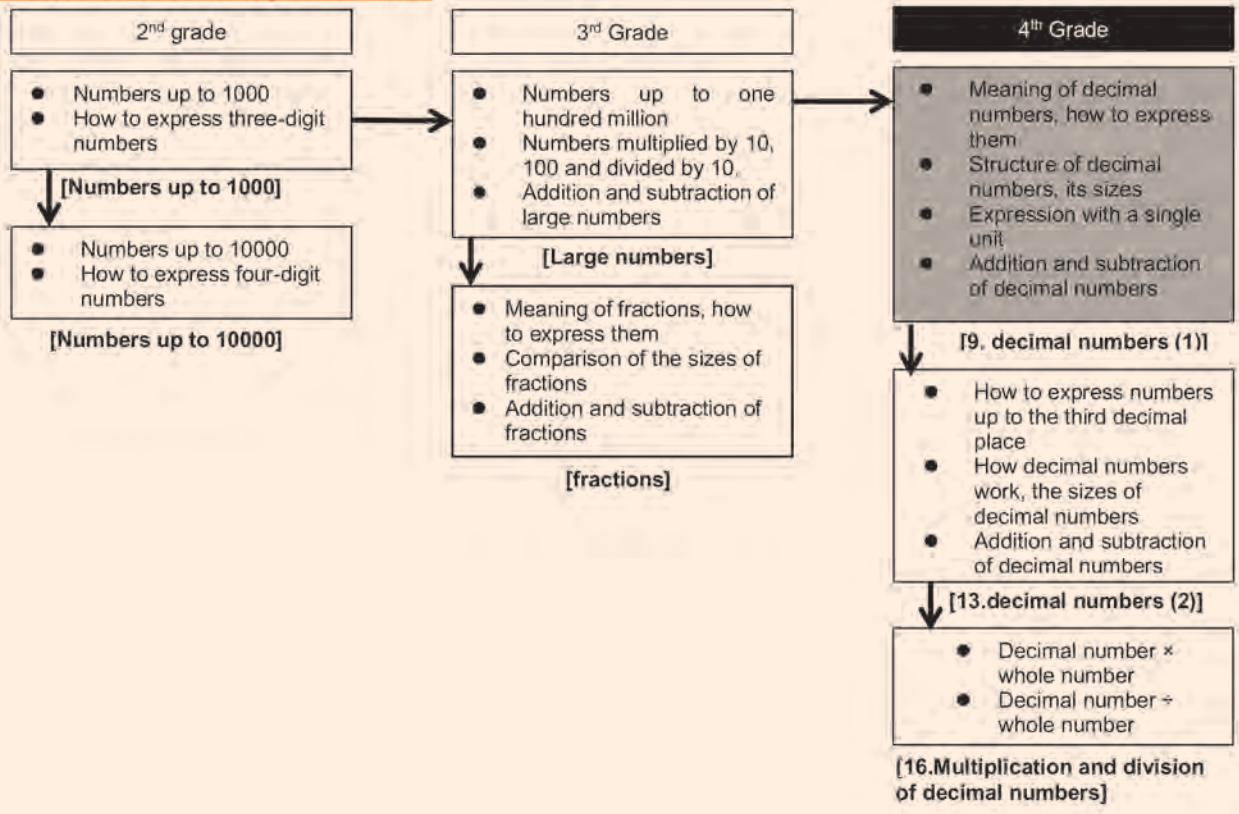
Students are familiar with counting numbers or whole numbers (discrete quantity). In this unit, they learn continuous quantity which are in between 2 consecutive whole numbers. For learning continuous quantities, we deal with length or volume through expressing the remaining part. For example, the length 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.g. 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)

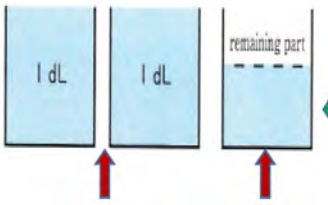
Preparation

- 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 •



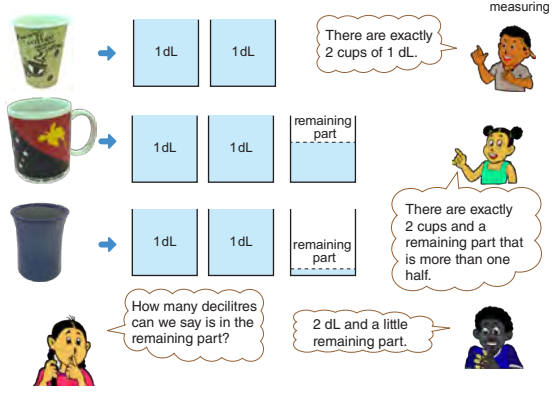
Smaller unit scale developed from 1 dL

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.

