Mathematics

Teacher's Manual

Grade 6

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

First Edition

Published in 2020 by the Department of Education, Papua New Guinea.

ISBN 978-9980-905-20-8

Acknowledgements

The Grade 6 Mathematics Teacher's Manual was developed by the Curriculum Development Division in partnership with the Mathematics specialists from Japan through the **Project for Improving the Quality of Mathematics and Science Education** known as **QUIS-ME Project**.

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

The Curriculum Panel (CP) 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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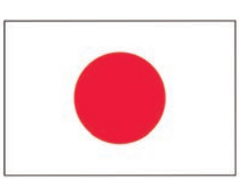

From
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Table of Contents

Secretary's Message

Dear Teacher,

The Mathematics Teacher's Manual is produced for Grade 6 teachers to guide them to plan and teach the Mathematics lessons jointly with the National Grade 6 Mathematics Textbook. It is designed for quality teaching and learning to achieve the implemented curriculum outlined in the Mathematics Syllabus.

The Teacher's Manual provides suitable teaching and learning strategies, content, concepts and plans for teachers to promote and maintain standard lessons for daily, termly and yearly teaching and learning activities nationwide. It guides critical thinking and problem solving approaches in which the teacher 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 assess.

The Teacher's 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. It guides teachers to deliver lessons to promote enjoyment and love of mathematics.

Some teachers are confident in teaching Mathematics while others find it challenging. 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, the teacher 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 6 Mathematics to be used with the National Textbook as an official teaching resource in all primary schools throughout Papua New Guinea.

Dr. Uke Kombra, PhD
Secretary for Education

How to use the Teacher's Manual

Introduction

It is important to understand the composition of the National Textbook in order to use the Teacher's Manual effectively. 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 6, 7 & 8 Mathematics Syllabus. The standards outlined in the syllabus are reflected in this Teacher's Manual to help teachers plan and conduct lessons. The Preliminary pages of the Teacher's Manual consists of the following 6 sections: **Components of the Teacher's Manual, Lesson Presentation using Textbook and Teacher's Manual, How to Use the Blackboard Plan, How to Conduct Assessment, Attachments and Yearly Overview.** It is important for you to take time to read and understand how to use the Textbook and theTeacher's Manual.

1. Components of the Teacher's Manual

1.1 Composition of the National Textbook

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

1. Chapter Heading Colours

Heading colour changes to assist teachers to recognise each teaching term.

2. Titles and Numbers

Each chapter consists of Chapter and Sub-chapter titles with numbers. All problems in the textbook have Tasks and Activities including by numbers. 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. Ice breaking Activity Symbol

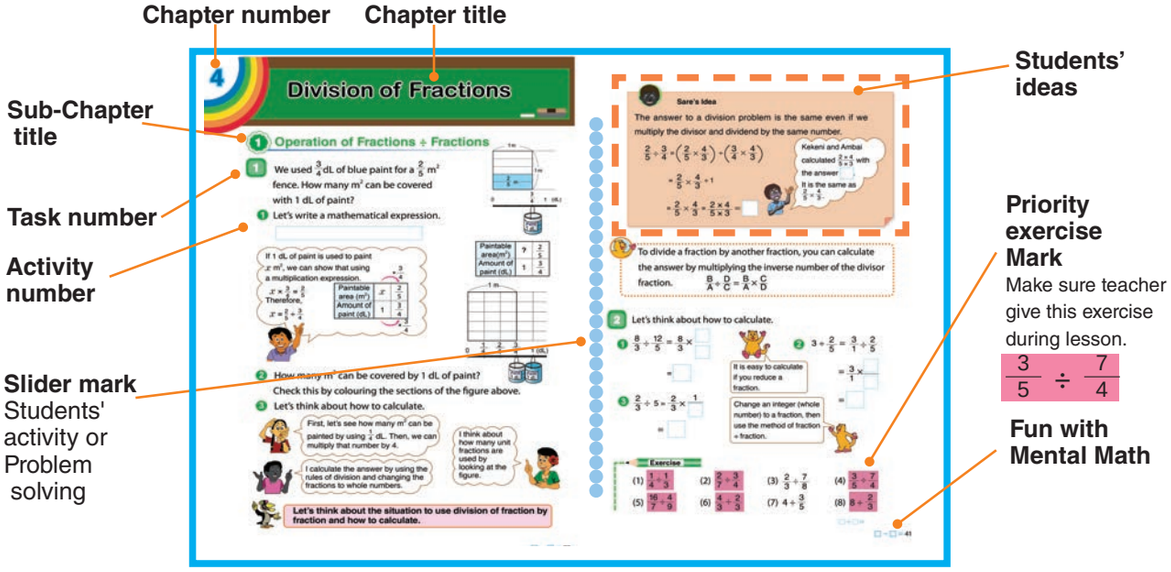
Some chapters have Ice breaking activity as the lead up activity for the chapter.

5. Fun with Mental Math!

$26 = \square \times \square$

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

Sample Textbook Page



Key Competencies acquired through the use of the 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, the textbooks are designed in order to use acquired abilities and skills for future learning contents and daily life situations.

Structure of a Chapter in the Textbook

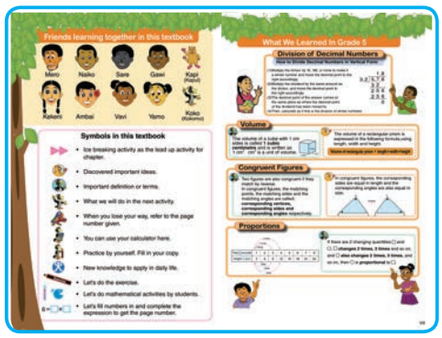
The structure in the Chapter consists of several Sub-chapters, Tasks, Activities, Exercises and ends with a set of Exercise and Problems.

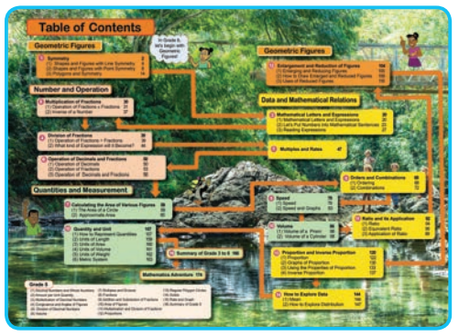
Chapter → Sub- Chapter → Tasks → Activities → Exercise → Exercise, Problems & Evaluation

Parts of the Textbook

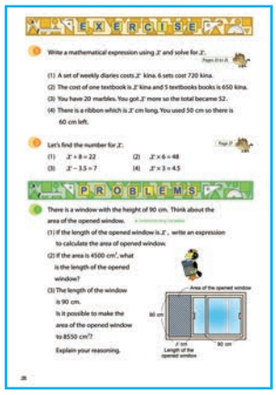
Textbook Introduction Page

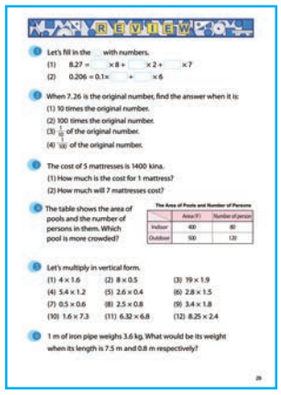
The introduction page consists of two pages which introduces very important information and icons allowing students and teachers to be familiar with what is expected to be encountered in the textbook. It also has chapters learned from previous grade outlined carefully in a table of contents. It promotes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





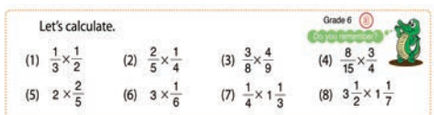
Exercise & Problems





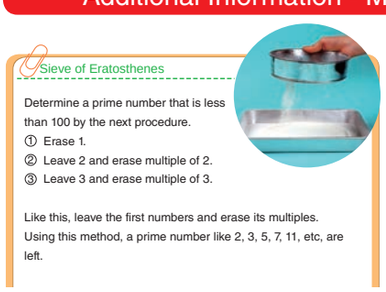
At the end of each chapter, Exercises are set for students to consolidate what has been learned in a particular chapter. Page numbers indicating specific content found for each exercise is tagged beside each exercise.
Problems and Review are placed after each Exercise in each chapter. The problems are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

Revision "Do you remember?"



This section of the textbook is purposely for revision. Before moving on to 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 consolidating of previous content.

Additional Information - Mathematics Extra



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: Lesson Information, Objectives, Prior Knowledge, Assessment, Preparation, Lesson Flow, Teacher's Note, Sample Blackboard Plan and Reduced Textbook page of the lesson. 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.

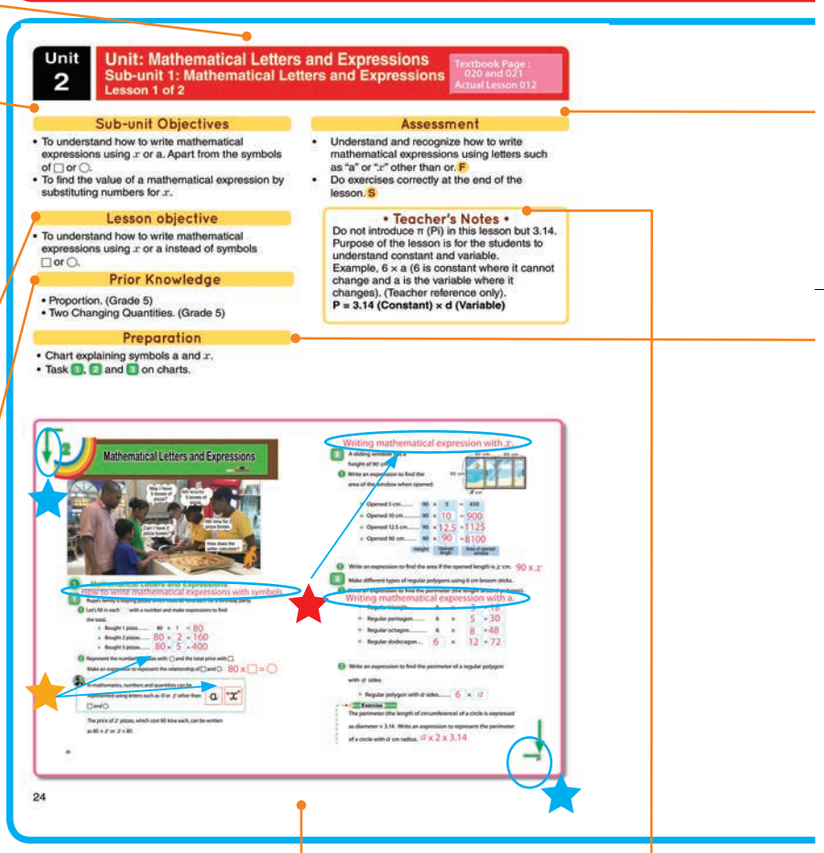
Lesson Objective

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.

Sample Teacher's Manual Page


Unit 2

Unit: Mathematical Letters and Expressions
Sub-unit 1: Mathematical Letters and Expressions
Lesson 1 of 2

Textbook Page : 020 and 021
Actual Lesson 012

Sub-unit Objectives
- To understand how to write mathematical expressions using x or a. Apart from the symbols of □ or ○.
- To find the value of a mathematical expression by substituting numbers for x.

Assessment
- Understand and recognize how to write mathematical expressions using letters such as "a" or "x" other than or. F
- Do exercises correctly at the end of the lesson. S

Lesson objective
- To understand how to write mathematical expressions using x or a instead of symbols □ or ○.

• Teacher's Notes •
Do not introduce π (Pi) in this lesson but 3.14. Purpose of the lesson is for the students to understand constant and variable. Example, 6 × a (6 is constant where it cannot change and a is the variable where it changes). (Teacher reference only).
P = 3.14 (Constant) × d (Variable)

Prior Knowledge
- Proportion. (Grade 5)
- Two Changing Quantities. (Grade 5)

Preparation
- Chart explaining symbols a and x.
- Task 1, 2 and 3 on charts.

Mathematical Letters and Expressions

Writing mathematical expression with x

Writing mathematical expression with a

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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.

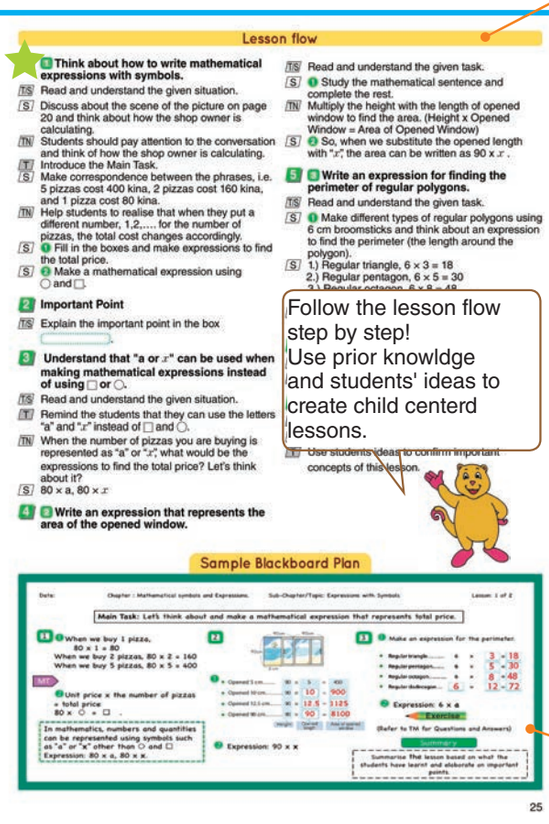
- **Lesson span** : Where the lesson begins and ends is indicated.
- Answers and solutions of the Tasks, Activities, Problems and Exercises.
- Teaching points such as; Purpose of the Tasks, Exercises and Problem types and characteristics of the problem, calculation and concepts.

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.

Assessment

There are two types of assessments in this Teacher's Manual, 'Formative F' and 'Summative S'. The details are shown on page IX.



Lesson flow

1 Think about how to write mathematical expressions with symbols.
T/S Read and understand the given situation.
S Discuss about the scene of the picture on page 20 and think about how the shop owner is calculating.
TN Students should pay attention to the conversation and think of how the shop owner is calculating.
T Introduce the Main Task.
S Make correspondence between the phrases, i.e. 5 pizzas cost 400 kina, 2 pizzas cost 160 kina, and 1 pizza cost 80 kina.
TN Help students to realise that when they put a different number, 1,2,.... for the number of pizzas, the total cost changes accordingly.
S 1 Fill in the boxes and make expressions to find the total price.
S 2 Make a mathematical expression using ○ and □.

2 Important Point
T/S Explain the important point in the box

3 Understand that "a or x" can be used when making mathematical expressions instead of using □ or ○.
T/S Read and understand the given situation.
T Remind the students that they can use the letters "a" and "x" instead of □ and ○.
TN When the number of pizzas you are buying is represented as "a" or "x", what would be the expressions to find the total price? Let's think about it?
S 80 × a, 80 × x

4 Write an expression that represents the area of the opened window.
T/S Read and understand the given task.
S 1 Study the mathematical sentence and complete the rest.
TN Multiply the height with the length of opened window to find the area. (Height x Opened Window = Area of Opened Window)
S 2 So, when we substitute the opened length with "x," the area can be written as 90 x x .

5 Write an expression for finding the perimeter of regular polygons.
T/S Read and understand the given task.
S 1 Make different types of regular polygons using 6 cm broomsticks and think about an expression to find the perimeter (the length around the polygon).
S 1.) Regular triangle, 6 × 3 = 18
2.) Regular pentagon, 6 × 5 = 30
3.) Regular octagon, 6 × 8 = 48

T/S 2 Use students ideas to confirm important concepts of this lesson.

Follow the lesson flow step by step! Use prior knowldge and students' ideas to create child centerd lessons.

Sample Blackboard Plan

Main Task: Let's think about and make a mathematical expression that represents total price.

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Teacher's Notes

Contains supplementary information that is useful to teachers and enhances their content background knowledge as well.

Lesson flow

The 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.

T/S : Instruction for both teacher and students to carry out together.

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 are indicated by the dotted boxes below;

Important Ideas

Important Definitions or Terms

Blackboard Plan

Shows a plan of how the blackboard can be arranged and must be utilised as a guide. Refer to page VIII for more detail.

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

1.3 Other Contents: Chapter Introduction Page

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

1. Content Standard

The Content Standard outlineses the expected content to be attained in this grade and is outlined in the syllabus, comprising of the facts, concepts and ideas that are important for the students.

2. Unit Objective

The 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.

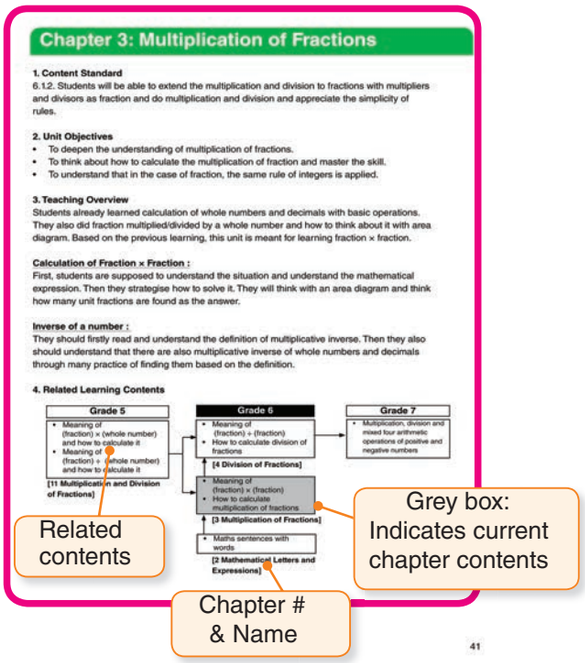
3. Teaching Overview

The 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.

4. Related Learning Content

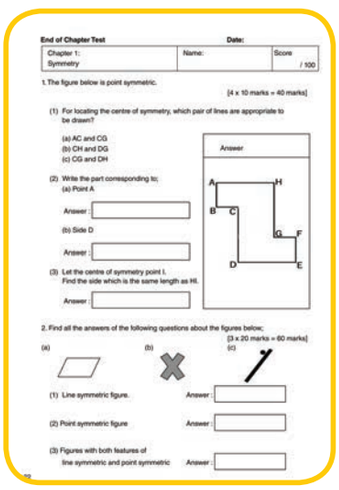
Related Learning Content outlines the content map of what the students have learned already, in-line with the current unit to be taught. The previous content covered will serve as the foundation for students to learn new concepts and contents. Furthermore, the current unit to be learned is also linked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

The three digits such as 5.1.3 represents the grade level (5), strand (1) and the content standard (3).The expansion of the content standard is further outlined in the Unit Objective.

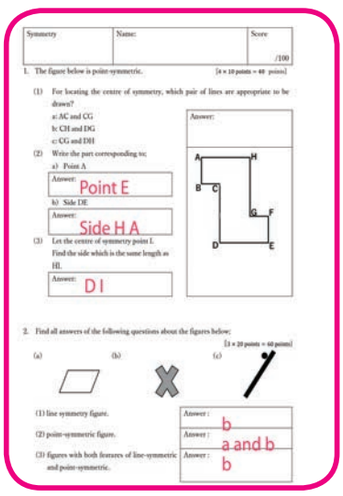


1.4 Other Contents: End of Chapter Test

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. The test should be conducted as **a separate lesson** to confirm students progress or as assessment. Answers to the end of chapter test is located before a page of End of chapter Test as sample on left.



End of Chapter Test



Answers of End of Chapter Test

Please use the evaluation test in each chapter to confirm students' progress and challenge each step for delivering the best lessons!!

2. Lesson presentation using Textbook and Teacher's Manual

In every lesson preparation, teachers should always consider what to do before, during and after the lesson. Both the Teacher's Manual and Textbook 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 Textbook and Teacher's Manual 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 and be familier with the answers to the activities and exercises in advance.
4. Study the lesson flow, 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 Teacher's Manual 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 learned and predict what is expected to be learned in the next lesson.

Must Dos

- Strictly follow Teachers Manual with reference to the Textbook.
- Conduct experimental activities when necessary.
- Expansion of student ideas in the textbook.
- Involve students in outdoor exercises when required to.
- Encourage students to use mathematical tools or instruments appropriately for its purpose.
- Encourage more student interactions.
- 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 Teacher's Manual 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.

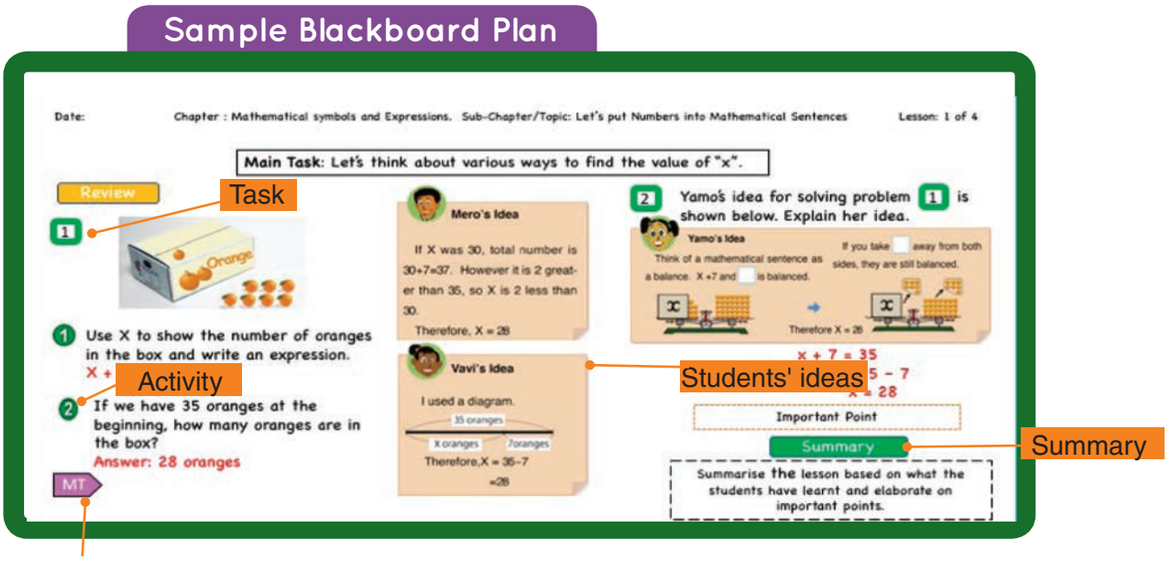
1. Ensure that the whole blackboard is clean.
2. Write Date, Chapter, Topic and lesson number from the top left hand corner to the right.
3. Follow the sequence of the lesson working from left to right according to the blackboard plan including:
   a) Main Task Heading (MT)
   b) Review
   c) Student 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 you 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 learned 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 the whole blackboard to point out important points.

Sample Blackboard Plan



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 are in line with the syllabus assessment to assess the students.
They are:

1. Formative Assessment (Assessment For or As)
2. Summative Assessment (Assessment Of)

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 Teacher's Manual:

- Observation checklists
- Correction of exercises
- Analysis of discussions
- Students' participation.

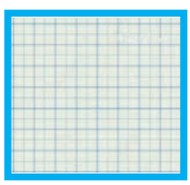
S **Summative assessment**
Summative assessment examples include:

- Exercise and Problems
- End of Chapter Test
- Projects
- Homework and Assignments.

5. Attachments

The Teacher's Manual has four attached pages that the teacher can use when teaching lessons. The pages consist of a Mathematics game information, Contents Chart and dotted grids (5 mm^2 grid, a 1 cm^2 grid, a 1 cm^2) and triangle rulers and a protractor.

1. **Mathematics game information**
2. **Content Chart from Elementary Prep to Grade 8**
3. **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.
4. **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.
5. **1 cm^2 dotted grid**
   The 1 cm^2 dotted grid can be used for drawing various lines, shapes or figures.
6. **Triangle rulers and protractor**
   The triangle rulers and protractor can be used to draw shapes and figures, measure and confirm lengths and angles.



These attachments can be photocopied and given to students when materials are not available in schools.

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.

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.
Column of Uni Names are highlighted by term colours suchas term1: green, term2: blue, term3: orange and tearm 4: Pink.
Finally, page numbers are attached to each lesson to easily identify the lesson topics for planning.
Note: In the Yearly overview, the term 'units' is used while the term 'chapter' is used in the textbook.

Strand	Unit #	Unit Name and Sub-unit Name	Lesson #	Page #
Measurement	7	**Calculating the Area of Various Figures**		**59**
		1. The Area of a Circle	48	59,60
			49	61,62
			50	63
			51	64
		2. Approximate Area	52	65
		Exercise, Problems and Evaluation	53,54	66,67
Data & Mathematical Relations	8	**Orders and Combinations**		**68**
		1. Ordering	55	68,69,70
			56	71
		2. Combinations	57	72,73
			58	74
		Exercise, Problems, Review and Evaluation	59,60	75,76,77
Measurement	9	**Speed**		**78**
		1. Speed	61	78,79,80
			62	81
			63	82
		2. Speed and Graphs	64	83
		Exercise, Problems and Evaluation	65,66	84,85
Measurement	10	**Volume**		**86**
		1. Volume of a Prism	67	86
			68	87
		2. Volume of a Cylinder	69	88
			70	89
		Exercise, Problems and Evaluation	71,72	90,91
Data & Mathematical Relations	11	**Ratio and its Application**		**92**
		1. Ratio	73	92,93,94
		2. Equivalent Ratio	74	95,96
			75	96
			76	97
			77	98
		3. Application of Ratio	78	99
			79	100
		Exercise, Problems, Evaluation and Mathematics Extra	80,81	101,102, 103
Geometric Figures	12	**Enlargement and Reduction of Figures**		**104**
		1. Enlarging and Reducing Figures	82	104,105
			83	106,107
			84	108
		2. How to Draw Enlarged and Reduced Figures	85	109,110
			86	111,112
			87	113
			88	114
			89	115
		3. Uses of Reduced Figures	90	116,117
		Exercise, Review and Evaluation	91,92	118,119

Chapter 1 Symmetry

1. Content Standard

6.3.1. Students will be able to examine symmetrical figures, and find out about their properties, and enjoy constructing symmetrical figures.

2. Unit Objectives

- To deepen the understanding about learning figure through observation and manipulation.
- To understand the definition and characteristics of learning line symmetry.
- To understand the definition and characteristic of learning point symmetry.

3. Teaching Overview

In Grade 6, students observe the features of figures by paying attention to the aspect of symmetry. Students are to analyse the axis, centre, corresponding points and sides of figures through several activities.

Figures with Line Symmetry :

Folding and overlapping activities will help students understand line symmetry. They also should discover that the line between 2 corresponding points are cut perpendicularly by the line of symmetry.

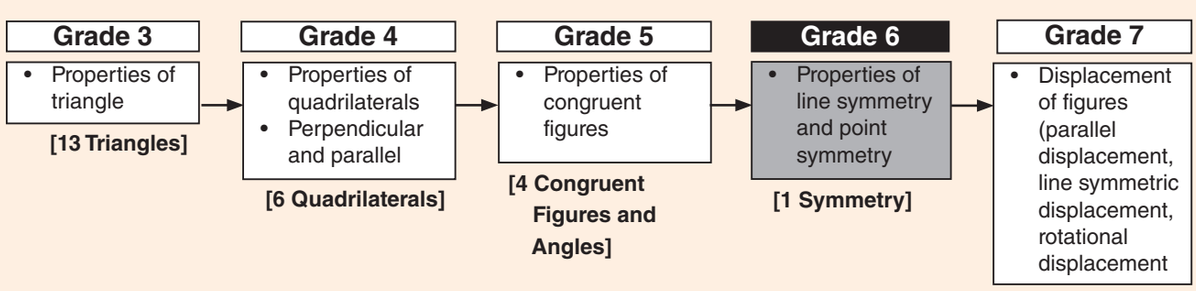
Figures with Point Symmetry:

Rotating activities will help students understand point symmetry. Note that the figure should be cut, not only drawing so that students will see clearly how it is overlapped by rotation. They also should find that the point of symmetry is the mid-point of the line between 2 corresponding points.

Polygons and Symmetry :

They observe the known polygons by the aspects of line and point symmetries.

4. Related Learning Contents



Unit 1

Unit: Symmetry
Sub-unit: 1. Shapes and Figures with Line Symmetry
Lesson 1 of 3

Textbook Pages :
002 to 004
Actual Lesson 001

Sub-unit Objectives

- To understand the definition and characteristics of line symmetry.
- To understand how to draw figures with line symmetry properties.

Lesson Objectives

- To realise that there is a balanced shape through the activities.
- To understand the meaning and definition of line symmetry.

Prior Knowledge

- Properties of quatrilaterals (Grade 4)

Preparation

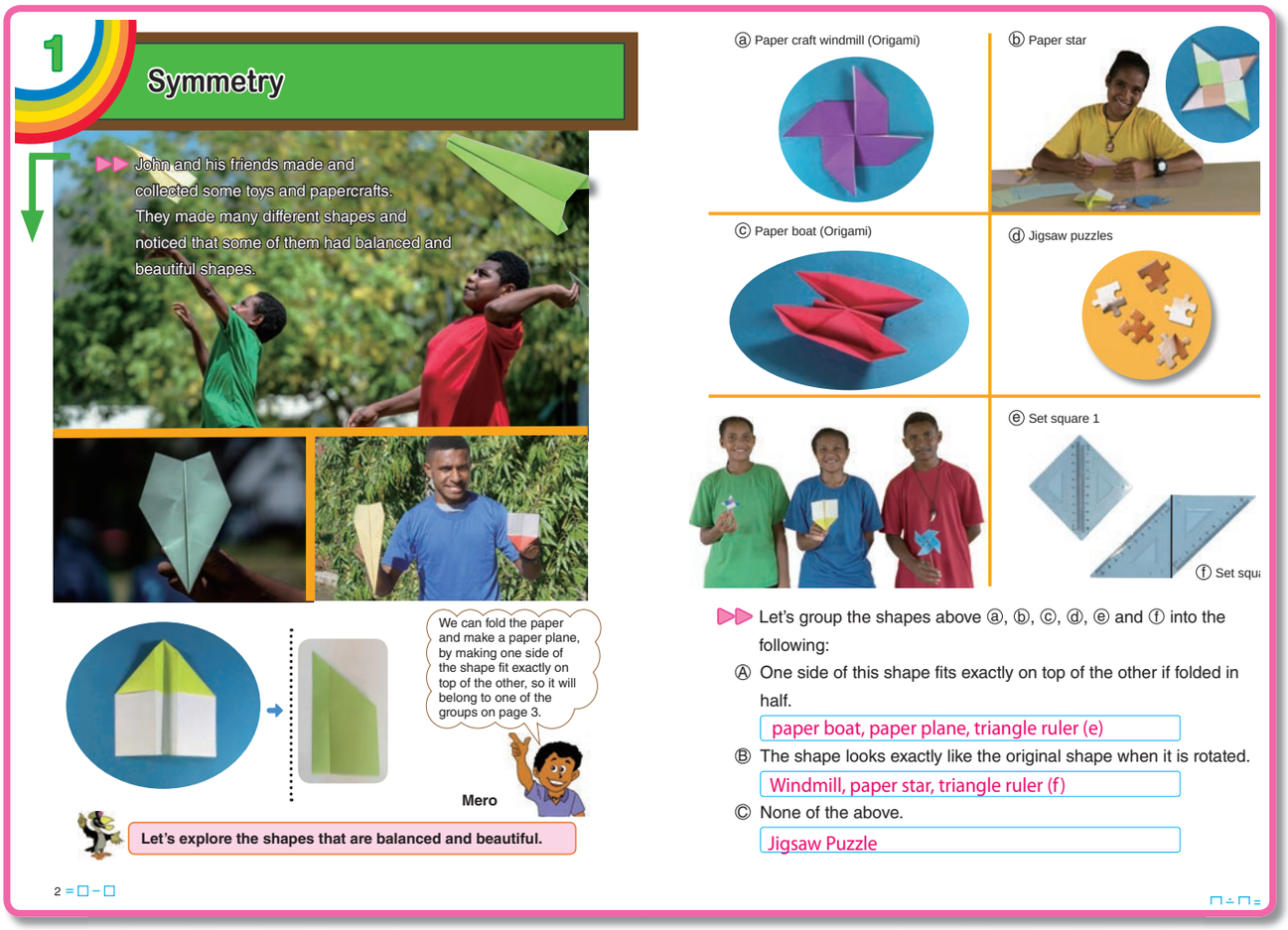
- Task 1 A, B and C on printed paper for manipulation.
- Copies of grid papers.

Assessment

- Identify balanced and beautiful shapes. F
- Define line of symmetry and its characteristics. F
- Draw and understand the line of symmetry. S

Teacher's Notes

Line of Symmetry or Axis of Symmetry is a new concept that the students may have to experience by using the line of symmetry. Assist them to realise that the folding line that the figure makes fits exactly on top of the other is called the line or the axis of symmetry. Teacher may use block letters A M E to explain features of the line of symmetry when folded.



Lesson flow

1 Explore figures that are balanced and beautiful.

T/S ▶▶ Read the situation and study the picture in the textbook.
S Check Mero's explanation in the speech bubble.
S Describe the different shapes in the textbook.
T "What similarities can you notice about these shapes?"
S Observe and share ideas about the figures; "they are the same when folded", "they are same when rotated at one point."
T Introduce the Main Task.
Refer to the Blackboard Plan

2 Categorise the figures.

T/S ▶▶ "Based on the discussions, categorise the figures into sections Ⓐ, Ⓑ and Ⓒ"
S Categorise into:
Ⓐ paper boat, paper star, paper plane, ruler ⓔ
Ⓑ windmill, paper star, ruler ⓕ
Ⓒ jigsaw puzzle

3 Fold figures in half and draw centre line.

T/S ① Read and understand the given situation.
T ① How do you fold figures in Ⓐ, Ⓑ and Ⓒ in half?
S By folding the figure, the left side and right side overlaps and fits exactly.

4 ② Draw shapes that can fit exactly by folding.

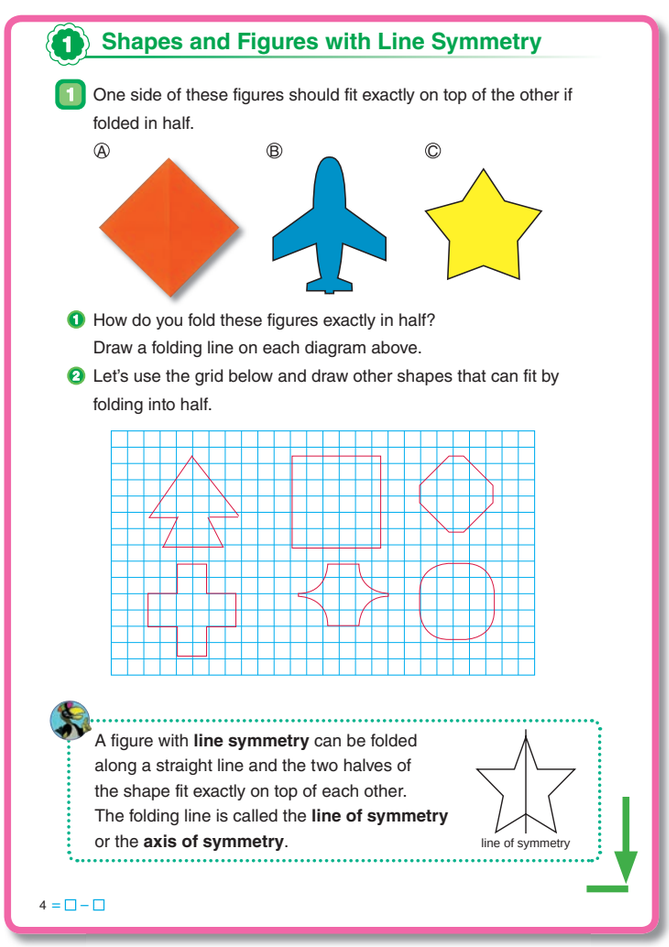
TN Give enough time for students to draw their figures that can fit exactly when folded into half.
S Draw figures that can fit exactly when folded into half.

5 Important Point

T/S Explain the important point in the box ____.

6 Summary

T What have you learned in this lesson?
S Present ideas on what they have learned.
T Use students' ideas to confirm the important concepts of this lesson.



1 Shapes and Figures with Line Symmetry

1 One side of these figures should fit exactly on top of the other if folded in half.

Ⓐ Ⓑ Ⓒ

① How do you fold these figures exactly in half?
Draw a folding line on each diagram above.

② Let's use the grid below and draw other shapes that can fit by folding into half.

A figure with **line symmetry** can be folded along a straight line and the two halves of the shape fit exactly on top of each other. The folding line is called the **line of symmetry** or the **axis of symmetry**.

line of symmetry

4 = □ – □

Sample Blackboard Plan

Lesson 01 Sample Blackboard Plan is on page 5.

Unit 1

Unit: Symmetry
Sub-unit: 1. Shapes and Figures with Line Symmetry
Lesson 2 of 3

Textbook Page : 005 and 006
Actual Lesson 002

Lesson Objectives

- To investigate the characteristics of corresponding points, sides and angles in line of symmetry.

Prior Knowledge

- Meaning of line symmetry.

Preparation

- Square grid paper, rulers and tracing paper.

Teacher's Notes

Use the terms corresponding points, corresponding sides and corresponding angles in the discussion with the students.
There are two main investigations in this lesson. Allow students to copy notes through the sequence. Students should come up with their own conclusion on what they have learned in these investigations.

Assessment

- Investigate and identify the characteristics of line symmetry. F
- Solve the exercises correctly. S

Lesson flow 1

1 Review the previous lesson.

T Introduce the Main Task. (Refer to the BP)

2 ② Investigate the properties of line symmetry.

T Read the task with students. Can you identify anything that overlaps and fits exactly?

S Complete activities ① to ③ before answering the teacher. Find out that corresponding points, sides and angles overlap and fits exactly.

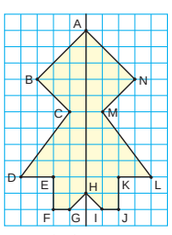
3 Important Point

T/S Explain the important point in the box .

Properties of Figures with Line Symmetry

Properties of Line of Symmetry

② The figure on the right has a line symmetry. Let's explore the points, sides and angles when it is folded along its line of symmetry.



axis of symmetry

① Which points lie on point B and point K respectively when the figure is folded along its symmetric axis? Point N and E

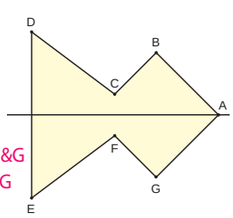
② Which side lies on top of side AB and DE, respectively? Lines AN and KL

③ Which angles lie on top of angle D and J, respectively? Angle L and angle F

When the figure with line symmetry is folded along its axis of symmetry, the matching points are called **corresponding points** and the matching sides are called **corresponding sides** and the matching angles are called **corresponding angles**.
In line symmetric figures, the sizes of corresponding sides and angles are respectively equal.

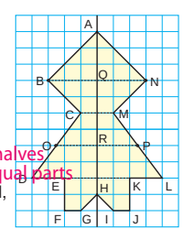
Exercise

The figure on the right has a line symmetry.
Let's write the corresponding points, sides and angles.



Points D&E,C& F,B&G
Sides DC&EF,CB&FG,AB & AG
Angle D&E,C& F,B&G

③ Let's explore the figure with line symmetry on the right.



① The points B and N are corresponding. Consider how the line BN intersects with the line of symmetry? Perpendicularly

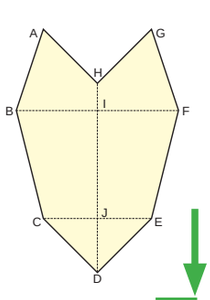
② The points O and P are corresponding. Consider how the line OP intersects with the line of symmetry. Line of symmetry halves line OP into two equal parts

③ Compare the lengths of lines QB and QN, RP and RO. Line BQ and QN are equal
Line RP and RO are equal.

For figures with line symmetry, a line that connects two corresponding points always intersects in perpendicular with the line of symmetry.
The length from the line of symmetry to the corresponding points are equal.

Exercise

The figure on the right has a line symmetry.
① How does the line CE intersect with the line of symmetry? Perpendicularly
② If the length of the line BI is 25 mm, what is the length of line IF? 25 mm



□ ÷ □ = 5

6 = □ − □

Lesson flow 2

4 Complete the Exercise.

T Allow students to give their answers in class and do on the spot correction.

T/S Do correction on the blackboard through discussions.

5 Investigate the relationship between lines of symmetry and lines connecting two points.

T/S 3 Read and understand the given situation.

T "Do you notice any relationship between the line that connects two points and the line of symmetry?"

S Solve activities 1 to 3 before answering the teacher. Identify that the corresponding squares on the grid are exactly the same on both sides of the points.

6 Important Point

T/S Explain the important point in the box .

7 Complete the Exercise.

S Solve all the exercises.

T Confirm students' answers.

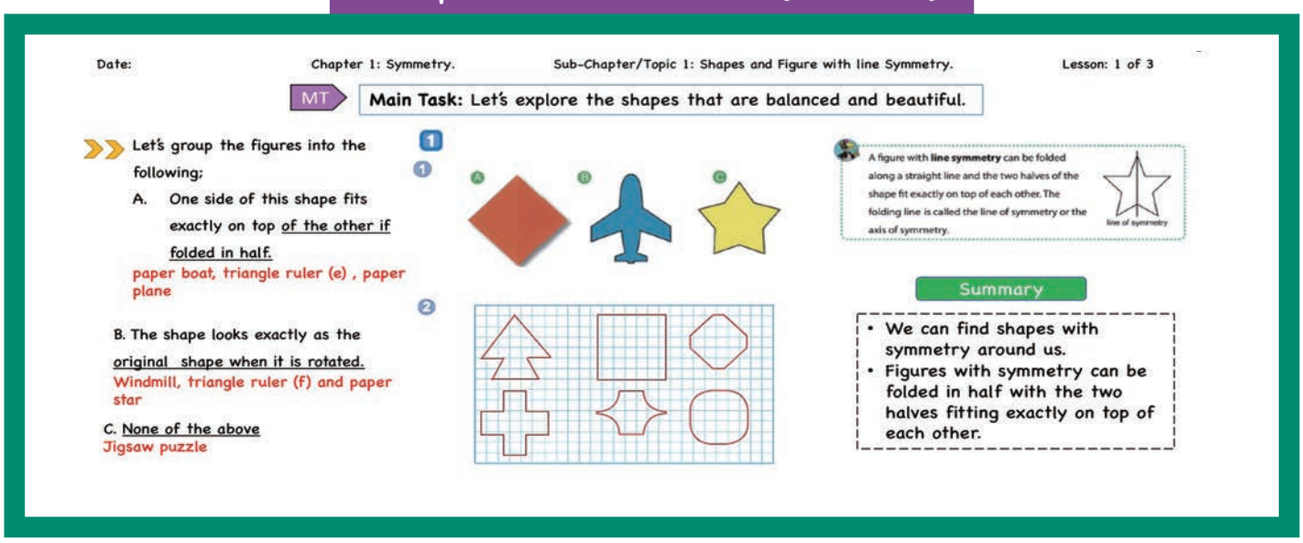
8 Summary

T What have you learned in this lesson?

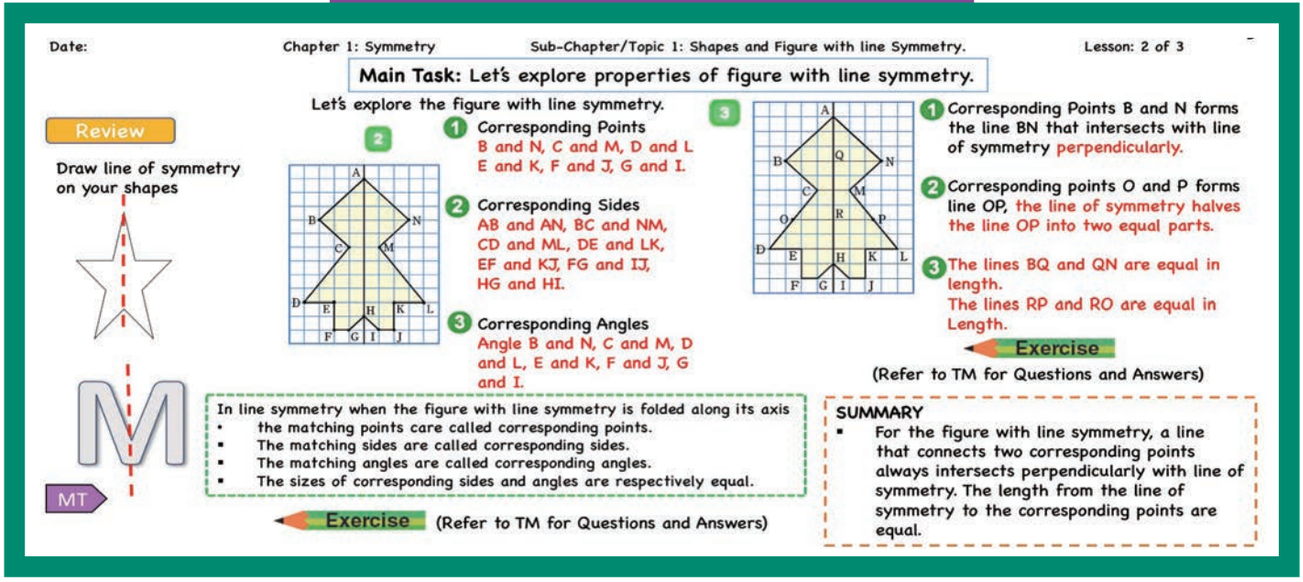
S Present ideas on what they have learned.

T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan (Lesson 1)



Sample Blackboard Plan (Lesson 2)



Unit 1

Unit: Symmetry
Sub-unit: 1. Shapes and Figures with Line Symmetry
Lesson 3 of 3

Textbook Page : 007
Actual Lesson 003

Lesson Objectives

- To understand how to draw line of symmetry by investigating the characteristics of corresponding points, sides and angles.

Prior Knowledge

- Meaning of line symmetry.
- Characteristics of line symmetry

Preparation

- Square grid paper, tracing papers and rulers.

Assessment

- Draw line symmetrical figures by investigating the characteristics of line symmetry. F
- Solve the exercise correctly. S

Teacher's Notes

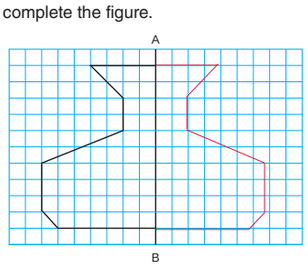
Assist the students to use line of symmetry to complete the drawing and set the understanding that corresponding lengths and corresponding angles are equal in figures of line symmetry.
Ensure that both sides of the line symmetry are equal.
After completing a series of study about line symmetric figures, it is good to create line-symmetric shapes using a mirror. If you place a triangular figure on a mirror, various line symmetric figures will appear depending on how you place it on the mirror. It is also fun to learn to create various line-symmetric figures by reflecting in the mirror not only triangles but also rectangles, squares and so on.

How to Draw Figures with Line Symmetry

Using the properties of line of symmetry

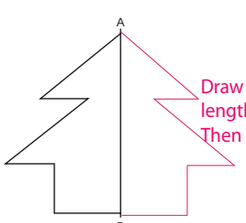
4 The figure below shows half of the figure with AB as the line symmetry.

1 Let's draw the other half to complete the figure.
Discuss with your friends how you will draw the other half to complete the figure.



Count the squares to plot points and draw reflecting lines

2 Let's draw the other half to complete the figure.



Draw straight lines with equal lengths from the line of symmetry. Then connect points

3 Let's explain the properties of line symmetry that you used to draw the complete figure.
The length from the axis of symmetry to the corresponding points are equal

□ ÷ □ = 7

Lesson flow

1 Review the previous lesson.

T Introduce the Main Task. (Refer to the Blackboard Plan)

2 Draw a figure of line symmetry with and without a grid.

T/S 4 Read and understand the given situation.

T Give out square grid paper and ask the students to complete 1.

S 1 Draw the other half with grid paper to complete the figure and discuss with friends on how you drew your figure.

S Possible response: I completed the other half by counting the number of squares to the line Symmetry.

3 Draw the other half without grid to complete the figure.

T 2 How can we draw the other half without the square grid paper?

S From the line of symmetry draw perpendicular lines that are the same length as the opposite side and connect to the corresponding points.

TN Ensure that the distance from the centre for both sides are equal.

4 3 Use the properties of line of symmetry.

T Ask the students to explain the properties of line of symmetry that they used to draw the complete figure.

S Explain that the length from the axis of symmetry to the corresponding points are equal.

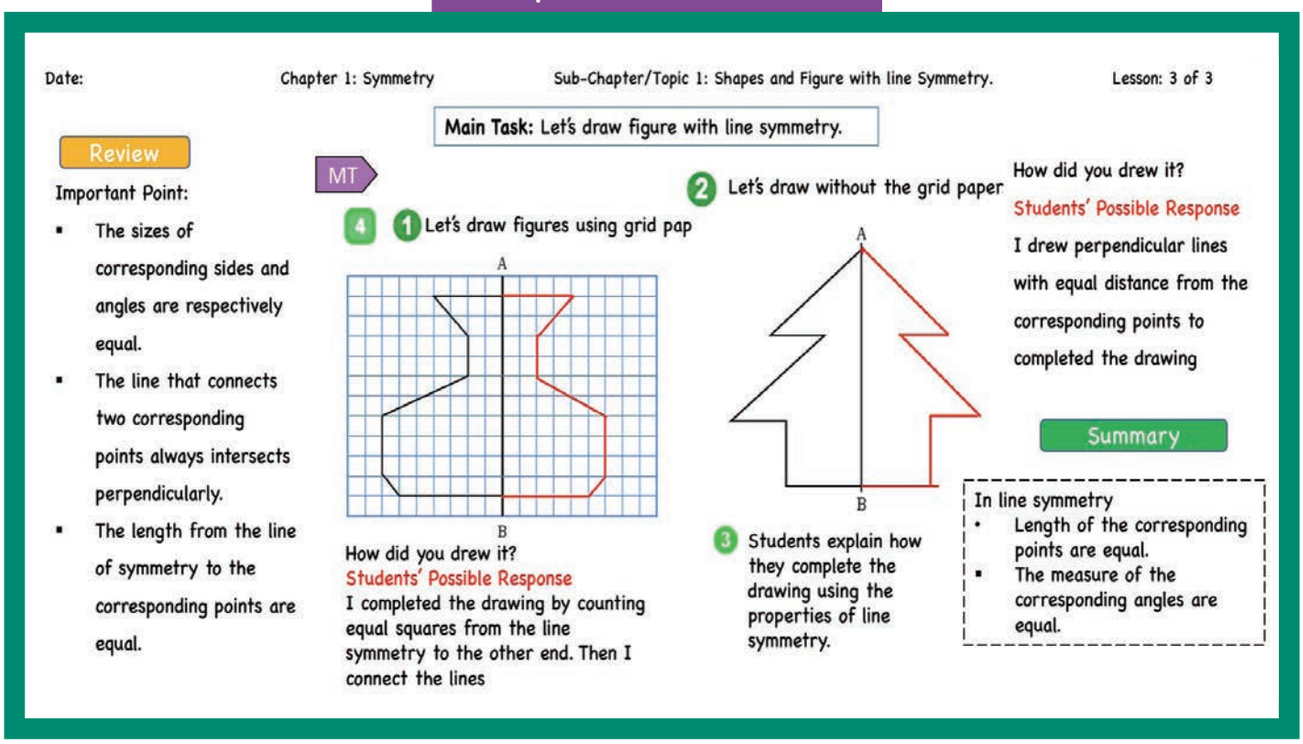
5 Summary

T What have you learned in this lesson?

S Present ideas on what they have learned.

T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan



Unit 1

Unit: Symmetry
Sub-unit: 2. Shapes and Figures with Line Symmetry
Lesson 1 of 4

Textbook Page : 008
Actual Lesson 004

Sub-unit Objectives

- To understand the definition and characteristics of point symmetry.
- To understand how to draw figures with point symmetry.

Lesson Objectives

- To understand the definition and characteristics of figures with point symmetry.

Prior Knowledge

- Characteristics of Line symmetry

Preparation

- Cut out image A, B and C from printed paper or by tracing

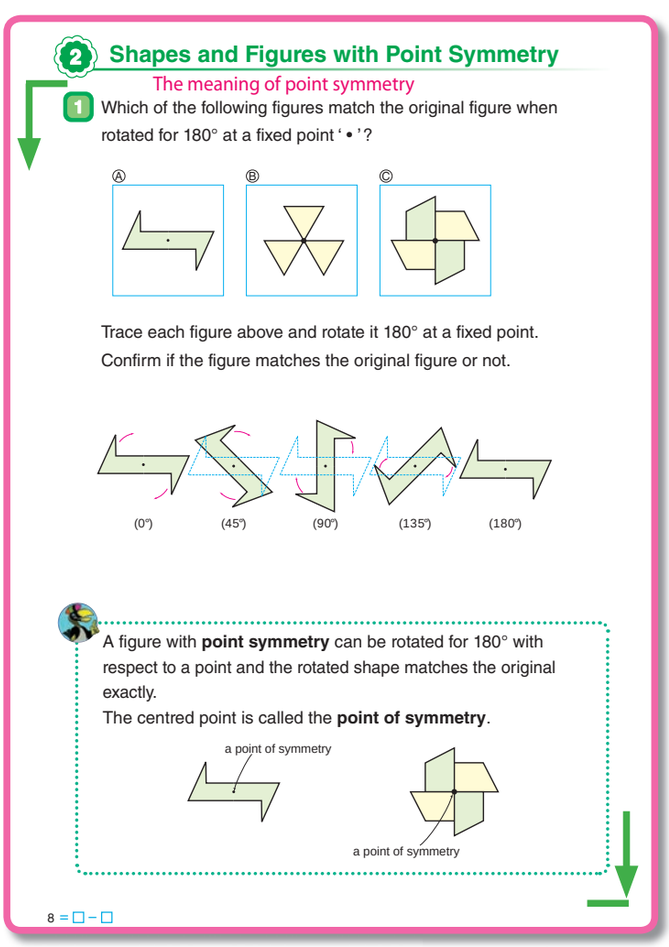
Assessment

- Show understanding that by rotating the figure the shape is the same. F
- Define point of symmetry and its characteristics. S

Teacher's Notes

A figure that will match the original shape when turned 180° around a point is called the point of symmetry. You may use block letters S Z D for further explanation. Place center point on one of these letters and rotate 180°.

It is important not only to learn point symmetric figures as knowledge but also to analyse them through manipulating figures. Students can capture the meaning of point symmetry through rotating various figures by 180 °.



Lesson flow

1 Review the previous lesson.

T Introduce the Main Task. (Refer to the BP)

2 Discuss which of the three figures matches its original figure when rotated at 180º.

T/S 1 Read and understand the given situation.
T What can you notice about the three (3) figures?
S B has a line of symmetry
S If figures A and C are rotated at 180°, the figure will be the same as the original.

3 Cut out the figures of A, B and C.

S Trace and cut out figures A, B and C.
TN Provide photocopied images if available or students may trace out the figures using tracing papers.

4 Confirm what will happen if these figures are rotated at 180° on the same point.

TN Emphasise that rotation should be made on a fixed point.
S Rotate the figure at 180° on a fixed point to confirm if the figures match the original.
T What can you notice?
S If A is rotated at 180°, the figure will be the same.
S If B is rotated at 180°, it will be different.
S If C is rotated as, A and B, the figure will be the same.

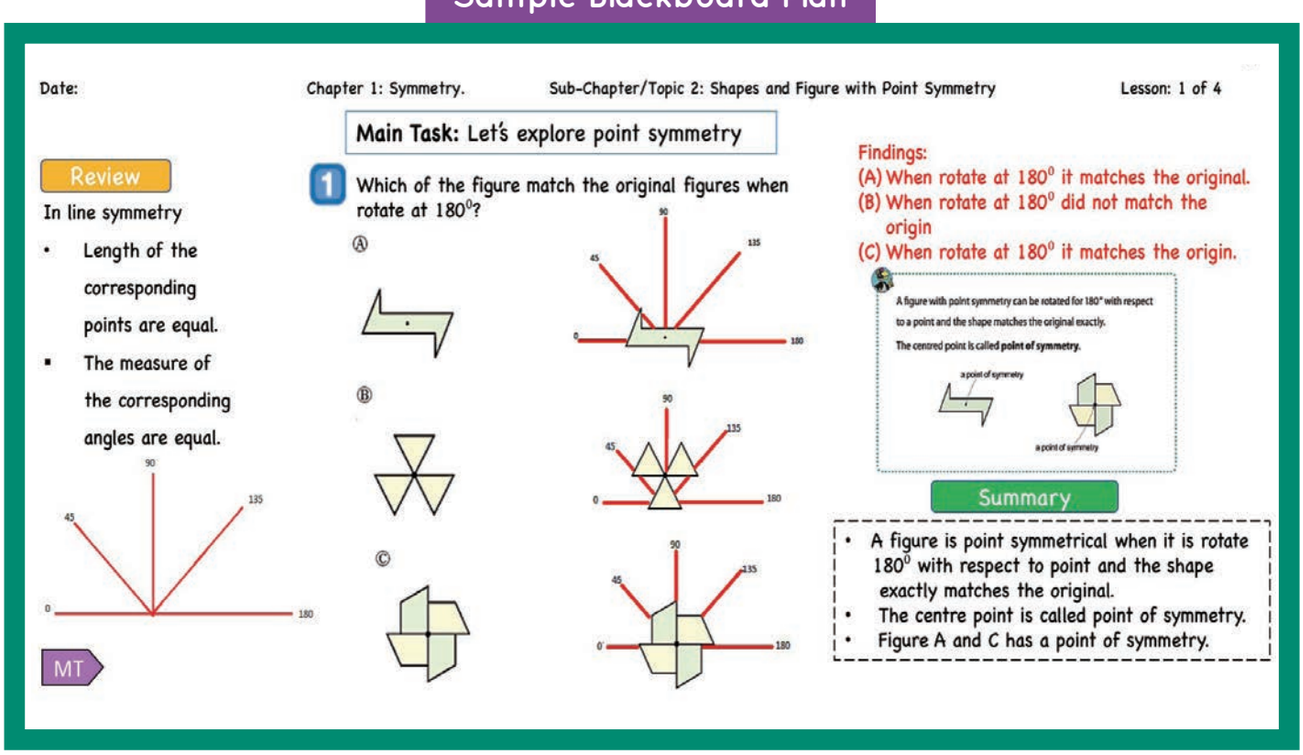
5 Important Point

T/S Explain the important point in the box .