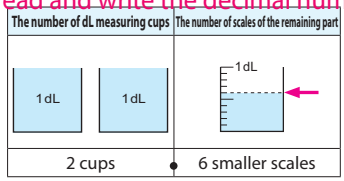
96 = □ ÷ □

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).

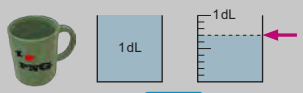
We read this as **"two point six decilitres".**

2 How many decilitres of water are there in the following containers?

1 Clay Coffee cup

. dL

2 Ordinary Coffee cup



. dL

□ × □ = 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.

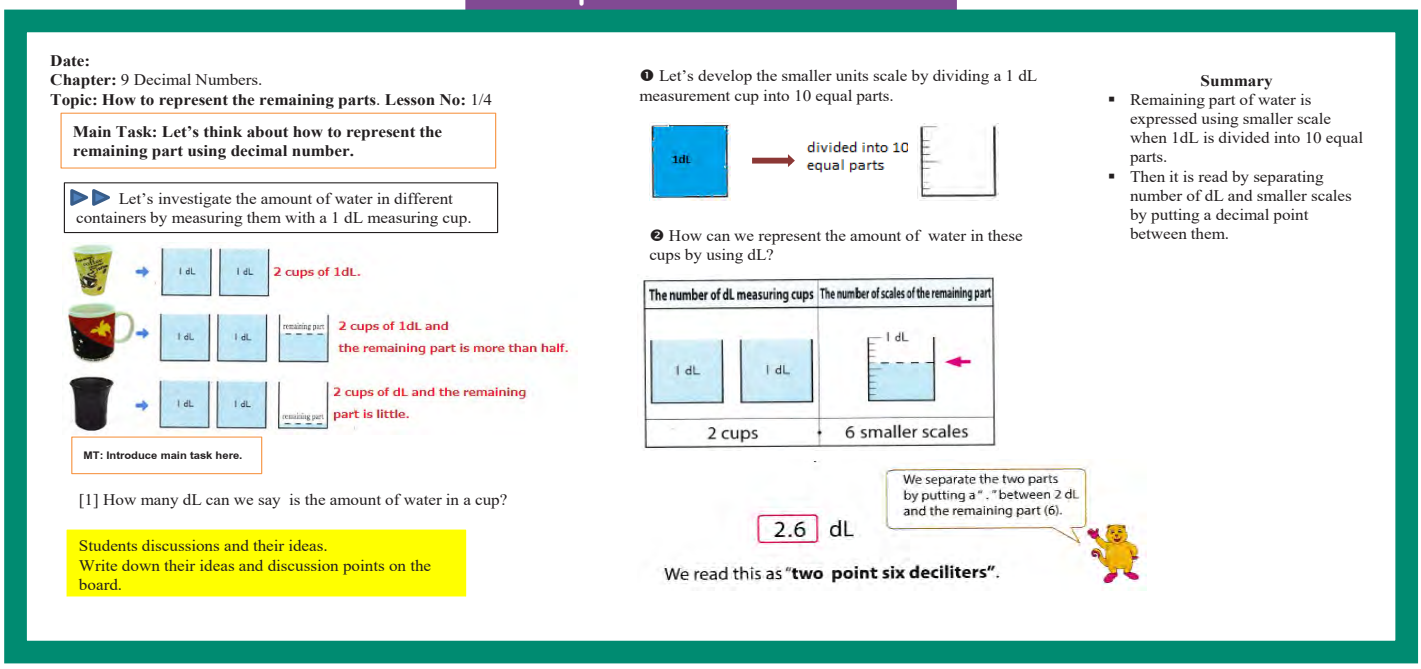
5 ❶❷ Understand how to read and represent the decimal number.

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



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.

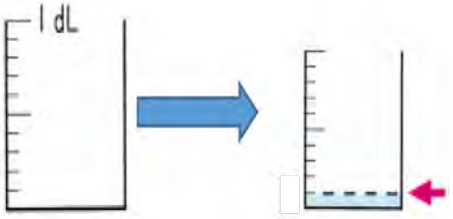
Preparation

- 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 •

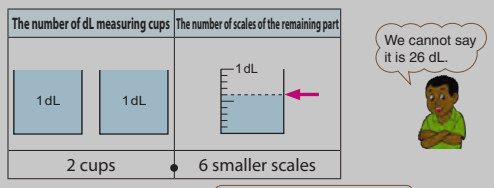


One of 10 equal parts is 0.1 dL.

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".**

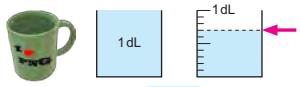
To confirm how to read and write decimal numbers

2 How many decilitres of water are there in the following containers?

1 Clay Coffee cup

2.0 dL

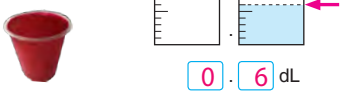
2 Ordinary Coffee cup



1.7 dL

3 How many decilitres of water are there in the following containers?

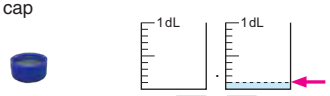
1 Ice block cup



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
...Tenths place
...Decimal point
...Ones place

□ × □ = 97 98 = □ ÷ □

Lesson Flow

1 Review the previous lesson.

2 ❷ ❶ ❷ 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 ❸ ❶ 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 ❸ ❶.

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 ❸ ❷ Write the answer by observing the diagram.

T Have students refer to ❸ ❶ 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 deciliters of water are there in the following containers?

❶ Clay Coffee cup

❷ 

Ordinary Coffee cup

MT: Introduce the main task here.

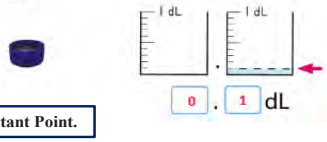
[3] How many deciliters of water are there in the following containers?

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)

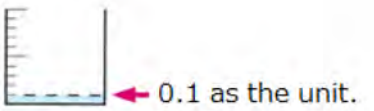
Preparation

- 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 •



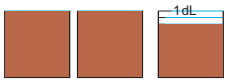
Sets of 0.1

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 ❹❶❷ Read decimal number correctly and colour the amount.

T Introduce the main task.

S Observe and read decimal number in ❶ and ❷ correctly and colour the amount of water using the diagram representation.

3 ❺❶❷❸ Understand 2.4 dL using various representations.

S ❶ Identify in 2.4 dL there are 2 dL and 0.4 dL as the remaining part.

T ❷ Observe the students understanding to colour 2.4 dL on the scale correctly to show the amount of water in the container.

T ❸ 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 ❻ 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.

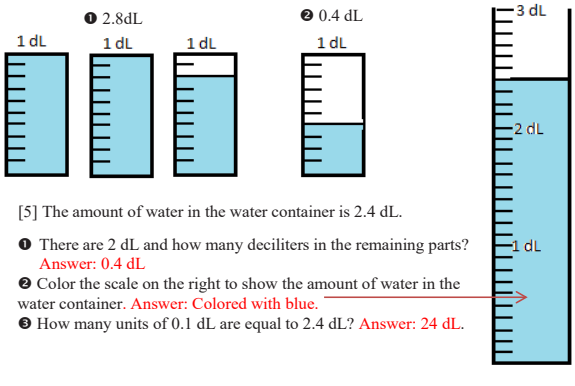
Sample Blackboard Plan

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.

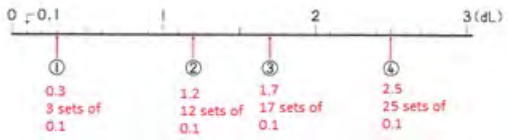
[4] Let's color in the following amounts of water.



[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 2.5 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

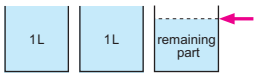
1 set of 10 cm is 0.1m	10cm
2 sets of 10 cm is 0.2m	20cm
3 sets of 10 cm is 0.3m	30cm
4 sets of 10 cm is 0.4m	40cm
5 sets of 10 cm is 0.5m	50cm
6 sets of 10 cm is 0.6m	60cm
7 sets of 10 cm is 0.7m	70cm
8 sets of 10 cm is 0.8m	80cm
9 sets of 10 cm is 0.9m	90cm
10 sets of 10 cm is 1.00m which is 1m	100cm

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?



What kind of scales should we make?

② How many litres are there?

2 L and 8 sets of the smaller scales.

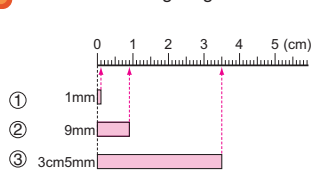
2 . 8 L

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.