6 Summary

T What have you learned in this lesson?
S Present ideas on what they have learned.
T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan



Unit 1

Unit: Symmetry
Sub-unit: 2. Shapes and Figures with Line Symmetry
Lesson 2 of 4

Textbook Page : 009 and 010
Actual Lesson 005

Lesson Objectives

- To investigate the characteristics of corresponding points, sides and angles using point symmetry.

Prior Knowledge

- Meaning of Point Symmetry

Preparation

- Square grid paper and rulers

Assessment

- Investigate and identify the corresponding points, sides and angles of point symmetry. F
- Solve the exercises correctly. S

Teacher's Notes

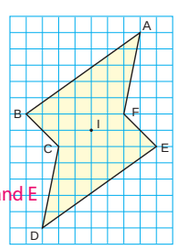
The corresponding sides, points and angles of point symmetry can be obtained when rotating 180° at the point of symmetry.
The size of corresponding sides and angles are equal respectively.
Avoid the misconception of folding point symmetry to find corresponding sides, points and angles.

Properties of Figures with Point Symmetry

2 The figure below has a point of symmetry. Trace the figure and rotate it for 180° with respect to its point of symmetry.

Let's explore the points, sides and angles.

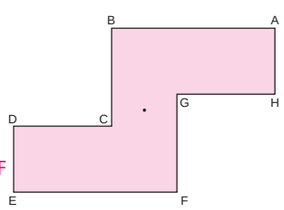
1. Which points lie on point B and C respectively after rotation? E and F
2. Which sides lie on side AB and BC respectively after rotation? DE and EF
3. Which angles lie on top of angle B and D respectively after rotation? Angle A and E



When a figure with point symmetry is rotated 180° on the point of symmetry, the matching points are called **corresponding points**, the matching sides are called **corresponding sides** and the matching angles are called **corresponding angles**.
For any figure with point symmetry, the sizes of corresponding sides and angles are equal respectively.

Exercise

The figure on the right has a point of symmetry.
Let's find the corresponding points, sides and angles.

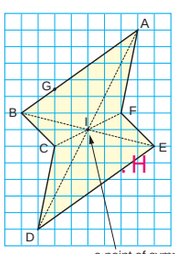


Points C and G
Sides AB and EF
Angles D and H

3 Let's explore the figure with point symmetry below.

1. Where do these lines intersect? AD, BE and CF. Point I
2. Draw point H corresponding to point G on side AB.
3. Compare the lengths of lines IG and IH.

Lines IG and IH are equal in length

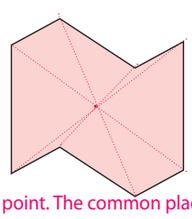


a point of symmetry

For figures with point symmetry, a line that connects two corresponding points always passes through the point of symmetry.
The segments between a point of symmetry and each of the corresponding points are equal.

Exercise

The figure on the right has point symmetry.
Let's locate the point of symmetry.
Then, explain how you locate it.



Rule lines from point to point. The common place where they meet is the point of symmetry.

□ ÷ □ = 9

10 = □ − □

Lesson flow

1 Review the previous lesson.

T Introduce the Main Task. (Refer to the BP)

2 Investigate the characteristics of corresponding points, angles and sides using point symmetry.

T/S 2 Read and understand the given situation.
S Discuss with a friend and solve activity 1 to 3.
1 E and F, 2 DG and EF and 3 Angle A and E
T Explain the difference between line symmetry and point symmetry to avoid misconception. (Refer to TN)

3 Important Point

T/S Explain the important point in the box .

4 Complete the Exercise.

S Solve the exercises
T Confirm students' answers.

5 Investigate the relationship between the corresponding points and point symmetry.

T/S 3 Read and understand the given situation.
S Solve activity 1 to 3.
1 Point I
2 Drawing point H.
3 Lines IG and IH are equal in length.
T Confirm students' answers.

6 Important Point

T/S Explain the important point in the box .

7 Complete the Exercise.

S Solve the exercise.
T Confirm students' answers.

8 Summary

T What have you learned in this lesson?
S Present ideas on what they have learned.
T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan

Date: Chapter 1: Symmetry. Sub-Chapter/Topic 2: Shapes and Figure with Point Symmetry Lesson: 2 of 4

Main Task: Let's explore properties of figure with point symmetry

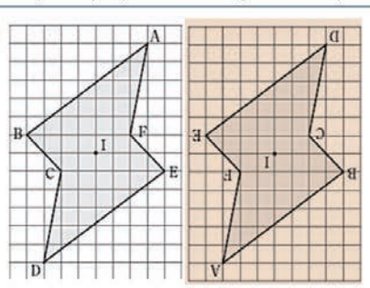
Review

Important Point:

- A figure is point symmetrical when it is rotate 180^0 with respect to point and the shape exactly matches the original.
- The center point is called point of symmetry.
- Figure A and C has a point of symmetry.

MT

2



Sample answers for 1 , 2 and 3

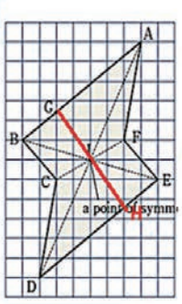
1 Points B and C lie on points E and F respectively.
2 Sides AB and BC lie on ED and EF respectively.
3 Angles B and D lie on angles E and A respectively.

Important Point

Exercise

(Refer to TM for Questions and Answers)

3



1 Lines AD, BE, CF intersect each other at point I.
2 Draw line from point G intersecting Point I to point H.
3 Length IG and IH are equal.

Important Point

Exercise

(Refer to TM for Questions and Answers)

Summary

A figure with point symmetry when rotating at 180^0
the sizes of corresponding sides and angles a are equal respectively.

Unit 1

Unit: Symmetry
Sub-unit: 2. Shapes and Figures with Line Symmetry
Lesson 3 of 4

Textbook Page : 011
Actual Lesson 006

Lesson Objectives

- To demonstrate the understanding of how to draw figures with point symmetry.

Prior Knowledge

- Meaning of point symmetry
- Characteristics of point symmetry

Preparation

- Square grid paper, tracing paper and rulers

Assessment

- Enjoy drawing the figures using point symmetry. F
- Explain the properties of point symmetry. S

Teacher's Notes

Use the Properties of Point of Symmetry below to draw figures ;

- The lengths from the centre to the corresponding points are equal.
- The segment connecting corresponding points will pass through the centre of symmetry.

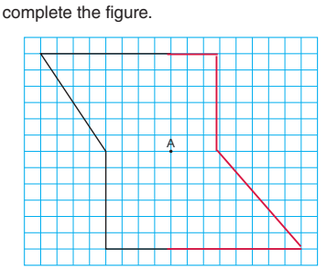
(use the 2 points above for flow 3)

In order to draw a point-symmetric figure, it is necessary to think beforehand about what kind of shape it will be.
It is necessary to be aware of three things: finding the corresponding points, a line connecting the corresponding points passes through the center of point symmetry, and the line has an equal distance from the center.

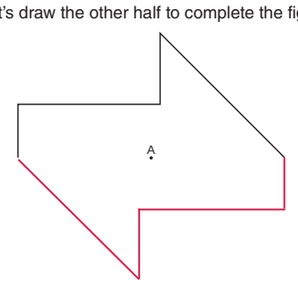
How to Draw Figures with Point Symmetry

4 The figure below is half of the shape with A as the point of symmetry.

1 Let's draw the other half to complete the figure.
Discuss with your friends how you will draw the other half to complete the figure.



2 Let's draw the other half to complete the figure.



3 Let's explain the properties of point symmetry that you used to complete the figure above in your exercise book.
Rule line from point through the point of symmetry with equal distance. Then connect the points.
(see Teacher's Notes)

□ ÷ □ = 11

Lesson flow

1 Review the previous lesson.

T Introduce the Main Task. (Refer to Blackboard Plan)

2 Draw a figure with point symmetry using grid paper.

T/S 4 Read and understand the given situation.

S 1 Identify the corresponding points by counting the squares from the centre.

S Explain how they drew to complete their figures.

3 Draw a figure with point symmetry without using grid paper.

T 2 How can we draw using point symmetry without a square grid paper?

S Identify the corresponding points without the squares to complete the figure by extending lines with the same distance.

S 3 Write down their explanation of the properties of point symmetry.

4 Summary

T What have you learned in this lesson?

S Present ideas on what they have learned.

T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan

Date: Chapter 1: Symmetry Sub-Chapter/Topic 2: Shapes and Figure with Point Symmetry Lesson: 3 of 4

Main Task: Let's draw figures with point symmetry

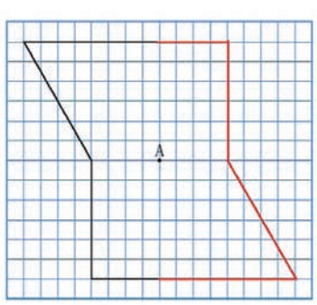
Review

Important Point:
When a figure with point symmetry is rotate 180^0 on the point of symmetry,
- the matching points are called the corresponding points
- The matching sides are called the corresponding sides
- and the matching angles are called the corresponding angles.
- The sizes of corresponding sides and angles are respectively equal.

MT

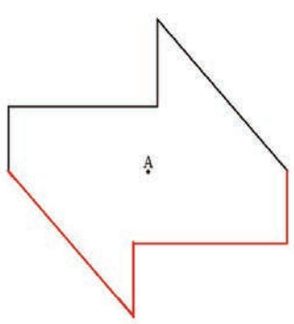
4 Draw the other half to complete the figures.

1



Students discuss how they complete the figure.

2



3 Write down their explanations of the properties of point symmetry

Summary

We can complete figures with point symmetry by using the idea of equal distance and draw line from the point symmetry to the other corresponding point.

Unit 1

Unit: Symmetry
Sub-unit: 2. Shapes and Figures with Line Symmetry
Lesson 4 of 4

Textbook Pages : 012 and 013
Actual Lesson 007

Lesson Objectives

- To find line or point symmetry in the figures using the characteristics of line and point symmetry.

Prior Knowledge

- Characteristics of line of Symmetry
- Characteristics of point of Symmetry

Preparation

- Images from the textbook

Assessment

- Identify and appreciate the symbols and signs around them that have the line of symmetry or point symmetry. F
- Categorise the symbols and signs into line symmetry and point symmetry according to their characteristics. S

Teacher's Notes

Discuss symbols and signs that are common to students in their provinces.
Allow students to identify figures within the symbols and not just looking at the overall symbol itself.

Lesson flow

1 Review the previous lesson.

T Introduce the Main Task. (Refer to the Blackboard Plan)

2 Discuss symmetrical figures in symbols.

T Ask the following questions; Are these figures familiar to you? How can we categorise the symbols and signs?

S Identify the line of symmetry and point of symmetry through discussions in pairs.

T Introduce the Main Task. (Refer to Blackboard Plan)

3 Categorise figures with line symmetry.

T/S 5 Read and understand the given situation.

T Ask students to complete the task by categorising the figures with line symmetry.

S 1 and 2. Categorise the figures with line symmetry.

4 Categorise figures with point symmetry.

T/S 6 Read and understand the given situation.

T 1 Ask students to complete the task by categorising the figures with point symmetry.

S Explore the characteristics of point symmetry of company and sports logos.

S Confirm the lines of symmetry and points of symmetry.

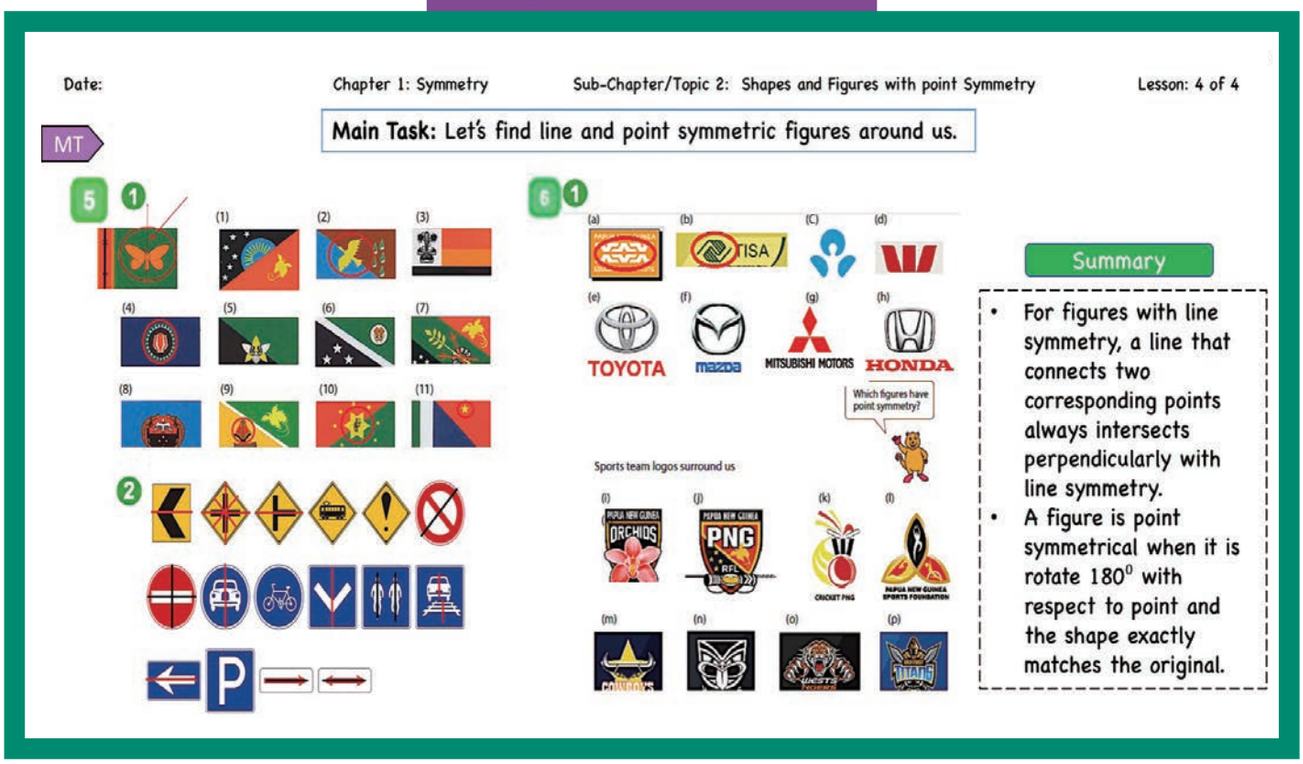
5 Summary

T What have you learned in this lesson?

S Present ideas on what they have learned.

T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan



Unit 1

Unit: Symmetry
Sub-unit: 3. Polygons and Symmetry
Lesson 1 of 2

Textbook Page : 014
Actual Lesson 008

Sub-unit Objectives

- To observe the basic shapes with line symmetry and point symmetry.

Lesson Objectives

- To explore and find the line of symmetry or point of symmetry by observing the basic shapes.

Prior Knowledge

- Characteristics of line symmetry
- Characteristics of point symmetry

Preparation

- 5 basic shapes of quadrilaterals

Assessment

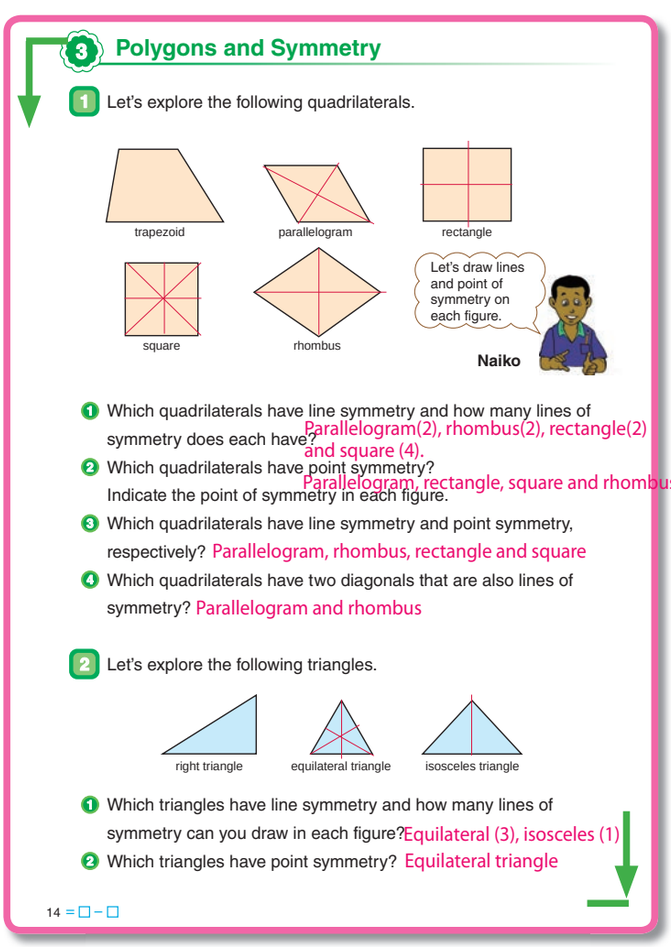
- Investigate line and point of symmetry on the basic shapes. F
- Identify and confirm the line and point of symmetry on the basic shapes. S

Teacher's Notes

Know that polygons like trapezoids and parallelograms do not have line symmetry. Prove these by folding actual cut out figures.

Symmetric axis of regular polygon

- A symmetric axis of odd number regular polygon connects the vertices and the midpoints of the opposite sides.
- A symmetric axis of even number regular polygon connects the vertices and opposite vertices or connects midpoints of opposite sides.
- The number of symmetric axes of N sides of a regular polygon is N.



3 Polygons and Symmetry

1 Let's explore the following quadrilaterals.

trapezoid parallelogram rectangle

square rhombus

Let's draw lines and point of symmetry on each figure.

Naiko

1 Which quadrilaterals have line symmetry and how many lines of symmetry does each have? Parallelogram(2), rhombus(2), rectangle(2) and square (4).

2 Which quadrilaterals have point symmetry? Indicate the point of symmetry in each figure. Parallelogram, rectangle, square and rhombus

3 Which quadrilaterals have line symmetry and point symmetry, respectively? Parallelogram, rhombus, rectangle and square

4 Which quadrilaterals have two diagonals that are also lines of symmetry? Parallelogram and rhombus

2 Let's explore the following triangles.

right triangle equilateral triangle isosceles triangle

1 Which triangles have line symmetry and how many lines of symmetry can you draw in each figure? Equilateral (3), isosceles (1)

2 Which triangles have point symmetry? Equilateral triangle

14 = □ − □

Lesson flow

1 Review the previous lesson.

T Introduce the Main Task. (Refer to the BP)

2 Explore and categorise the quadrilaterals.

T/S 1 Read and understand the given situation.

T Display the 5 quadrilaterals on the blackboard and ask students to explore.

S Explore the 5 different quadrilateral and identify the number of line and point symmetry for each quadrilateral.

T 1 Which quadrilateras have line symmetry and how many lines of symmetry does each have?

S Draw lines to identify number of symmetry for each shape.
Answers: Parallelogram (2), rhombus (2), rectangle (2) and square (4).

T 2 Which quadrilaterals have point symmetry? Indicate the point symmetry in each figure.

S Use the properties of point symmetry to identify the quadrilaterals that have point symmetry.
Answers: Parallelogram, rectangle, square and rhombus.

T 3 Which quadrilateral have line symmetry and point symmetry, respectively?

S Categorise quadrilaterals into line symmetry and point symmetry.
Answers: Parallelogram, rhombus, rectangle and square.

T 4 Which quadrilaterals have two diagonals that are also lines of symmetry?

S Identify quadrilaterals that have two diagonals that are also lines of symmetry.
Answers: Parallelogram, rhombus and square

3 Explore the 3 types of triangles.

T 2 Display the 3 types of triangles on the blackboard and ask students to explore their line and point of symmetry.

S Explore the 3 different triangles and identify the number of line of symmetry for each triangle.

T 1 Which triangles have line symmetry and how many lines of symmetry can you draw in each figure?

S Draw lines to identify number of symmetry for each triangle.
Answer: Equilateral (3) and isosceles (1)

T 2 Which triangles have point symmetry?.

S Use the properties of point symmetry to identify the triangles. Answer: Equilateral triangle.

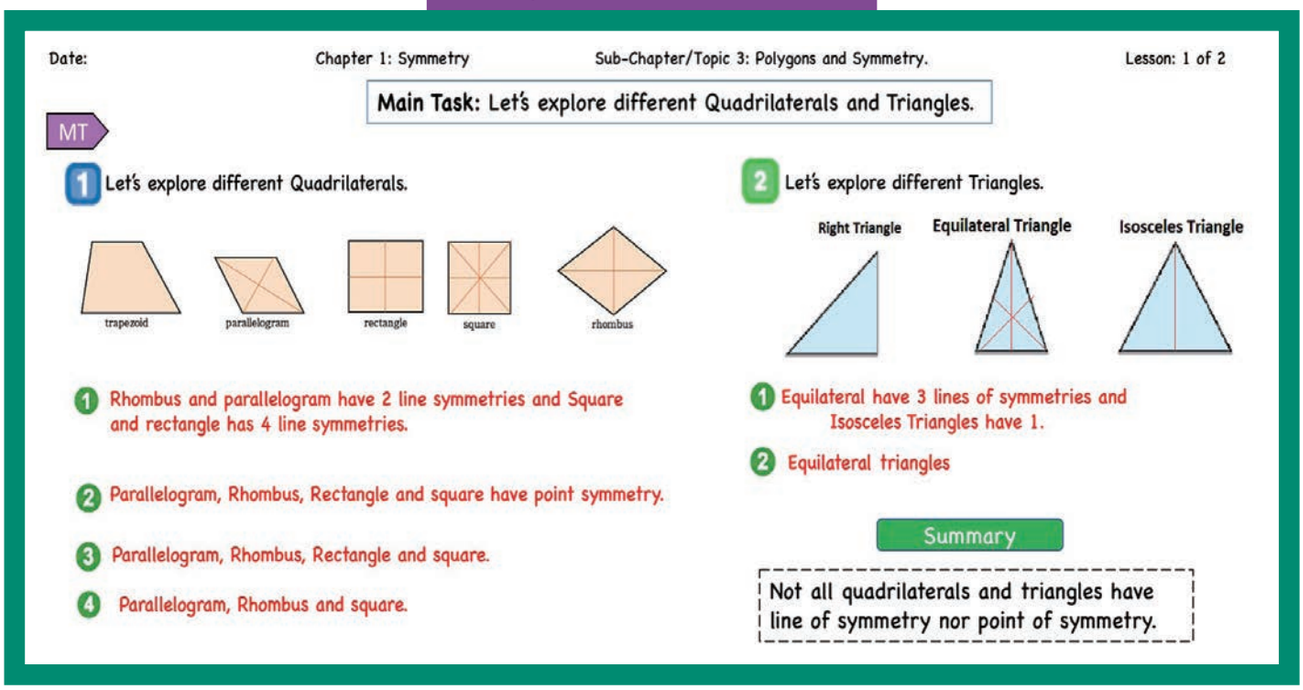
4 Summary

T What have you learned in this lesson?

S Present ideas on what they have learned.

T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan



Unit 1

Unit: Symmetry
Sub-unit: 3. Polygons and Symmetry
Lesson 2 of 2

Textbook Pages : 105 and 016
Actual Lesson 009

Lesson Objectives

- To explore regular polygons and identify their line of symmetry and point of symmetry.

Prior Knowledge

- Properties of line and point of symmetry in polygons.

Preparation

- Coloured papers and table for regular polygons to be categorised.

Assessment

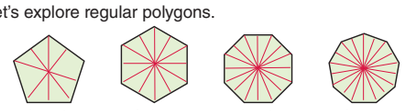
- Explore and identify line and point of symmetry of regular polygons. F
- Solve the exercise correctly. S

Teacher's Notes

- Regular polygons with even number of sides have both point and line symmetry while polygons with odd number of sides have line symmetry but not point symmetry because when rotating 180 , the corresponding points,sides and angles do not match. The lines of symmetry pass through the point of symmetry. In the case of circles, they have a point of symmetry and unlimited lines of symmetry.

Regular Polygons and Symmetry

3 Let's explore regular polygons.



regular pentagon　regular hexagon　regular octagon　regular nonagon

1 Let's group the figures above into the figures with line symmetry and point symmetry.

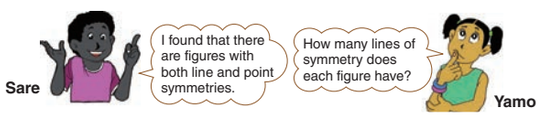
Line symmetry	Regular Pentagon, Hexagon, Octagon and Nonagon
Point symmetry	Regular Hexagon and Regular Octagon

2 How many lines of symmetry does each figure have?
Let's fill in the table below.

Name	regular pentagon	regular hexagon	regular octagon	regular nonagon
Number of lines	5	6	8	9

3 Let's draw a point of symmetry in each of the point symmetrical figures.

4 Let's reflect on what you explored. Please write what you observed in your exercise book and discuss with your friends.
Let's classify heptagon and decagon in the above table.

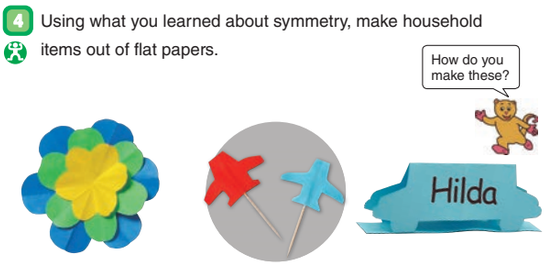


Exercise

Let's explore a circle.
① Does a circle have line symmetry? Yes
How many lines of symmetry can you find? Many all around the circle
② Does a circle have point symmetry? Yes
Place the point of symmetry on the circle.
The point of symmetry is the center.

Let's Make Some Paper Crafts

4 Using what you learned about symmetry, make household items out of flat papers.



floral decoration　toothpick　nameplate

Rubin's Vase

The picture on the right is symmetrically designed. Take a closer look into it. What do you see?

□ ÷ □ = 15　　16 = □ − □

Lesson flow

1 Review the previous lesson.

2 ③ Explore and find the line and point of symmetry.

T Introduce the main task. (Refer to the BP)

S ① Group figures into those with line symmetry and those with point symmetry.

TN Let the students notice that there are various characteristics. For example:

- There are more than one lines of symmetry in each figure.
- Regular hexagons and octagons have lines of symmetry and points of symmetry.

3 Identify the line and point of symmetry for polygons.

T ② How many lines of symmetry does each figure have?

S Identify the number of lines of symmetry for each figure.

T ③ Ask students to draw a point of symmetry for the figures with point symmetry.

T ④ What did you observe in activity ② and ③?

S Confirm that there is more than one line of symmetry for each figure and regular polygons with even sides have a point of symmetry.

4 Complete the Exercise.

S Solve the exercises.

T Confirm students' answers.

5 Let's Make Some Paper Craft.

S ④ Do this task as homework or during free time and discuss the attachment of Rubin's Vase with a friend.

6 Summary

T What have you learned in this lesson?

S Present ideas on what they have learned.

T Use students' ideas to confirm the important concepts of this lesson.

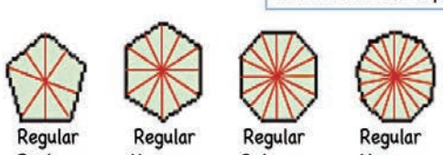
Sample Blackboard Plan

Date: Chapter 1: Symmetry. Sub-Chapter/Topic 3: Polygons and Symmetry. Lesson: 2 of 2

MT

Main Task: Let's explore Regular Polygons.

3



Regular Pentagon | Regular Hexagon | Regular Octagon | Regular Nonagon

1

Line Symmetry	Regular pentagon, Hexagon, Octagon and Nonagon
Point Symmetry	Regular Hexagon and Regular Octagon

2

Name	Regular pentagon	Regular hexagon	Regular octagon	Regular nonagon
No. of Lines	5	6	8	9

3

Regular Hexagon | Regular Octagon

4

- In regular polygons, the line of symmetry can be found by corresponding sides and point.
- The regular polygons with even sides also have point symmetry.

Exercise

(Refer to TM for Questions and Answers)

4 Let's make household items. Complete as Homework

Summary

We can find line and point symmetry in figures and items around us.

Unit 1

Unit: Symmetry
Exercises, Problems and Evaluation
Lesson 1 and 2 of 2

Textbook Pages :
017 to 019
Actual Lesson 10 and 11

Lesson Objectives

- To confirm their understanding on the concepts they learned in this unit by completing the Exercises, Problems and Evaluation Test confidently.

Prior Knowledge

- All the contents in this unit

Preparation

- Evaluation Test

Assessment

- Solve the exercises and problems correctly. F S

Teacher's Notes

This is the last lesson of Chapter 1. Students should be encouraged to use the necessary skills learned in this unit to complete all the Exercises and solve the Problems in preparation for the evaluation test. The test can be conducted as assesment for your class after completing all the exercises. Use the attached evaluation test to conduct assesment for your class after finishing all the exercises, problems and review as a seperate lesson.

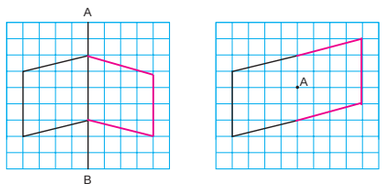
EXERCISE

1 Draw the other half to complete the symmetrical figure.

Pages 4 to 9

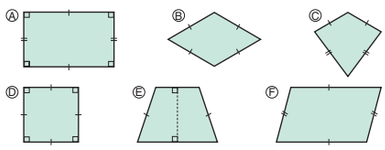
① Line AB is the line of symmetry.

② Point A is the point of symmetry.



2 Fill in the table below using the properties of the following quadrilaterals.

Pages 14 and 15



	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ	Ⓕ
Figures with line symmetry	○	○	○	○	○	○
Number of line	2	2	1	4	1	
Figures with point symmetry	○	○		○		○

Grade 4 and 5 Do you remember?

Let's calculate.

① 1.2×43 51.6 ② 3.6×35 126 ③ 7.2×4.9 35.28 ④ 8.6×7.5 64.5

⑤ 448÷8 56 ⑥ 379÷4 94.75 ⑦ 60÷25 24 ⑧ 9.1÷0.7 13

PROBLEMS 1

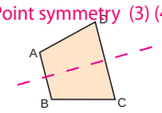
1 Which figures have line symmetry, point symmetry or both?

● Distinguishing symmetric figers.

Line symmetry (1) (2) (4) (5) Point symmetry (3) (4)

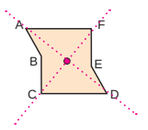
2 The figure on the right has line symmetry. Draw the line of symmetry.

● Finding the axis of symmetry.



3 The figure on the right has point symmetry. Draw the point of symmetry.

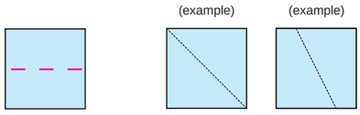
● Finding a point of symmetry.



4 A square has both line and point symmetry.

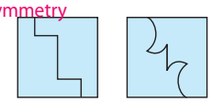
● Dividing a square into two congruent shapes.

① Divide a square into two congruent shapes by a line.



② You will find that any line drawn in ① passes the same point. What do you call the point? Point of symmetry

③ Use lines and curves to divide a square into two congruent shapes. The figures on the right are examples.



Lesson flow

1 Complete Exercises 1 and 2.

S Solve all the exercises.
T Confirm students' answers.

2 Complete the Do You Remember exercise.

S Calculate the multiplication and division of decimal numbers.

3 Complete Problems 1, 1 to 4.

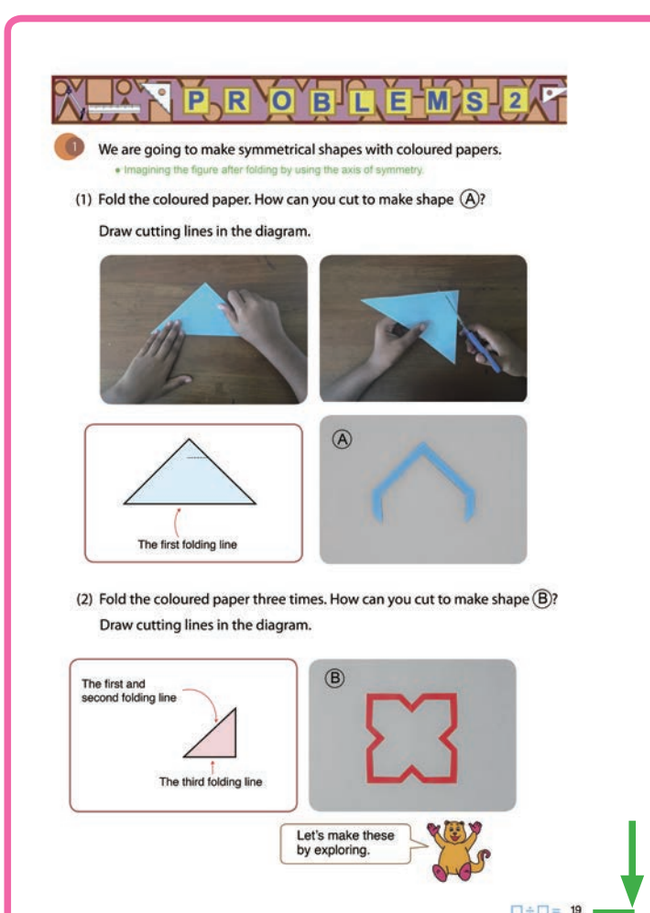
S Solve the problems.
T Confirm students' answers.

4 Complete Problems 2, 1.

S Solve the problem.
T Confirm students' answers.

5 Complete the Evaluation Test.

TN Use the attached evaluation test to conduct assesment for your class after finishing all the exercises and problems as a seperate lesson.
S Complete the Evaluation Test.



PROBLEMS 2

1 We are going to make symmetrical shapes with coloured papers.
• Imagining the figure after folding by using the axis of symmetry.

(1) Fold the coloured paper. How can you cut to make shape Ⓐ?
Draw cutting lines in the diagram.

The first folding line

Ⓐ

(2) Fold the coloured paper three times. How can you cut to make shape Ⓑ?
Draw cutting lines in the diagram.

The first and second folding line
The third folding line

Ⓑ

Let's make these by exploring.

□÷□= 19

Symmetry	Name:	Score /100

1. The figure below is point-symmetric. [4 × 10 points = 40 points]

(1) For locating the centre of symmetry, which pair of lines are appropriate to be drawn?
a: AC and CG
b: CH and DG
c: CG and DH

Answer:

(2) Write the part corresponding to;
a) Point A
Answer: Point E
b) Side DE
Answer: Side H A

(3) Let the centre of symmetry point I. Find the side which is the same length as HI.
Answer: D I

A H B C G F D E

2. Find all answers of the following questions about the figures below; [3 × 20 points = 60 points]

(a) (b) (c)

(1) line symmetry figure. Answer : b
(2) point-symmetric figure. Answer : a and b
(3) figures with both features of line-symmetric and point-symmetric. Answer : b

End of Chapter Test **Date:**

Chapter 1: Symmetry	Name:	Score / 100

1. The figure below is point symmetric. [4 x 10 marks = 40 marks]

(1) For locating the centre of symmetry, which pair of lines are appropriate to be drawn?

(a) AC and CG
(b) CH and DG
(c) CG and DH

Answer :

(2) Write the part corresponding to;
(a) Point A

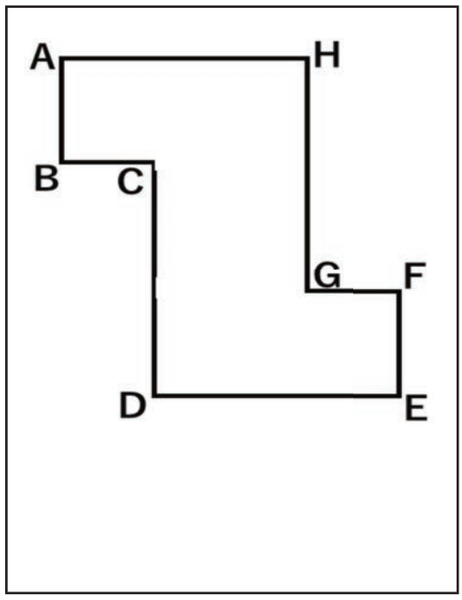
Answer :

(b) Side D

Answer :

(3) Let the centre of symmetry point I.
Find the side which is the same length as HI.

Answer :



2. Find all the answers of the following questions about the figures below;
[3×20 marks = 60 marks]

(a)

(b)

(c)

(1) Line symmetric figure. Answer :

(2) Point symmetric figure Answer :

(3) Figures with both features of
line symmetric and point symmetric Answer :

Chapter 2 Mathematical Letters and Expressions

1. Content Standard

6.4.3. Students will be able to use mathematical letters in expressions to represent place values and interpret them.

2. Unit Objectives

- To deepen the understanding of mathematical expressions describing the relation of numbers and quantities and for making use of them.
- Use letters a and x instead of using words, or to express quantities to write mathematical expressions.
- Investigate by substituting numbers for letters.

3. Teaching Overview

Mathematical letters in expressions such as a or x tend to be psychological barrier for students to learn mathematics. Teachers should be sensitive to those psychological barriers and think how students can accept the new concepts. Remember that it students do not understand the ideas then they are not convinced.

Expressions with Letters :

First the class can recall expressions with words. Next they recall the expressions using ○ or □. Those previous learning will be developed gradually to expressions with mathematical letters. Substitution of numbers or thinking with diagrams and pictograms will help students understand.

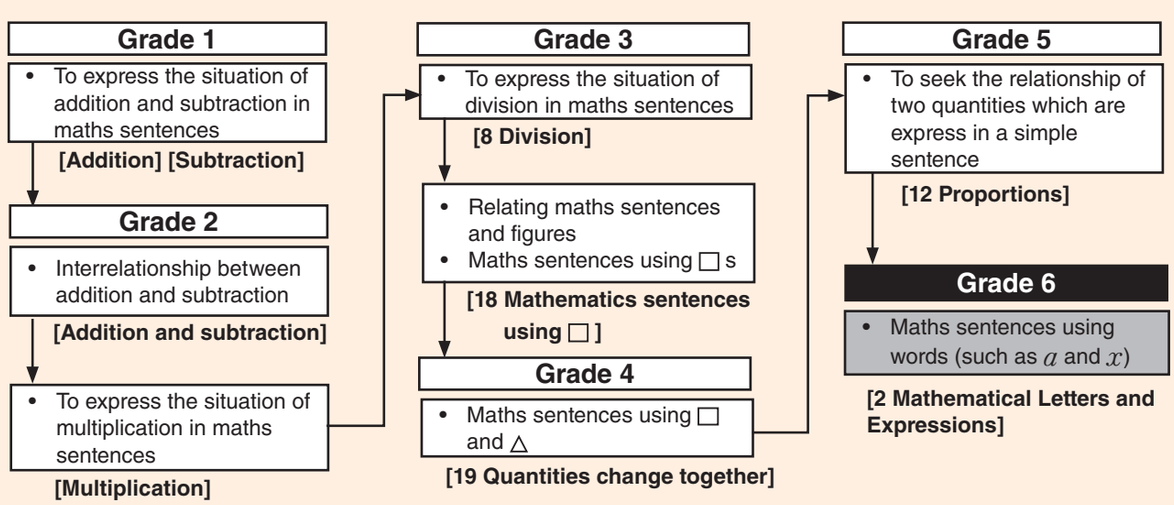
Let's Put Numbers into Mathematical Letters :

Students should find that any numbers including decimals and fractions can be substituted for letters. They should investigate the relationship among numbers in expressions by referring to diagrams, mathematical sentences with words and tables.

Interpreting Expressions :

Students are supposed to be given lots of experiences for interpreting mathematical sentences with letters. They will appreciate that mathematical sentences with letters are simple ways to express the relationship between letters through their experiences.

4. Related Learning Contents



Unit 2

Unit: Mathematical Letters and Expressions
Sub-unit: 1. Mathematical Letters and Expressions
Lesson 1 of 2

Textbook Page : 020 and 021
Actual Lesson 012

Sub-unit Objectives

- To understand how to write mathematical expressions using x or a, apart from the symbols □ or ○.
- To find the value of a mathematical expression by substituting numbers for x.

Assessment

- Understand and write mathematical expressions using letters such as a or x other than □ or ○. F
- Solve the exercise correctly. S

Lesson Objectives

- To understand how to write mathematical expressions using x or a instead of symbols □ or ○.

Prior Knowledge

- Proportion (Grade 5)
- Two Changing Quantities (Grade 5)

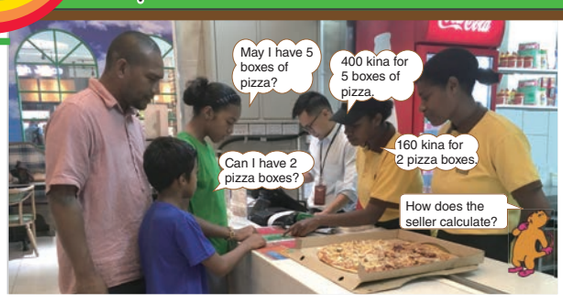
Preparation

- Chart explaining the important point.
- Task 3 diagram on a chart.

Teacher's Notes

Do not introduce π (Pi)in this lesson but 3.14 Pi means the ratio of the circumference of the circle to its diameter.
Purpose of the lesson is for the students to understand constant and variable.
Example, $6 \times a$ (6 is constant where it cannot change and a is the variable where it changes (Teacher reference only).
Perimetre = 3.14 (Constant) × d (Variable)

2 Mathematical Letters and Expressions



1 Mathematical Letters and Expressions

How to write mathematical expressions with symbols

1 Rupa's family are buying pizzas which costs 80 kina each for a birthday party.

1 Let's fill in each □ with a number and make expressions to find the total.

- Bought 1 box of pizza ..... 80 × 1 = 80
- Bought 2 boxes of pizza ..... 80 × 2 = 160
- Bought 5 boxes of pizza ..... 80 × 5 = 400

2 Represent the number of pizzas with ○ and the total price with □. Make an expression to represent the relationship of □ and ○.

80 x □ = ○

In mathematics, numbers and quantities can be represented using letters such as a or x other than □ and ○.

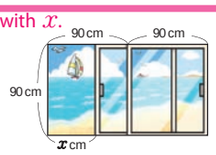
a x

The price of x pizzas, which cost 80 kina each, can be written as $80 \times x$ or $x \times 80$.

Writing mathematical expression with x.

2 A sliding window has a height of 90 centimetre (cm).

1 Write an expression to find the area of the window when opened.



- Opened 5 cm ..... 90 × 5 = 450
- Opened 10 cm..... 90 × 10 = 900
- Opened 12.5 cm..... 90 × 12.5 = 1125
- Opened 90 cm..... 90 × 90 = 8100

Height | Opened length | Area of opened window

2 Write an expression to find the area if the opened length is x cm.

90 x x

3 Make different types of regular polygons using 6 cm broom sticks.

Writing mathematical expression with a.

1 Write an expression to find the perimeter (the length around the polygon).

- Regular triangle..... 6 × 3 = 18
- Regular pentagon ..... 6 × 5 = 30
- Regular octagon..... 6 × 8 = 48
- Regular dodecagon ... 6 × 12 = 72

2 Write an expression to find the perimeter of a regular polygon with a sides.

- Regular polygon with a sides..... 6 × a

Exercise

The perimeter (the length of circumference) of a circle is expressed as diameter × 3.14
Write an expression to represent the perimeter of a circle with a cm radius. a x 2 x 3.14

20 = □ ÷ □

□ × □ = 21

Lesson flow

1 Think about how to write mathematical expressions with symbols.

T/S Look at the picture and discuss what the situation is about.
S Discuss about the scene of the picture on page 20 and think about how the shop owner is calculating.
TN Students should pay attention to the conversation and think of how the shop owner is calculating.
T/S 1 Read and understand the given situation.
T Introduce the Main Task. (Refer to the BP)
S Make correspondence between the phrases, i.e. 5 pizzas cost 400 kina, 2 pizzas cost 160 kina and 1 pizza cost 80 kina.
TN Help students to realise that when they put a different number 1, 2,…. for the number of pizzas, the total cost changes accordingly.
S 1 Fill in the boxes and make expressions to find the total price.
S 2 Make a mathematical expression using ○ and □.

2 Important Point

T/S Explain the important point in the box .....

3 Understand that a or x can be used when making mathematical expressions instead of using □ or ○.

T Remind the students that they can use the letters a and x instead of □ and ○.
TN When the number of pizzas you are buying is represented as a or x, what would be the expressions to find the total price?
Let's think about it?
S **80 × a, 80 × x.**

4 Write an expression that represents the area of the opened window.

T/S 2 Read and understand the given situation.
S 1 Study the mathematical sentence and complete the rest.
TN Multiply the height with the length of the opened window to find the area. (Height × Opened Window = Area of Opened Window)
S 2 So, when we substitute the opened length with x, the area can be written as 90 × x.

5 Write an expression for finding the perimetre of regular polygons.

T/S 3 Read and understand the given situation.
S 1 Make different types of regular polygons using 6 cm broomsticks and think about an expression to find the perimeter (the length around the polygon).
S 1.) Regular triangle, 6 × 3 = 18
2.) Regular pentagon, 6 × 5 = 30
3.) Regular octagon, 6 × 8 = 48
4.) Regular dodecagon, 6 × 12 = 72
S 2 The expression to find the perimeter of a regular polygon with a sides is 6 × a.

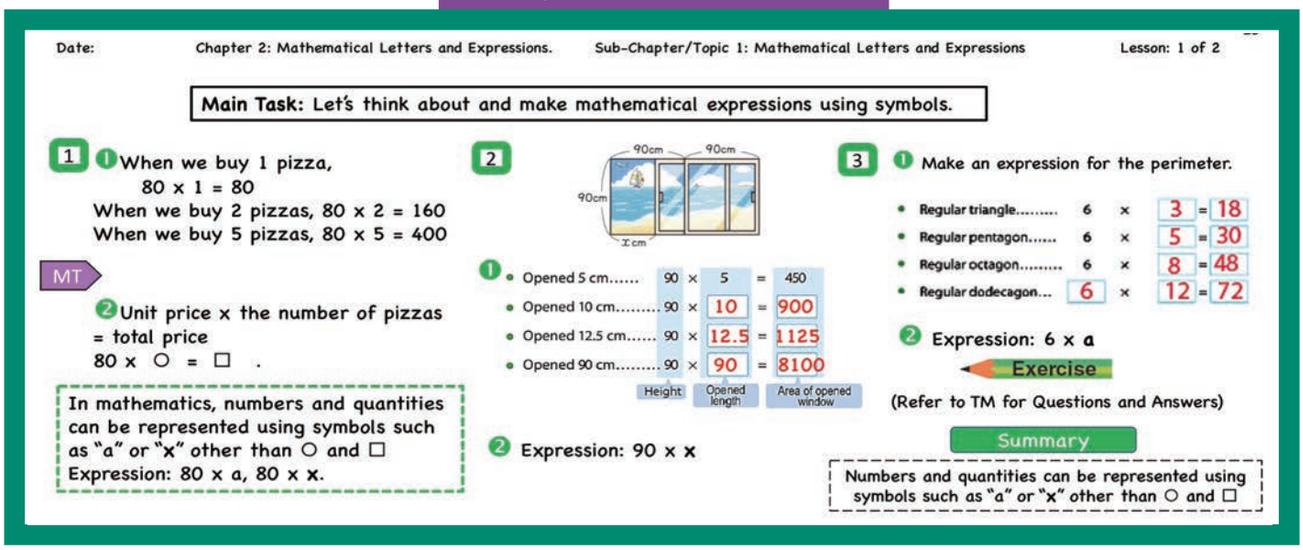
6 Complete the Exercise.

S Solve the exercise.
T Confirm students' answers.

7 Summary

T What have you learned in this lesson?
S Present ideas on what they have learned.
T Use students' ideas to confirm important concepts of this lesson.

Sample Blackboard Plan



Unit 2

Unit: Mathematical Letters and Expressions
Sub-unit: 1. Mathematical Letters and Expressions
Lesson 2 of 2

Textbook Page : 022
Actual Lesson 013

Lesson Objectives

- To find the value of mathematical expressions by substituting a number for x.

Prior Knowledge

- Expressions with Symbols

Preparation

- Activity 1, 2 and 3

Assessment

- Understand and write a mathematical expression using x. F
- Calculate using x to find the value of the mathematical expression. F
- Solve the exercises correctly. S

Teacher's Notes

The mathematical expression must always relate to the problem situation and make meaning out of it.
We introduce ○ and □ as a place−holder into which we can put any number. (In some special cases, the same number is put into such place−holders). However, once we start to use a and x instead of ○ and □ , students may have difficulty considering such symbols a and x equally as place−holders. Some may encounter problem here.

Exercise.

S 1 Write an expression using x to find the total number of bubble gums.
Mathematical Expression: $2\times x+4$.

S 2 Write an expression using x to find the total amount of juice.
Expression is $3\times x+2$

T Confirm the expression for the situation.

S Substitute x with 5 and solve expression: $3\times x+2$, so it would be $3\times5+2=17$
Answer: 17 dL

Let's Calculate Total

To find the value of mathematical expression by substituting a number for x

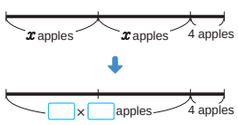
4 Anda filled in boxes with apples.
There are 2 boxes of apples and 4 single apples.

1 If there are 10 apples in each box, how many apples are there altogether? $2\times10+4=24$ Answer: 24 apples

2 Use x to show the number of apples in each box and write an expression to find the total number of apples. $2\times x+4$

Mero

The number of apples in 2 boxes is calculated, 2× the number of apples in each box.



3 If the number of apples in each box is 15, how many apples are there altogether? $2\times15+4=34$ Answer: 34 apples

Exercise

Use x to show the number of bubble gums in each box.
Write an expression to find the total number of bubble gums using x.

$2\times x+4$

There are 3 bottles and 2 decilitre (dL) of juice.

① Use x dL to show the amount of juice in each bottle. Write an expression to find the total amount of juice using x. $3\times x+2$

② If the amount of juice in each bottle is 5 dL, how much do we have?
$3\times5+2=17$ Answer: 17 dL

Let's use x to show what you want to know.

22 = □ ÷ □

Lesson flow

1 Review the previous lesson.

T Introduce the Main Task. (Refer to the BP)

2 Find the total number of apples.

T/S 4 Read and understand the given situation.

T 1 Get the students to read the question and explain how to write their mathematical sentences to solve the situation.

S Each box has 10 apples, so if there are 2 boxes, then, we should calculate as 2 × 10 and add 4 extra apples.
2 × 10 + 4 = 24 Answer: 24 apples

3 2 Make an expression using x to find the total number of apples.

T Confirm with students which part of the expression changes.

S It is the number of apples in each box.

S Express the problem in words or by symbols such as x.
- In words: 2 boxes × apples and add 4 more apples
- Mathematical Expression: $2 \times x + 4$
- . Diagram Description (Line Segment) from the text book.

S 2 × the number of apples in each box + 4.

4 3 Solve the expression by substituting x with a number.

T Guide students to put the number 15 to substitute x and find the total number of apples when there are 15 apples in each box and 4 apples outside the box.

S Because x is 15, now we can rewrite the expression as 2 × 15 + 4 = 34
Answer is 34 apples.

5 Complete the Exercise.

S Solve the exercises.

T Confirm students' answers.

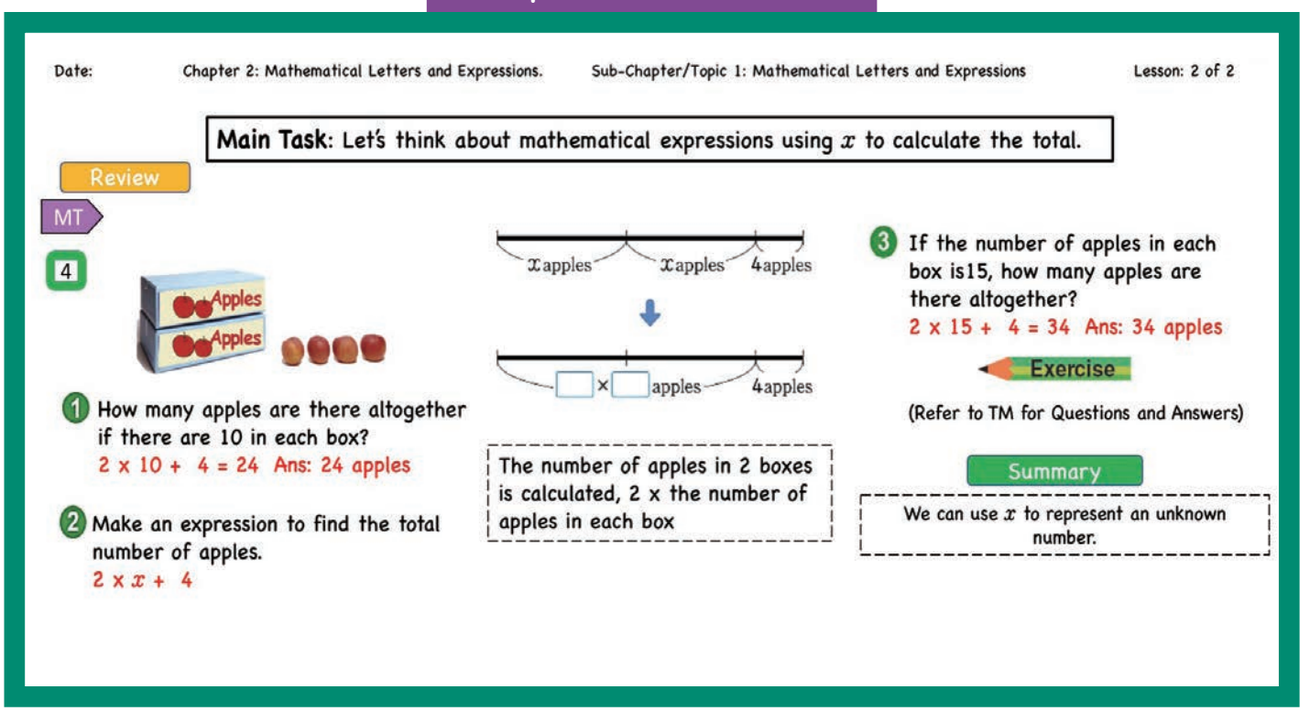
6 Summary

T What have you learned in this lesson?

S Present ideas on what they have learned.

T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan



Unit 2

Unit: Mathematical Letters and Expressions
Sub-unit: 2. Let's Put Numbers into Mathematical Sentences
Lesson 1 of 4

Textbook Page : 023
Actual Lesson 014

Sub-unit Objectives

- To explore various ways to identify the appropriate number or value to substitute for x in problems applying addition.
- To identify the appropriate number or value to substitute for x in problems applying multiplication.
- To identify the number or value to substitute for x in problems applying both multiplication and addition.
- To identify various mathematical expressions that represents the sum of angles in polygons. To find the appropriate value for a when the number of sides/ angles is described a.

Lesson Objectives

- To explore various ways to identify the appropriate number or value to substitute for x in problems when addition is applied.
- Find the value of x.

Prior Knowledge

- Calculating total
- Expressions with Symbols

Preparation

- Chart showing students' ideas.

Assessment

- Identify various ways on how to find a number by substituting for x in a mathematical sentence of addition with x. F
- Find x by solving the equation which satisfies the mathematical sentence. F S

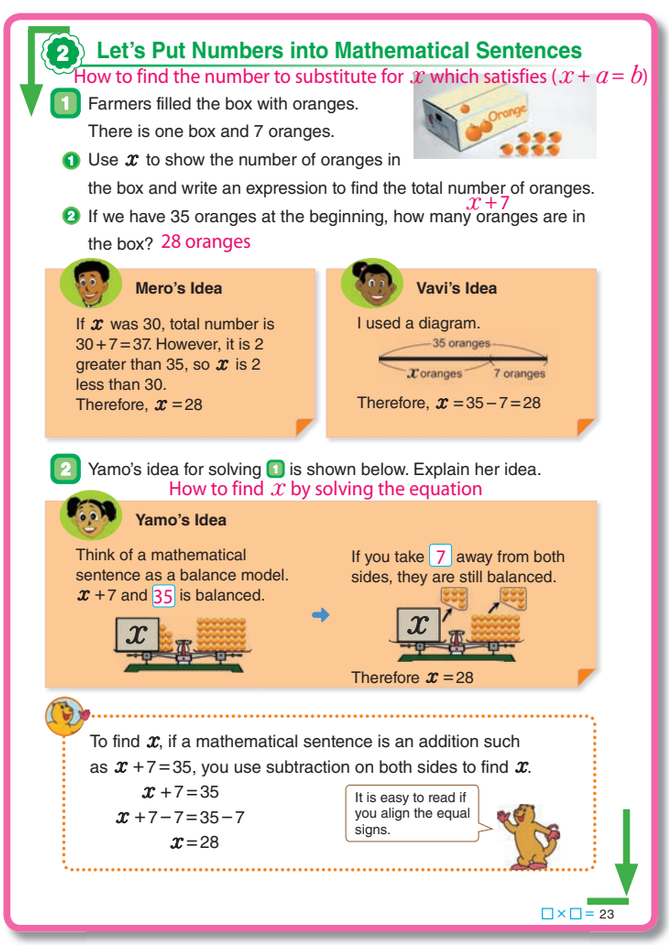
Teacher's Notes

Yamo's idea can be considered as an advanced solution. She looks at the given mathematical sentence as a scale and thinks $x+7$ and 35 are balanced. She further thinks she can maintain the balance if she takes out 7 from both sides. This is an application of the property of equations.

$x+7=35$

$x+7-7=35-7$

$x=28$



2 Let's Put Numbers into Mathematical Sentences

How to find the number to substitute for x which satisfies ($x+a=b$)

1 Farmers filled the box with oranges.
There is one box and 7 oranges.

1 Use x to show the number of oranges in the box and write an expression to find the total number of oranges. $x+7$

2 If we have 35 oranges at the beginning, how many oranges are in the box? 28 oranges

Mero's Idea

If x was 30, total number is $30+7=37$. However, it is 2 greater than 35, so x is 2 less than 30.
Therefore, $x=28$

Vavi's Idea

I used a diagram.

Therefore, $x=35-7=28$

2 Yamo's idea for solving 1 is shown below. Explain her idea.

How to find x by solving the equation

Yamo's Idea

Think of a mathematical sentence as a balance model.
$x+7$ and 35 is balanced.

If you take 7 away from both sides, they are still balanced.

Therefore $x=28$

To find x, if a mathematical sentence is an addition such as $x+7=35$, you use subtraction on both sides to find x.

$x+7=35$

$x+7-7=35-7$

$x=28$

It is easy to read if you align the equal signs.

□×□= 23

Lesson flow

1 Review the previous lesson.

2 Think about how to find the total number of oranges.

T/S 1 Read and understand the given situation.
T How many oranges are there altogether in the box?
S We do not know how many oranges in the box.
T For now we do not know so, there are x number of oranges in the box with 7 extras.
S 1 Discuss and write an expression by substituting x for the number of oranges in a box.
T How can we represent the number of oranges in an expression?
S The number of oranges in the box is represented by x and the oranges left is 7 so the expression would be x + 7.

3 2 Explore various ways to determine the appropriate number or value to substitute for x.

T Introduce the Main Task. (Refer to the BP)
T Get students to explore various ways to identify the number of oranges in the box.
S Use the expression above to think of various ways to find the appropriate number or value for x.
T Ask the students to discuss and explain the 2 ideas.
S **Mero's Idea:** Assuming that there were 30 oranges in a box, he was able to calculate 30 + 7 = 37.
However, it can be seen that there was an increase of 2 from the 35 oranges at the beginning, so that means x is 2 less than 30. Therefore, x = 28.
S **Vavi'a Idea:** In the beginning there were 35 oranges, so she thought of drawing a line segment to help find the number of oranges in a box.

4 Solve the task by finding the value of x.

T/S 2 Discuss Yamo's idea by drawing the explanation of the diagram and calculation of the equation on the blackboard on making a balance following the sample in the textbook.
TN Remind students that subtraction can be used to identify the appropriate value for x.
Whatever is done on the right side of the equation must be done on the left side of the equation.

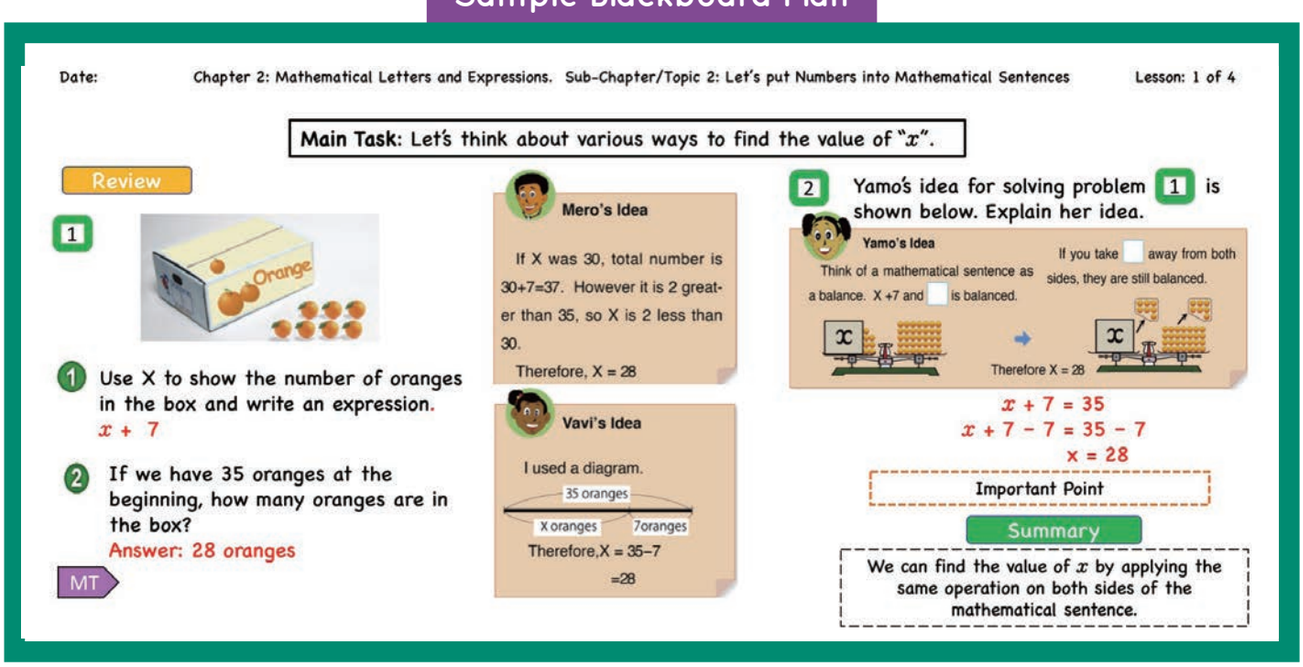
5 Important Point

T/S Explain the important point in the box .....

6 Summary

T What have you learned in this lesson?
S Present ideas on what they have learned.
T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan



Unit 2

Unit: Mathematical Letters and Expressions
Sub-unit: 2. Let's Put Numbers into Mathematical Sentences
Sentences Lesson 2 of 4

Textbook Page : 024 and 025
Actual Lesson 015

Lesson Objectives

- To explore various ways to identify the correct value for x in problems applying multiplication and division.

Prior Knowledge

- How to solve a math sentence using the opposite operation.
- Expressions with symbols.

Preparation

- Chart or Drawing of a parallelogram.

Assessment

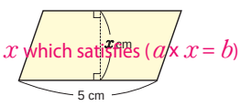
- Understand how to calculate a mathematical sentence with a multiplication of x. F
- Calculate based on a mathematical sentence for a given situation. F
- Solve the exercises correctly. S

Teacher's Notes

Mathematical sentences (Equations)
In this textbook, some equation patterns are introduced; $a+x=b$, $x-a=b$, $a\times x=b$.The value for x can be identified using opposite operation on both sides of the equation. Ensure better understanding by demonstrating it with a chart or other methods. Those who do not fully understand its logic tend to make simple mistakes, i.e. to identify the value for x in an equation $a-x=b$, writing $x=b-a$ without thinking.
Students should be also advised to write equal signs (=) aligned with the previous sentence when rewriting their sentences when solving for x.

Students should practice identifying the appropriate values for x in mathematical sentences (addition, subtraction, and multiplication) for the exercises.

3 There is a parallelogram like the figure on the right.



How to find the number to substitute for x which satisfies ($a\times x=b$)

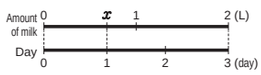
① If the area is 18 square centimetres (cm²) and height is x cm, write a mathematical sentence to find the area. $5\times x=18$

② Based on the expression in ①, find the height of the parallelogram. $x=18\div 5=3.6$ Answer: 3.6 cm

How to find the number to substitute for x which satisfies ($x\times a=b$)

4 Rodney drinks the same amount of milk everyday. He drank 2 litres (L) in 3 days.

① If he drank x L per day, write a mathematical sentence to find the total amount of milk he drank in 3 days. $x\times 3=2$



② Based on the mathematical sentence of ①, solve to find the amount of milk he drank per day. $x=2\div 3=\frac{2}{3}$ Answer: $\frac{2}{3}$ L

Milk (L)	x	2
Day (day)	1	3

(×3 above, ×3 below)

To find x, if a mathematical sentence is in multiplication such as $5\times x=18$, or $x\times 3=2$, you use division on both sides to find x.

$5\times x=18$
$5\times x\div 5=18\div 5$
$x=3.6$

$x\times 3=2$
$x\times 3\div 3=2\div 3$
$x=\frac{2}{3}$

Not only does x represent whole numbers (integers) but also decimals and fractions.

Thinking about why mathematical expressions using symbols as $x\times a$ are appreciated

5 You used a or x to show various quantities. Write in your exercise book about why letters are useful and discuss it with your friends.

Gawi: It is useful because we can represent quantities that changes in one letter.

Make a mathematical sentence which you think is easier to solve. :Kekeni

Exercise

Find the number for x.

① $x+4=22$ 18 ② $38+x=54$ 16 ③ $x-6=15$ 21
④ $x-27=18$ 45 ⑤ $7\times x=5$ $\frac{5}{7}$ ⑥ $x\times 4=14$ 3.5

6 There are 2 boxes of chocolates which contain the same amount and 3 more pieces of chocolates. When you count the total, it is 23 chocolates. How many chocolates does each box have?

① If the number of chocolates per box is x, write a mathematical sentence for the total number.

② By using the following table below, let's find the total number of chocolates in the case of 7, 8, 9, … for x.

x	7	8	9				
$x\times 2$	14						
$x\times 2+3$	17						

First, calculate the number of chocolates in 2 boxes and then add 3.

I could find the number for x, if the total number of chocolates is 23.

7 There are 8 stacks of coloured papers and 3 sheets.

① If 1 stack is x sheets, write a mathematical expression to find the total.

② If the total is 107 sheets, how many sheets are in one stack? Try numbers 10, 11, 12 and so on for x.

Exercise

Find the number that applies for x by replacing it with 8, 9, 10, ... and so on.

① $x\times 3+4=37$ ② $x\times 8+5=77$

24 = □ ÷ □

□ × □ = 25

Lesson flow

1 Review the previous lesson.

2 Find the area of a parallelogram whose height is x.

T/S 3 Read and understand the given situation.
T 1 Get the students to write a mathematical sentence using the base, height and area.
S Base is 5cm, the height is unknown and the total area is 18 cm².
TN If the area of a parallelogram is 18 cm² and the height is $x$cm. Use the formula to write a mathematical sentence.
S The mathematical sentence would be $5 \times x = 18$
T Confirms relationship of the diagram and mathematical sentence of the formula of the parallelogram.
T Introduce the Main Task. (Refer to the BP)
S 2 Based on the expression in Activity 1, find x and explain.
T Confirm using the idea of balancing the equation from one side with the other side. ($18 = 5 \times x$)
S $5 \times x = 18$
$5 \times x \div 5 = 18 \div 5$
$x = 3.6$
Confirmation: $5 \times 3.6 = 18$
TN Advice students to substitute x with its value to check if their answers are correct.

3 Identify the appropriate number or value for x, and write a mathematical sentence.

T/S 4 Read and understand the given situation.
S 1 Write a mathematical sentence to find the total amount of milk Rodney drank in 3 days if he drank x L per day.
Identify the appropriate value for x.
S If 2 L = 3 days and x L = 1 day. The mathematical sentence is $2 = x \times 3$
S 2 Solve the amount he drank per day by writing $x \times 3 = 2$.
The value of x is $x = 2 \div 3$ or $\frac{2}{3}$ and so
Answer is $x = \frac{2}{3}$ L per day.

4 Important Point

T/S Explain the important point in the box .
S Learn that when identifying the value for x, if a mathematics sentence is in such as $5 \times x = 18$, or $x \times 3 = 2$, they can use division to find x.
TN Emphasise that x does not always represent whole numbers (integers) but they can be decimals and fractions.

5 Explain the usefulness of the letters a or x in mathematical expressions.

T/S 5 Read and understand the given task.
S Discuss with others why letters such as a or x are useful.
T Confirm that they can use one letter to represent a variable or quantity.

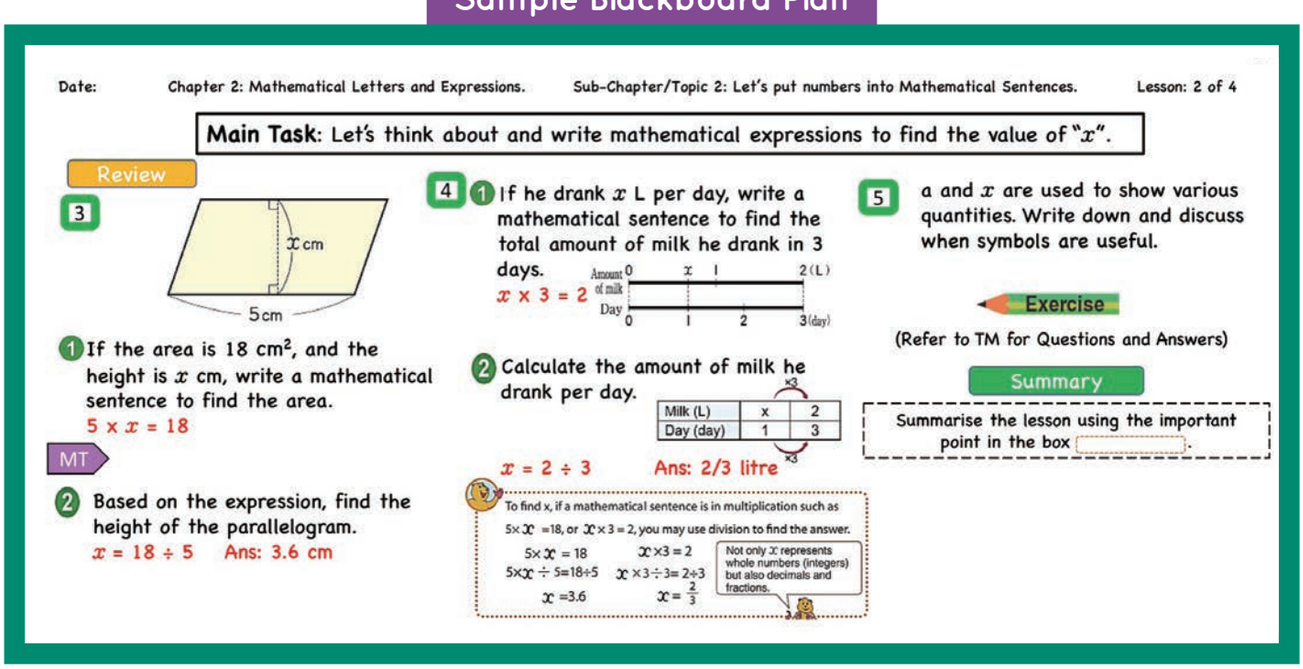
6 Complete the Exercise.

S Solve the exercise.
T Confirm students' answers.

7 Summary

T What have you learned in this lesson?
S Present ideas on what they have learned.
T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan



Unit 2

Unit: Mathematical Letters and Expressions
Sub-unit: 2. Let's Put Numbers into Mathematical Sentences
Sentences Lesson 3 of 4

Textbook Page : 025
Actual Lesson 016

Lesson Objectives

- To find the number to substitute for x which satisfies ($x \times a + b = c$) where a, b and c represent known numbers.
- To write mathematical expressions with x and to find the number to substitute for x.

Prior Knowledge

- Expressions with symbols
- Solving expressions with symbols by balancing the equations.

Preparation

- Chart of table on textbook page.

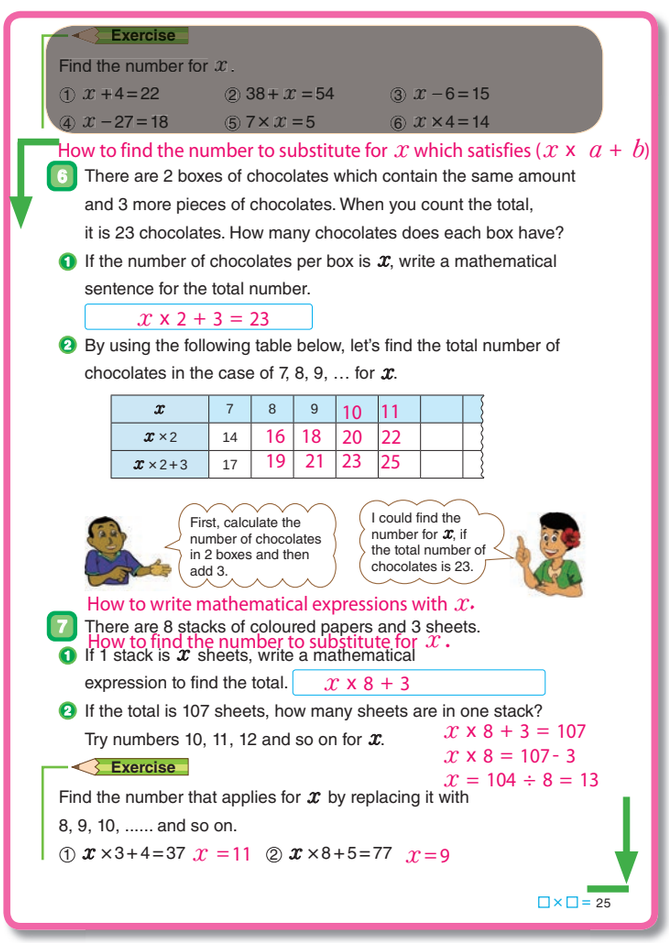
Assessment

- Write mathematical expressions for x with enjoyment and find the value of x. F
- Think about how to find the number to substitute for x which satisfies ($x \times a + b = c$) where a, b and c represent known numbers. F S

Teacher's Notes

From the table, x is represented by 7, 8, 9, etc. and it is called an Independent Variable or commonly known as x values, where it stays the same. In the same way $x \times 2$ in this case is called a dependent variable or commonly known as the y values because it depends entirely on the x (independent variable to make it change)

Recommend the idea of replacing and accept calculations as well from advanced students who use prior knowledge.



Exercise

Find the number for x.

① $x + 4 = 22$ ② $38 + x = 54$ ③ $x - 6 = 15$

④ $x - 27 = 18$ ⑤ $7 \times x = 5$ ⑥ $x \times 4 = 14$

How to find the number to substitute for x which satisfies ($x \times a + b$)

6 There are 2 boxes of chocolates which contain the same amount and 3 more pieces of chocolates. When you count the total, it is 23 chocolates. How many chocolates does each box have?

1 If the number of chocolates per box is x, write a mathematical sentence for the total number.

$x \times 2 + 3 = 23$

2 By using the following table below, let's find the total number of chocolates in the case of 7, 8, 9, … for x.

x	7	8	9	10	11		
$x \times 2$	14	16	18	20	22		
$x \times 2 + 3$	17	19	21	23	25		

First, calculate the number of chocolates in 2 boxes and then add 3.

I could find the number for x, if the total number of chocolates is 23.

How to write mathematical expressions with x.

7 There are 8 stacks of coloured papers and 3 sheets.

How to find the number to substitute for x.

1 If 1 stack is x sheets, write a mathematical expression to find the total. $x \times 8 + 3$

2 If the total is 107 sheets, how many sheets are in one stack?

Try numbers 10, 11, 12 and so on for x.

$x \times 8 + 3 = 107$

$x \times 8 = 107 - 3$

$x = 104 \div 8 = 13$

Exercise

Find the number that applies for x by replacing it with 8, 9, 10, ... and so on.

① $x \times 3 + 4 = 37$ $x = 11$ ② $x \times 8 + 5 = 77$ $x = 9$

$\square \times \square = 25$

Lesson flow

1 Review the previous lesson.

T Introduce the Main Task. (Refer to the BP)

2 6 Think about how to find the number of chocolates per box as x and write a mathematical sentence for the total.

T/S Read and understand the given situation.

S 1 Read the problem and find the number to replace x.

TN Students should realise that if the number of chocolates per box is represented by x. It is written as x as the number of chocolates in one box multiplied by 2 boxes plus 3 extra chocolates outside of the box and so it will total to 23 chocolates.

S Write the mathematical sentence $x \times 2 + 3 = 23$

3 Think about how to find the number to replace x.

S 2 Use the mathematical sentence from 1 to complete the table by finding the total number of chocolates.

T/S Discuss and complete the first column of the table so they can complete the others.

S Copy the table and complete the table for 7, 8, 9.

T Invite students to complete the table on the board and identify patterns.

S Complete 10, 11 and 12 on the table.

T Ask students for which value of x satisfies the sentence $2 \times x + 3 = 23$.

S When x is 10

4 Write mathematical expressions using x and how to identify the appropriate number or value to substitute for x.

T/S 7 Read and understand the given situation.

T 1 If 1 stack is substituted as x sheets, write a mathematical sentence to find the total.

S Follow the example from the previous task 6 and write the mathematical sentence $x \times 8 + 3 = 107$.

T Confirm the mathematical sentence of $x \times 8 + 3 = 107$.

S 2 Complete the activity by finding the number of sheets in a stack.

T From the confirmed mathematical sentence $x \times 8 + 3 = 107$. Clarify that x is represented by 10, 11, 12; etc on the blackboard.

S Present their calculations to find the total which is 107 sheets.

TN Encourage students to extend their numbers to see where their answer lies in the table.

S Present their answers on the blackboard.

T Confirm their answers.

TN Students can just use the mathematical sentence to find the x value which is 13.

5 Complete the Exercises.

S Solve all the exercises.

T Confirm students' answers.

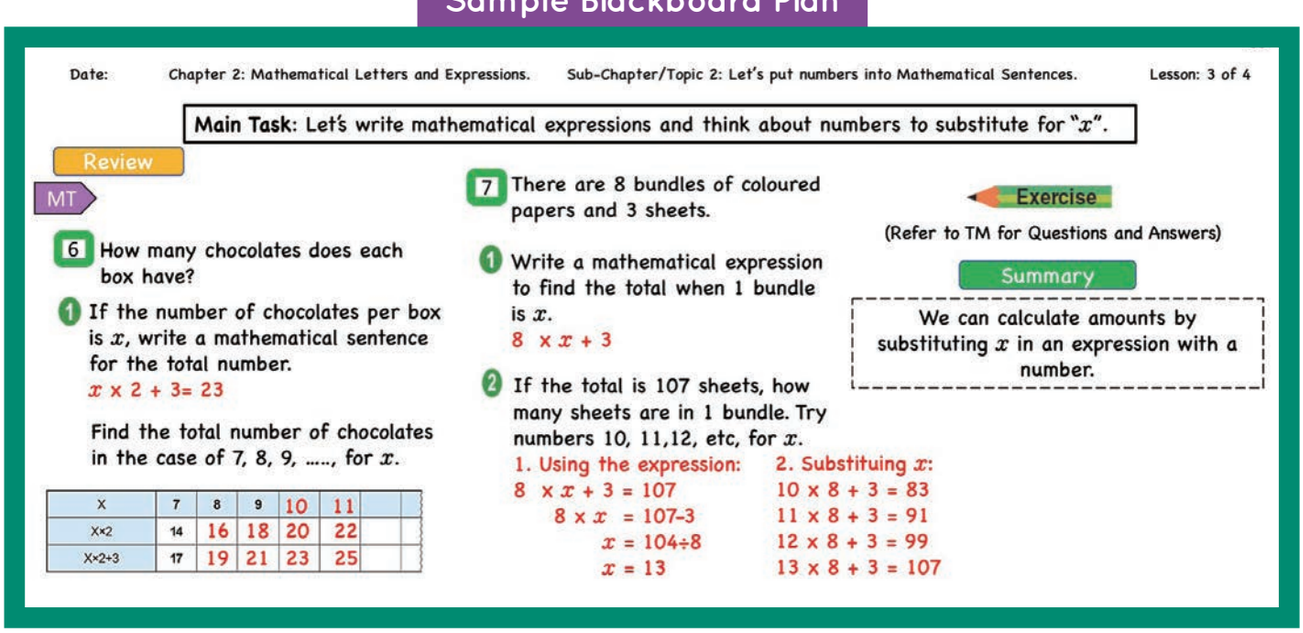
6 Summary

T What have you learned in this lesson?

S Present ideas on what they have learned.

T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan



Unit 2

Unit: Mathematical Letters and Expressions
Sub-unit: 2. Let's Put Numbers into Mathematical Sentences
Lesson 4 of 4

Textbook Page : 026
Actual Lesson 017

Lesson Objectives

- To think of various mathematical expressions representing the sum of the angles in a-sided polygons and determine the appropriate value for a.

Prior Knowledge

- Characteristics of triangles.
- Congruence and angles of figures
- Mathematical sentences
- Regular polygons and circles (Grade 5)

Preparation

- Drawing of two polygons on a chart.
- Tape diagram in activity 3.

Assessment

- Think about various mathematical expressions to identify the sum of angles in polygons. F S

Teacher's Notes

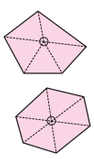
The lesson focus is on identifying patterns and developing mathematical expressions and sentences using angle sum of regular polygons.

In the expression $180 \times a - 360$, we simplify the expression to $180 \times (a - 2)$ by taking out 180 as the common multiple. We then find the sides of the polygon with 1620 by balancing the equation.

The Sum of Angles in Polygons

8 Let's reflect on the sum of angles in polygons.

- The sum of angles in a triangle ..... 180°
- The sum of angles in a quadrilateral..... 360°
- The sum of angles in a pentagon ..... 540°
- The sum of angles in a hexagon ..... 720°



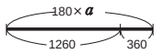
1 Based on the figures above, Phillip thought of an expression for calculating the sum of the angles of regular polygons.
Fill in the ☐ below and explain his thinking.

180 × a − 360

2 Use the expression in 1 to find the sum of angles of a decagon.

3 If the sum of angles is 1260°, how many sides does this polygon have?

$180 \times a - 360 = 1260$



$180 \times a - 360 + 360 = 1260 + 360$
$180 \times a = 1620$
$180 \times a \div 180 = 1620 \div 180$
$a = 9$

It is easy to calculate if we divide both dividend and divisor by 10 for calculating 1620 ÷ 180.

4 Brenda wrote the expression $180 \times (a - 2)$ to find the sum of angles in a - sided polygon. Explain her idea with figures.
Using the expression, calculate how many sides a polygon has if the sum of its angles is 1620°.

26 = ☐ ÷ ☐

Lesson flow

1 Review the previous lesson.

2 Think about various mathematical expressions to identify the angle sum of polygons.

T Introduce the Main Task. (Refer to the BP)

T/S 8 Read and understand the given situation.

S Find the angle sum of all the polygons. (Refer to textbook)

TN Students should treat this as a review of their previous knowledge of polygons in grade 5.

T 1 Based on the figure above how did Philip think of an expression to calculate? Please explain his thinking.

S A pentagon makes 5 triangles.
180 × 5 = 900° (the angle sum is too large)
So, 900- 360 = 540° (angle in the centre)
180 × 5 - 360 = 540°
Expression: 180 × a - 360

3 Use the expression to find the angle sum of a decagon.

T 2 Using the expression in 1, find the sum of angles of a decagon.

S 180 is multiplied by10 (triangles) in a decagon and subtract 360 to get the answer 1440.
(180 × 10 – 360 = 1440) Answer: 1440°

T 3 Sum of angles is 1260°. Use the same expression in 1 to find how many sides this polygon has.

S Write a sentence, 180 × a – 360 = 1260° and solve.

TN When identifying the appropriate value for a, that is a question of how many sides the polygon has in 3 to solve.

S Think about it based on the line diagram.
180 × a – 360 = 1260° Answer: a = 9

4 4 Making a math sentence based on a figure.

T Get students to explain how Brenda is thinking.

S Draw figures of polygons; quadrilateral, pentagon and hexagon to determine that the number of triangles is the **number of sides - 2.**

TN a - 2 represents the number of triangles she found in the polygon.

T Put the identified answer into an equation to check the answer.

S Calculate 180 (a - 2) = 1620
180 (a - 2) ÷180 = 1620 ÷ 180
a - 2 + 2 = 9 + 2
a = 11

5 Summary

T What have you learned in this lesson?

S Present ideas on what they have learned.

T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan

Date: Chapter 2: Mathematical Letters and Expressions. Sub-Chapter/Topic 2: Let's put numbers into Mathematical Sentences Lesson: 4 of 4

Main Task: Let's think of various expressions to identify the number of sides (a) of polygons.

Review

MT

8 Sum of angles in polygons
- Triangle 180°
- Quadrilateral 360°
- Pentagon 540°
- Hexagon 720°

1 Phillip thought of an expression for calculating the sum of angles for regular polygons.

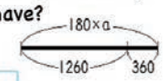
Fill the ☐ below, and explain his thinking.

180 × a – 360

2 Use the expression to find the sum of angles of a decagon.
180 x 10 - 360 = 1440°

3 If the sum of angles 1620°, how many sides does this polygon have?

180 × a – 360 = 1260



180 × a = 1260 + 360
180 × a = 1620
a = 1620 ÷ 180
a = 9

4 Brenda wrote the expression 180 x (a-2) to find the sum of angles in a-sided polygon. Explain her ideas with figures.
Using the expression, calculate how many sides a polygon has if the sum of angles is 1620°.

When the sum of angles is 1620°
180 x (a - 2) = 1620
a= 11
Answer: Undecagon

Summary

To find the number of sides in a polygon, we find the value of "a" in:
i. 180° x a - 360 = angle sum
ii. 180° x (a - 2) = angle sum

Unit 2

Unit: Mathematical Letters and Expressions
Sub-unit: 3. Reading Expressions
Lesson 1 of 1

Textbook Page : 027
Actual Lesson 018

Sub-unit Objectives

- To read a mathematical expression and identify what it represents.

Lesson Objectives

- To read a mathematical expression and identify what it represents.

Prior Knowledge

- Expressions with Symbols

Preparation

- Chart showing the cost for each vegetable

Assessment

- Calculate by reading the expressions. F
- Interpret and appreciate what mathematical expressions represent. F S

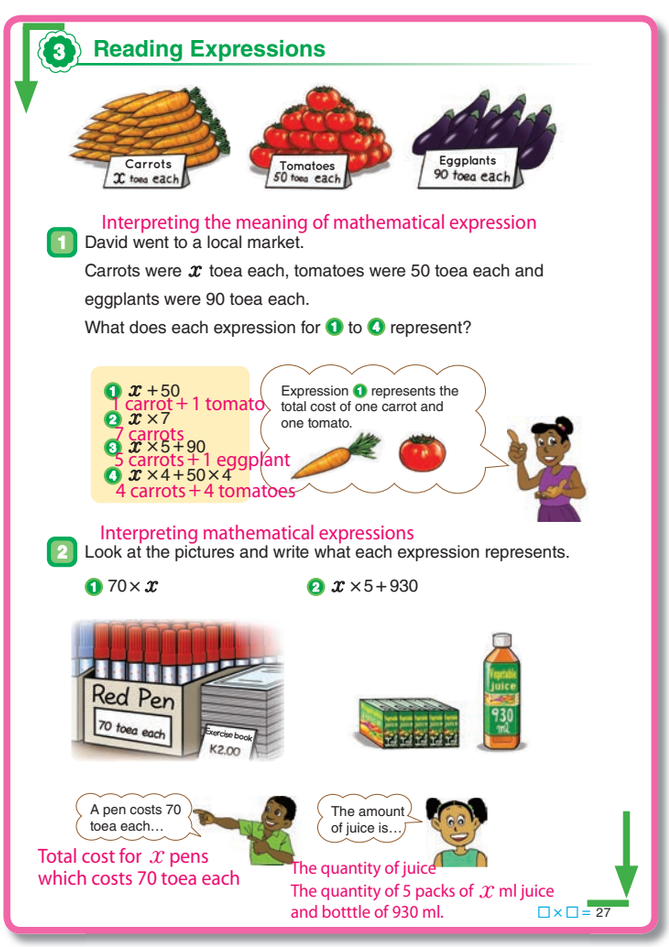
Teacher's Notes

Mathematical Expressions Represents Relations of Numbers/Quantities.

In this unit, teacher needs to carry out effective teaching and learning activities for students to understand what they mean by mathematical expressions of numbers or quantities.

Encourage and involve students in activities that are not only to make mathematical expressions using symbols but also to read expressions in depth. There are various ways to read expressions in depth, some of which would include the following:

- To read an expression and contextualize it with concrete situations accordingly;
- To consider a wide range of numbers and apply them to an expression; and
- To read an expression in accordance with a visualised model such as a line diagram; and the table to help them solve accurately.



Lesson flow

1 Review the previous lesson.

T Introduce the Main Task. (Refer to the BP)

2 Intepret the meaning of mathematical expressions in the given problems.

T/S 1 Read and understand the given situation.

T Get the students to discuss and make meaning out of each expression 1 to 4.

S 1 x + 50, represents total cost of 1 carrot and 1 tomato

2 $x \times 7$, represents total cost of 7 carrots

3 $x \times 5 + 90$, represents total cost of 5 carrots and 1 eggplant

4 $x \times 4 + 50 \times 4$, represents total cost of 4 carrots and 4 tomatoes.

3 2 Look at the pictures and think about what each expression represents.

T What do you think each of the expression represents?

S 1 The red pen costs 70 toea each. So, $70 \times x$ represents the total cost of x number of red pens.

S 2 930 ml is the amount of juice in a bottle. There are 5 packed juices in the picture, so x in the expression $x \times 5 + 930$ represents the total amount of x mL times 5 packs and 930 mL bottle of juice.

S Therefore, representation says that there is x ml of juice in a pack times 5 plus 930 ml of bottled juice.

TN Encourage students to think and realise what x represents by associating the pictures with the given expressions.

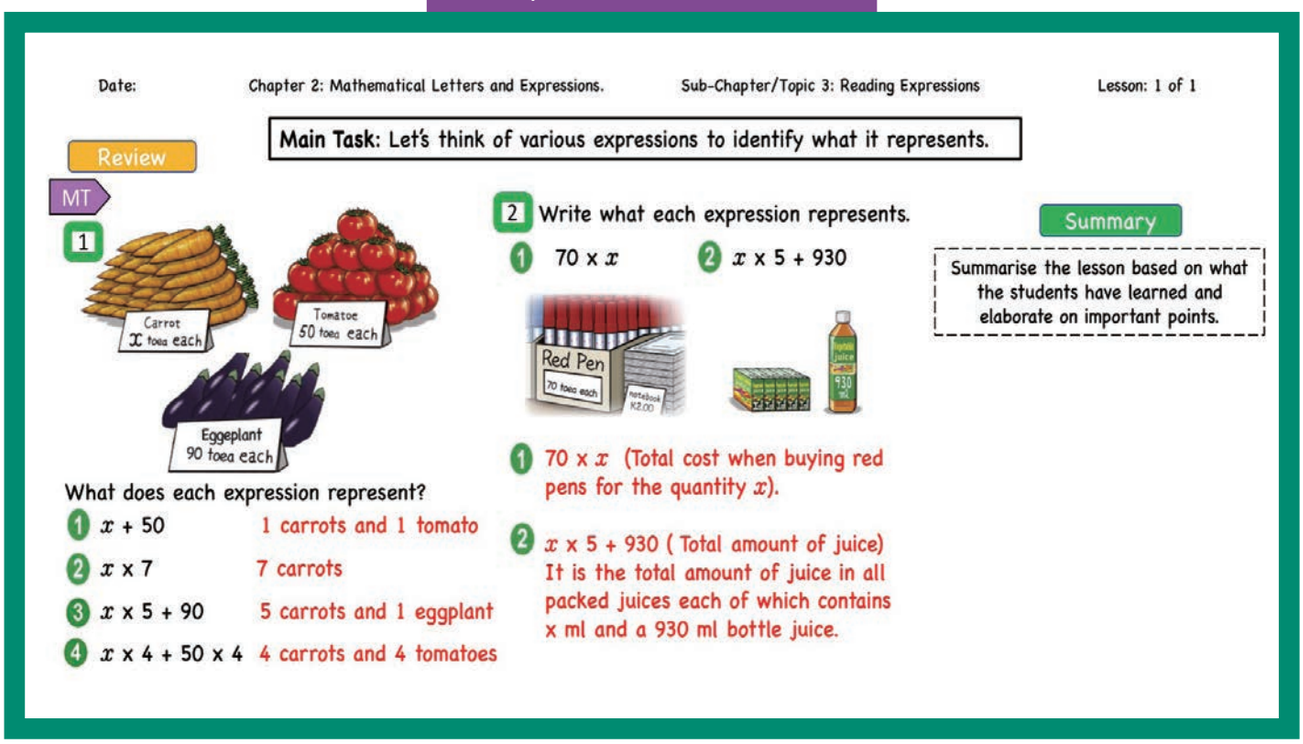
4 Summary.

T What have you learned in this lesson?

S Present ideas on what they have learned.

T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan



Unit 2

Unit: Mathematical Letters and Expressions
Exercise, Problems, Review and Evaluation
Lesson: 1 and 2 of 2

Textbook Page : 028 and 029
Actual Lesson 019 & 020

Lesson Objectives

- To confirm their understanding on the concepts they learned in this unit by completing the Exercises, Problems, Review and Evaluation Test confidently.

Prior Knowledge

- All the contents learned in the unit.

Preparation

- Evaluation Test

Assessment

- Solve the exercises correctly by confirming what they learned in the unit. F S

Teacher's Notes

This is the last lesson of Chapter 2. Students should be encouraged to use the necessary skills learned in this unit to complete all the Exercises and solve the Problems in preparation for the evaluation test. The test can be conducted as assesment for your class after completing all the exercises. Use the attached evaluation test to conduct assesment for your class after finishing all the exercises, problems and review as a seperate lesson.

EXERCISE

How to write a mathematical expression with x and How to find the number to substitute for x.

1 Write a mathematical expression using x and solve for x.

Pages 23 to 25

① A set of weekly diaries costs x kina. 6 sets cost 720 kina.
$x \times 6 = 720$ $x = 720 \div 6 = 120$

② The cost of one textbook is x kina and 5 textbooks books is 650 kina.
$x \times 5 = 650$ $x = 650 \div 5 = 130$

③ Mary has 20 marbles. She got x more so the total became 52.
$20 + x = 52$ $x = 52 - 20 = 32$

④ There is a ribbon which is x cm long.
Lolo used 50 cm so there is 60 cm left.
$x - 50 = 60$ $x = 50 + 60 = 110$

Finding the number to substitute for x.

2 Let's find the number for x.

Page 27

① $x + 8 = 22$ 14 ② $x \times 6 = 48$ 8
③ $x - 3.5 = 7$ 10.5 ④ $x \times 3 = 4.5$ 1.5

PROBLEMS

Application of mathematical expressions with x.

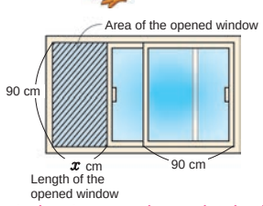
1 There is a window with the height of 90 cm.
Think about the area of the opened window.

● Understanding variables.

① If the length of the opened window is x, write an expression to calculate the area of opened window. $90 \times x$

② If the area is 4500 cm², what is the length of the opened window? 500 cm

③ The length of the window is 90 cm.
Is it possible to make the area of the opened window to 8550 cm²?
Explain your reasoning.



Not possible because when the window is opened completely, the length is 90 cm. So, 90 x 90 = 8100 which 8550 exceeds.

REVIEW

1 Let's fill in the ☐ with numbers.
① 8.27 = 1 × 8 + 0.1 × 2 + 0.01 × 7
② 0.206 = 0.1 × 2 + 0.01 × 6

2 When 7.26 is the original number, find the answer when it is:
① 10 times the original number. 72.6
② 100 times the original number. 726
③ $\frac{1}{10}$ of the original number. 0.726
④ $\frac{1}{100}$ of the original number. 0.0726

3 The cost of 5 mattresses is 1400 kina.
① How much is the cost for 1 mattress? $1400 \div 5 = 280$ kina
② How much will 7 mattresses cost? $1400 \times \frac{7}{5} = 1960$ kina

4 The table shows the area of pools and the number of persons in them. Which pool is more crowded?

The Area of Pools and Number of Persons

	Area (m²)	Number of person
Indoor	400	80
Outdoor	500	120

$400 \div 80 = 5$
$500 \div 120 = 4.1$
Outdoor is more crowded.

5 Let's multiply in vertical form.
① 4 × 1.6 6.4 ② 8 × 0.5 4 ③ 9 × 1.9 36.1
④ 5.4 × 1.2 6.48 ⑤ 2.6 × 0.4 1.04 ⑥ 2.8 × 1.5 4.2
⑦ 0.5 × 0.6 0.3 ⑧ 2.5 × 0.8 2.0 ⑨ 3.4 × 1.8 6.12
⑩ 1.6 × 7.3 11.68 ⑪ 6.32 × 6.8 42.976 ⑫ 8.25 × 2.4 19.8

6 1 m of iron pipe weighs 3.6 kg.
What would be its weight when its length is 7.5 m and 0.8 m respectively?
$3.6 \times 7.5 = 27$ 27 kg
$3.6 \times 0.8 = 6$ 2.88 kg

Lesson flow

1 Complete Exercise ① and ②.

S Read the Question ① to ④ from the textbook. Write a mathematical expression using x and solve for x.
S Read Questions ① to ④ from the textbook and find the number for x .
T Confirm students' answers.

2 Complete Problem ①.

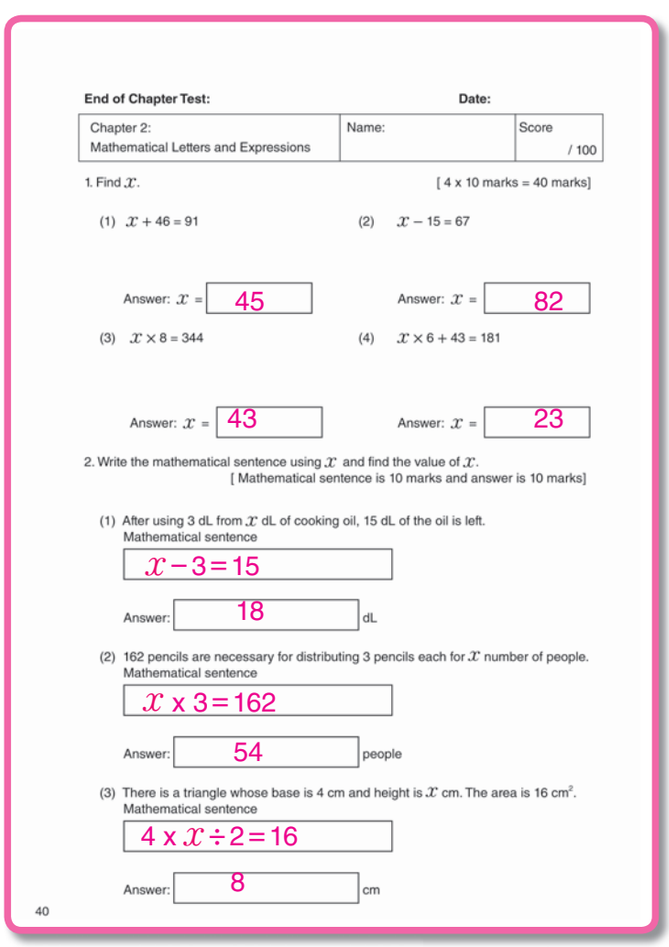
S Solve the problem by answering question ① to ③.
T Confirm students' answers.

3 Complete Review ① to ⑥.

S Solve the review questions.
T Confirm students' answers.

4 Complete the Evaluation Test.

TN Use the attached evaluation test to conduct assesment for your class after finishing all the exercises, problems and review as a seperate lesson.
S Complete the Evaluation Test.



End of Chapter Test: **Date:**

Chapter 2: Mathematical Letters and Expressions	Name:	Score / 100

1. Find x. [4 x 10 marks = 40 marks]

(1) $x + 46 = 91$ Answer: x = 45

(2) $x - 15 = 67$ Answer: x = 82

(3) $x \times 8 = 344$ Answer: x = 43

(4) $x \times 6 + 43 = 181$ Answer: x = 23

2. Write the mathematical sentence using x and find the value of x.
[Mathematical sentence is 10 marks and answer is 10 marks]

(1) After using 3 dL from x dL of cooking oil, 15 dL of the oil is left.
Mathematical sentence: $x - 3 = 15$
Answer: 18 dL

(2) 162 pencils are necessary for distributing 3 pencils each for x number of people.
Mathematical sentence: $x \times 3 = 162$
Answer: 54 people

(3) There is a triangle whose base is 4 cm and height is x cm. The area is 16 cm^2.
Mathematical sentence: $4 \times x \div 2 = 16$
Answer: 8 cm

40

End of Chapter Test **Date:**

Chapter 2: Mathematical Letters and Expressions	Name:	Score / 100

1. Find x. [4 × 10 marks = 40 marks]

(1) $x + 46 = 91$

Answer: $x =$ ☐

(2) $x - 15 = 67$

Answer: $x =$ ☐

(3) $x \times 8 = 344$

Answer: $x =$ ☐

(4) $x \times 6 + 43 = 181$

Answer: $x =$ ☐

2. Write the mathematical sentence using x and find the value of x.
[Mathematical sentence is 10 marks and answer is 10 marks]

(1) After using 3 dL from x dL of cooking oil, 15 dL of the oil is left.
Mathematical sentence

☐

Answer: ☐ dL

(2) 162 pencils are necessary for distributing 3 pencils each for x number of people.
Mathematical sentence

☐

Answer: ☐ people

(3) There is a triangle whose base is 4 cm and height is x cm. The area is 16 cm^2.
Mathematical sentence

☐

Answer: ☐ cm

Chapter 3 Multiplication of Fractions

1. Content Standard

6.1.2. Students will be able to extend the multiplication and division to fractions with multipliers and divisors as fraction and do multiplication and division and appreciate the simplicity of rules.

2. Unit Objectives

- To deepen the understanding of multiplication of fractions.
- To think about how to calculate the multiplication of fraction and master the skill.
- To understand that in the case of fraction, the same rule of integers is applied.

3. Teaching Overview

Students already learned calculation of whole numbers and decimals with basic operations. They also did fraction multiplied/divided by a whole number and how to think about it with area diagram. Based on the previous learning, this unit is meant for learning fraction × fraction.

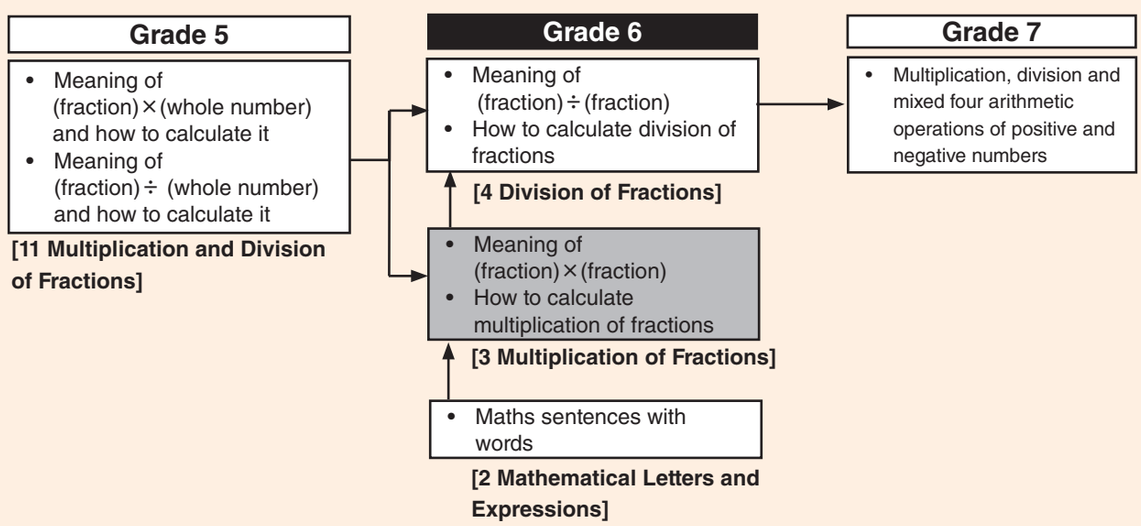
Calculation of Fraction × Fraction :

First, students are supposed to understand the situation and understand the mathematical expression. Then they strategise how to solve it. They will think with an area diagram and think how many unit fractions are found as the answer.

Inverse of a number :

They should firstly read and understand the definition of multiplicative inverse. Then they also should understand that there are also multiplicative inverse of whole numbers and decimals through many practice of finding them based on the definition.

4. Related Learning Contents



Unit 3

Unit: Multiplication of Fractions
Sub-unit: 1. Operation of Fractions × Fractions
Lesson 1 of 5

Textbook Pages :
030 to 032
Actual Lesson 021

Sub-unit Objectives

- To understand how to multiply fraction.

Lesson Objectives

- Make mathematical expressions by understanding the meaning of multiplication of fractions.
- Think about and understand how to calculate multiplication of fractions.

Prior Knowledge

- Multiplication of integers
- When multiplying a proper fraction by a whole number, multiply the numerator by the whole number and leave the denominator as it is.
- Unit fraction

Preparation

- Tape diagrams, tables and area diagrams

Assessment

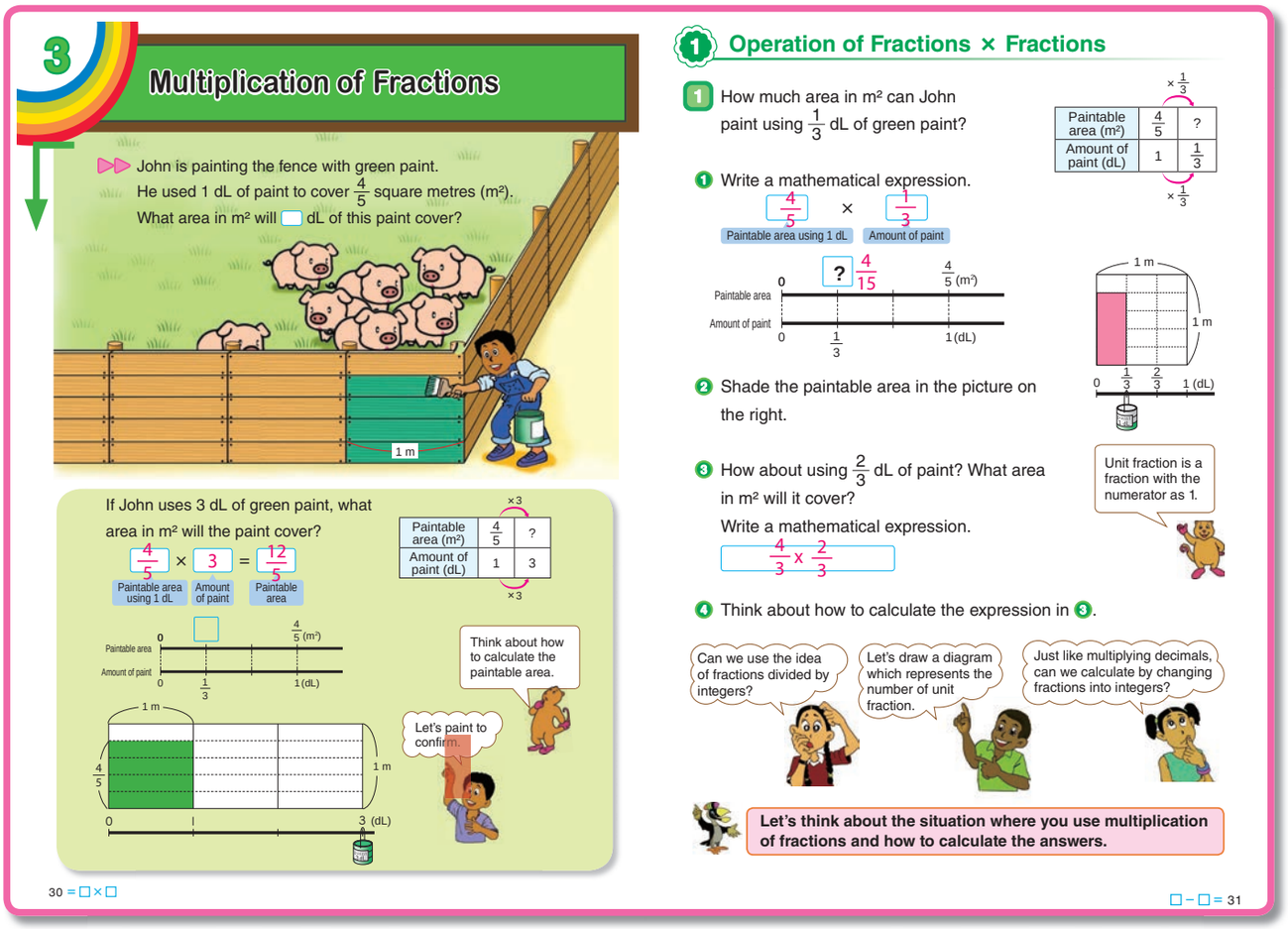
- Think about and write mathematical expressions for the multiplication of fraction. F
- Explain how to calculate multiplication of fraction. S

Teacher's Notes

This lesson is focused on the meaning of calculation of fraction × fraction and doing calculation with answers. The students need to understand and make meaning from the representations. From the understanding and meaning they will be able to write mathematical expression.

Paintable area means the area to be painted.

Refer to the teacher's notes in the next lesson as well.



Lesson flow

1 Understand the meaning of fractions × fractions.

T Introduce the Main Task. (Refer to the BP)

T/S Read and understand the given situation.

T ▶▶ Ask the students to observe the picture and have 1 - 2 minutes discussion about the picture.

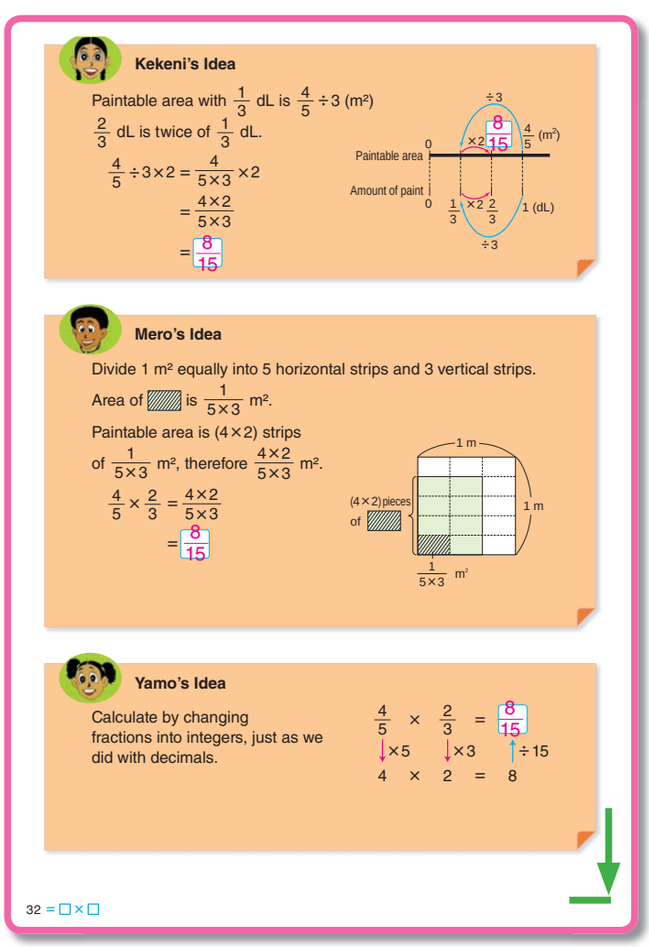
TN Focus on the paintable area using 1 dL. The amount of paint used for 1 m², students think about the situation and write a mathematical sentence.

S Think about how to write the mathematical sentence by filling in the □.
Answer: $\frac{4}{5} \times 3 = \frac{12}{5}$

T Ask the students to relate their mathematical sentence to the answers to the table, number line and think about how to calculate the paintable area using the diagram representation.

S Relate their mathematical sentence to the answers to the table, number line and think about how to represent the paintable area using the diagram and present their answers.

2 Think about how to make a mathematical expression.



T/S 1 Read and understand the given situation.

T Ask students to use their prior knowledge of fraction multiplied by whole number to write the mathematical expression for the given situation.

S Do activity 1 by relating to the table and the number line.

S 2 Shade the paintable area using the area diagram.

S 3 Read and understand the situation and write the mathematical expression.

3 4 Think about how to calculate the expression in 3.

T Get the students to discuss the ideas in the bubbles.

S Use the bubbles to think about how to calculate and suggest ideas.

4 Using the ideas.

T Go through Kekeni's, Mero's and Yamo's ideas.

S Explain each idea about how they calculate $\frac{4}{3} \times \frac{2}{3}$.

5 Summary

T What have you learned in this lesson?

S Present ideas on what they have learned.

T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan

Lesson 22 Sample Blackboard Plan is on page 45.

Unit 3

Unit: Multiplication of Fractions
Sub-unit: 1. Operation of Fractions × Fractions
Lesson 2 of 5

Textbook Pages :
033
Actual Lesson 022

Lesson Objectives

- To think about how to explain the calculation of fraction multipied by a fraction.
- To simplify fractions during calculation of fraction multiplied by a fraction.

Prior Knowledge

- 1 dL of paint will cover $\frac{4}{5}$ m².
- Representation of $\frac{1}{3}$ dL and $\frac{2}{3}$ dL showing the amount of paintable area in m².

Preparation

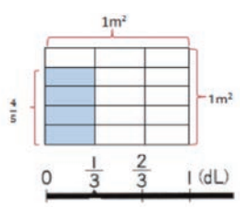
- Tape diagrams, tables and area diagrams.

Assessment

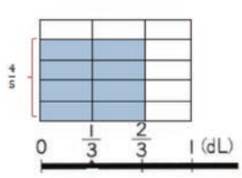
- Calculate fraction × fraction and simplify its answer. F
- Solve the exercises correctly. S

Teacher's Notes

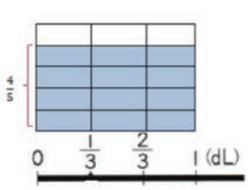
From the first lesson to this second lesson students may be able to observe and compare the paintable area and amount of paint in dL used. The amount of paint in dL went from $\frac{1}{3}$ to $\frac{4}{3}$.