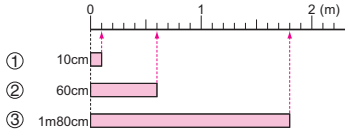
How many sets of 1 mm are in 1 cm?



① 0. 1 cm
② 0.9 cm
③ 3.5 cm

9 Write the following lengths in decimal numbers by using m.

How many sets of 10 cm are in 1 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?

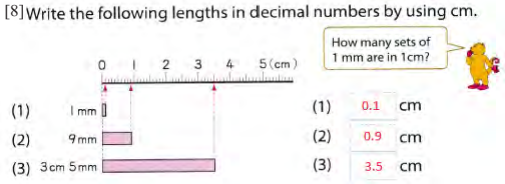
2 . 8 L

❷ How many liters are there?
2 L and 8 sets of the smaller scales.

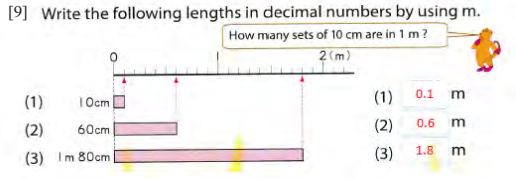
Important Point.

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

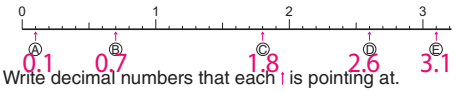
• Teacher's Notes •

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

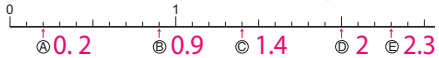
3 Fill in each box with a number.

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.

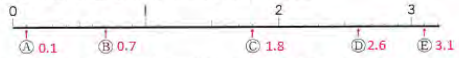
Sample Blackboard Plan

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.



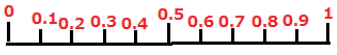
❶ Write decimal numbers that each ↑ is pointing at.

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 •

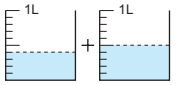
For addition of decimal numbers the application in calculation using vertical from is just like the whole number addition in vertical form.

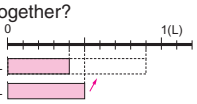
In addition when the sum is 10 or more than 10, carrying is applicable to the next higher place value.

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.

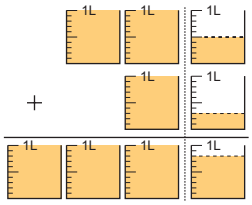
Addition of decimal numbers in vertical form can be done if we line up numbers according to their place value just like whole numbers.

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.

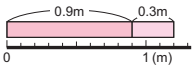
① 0.2 + 0.5 = 0.7 ② 0.8 + 0.1 = 0.9 ③ 3.2 + 1.6 = 4.8 ④ 2.8 + 7.1 = 9.9

102 = □ ÷ □

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

□ × □ = 103

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.

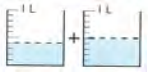
7 Do the exercises.

Sample Blackboard Plan

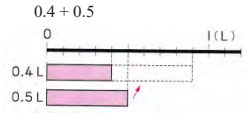
Date:
Chapter: 9 Decimal Numbers.
Topic: Addition and Subtraction of Decimal Numbers. Lesson No: 1/2

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

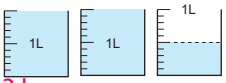
- Solve word problem. F
- Do the exercise correctly. S

• Teacher's Notes •

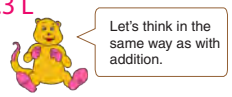
For subtraction of decimal numbers, the application in calculation using vertical from is just like the whole number subtraction in vertical form.
In subtraction when the subtrahend is smaller than the minuend borrowing is applicable to borrow from the higher place values.

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



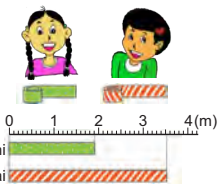
① Think about how many sets of 0.1 are there.

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?



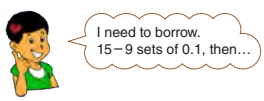
3.5 − 1.9 = 1.6

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.

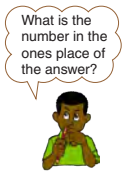
① 0.7 − 0.3 0.4
② 0.9 − 0.6 0.3
③ 3.9 − 1.5 2.4
④ 6.7 − 1.4 5.3
⑤ 2.8 − 0.5 2.3
⑥ 4.1 − 1.7 2.4
⑦ 5.4 − 2.5 2.9
⑧ 2.8 − 0.9 1.9

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

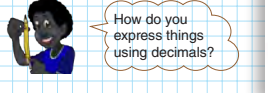
Let's subtract in vertical form.