$\frac{4}{5}\times\frac{1}{3}=\frac{4\times1}{5\times3}=\frac{4}{15}$ ans: $\frac{4}{15}$m²

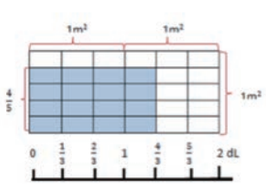


$\frac{4}{5}\times\frac{2}{3}=\frac{4\times2}{5\times3}=\frac{8}{15}$ ans: $\frac{8}{15}$m²



$\frac{4}{5}\times1=\frac{4\times1}{5\times1}=\frac{4}{5}$ ans: $\frac{4}{5}$m²

$\frac{4}{5}\times\frac{3}{3}=\frac{4\times3}{5\times3}=\frac{12}{15}$ ans: $\frac{4}{5}$m²



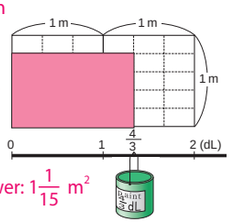
$\frac{4}{5}\times\frac{4}{3}=\frac{4\times4}{5\times3}=\frac{16}{15}$

ans: $\frac{16}{15}$m² or $1\frac{1}{15}$m²

How to calculate fraction x fraction

5 How much area in m² will the $\frac{4}{3}$ dL of paint cover in 1?

- Write an expression. $\frac{4}{5}\times\frac{4}{3}$
- Colour the diagram.
- Calculate the answer.



$\frac{4}{5}\times\frac{4}{3}=\frac{4\times4}{5\times3}=\frac{16}{15}$ Answer: $1\frac{1}{15}$ m²

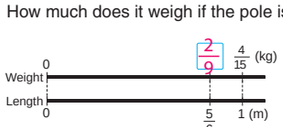
When multiplying a fraction by another fraction, multiply the two numerators and two denominators respectively.

$\frac{B}{A}\times\frac{D}{C}=\frac{B\times D}{A\times C}$

Multiplication of fraction with simplification

2 There is an iron pole, which weighs $\frac{4}{15}$ kilograms per metre (kg/m).

How much does it weigh if the pole is $\frac{5}{6}$ m in length?



Weight (kg)	4/15	?
Length (m)	1	5/6

(×5/6 above, ×5/6 below)

$\frac{4}{15}\times\frac{5}{6}=\frac{4\times5}{15\times6}=\frac{4\times5}{15\times6}=\frac{2}{9}$

It is easy to calculate if you simplify the fraction during the calculation.

Exercise

① $\frac{3}{4}\times\frac{1}{2}$ $\frac{3}{8}$ ② $\frac{3}{5}\times\frac{3}{8}$ $\frac{9}{40}$ ③ $\frac{5}{4}\times\frac{5}{3}$ $\frac{25}{12}$ $(2\frac{1}{12})$ ④ $\frac{3}{2}\times\frac{14}{9}$ $\frac{7}{3}$ $(2\frac{1}{3})$

□ − □ = 33

Lesson flow

1 Review the previous lesson.

T Introduce the Main Task. (Refer to the BP)

2 1 Solve the activity and summarise how to calculate.

S 5 Read the situation and think about the paintable area using $\frac{4}{3}$ dL.

S Complete the activity by:

- Writing the expression. ($\frac{4}{5} \times \frac{4}{3}$)
- Colouring the diagram
- Calculating the answer. ($1\frac{1}{5}$)

TN Refer to Teacher's Notes for explanations.

T Give ample time to students to complete their activity.

S Complete tasks and share answers with explanations.

3 Important Point

T/S Explain the important point in the .....

4 2 Calculating fraction × fraction.

S Use the same idea and process for the previous activity and the summary to understand the situation to calculate by filling in the ☐.

TN Advice students to simplify the fractions during the calculation.

S Present answers on the board.

T Confirm and emphasise the concept of multiplying fraction × fraction.

5 Complete the Exercise.

S Solve the selected exercises.

T Confirm students' answers.

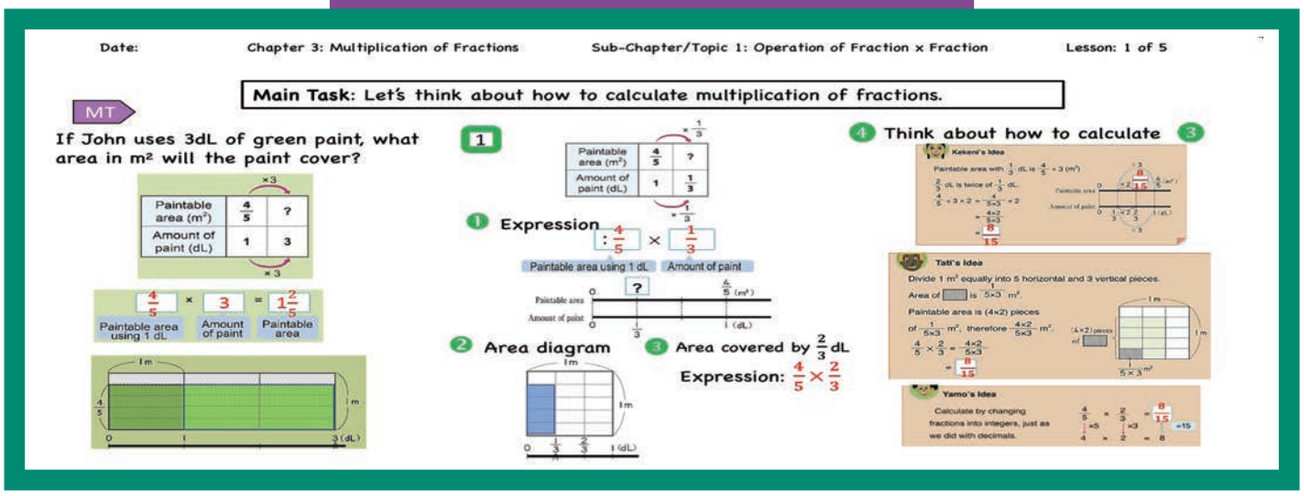
6 Summary

T What have you learned in this lesson?

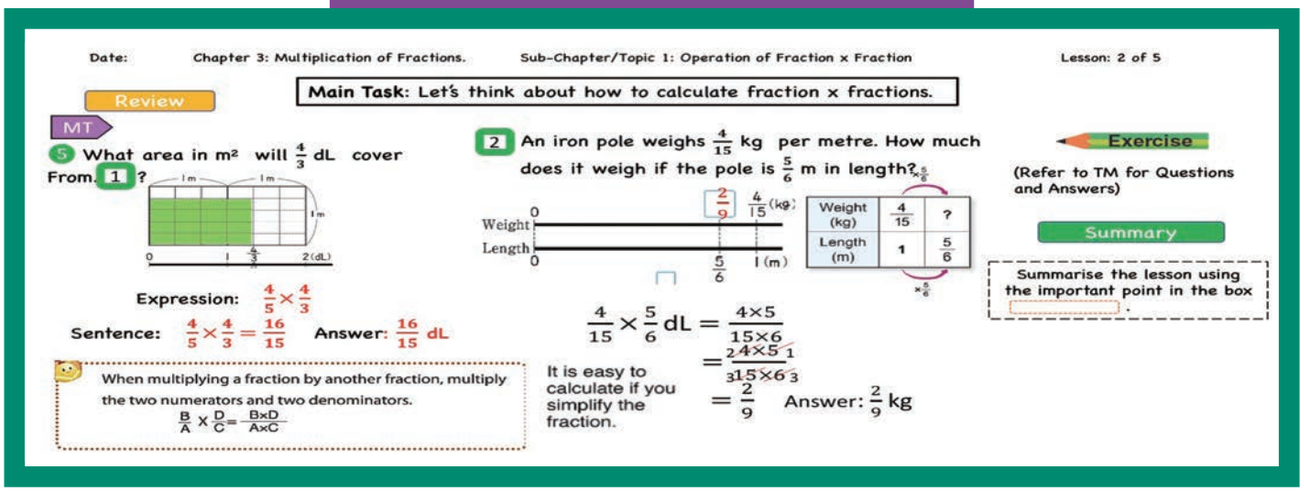
S Present ideas on what they have learned.

T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan (Lesson 21)



Sample Blackboard Plan (Lesson 22)



Unit 3

Unit: Multiplication of Fractions
Sub-unit: 1. Operation of Fractions × Fractions
Lesson 3 of 5

Textbook Page : 034
Actual Lesson 023

Lesson Objectives

- To think about and identify the relationship amongst whole number × fraction, fraction × whole number and fraction × fraction.

Prior Knowledge

- How to calculate fraction × fraction. (Multiply the two numerators and two denominators.)

Preparation

- Area diagrams in task 4

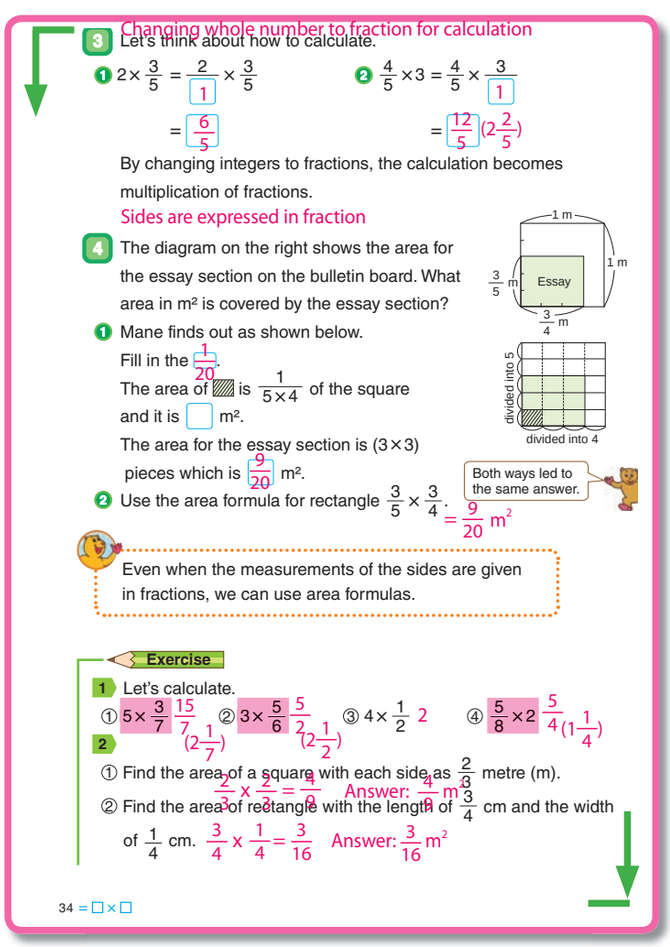
Assessment

- Think about how to multiply whole number by fraction. F
- Multiply fraction by fraction using area formula. F
- Solve the exercises correctly. S

Teacher's Notes

Apply the formula for calculating the area as A = L × W to calculate the length and width expressed in fraction.

It is difficult for children to understand the meaning of multiplying fractions. Because they understand multiplication as the meaning of continuous addition. Therefore, they can understand easily the meaning of '$\frac{2}{3}\times 2$', however they cannot understand $\frac{1}{2}\times\frac{2}{3}$.
In these lessons, it is good for the students to ~~think about~~ the meaning of multiplication of fractions recalling the multiplication of decimal numbers as follows.
Base amount × proportion = amount of corresponded proportion



Changing whole number to fraction for calculation

3 Let's think about how to calculate.

1 $2\times\frac{3}{5}=\frac{2}{1}\times\frac{3}{5}$ $=\frac{6}{5}$

2 $\frac{4}{5}\times 3=\frac{4}{5}\times\frac{3}{1}$ $=\frac{12}{5}\left(2\frac{2}{5}\right)$

By changing integers to fractions, the calculation becomes multiplication of fractions.

Sides are expressed in fraction

4 The diagram on the right shows the area for the essay section on the bulletin board. What area in m² is covered by the essay section?

1 Mane finds out as shown below.
Fill in the $\frac{1}{20}$.
The area of ▨ is $\frac{1}{5\times 4}$ of the square and it is ☐ m².
The area for the essay section is (3 × 3) pieces which is $\frac{9}{20}$ m².

2 Use the area formula for rectangle $\frac{3}{5}\times\frac{3}{4}$. $=\frac{9}{20}$ m²

Both ways led to the same answer.

Even when the measurements of the sides are given in fractions, we can use area formulas.

Exercise

1 Let's calculate.
① $5\times\frac{3}{7}$ $\frac{15}{7}$ $\left(2\frac{1}{7}\right)$ ② $3\times\frac{5}{6}$ $\frac{5}{2}$ $\left(2\frac{1}{2}\right)$ ③ $4\times\frac{1}{2}$ 2 ④ $\frac{5}{8}\times 2$ $\frac{5}{4}$ $\left(1\frac{1}{4}\right)$

2
① Find the area of a square with each side as $\frac{2}{3}$ metre (m). $\frac{2}{3}\times\frac{2}{3}=\frac{4}{9}$ Answer: $\frac{4}{9}$ m²
② Find the area of rectangle with the length of $\frac{3}{4}$ cm and the width of $\frac{1}{4}$ cm. $\frac{3}{4}\times\frac{1}{4}=\frac{3}{16}$ Answer: $\frac{3}{16}$ m²

34 = ☐ × ☐

Lesson flow

1 Review the previous lesson.

T Introduce the Main Task. (Refer to the BP)

2 Whole Number multiplied by Fractions.

T 3 Have the students to study activity 1 and 2 and think about how to calculate.

TN Students should understand that integers or whole numbers should be converted to fractions so it becomes multiplication of fraction × fraction where they multiply the two numerators and two denominators.

S Complete activity 1 and 2 by filling in the boxes ☐ .

3 Use the formula for Area to calculate using fractions.

T/S 4 Read and understand the given situation.

T Get the students to use the diagram representation to explain the situation.

S Fill in the boxes ☐ in activity 1.

S Apply the formula for calculating area to calculate the width and length given in fractions in the activity 2 by multiplying fraction × fraction.

4 Important Point

T/S Explain the important point in the box ☐.

5 Complete the Exercise.

S Solve the selected exercises.

T Confirm students' answers.

6 Summary

T What have you learned in this lesson?

S Present ideas on what they have learned.

T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan

Date: Chapter 3: Multiplication of Fractions Sub-Chapter/Topic 1: Operation of Fraction x Fraction Lesson:3 of 5

Main Task: Let's think about multiplying Whole Numbers and Fractions.

Review

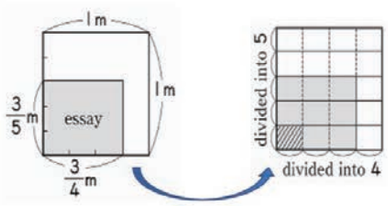
MT

3 Think about how to calculate

1 $2\times\frac{3}{5}=\frac{2}{1}\times\frac{3}{5}=\frac{6}{5}=1\frac{1}{5}$

2 $\frac{4}{5}\times 3=\frac{4}{5}\times\frac{3}{1}=\frac{12}{5}=2\frac{2}{5}$

4 What area in m² is there for the students essay?



1 The area of ▨ is $\frac{1}{5\times4}$ of the square, and it is $\frac{1}{20}$ m².

The area for the essay section is (3×3) pieces which is $\frac{9}{20}$ m².

2 Using the area formula

$\frac{3}{5}\times\frac{3}{4}=\frac{3\times3}{5\times4}=\frac{9}{20}$

Even when the measurements of the sides are given in fractions, we can use area formulas.

Exercise

(Refer to TM for Questions and Answers)

Summary

When multiplying whole numbers with fractions, change the whole number into fractions and multiply them as fraction x fraction.

Unit 3

Unit: Multiplication of Fractions
Sub-unit: 1. Operation of Fractions × Fractions
Lesson 4 of 5

Textbook Page : 035
Actual Lesson 024

Lesson Objectives

- To think about how to calculate multiplication of mixed fractions.

Prior Knowledge

- Multiplication of fraction × fraction and whole number × fraction

Preparation

- Tape diagram in task 6

Assessment

- Think about how to calculate multiplication of mixed fraction. F
- Understand the relationship between the multiplicand, multiplier and the product. S
- Solve the exercises correctly. S

Teacher's Notes

Multiplication of mixed fraction:
When multiplying fractions, change mixed numbers into improper fractions, then calculate.

5 Multiplication of mixed fractions

Let's think about how to calculate $3\frac{1}{7} \times 2\frac{1}{10}$.

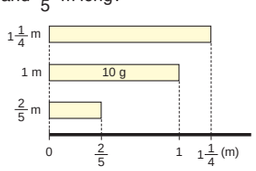
$$3\frac{1}{7} \times 2\frac{1}{10} = \frac{22}{7} \times \frac{21}{10}$$
$$= \frac{22 \times 21}{7 \times 10}$$
$$= \boxed{\frac{33}{5}} \quad (6\frac{3}{5})$$

When multiplying fractions, change mixed numbers into improper fractions.

Relation among multiplicand, multiplier and product

6 1 m of wire weighs 10 grams (g).

1 How much does each wire weigh in grams (g) if it is $1\frac{1}{4}$ m and $\frac{2}{5}$ m long?



$10 \times 1\frac{1}{4} = \boxed{\frac{25}{2}} \quad (12\frac{1}{2})$

$10 \times 1 = 10$

$10 \times \frac{2}{5} = \boxed{4}$

2 $10 \times 1\frac{1}{4}$ or $10 \times \frac{2}{5}$, which expression has the product that is less than 10? $10 \times \frac{2}{5}$

If you multiply a fraction that is less than 1, the product will be less than the multiplicand.

Exercise

1 Let's calculate.

① $3\frac{1}{2} \times 1\frac{5}{9}$ $\frac{49}{9}$ $(5\frac{4}{9})$ ② $2\frac{5}{8} \times 2\frac{2}{9}$ $\frac{35}{6}$ $(5\frac{5}{6})$ ③ $9\frac{1}{3} \times \frac{3}{8}$ $\frac{7}{2}$ $(3\frac{1}{2})$ ④ $\frac{6}{7} \times 4\frac{2}{3}$ 4

2 1 L of sand weighs $1\frac{3}{5}$ kg.
How much does it weigh in kg, if there is $3\frac{3}{4}$ L of sand? 6 kg

□ − □ = 35

Lesson flow

1 Review the previous lesson.

T Introduce the Main Task. (Refer to the BP)

2 Multiplication of mixed fractions.

T 5 Ask the students to think about how to calculate the multiplication of mixed fraction in the task.

S Observe the calculation and identify that when multiplying mixed fractions, change into improper fractions before calculating to find the answer.

TN Remind students to simplify fractions for easier calculations.

3 6 Relationship between the multiplicand, multiplier and product.

T/S Read and understand the given situation.

S Find the answers to activity 1 by comparing the weight of 3 different wires with different lengths.

T Ask students to determine which expression has a product less than 10.

S Calculate the expressions in activity 2 to confirm that $10 \times \frac{2}{5}$ will have a product less than 10.

4 Important Point

T/S Explain the important point in the box

5 Complete the Exercise.

S Solve the selected exercises.

T Confirm students' answers.

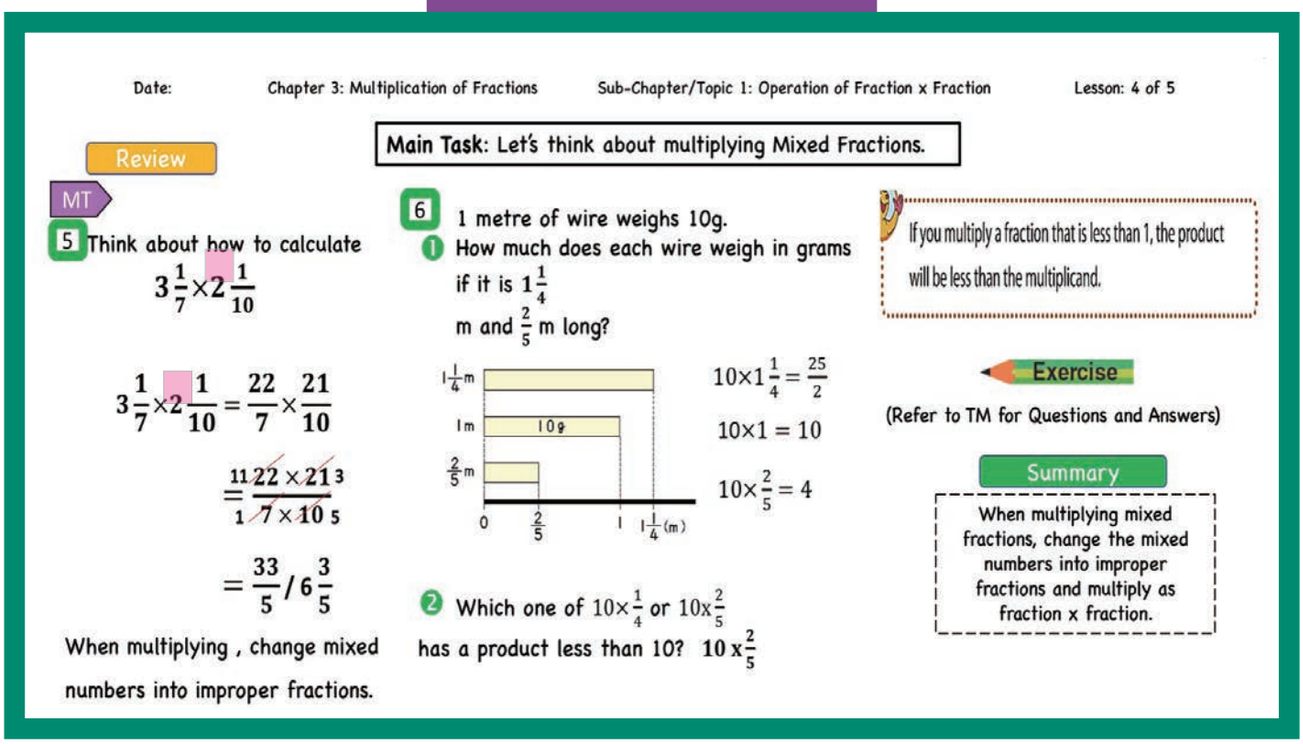
6 Summary

T What have you learned in this lesson?

S Present ideas on what they have learned.

T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan



Unit 3

Unit: Multiplication of Fractions
Sub-unit: 1. Operation of Fractions × Fractions
Lesson 5 of 5

Textbook Page : 036
Actual Lesson 025

Lesson Objectives

- To understand the rules of calculation can be applied to fractions.
- Apply rules of calculation to calculate fractions.

Prior Knowledge

- Rules of calculation (Grade 5)
- Basic rules of calculation in the operation of whole numbers.
- Multiplication of fraction

Preparation

- Rules of Calculation on a chart
- Diagrams for ❶ and ❷

Assessment

- Apply the rules of calculation to multiply fractions. F S

Teacher's Notes

Students have to understand that the rules of calculation can be applied to fractions.
Basic rules of calculation.

ⓐ A×B=B×A
ⓑ (A×B)×C=A×(B×C)
ⓒ (A+B)×C=A×C+B×C
ⓓ (A−B)×C=A×C−B×C

Summary
Review the calculation rules and its application to fractions to conclude the lesson.

Rules of Calculations

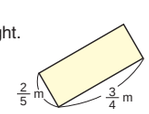
Rules of multiplication

7 You learned the rules of calculation in grade 5.
Confirm that those rules can be used in calculation of fractions.

ⓐ A×B=B×A
ⓑ (A×B)×C=A×(B×C)
ⓒ (A+B)×C=A×C+B×C
ⓓ (A−B)×C=A×C−B×C

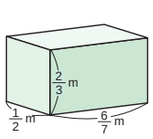
❶ Let's calculate the area of a rectangle on the right.

$\frac{2}{5}\times\frac{3}{4}=\frac{\overset{1}{\cancel{2}}\times 3}{5\times\underset{2}{\cancel{4}}}=\frac{3}{10}$ $\quad\frac{3}{4}\times\frac{2}{5}=\frac{3\times\overset{1}{\cancel{2}}}{\underset{2}{\cancel{4}}\times 5}=\frac{3}{10}$



Which rule is applied to this calculation?

❷ Let's find the volume of a quadrangular prism on the right.



$\left(\frac{1}{2}\times\frac{6}{7}\right)\times\frac{2}{3}=\frac{1\times\overset{3}{\cancel{6}}}{\underset{1}{\cancel{2}}\times 7}\times\frac{2}{3}=\frac{3}{7}\times\frac{2}{3}=\frac{\overset{1}{\cancel{3}}\times 2}{7\times\underset{1}{\cancel{3}}}=\frac{2}{7}$

$\frac{1}{2}\times\left(\frac{6}{7}\times\frac{2}{3}\right)=\frac{1}{2}\times\frac{\overset{2}{\cancel{6}}\times 2}{7\times\underset{1}{\cancel{3}}}=\frac{1}{2}\times\frac{4}{7}=\frac{1\times\overset{2}{\cancel{4}}}{\underset{1}{\cancel{2}}\times 7}=\frac{2}{7}$

Which rule is applied to this calculation?

❸ If A=$\frac{2}{3}$, B=$\frac{1}{2}$ and C=$\frac{6}{7}$, confirm if calculation rules © and Ⓓ work with these fractions. Refer to the black board plan

36 = □ × □

Lesson flow

1 Review the previous lesson.

T Introduce the Main Task. (Refer to the BP)

2 Confirm the rules of multiplication.

T/S 7 Revise the rules of calculation ⓐ ⓑ ⓒ ⓓ based on previous knowledge through discussion.
T Ask the students to study activity 1 to confirm which rule it applies to.
S Confirm that Rule ⓐ can be applied when multiplying fractions.
T Get the students to study activity 2 and identify which calculation rule is applied.
S Calculate the volume of the quadrangular prism and confirm that Rule ⓑ is applicable in this case.

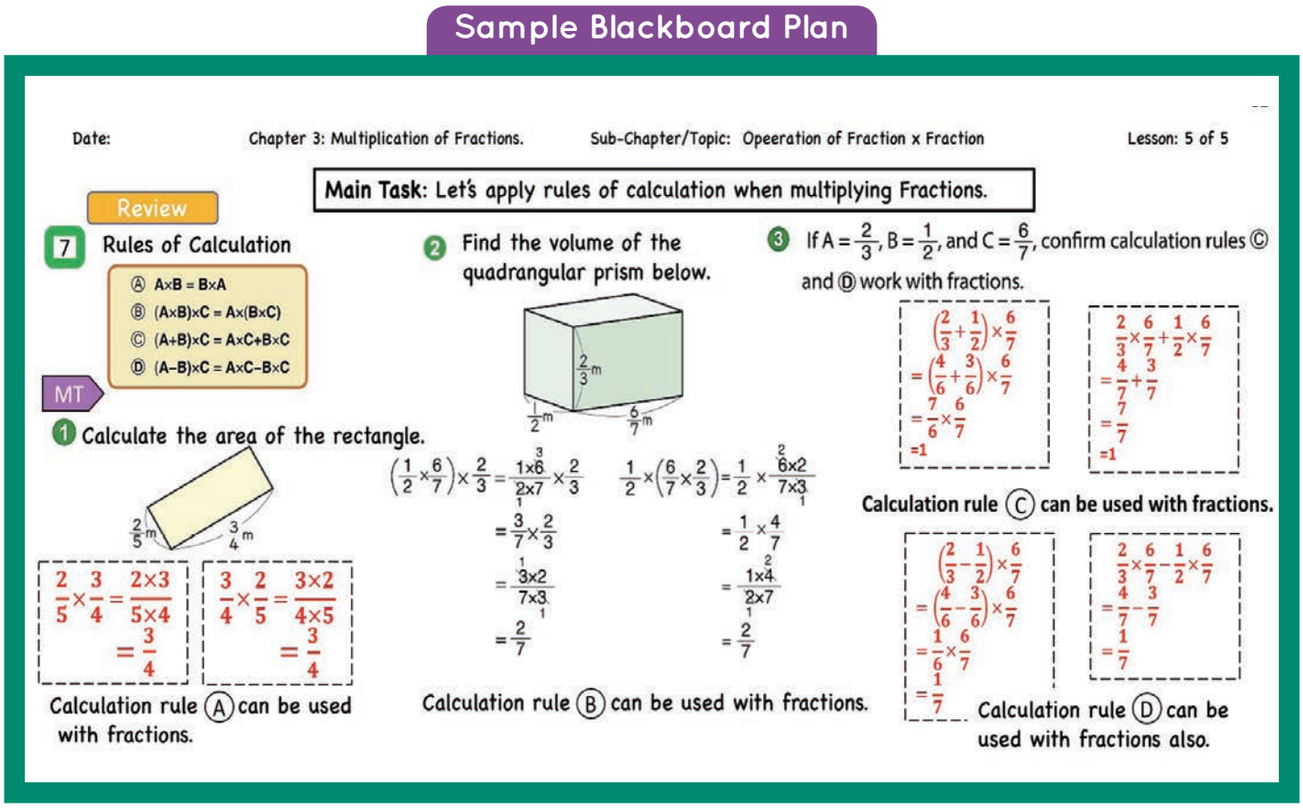
3 Apply the rules of calculation.

S 3 Complete the activity to confirm rule ⓒ ⓓ.
TN Give ample time and allow students to present their calculations and discuss with others.
Confirm the students' calculations and discussion with reference to the black board plan.
(Do not write the calculation on the board prior to students work. Write the calculation after their presentation and discussion so you are able to confirm their calculation and discussion.)

4 Summary

T What have you learned in this lesson?
S Present ideas on what they have learned.
T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan



Unit 3

Unit: Multiplication of Fractions
Sub-unit: 2. Inverse of a number
Lesson 1 of 1

Textbook Page : 037
Actual Lesson 026

Sub-unit Objectives
- To understand the meaning of inverse numbers.

Lesson Objectives
- To understand the meaning of inverse numbers.

Prior Knowledge
- Multiplication of Proper factions, Improper fractions and mixed numbers.

Preparation
- 18 cards with numbers 1 – 9. Two cards for each number.

1	1	2	2	3	3	4	4	5	5
6	6	7	7	8	8	9	9		

Assessment
- Understand the meaning of inverse numbers. F
- Identify the inverse of intergers, decimals and fractions. F S
- Solve the exercises correctly. S

Teacher's Notes
Task 2 is a special case. The whole number and decimal number changes into fraction first before finding a reciprocal or inverse of numbers.

Whole Number or Decimal Number	Fraction	Inverse Number
6	$\frac{6}{1}$	$\frac{1}{6}$
0.4	$\frac{4}{10}=\frac{2}{5}$	$\frac{5}{2}=2\frac{1}{2}=2.5$

2 Inverse of a Number

Finding the reciprocal number

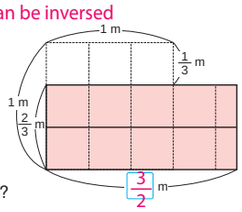
1 Let's answer the following questions.

1 There are 18 cards with numbers 1 to 9 and there are two cards for each number.
Use those cards and complete the expression below.

$\frac{\square}{\square}\times\frac{\square}{\square}=1$

2 What rule is there between the multiplicand and the multiplier to make the product 1?
Numerators and denominators can be inversed

3 There is a square whose side is 1 m each.
If you change the shape into a rectangle without changing its area of 1 m², and if the width of the rectangle is $\frac{2}{3}$ m what is the length?



Refer to blackboard plan

When the product of two fractions is 1, one fraction is called **inverse** of the other fraction.
The inverse of $\frac{2}{3}$ is $\frac{3}{2}$ and the inverse of $\frac{3}{2}$ is $\frac{2}{3}$.

Inverse number of whole number and decimal number

2 Let's find the inverse numbers of 6 and of 0.4.
To find an inverse number of integers or decimals, change them into fractions first. Refer to blackboard plan

Exercise

Let's find the inverse numbers.
① $\frac{4}{5}$ $\frac{5}{4}$ ② $\frac{10}{3}$ $\frac{3}{10}$ ③ $\frac{1}{8}$ 8 ④ $1\frac{5}{6}$ $\frac{6}{11}$ ⑤ 0.6 $\frac{10}{6}$

□ – □ = 37

Lesson flow

1 Review the previous lesson.

2 Think about multiplications of fractions where the product becomes 1.

T/S 1 Read and understand activity 1 using numbered cards.

S Think freely using cards 1 – 9 and display their answers.

TN Students should be able to manipulate the cards in different ways so that the product is 1. They will realise that the multiplier will be the inverse of the multiplicand.

T Introduce the Main Task. (Refer to the BP)

S Discuss the rule in activity 2 after completing activity 1.
The multiplier and the multiplicand are inverse of the same fractions.

T/S 3 Read and understand the given situation.

S Think about the problem and solve its.

3 Important Point

T/S Explain the important point in the [ ].

4 Inverse of intergers (whole numbers) and decimal numbers.

T 2 Explain that to find a inverse of an integer or a decimal, change them into a fraction first. Pose the discussion questions.

T/S ① What will be the fraction for the whole number or integer 6? $\frac{6}{1}$

② The fraction for the whole number or integer 6 is $\frac{6}{1}$ what is the inverse number to that fraction? $\frac{1}{6}$

③ What fraction is 0.4? $\frac{4}{10}$

④ When the fraction for 0.4 is reduced or simplified what is the fraction or answer? $\frac{2}{5}$

⑤ What will be the inverse number? $\frac{5}{2} = 2\frac{1}{2}$ =2.5

5 Complete the Exercise.

S Solve the exercises.

T Confirm students' answers.

6 Summary

T What have you learned in this lesson?

S Present ideas on what they have learned.

T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan

Date: Chapter 3: Multiplication of Fractions Sub-Chapter/Topic 2: Inverse of a Number Lesson: 1 of 1

Main Task: Let's think about the meaning of Inverse Numbers.

Review

1 Manipulate the 18 cards to complete the Math Sentence

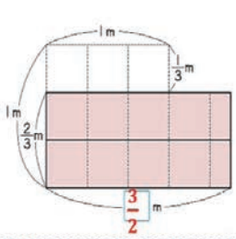
1 $\square \times \square = \square \times \square = 1$

Example: $\frac{2}{3} \times \frac{3}{2} = 1$

MT

2 What rule is there between multiplicand and multiplier?
Numerators and denominators can be inversed.

3



When the product of 2 numbers is 1, one number is called the other number's **inverse number.**

The inverse number of $\frac{2}{3}$ is $\frac{3}{2}$, and the inverse number for $\frac{3}{2}$ is $\frac{2}{3}$.

2 Inverse of 6

$6 = \frac{6}{1} \Rightarrow \frac{1}{6}$

Inverse of 0.4

$0.4 = \frac{4}{10} = \frac{2}{5} \Rightarrow \frac{5}{2} = 2\frac{1}{2} = 2.5$

Exercise

(Refer to TM for Questions and Answers)

Summary

- The inverse of a number is the reciprocal of an integer.
- When the product of 2 numbers is 1, one number is the inverse of the other.

Unit 3

Unit: Multiplication of Fractions
Exercises, Problems and Evaluation
Lesson 1 and 2 of 2

Textbook Page : 038
Actual Lesson 027 & 028

Lesson Objectives

- To confirm their understanding on the concepts they learned in this unit by completing the Exercises, Problems and Evaluation Test confidently.

Prior Knowledge

- Multiplication of fractions
- Inverse numbers
- Calculating the area with fractions.
- Making multiplication of fractions.

Preparation

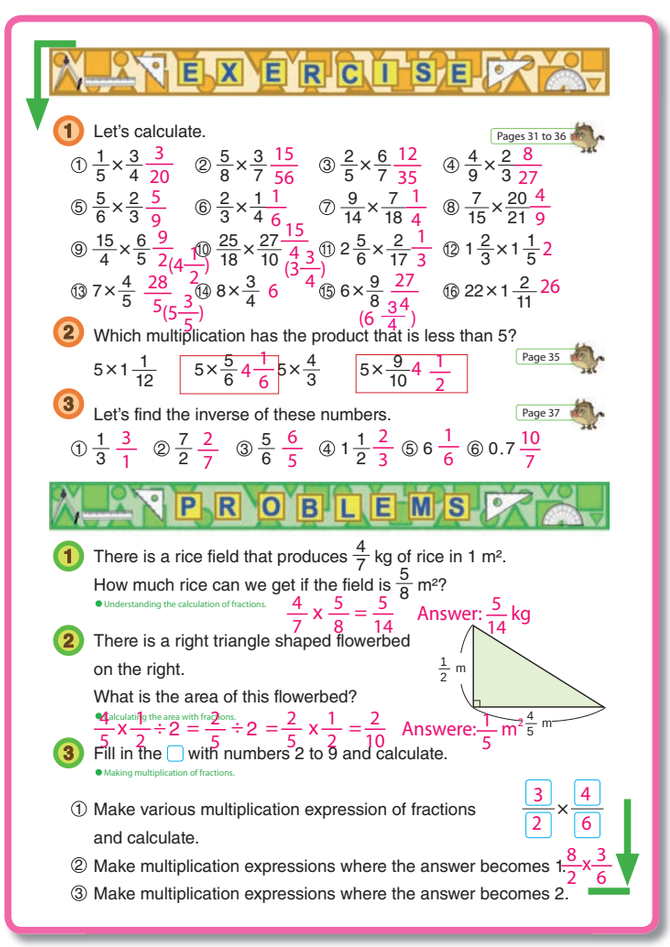
- Evaluation Test

Assessment

- Solve the exercises and problems correctly. F S

Teacher's Notes

This is the last lesson of Chapter 3. Students should be encouraged to use the necessary skills learned in this unit to complete all the Exercises and solve the Problems in preparation for the evaluation test. The test can be conducted as assesment for your class after completing all the exercises. Use the attached evaluation test to conduct assesment for your class after finishing all the exercises, problems and review as a seperate lesson.



EXERCISE

1 Let's calculate. Pages 31 to 36

① $\frac{1}{5}\times\frac{3}{4}$ $\frac{3}{20}$ ② $\frac{5}{8}\times\frac{3}{7}$ $\frac{15}{56}$ ③ $\frac{2}{5}\times\frac{6}{7}$ $\frac{12}{35}$ ④ $\frac{4}{9}\times\frac{2}{3}$ $\frac{8}{27}$

⑤ $\frac{5}{6}\times\frac{2}{3}$ $\frac{5}{9}$ ⑥ $\frac{2}{3}\times\frac{1}{4}$ $\frac{1}{6}$ ⑦ $\frac{9}{14}\times\frac{7}{18}$ $\frac{1}{4}$ ⑧ $\frac{7}{15}\times\frac{20}{21}$ $\frac{4}{9}$

⑨ $\frac{15}{4}\times\frac{6}{5}$ $\frac{9}{2}\left(4\frac{1}{2}\right)$ ⑩ $\frac{25}{18}\times\frac{27}{10}$ $\frac{15}{4}\left(3\frac{3}{4}\right)$ ⑪ $2\frac{5}{6}\times\frac{2}{17}$ $\frac{1}{3}$ ⑫ $1\frac{2}{3}\times1\frac{1}{5}$ 2

⑬ $7\times\frac{4}{5}$ $\frac{28}{5}\left(5\frac{3}{5}\right)$ ⑭ $8\times\frac{3}{4}$ 6 ⑮ $6\times\frac{9}{8}$ $\frac{27}{4}\left(6\frac{3}{4}\right)$ ⑯ $22\times1\frac{2}{11}$ 26

2 Which multiplication has the product that is less than 5? Page 35

$5\times1\frac{1}{12}$ $5\times\frac{5}{6}$ $4\frac{1}{6}$ $5\times\frac{4}{3}$ $5\times\frac{9}{10}$ $4\frac{1}{2}$

3 Let's find the inverse of these numbers. Page 37

① $\frac{1}{3}$ $\frac{3}{1}$ ② $\frac{7}{2}$ $\frac{2}{7}$ ③ $\frac{5}{6}$ $\frac{6}{5}$ ④ $1\frac{1}{2}$ $\frac{2}{3}$ ⑤ 6 $\frac{1}{6}$ ⑥ 0.7 $\frac{10}{7}$

PROBLEMS

1 There is a rice field that produces $\frac{4}{7}$ kg of rice in 1 m². How much rice can we get if the field is $\frac{5}{8}$ m²?

● Understanding the calculation of fractions.

$\frac{4}{7}\times\frac{5}{8}=\frac{5}{14}$ Answer: $\frac{5}{14}$ kg

2 There is a right triangle shaped flowerbed on the right. What is the area of this flowerbed?

$\frac{1}{2}$ m, $\frac{4}{5}$ m

● Calculating the area with fractions.

$\frac{1}{5}\times\frac{1}{2}\div2=\frac{2}{5}\div2=\frac{2}{5}\times\frac{1}{2}=\frac{2}{10}$ Answere: $\frac{1}{5}$ m²

3 Fill in the ☐ with numbers 2 to 9 and calculate.

● Making multiplication of fractions.

① Make various multiplication expression of fractions and calculate. $\frac{3}{2}\times\frac{4}{6}$

② Make multiplication expressions where the answer becomes 1. $\frac{8}{2}\times\frac{3}{6}$

③ Make multiplication expressions where the answer becomes 2.

Lesson flow

1 Complete Exercise ①.

S Solve activity 1 to16.
T Confirm students' answers.

2 Complete Exercise ② and ③.

S Solve the exercises.
T Confirm students' answers.

3 Complete Problems ① to ③.

S Solve problems 1, 2 and 3.
T Confirm students' answers.

4 Complete the Evaluation Test.

TN Use the attached evaluation test to conduct assesment for your class after finishing all the exercises and problems as a seperate lesson.
S Complete the Evaluation Test.

Copy of the Evaluation Test is found after Unit 5

End of Chapter Test **Date:**

Chapter 3: Multiplication of Fractions	Name:	Score / 100

1. Calculate. [4 x 10 marks = 40 marks]

(1) $\frac{4}{5} \times \frac{8}{4}$
$= \frac{3}{4} \times \frac{8}{4} = \frac{3}{2}$ or $1\frac{1}{2}$

(2) $\frac{5}{6} \times \frac{9}{10}$
$= \frac{5}{6} \times \frac{9}{10} = \frac{3}{4}$

(3). $1\frac{1}{2} \times 2\frac{4}{5}$
$= \frac{3}{2} \times \frac{8}{5} = 2$

(4) $2\frac{1}{2} \times 1\frac{4}{5}$
$= \frac{5}{2} \times \frac{7}{6} = \frac{35}{12}$ or $2\frac{11}{12}$

2. Find the inverse fraction. [2 x 10marks = 20 marks]

(1) $\frac{7}{3}$ Answer: $\frac{3}{7}$

(2) $3\frac{1}{6}$ Answer: $\frac{6}{19}$

3. Write an appropriate inequality sign (<, > or =). [2 x 10marks = 20 marks]

(1) $\frac{2}{3} \times \frac{4}{7}$ < $\frac{2}{3}$

(2) $\frac{5}{9} \times 1\frac{9}{10}$ > $\frac{5}{9}$

4. A car drives $5\frac{1}{5}$ km with 1 L of fuel. How many km does the car drives with $1\frac{1}{3}$ L of fuel.
[10 marks in total; 5 marks for expression and 5 marks for the answer]

Mathematical Expression:
$= 1\frac{1}{3} \times 5\frac{1}{5} = \frac{104}{15}$

Answer:
$\frac{104}{15}$ km or $6\frac{14}{15}$ km

End of Chapter Test **Date:**

Chapter 3: Multiplication of Fractions	Name:	Score / 100

1. Calculate. [4×10 marks =40 marks]

(1) $\frac{4}{5} \times \frac{8}{4}$

(2) $\frac{5}{6} \times \frac{9}{10}$

(3) $1\frac{1}{2} \times 2\frac{4}{5}$

(4) $2\frac{1}{2} \times 1\frac{4}{5}$

2. Find the inverse fraction. [2×10marks =20 marks]

(1) $\frac{7}{3}$ Answer: ☐

(2) $3\frac{1}{6}$ Answer: ☐

3. Write an appropriate inequality sign (<, > or =). [2×10marks =20 marks]

(1) $\frac{2}{3} \times \frac{4}{7}$ ☐ $\frac{2}{3}$

(2) $\frac{5}{9} \times 1\frac{9}{10}$ ☐ $\frac{5}{9}$

4. A car drives $5\frac{1}{5}$ km with 1 L of fuel. How many km does the car drives with $1\frac{1}{3}$ L of fuel.
[10 marks in total; 5 marks for expression and 5 marks for the answer]

Mathematical Expression:

Answer:

Chapter 4 Division of Fractions

1. Content Standard

6.1.2. Students will be able to extend the multiplication and division to fractions with multipliers and divisors as fraction and do multiplication and division and appreciate the simplicity of rules.

2. Unit Objectives

- To deepen the understanding of Fractions ÷ Fractions.
- To think about how to calculate Fractions ÷ Fractions.
- To master the skill of calculating Fractions ÷ Fractions.

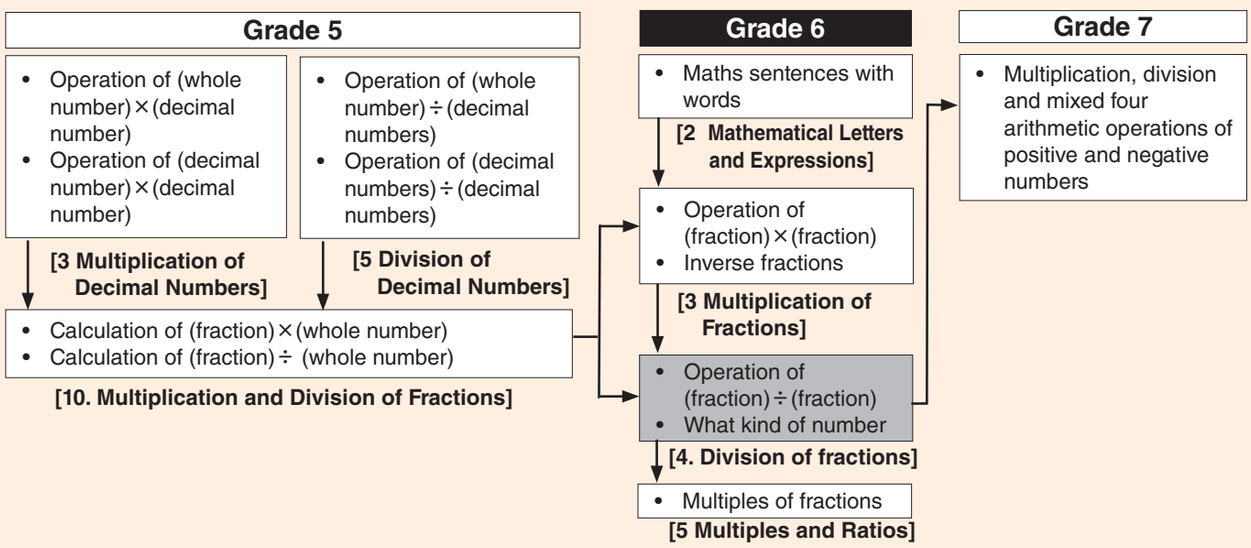
3. Teaching Overview

This unit is meant as a summary for 4 operations of whole numbers, decimals and fractions.

Calculation of Fraction ÷ Fraction : Firstly students should understand the situation and why they are dividing by a fraction. Then they should strategise how to calculate it using their previous learning.

What Kind of Expression Will It Become : Students are required to grasp situations of multiplication or division of fractions and identify a mathematical expression with drawing a number line diagram or replacing by simple numbers.

4. Related Learning Contents



Chapter 5 Multiples and Rate

1. Content Standards

6.4.2. Students will be able to appraise the proportional relationship between two numbers or quantities in various simultaneous expression approaches and appreciate their usefulness in daily life.

2. Unit Objectives

To deepen the understanding of rate. To use rate to describe proportional relationships between various quantities. To understand how to express rate as a fraction and how to find a compared quantity as well as abasic quantity.

3. Teaching Overview

Students already learned how many times a whole in whole number such as 1 time, 2 times, etc and in decimal numbers such as 0.4 times, 1.2 times, etc. In this topic, students will learn how many times a whole in fractions. “How many times” is also a relative amount when we compare a value with a base of value and take the base as 1.

Unit 4

Unit: Division of Fractions
Sub-unit: 1. Operation of Fractions ÷ Fractions
Lesson 1 of 4

Textbook Page : 039 to 041
Actual Lesson 029

Sub-unit Objectives

- To understand how to calculate fractions ÷ fractions.

Lesson Objectives

- To think about how to explain the calculation of fractions ÷ fractions.

Prior Knowledge

- Multiplication and division of fractions with whole numbers
- Fractions × fractions
- Inverse Numbers

Preparation

- Area diagrams

Assessment

- Represent the calculation of fraction ÷ fraction on an area diagram. F
- Demonstrate how to calculate fraction ÷ fraction. S

Teacher's Notes

When calculating fractions ÷ fractions, we can utilise the properties of division and think ofWe can conclude that the inverse of the divisor fraction is used to multiply the dividend.

$\frac{2}{5} \div \frac{3}{4}$ as:

i. $\frac{2}{5} \div \frac{3}{4} = \left(\frac{2}{5} \times 4\right) \div \left(\frac{3}{4} \times 4\right) = \left(\frac{2}{5} \times 4\right) \div 3 = \frac{2\times4}{5\times3} = \frac{8}{15}$

ii. $\frac{2}{5} \div \frac{3}{4} = \left(\frac{2}{5} \times \frac{4}{3}\right) \div \left(\frac{3}{4} \times \frac{4}{3}\right) = \left(\frac{2}{5} \times \frac{4}{3}\right) = \frac{2\times4}{5\times3} = \frac{8}{15}$

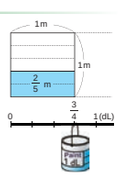
4 Division of Fractions

1 Operation of Fractions ÷ Fractions

Meaning of Fraction ÷ Fraction

1 We used $\frac{3}{4}$ dL of blue paint for a $\frac{2}{5}$ m² fence.

How many m² can be covered with 1 dL of paint?



1 Let's write a mathematical expression.

$\frac{2}{5} \div \frac{3}{4}$

If 1 dL of paint is used to paint x m², we can show that using a multiplication expression.

$x \times \frac{3}{4} = \frac{2}{5}$

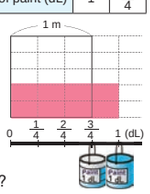
Therefore,

$x = \frac{2}{5} \div \frac{3}{4}$

Paintable area (m²)	x	$\frac{2}{5}$
Amount of paint (dL)	1	$\frac{3}{4}$

(× $\frac{3}{4}$)

Paintable area (m²)	?	$\frac{2}{5}$
Amount of paint (dL)	1	$\frac{3}{4}$



2 How many m² can be covered by 1 dL of paint?

Check this by colouring the sections of the figure above.

3 Let's think about how to calculate.

First, let's see how many m² can be painted by using $\frac{1}{4}$ dL. Then, we can multiply that number by 4.

I calculated the answer by using the rules of division and changing the fractions to whole numbers.

I think about how many unit fractions are used by looking at the figure.

Let's think about the situation to use division of fraction by fraction and how to calculate.

Kekeni's Idea

The area that can be painted with $\frac{1}{4}$ dL of paint is $\frac{2}{5} \div 3$ (m²).

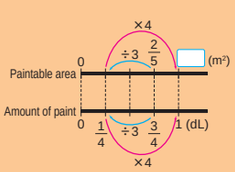
The area that can be painted with 1 dL of paint is $\frac{2}{5} \div 3 \times 4$ (m²).

$\frac{2}{5} \div \frac{3}{4} = \frac{2}{5} \div 3 \times 4$

$= \frac{2}{5\times3} \times 4$

$= \frac{2\times4}{5\times3}$

$= \frac{8}{15}$



Ambai's Idea

I divide 1 m² horizontally into 5 equal parts and vertically into 3 equal parts.

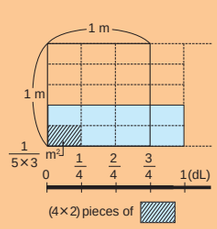
Then the area of ▨ becomes $\frac{1}{5\times3}$ m².

Since there are (2×4) sets of $\frac{1}{5\times3}$ m², the area that can be painted with 1dL is

$\frac{2}{5} \div \frac{3}{4} = \frac{1}{5\times3} \times (2\times4)$

$= \frac{2\times4}{5\times3}$

$= \frac{8}{15}$



□ − □ = 39

40 = □ × □

Lesson Flow

1 Understanding the meaning of fraction ÷ fractions.

T/S 1 Read and understand the given situation.
S Think about the problem and relate to the area diagram that represents the situation.
T Remind the students to think about the relationship of multiplying and dividing to find an unknown quantity using the given tables.
T Introduce the Main Task. (Refer to the BP)
S 1 Write an expression representing the given situation to find the unknown area.

2 Representing fractions ÷ fraction using area diagrams.

T Let the students study the area diagram and discuss how they can find the answer using the area diagram.
S Think about how to shade in the area diagram to represent the answer of the division.
S 2 Shade in the area diagram to represent the answer to the problem.

3 Calculate fraction ÷ fractions.

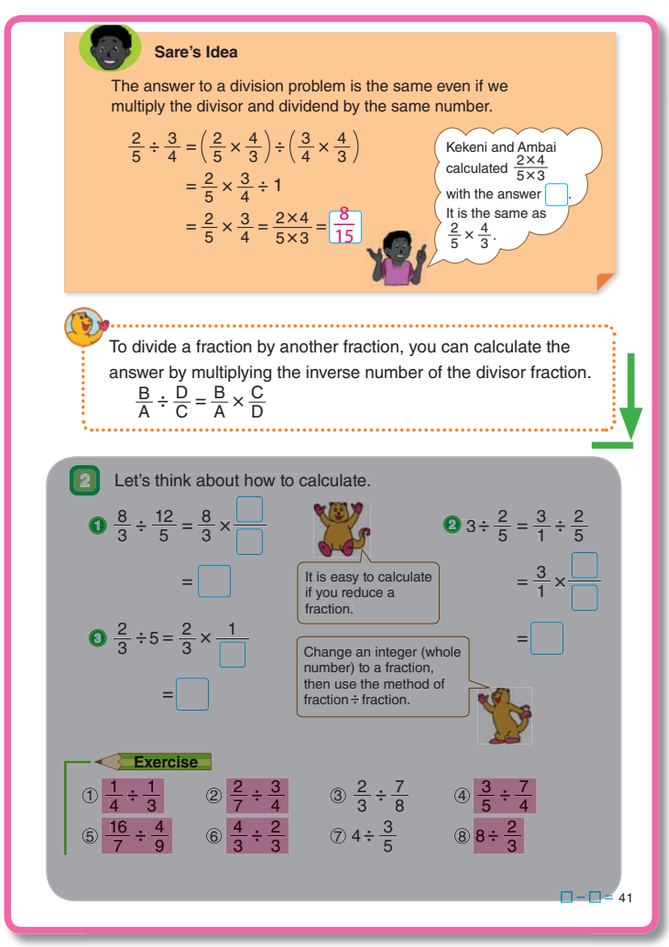
S 3 Discuss the three ideas and compare how each one has found the answer.
i. Kekeni's Idea ($\frac{1}{4}$ of the area times 4 = 1 dL)
ii. Ambai's Idea (unit fraction times the total area painted)
iii. Sare's Idea (Fraction × Inverse fraction)
T Allow students to explain their ideas based on their understanding before explaining the 3 ideas on the board.
TN Students should be led to discover that in all 3 ideas, the inverse of the divisor fraction is used to multiply the dividend.

4 Important Point.

T/S Explain the important point in the box .

5 Summary

T What have you learned in this lesson?
S Present ideas on what they have learned.
T Use students' ideas to confirm the important concepts of this lesson.



Sample Blackboard Plan

Lesson 29 Sample Blackboard Plan is on page 61.

Unit 4

Unit: Division of Fractions
Sub-unit: 1. Operation of Fractions ÷ Fractions
Lesson 2 of 4

Textbook Page : 041
Actual Lesson 030

Lesson Objectives

- To think about how to calculate fractions ÷ fractions by reducing or simplifying.
- To understand how to divide fractions and whole Numbers.

Prior Knowledge

- Addition and subtraction of fractions
- Multiplication and division of fractions with whole numbers
- Fractions × fractions

Preparation

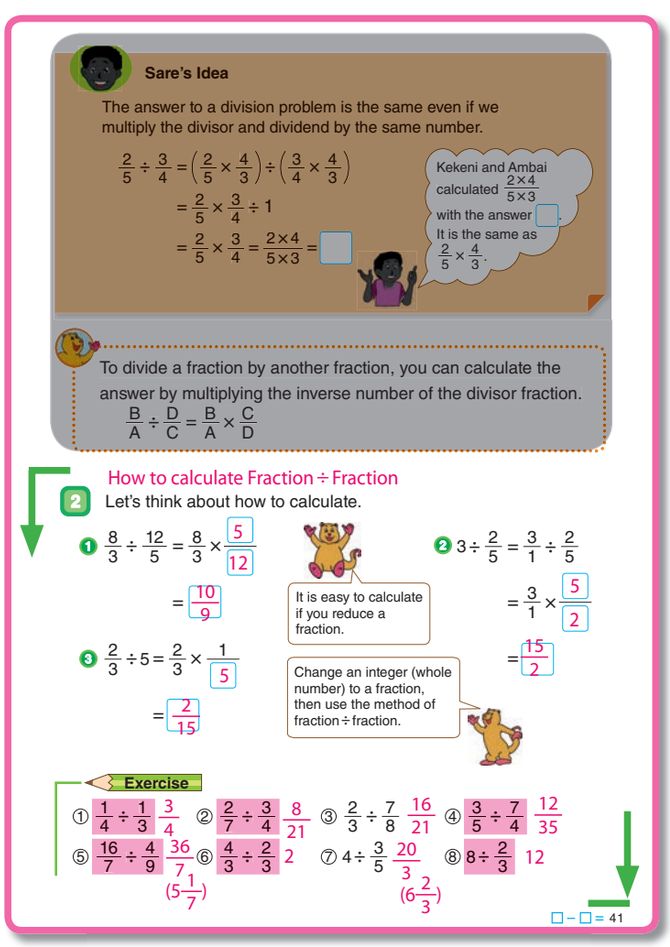
- Answers to calculations

Assessment

- Think about how to reduce fractions before calculating. F S
- Demonstrate the understanding on how to divide fractions and whole numbers. F S
- Solve the exercises correctly. S

Teacher's Notes

Students should be able to expand on the 3 ideas from the previous lesson when dividing fractions.



Lesson Flow

1 Review the previous lesson.

T Introduce the Main Task.(Refer to the BP)

2 Think about how to calculate fractions ÷ fractions by reducing.

S 2 Calculate the answer to activity 1 as a review of the rule learnt in the previous lesson.
T Ask students if they found any interesting ideas.
S Realise that the fractions can be calculated easily when the fractions are reduced by a common factor.
T Emphasise the idea of reducing fractions as an easier way to calculate fractions ÷ fractions.

3 Discuss and calculate fraction ÷ fraction involving whole numbers.

T Activity 2 and 3. Ask the students about how they can calculate when dealing with fractions and whole numbers.
S Calculate by changing the whole numbers into fractions before dividing.
T Check and confirm students' answers.

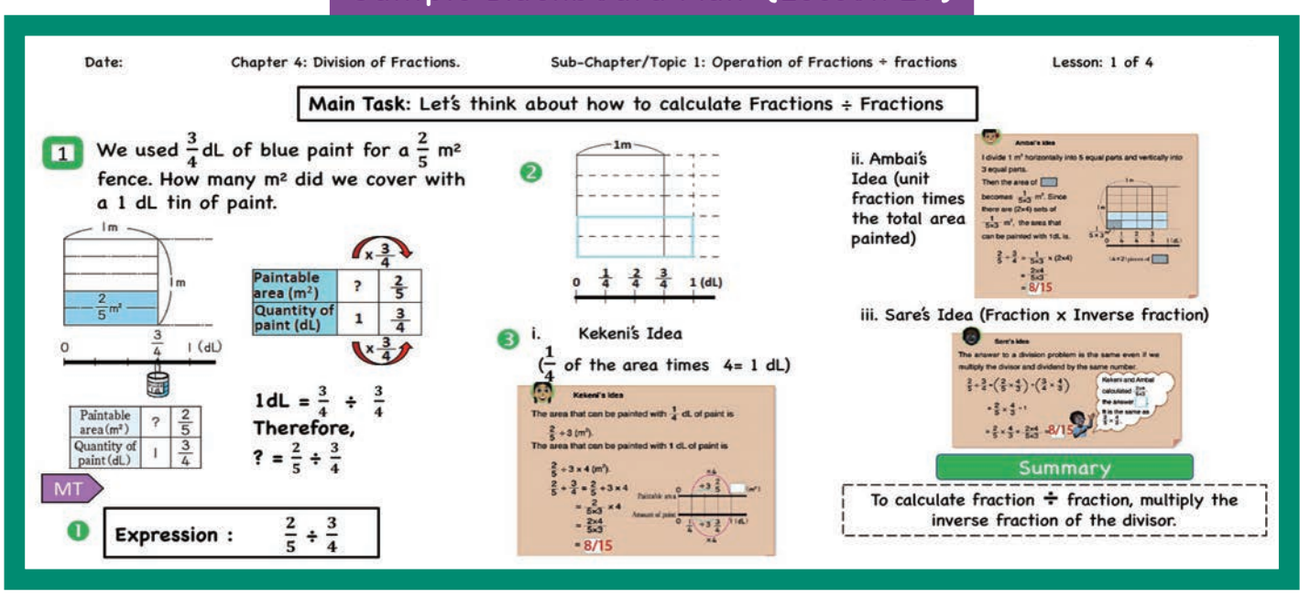
4 Complete the Exercise.

S Solve the selected exercises.
T Confirm students' answers.

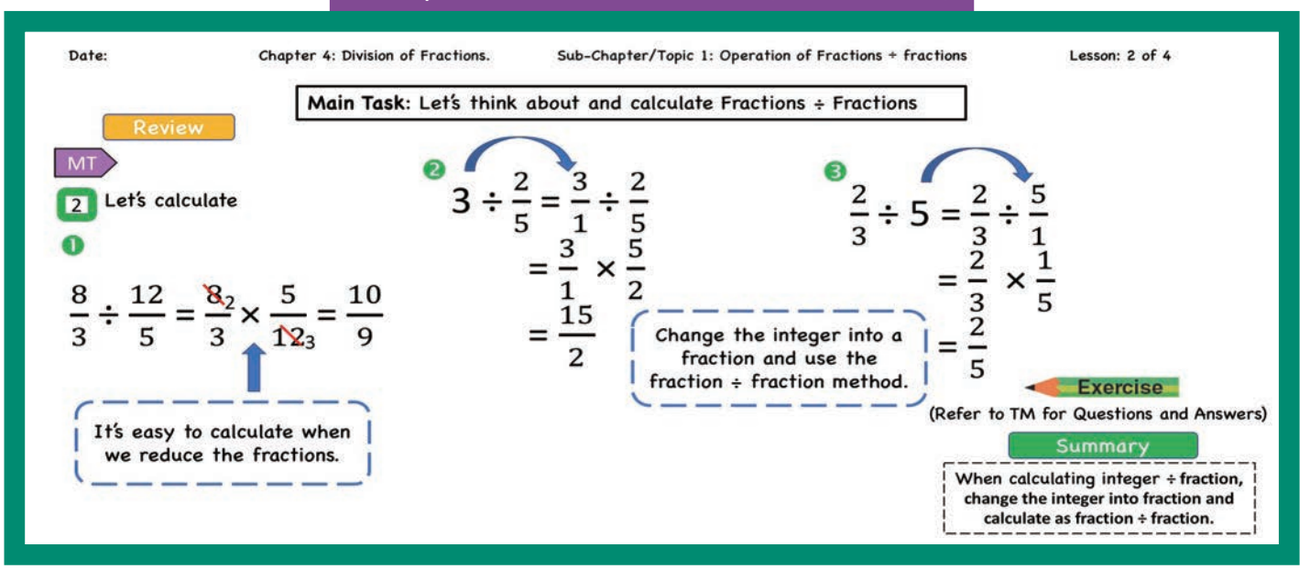
5 Summary

T What have you learned in this lesson?
S Present ideas on what they have learned.
T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan (Lesson 29)



Sample Blackboard Plan (Lesson 30)



Unit 4: Unit: Division of Fractions

Sub-unit: 1. Operation of Fractions ÷ Fractions

Lesson 3 of 4

Textbook Page : 042
Actual Lesson 031

Lesson Objectives

- To explain and calculate fraction ÷ mixed fractions..

Prior Knowledge

- Multiplication and division of fractions with whole numbers.
- Fractions × fractions

Preparation

- Area diagram and table (Refer to blackboard plan)

Assessment

- Explain and calculate fractions ÷ mixed numbers. F
- Solve the exercises correctly. S

Teacher's Notes

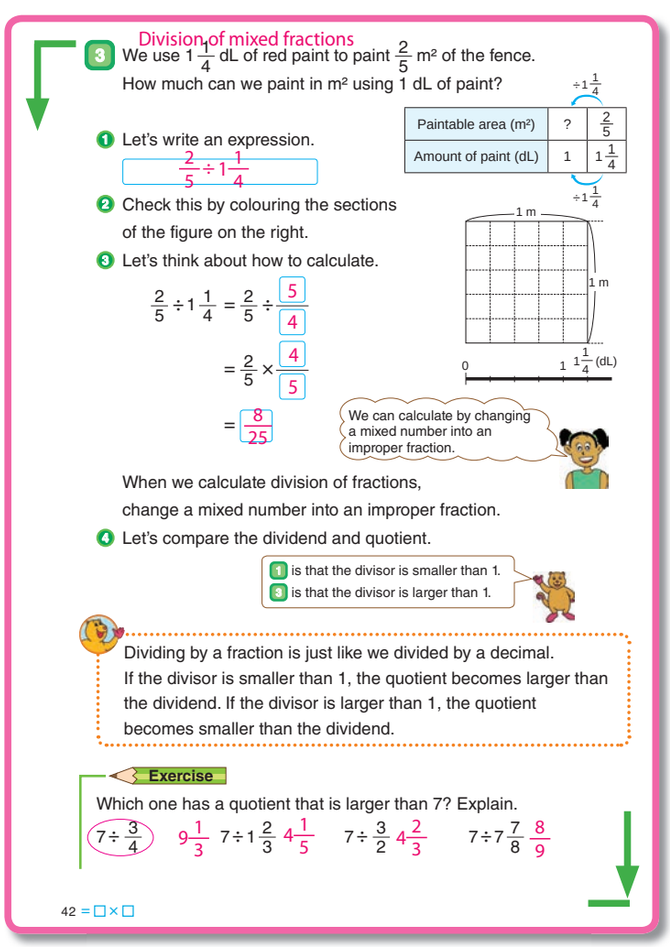
Students should be able to utilize what has been learned previously to do calculations and understand the method of Fraction ÷ Fraction by;

- Fraction ÷ Fraction after changing Mixed Numbers into Fractions

$$\frac{2}{5} \div 1\frac{1}{4} = \frac{2}{5} \div \frac{5}{4} = \frac{2}{5} \times \frac{4}{5} = \frac{8}{25}$$

- Using the unit fraction

$$\frac{2}{5} \div 1\frac{1}{4} = \frac{1}{5\times5} \times (2\times4) = \frac{2\times4}{5\times5} = \frac{8}{25}$$



Division of mixed fractions

3 We use $1\frac{1}{4}$ dL of red paint to paint $\frac{2}{5}$ m² of the fence.
How much can we paint in m² using 1 dL of paint?

Paintable area (m²)	?	$\frac{2}{5}$
Amount of paint (dL)	1	$1\frac{1}{4}$

(×1 1/4 / ÷1 1/4)

1 Let's write an expression.
$\frac{2}{5} \div 1\frac{1}{4}$

2 Check this by colouring the sections of the figure on the right.

3 Let's think about how to calculate.

$\frac{2}{5} \div 1\frac{1}{4} = \frac{2}{5} \div \frac{5}{4}$

$= \frac{2}{5} \times \frac{4}{5}$

$= \frac{8}{25}$

1 m, 1 m, 0, 1, $1\frac{1}{4}$ (dL)

We can calculate by changing a mixed number into an improper fraction.

When we calculate division of fractions, change a mixed number into an improper fraction.

4 Let's compare the dividend and quotient.

1 is that the divisor is smaller than 1.
3 is that the divisor is larger than 1.

Dividing by a fraction is just like we divided by a decimal. If the divisor is smaller than 1, the quotient becomes larger than the dividend. If the divisor is larger than 1, the quotient becomes smaller than the dividend.

Exercise

Which one has a quotient that is larger than 7? Explain.

$7 \div \frac{3}{4}$ $9\frac{1}{3}$ $7 \div 1\frac{2}{3}$ $4\frac{1}{5}$ $7 \div \frac{3}{2}$ $4\frac{2}{3}$ $7 \div 7\frac{7}{8}$ $\frac{8}{9}$

42 = □ × □

Lesson Flow

1 Review the previous lesson.

2 Division of mixed fraction.

T/S 3 Read and understand the given situation.
T Introduce the Main Task. (Refer to the BP)
T Allow the students to study the table and ask them to write an expression to solve the problem.
S 1 Write an expression for the problem using the information from the table.

3 Represent Fractions ÷ Mixed Numbers using an area diagram.

T Let the students study the area diagram and discuss how they can find the answer using the area diagram.
S Think about how to represent the answer of the division.
S 2 Shade in the sections on the area diagram to represent the answer to the problem.
T Allow some students to present their answers with explanation.

4 Think about how to calculate Fraction ÷ Mixed Numbers.

T "How can we calculate to find the answer using the Fraction ÷ Fraction method?"
S "Change the mixed numbers to improper fractions"
S 3 Change the mixed numbers to improper fractions and calculate using the method of fraction ÷ fraction.
TN Appreciate students ideas when they use the idea of unit fractions.

5 Comparing the dividend and the quotient.

T 4 Get the students to compare the dividends and quotients of the two problems in 1 and 3 to find the difference.
S Realise that in task:
1 , the divisor is smaller than 1.
3 , the divisor is larger than 1

6 Important Point

T/S Explain the important point in the box .

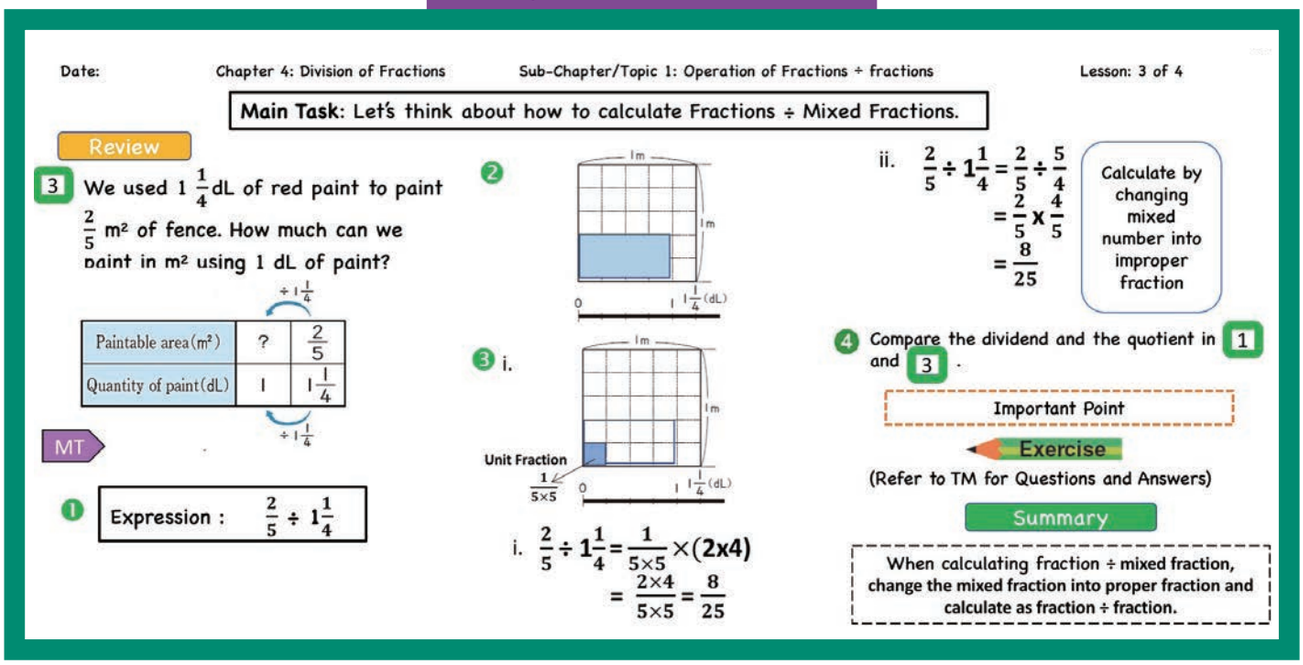
7 Complete the Exercises.

S Solve the exercises.
T Confirm students' answers.

8 Summary

T What have you learned in this lesson?
S Present ideas on what they have learned.
T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan



Unit 4

Unit: Division of Fractions
Sub-unit: 1. Operation of Fractions ÷ Fractions
Lesson 4 of 4

Textbook Page : p.43
Actual Lesson 032

Lesson Objectives

- To solve various problems on Division of Fractions.

Prior Knowledge

- Multiplication and division of fractions with whole numbers and mixed fractions
- Fractions × fractions

Preparation

- Tape diagrams and tables for task 4 and 5

Assessment

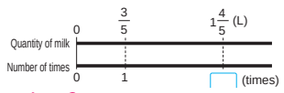
- Solve various problems involving fractions, integers and mixed numbers. F
- Solve the exercises correctly. S

Teacher's Notes

Students should be able to solve problems that involve mixed fractions ÷ proper fractions, intergers ÷ mixed fractions and mixed fractions ÷ mixed fractions.
Review of main concepts from previous lessons may be required.
Many children have difficulty understanding that the quotient is less than the dividend when dividing a number by a fraction less than 1. This is because they assume that the quotient is always smaller than the dividend. It is good to explain using the diagram for taking away the misunderstanding.

Calculating problems on fraction ÷ fraction

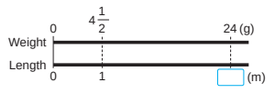
4 There is $1\frac{4}{5}$ L of milk. If you drink $\frac{3}{5}$ L each time with your family meals, how many meals will it take to finish the milk?



Amount of milk (L)	$\frac{3}{5}$		$1\frac{4}{5}$
Number of times	1		?

$1\frac{4}{5} \div \frac{3}{5} = 3$ Answer: 3 times

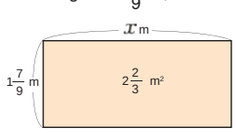
5 There is a wire which weighs $4\frac{1}{2}$ g per metre (g/m). If it weighs 24 g in total, what is its length in m?



Weight (g)	$4\frac{1}{2}$		24
Length (m)	1		?

$24 \div 4\frac{1}{2} = \frac{16}{3}$ Answer: $\frac{16}{3}$ m ($5\frac{1}{3}$ m)

6 There is a rectangular cloth with an area of $2\frac{2}{3}$ m². If its length is $1\frac{7}{9}$ m, what is its width in m?



The area formula of a rectangle is **length × width**.

$2\frac{2}{3} \div 1\frac{7}{9} = \frac{3}{2}$

Answer: $\frac{3}{2}$ m ($1\frac{1}{2}$ m)

Exercise

① $\frac{3}{5} \div \frac{9}{10}$ $\frac{2}{3}$ ② $\frac{5}{8} \div \frac{5}{6}$ $\frac{3}{4}$ ③ $\frac{7}{8} \div \frac{7}{12}$ $\frac{3}{21}$ $(1\frac{1}{2})$ ④ $\frac{5}{6} \div \frac{10}{21}$ $\frac{7}{4}$ $(1\frac{3}{4})$

⑤ $\frac{2}{3} \div \frac{2}{9}$ 3 ⑥ $\frac{6}{7} \div \frac{13}{14}$ $\frac{12}{13}$ ⑦ $\frac{9}{10} \div \frac{3}{20}$ 6 ⑧ $\frac{1}{4} \div \frac{1}{12}$ 3

⑨ $1\frac{3}{5} \div \frac{2}{7}$ $\frac{28}{5}$ $(5\frac{3}{8})$ ⑩ $1\frac{1}{4} \div \frac{5}{8}$ 2 ⑪ $4\frac{2}{3} \div 1\frac{1}{5}$ $\frac{35}{9}$ $(3\frac{8}{9})$ ⑫ $2\frac{1}{3} \div 1\frac{5}{9}$ $\frac{3}{2}$

□ − □ = 43

Lesson Flow

1 Review the previous lesson.

T Introduce the Main Task. (Refer to the BP)

2 Calculate Mixed Numbers ÷ Proper Fraction.

T/S 4 Read and understand the given situation.
T Allow students to study the table and ask them to write an expression.
S Write an expression using the information from the table.
S Solve the problem by changing the mixed number into fraction and calculate as fraction ÷ fraction.
S Present and explain their answers.
T Confirm students' answers.

3 Calculate Integers ÷ Mixed Fractions.

T/S 5 Read and understand the given situation.
T Allow the students to study the table and write an expression.
S Write an expression and solve the problem.
TN Ensure that students follow the correct methods to change the integer into fraction and mixed number into fraction to calculate fraction ÷ fraction.
T Ask students to present and explain their answers.

4 Calculate Mixed Numbers ÷ Mixed Numbers.

T/S 6 Read and understand the given situation.
T Allow the students to study the rectangular cloth and write an expression.
S Write an expression and solve the problem.
TN Ensure that students follow the correct methods to change the mixed numbers into fractions and calculate as fraction ÷ fraction.
T Confirm students' answers as they present and explain their answers.

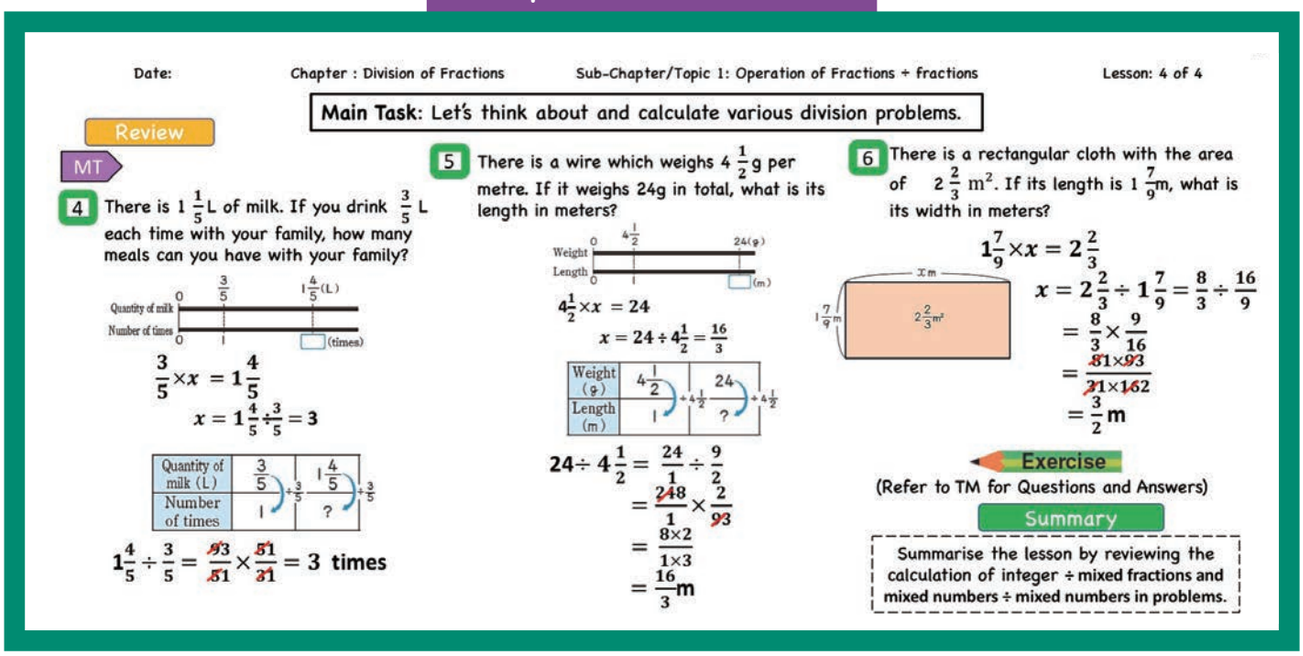
5 Complete the Exercise.

S Solve the selected exercises.
T Confirm students' answers.

6 Summary

T What have you learned in this lesson?
S Present ideas on what they have learned.
T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan



Unit 4: Unit: Division of Fractions

Sub-unit: 2. What kind of Expression will it Become?

Lesson 1 of 1

Textbook Page : 044
Actual Lesson 033

Sub-unit Objectives

- To think about and understand how to calculate fractions when dividing.

Lesson Objectives

- To think about which operation is used to solve a given problem.
- Make a word problem of Division or Multiplication of fractions.
- To enjoy solving problems made by themselves.

Prior Knowledge

- Multiplication and Division of Fractions with Whole Numbers and Mixed Numbers
- Fractions × fractions, Fractions × mixed number and Intergers × mixed numbers

Preparation

- Tape diagrams and tables for task 1 and 2.

Assessment

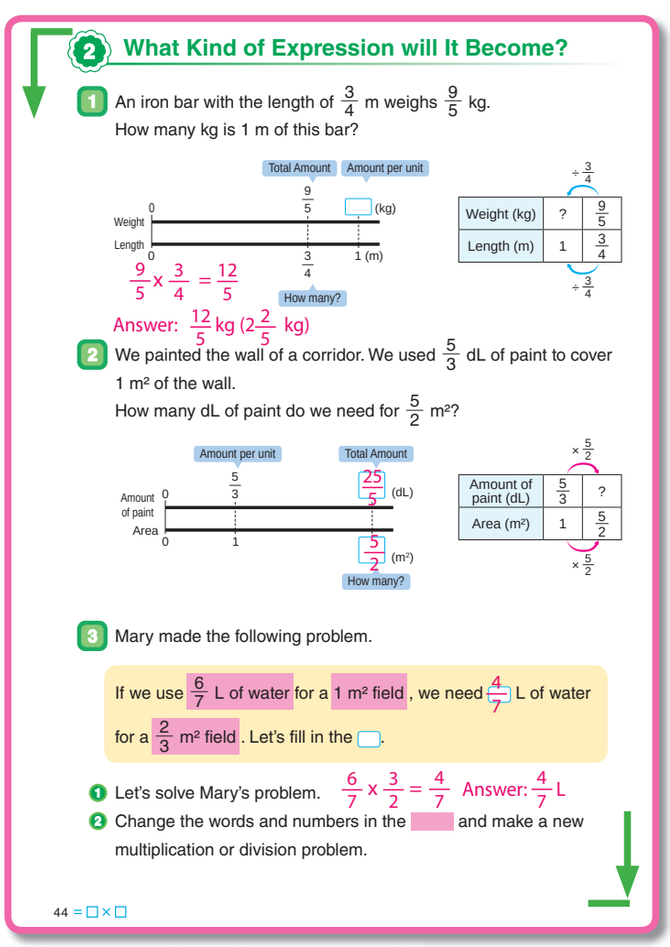
- Differentiate between multiplication and division of fraction problems. F S
- Make their own multiplication or division problems of fractions and solve. S

Teacher's Notes

All contents learned in the Unit of Fractions will be used in this lesson when creating and solving problems.
In 3, encourage students to explore the options of doing calculations.

Example:
If we use L of water for a $\frac{3}{8}$ g spice, we need $\square$ L of water for $\frac{3}{5}$ g of spice.
Calculation:
$\frac{3}{8} \div \frac{1}{4} = \frac{3}{8} \times \frac{4}{1} = \frac{3}{2}$

Therefore, $\frac{3}{2} \times \frac{3}{5} = \frac{9}{10}$ L



2 What Kind of Expression will It Become?

1 An iron bar with the length of $\frac{3}{4}$ m weighs $\frac{9}{5}$ kg.
How many kg is 1 m of this bar?

Total Amount, Amount per unit, Weight, Length, $\frac{9}{5}$, (kg), 1 (m), How many?

$\frac{9}{5} \times \frac{3}{4} = \frac{12}{5}$

Weight (kg)	?	$\frac{9}{5}$
Length (m)	1	$\frac{3}{4}$

Answer: $\frac{12}{5}$ kg ($2\frac{2}{5}$ kg)

2 We painted the wall of a corridor. We used $\frac{5}{3}$ dL of paint to cover 1 m² of the wall.
How many dL of paint do we need for $\frac{5}{2}$ m²?

Amount per unit, Total Amount, Amount of paint, Area, $\frac{5}{3}$, $\frac{25}{5}$, (dL), $\frac{5}{2}$, (m²), How many?

Amount of paint (dL)	$\frac{5}{3}$	?
Area (m²)	1	$\frac{5}{2}$

3 Mary made the following problem.

If we use $\frac{6}{7}$ L of water for a 1 m² field, we need $\frac{4}{\square}$ L of water for a $\frac{2}{3}$ m² field. Let's fill in the $\square$.

1 Let's solve Mary's problem. $\frac{6}{7} \times \frac{3}{2} = \frac{4}{7}$ Answer: $\frac{4}{7}$ L
2 Change the words and numbers in the $\square$ and make a new multiplication or division problem.

44 = □ × □

Lesson Flow

1 Think about which operation to use and how to solve the problem.

T Introduce the Main Task. (Refer to the BP)
T/S 1 Read and understand the given situation.
S Think about how to solve it, either by multiplying or dividing.
T Ask the students to analyse the problem and identify whether to divide or multiply.
S Discuss and identify the operation and solve the problem.
TN Ensure students solve the problem by dividing $\frac{9}{5} \div \frac{3}{4}$ using the Fraction ÷ Fraction method.
T Confirm students' answers as they present and explain their answers.

2 Think about which operation to use and how to solve the problem.

T/S 2 Read and understand the given situation.
S Think about solving it either by multiplying or dividing.
T Ask the students to analyse the problem and identify whether to divide or multiply.
S Discuss and identify the operation and solve the problem.
TN Ensure that students solve the problem by multiplying $\frac{5}{3} \times \frac{5}{2}$ using the Fraction × Fraction method.
T Confirm students' answers as they present and explain their answers.

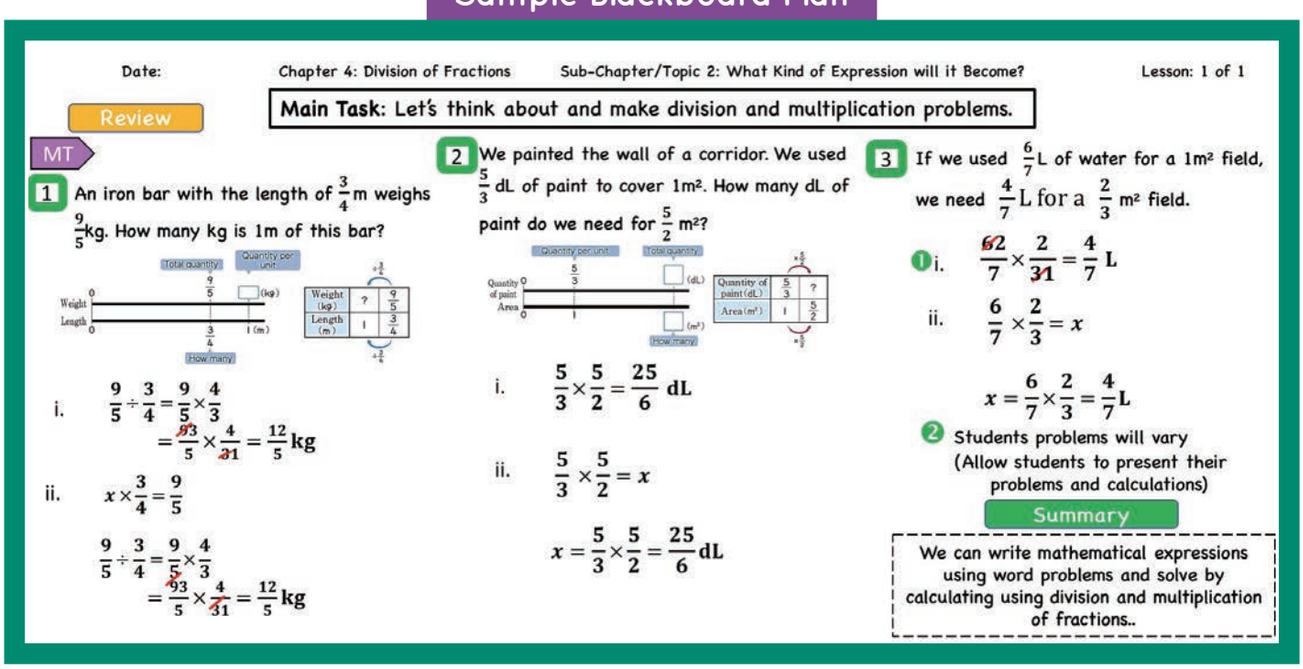
3 Think about Mary's problem and complete the following activities.

T/S 3 Read and understand the given situation.
S 1 Solve Mary's problem by multiplying $\frac{6}{7} \times \frac{2}{3}$
T Get a few students to present their answers and correct it together.
TN Allow students to use diagrams if necessary for better understanding.
T Ask the class to change the words and fractions from Mary's problem to create their own division or multiplication problems.
S 2 Make their own problems using Mary's idea and try to solve them as well.
T Check to ensure that students have correctly written and solved their own problems.
TN Encourage students to try fractions instead of 1 so that there is division involved. (see Teacher's Notes)

4 Summary

T What have you learned in this lesson?
S Present ideas on what they have learned.
T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan



Unit 4

Unit: Division of Fractions
Exercise, Problems and Evaluation
Lesson 1 and 2 of 2

Textbook Page : 045 and 046
Actual Lesson 34 & 35

Lesson Objectives

- To confirm their understanding on the concepts they learned in this unit by completing the Exercises, Problems and Evaluation Test confidently.

Prior Knowledge

- Multiplication and Division of Fractions with whole numbers
- Fractions × Fractions

Preparation

- Evaluation test

Assessment

- Solve the exercises and problems correctly. F S

Teacher's Notes

This is the last lesson of Chapter 4.

Students should be encouraged to use the necessary skills learned in this unit to complete all the Exercises and solve the Problems in preparation for the evaluation test. The test can be conducted as assesment for your class after completing all the exercises. Use the attached evaluation test to conduct assesment for your class after finishing all the exercises, problems and review as a seperate lesson.

EXERCISE

1 Let's calculate. Pages 39 to 41

① $\frac{2}{5} \div \frac{3}{7} \frac{14}{15}$ ② $\frac{1}{5} \div \frac{9}{10} \frac{2}{9}$ ③ $\frac{4}{9} \div \frac{2}{3} \frac{2}{3}$ ④ $\frac{3}{4} \div \frac{15}{16} \frac{4}{5}$

⑤ $3 \div \frac{2}{5} (7\frac{1}{2}) \frac{15}{2}$ ⑥ $4 \div \frac{8}{9} (4\frac{1}{2}) \frac{9}{2}$ ⑦ $3\frac{4}{5} \div 2\frac{1}{11} (1\frac{4}{11}) \frac{15}{11}$ ⑧ $6 \div 1\frac{2}{3} \frac{8}{15} (3\frac{3}{5})$

⑨ $\frac{2}{5} \div 1\frac{3}{5} \frac{1}{4}$ ⑩ $\frac{3}{8} \div 5\frac{1}{4} \frac{1}{14}$ ⑪ $2\frac{2}{9} \div \frac{2}{7} \frac{70}{9} (7\frac{7}{9})$ ⑫ $3\frac{1}{6} \div 1\frac{1}{18} 3$

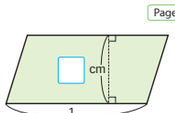
2 Which one has a quotient that is larger than 5? Pages 39 to 43

$5 \div \frac{2}{3}$ $5 \div 1\frac{1}{2}$ $5 \div \frac{5}{4}$ $5 \div \frac{7}{9}$

3 Let's fill in the □. Page 42

① $\frac{7}{12} \div \frac{3}{5} = \frac{7}{12} \times \frac{5}{3}$ ② $3 \div \frac{4}{7} = 3 \times \frac{7}{4}$

4 There is a parallelogram with an area of 6 m² on the right. What is its height in cm? Page 43



$6 \div 3\frac{1}{5} = \frac{15}{8}$ Answer: $\frac{15}{8}$ cm

5 You cut $1\frac{4}{5}$ m of tape into pieces that are $\frac{3}{10}$ m long. How many pieces of tape can you make? Page 43

$1\frac{4}{5} \div \frac{3}{10} = 6$ Answer: 6 pieces

Grade 6 Do you remember?

Let's calculate.

① $\frac{1}{3} \times \frac{1}{2} \frac{1}{6}$ ② $\frac{2}{5} \times \frac{1}{4} \frac{1}{10}$ ③ $\frac{3}{8} \times \frac{4}{9} \frac{1}{6}$ ④ $\frac{8}{15} \times \frac{3}{4} \frac{2}{5}$

⑤ $2 \times \frac{2}{5} \frac{4}{5}$ ⑥ $3 \times \frac{1}{6} \frac{1}{2}$ ⑦ $\frac{1}{4} \times 1\frac{1}{3} \frac{1}{3}$ ⑧ $3\frac{1}{2} \times 1\frac{1}{7} 4$

PROBLEMS

1 Let's calculate.
● Calculating division of fraction.

① $\frac{3}{7} \div \frac{1}{3} 1\frac{1}{7}$ ② $\frac{1}{4} \div \frac{7}{8} \frac{2}{7}$ ③ $\frac{4}{5} \div \frac{8}{9} \frac{9}{10}$ ④ $\frac{3}{4} \div \frac{15}{16} \frac{4}{5}$

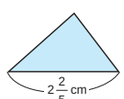
⑤ $7 \div \frac{2}{5} 17\frac{1}{2}$ ⑥ $14 \div \frac{8}{11} 5\frac{1}{2}$ ⑦ $3\frac{1}{3} \div \frac{5}{7} 4\frac{2}{3}$ ⑧ $4\frac{1}{6} \div \frac{5}{2} 1\frac{1}{3}$

2 Find the number for x.
● Understanding the relationship between multiplication and division.

① $x \times \frac{5}{6} = \frac{10}{21}$ $x = \frac{4}{7}$ ② $x \div 1\frac{2}{3} = \frac{3}{5}$ $x = 1$

3 There is $\frac{2}{3}$ L of paint and its weight is $\frac{3}{4}$ kg. How much does it weigh in kilogram per 1 L?
● Understanding the situation for calculating fractions. $\frac{3}{4} \div \frac{2}{3} = \frac{1}{8}$ 1kg

4 The area of the triangle shown on the right is $1\frac{3}{5}$ cm². Let's find it's height.
● Calculating the height of triangle with fraction.



$x \times 2\frac{2}{5} \div 2 = 1\frac{3}{5}$
$x = 1\frac{1}{3}$ cm

5 Skylar, Philomina and Keneto share $\frac{3}{5}$ of a cake. What fraction of the cake does each person get?
● Understanding the situation for calculating fractions. $\frac{3}{5} \div 3 = \frac{1}{5}$

6 A $2\frac{1}{2}$ m of string is used to make shell necklaces. How many necklaces can be made if each one requires $\frac{1}{4}$ m?
● Understanding the situation for calculating fractions. $2\frac{1}{2} \div \frac{1}{4} = 10$ necklaces

7 Wena's family is preparing a mumu. It takes 6 hours to cook for $\frac{3}{4}$ of the total time needed. How many hours will it take for the mumu to be cooked? $6 \div \frac{3}{4} = 8$ hours
● Understanding the situation for calculating fractions.

Lesson Flow

1 Complete Exercise ①.

S Division of fractions using fraction ÷ fraction method.

T Confirm students' answers.

2 Complete Exercise ②

S Comparing to identify which quotient is larger.

T Confirm students' answers.

3 Complete Exercise ③.

S Filling in the spaces to make the inverse of fractions when dividing.

T Confirm students' answers.

4 Complete Exercise④.

S Solve the presented problem to find the height of a parallelogram.

T Confirm students' answers.

5 Complete Exercise ⑤.

S Solve the division word problem.

T Confirm students' answers.

6 Complete the Do You Remember exercise.

S Calculate the multiplication of fractions.

7 Complete Problem ①.

S Calculate and solve the division problems (1) to (8).

T Confirm students' answers.

8 Complete Problem ②.

S Solve (1) and (2) by finding the value of x.

T Confirm students' answers.

9 Complete Problems ③ to ⑦.

S Read each problem and write mathematical expressions before solving them to find the answers.

T Confirm students' answers.

10 Complete the Evaluation Test.

TN Use the attached evaluation test to conduct assesment for your class after finishing all the exercises and problems as a seperate lesson.

TN The test copy for this Unit is attached at the end of Unit 5.

S Complete the Evaluation Test.

End of Chapter Test **Date:**

Chapter 4: Division of Fractions	Name:	Score / 100

1. Calculate. [4 x 10 marks = 40 marks]

(1) $\frac{3}{8} \div \frac{3}{5} = \frac{3}{8} \times \frac{5}{3} = \frac{5}{8}$

(2) $\frac{5}{6} \div \frac{1}{9} = \frac{5}{6} \times \frac{3}{1} = \frac{15}{2}$ or $7\frac{1}{2}$

(3) $1\frac{4}{5} \div \frac{3}{4} = \frac{9}{5} \times \frac{4}{3} = \frac{12}{5}$ or $2\frac{2}{5}$

(4) $\frac{7}{10} \div 1\frac{4}{5} = \frac{7}{10} \div \frac{9}{5} = \frac{7}{10} \times \frac{5}{9} = \frac{7}{18}$

(5) $2\frac{5}{6} \div 2\frac{5}{6} = \frac{17}{6} \div \frac{17}{6} = \frac{17}{6} \times \frac{6}{17} = 1$

2. Which quotients are greater than 8? Write letters. [20 marks]

(1) $8 \div \frac{3}{5}$ (2) $8 \div 1\frac{1}{2}$ (3) $\frac{5}{9} \div 1\frac{9}{10}$ (4) $8 \div \frac{7}{9}$

$= \frac{17}{6} \div \frac{28}{9} = \frac{17}{6} \times \frac{9}{28} = \frac{51}{56}$

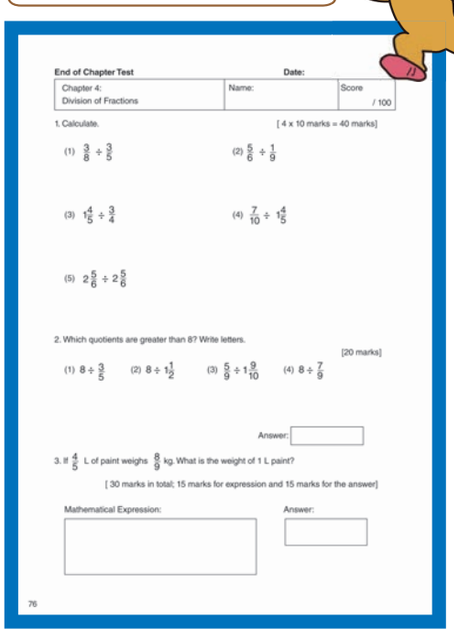
Answer: (a) and (d)

3. If $\frac{4}{5}$ L of paint weighs $\frac{8}{9}$ kg. What is the weight of 1 L paint?

[30 marks in total; 15 marks for expression and 15 marks for the answer]

Mathematical Expression: $\frac{8}{9} \div \frac{4}{5} = \frac{8}{9} \times \frac{5}{4} = \frac{10}{9}$

Answer: $\frac{10}{9}$ kg



Unit 5: Unit: Multiples and Rates
Sub-unit: Multiples and Rates
Lesson 1of 3

Textbook Page : 047
Actual Lesson 036

Sub-unit Objectives

- To deepen the understanding of rate.
- To use rate to describe proportional relationships between various quantities.
- To understand how to express rate as a fraction and how to find a compared quantity as well as a basic quantity.

Lesson Objectives

- To understand the rate of two quantities that are in a proportional relationship.
- To understand that there are cases when a rate is described using multiples.

Prior Knowledge

- Amount per unit quantity. (Grade 5)
- Mathematical symbols and expression. (Grade 6)
- Multiples and divisors

Preparation

- Table for task 1.

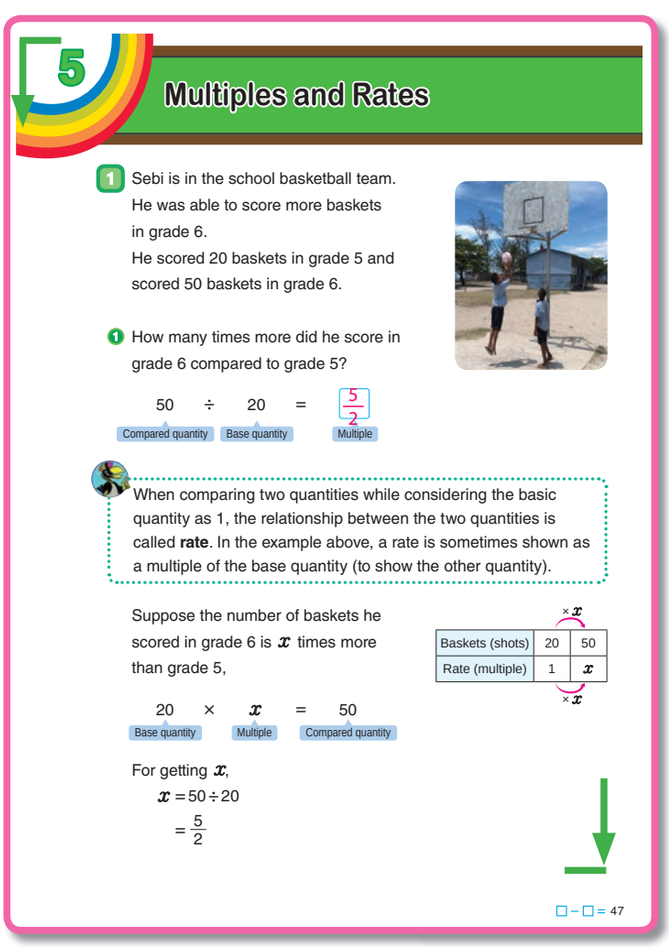
Assessment

- Think about how to show a relation using rate from a given situation. F
- Understand the meaning of the word rate. S

Teacher's Notes

Students should use prior knowledge of finding the value of x in a mathematical sentence to find the multiple of the basic quantity and the compared quantity.

$50 \div 20 = \frac{5}{2}$



5 Multiples and Rates

1 Sebi is in the school basketball team. He was able to score more baskets in grade 6.
He scored 20 baskets in grade 5 and scored 50 baskets in grade 6.

1 How many times more did he score in grade 6 compared to grade 5?

50 ÷ 20 = 5/2
(Compared quantity, Base quantity, Multiple)

When comparing two quantities while considering the basic quantity as 1, the relationship between the two quantities is called **rate**. In the example above, a rate is sometimes shown as a multiple of the base quantity (to show the other quantity).

Suppose the number of baskets he scored in grade 6 is x times more than grade 5,

Baskets (shots)	20	50
Rate (multiple)	1	x

(×x above 20 and 50; ×x below 1 and x)

20 × x = 50
(Base quantity, Multiple, Compared quantity)

For getting x,
$x = 50 \div 20$
$= \frac{5}{2}$

□ − □ = 47

Lesson Flow

1 Understanding the relationship of basic quantity and compared quantity as a rate.

T Introduce the Main Task. (Refer to the Blackboard Plan)

T/S 1 Read and understand the given situation.

T/S 1 Discuss how many more times Sebi scored in Grade 6 compared to Grade 5.

S $50 \div 20 = \frac{5}{2}$ as a fraction and 2.5 as a decimal.

T Emphasise what the basic quantity and compared quantities are.

TN Help students to realise that the rate of the number of baskets he scored in Grade 6 (compared quantity) compared to the number of baskets he scored in Grade 5 (basic quantity) is considered as 1.

2 Important Point

T/S Explain the important point in the box ⬚.

3 Understand rate as multiples of two numbers.

T Direct students' attention to the table to find how many times more.

S By applying × to show the rate, students make the equation:
basic quantity × rate = compared quantity.

S Find the appropriate value for × and express it as a fraction or decimal.
$x = 50 \div 20 = \frac{5}{2}$

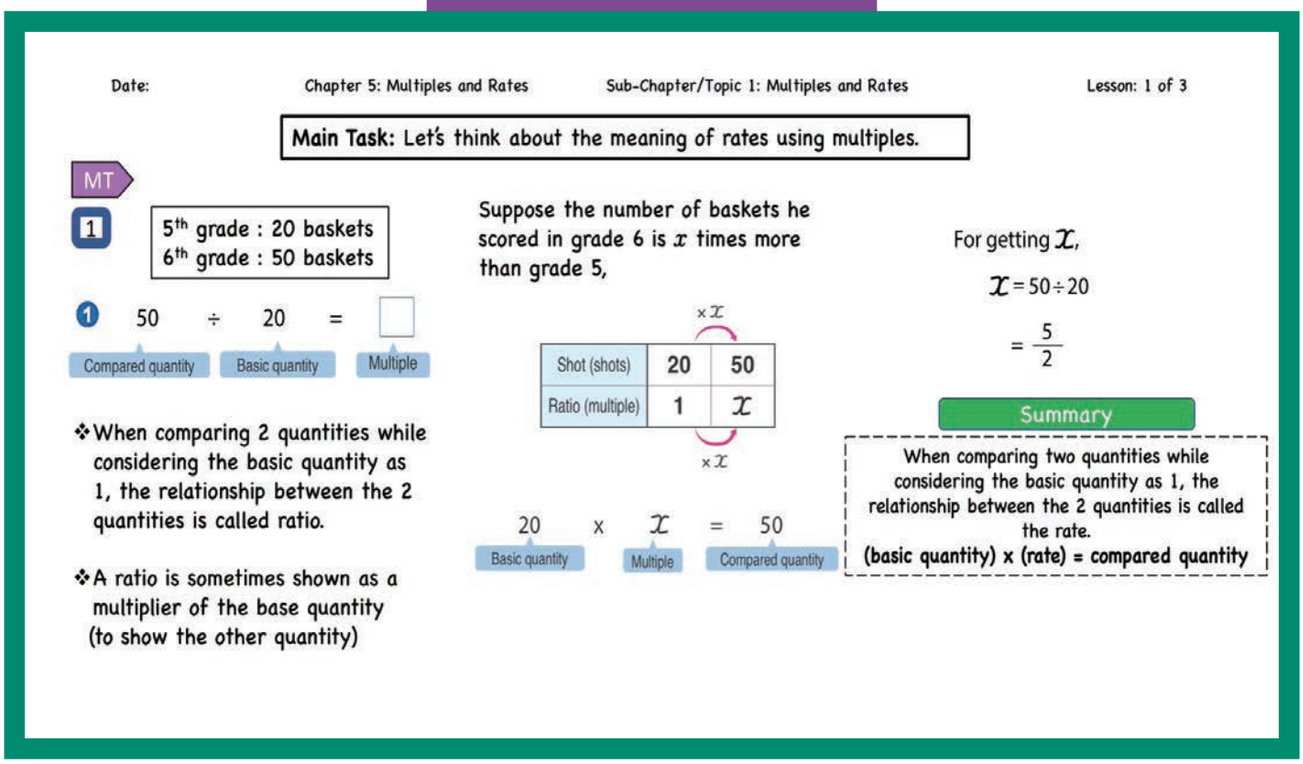
4 Summary

T What have you learned in this lesson?

S Present ideas on what they have learned.

T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan



Unit 5: Unit: Multiples and Rates

Sub-unit: Multiple and Rates

Lesson 2 of 3

Textbook Page : 048
Actual Lesson 037

Lesson Objectives

- To express rates with fractions.

Prior Knowledge

- Measurement per unit quantity. (Grade 5)
- Mathematical symbol and expression. (Grade 6)
- Meaning of rate. (Previous lesson)

Preparation

- Tape diagrams and tables

Assessment

- Think about how to express the rate of two quantities. F
- Solve the exercise correctly. S

Teacher's Notes

Emphasise using the example that rate can be expressed as a fraction.

$18 \times x = 24$

$= 24 \div 18$

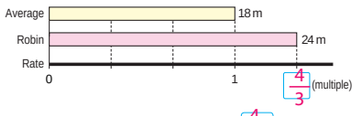
$= \frac{24}{18}$

$= \frac{4}{3}$

Rate Represented by a Fraction

2 Robin and his friends played a game by comparing how far they could throw a ball.
The average was 18 m.

1 Robin's record is 24 m. How many times the average is his record?
Show it by a fraction.



24 ÷ 18 = $\frac{4}{3}$

Compared quantity | Base quantity | Multiple

Suppose his record is x times the average,

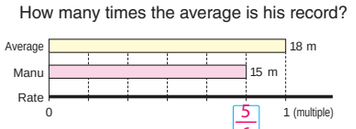
Distance (m)	18	24
Rate (multiple)	1	x

(×x on both sides)

$18 \times x = 24$
$x \quad = 24 \div 18$

Rate is sometimes expressed as fractions.

2 Manu's record was 15 m.
How many times the average is his record?



15 ÷ 18 = $\frac{5}{6}$

Compared quantity | Base quantity | Multiple

Suppose his record is x times the average,

Distance (m)	18	15
Rate (multiple)	1	x

(×x on both sides)

$18 \times x = 15$
$x \quad = 15 \div 18$

Exercise

Let's fill in the ☐ with fractions.

① 15 m is $\frac{5}{6}$ times of 9 m. ② 35 kg is $\frac{5}{6}$ times of 42 kg.

48 = ☐ × ☐

Lesson Flow

1 Review the previous lesson.

T Introduce the Main Task. (Refer to the BP)

2 Expressing rate using multiples.

T/S 2 Read and understand the given situation.

T 1 How many times is Robin's recorded distance compared to the average.

TN Ask the students to look at the figure and identify what is the basic and compared quantity in this problem.

S Basic quantity = 18 m.
Compared quantity = 24 m.

TN By looking at the figure, make sure that if the rate is x times, the distance should also be x times.

T Ask students to complete the mathematical sentence.

S Complete the mathematical sentence and find the answer.

3 Important Point

T/S Explain the important point in the box

4 2 Find how many times Manu's record distance is compared to the average.

T Make sure that the compared quantity (Manu's record in this case) is shorter than the basic quantity.

TN From the figure, make sure that if the rate is x times, the distance should also be x times.

S Complete the mathematical sentence.

5 Complete the Exercise.

S Solve the selected exercises.

T Confirm students' answers.

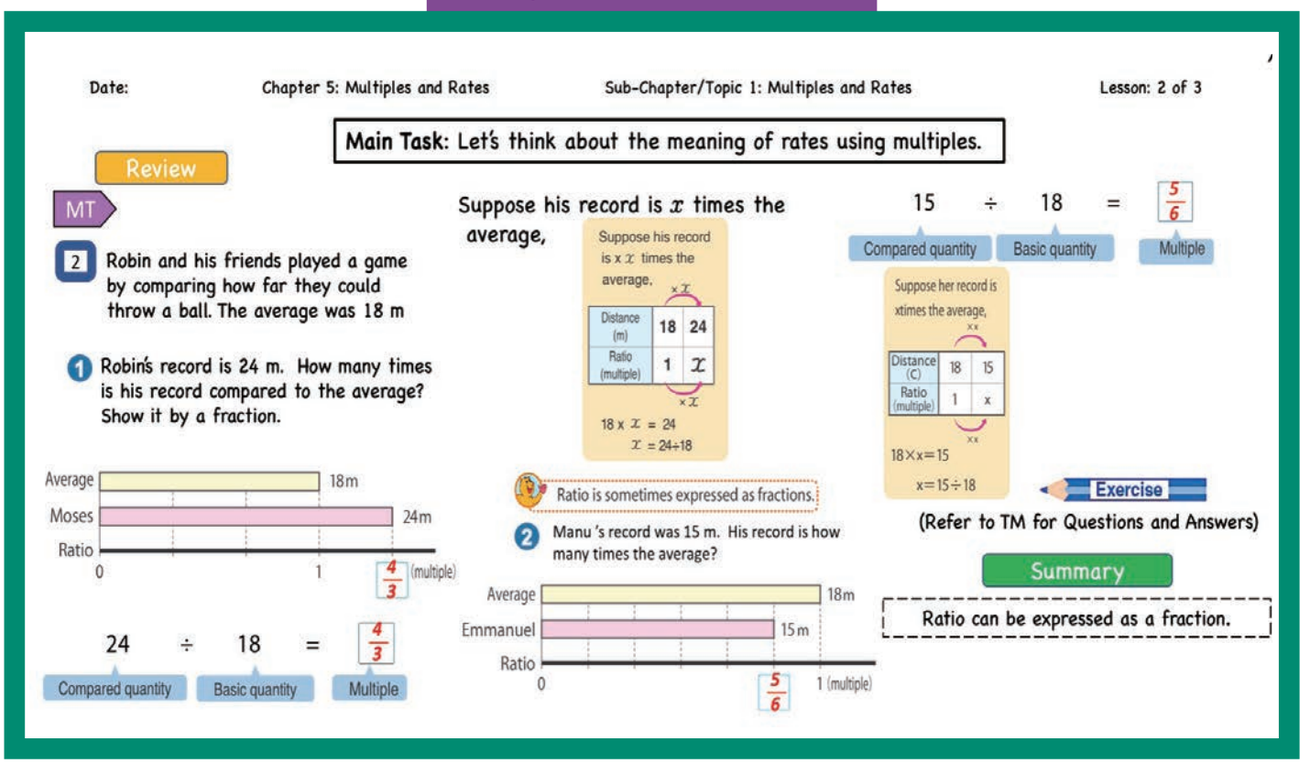
6 Summary

T What have you learned in this lesson?

S Present ideas on what they have learned.

T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan



Unit 5

Unit: Multiples and Rates
Sub-unit: Multiple and Rates
Lesson 3 of 3

Textbook Page : 049
Actual Lesson 038

Lesson Objectives

- To identify the base quantity and compared quantity based on the given value of rate in which two quantities are expressed as fractions.

Prior Knowledge

- Measurement per unit quantity. (Grade 5)
- Mathematical symbol and expression. (Grade 6)
- Meaning of rate. (Previous lesson)
- Expressing rate as a fraction.

Preparation

- Tape diagrams and tables

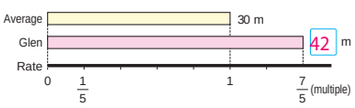
Assessment

- Identify the base quantity and compared quantity based on the given rate. F
- Solve the exercise correctly. S

Teacher's Notes

In this lesson, ensure that students relate the information from the tape diagram and the table to find the unknown values to determine the base quanity, value of rate and the multiple.

3 Glen and his friends played a game by comparing how far they could throw a ball and the average distance was 30 m.
Glen's record was $\frac{7}{5}$ times the average.
How far did he throw in m?



30 × 7/5 = 42
Base quantity | Value of rate | Compared quantity

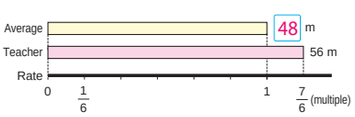
Suppose his record is x m.