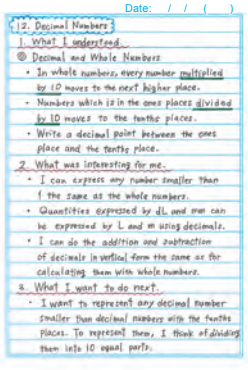
① 2.4 − 1.6 0.8
② 1.5 − 0.9 0.6
③ 3 − 1.2 1.8
④ 2 − 0.7 1.3

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.

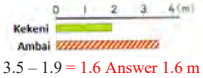
MT: Introduce the main task here.

[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
$$\begin{array}{r} 2.5 \\ -\ 1.2 \\ \hline 1.3 \end{array}$$

[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
$$\begin{array}{r} 3.5 \\ -\ 1.9 \\ \hline 1.6 \end{array}$$

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

$$\begin{array}{r} 4.2 \\ -\ 3.8 \\ \hline 0.4 \end{array}$$

(2) 4−1.8

$$\begin{array}{r} 4.0 \\ -\ 1.8 \\ \hline 2.2 \end{array}$$

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.

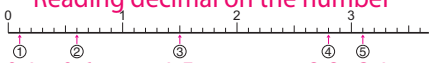
④ 27 sets of 0.1 cm is 2.7 cm.

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.

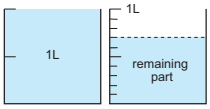
④ An isosceles triangle with sides of 7 cm, 7 cm and 5 cm.

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 3.372 < 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 rope, 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

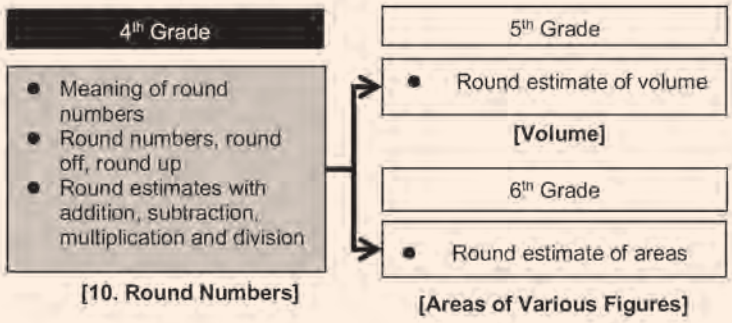
In this unit, students understand significance of rounding numbers and how to round them to enable them to utilise the round numbers in daily situations. Activities based on real life situations will help them to develop the attitude and habit of utilising round numbers. Students may have such misconceptions 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