Distance (m)	30	x
Rate (multiple)	1	$\frac{7}{5}$

× 7/5 (top), × 7/5 (bottom)

$30 \times \frac{7}{5} = x$

4 A teacher threw a softball 56 m.
The record was $\frac{7}{6}$ times the teacher's average.
What was the teacher's average in m?



Distance (m)	x	56
Rate (multiple)	1	$\frac{7}{6}$

× 7/6 (top), × 7/6 (bottom)

Suppose the average is x m, write its mathematical sentence.

$x \times \frac{7}{6} = 56$

$x = 56 \div \frac{7}{6} = 48$

Exercise

Let's fill in the ☐.

① $\frac{7}{5}$ times of 5 kg is 7 kg.

② $\frac{5}{6}$ times of 60 kg is 50 kg.

☐ – ☐ = 49

Lesson Flow

1 Review the previous lesson.

T Introduce the Main Task. (Refer to the BP)

2 Expressing rate as a fraction.

T/S 3 Read and understand the given situation.

T/S Discuss and confirm what they already know and what they need to find out.

S Identify that;

- Base quantity is 30 m
- Value of rate is $\frac{7}{5}$

We need to find the compared quantity which is x metre.

3 Complete the mathematical sentence.

T Remind students of the sentence:
(Base Quantity) × (Value of rates)
= (Compared Quantity)

S Think about what quantities they should put in to complete the sentence with the correct answer.

4 Applying rate as a fraction.

T/S 4 Read and understand the given situation.

T Discuss and confirm what they already know and what they need to find out.

S Identify that:

- Compared quantity is 56 m
- Value of rate is $\frac{7}{6}$

We need to find the basic quantity which is x metre.

5 Complete the mathematical sentence.

S Use x for the average and make a mathematical sentence based on
(Base Quantity) × (Value of rates)
= (Compared Quantity).

6 Complete the Exercise.

S Solve the selected exercises.

T Confirm students' answers.

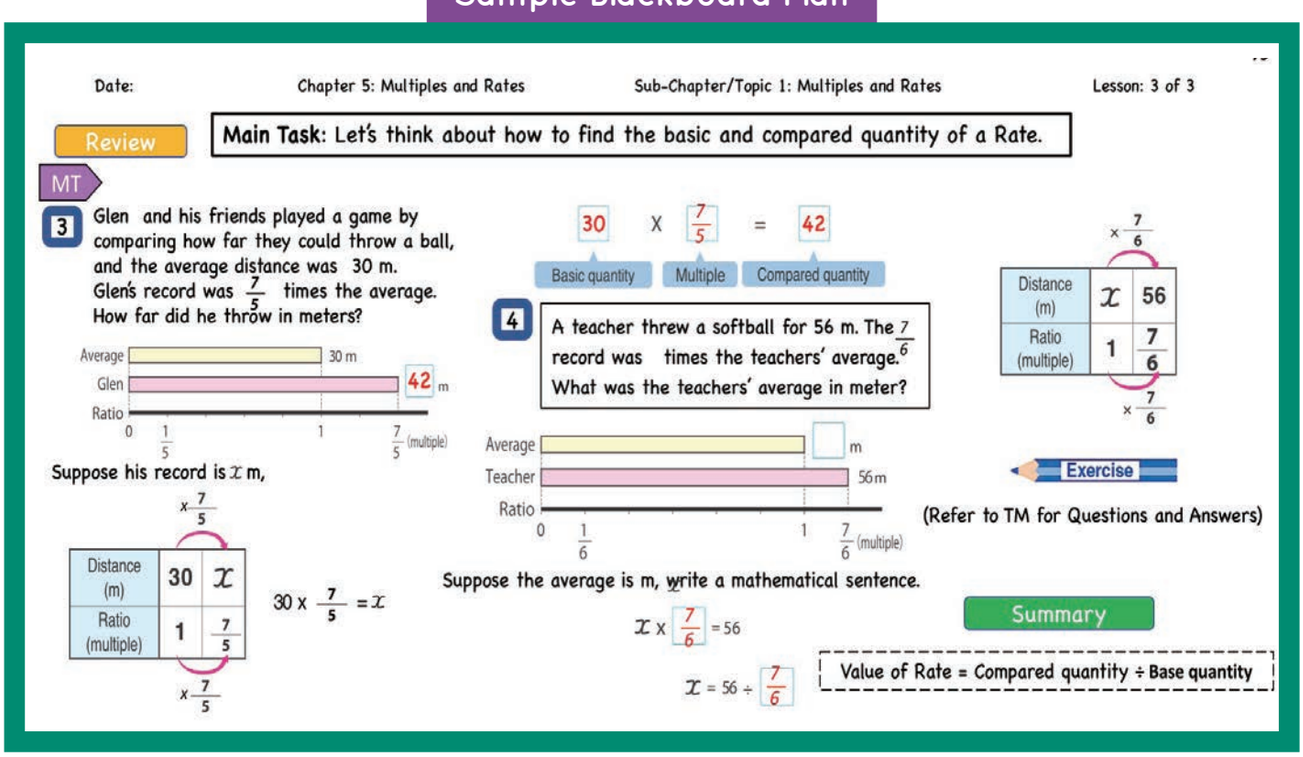
7 Summary

T What have you learned in this lesson?

S Present ideas on what they have learned.

T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan



End of Chapter Test **Date:**

Chapter 4: Division of Fractions	Name:	Score / 100

1. Calculate. [4 × 10 marks = 40 marks]

(1) $\frac{3}{8} \div \frac{3}{5}$

(2) $\frac{5}{6} \div \frac{1}{9}$

(3) $1\frac{4}{5} \div \frac{3}{4}$

(4) $\frac{7}{10} \div 1\frac{4}{5}$

(5) $2\frac{5}{6} \div 2\frac{5}{6}$

2. Which quotients are greater than 8? Write letters. [20 marks]

(1) $8 \div \frac{3}{5}$ (2) $8 \div 1\frac{1}{2}$ (3) $\frac{5}{9} \div 1\frac{9}{10}$ (4) $8 \div \frac{7}{9}$

Answer:

3. If $\frac{4}{5}$ L of paint weighs $\frac{8}{9}$ kg. What is the weight of 1 L paint?

[30 marks in total; 15 marks for expression and 15 marks for the answer]

Mathematical Expression:

Answer:

Chapter 6 Operation of Decimals and Fractions

1. Content Standard

6.1.3. Students will be able to demonstrate the proficiency in calculation of four arithmetic operations with fractions and decimals and be confident in using them.

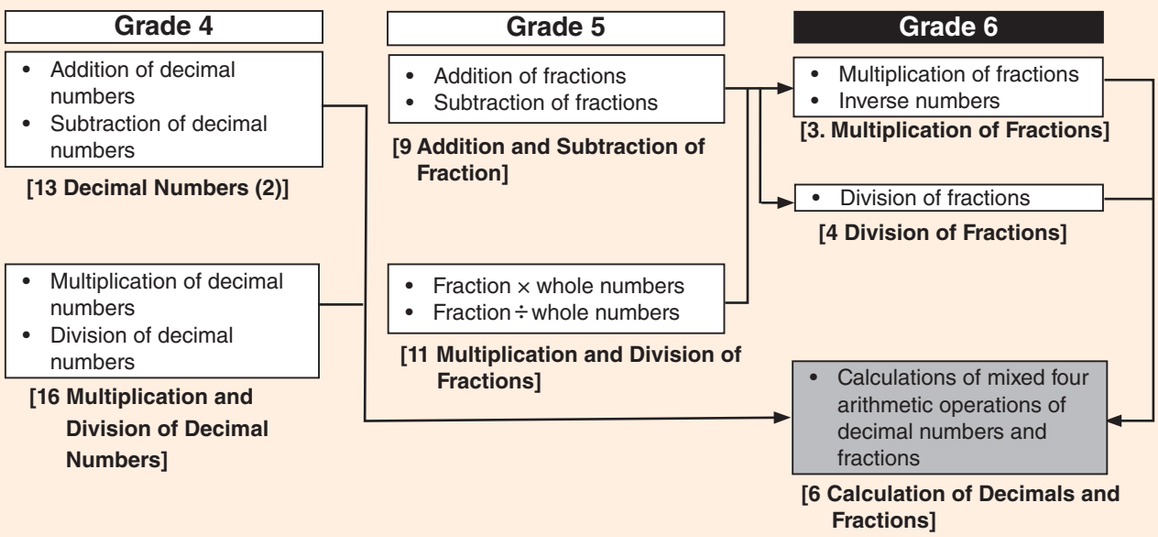
2. Unit Objective

- To improve basic calculation skill concerning decimal numbers and fractions.

3. Teaching Overview

In this topic, students are supposed to master calculation of whole numbers, decimals and fractions with all 4 operations combined. As they get used to any calculations found in their daily lives, they will fully appreciate mathematics. Students are supposed to be given as many situations as possible to form mathematical expressions and find the answers and think the meaning of the answers.

4. Related Learning Contents



Unit 6

Unit: Operation of Decimals and Fractions
Sub-unit: 1. Operation of Decimals
Lesson 1 of 3

Textbook Page : 050
Actual Lesson 039

Sub-unit Objectives

- To solve the problems of decimal numbers.
- To apply the knowledge of decimal numbers to daily life.

Lesson Objectives

- To solve various problems involving decimal numbers.

Prior Knowledge

- Calculation of decimal numbers using the 4 operations.

Preparation

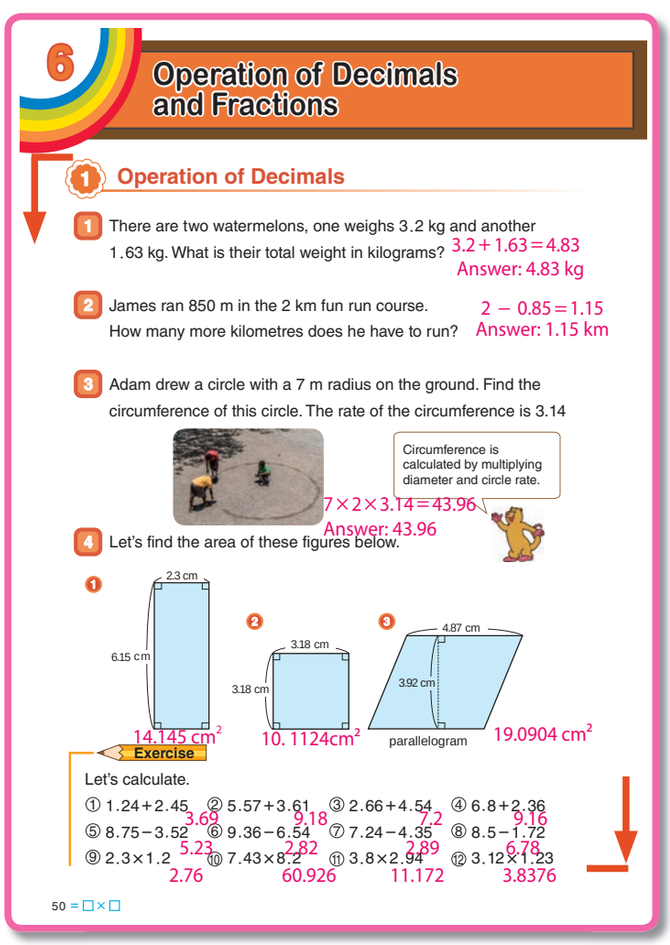
- Diagrams for task 4.

Assessment

- Solve various problems involving length, weight and area in decimal numbers. F S

Teacher's Notes

Using prior knowledge, the students should identify the operation and the unit for calculation.
Encourage the students to use vertical calculation, giving emphasis on place values.



6 Operation of Decimals and Fractions

1 Operation of Decimals

1 There are two watermelons, one weighs 3.2 kg and another 1.63 kg. What is their total weight in kilograms? 3.2 + 1.63 = 4.83
Answer: 4.83 kg

2 James ran 850 m in the 2 km fun run course. How many more kilometres does he have to run? 2 − 0.85 = 1.15
Answer: 1.15 km

3 Adam drew a circle with a 7 m radius on the ground. Find the circumference of this circle. The rate of the circumference is 3.14

Circumference is calculated by multiplying diameter and circle rate.

7 × 2 × 3.14 = 43.96
Answer: 43.96

4 Let's find the area of these figures below.

1 2.3 cm, 6.15 cm — 14.145 cm²
2 3.18 cm, 3.18 cm — 10. 1124cm²
3 4.87 cm, 3.92 cm, parallelogram — 19.0904 cm²

Exercise

Let's calculate.

① 1.24 + 2.45 3.69 ② 5.57 + 3.61 9.18 ③ 2.66 + 4.54 7.2 ④ 6.8 + 2.36 9.16
⑤ 8.75 − 3.52 5.23 ⑥ 9.36 − 6.54 2.82 ⑦ 7.24 − 4.35 2.89 ⑧ 8.5 − 1.72 6.78
⑨ 2.3 × 1.2 2.76 ⑩ 7.43 × 8.2 60.926 ⑪ 3.8 × 2.94 11.172 ⑫ 3.12 × 1.23 3.8376

50 = □ × □

Lesson Flow

1 Addition of decimal numbers.

T Introduce the Main Task. (Refer to the BP)
T/S 1 Read and understand the given situation.
S Make a mathematical expression and solve it by finding the total weight.

2 Subtraction of decimal numbers.

T/S 2 Read and understand the given situation.
S Make a mathematical expression and solve it by finding the difference.
TN 850m has to be changed to 0.85 km to calculate.

3 Multiplication of decimal numbers.

T/S 3 Read and understand the given situation.
S Make a mathematical expression and solve the problem.
TN Confirm the formula for finding circumference of a circle (C = radius × 2 × 3.14)

4 4 Find the area of figures 1, 2 and 3.

S Find the area of each shape by applying the formula.

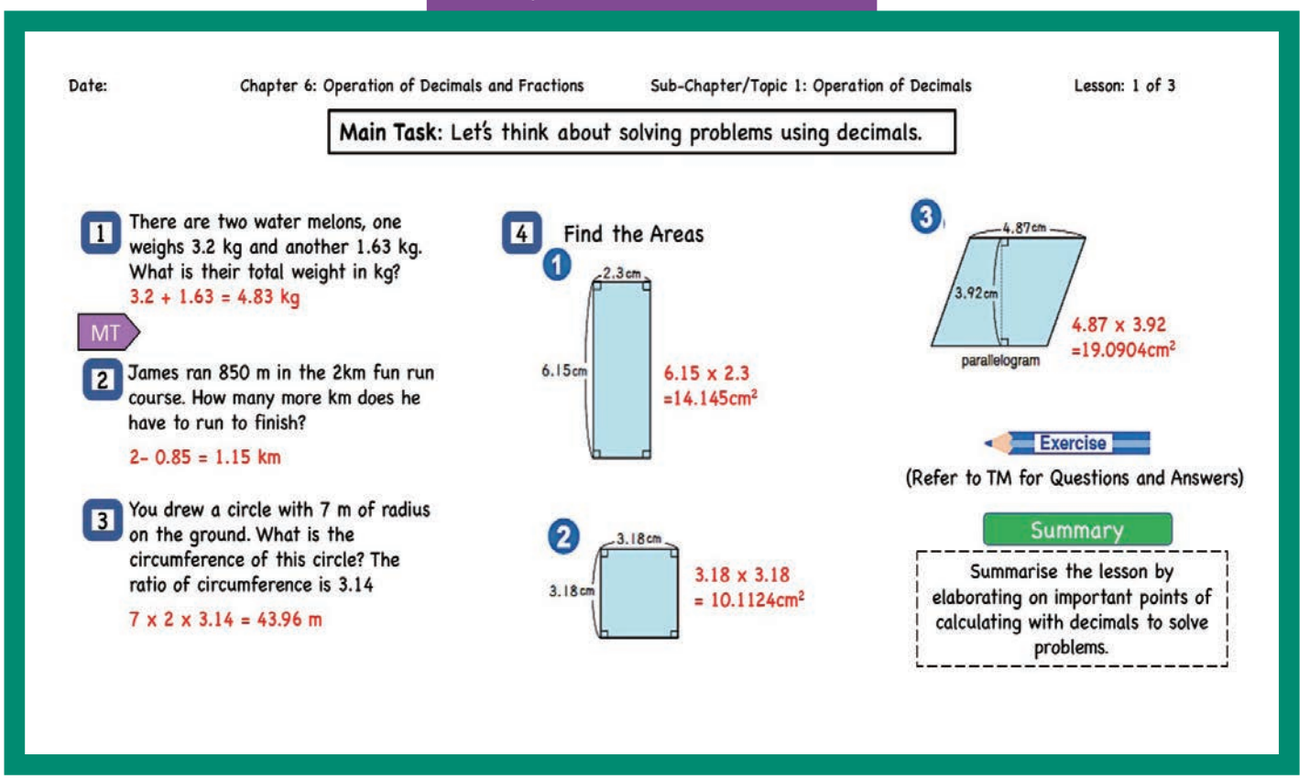
5 Complete the Exercise.

S Solve the selected Exercises.
T Confirm students' answers.

6 Summary

T What have you learned in this lesson?
S Present ideas on what they have learned.
T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan



Unit 6

Unit: Operation of Decimals and Fractions
Sub-unit: 1. Operation of Decimals
Lesson 2 of 3

Textbook Page : 051
Actual Lesson 040

Lesson Objectives

- To solve problems of decimal numbers in daily life.

Prior Knowledge

- Calculation of decimal numbers using the 4 operations.

Preparation

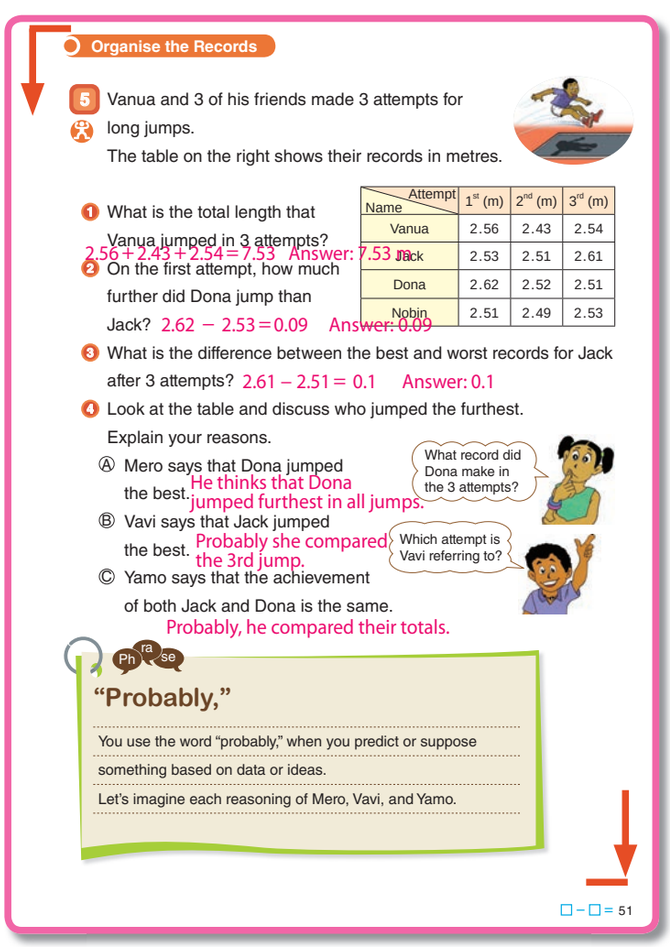
- Table of results.

Assessment

- Solve problems involving estimation and comparing using decimal numbers. F S

Teacher's Notes

While using the table, the students may have their different reasons for choosing certain answers.
Encourage students to use the word probably when predicting their answers. For example; Mero said that Dona jumped the best probably because he based his answer on the 1st attempt.



Organise the Records

5 Vanua and 3 of his friends made 3 attempts for long jumps.
The table on the right shows their records in metres.

Name \ Attempt	1st (m)	2nd (m)	3rd (m)
Vanua	2.56	2.43	2.54
Jack	2.53	2.51	2.61
Dona	2.62	2.52	2.51
Nobin	2.51	2.49	2.53

1 What is the total length that Vanua jumped in 3 attempts?
2.56 + 2.43 + 2.54 = 7.53 Answer: 7.53 m

2 On the first attempt, how much further did Dona jump than Jack? 2.62 − 2.53 = 0.09 Answer: 0.09

3 What is the difference between the best and worst records for Jack after 3 attempts? 2.61 − 2.51 = 0.1 Answer: 0.1

4 Look at the table and discuss who jumped the furthest. Explain your reasons.

Ⓐ Mero says that Dona jumped the best. He thinks that Dona jumped furthest in all jumps.

Ⓑ Vavi says that Jack jumped the best. Probably she compared the 3rd jump.

Ⓒ Yamo says that the achievement of both Jack and Dona is the same. Probably, he compared their totals.

What record did Dona make in the 3 attempts?

Which attempt is Vavi referring to?

Phrase

"Probably,"

You use the word "probably," when you predict or suppose something based on data or ideas.

Let's imagine each reasoning of Mero, Vavi, and Yamo.

□ − □ = 51

Lesson Flow

1 Review the previous lesson.

T Introduce the Main Task. (Refer to the Blackboard Plan)

2 5 Interpreting decimal records on a table.

T/S Read and understand the given situation.

TN Discuss with students about the table of records. Students should intepret the information in the table to write mathematical expressions.

S Make mathematical expressions and find the answers.

1. 2.56 + 2.43 + 2.54 = 7.53 7.53 m
2. 2.62 – 2.53 = 0.09 0.09 m
3. 2.61 – 2.51 = 0.1 0.1 m (Confirm that 0.10 is expressed as 0.1)

3 4 Look at the table and discuss who jumped the furthest. Explain reasons.

T Allow the students to discuss the reason for Ⓐ, Ⓑ and Ⓒ

S Ⓐ Probably she jumped the furthest in her 1st attempt.

S Ⓑ Probably Vavi compared to his 3rd attempt.

S Ⓒ Probably their totals are the same.

TN Students' reasons may vary according to how they understand. Encourage them to use the word **probably** when they are not sure.

4 Summary

T What have you learned in this lesson?

S Present ideas on what they have learned.

T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan

Date: Chapter 6: Operation of Decimals and Fractions Sub-Chapter/Topic 1: Operation of Decimals Lesson: 2 of 3

Main Task: Let's think about solving problems using decimals.

Review

MT

5 The table below shows the records in meters.

(m)

Name \ Try	1st Try	2nd Try	3rd Try
Vanua	2.56	2.43	2.54
Jack	2.53	2.51	2.61
Dona	2.62	2.52	2.51
Nobin	2.51	2.49	2.53

1 What is the total length Vanua jumped in 3 tries?
2.56 + 2.43 + 2.54= 7.53m

2 On the first tries, how much further did Dona jump than Jack?
2.62 – 2.53= 0.09m

3 What is the difference between the best and the worst records of Jack after 3 tries?
2.61 – 2.51= 0.1m

4 Discuss who jumped the furthest using the table.
Explain the reasons for (A), (B) and (C).

Ⓐ Probably she jumped the longest in her 1st attempt.

Ⓑ Probably Vavi compared to his 3rd attempt.

Ⓒ Probably their totals are the same.

Summary

Summarise the lesson based on what the students have learnt and elaborate on important points.

Unit 6

Unit: Operation of Decimals and Fractions
Sub-unit: 1. Operation of Decimals
Lesson 3 of 3

Textbook Page : 052
Actual Lesson 041

Lesson Objectives

- To solve various problems of decimal numbers.

Prior Knowledge

- Calculation of decimal numbers using the 4 operations.

Preparation

- 3 sets of numbered cards from 1 to 9.

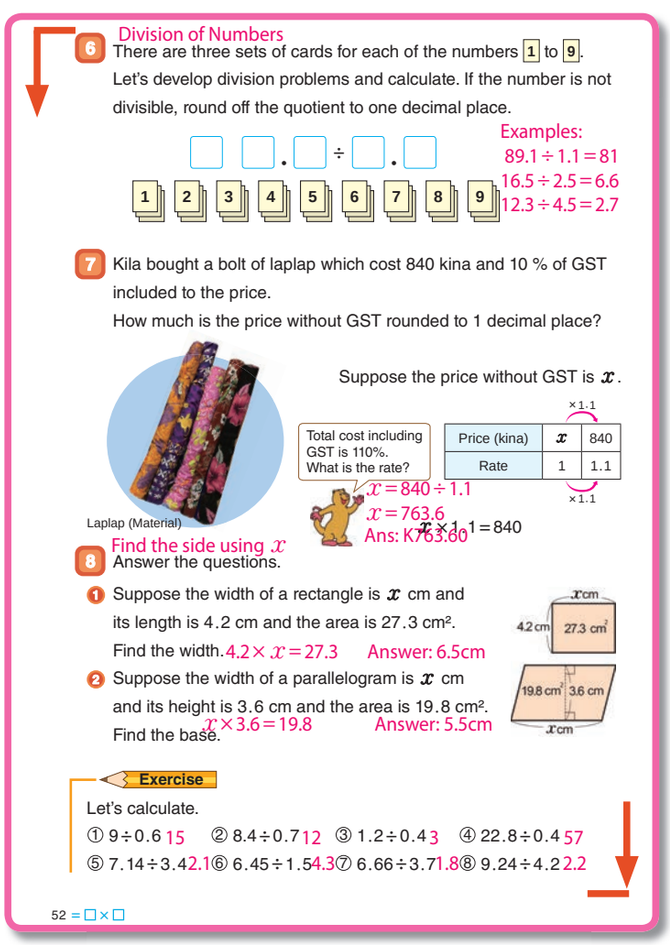
Assessment

- Solve various problems concerning decimal numbers. F S

Teacher's Notes

6 is an ice breaking activity where the students pick any numbers from 1 to 9. They may use the same number 3 times to substitute into the divisional expression and find their answers.

7 is about calculation of 10% GST. The cost with GST is 840 kina. Students are asked to find the price without GST. Therefore, they use the table to establish the relationship with x to calculate the answer by finding the value of x.



Division of Numbers

6 There are three sets of cards for each of the numbers 1 to 9.
Let's develop division problems and calculate. If the number is not divisible, round off the quotient to one decimal place.

□□.□ ÷ □.□

1 2 3 4 5 6 7 8 9

Examples:
89.1 ÷ 1.1 = 81
16.5 ÷ 2.5 = 6.6
12.3 ÷ 4.5 = 2.7

7 Kila bought a bolt of laplap which cost 840 kina and 10 % of GST included to the price.
How much is the price without GST rounded to 1 decimal place?

Laplap (Material)

Suppose the price without GST is x.

Total cost including GST is 110%. What is the rate?

Price (kina)	x	840
Rate	1	1.1

×1.1 ×1.1

$x = 840 \div 1.1$
$x = 763.6$
Ans: K763.60

$x \times 1.1 = 840$

8 Find the side using x
Answer the questions.

1 Suppose the width of a rectangle is x cm and its length is 4.2 cm and the area is 27.3 cm².
Find the width. $4.2 \times x = 27.3$ Answer: 6.5cm

2 Suppose the width of a parallelogram is x cm and its height is 3.6 cm and the area is 19.8 cm².
Find the base. $x \times 3.6 = 19.8$ Answer: 5.5cm

Exercise

Let's calculate.
① 9 ÷ 0.6 15 ② 8.4 ÷ 0.7 12 ③ 1.2 ÷ 0.4 3 ④ 22.8 ÷ 0.4 57
⑤ 7.14 ÷ 3.4 2.1 ⑥ 6.45 ÷ 1.5 4.3 ⑦ 6.66 ÷ 3.7 1.8 ⑧ 9.24 ÷ 4.2 2.2

52 = □ × □

Lesson Flow

1 Review the previous lesson.

T Introduce the Main Task. (Refer to the BP)

2 Division of decimal numbers.

T/S 6 Read and understand the given situation.

T Ask students to make division problems of decimal numbers.

TN Allow students to use number cards from 1 to 9 to make division problems.
Remind them that each number can be used up to 3 times.

S Make any division problem using the number cards.

TN Examples: 81.1 ÷ 1.1
38.4 ÷ 1.2

3 Solving problems involving decimal numbers by finding the value of x.

T/S 7 Read and understand the given situation.

T Allow students to discuss and make expressions.

S Make a mathematical sentence to find the value of x.

TN x = 840 ÷ 1.1
x = 763.6363
Rounded to: 763.6 (1 decimal place)
Answer:K763.60

4 8 Solve the area problems using decimal numbers.

T/S Read and understand the given situation.

T 1 How can we find the width of the rectangle using the length and area?

S 4.2 × x = 27.3, x = 6.5 Answer: 6.5 cm

T 2 How can we find the base of the parallelogram using the height and area?

S x × 3.6 = 19.8 Answer: 5.5 cm

5 Complete the Exercise.

S Solve the Exercises.

T Confirm students' answers.

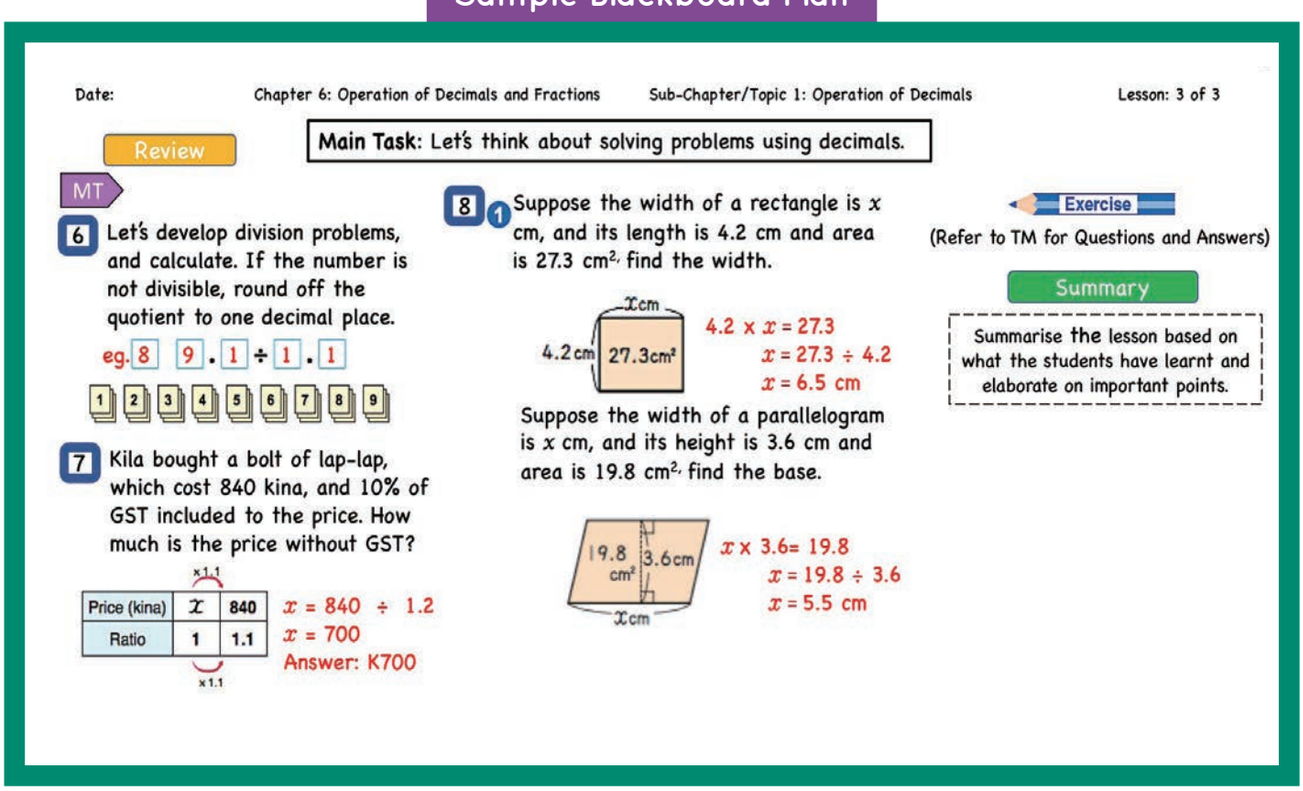
6 Summary

T What have you learned in this lesson?

S Present ideas on what they have learned.

T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan



Unit 6

Unit: Operation of Decimals and Fractions
Sub-unit: 2. Operation of Fractions
Lesson 1 of 3

Textbook Page : 053
Actual Lesson 042

Sub-unit Objectives

- To solve various problems of fractions.
- To apply fraction problems to daily life.

Lesson Objectives

- To solve various problems of fractions.

Prior Knowledge

- Calculation of fractios using the 4 operations.

Preparation

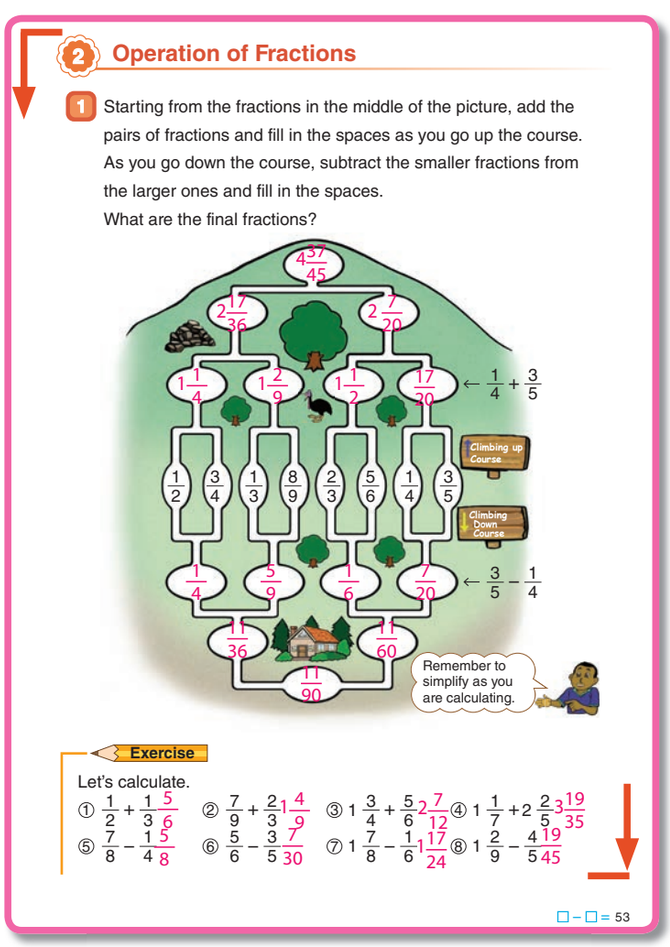
- Enlarged image of the course.

Assessment

- Solve problems by adding, subtracting and simplifying fractions. F
- Solve the exercises correctly. S

Teacher's Notes

This activity is an interesting activity if students try to solve it as a competition and complete. The students should use their prior knowledge and where possible they should try to simplify before calculating.
Let the children work together as a team or individually.



2 Operation of Fractions

1 Starting from the fractions in the middle of the picture, add the pairs of fractions and fill in the spaces as you go up the course. As you go down the course, subtract the smaller fractions from the larger ones and fill in the spaces.
What are the final fractions?

Exercise

Let's calculate.

① $\frac{1}{2}+\frac{1}{3}=\frac{5}{6}$ ② $\frac{7}{9}+\frac{2}{3}=1\frac{4}{9}$ ③ $1\frac{3}{4}+\frac{5}{6}=2\frac{7}{12}$ ④ $1\frac{1}{7}+2\frac{2}{5}=3\frac{19}{35}$

⑤ $\frac{7}{8}-\frac{1}{4}=\frac{5}{8}$ ⑥ $\frac{5}{6}-\frac{3}{5}=\frac{7}{30}$ ⑦ $1\frac{7}{8}-\frac{1}{6}=1\frac{17}{24}$ ⑧ $1\frac{2}{9}-\frac{4}{5}=\frac{19}{45}$

□ – □ = 53

Lesson Flow

1 Review the previous lesson.

T Introduce the Main Task. (Refer to the Blackboard Plan)

2 1 Do addition of fraction for the climbing course.

T/S Read and understand the given situation.
S Do the addition of fractions with different denominators.
TN Treat this as a race where students try to complete the course as fast as they can and confirm the answer.

3 Do subtraction for the climbing down course.

T Concerning $\frac{1}{2}$ and $\frac{3}{4}$, how can we do the subtraction?
S Subtract smaller fraction from the larger fraction .
T Compare the two fractions and subtract from the larger fraction.

4 Complete the Exercise.

S Solve the Exercises.
T Confirm students' answers.

5 Summary

T What have you learned in this lesson?
S Present ideas on what they have learned.
T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan

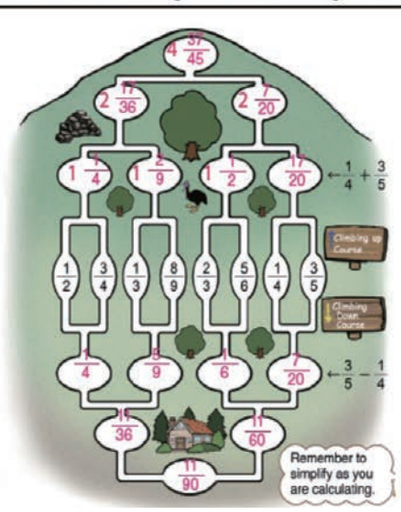
Date: Chapter 6: Operation of Decimals and Fractions. Sub-Chapter/Topic 2: Operation of Fractions Lesson: 1 of 3

Main Task: Let's think about adding and subtracting fractions.

Review

MT

1 Starting from the fractions in the middle of the picture, as you go up the course, add the fractions. As you go down the course, subtract the smaller fractions from the larger ones. What are the final fractions?



Exercise

(Refer to TM for Questions and Answers)

Summary

When going up, we can add the pairs of fractions easily.
When going down, we identify and subtract the smaller fraction from the larger one.

Unit 6

Unit: Operation of Decimals and Fractions
Sub-unit: 2. Operation of Fraction
Lesson 2 of 3

Textbook Page : 054
Actual Lesson 043

Lesson Objectives

- To apply fractions to daily life.

Prior Knowledge

- Calculation of decimal numbers using the 4 operations.

Preparation

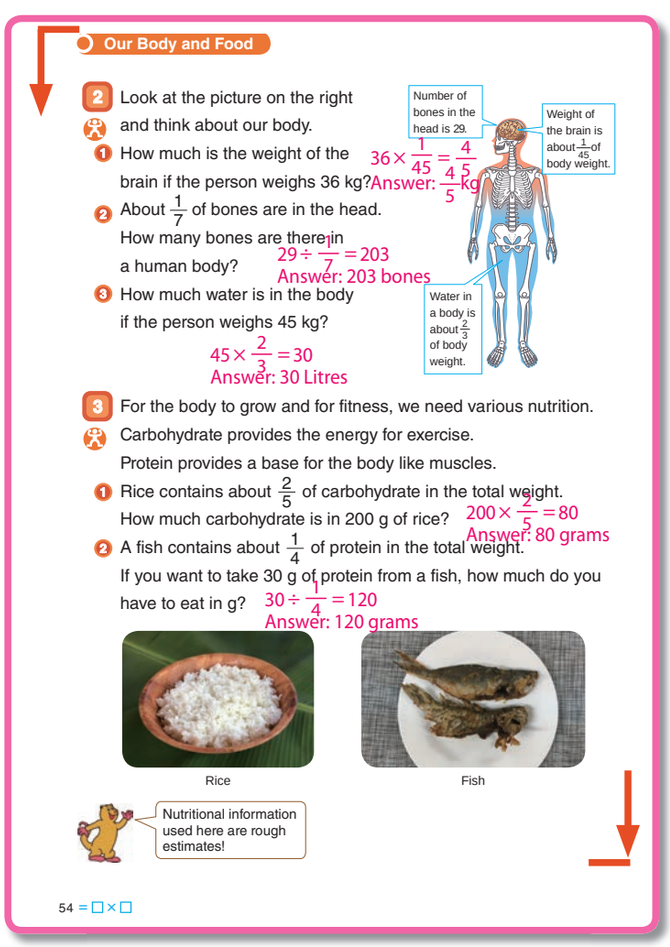
- Enlarged diagram of the skeleton

Assessment

- Solve various problems by multipying, dividing and simplifying fractions. F S

Teacher's Notes

The students will find the lessons interesting as it deals with their body. They will also discover an interesting fact about their bones and that is, not all Human beings have 206 bones. Some human beings may have about 203 bones or so.



Our Body and Food

2 Look at the picture on the right and think about our body.

1 How much is the weight of the brain if the person weighs 36 kg?
$36 \times \frac{1}{45} = \frac{4}{5}$
Answer: $\frac{4}{5}$ kg

2 About $\frac{1}{7}$ of bones are in the head. How many bones are there in a human body?
$29 \div \frac{1}{7} = 203$
Answer: 203 bones

3 How much water is in the body if the person weighs 45 kg?
$45 \times \frac{2}{3} = 30$
Answer: 30 Litres

Number of bones in the head is 29.

Weight of the brain is about $\frac{1}{45}$ of body weight.

Water in a body is about $\frac{2}{3}$ of body weight.

3 For the body to grow and for fitness, we need various nutrition.
Carbohydrate provides the energy for exercise.
Protein provides a base for the body like muscles.

1 Rice contains about $\frac{2}{5}$ of carbohydrate in the total weight. How much carbohydrate is in 200 g of rice?
$200 \times \frac{2}{5} = 80$
Answer: 80 grams

2 A fish contains about $\frac{1}{4}$ of protein in the total weight. If you want to take 30 g of protein from a fish, how much do you have to eat in g?
$30 \div \frac{1}{4} = 120$
Answer: 120 grams

Rice

Fish

Nutritional information used here are rough estimates!

54 = □ × □

Lesson Flow

1 Review the previous lesson.

T Introduce the Main Task. (Refer to the Blackboard Plan)

2 Multiplication and division of fractions in problems.

T/S 2 Read and understand the given situation.
S 1 Make a mathematical expression and answer the question.
T Remind students to answer the question in fractions and in decimals when necessary.
S 2 Make a mathematical expression and answer the question.
S 3 Make a mathematical expression and answer the question.

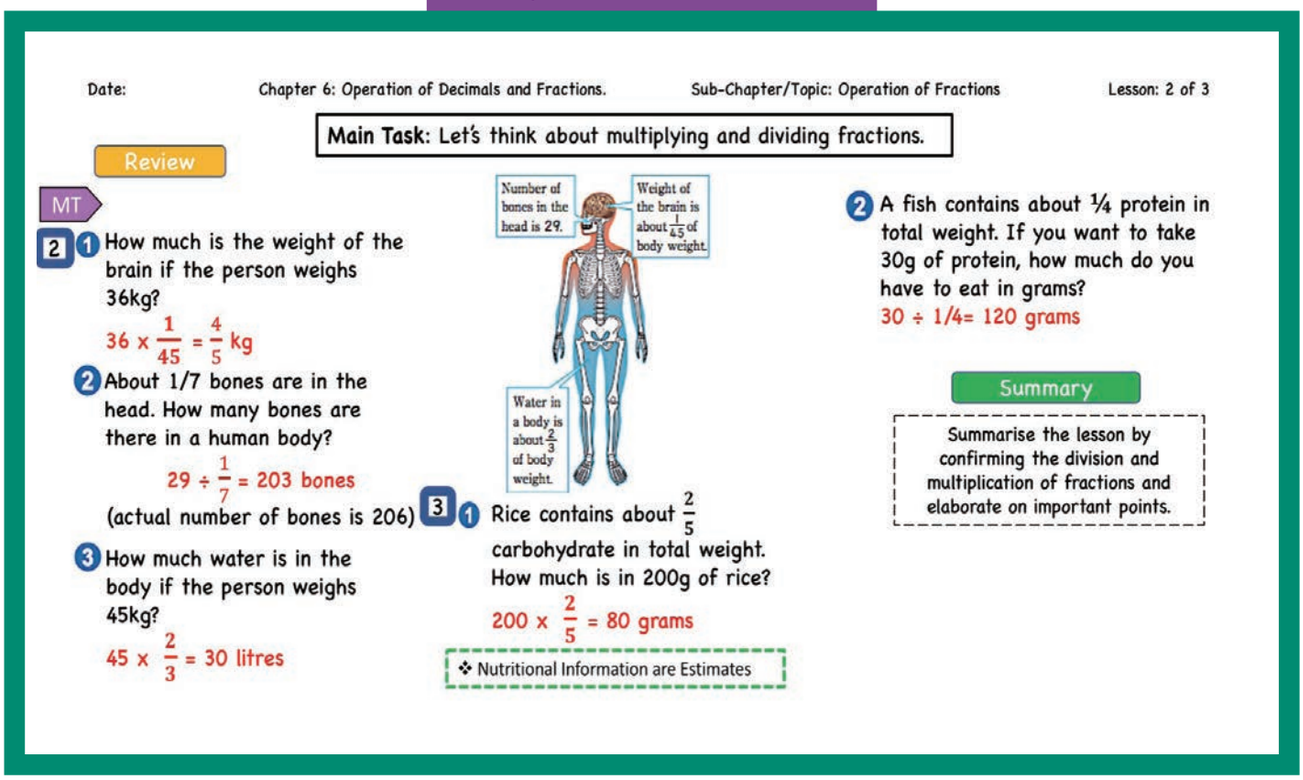
3 Multiplication and division of fractions in problems.

T/S 3 Read and understand the given given situation.
S 1 Make a mathematical expression and answer the question.
T Remind students to answer the question in fractions and in decimals when necessary.
S 2 Make a mathematical expression and answer the question.
TN Students should be aware of the weight composition of food which they eat every day.

4 Summary.

T What have you learned in this lesson?
S Present ideas on what they have learned.
T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan



Unit 6

Unit: Operation of Decimals and Fractions
Sub-unit: 2. Operation of Fraction
Lesson 3 of 3

Textbook Page : 055
Actual Lesson 044

Lesson Objectives

- To calculate time and duration using fractions.

Prior Knowledge

- Knowledge of time and duration

Preparation

- Time conversion table.

Assessment

- Solve various fraction problems involving time and duration correctly. F S

Teacher's Notes

In this lesson, the emphasis of calculating time using fractions should be made clear to the students before solving the tasks.

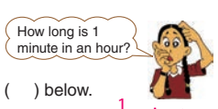
Calculation of Time

4 The relationships among different units of time are shown in the table on the right. Time units are not organised by multiples of tens. To calculate time, it is useful to use fractions.

Hour	Minutes	Second
$\frac{1}{3600}$	$\frac{1}{60}$	1
$\frac{1}{60}$	1	60
1	60	3600

1 What is 4 minutes in terms of hours?

$\frac{1}{60} \times 4 = \frac{1}{15}$



2 Let's change the given time by the unit ( ) below.

Ⓐ 35 minutes (hour) $\frac{7}{12}$ of an hour Ⓑ 20 seconds (minute) $\frac{1}{3}$ minutes

Ⓒ $\frac{2}{3}$ hour (minute) 40 minutes Ⓓ $\frac{1}{4}$ minute (second) 15 seconds

3 How long is $7\frac{1}{3}$ minutes in minutes and seconds?

$7\frac{1}{3}$ (minutes) $= 7$ (minutes) $+ \frac{1}{3}$ (minutes)

$= 7$ (minutes) $+ 60 \times \frac{1}{3}$ (seconds)

$= 7$ (minutes) $+ 20$ (seconds)

Answer: 7 minutes, 20 seconds.

5 When we use the method in task 4, we can represent the calculation of time using fractions.

Answer the following by using fractions.

1 The game played by grade 6 students is 1 hour and 40 minutes long. If they played it 3 times, how long will it take in hours? 5 hours

2 Melo ran 1.5 km in 6 minutes and 15 seconds. How much time did it take him to run 1 km? $4\frac{1}{6}$ minutes

3 Loa studies for 2 hours and 40 minutes every day. Yesterday, she spent 40 minutes on each subject. How many subjects did she study? 4 subjects

□ − □ = 55

Lesson Flow

1 Review the previous lesson.

T Introduce the Main Task. (Refer to the BP)

2 4 Relationship of the units of time.

T/S Read and understand the given situation.

T/S Discuss and make meaning out of the table.

T 1 What is 4 minutes in seconds?.

S Understand that 1 minute = $\frac{1}{60}$ hour, therefore the answer can be found using $4 \times \frac{1}{60}$.

3 Converting units of time using fractions.

T 2 Let's change the given time by the unit in brackets.

S Solve using the information on the table.

Ⓐ $\frac{35}{60}$ hour is equal to $\frac{7}{12}$ hour.

Ⓑ $\frac{20}{60}$ minute is equal to $\frac{1}{3}$ minute.

Ⓒ 1 hour is 60 minutes,
so $\frac{2}{3}$ hour = $60 \times \frac{2}{3}$ = 40 minutes

Ⓓ 1 minute is 60 seconds,
so $\frac{1}{4}$ minute = 60 seconds $\times \frac{1}{4}$ = 15 seconds

S 3 Express $7\frac{1}{3}$ minutes in minutes and seconds.

4 5 Solving problems using fractions to calculate time.

T Let students to solve activities 1, 2 and 3 using the methods used in 4.

S 1 Change 1 hour 40 minutes to fraction before calculating. 1 hour 40 minutes is equal to $1\frac{2}{3}$ minute.

2 6 minutes 15 seconds is equal to $6\frac{1}{4}$ minutes. Find a unit (1 hour) quantity.

3 2 hours 40 minutes is equal to $2\frac{2}{3}$ hours. 40 minutes is equal to $\frac{2}{3}$ minutes.
Find a unit (1 hour) quantity.

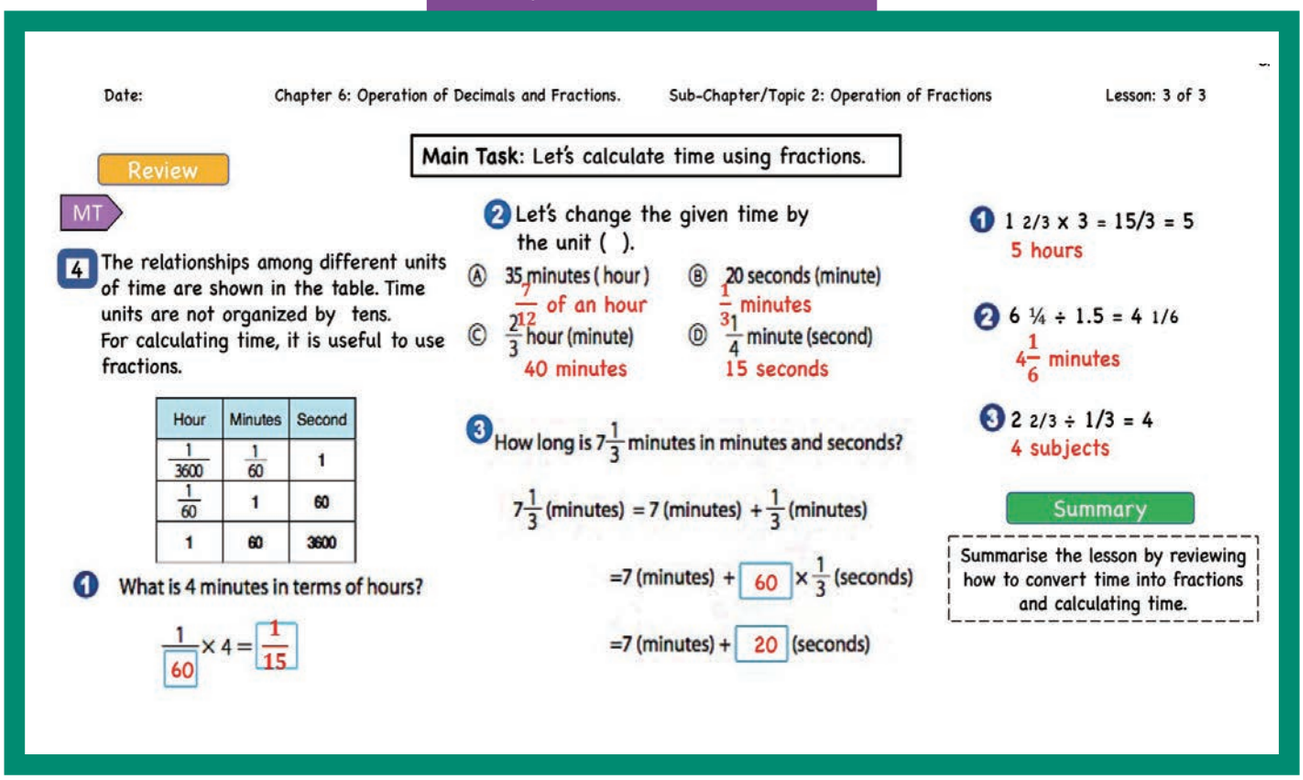
5 Summary

T What have you learned in this lesson?

S Present ideas on what they have learned.

T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan



Unit 6

Unit: Operation of Decimals and Fractions
Sub-unit: 3. Operation of Decimals and Fractions
Lesson 1 of 1

Textbook Page : 056 and 057
Actual Lesson 045

Sub-unit Objectives

- To calculate mixed decimal numbers and fraction using the 4 operations.

Lesson Objectives

- To understand how to calculate addition and subtraction of decimal numbers and fractions.

Prior Knowledge

- Calculation of decimal numbers and fractions using the 4 operations..

Preparation

- Prepare answers for the tasks.

Assessment

- Think about how to calculate addition and subtraction of mixed decimal numbers and fraction. F
- Think about how to calculate multiplication and division of mixed decimal numbers and fraction. F
- Solve the exercises correctly. S

Teacher's Notes

- When addition and subtraction include a decimals and fractions or vice versa, convert one of the unit either to a fraction or a decimal to make it easy to add or subtract.
- If you cannot convert a number to an accurte decimal, convert to a fraction for an accurate calculation.
- When the calculation includes both multiplication and division, convert the decimals to fractions and change the divisor to its inverse and multiply.

3 Operation of Decimals and Fractions

1 Let's calculate $\frac{2}{5}+0.5$

❶ Let's convert decimals to fractions and calculate.

$0.5=\frac{1}{2}$ $\frac{2}{5}+\frac{1}{2}=\frac{9}{10}$

❷ Let's convert fractions to decimals and calculate.

$\frac{2}{5}=0.4$ $0.4+0.5=0.9$

2 Let's calculate $0.2-\frac{1}{6}$.

❶ Let's convert decimals to fractions and calculate.

$0.2=\frac{1}{5}$ $\frac{1}{5}-\frac{1}{6}=\frac{1}{30}$

❷ Let's convert fractions to decimals and calculate.

$\frac{1}{6}=0.1666\ldots$ $0.2-0.167=0.033$

0.167

If addition and subtraction include both decimal and fraction, convert the units to either decimal or fraction.
If you cannot convert a number to an accurate decimal, convert the unit to a fraction.

Exercise

Let's calculate.

① $0.6+\frac{4}{9}=1\frac{2}{45}$ ② $0.7+\frac{4}{5}=1\frac{1}{2}$ ③ $\frac{3}{7}+0.4=\frac{29}{35}$ ④ $\frac{2}{3}+0.45=\frac{127}{150}$

⑤ $\frac{7}{8}-0.3=\frac{23}{40}$ ⑥ $1\frac{4}{7}-0.4=1\frac{6}{35}$ ⑦ $\frac{7}{8}-0.25=\frac{5}{8}$ ⑧ $\frac{1}{5}-0.12=\frac{2}{25}$

3 Let's calculate the area of the triangle as shown below.

❶ Write a mathematical expression.

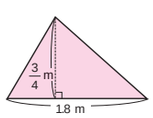
❷ Calculate it.

$1.8\times\frac{3}{4}\div 2=\frac{18}{10}\times\frac{3}{4}\div\frac{2}{1}$

$=\frac{9}{5}\times\frac{3}{4}\times\frac{1}{2}$

$=\frac{9\times 3\times 1}{5\times 4\times 2}$

$=\frac{27}{40}$



If calculation of fraction includes both multiplication and division, change the divisor into its inverse and multiply all.

4 Let's calculate using fractions.

❶ $1.6\div 0.25\times\frac{5}{8}=\frac{16}{10}\div\frac{15}{100}\times\frac{5}{8}=\frac{16}{10}\times\frac{100}{25}\times\frac{5}{8}$

$=\frac{16\times 100\times 5}{10\times 25\times 8}=4$

❷ $0.3\times 0.48\div 0.45=\frac{3}{10}\times\frac{48}{100}\div\frac{45}{100}=\frac{3}{10}\times\frac{48}{100}\times\frac{100}{45}$

$=\frac{3\times 48\times 100}{10\times 100\times 45}=\frac{8}{25}$

Exercise

Let's calculate using fractions.

① $\frac{1}{3}\div 0.4\times\frac{3}{5}=1\frac{1}{2}$ ② $27\div 48\times 32=18$ ③ $0.8\times\frac{3}{5}\div 0.36=1\frac{1}{3}$

④ $\frac{3}{7}\div 0.75\div\frac{9}{14}=\frac{8}{9}$ ⑤ $0.7\times 0.35\div 0.25=\frac{49}{50}$ ⑥ $0.5\div 0.21\times 0.7=1\frac{2}{3}$

56 = □ × □

□ − □ = 57

Lesson Flow

1 Review the previous lesson.

2 ① Think about how to calculate $\frac{2}{5}$ + 0.5

T Introduce the Main Task. (Refer to the BP)

T Let the students think about how to solve the expression.

S Change fraction to decimal number or decimal number to fraction.

S ① Confirm that $0.5 = \frac{1}{2}$ $\frac{2}{5} + \frac{1}{2} = \frac{9}{10}$

S ② Confirm that $\frac{2}{5} = 0.4$. $0.5 + 0.4 = 0.9$

3 ② Think about how to calculate $0.2 - \frac{1}{6}$.

S ① Change 0.2 to fraction and calculate

S ② Change $\frac{1}{6}$ to decimal number to calculate. But, $\frac{1}{6}$ is not divisible so it has to be rounded up to the thousandths place.

4 Important Point

T/S Explain the important point in the box .

5 Complete the Exercise.

S Solve the Exercises.

T Confirm students' answers.

6 ③ Find the area of triangle.

T What is the mathematical expression?

S $1.8 \times \frac{3}{4} \div 2$

T How are we going to calculate?

S Change 1.8 to fraction.

7 Important Point

T/S Explain the important point in the box .

8 ④ Solve various calculation using inverse fractions.

T Let students notice that in ① ②, calculating by fraction using inverse number is easier than calculating by decimals.

9 Complete the Exercis.

S Solve the Exercises.

T Confirm students' answers.

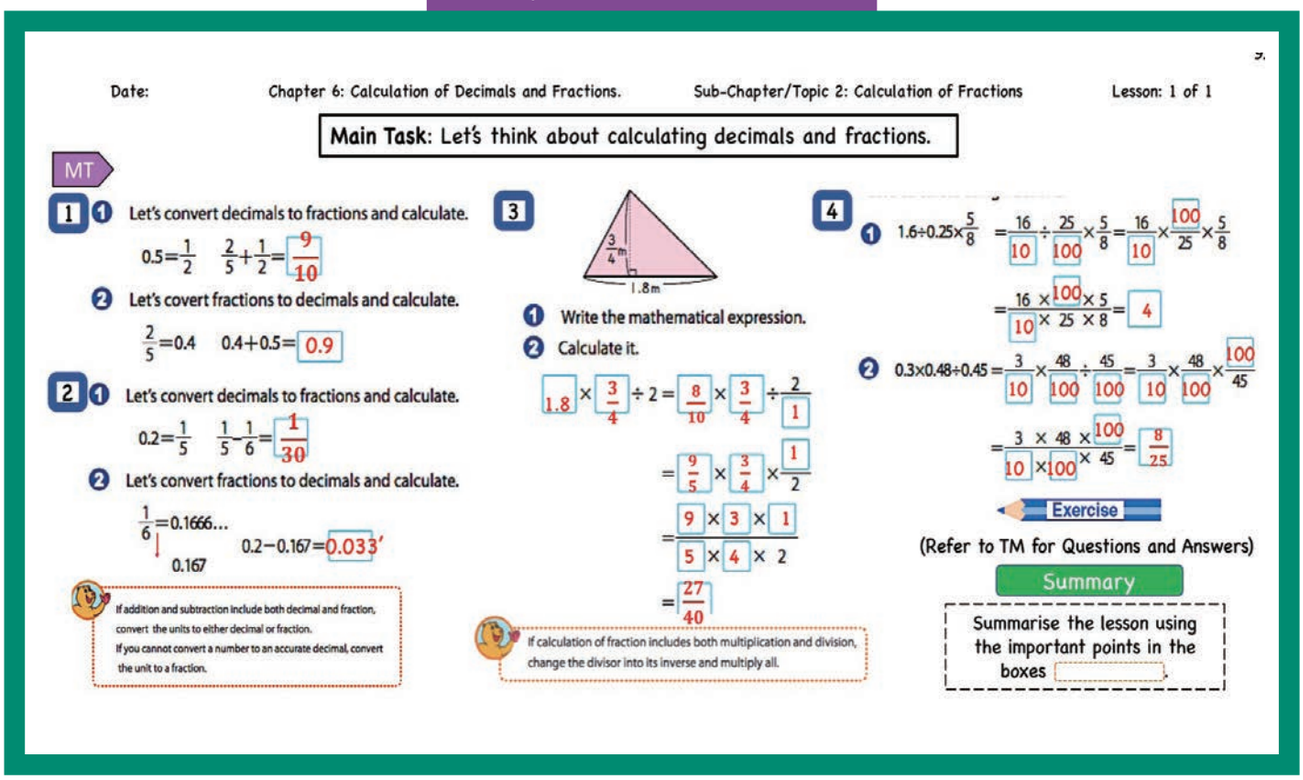
10 Summary

T What have you learned in this lesson?

S Present ideas on what they have learned.

T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan



Unit 6: Unit: Operation of Decimals and Fractions
Exercises and Evaluation
Lesson 1 and 2 of 2

Textbook Page : 058
Actual Lesson 46 &47

Lesson Objectives

- To confirm their understanding on the concepts they learned in this unit by completing the Exercises and Evaluation Test confidently.

Prior Knowledge

- All the contents learned in the unit.

Preparation

- Evaluation Test.

Assessment

- Solve the exercises correctly. F S

Teacher's Notes

This is the last lesson of Chapter 6.
Students should be encouraged to use the necessary skills learned in this unit to complete all the Exercises in preparation for the Evaluation Test.
The test can be conducted as assesment for your class after completing all the exercises.
Use the attached evaluation test to conduct assesment for your class after finishing all the exercises, problems and review as a seperate lesson.

EXERCISE

1 Let's find the sum, difference, product and quotient of decimals below. For quotient, use the number on the left as a dividend and right as a divisor, then round off the answer to one decimal place. Pages 50 to 52

① 3.25, 2.13 ② 4.37, 8.06
③ 9.18, 6.57 ④ 0.85, 5.32
(1) 5.4, 1.1, 6.9, 1.5 (2) 12.4, 3.7, 35.2, 0.5
(3) 15.8, 2.6, 60.3, 1.4 (4) 6.5, 4.5, 4.5, 0.2

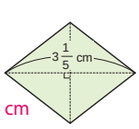
2 Let's find the sum, difference, product and quotient of fractions. For quotient, use the number on the left as a dividend and right as a divisor. Pages 53 and 54

① $\frac{1}{2}$, $\frac{1}{3}$ $\frac{5}{6}$, $\frac{1}{6}$, $\frac{1}{6}$, $1\frac{1}{2}$ ② $\frac{1}{3}$, $\frac{2}{7}$ $\frac{13}{21}$, $\frac{1}{21}$, $\frac{2}{21}$, $1\frac{1}{6}$
③ $1\frac{2}{3}$, $\frac{7}{8}$ ④ $3\frac{3}{4}$, $2\frac{1}{3}$ $6\frac{1}{2}$, $1\frac{5}{12}$, $8\frac{3}{4}$, $1\frac{17}{28}$
$2\frac{13}{24}$, $\frac{19}{24}$, $1\frac{11}{24}$, $1\frac{19}{21}$

3 Let's calculate using fractions. Page 57

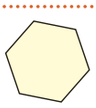
① $\frac{1}{5} \div 0.6 \times \frac{2}{3}$ $\frac{2}{9}$ ② $36 \div 27 \times 16$ $21\frac{1}{3}$ ③ $0.9 \times \frac{2}{7} \div 0.18$ $1\frac{3}{7}$
④ $\frac{5}{12} \div 0.25 \div \frac{3}{10}$ $5\frac{5}{9}$ ⑤ $0.2 \div 0.16 \div 0.35$ $3\frac{4}{7}$ ⑥ $0.7 \div 0.35 \div 0.5$ 4

4 The rhombus on the right has an area of 4 cm². Page 57
What is the length of the other diagonal line in cm? $3\frac{1}{5}$ $x \div 2 = 4$ cm
$2\frac{1}{2}$ cm



Grade 6 Do you remember?

The figure on the right has lines of symmetry.
Draw the lines of symmetry.



Calculation of Decimals and Fractions	Name:	Score /100

1. Calculate. [4 × 10 points = 40 points]

(1) $\frac{5}{12} \times \frac{6}{7} \div \frac{5}{14}$ Answer: 1

(2) $\frac{3}{4} \div \frac{5}{8} \times \frac{10}{21}$ Answer: $\frac{4}{7}$

(3) $4 \times 0.6 \div \frac{3}{10}$ Answer: 8

(4) $0.25 \times 2.4 \times 0.96$ Answer: $\frac{1}{10}$

2. Find the appropriate number for □. [2 × 10 = 20 points]

(1) $1\frac{1}{6}$ minutes = □ seconds Answer: 70

(2) $\frac{5}{12}$ hours = □ minutes Answer: 25

3. Jessy bought a desk at K81.40 including goods and service tax(GST). Find the price for the desk itself. [20 points in total; 10 points for expression and 10 points for the answer]
Mathematical Expression : 81.4 ÷ 1.1=74 Answer : 74 kina

4. An artist takes 40 minutes for making a carving. How many carvings can he make for 4 hours if he does not take rests? Find the answer using a decimal fraction in the expression.
[20 points in total; 10 points for expression and 10 points for the answer]
Mathematical Expression : $4 \div \frac{2}{3} = 6$ Answer : 6 carvings

Lesson Flow

1 Complete Exercise 1 ① - ④.

S Read the Questions and find the sum, difference, product, and quotient of the decimal numbers.
T Confirm students' answers.

2 Complete Exercise 2 ① - ④.

S Read the Question and find the sum, difference, product and quotient of fractions.
T Confirm students' answers.

3 Complete Exercise 3 ① - ⑥.

S Calculate the problems using fractions.
T Confirm students' answers.

4 Complete Exercise 4.

S Solve the problem by finding the length of the other diagonal line in the Rhombus.
T Confirm students' answers.

5 Complete the Do You Remember excercise.

S Draw lines of symmetry for the given figure.

6 Complete the Evaluation Test.

TN Use the attached evaluation test to conduct assesment for your class after finishing all the exercises as a seperate lesson.
S Complete the Evaluation Test.

End of Chapter Test **Date:**

Chapter 6: Operation of Decimals and Fractions	Name:	Score / 100

1. Calculate. [4 × 10 marks = 40 marks]

(1) $\frac{7}{10} \times \frac{6}{7} \div \frac{5}{14}$

Answer:

(2) $\frac{3}{4} \div \frac{5}{8} \times \frac{10}{21}$

Answer:

(3) $4 \times 0.6 \div \frac{3}{10}$

Answer:

(4) $0.25 \div 2.4 \times 0.96$

Answer:

2. Find the appropriate number for the □. [2 × 10 marks = 20 marks]

(1) $1\frac{1}{6}$ minutes = □ seconds

Answer:

(2) $\frac{5}{12}$ hours = □ minutes

Answer:

3. Jessy bought a desk at K81. 40 including 10 % Goods and Service Tax (GST). Find the price of the desk itself.

[20 marks in total; 10 marks for expression and 10 marks for the answer]

Mathematical Expression:

Answer:

4. An artist takes 40 minutes for making a carving. How many carvings can he make in 4 hours if he does not take a rest? Find the answer using a decimal fraction in the expression.

[20 marks in total; 10 marks for expression and 10 marks for the answer]

Mathematical Expression:

Answer:

Chapter 7 Calculating the Area of Various Figures

1. Content Standard

6. 2. 1. Students will be able to explore the area of various shapes such as a circle and measure their area and attain expected level of proficiency and appreciation power of the formula.

2. Unit Objectives

- To determine the area of geometrical figures by calculation.
- To determine the area of circle by transforming it into another basic shape with the same area.
- To estimate the area of figures in their surroundings by approximating them with familiar geometrical figures.

3. Teaching Overview

In Grade 3, students learn circles and their centres, diametres and radii.
In Grade 5, they learn circumference and the rate of circumference to its diameter.
In this unit, they learn areas of circles.

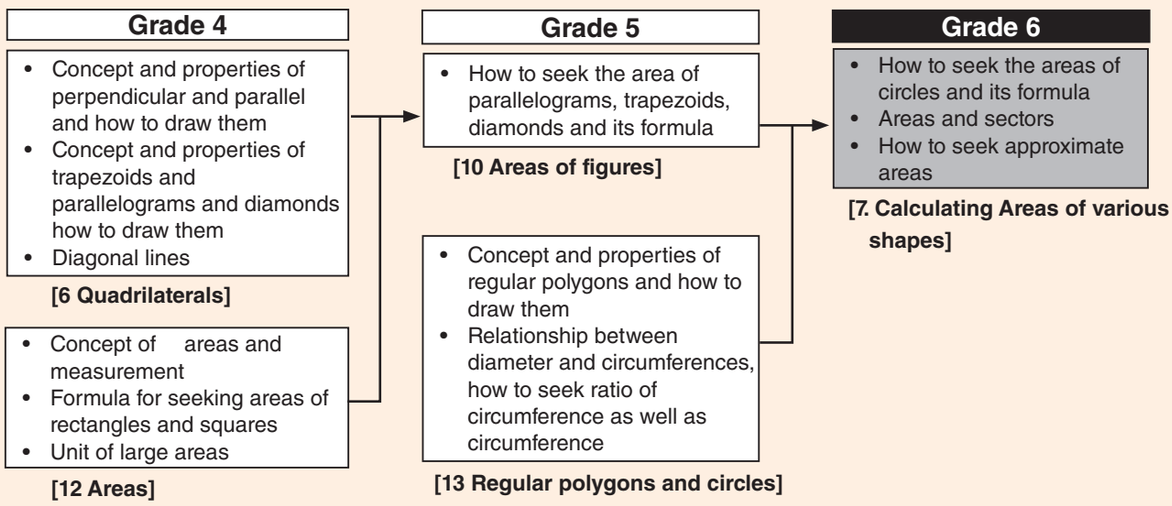
The area of a Circle :

The first way to estimate the area of a circle is to count the number of 1cm squares.
Then change and transform the shape of a circle to a known shape, a rectangle.
The new idea introduced here is to approximate the shape of combined sectors of a circle for a rectangle by cutting into many tiny sectors.

Approximate Area :

This topic is very useful for daily life. There are so many situations to approximate the area by approximating a shape to a known shape.

4. Related Learning Contents



Unit 7

Unit: Calculating the Area of Various Figures
Sub-unit: 1. The Area of a Circle
Lesson 1 of 4

Textbook Page : 059 and 060
Actual Lesson 048

Sub-unit Objectives

- To understand how to determine the area of circle by transforming it to other basic figures that have been already learned.
- To make a formula for the area of incomplete cells in a grid.

Lesson Objectives

- To think about ways to determine the area of a circle with a grid.
- To think about ways to identify the area of incomplete cells in a grid.

Prior Knowledge

- Circles and Spheres (Grade 3)
- Area (Grade 4)
- Regular polygons and circles (Grade 5)
- Diameters and circumferences (Grade 5)

Preparation

- 1 cm grid paper, compasses, enlarged picture of a quarter of a circle as shown in the textbook.

Assessment

- Think about ways to determine the area of a circle with a grid. F
- Think about ways to identify the area of incomplete cells in a grid. S

Teacher's Notes

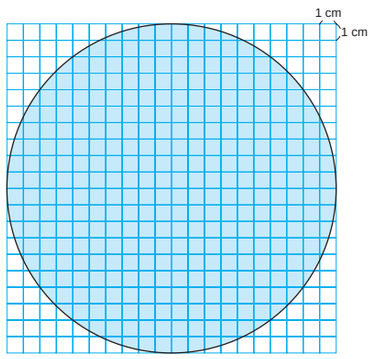
How to determine the area of a circle with a grid.
Counting the number of cells in a grid is the process of finding out the total number of units (1 cm²), as this is the basic in learning and determining the area of shapes.
In a circle placed on a grid, there are complete cells and incomplete cells as the shape of a circle is round. Those incomplete cells can be counted as 0.5 cm². This is one of the ways often used in finding the area of irregular shapes.

7 Calculating the Area of Various Figures

1 The Area of a Circle

Find the area of a circle using squares

1 What is the area of the circle with a radius of 10 cm? Check the answer by drawing this circle on graph paper with a 1 cm scale.



1 How can we check the answer?
Count the number of squares

What should we do with squares that are only partially filled in?

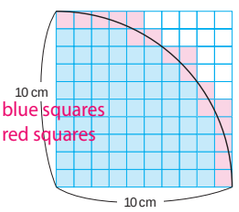
Let's think about how to find the area of the circle and the area formula for a circle.

□ − □ = 59

2 Let's begin by dividing the circle into 4 equal parts, then look at one part.

① How many blue squares and red squares are there?

② If we think of the areas of the red squares along the circumference as 0.5 cm² each, approximately how many cm² is the area of this quarter of a circle?



69 blue squares
17 red squares

Blue squares..... 1 × 69 (cm²)

Red squares .....0.5 × 17 (cm²)

69 + 8.5 = 77.5 Answer: 77.5 cm²

3 How many cm² is the area of the entire circle?

77.5 × 4 = 310 Answer: 310 cm²

Formula to Calculate the Area of a Circle

2 Let's think about how to find the area of a circle.

There are formulas for the area of rectangles and triangles. Is there a formula for circles?

1 Let's think about the formula by using figures that divide the circle into many equal sections from the radius.

Let's think about this circle.

To calculate the area of parallelograms or triangles, we change them into other known figures.

60 = □ × □

Lesson Flow

1 Find the area of the circle with its radius of 10 cm.

T/S 1 Read and understand the given situation.
S Draw a circle with the radius of 10 cm on a graph paper with a 1 cm scale.
T Let students check the answer by doing activity 1 using prior knowledge.
S Explain how they got their answers with others.
TN The circle on the grid comprises of complete and incompete squares because the shape of a circle is round where incomplete squares can be counted as 0.5 cm^2.This is one of the ways often used in finding the area of irregular shapes.
T Ask students to prepare their ideas to compare with the next activity.
T Introduce the Main Task. (Refer to BP)

2 Find the area of the circle and the formula.

TN The quarter- circle can be drawn on a large chart for students to see clearly.
T Ask the students to observe the quarter- circle and do the activity 2 ① and ②
S The area of blue squares is 69 cm^2 and the area for red squares is 8.5 cm^2. The total area for blue squares and red squares is 69 + 8.5 = 77.5
Therefore the area of the quarter of the circle is approximately 77.5 cm^2.
T Confirm the students' answers.

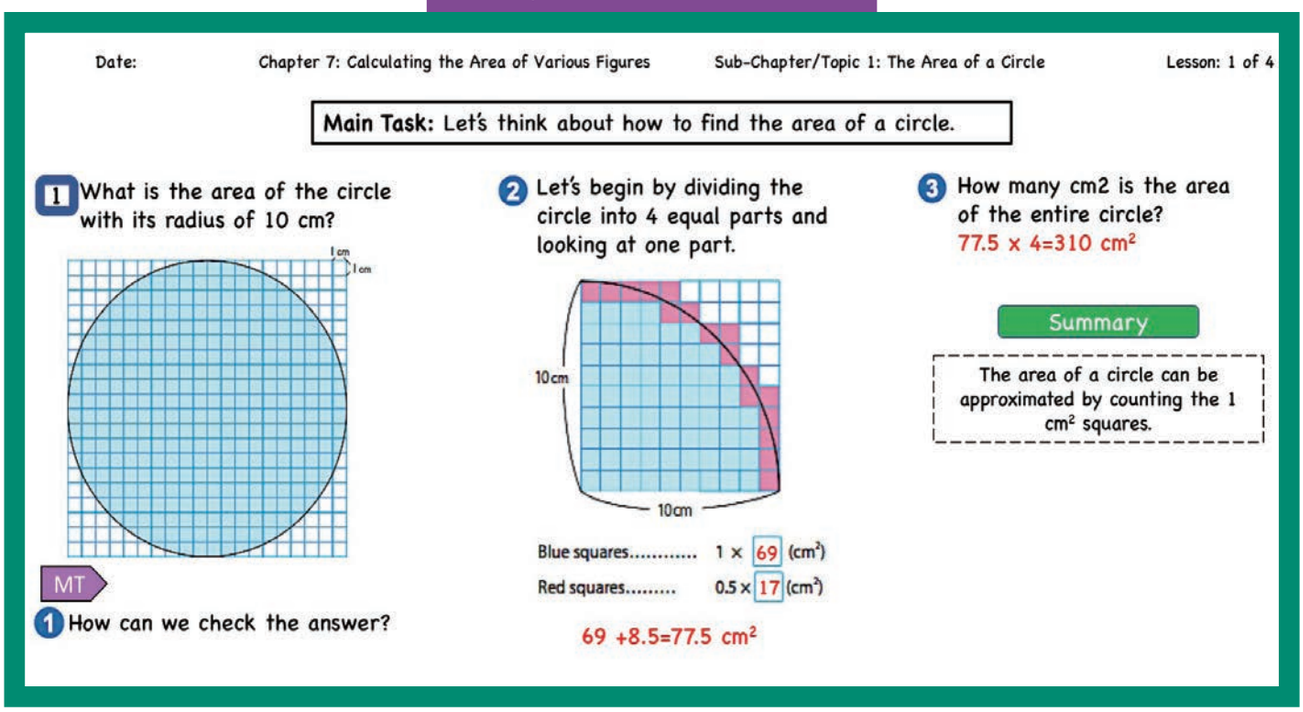
3 How many cm^2 is the area of the entire circle?

T Ask students to find the answer to activity 3 and share with other students.
S Find the area of the entire circle
Area of entire circle: 77.5 × 4 = 310 that is 310 cm^2 (77.5 cm^2 is the area of the quarter circle).
T Confirm the answer by explaining the area using squares.
S Compare their answers from activity 1 to see if their answers are close.
T Remind the students that the area they find in this manner is an approximate area.

4 Summary.

T What have you learned in this lesson?
S Present ideas on what they have learned.
T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan



Unit 7

Unit: Calculating the Area of Various Figures
Sub-unit: 1. The Area of a Circle
Lesson 2 of 4

Textbook Page : 060 to 062
Actual Lesson 049

Lesson Objectives

- To think about ways to determine the area of a circle.
- To transform it into other known figures to find the area of the circle.
- To think about a formula to calculate the area of a circle.

Prior Knowledge

- Area of triangle and rectangle, properties of circles, ratio of circumference (3.14).

Preparation

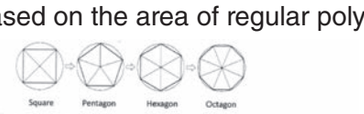
- Pictures of circles in Textbook (circle split into 16 pieces and 32 pieces), calculators.

Assessment

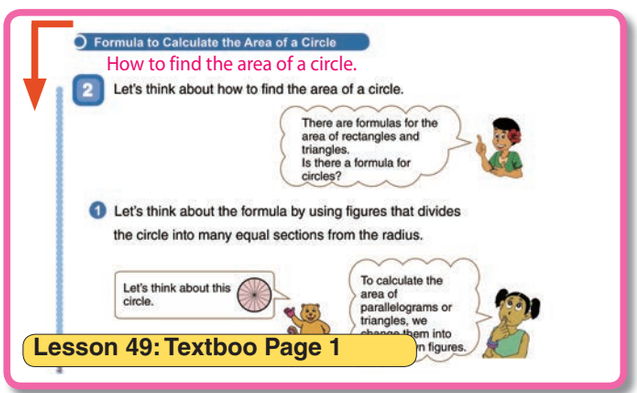
- Transform the circle into other known figures to find the area. F
- Identify the formula to calculate the area of a circle. F S

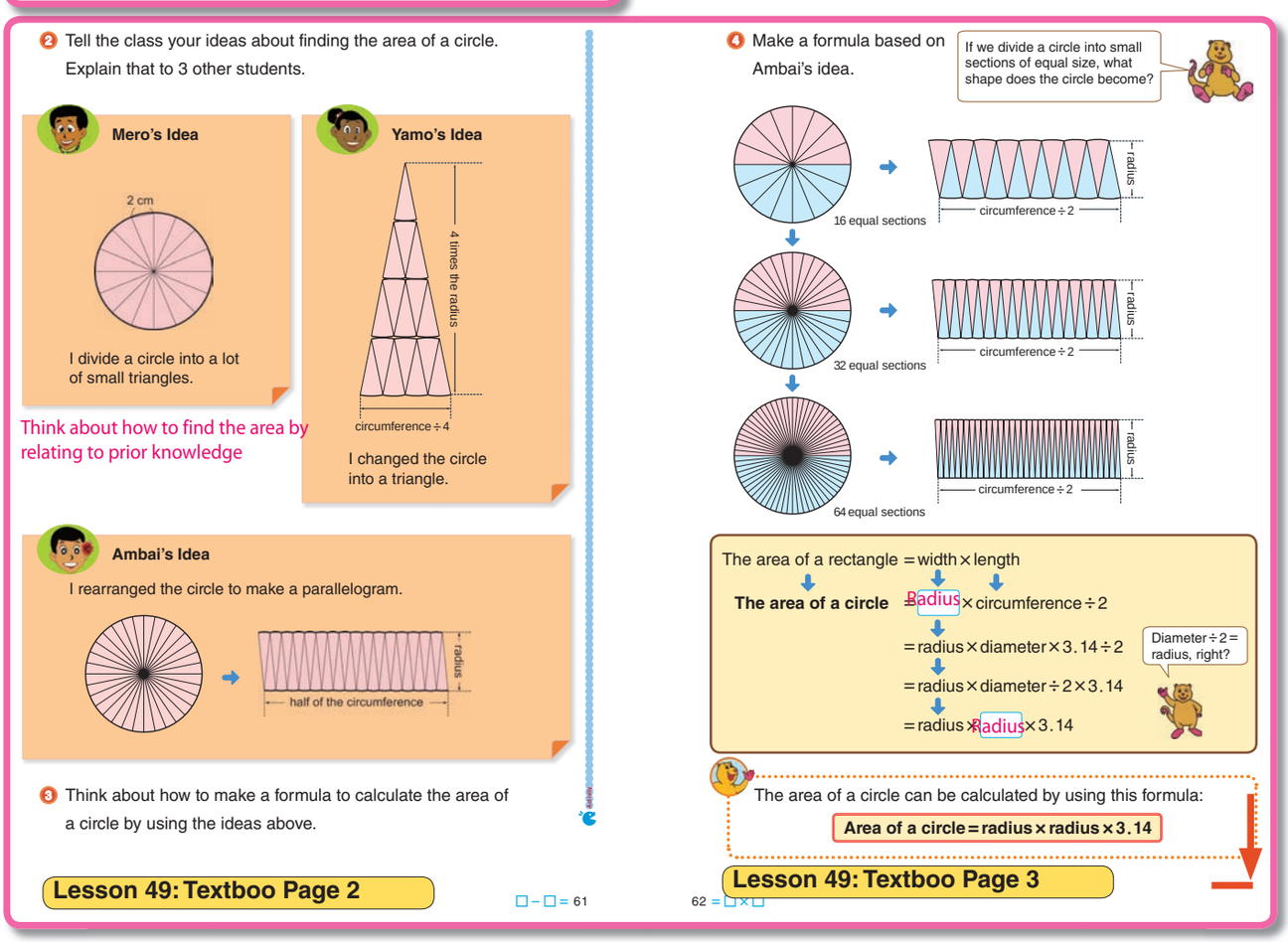
Teacher's Notes

In flow 4, 2 3 If students cannot reach that conclusion teacher needs to offer explanation that they can apply Ambai's idea to make the formula. Making the formula for the area of a circle based on the area of regular polygons.



Teacher helps pupils realize that as the number of sides in regular polygons increases, the shape looks more like a circle. Therefore, the area of the circle is an equivalent to the total area of all triangles each of which is formed with two vertices and the center of the circle.





Lesson Flow

1 Review the previous lesson.

T Display a chart of a circle without the grid on the board and ask students to think about how to find the area of a circle without counting squares.
S Think about and share their ideas on how to find the area.
T Introduce the Main Task. (Refer to the BP)

2 (2) Let's think about how to find the area of the circle

T Read the bubble…. There are formulas for the area of rectangles and triangles. *Is there a formula for area of circles?*

S (1) Think about how to find the formula for the area of a circle by relating to known shapes.

TN Draw students' attention to think about the segments of the given circle and come up with ideas to find a formula for the area.

3 (2) Explain the 3 ideas in the textbook.

T If we can rearrange the circle split into pieces and make other shapes such as a parallelogram and triangle whose idea is better to find the area of a circle?.
S Discuss the 3 ideas presented by Mero, Yamo and Ambai.
S Discuss their own ideas together with the ideas of Mero, Yamo and Ambai and explain.

4 (3) Compare the idea they should consider in making a formula to find the area.

T Whose idea do you think we can use?
S Identify that Ambai's idea is easier to use.

5 (4) Using Ambai's idea to find the formula for the area of a circle.

T As we split the circle into smaller pieces from 16 to 32 and 64 pieces, what can be observed in the kind of shape formed?
S The shapes first looked like a parallelogram and started to look more like a rectangle.
T Ask the following questions while using the figure and guide students in making the formula. *Which part of the circle is the length of the rectangle? Which part of the circle is the width of a rectangle?*
S Answer the questions and follow the teacher to complete the formula in the box.

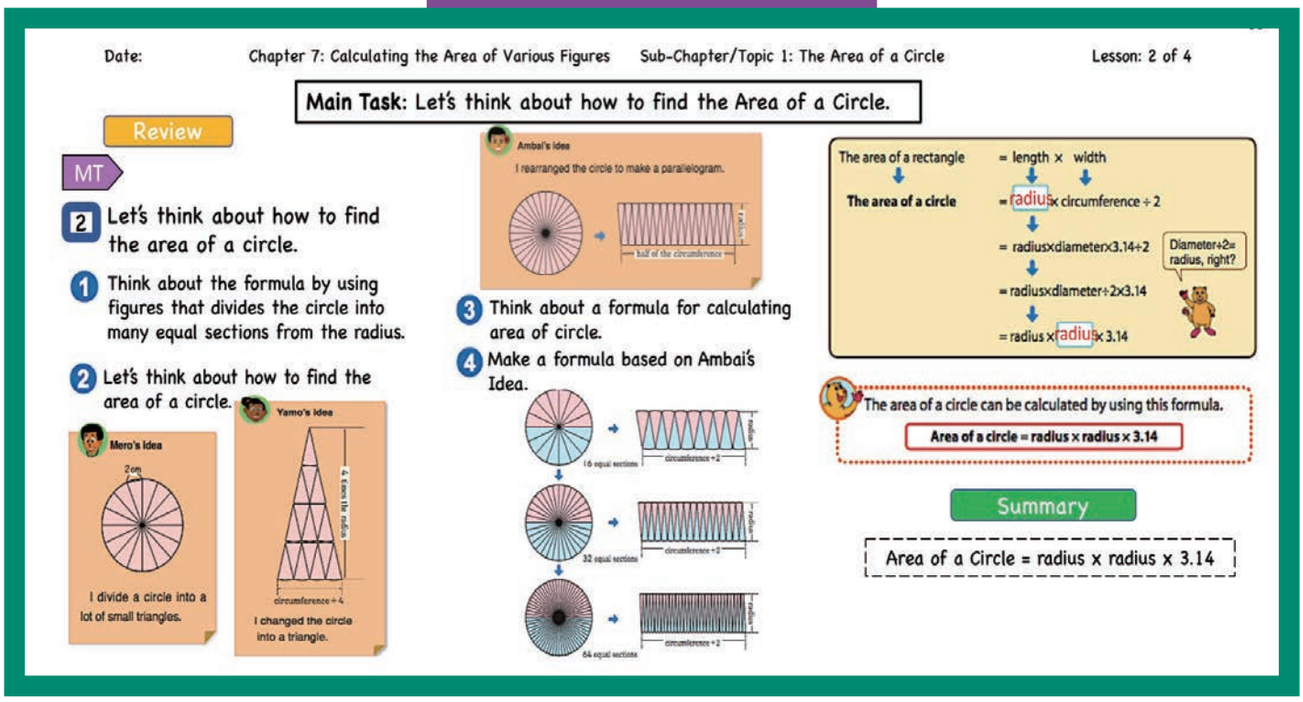
6 Important Point

T/S Explain the important point in the box .

7 Summary

T What have you learned in this lesson?
S Present ideas on what they have learned.
T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan



Unit 7

Unit: Calculating the Area of Various Figures
Sub-unit: 1. The Area of a Circle
Lesson 3 of 4

Textbook Page : 063
Actual Lesson 050

Lesson Objectives

- To find the area of a circle using the formula.
- To compare two circles and examine how many times the circumference and area of one circle is to the other and when the diameter of the circle is twice the other.

Prior Knowledge

- The formula for calculating the area of a circle.
  Area of Circle = Radius × radius × 3.14

Preparation

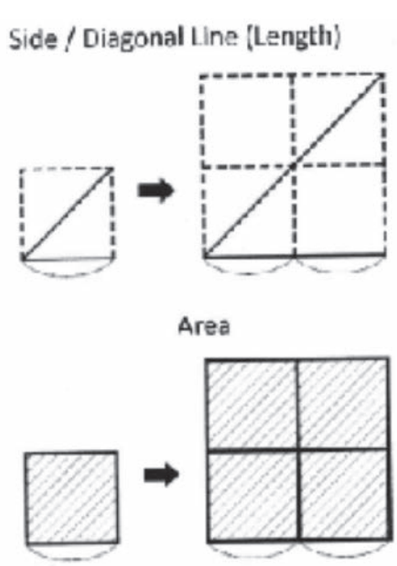
- Draw the two circles on the textbook page on a chart or the blackboard.

Assessment

- Use the area formula to calculate the area of given circles. F S
- Examine and compare two circles using their circumference and area. F

Teacher's Notes

In 4 2 students will find that when the diameter is twice the original, the circumference also becomes twice the original. However they will find that the area becomes four times larger than the original. Students may question why it is this way. This is similar to the question they had in the unit of Area in the 4th grade where they wondered why 1 m^2 = 10 000 cm^2 while 1 m = 100 cm. In such a case teacher can ask them to examine if the diameter becomes three times longer than the original, how about circumference and the area? and What if the diameter is half the original? and help them generalise the results.
Show the figures below. Students can see in a square that when the length of a diagonal line and a side becomes twice the original, the area becomes four times larger than the original.



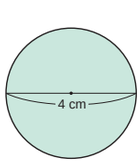
3 Calculate the area of these circles.

1. A circle with 8 cm radius. $8 \times 8 \times 3.14 = 200.96$ (cm^2)
2. A circle with 12 cm diameter. $6 \times 6 \times 3.14 = 113.04$ (cm^2)

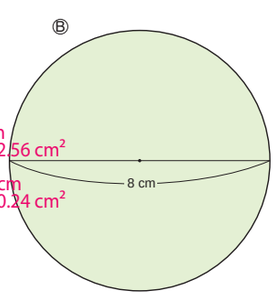
4 There are two circles, one with a 4 cm diameter and another with 8 cm diameter as shown.

1. Find the circumference and area of each circle.
2. The diameter of Ⓑ is twice the diameter of Ⓐ. How many times are the circumference and the area of Ⓑ to Ⓐ? 2 times

Ⓐ



Ⓑ



(A) Circumference
$4 \times 3.14 = 12.56$ Answer: 12.56 cm
Area: $2 \times 2 \times 3.14 = 12.56$ Answer: 12.56 cm^2
(B) Circumference
$8 \times 3.14 = 25.12$ Answer: 25.12 cm
Area: $4 \times 4 \times 3.14 = 50.24$ Answer: 50.24 cm^2

Exercise

These numbers are the circumferences of circles.
Find the radius and area of each circle.

① 62.8 cm
R:10 cm
A:314cm^2

② 18.84 cm
R:3 cm
A:28.26cm^2

③ 15.7 cm
R:2.5 cm
A:19.625cm^2

Lesson Flow

1 Review the previous lesson.

T Introduce the Main Task. (Refer to the Blackboard Plan)

2 3 Calculate the area of the given circles using the formula.

T Revise the formula for calculating the area of the circle.
S Calculate the area of the given circles 1 and 2 based on the radii and diameters.
TN Students may use calculators for the rest of the calculations.
T Advice students to divide the diameter of a circle by 2 to get its radius and put it into the formula.

3 4 Finding the circumference and the area of each circle based on its diameter.

T Ask the students to solve 1 and 2.
S 1 Find the circumference and the area of each circle based on its diameter.
2 Compare the circumference and area of circles Ⓐ and Ⓑ knowing that the diameter of circle Ⓑ is twice the diameter of circle Ⓐ.
T Make sure that students use the diameter to find the circumference and radius to find the area.
TN Since the diameter of Ⓑ is twice the diameter of Ⓐ, the circumference and area for Ⓑ will also be twice that of Ⓐ.

4 Complete the Exercise.

S Solve the selected Exercises.
T Confirm students' answers.

5 Summary

T What have you learned in this lesson?
S Present ideas on what they have learned.
T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan

Date: Chapter 7: Calculating the Area of Various Figures Sub-Chapter/Topic 1: The Area of a Circle Lesson: 3 of 4

Main Task: Let's think about finding the Area and Circumference of Circles using formula.

Review

MT

3 Calculate the area of these circles..

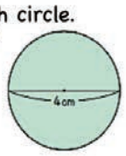
1 A circle with 8 cm radius.
8 x 8 x 3.14=200.96 cm²

2 A circle with 12 cm diameter.
6 x 6 x 3.14=113.04 cm²

4 There are circles with 4 cm diameter and another with 8 cm diameter shown.

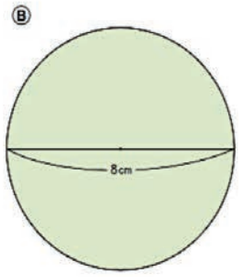
1 Find the circumference and area of each circle.

Ⓐ



(A) Circumference: 4 x 3.14=12.56 cm
Area: 2 x 2 x 3.14=12.56 cm²

Ⓑ



(B) Circumference: 8 x 3.14=25.12 cm
Area: 4 x 4 x 3.14=50.24 cm²

2 The diameter of Ⓑ is twice the diameter of Ⓐ. How many times are the circumference and the area of Ⓑ is to Ⓐ?
2 times

Exercise

(Refer to TM for Questions and Answers)

Summary

We can calculate the area and circumference of a circle using the diameter or radius of the circle.
Area = radius x radius x 3.14
Diameter = diameter x 3.14

Unit 7

Unit: Calculating the Area of Various Figures
Sub-unit: 1. The Area of a Circle
Lesson 4 of 4

Textbook Page : 064
Actual Lesson 051

Lesson Objectives

- To apply the formula of calculating area of a circle to the problems which involve half circles, squares and quarter circles.

Prior Knowledge

- The formula for calculating the area of a circle
  Area of Circle = radius × radius × 3.14

Preparation

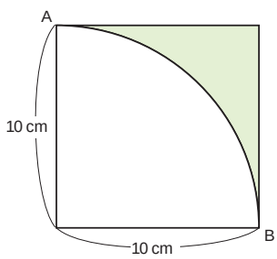
- Enlarged figures for Task 5 and 6.

Assessment

- Apply the area formula to calculate area of half circle, square and quarter circle. F S

Teacher's Notes

While solving problems in the exercise, students may find math expressions to be very lengthy which are often difficult to understand. You can suggest the following.

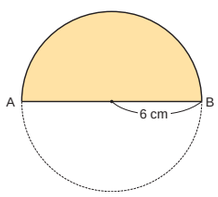


- Calculate section by section in order.
  $10 \times 10 \times 3.14 \div 2 = 157$ …. A
  $5 \times 5 \times 3.14 \div 2 = 39.25$ ….. B
  A − B $157 - 39.25 = 117.75$
  Answer: 117.75cm²

- Making one math expression and calculating it efficiently.
  $10 \times 10 \times 3.14 \div 2 - 5 \times 5 \times 3.14 \div 2$
  $= (10 \times 10 - 5 \times 5) \times 3.14 \div 2$
  $= 75 \times 3.14 \div 2 = 117.75$
  Answer: 117.75cm²

The **arc** of a circle refers to part of the circumference of the circle which forms a curve. The curved line A to B in the diagram above is an arc.

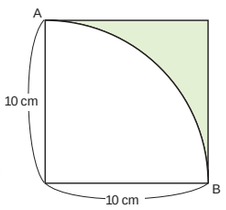
5 The figure on the right is a circle with a 6 cm radius that has been cut along its diameter. Answer the following.



1 The length of the arc from A to B. $6 \times 2 \times 3.14 \div 2 = 18.84$
Answer: 18.84cm

2 The circumference and area of this half circle.
C: $18.84 + 6 \times 2 = 30.84$
Answer: 30.84 cm
A: $6 \times 6 \times 3.14 \div 2 = 56.52$
Answer: 56.52 cm²

6 As shown on the right, one part of a circle fits exactly inside a square with 10 cm sides. Answer the following.

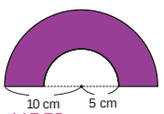


1 The length of the arc from A to B. $10 \times 2 \times 3.14 \div 4 = 15.7$
Answer: 15.7 cm

2 The area of the coloured section.
$10 \times 10 - 10 \times 10 \times 3.14 \div 4 = 21.5$
Answer: 21.5 cm²

Exercise

Let's find the area of the coloured section on the right.



$(10 \times 10 \times 3.14 \div 2) - (5 \times 5 \times 3.14 \div 2) = 117.75$
Answer: 117.75 cm²

64 = □ × □

Lesson Flow

1 Review the previous lesson.

T Introduce the Main Task. (Refer to the BP)

2 5 Find the length of the arc, circumference and the area of the half circle.

T/S Read and understand the given situation.

S Find the circumference and the area of the circle by completing 1 and 2.

TN Help and guide the students using the 3 bullet points.

- Calculate the circumference of the circle and find half of it to get the length of the arc.
- When trying to calculate the circumference of the half circle, add the arc length and diameter.
- When calculating area of half the circle, find the area of the full circle and divide by 2.

3 Find the length of the arc and coloured area of the quarter circle.

T/S 6 Read and understand the given situation.

S Find the length of the arc and the area of the coloured section of the quarter circle by completing 1 and 2.

T Help and guide the students using the following;

- Calculate the Circumference of the full circle and divide by 4 to get the Arc length AB.
- Calculate the area of the quarter circle by calculating the area of the full circle and divide by 4.
- Let students understand that the area of the coloured section can be found by subtracting the area of the quarter circle from the square. (Refer to Teacher's Notes).
- Calculate the area of square side × side and find the area of the quarter circle by calculating radius × radius × 3.14 ÷ 4. Then further find the area of the coloured section based on these two answers.

4 Complete the Exercise.

S Solve the Exercises.

T Confirm students' answers.

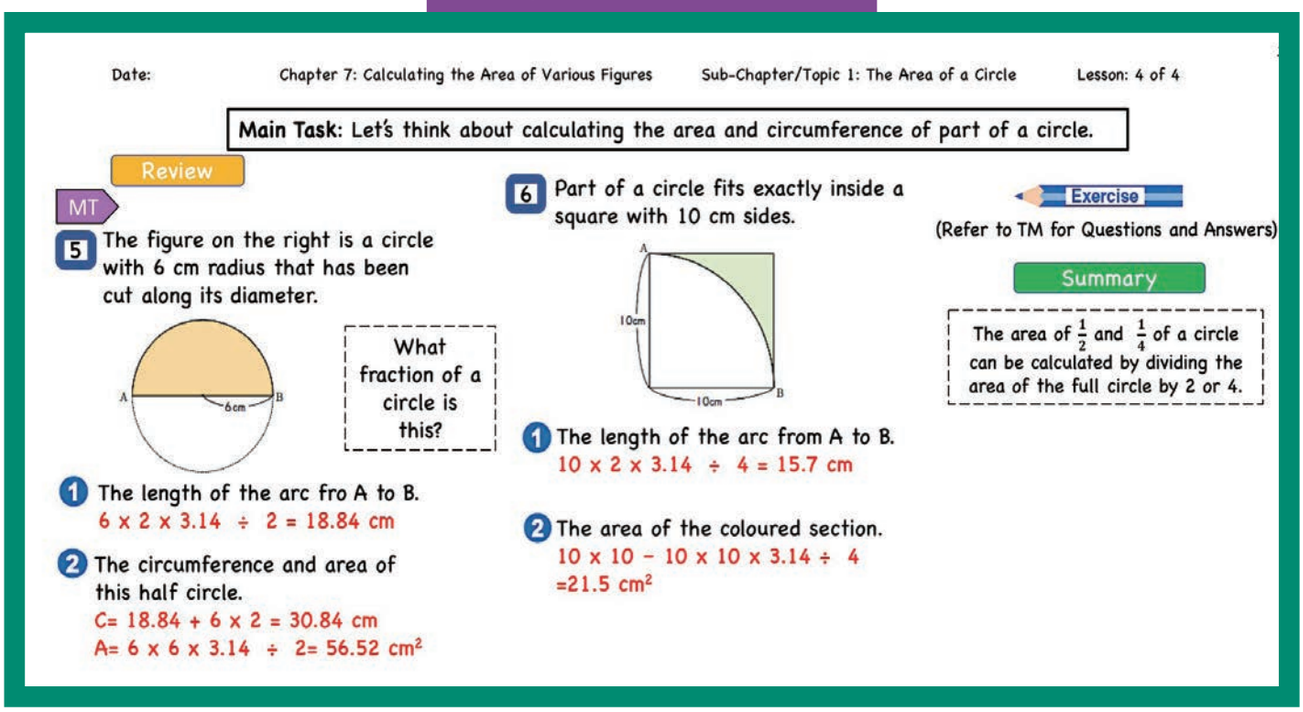
5 Summary

T What have you learned in this lesson?

S Present ideas on what they have learned.

T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan



Unit 7

Unit: Calculating the Area of Various Figures
Sub-unit: 2. Approximate Area
Lesson 1 of 1

Textbook Page : 065
Actual Lesson 052

Sub-unit Objectives

- To understand how to determine the area of figures by working out ways to identify the area of incomplete cells in a grid

Lesson Objectives

- To think about how to approximate area of figures by applying basic mathematical rules.

Prior Knowledge

- Finding the area of circle using square grids.
- The incomplete cells in a grid is counted as 0.5 cm².

Preparation

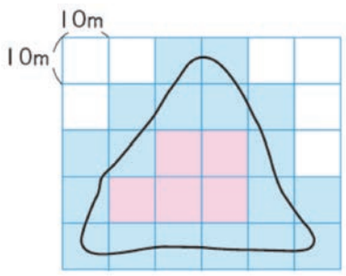
- Students to bring a leaf each.
- Diagram for Task 2

Assessment

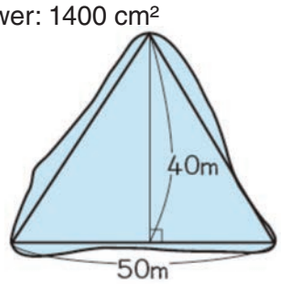
- Think about how to approximate area of figures by applying basic mathematical rules. F S

Teacher's Notes

1

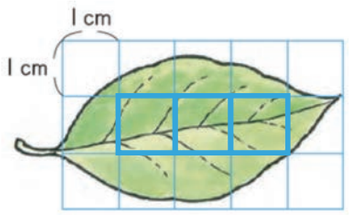


Complete squares: 5
Incomplete squares: 18
5 × 100 = 500
18 × 100 ÷ 2 = 900
500 + 900 = 1400
Answer: 1400 cm²



Use the triangle formula: A = bh ÷ 2
50 × 40 ÷ 2 = 1000
Answer: 1000 cm²

2

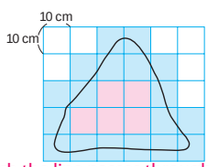


Complete squares: 3
Incomplete squares: 12
12 ÷ 2 = 6
3 + 6 = 9
Answer: 9 cm²

2 Approximate Area

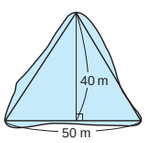
1 What is the area of the field bordered by 2 rivers as shown on the right?

1 How many squares are there inside the curved area? Calculate the area of the field by considering the area of any 2 squares that the line passes through as 100 m².

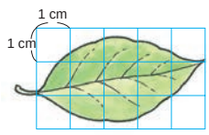


5 squares
18 squares which the line passes through
500 + 900 = 1400m²

2 Calculate the area by considering the shape of the field as a triangle.
50 × 40 ÷ 2 = 1000
Answer: 1000m²



2 Calculate the area of various leaves by using the method in 1.
3 + 6 = 9
Answer: 9cm²



□ − □ = 65

Lesson Flow

1 Review the previous lesson.

T Introduce the Main Task. (Refer to the BP)

2 Calculating the approximate area of a field.

T/S 1 Read and understand the given situation.
TN Allow the students to think about how to calculate the area of the figure.
S Observe the figure and calculate the area using square grid in 1.
S Calculate the area by considering the shape of the field as a triangle in 2.
TN Students should use their prior knowledge to find the area of triangles.

Incomplete squares are counted as 0.5 cm^2 which is the same as $\frac{1}{2}$ cm^2 and the formula for calculating the area of a triangle is **b × h ÷ 2**.

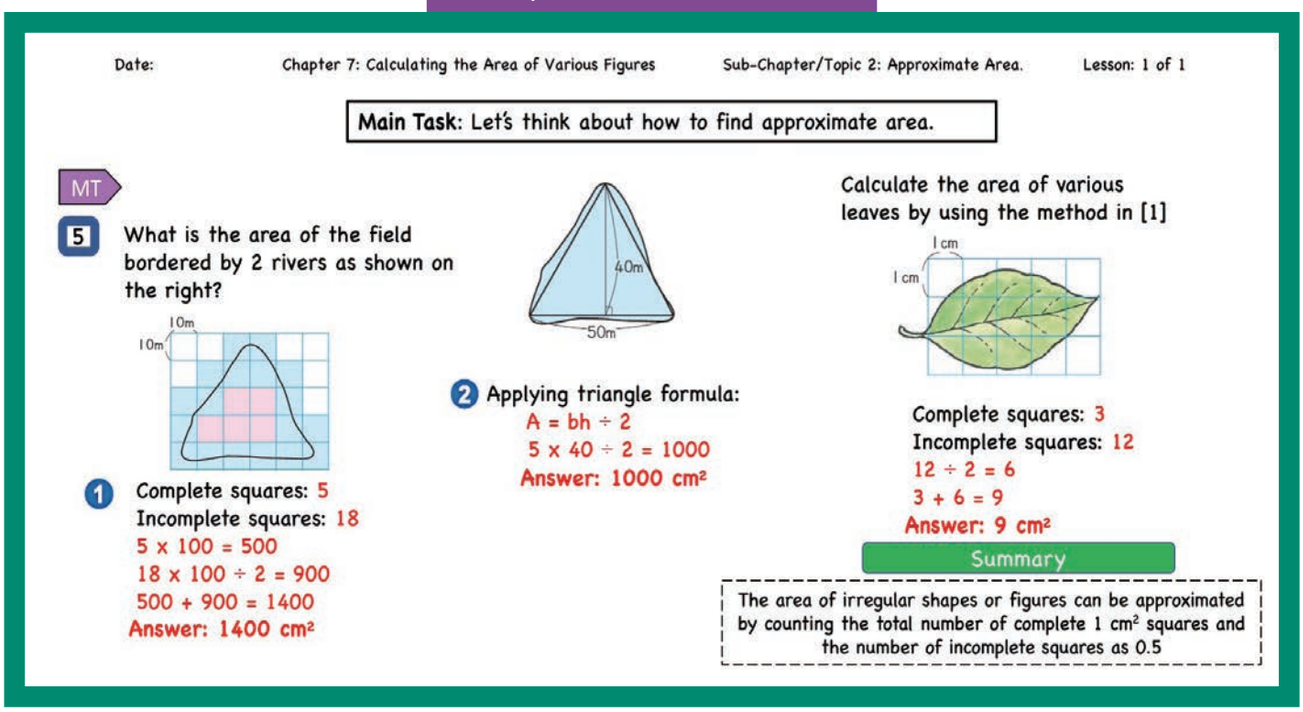
3 2 Calculating the area of various leaves using incomplete cells as 0.5 cm² which is cm² in square grids.

T Organise students to collect a leaf for this task.
S Calculate the area of the leaf displayed on the square grid by applying the knowledge of incomplete cells as 0.5 cm^2 which is $\frac{1}{2}$ cm^2 added to the complete squares to get the total area of the leaf.
S Apply the same idea using the leaves they have collected.
TN Students 'answers will vary based on the size and shape of the leaves they collect. Check thoroughly when confirming their answers.

4 Summary.

T What have you learned in this lesson?
S Present ideas on what they have learned.
T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan



Unit 7

Unit: Calculating the Area of Various Exercise, Problems and Evaluation

Lesson 1 and 2 of 2

Textbook Page : 066 and 067
Actual Lesson 53 & 54

Lesson Objectives

- To confirm and consolidate what students learned in the unit.

Prior Knowledge

- All the contents learned in the unit on Calculating Area.

Preparation

- Evaluation Test.

Assessment

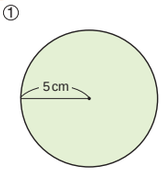
- Solve the exercises correctly to confirm what they learned in this unit. F S

Teacher's Notes

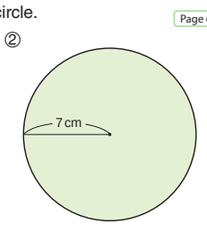
This is the last lesson of Chapter 7.
Students should be encouraged to use the necessary skills and ideas learnt in this unit to complete all the Exercises and solve the Problems in preparation for the evaluation test.
Use the attached evaluation test to conduct assesment for your class after finishing all the exercises and problems as a seperate lesson.

EXERCISE

1 Let's calculate the area of each circle. Page 61

① 

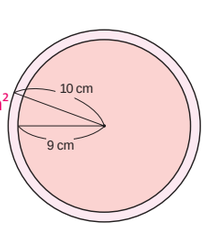
$5 \times 5 \times 3.14 = 78.5\ cm^2$

② 

$7 \times 7 \times 3.14 = 153.86\ cm^2$

2 There are 2 circles with radii 9 cm and 10 cm on the right. Let's find the difference in their areas. Page 63

$(10 \times 10 \times 3.14) - (9 \times 9 \times 3.14) = 59.66\ cm^2$



Grade 4 Do you remember?

Let's calculate.

① $\frac{2}{3} + \frac{1}{2} = 1\frac{1}{6}$ ② $\frac{3}{4} + 2\frac{1}{3} = 3\frac{1}{12}$ ③ $2\frac{2}{5} + 1\frac{1}{2} = 3\frac{9}{10}$ ④ $2\frac{2}{3} + 3\frac{5}{7} = 6\frac{8}{21}$

⑤ $\frac{4}{5} - \frac{1}{3} = \frac{7}{15}$ ⑥ $1\frac{3}{4} - \frac{4}{5} = \frac{19}{20}$ ⑦ $2\frac{1}{5} - 1\frac{6}{7} = \frac{12}{35}$ ⑧ $3\frac{2}{3} - 2\frac{5}{8} = 1\frac{1}{24}$

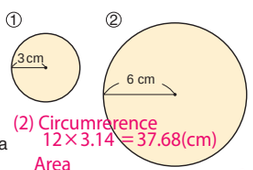
PROBLEMS

1 Calculate the circumference and the area of these circles.

● Calculating the circumference and area from the radius.

(1) Circumrerence
$6 \times 3.14 = 18.84(cm)$
Area
$3 \times 3 \times 3.14 = 28.26(cm^2)$

(2) Circumrerence
$12 \times 3.14 = 37.68(cm)$
Area
$6 \times 6 \times 3.14 = 113.04(cm^2)$



2 Calculate the diameter and the area of these circles.

● Usng a circumference to calculate the diameter and area of a circle.

① A circle with 6.28 cm circumference.
Diameter: $6.28 \div 3.14 = 2$ cm
Area: $1 \times 1 \times 3.14 = 3.14\ cm^2$

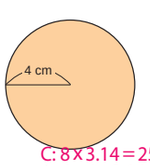
② A circle with 12.56 cm circumference.
Diameter: $12.56 \div 3.14 = 4$cm
Area: $2 \times 2 \times 3.14 = 12.56 cm^2$

3 Find the circumference and area of the following.

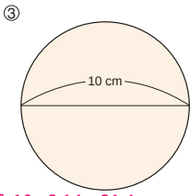
● Finding area and circumference using formula.

① 

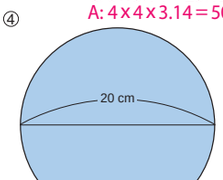
C: $4 \times 3.14 = 12.56$cm
A: $2 \times 2 \times 3.14 = 12.56 cm^2$

② 

C: $8 \times 3.14 = 25.12$cm
A: $4 \times 4 \times 3.14 = 50.24 cm^2$

③ 

C: $10 \times 3.14 = 31.4$cm
A: $5 \times 5 \times 3.14 = 78.5 cm^2$

④ 

C: $20 \times 3.14 = 62.8$ cm
A: $10 \times 10 \times 3.14 = 314\ cm^2$

Lesson Flow

1 Complete Exercise ①.

S Calculate the area for circle ① and ②.
T Confirm students' answers.

2 Complete Exercise ②.

S Solve by calculating to find the area and circumference of the given circles.
T Confirm students' answers.

3 Complete the DO YOU REMEBER? exercise.

S Solve by adding and subtracting the mixed fractions.

4 Complete Problem ①.

S Solve by calculating to find the circumference and area of circle ① and ② using the given radii.
T Confirm students' answers.

5 Complete Problem ②.

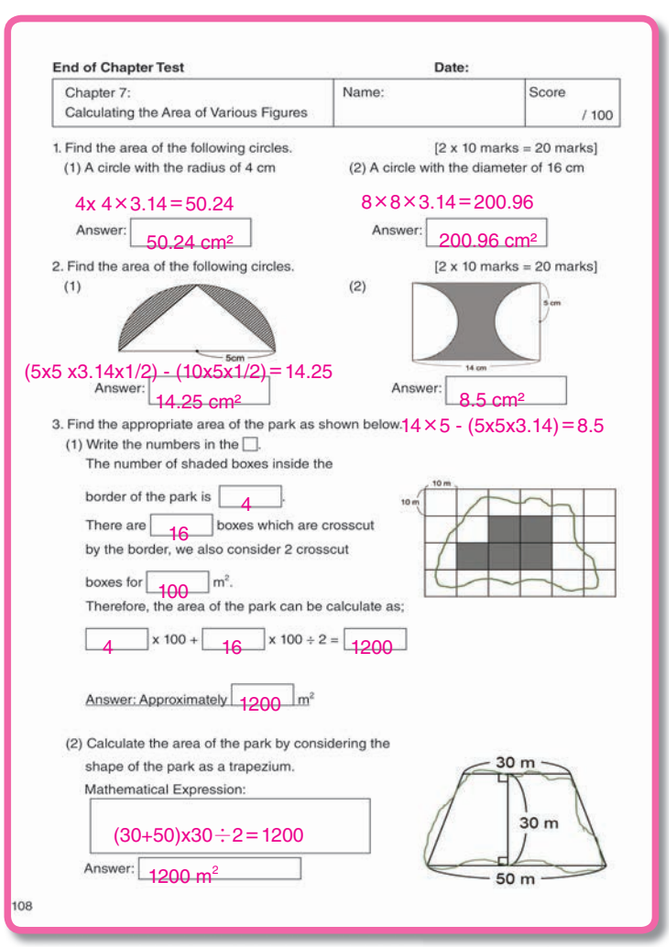
S Use the given circumferences of circles to calculate the diameter and area of ① and ②.
T Confirm students' answers.