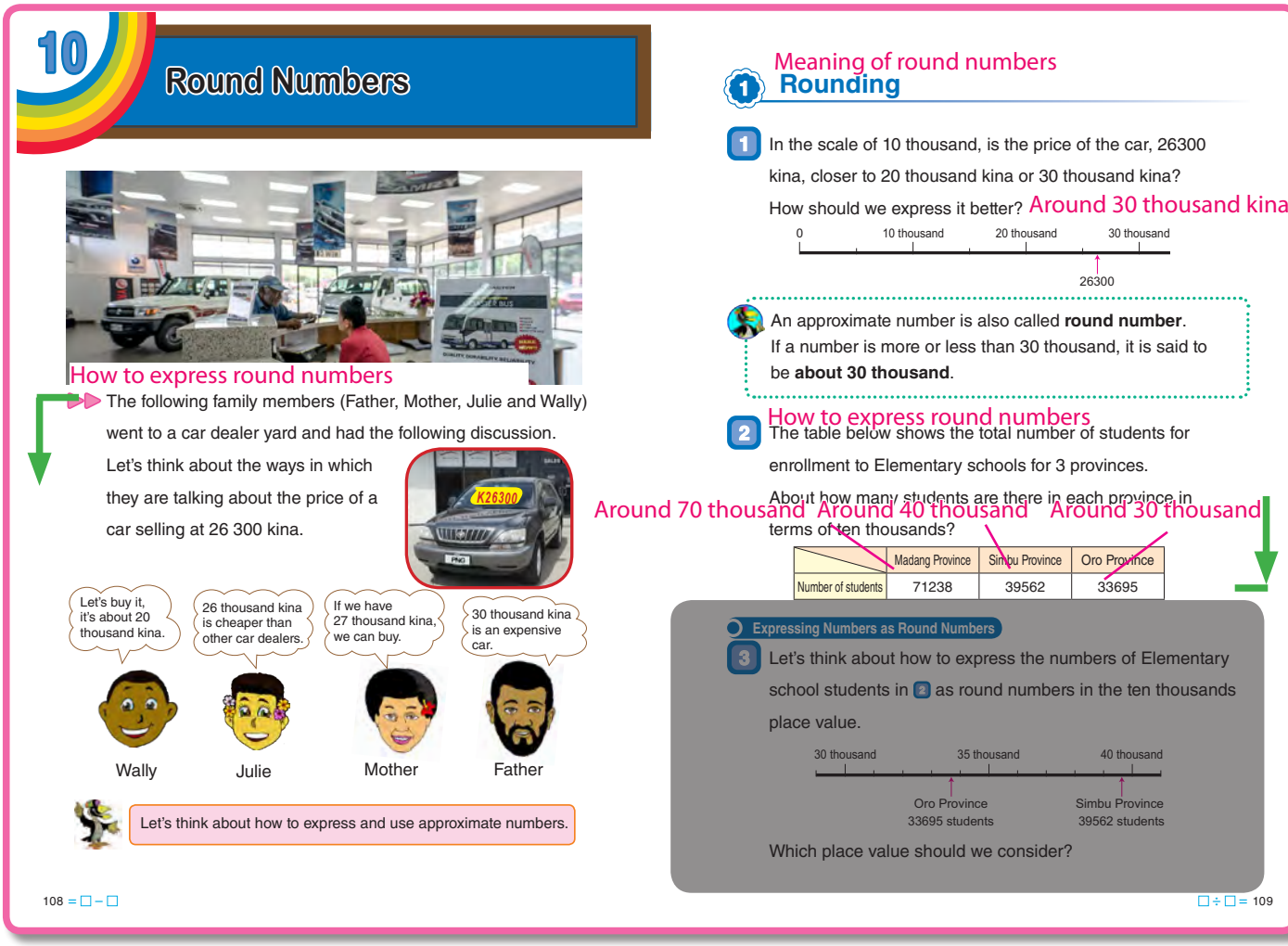
- Large Numbers. (Grade 4)
- The structure of large numbers. (Grade 3)
- 10 Times, 100 Times, and Divided by 10. (Grade 3)
- Addition and Subtraction. (Grade 3)

Preparation

- Strip of paper for Number line

Assessment

- Think about how to express approximate numbers. F
- Understand the meaning and term 'round number'. S



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.

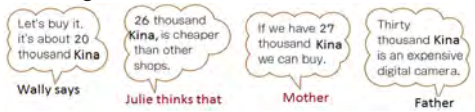
Also, advantages are given as follows:
1. Easy to grasp sizes of numbers.
2. Easy to understand relationship of sizes.
3. Easy to see.
4. Be able to avoid big mistakes.

Sample Blackboard Plan

Date: **Chapter: Round Numbers** **Topic: Rounding** **Lesson: 1 of 3** **Page: 112 and 113.**

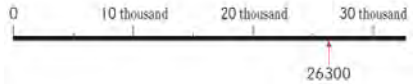
Let's think about how to express and use approximate numbers.

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 •

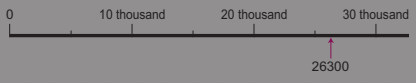
Rounding and Expression
Students can understand well on how to make round numbers by rounding itself. However, in actual problems, sometimes students might get confuse and cannot understand which place value they need to round to because various expressions are used in a sentence. For example, following 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?



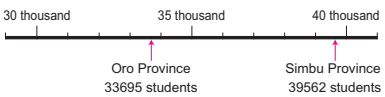
An approximate number is also called **round number**. If a number is more or less than 30 thousand, it is said to be **about 30 thousand**.

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

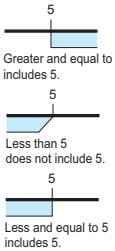
If the number in the thousands place is 0, 1, 2, 3, or 4 as less than 5 we can leave that number unchanged and replace the numbers to the right with 0000.

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.

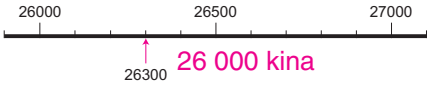
4 Understand about the meaning of "rounding" and terms, "greater and equal to" , "Less than and equal to" , "less than" and greater than.

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.

4 Let's show the price of the car, 26300 kina by rounding to the thousands place using the scale below.



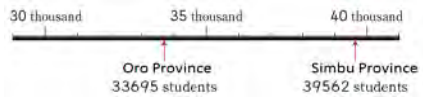
5 The enrollment for Primary schools in Hela and

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.



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.

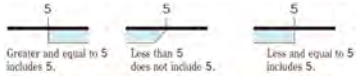
1. If the number in the thousands place is 0, 1, 2, 3, 4, we can leave that number unchanged and replace the numbers to the right with 0000.

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.

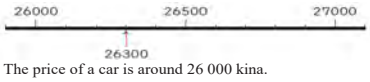
For example
10000
39562 → 40000
About 40 thousand

The method shown above for expressing approximate numbers is called **Rounding** or **Round off**.



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.



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

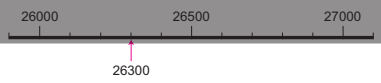
Assessment

- 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.

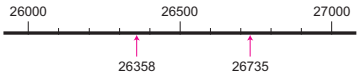
4 Let’s show the price of the car, 26300 kina by rounding to the thousands place using the scale below.



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?

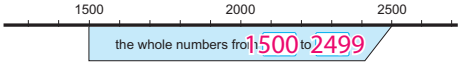
6 Let’s consider the numbers whose round numbers are 2000 when rounding to the nearest thousands.

1. Round the following numbers to the nearest thousands.

1350, 1499, 1500, 1502, 2001
2499, 2500, 2501, 2570, 2608
1000 1500 2000 2000 2000
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.

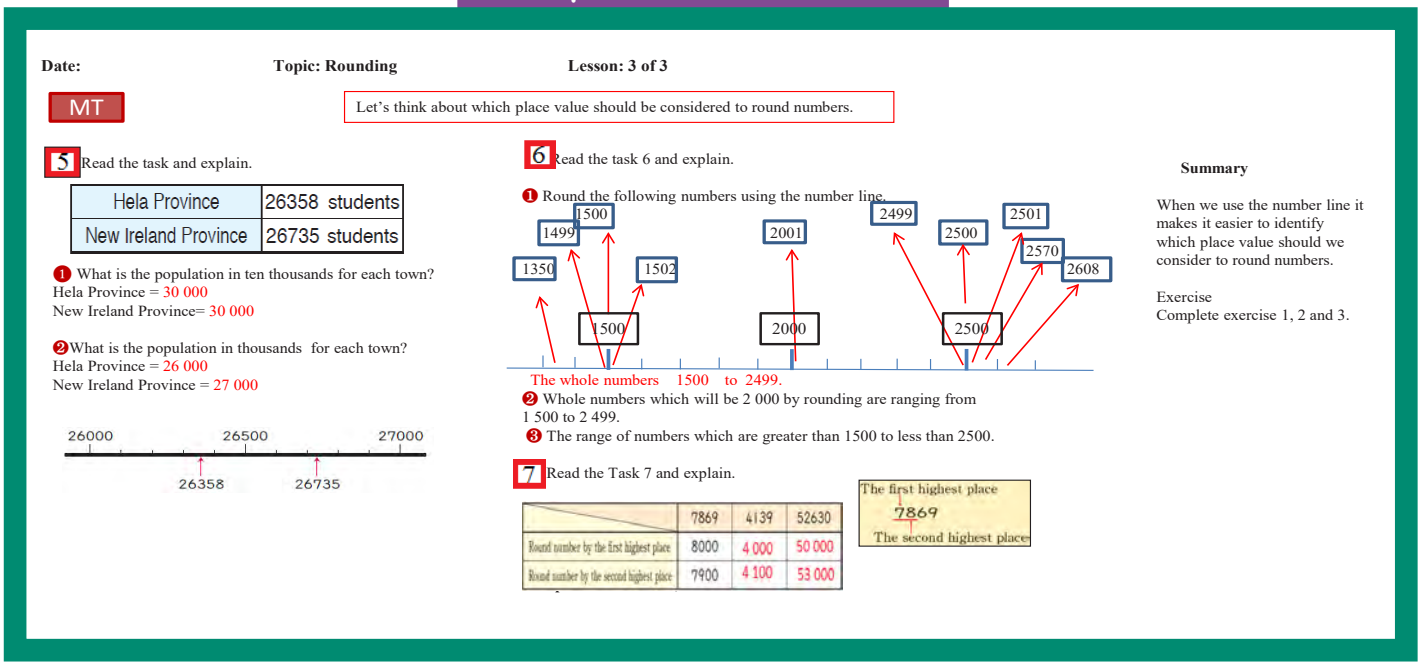
5 Summary

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

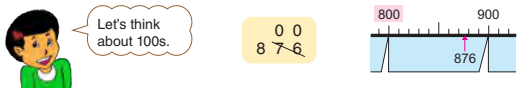
- Understand how to round up and round down to solve problems. F
- Do the exercises correctly. S

• 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.

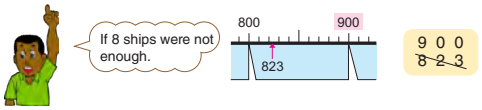
2 Rounding Up and Down

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.

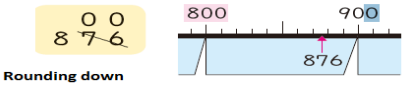
Sample Blackboard Plan

Date: **Topic: Rounding** **Lesson: 1 of 1**

Let’s think about which situations in which we can round up and down.

MT

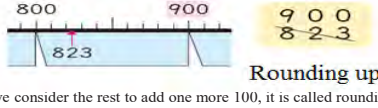
1. There are 876 sheets of papers. If bundling in 100 sheets, how many bundles can we have?



Rounding down

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?



Rounding up

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.
Can they receive a free mobile phone?

Shopping List

Item	Amount (Kina)
Sleeping bag	128
Tent	150
Small generator	1320

100 + 100 + 1300 = 1500 Answer: 1500 kina
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

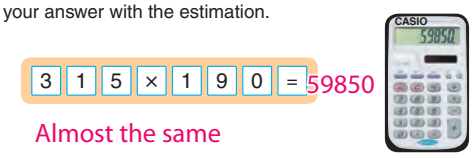
- Calculator

• 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.



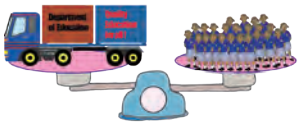
Almost the same

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

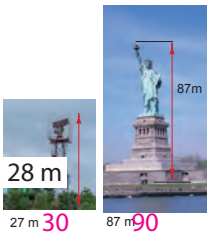
1. Estimate the size of the quotient by rounding the dividend and divisor to their highest places.
   6000 and 40 150
   6000 ÷ 40
   ÷10 ÷10
   600 ÷ 4



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

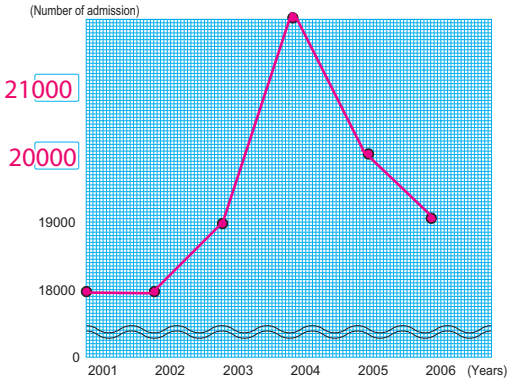
6 Jane's class discussed about the Malaria cases in PNG. The table below shows the numbers of Malaria admissions for all ages in PNG.
Let's draw a line graph.

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.

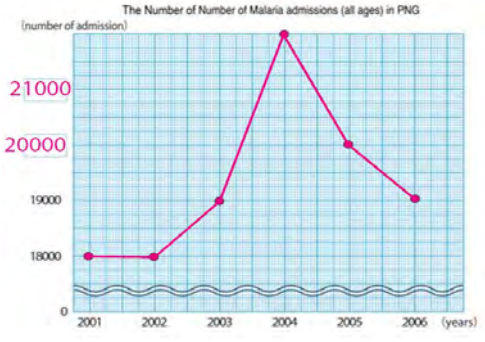
Jane’s class discussed about Malaria cases in PNG. The table below shows number of Malaria admissions for all ages in PNG.

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

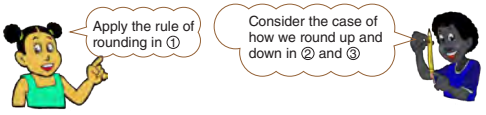
38478, 37400, 38573, 37501

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 36000 40000 ② 43759 44000 40000 ③ 239500 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 5000 4600 ② 62175 60000 62000 ③ 832760 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?

_____