6 Complete Problem ③

S Calculate the circumference and area of circles ① to ④ using the given radii and diameters.
T Confirm students' answers.

7 Complete the Evaluation Test.

TN Use the attached evaluation test to conduct assesment for your class after finishing all the exercises and problems as a seperate lesson.
S Complete the Evaluation Test.



End of Chapter Test Date:

Chapter 7: Calculating the Area of Various Figures	Name:	Score / 100

1. Find the area of the following circles. [2 x 10 marks = 20 marks]
(1) A circle with the radius of 4 cm
4x 4×3.14=50.24
Answer: 50.24 cm²
(2) A circle with the diameter of 16 cm
8×8×3.14=200.96
Answer: 200.96 cm²

2. Find the area of the following circles. [2 x 10 marks = 20 marks]
(1)
(5x5 x3.14x1/2) - (10x5x1/2)=14.25
Answer: 14.25 cm²
(2)
14×5 - (5x5x3.14)=8.5
Answer: 8.5 cm²

3. Find the appropriate area of the park as shown below.
(1) Write the numbers in the □.
The number of shaded boxes inside the border of the park is 4.
There are 16 boxes which are crosscut by the border, we also consider 2 crosscut boxes for 100 m².
Therefore, the area of the park can be calculate as;
4 x 100 + 16 x 100 ÷ 2 = 1200
Answer: Approximately 1200 m²

(2) Calculate the area of the park by considering the shape of the park as a trapezium.
Mathematical Expression:
(30+50)x30÷2=1200
Answer: 1200 m²

108

End of Chapter Test **Date:**

Chapter 7: Calculating the Area of Various Figures	Name:	Score / 100

1. Find the area of the following circles. [2×10 marks=20 marks]

(1) A circle with the radius of 4 cm

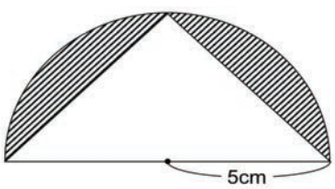
Answer: ☐

(2) A circle with the diameter of 16 cm

Answer: ☐

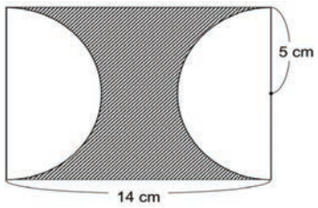
2. Find the area of the following circles. [2×10 marks=20 marks]

(1)



Answer: ☐

(2)



Answer: ☐

3. Find the appropriate area of the park as shown below.

(1) Write the numbers in the ☐.

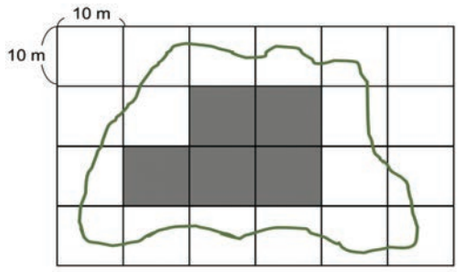
The number of shaded boxes inside the border of the park is ☐.

There are ☐ boxes which are crosscut by the border, we also consider 2 crosscut boxes for ☐ m^2.

Therefore, the area of the park can be calculate as;

☐ ×100+☐ ×100÷2=☐

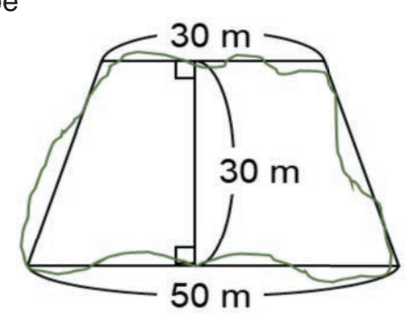
Answer: Approximately ☐ m^2



(2) Calculate the area of the park by considering the shape of the park as a trapezium.

Mathematical Expression:

Answer: ☐



Chapter 8 Orders and Combinations

1. Content Standard

6.4.5. Students will be able to critique possible outcomes from appropriate viewpoints and be able to figure out, sort and organize viewpoints systematically with confidence.

2. Unit Objectives

- To systematically analyze and examine possible cases in actual events which are relatively simple and easy to cope with.
- To analyze systematically the order and combination of various things using figures and tables with careful attention to avoid duplication and overlooking.
- To understand ways to examine and identify the number of cases based on ways to make figures and charts.

3. Teaching Overview

Students seek efficient ways of counting all ways of ordering and finding combinations in efficient ways without dropping or double-counting any ways.

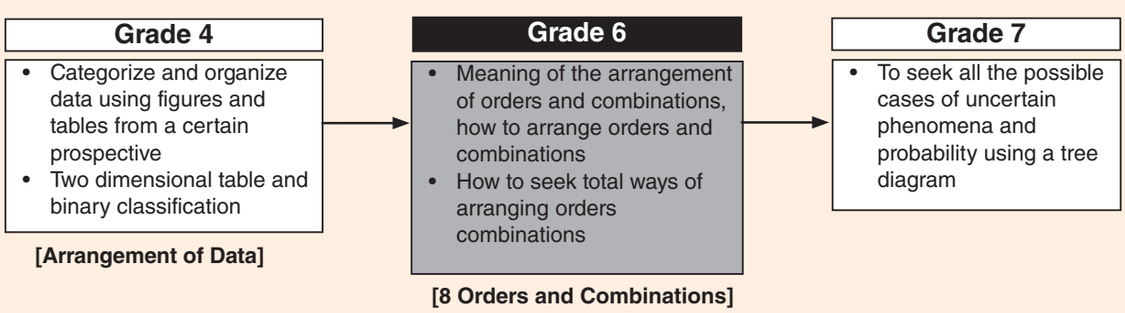
Ordering :

Teachers should not just teach how to count ordering efficiently.
Students should shown more effort to find out the most efficient way through discussions as a class.

Combination :

Students are supposed to be able to explain why the way of counting all combinations can avoid double-counting or dropping.
All questions should be well-discussed by students such as “Can we use the same card twice?” etc, so that students’ understanding of the given situations will be deepen.

4. Related Learning Contents



Unit 8

Unit: Orders and Combinations
Sub-unit: 1. Ordering
Lesson 1of 2

Textbook Page :
068 to 070
Actual Lesson 056

Sub-unit Objectives

- Think about ways to examine and identify the different orders without repetition.
- To understand ways to examine and identify the order of things based on tables and figures.
- To think about how many different orders there can be when certain conditions are given.

Lesson Objectives

- To think about ways to examine and identify different orders without repetition.
- To understand ways to examine and identify the order of things based on tables and figures.

Prior Knowledge

- Organising data
- Making table

Preparation

- Table and Tree diagram

Assessment

- Think about ways to examine and identify the numbers of different orders without repetition. F
- Understand ways to examine and identify the order of things using tables and diagrams. S

Teacher's Notes

It is important to let students experience the usefulness of tables and figures in avoiding repetition and omission when examining the orders.


8

Orders and Combinations

I'll run first in the first race and you run second.

In that case, I'll run first in the next race.

1 Ordering

1 Naiko, Ambai, Kekeni and Mero are running the relay race.
Let's decide their turn to run.

It is difficult to decide the turn, since there are several options.

Why don't we decide the anchor first?

The anchor should be the fastest and therefore, run last.

I think Mero should be the anchor.

When Mero is the anchor, how many different orders can there be for the first, second and third runners?

68

First, Naiko→Kekeni→ Ambai.
Second, Ambai→Naiko→Kekeni.
Third, Kekeni→Ambai→Naiko.
There are three cases. Wait a minute, there could be more...

1 Are there other ways of ordering, other than what Yamo found?
(Kekeni, Naiko, Ambai) (Naiko, Ambai, Kekeni) (Ambai,Naiko,Kekeni)

2 Let's think about ways to find all the orders systematically and efficiently.

69

Lesson Flow

1 Think about the ordering of 4 runners.

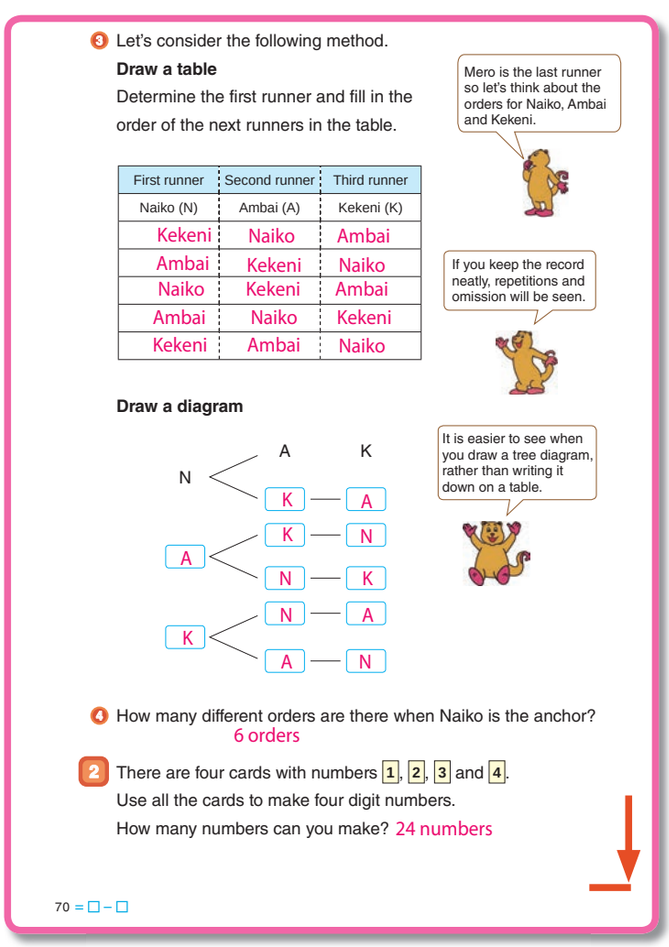
T Introduce the Main Task. (Refer to the Blackboard Plan)
T/S 1 Read and understand the given situation.
TN Explain to students that the anchor in a relay race is usually the final runner who finishes the race.
S 1 Write the orders in their exercise books.
T Ask students to give answers and comment positively on their answers when they use symbols (i.e. simple initials) or tables and figures.
T Are there any other orders?
S 2 Think about ways to find all the orders.
TN Teacher should also check with students to see how many orders in total there can be.
T 3 Introduce the methods.
S 4 Count how many orders there are when Naiko is the anchor.

2 2 Think about how many 4-digit numbers there are in total.

T/S Read and understand the given situation.
TN Read and understand the given situation.
S Use tables and figures to help them find out that there are 24 numbers.

3 Summary.

T What have you learned in this lesson?
S Present ideas on what they have learned.
T Use students' ideas to confirm the important concepts of this lesson.



3 Let's consider the following method.

Draw a table

Determine the first runner and fill in the order of the next runners in the table.

First runner	Second runner	Third runner
Naiko (N)	Ambai (A)	Kekeni (K)
Kekeni	Naiko	Ambai
Ambai	Kekeni	Naiko
Naiko	Kekeni	Ambai
Ambai	Naiko	Kekeni
Kekeni	Ambai	Naiko

Mero is the last runner so let's think about the orders for Naiko, Ambai and Kekeni.

If you keep the record neatly, repetitions and omission will be seen.

Draw a diagram

It is easier to see when you draw a tree diagram, rather than writing it down on a table.

4 How many different orders are there when Naiko is the anchor?
6 orders

2 There are four cards with numbers 1, 2, 3 and 4.
Use all the cards to make four digit numbers.
How many numbers can you make? 24 numbers

70 = □ – □

Sample Blackboard Plan

Lesson 55 Sample Blackboard Plan is on page 113

Unit 8

Unit: Orders and Combinations
Sub-unit: 1. Ordering
Lesson 2 of 2

Textbook Page : 071
Actual Lesson 056

Lesson Objectives

- To think about how many different orders there can be on given conditions.

Prior Knowledge

- Identifying the number of orders based on tables and tree diagrams. (Previous lesson)

Preparation

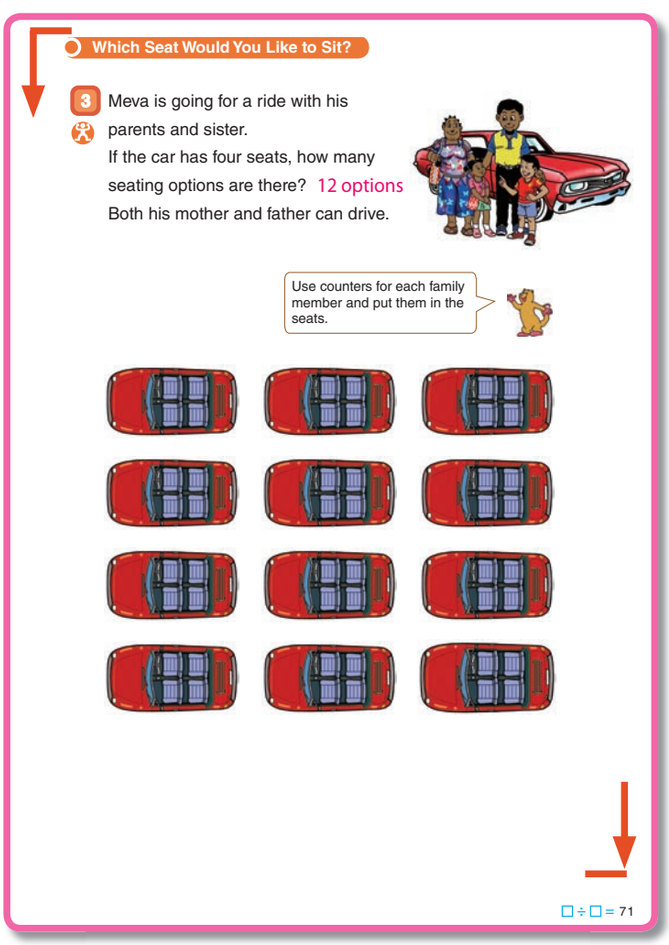
- Square boxes to represent the car.

Assessment

- Think about how many different orders there can be on given conditions by constructing diagrams. F S

Teacher's Notes

See samples of different ways of ordering in the previous lesson and refer to the sample blackboard plan.



Lesson Flow

1 Review the previous lesson

T Introduce the Main Task. (Refer to the BP)

2 Investigate the number of seating options.

T/S 3 Read and understand the given situation.

S Think based on the pictures in the textbook and discuss what the situation is talking about.

T Give enough time for students to write different orders in their exercise books.

TN Provide useful ideas such as replacing each family member with a marble with different colors or using symbols such as F (for father), M (for mother), S (for sister) and B (for Meva).

S Present ideas and identify good aspects in each presented idea.

TN Assist students to realise that when setting the father as a driver, all they have to do is to think about the seating options of the remaining three people, namely the mother, sister and Meva himself.

3 Summary

T What have you learned in this lesson?

S Present ideas on what they have learned.

T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan (Lesson 55)

Date: Chapter 8: Orders and Combinations Sub-Chapter/Topic 1: Ordering Lesson: 1 of 2

Main Task: Let's think about how to order things.

MT

1 Naiko, Ambai, Kekeni and Mero are running the relay race. Decide their turns.
When Mero is the anchor, how many different orders can there be for the first, second, and third runners?

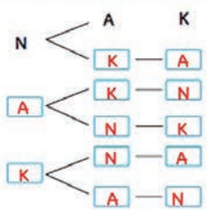
First, Naiko→Kekeni→ Ambai.
Second, Ambai→Naiko→Kekeni.
Third, Kekeni→Ambai→Naiko.
There are three cases. Wait a minute, there could be more...

1 Are there other ways of ordering, other than what Yamo found?
(Kekeni,Naiko,Ambai) (Naiko,Ambai,Kekeni)
(Ambai,Naiko,Kekeni)

2 Think about ways to find all orders systematically and efficiently. Discuss.

3

First runner	Second runner	Third runner
N(Naiko)	A(Ambai)	K(Kekeni)
Kekeni	Naiko	Ambai
Ambai	Kekeni	Naiko
Naiko	Kekeni	Ambai
Ambai	Naiko	Kekeni
Kekeni	Ambai	Naiko



4 How many different orders are there when Mero is the anchor?
6 orders

2 Use all cards and make four digit numbers. How many numbers can you make?
24 numbers

Summary

- Tables or tree diagrams are used to order without repetition.
- The order of selection matters when ordering sets.
- NAK and ANK are 2 different orders.

Sample Blackboard Plan (Lesson 56)

Date: Chapter 8: Orders and Combinations Sub-Chapter/Topic 1: Ordering Lesson: 2 of 2

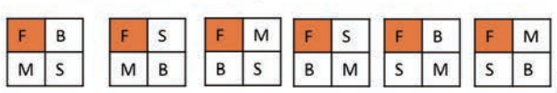
Main Task: Let's think about different orders.

Review

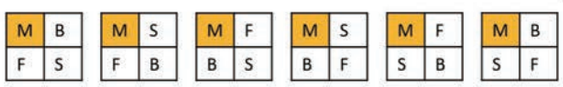
MT

3 If the car has four seats, how many seating options are there?
Both the mother and father can drive.

When father is driving.



When mother is driving.



There are 12 options

Summary

Summarise the lesson based on what the students have learnt and elaborate on important points.

Unit 8

Unit: Orders and Combinations
Sub-unit: 2. Combinations
Lesson 1 of 2

Textbook Page : 072 and 073
Actual Lesson 057

Sub-unit Objectives

- To think about combinations when selecting 2 objects from a set of 5 objects systematically.
- To think about combinations when selecting 2 objects from a set of 6 objects systematically.

Lesson Objectives

- To systematically think about combinations when selecting 2 objects from a set of 5 objects.

Prior Knowledge

- Identifying the number of orders based on tables and tree diagrams.

Preparation

- Tables and Diagrams.

Assessment

- Determine the number of different combinations by drawing tables and diagrams. F
- Solve the exercises correctly. S

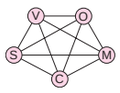
Teacher's Notes

In this lesson, the order does not matter but similar combinations should be omitted when identified so that only one of the combinations remains to ensure that there is no repetition.

2 Combinations

1 Nukuwe is going to buy ice cream.
She can buy two kinds from five flavours shown below.
How many combinations are there?

① Look at the figure on the right and write all the combinations.



Combinations with vanilla..... Ⓥ–Ⓢ, Ⓥ–Ⓒ, Ⓥ–Ⓜ, Ⓥ–Ⓞ
Combinations with strawberry..... Ⓢ–Ⓥ, Ⓢ–Ⓒ, Ⓢ–Ⓜ, Ⓢ–Ⓒ
Combinations with chocolate..... Ⓒ–Ⓥ, Ⓒ–Ⓢ, Ⓒ–Ⓜ, Ⓒ–Ⓞ
Combinations with melon ..... Ⓜ–Ⓥ, Ⓜ–Ⓢ, Ⓜ–Ⓒ, Ⓜ–Ⓞ
Combinations with orange..... Ⓞ–Ⓥ, Ⓞ–Ⓢ, Ⓞ–Ⓒ, Ⓞ–Ⓜ

② Are there same combinations in the figure?
Erase one of the combinations which overlaps.

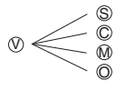
The order does not matter, so Ⓥ–Ⓒ and Ⓒ–Ⓥ is the same.

③ How many combinations are there, if you buy two kinds of flavours from five? 10 combinations

4 Yenbi drew a table below.
Continue and fill in the ☐ for the combinations.

Ⓥ	V–S	V–C	V–M	V–O						
Ⓢ	S–V				S–C	S–M	S–O			
Ⓒ		C–V			C-S			C–M	C-O	
Ⓜ			M-V			M-S		M-C		M-O
Ⓞ				O–V			O-S		O-C	O-M

5 Haro used a diagram below.
Explain his method.



Haro thought about the combination and erased overlaps.

Exercise

① If you are buying three flavours, how many combinations are there? 10 combinations

② If you are buying four flavours, how many combinations are there? 5 combinations

72 = ☐ – ☐

☐ ÷ ☐ = 73

Lesson Flow

1 Finding different combinations.

T/S ❶ Read and understand the given situation.
T Introduce the Main Task. (Refer to the BP)
T Ask students to choose 2 flavours from the 5 and tell them to write their answers in their exercise books.
In this way, students can start understanding the meaning and the context.
S Find other combinations of the 5 flavours apart from the first two.

2 Finding other possible combinations.

S ❶ Look at the pentagon shown in the textbook. and think about the number of combinations of 2 flavours.
T Help students to realise that the sides and the diagonals show the combinations of 2 kinds of flavours from 5.
S Think about all the combinations by filling in the diagram.
T/S ❷ Discuss how to deal with similar combinations. (Refer to TN)
S Determine whether the combinations of vanilla-chocolate and chocolate-vanilla are the same or different.
TN The combination vanilla-chocolate and chocolate-vanilla are the same. Eliminate one of the same combinations.
T ❸ Ask students to count how many combinations there are in total after eliminating repeated combinations.
S There are 10 combinations.
T As in the previous lessons in finding orders, get them to think again by using tables and figures for ❹ and ❺ .
S Refer to the table and figure shown in ❹ and ❺ and write their own ideas.
T Advise students to always follow a rule to check and complete the table systematically.
S Discuss the tables and completed tree diagrams.
TN Ensure that there are 10 combinations to select 2 kinds of flavours from 5.

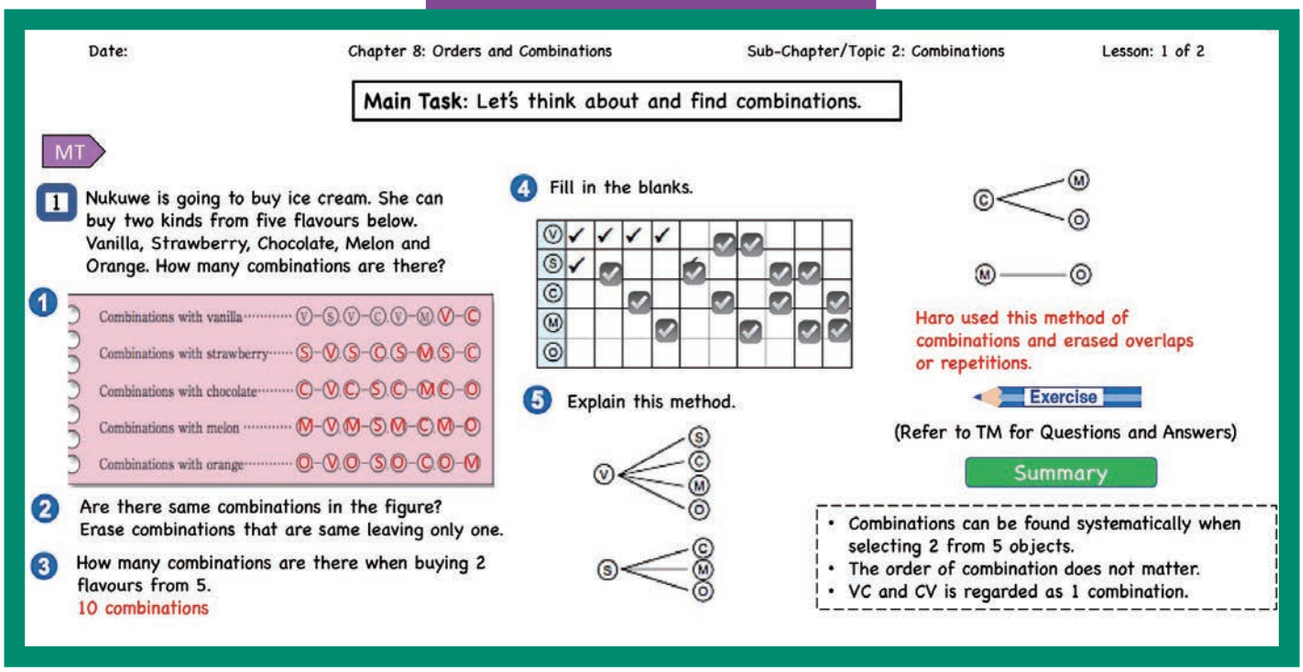
3 Complete the Exercise.

T Based on tables and figures, get the students to think about how many combinations there will be when they select 3 kinds from 5 kinds.
S Complete the exercises.
T Confirm students' answers.

4 Summary

T What have you learned in this lesson?
S Present ideas on what they have learned.
T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan



Unit 8

Unit: Orders and Combinations
Sub-unit: 2. Combinations
Lesson 2 of 2

Textbook Page : 074
Actual Lesson 058

Lesson Objectives

- To think about combinations when selecting 2 objects from a set of 6 objects systematically.

Prior Knowledge

- Combinations when selecting 2 object from a set of 5 objects.

Preparation

- Table on Mero's Idea

Assessment

- Think about how many combinations there are by drawing figures, tables and diagrams. F
- Solve the exercises correctly. S

Teacher's Notes

Refer to the notes for the previous lesson. Students should be reminded to use methods used to find combinations to avoid repetition.

2 There are six teams participating in a basketball tournament. Each team will play with the other five teams. In this tournament, how many games are played in total? 15 games

Ambai's Idea

I numbered the teams and found their combinations.

1 – 2, 1 – 3, 1 – 4, 1 – 5, 1 – 6
2 – 3, 2 – 4, 2 – 5, 2 – 6
: .....

Mero's Idea

I numbered the teams and made a table.

	1	2	3	4	5	6
1						
2	✓					
3	✓	✓				
4	✓	✓	✓			
5	✓	✓	✓	✓		
6	✓	✓	✓	✓	✓	

Exercise

1 There is a baseball tournament with seven teams participating. Each team plays one time with each other. In this tournament, how many games are played in total? 21 games

74 = □ – □

Lesson Flow

1 Review the previous lesson.

T Introduce the Main Task. (Refer to the Blackboard Plan)

2 Think about the number of games played in a tournament.

T/S 2 Read and understand the given situation.
T How many games are played in total?
S Discuss and present their own ideas.
T Ask students to discuss Ambai's and Mero's ideas to find what is common between the two.
S Realise that both of them put a number for each team.
T What combinations do you find in each of the ideas?
S Ambai is using the rule of combination for one team and listing down the possibilities while Mero is using a table.

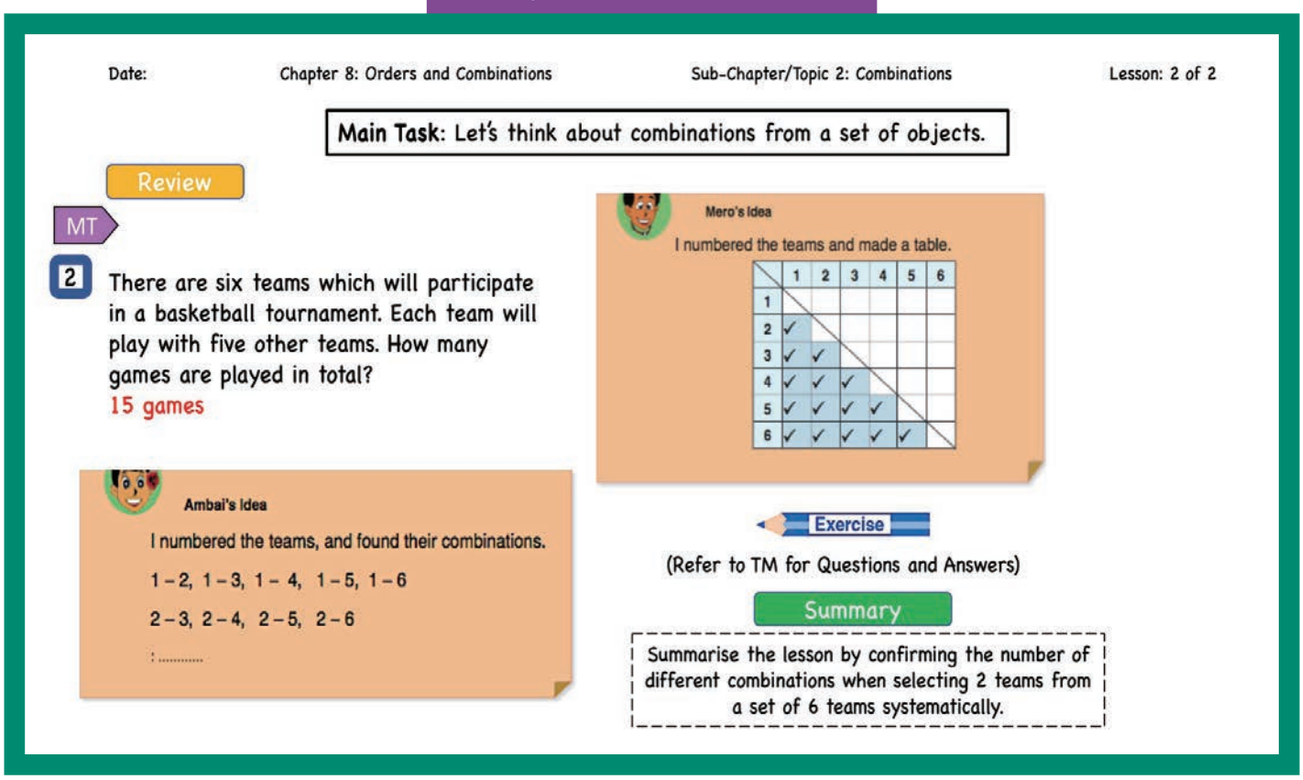
3 Complete the Exercise.

S Find the number of games played in total by utilising Ambai's and Mero's ideas.
T Confirm students' answers.

4 Summary

T What have you learned in this lesson?
S Present ideas on what they have learned.
T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan



Unit 8

Unit: Orders and Combinations
Exercise, Problems, Review and Evaluation
Lesson 1 and 2 of 2

Textbook Page : 075 to 077
Actual Lesson 59 & 60

Lesson Objectives

- To confirm their understanding on the concepts they learned in this unit by completing the Exercises and Evaluation Test confidently.

Prior Knowledge

- All the contents learned in the unit on Order and Combinations.

Preparation

- Evaluation Test.

Assessment

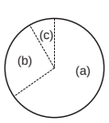
- Solve the exercises correctly to confirm what they learned in this unit. F S

Teacher's Notes

This is the last lesson of Chapter 8.
Students should be encouraged to use the necessary skills and ideas learnt in this unit to complete all the Exercises and solve the Problems and Review in preparation for the evaluation test.
Use the attached evaluation test to conduct assesment for your class after finishing all the exercises, problems and review as a seperate lesson.

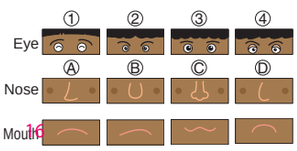
EXERCISE

1 There is a circle graph on the right. Colour (a), (b) and (c) with red, yellow and blue. Show all possible colour combinations.



Pages 69 to 70
A,B,C
A,C,B
B,A,C
B,C,A
C,A,B
C,B,A

2 In making a face, choose eyes, nose and mouth from each category on the right. If you choose eyes, ① how many combinations are there to make a face by choosing different nose and mouth?



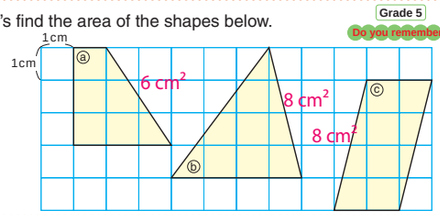
Pages 69 to 71
C,B,A

3 There are three cards numbered 3, 4 and 5.
① If you make a two-digit number using two cards out of three, what is the third largest number you can make? 45
② If you make a three-digit number using all three cards, how many numbers can you make? Let's write them down. 345, 354, 435, 453, 534, 543
③ If you choose two cards out of three, how many combinations are there? Find them all and write them. 3 & 4, 3 & 5, 4 & 5

Pages 69 to 73

Let's find the area of the shapes below.

Grade 5 Do you remember?



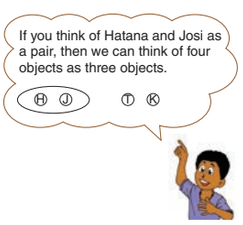
PROBLEMS

1 There is a road below. How many ways are there to go from A to B? 6
● Counting all posssibilities without repetition and ommisions.

2 There are four cards numbered 0, 1, 2 and 3. Make a four digit number.
● Considering possibilities with omissions.

① How many numbers can you make? Write down all options. 18 numbers
1023,1032,1203
1230,1302,1320
2013,2031,2103
2130,2301,2310
3012,3021,3102
3120,3201,3210
② How many even numbers can you make? Write them from the smallest to the largest. 10 numbers
1032,1230,1302,1320, 2130, 2310,3012,3102,3120,3210

3 Hatana, Tukana, Keara and Josi will sit on a bench. How many different ways can they sit while Hatana and Josi are next to each other? 12 ways
● Considering with the special case.



Lesson Flow

1 Complete Exercise ①.

S Identify all the colour combinations for (a), (b) and (c) in the circle.

T Confirm students' answers.

2 Complete Exercise ②.

S Solve the problem by identifying the different combinations to make a face.

T Confirm students' answers.

3 Complete Exercise ③ ① to ③.

S Find the different combinations for the cards numbered 3, 4 and 5.

T Confirm students' answers.

4 Complete the Do You Remember exercise.

S Solve the area problems.

5 Complete Problem ①.

S Solve the problem.

T Confirm students' answers.

6 Complete Problem ② ① & ②.

S Find the different combinations for the cards numbered 0, 1, 2 and 3.

T Confirm students' answers.

7 Complete Problem ③.

S Use combinations to find all the different sitting positions.

T Confirm students' answers.

8 Complete Review ①.

S Calculate the fraction problems.

T Confirm students' answers.

9 Complete Review ② to ⑤.

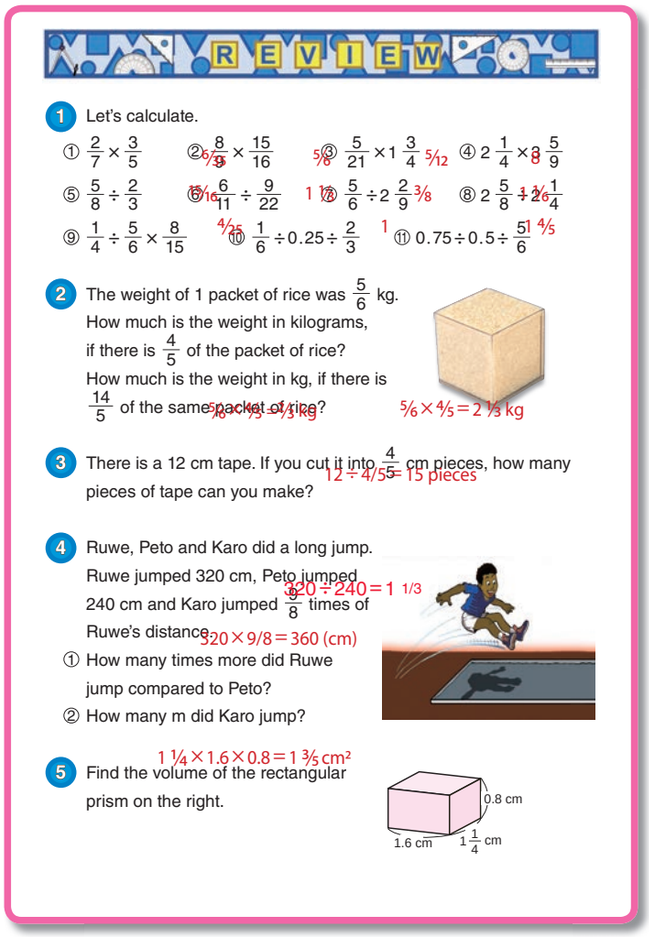
S Solve the fraction problems.

T Confirm students' answers.

10 Complete the Evaluation Test.

TN Use the attached evaluation test to conduct assesment for your class after finishing all the exercises, problems and review as a seperate lesson.

S Complete the evaluation test.



REVIEW

1 Let's calculate.

① $\frac{2}{7} \times \frac{3}{5}$ ② $\frac{8}{9} \times \frac{15}{16}$ ③ $\frac{5}{21} \times 1\frac{3}{4}$ $5/12$ ④ $2\frac{1}{4} \times 3\frac{5}{9}$ 8

⑤ $\frac{5}{8} \div \frac{2}{3}$ $15/16$ ⑥ $\frac{6}{11} \div \frac{9}{22}$ $1\frac{1}{3}$ ⑦ $\frac{5}{6} \div 2\frac{2}{9}$ $3/8$ ⑧ $2\frac{5}{8} \div 2\frac{1}{4}$

⑨ $\frac{1}{4} \div \frac{5}{6} \times \frac{8}{15}$ $4/5$ ⑩ $\frac{1}{6} \div 0.25 \div \frac{2}{3}$ 1 ⑪ $0.75 \div 0.5 \div \frac{5}{6}$ $1\frac{4}{5}$

2 The weight of 1 packet of rice was $\frac{5}{6}$ kg.
How much is the weight in kilograms, if there is $\frac{4}{5}$ of the packet of rice?
How much is the weight in kg, if there is $\frac{14}{5}$ of the same packet of rice?
$5/6 \div 5/4 = 2/3$ kg

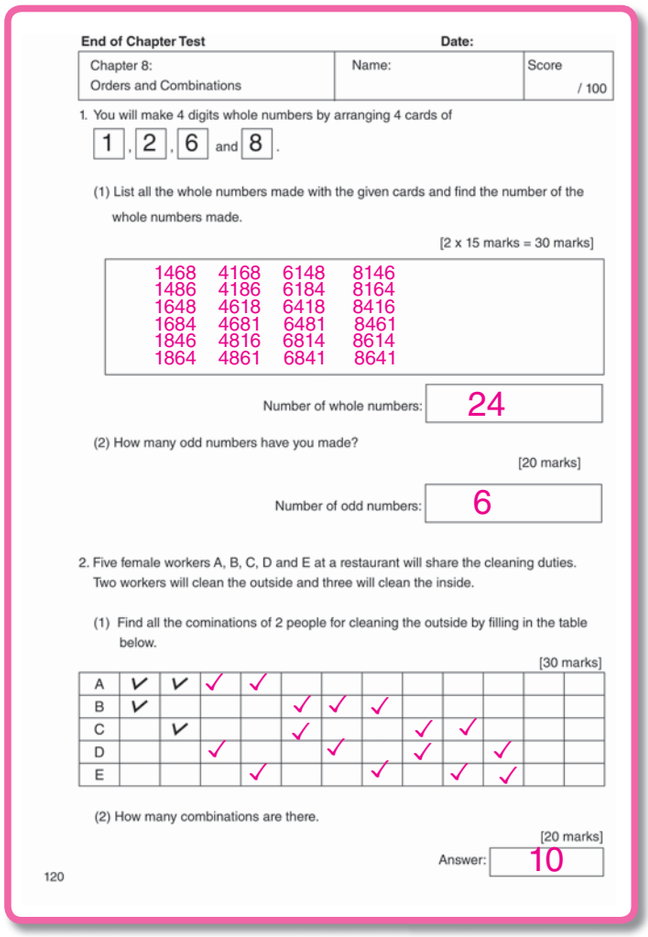
$5/6 \times 4/5 = 2\frac{1}{3}$ kg

3 There is a 12 cm tape. If you cut it into $\frac{4}{5}$ cm pieces, how many pieces of tape can you make?
$12 \div 4/5 = 15$ pieces

4 Ruwe, Peto and Karo did a long jump.
Ruwe jumped 320 cm, Peto jumped 240 cm and Karo jumped $\frac{9}{8}$ times of Ruwe's distance.
$320 \div 240 = 1\ 1/3$
$320 \times 9/8 = 360$ (cm)
① How many times more did Ruwe jump compared to Peto?
② How many m did Karo jump?

5 Find the volume of the rectangular prism on the right.
$1\frac{1}{4} \times 1.6 \times 0.8 = 1\frac{3}{5}$ cm²

0.8 cm
1.6 cm
$1\frac{1}{4}$ cm



End of Chapter Test Date:

Chapter 8: Orders and Combinations	Name:	Score / 100

1. You will make 4 digits whole numbers by arranging 4 cards of 1, 2, 6 and 8.

(1) List all the whole numbers made with the given cards and find the number of the whole numbers made.

[2 x 15 marks = 30 marks]

1468	4168	6148	8146
1486	4186	6184	8164
1648	4618	6418	8416
1684	4681	6481	8461
1846	4816	6814	8614
1864	4861	6841	8641

Number of whole numbers: 24

(2) How many odd numbers have you made?

[20 marks]

Number of odd numbers: 6

2. Five female workers A, B, C, D and E at a restaurant will share the cleaning duties. Two workers will clean the outside and three will clean the inside.

(1) Find all the cominations of 2 people for cleaning the outside by filling in the table below.

[30 marks]

A	✓	✓	✓	✓								
B	✓				✓	✓	✓					
C		✓			✓			✓	✓			
D			✓			✓		✓		✓		
E				✓			✓		✓	✓		

(2) How many combinations are there.

[20 marks]

Answer: 10

120

End of Chapter Test **Date:**

Chapter 8: Orders and Combinations	Name:	Score / 100

1. You will make 4 digits whole numbers by arranging 4 cards of

1 , 2 , 6 and 8 .

(1) List all the whole numbers made with the given cards and find the number of the whole numbers made. [2×15 marks=30 marks]

Number of whole numbers:

(2) How many odd numbers have you made? [20 marks]

Number of odd numbers:

2. Five female workers A, B, C, D and E at a restaurant will share the cleaning duties. Two workers will clean the outside and three will clean the inside.

(1) Find all the cominations of 2 people for cleaning the outside by filling in the table below. [30 marks]

A	✓	✓										
B	✓											
C		✓										
D												
E												

(2) How many combinations are there. [20 marks]

Answer:

Chapter 9 Speed

1. Content Standard

6. 2. 2. Students will be able to comprehend speed as a ratio of time and distance and use its situation to calculate and appreciate their relationship.

2. Unit Objectives

- To understand the meaning of speed and how to express and determine speed.
- To understand relationship between speed, time and distance.

3. Teaching Overview

In Grade 5, students started learning combined quantities such as number of people in a unit area, etc. In this unit, students learn distances traveled per unit time.

Speed is a combined quantity for us to think about 2 quantities at the same time and express as a quantity. The concept is quite complicated for students.

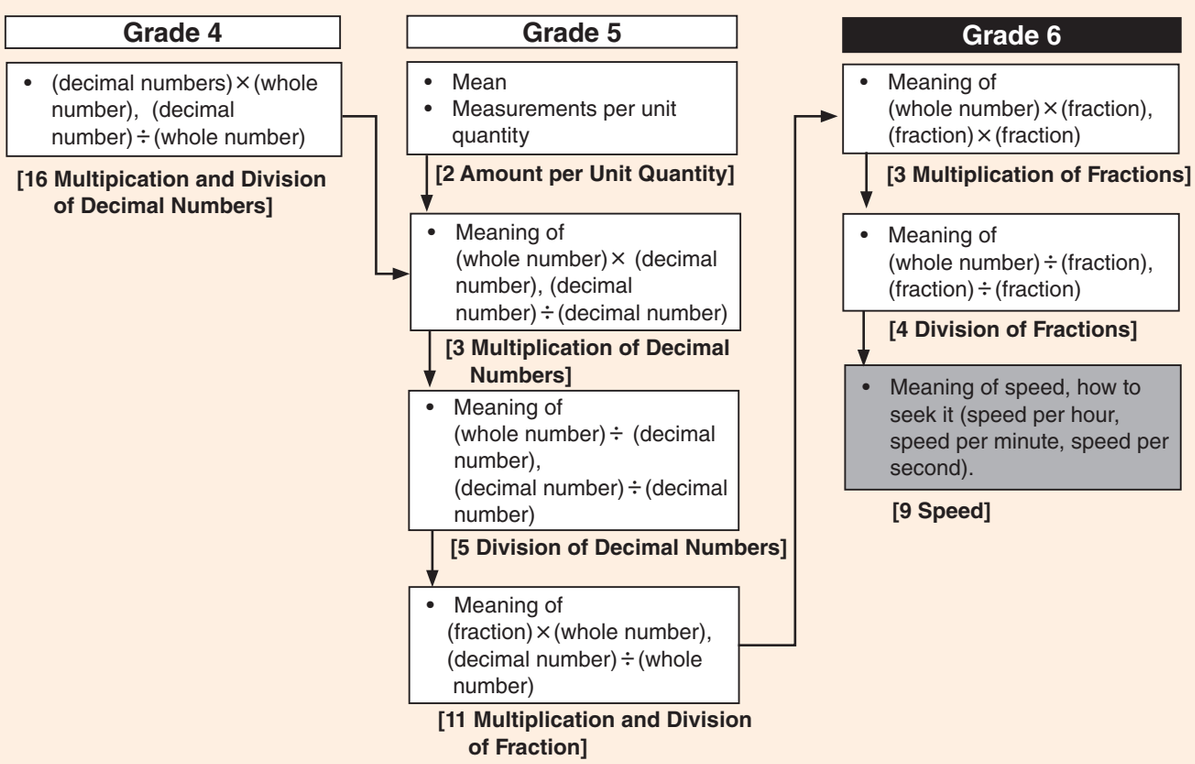
Speed :

Firstly students compare the speed for 2 different distances traveled in the same time durations. They also compare the speed for the same distances traveled in different time durations. Finally students find out that they can compare the speed even though they travel different routes in different time durations.

Speeds and Graphs :

Students need to have enough experiences to draw graphs of speed and interpreting graphs. They will appreciate that visualization of graphs will give them pictures of the travel.

4. Related Learning Contents



Unit 9

Unit: Speed
Sub-unit: 1. Speed
Lesson 1 of 3

Textbook Page :
078 to 080
Actual Lesson 061

Sub-unit Objectives

- To understand how to express, compare and determine speed by applying the idea of per unit quantity.
- To solve various problems by applying the relationship between speed, time and distance.

Lesson Objectives

- To think of how to compare speed by applying the idea of per unit quantity.
- To recognise the usefulness of applying the idea of per unit quantity when comparing speed.
- To understand how to find speed and realise that there are various units of speed; speed per hour, per minute and per second.

Prior Knowledge

- All contents of multiplication and division.
- Distance and time
- Per unit quantity

Preparation

- Table of distance and time
- Two charts of 'same times' and 'same distance'

Assessment

- Think about how to compare speed by applying the idea of per unit quantity. F
- Find speed by applying the idea of per unit quantity. S
- Solve the excerises correctly. S

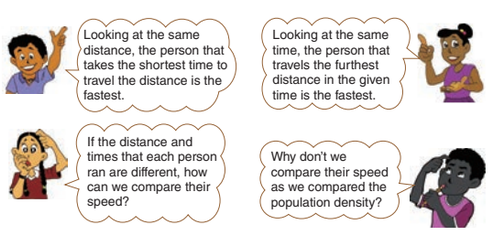
Teacher's Notes

1 2 Students find the distance for each student travelling in 1 second. Table shows, student Ⓐ ran 20 m in 5 second. So students can do 20 m divided by 5 seconds to find distanec in 1 second.
Eg; Ⓐ 20 (m) ÷ 5 (s) = 4 (m) in 1 seond.
3 student find the distance each student travelling in 1 m.
Through 2, students found Ⓐ ran 4 m in 1 second.
Therefore, 4 m ÷ 4 to find time for 1 m. So students can do 1 second ÷ 4 = 0.25 second (in 1 m).

9 Speed

How to compare speed

In a Physical Education class, the teacher wants to measure the running speed of individual students.
They got into two groups.
One group timed students that ran certain distances.
Another group measured the distance the students ran within a time period.
Who can run the fastest?



78 = □ ÷ □

1 Speed

How to Express "Speed"

Meaning of speed and how to express it

1 The distance and time of the 3 students are shown in the table.

Distances and Times

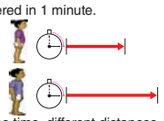
Student	Distance (m)	Time (seconds)
Ⓐ	20	5
Ⓑ	15	5
Ⓒ	15	4

1 Which student is the fastest?
Compare their speed.
Comparing Ⓐ and Ⓑ → A is faster.
Comparing Ⓑ and Ⓒ → C is faster.
Comparing Ⓐ and Ⓒ → ? is faster.

Both time and distance are different

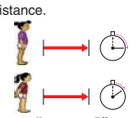
Speed can be compared if the time or the distance is the same.

Same time
The distance that the student covered in 1 minute.



Same time, different distances.

Same distance
The time needed to travel the distance.



Same distance, different times.

2 Let's compare their speed by calculating how many m travelled in one second.
(A) 20 ÷ 5 = 4 (m), (B) 15 ÷ 5 = 3 (m), (C) 15 ÷ 4 = 3.75 (m)
(A) is the fastest.

3 Let's compare their speed by calculating how many seconds it took to travel in 1 m.
(A) 5 ÷ 20 = 0.25 (minutes), (B) 5 ÷ 15 = 0.333.. (Second)
(C) 4 ÷ 15 = 0.2666... (Second) (A) is the fastest.

If you compare the speed by distance, the shorter the time the faster the student. If you compare the speed by time, the longer the distance the faster the student.

□ × □ = 79

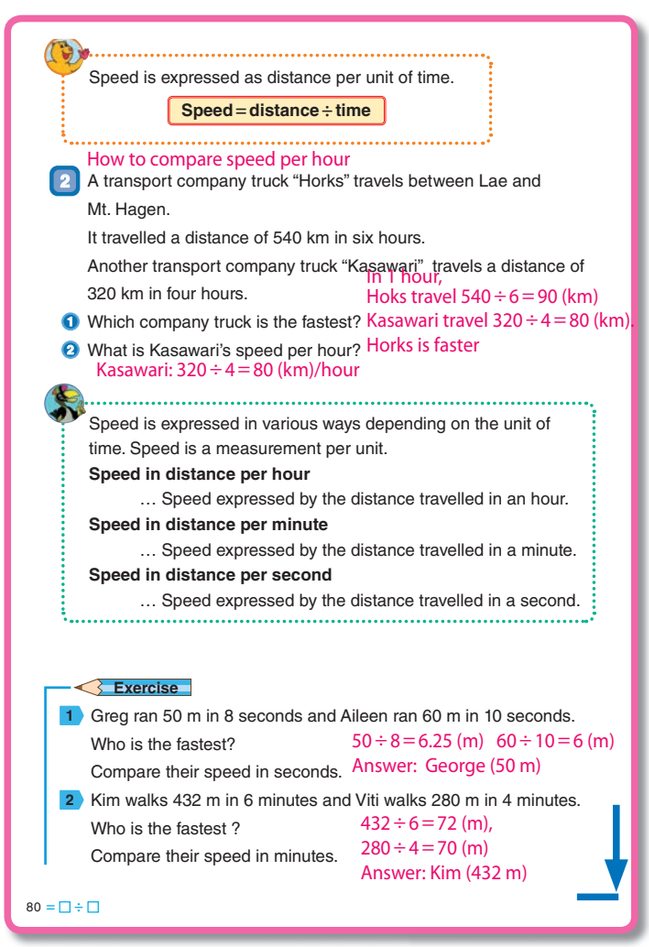
Lesson Flow

1 ▶▶ Discuss the speed of students in different contexts.

T/S Read and understand the given situation.
T How can we compare the speed of the students?
S When the given distance is the same, the student that takes the shortest time to run the distance is the fastest. Consider also the student's ideas from the bubbles.
TN Students should realise that when the given time is the same, the student that runs the furthest distance in the given time is the fastest. (Speed of different times per distances cannot be compared)
T Introduce the Main Task. (Refer to the BP)

2 Comparing the speed of students.

T/S 1 Read and understand the given situation.
T 1 Let's look at the table. Which student is the fastest from the result?
S Ⓐ is faster than Ⓑ because Ⓐ travelled further even though the time is the same for both.
S Ⓒ is faster than Ⓑ because Ⓒ travelled the distance in a shorter time even though the distance is the same for both.



3 Important Point

T/S Explain the important point in the box .
T Explain the ideas about 'same time' and 'same distance' using the charts.

4 Comparing speed using Per Unit Quantity.

T 2 Let's compare their speed by calculating how many m traveled in 1 second.
S Distance each student travels in 1 second;
Ⓐ 20 ÷ 5 = 4 (m), Ⓑ 15 ÷ 5 = 3 (m),
Ⓒ 15 ÷ 4 = 3.75 (m) Answer: Ⓐ is the fastest.
S 3 Time each student takes to travel 1 metre;
Ⓐ 5 ÷ 20 = 0.25 (second), Ⓑ 5 ÷ 15 = 0.33333.. (second) and Ⓒ 4 ÷ 15 = 0.2666.... (second)
Answer: Ⓐ is the fastest.

5 Important Point

T/S Explain the important point in the box .

6 Comparing speed per hour.

T/S 2 1 Read and understand the given situation.
S What we know: Horks goes 540 km in 6 hours and Kasawari goes 320 km in 4 hours.
T Which company truck is the fastest?
S Find out the distance that each company truck travels in 1 hour and compare the result.
In 1 hour, Horks travel: 540 ÷ 6 = 90 (km),
Kasawari travel: 320 ÷ 4 = 80 (km)
S Horks is faster because Horks can travel longer distance than Kasawari in 1 hour.
T 2 Ask students to find speed of Kasawari truck.
S Kasawari's speed is 320 ÷ 4 = 80 (km per hour).

7 Important Point

T/S Explain the important point in the box .

8 Complete the Exercise.

S Solve the exercises.
T Confirm students' answers.

9 Summary

T What have you learned in this lesson?
S Present ideas on what they have learned.
T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan

Lesson 61 Sample Blackboard Plan is on page 125.

Unit 9

Unit: Speed
Sub-unit: 1. Speed
Lesson 2 of 3

Textbook Page : 081
Actual Lesson 062

Lesson Objectives

- To understand and explain the relationship amongst speed per hour, speed per minute and speed per second.

Prior Knowledge

- How to find speed
- Various unit of speed
- Per unit quantity

Preparation

- Tape diagram
- Conversion of time in seconds, minutes and hours.

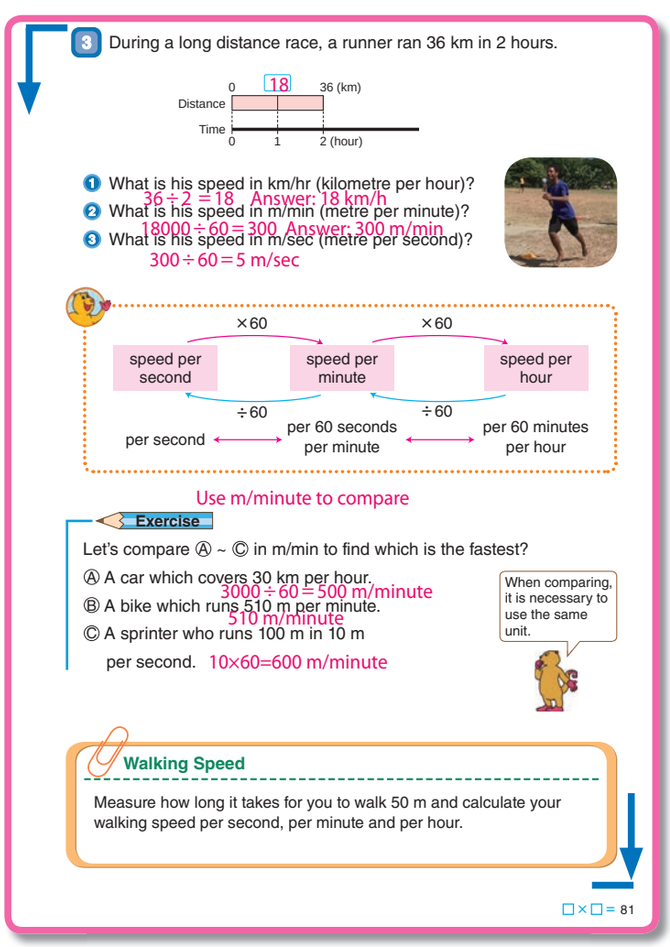
Assessment

- Explain the relationship amongst speed per hour, speed per minute and speed per second. F
- Solve the exercises correctly. S

Teacher's Notes

The speed in m/h shows the distance travelled in 1 hour meaning 60 minutes. Therefore, the distance traveled in 1 minute can be calculated based on this, where the speed in metres per minute can be found

Guide students to take the same logical steps to change from speed per minute to speed per second and solve the problem on their own.



3 During a long distance race, a runner ran 36 km in 2 hours.

1 What is his speed in km/hr (kilometre per hour)?
36 ÷ 2 = 18 Answer: 18 km/h
2 What is his speed in m/min (metre per minute)?
18000 ÷ 60 = 300 Answer: 300 m/min
3 What is his speed in m/sec (metre per second)?
300 ÷ 60 = 5 m/sec

Use m/minute to compare

Exercise

Let's compare Ⓐ ~ Ⓒ in m/min to find which is the fastest?

Ⓐ A car which covers 30 km per hour.
3000 ÷ 60 = 500 m/minute
Ⓑ A bike which runs 510 m per minute.
510 m/minute
Ⓒ A sprinter who runs 100 m in 10 m per second. 10×60=600 m/minute

When comparing, it is necessary to use the same unit.

Walking Speed

Measure how long it takes for you to walk 50 m and calculate your walking speed per second, per minute and per hour.

□×□= 81

Lesson Flow

1 Review the previous lesson.

T Introduce the Main Task. (Refer to the BP)

2 3 Solve the problem by calculating speed in various ways.

T/S Read and understand the given situation.
S Solve 1: 36 ÷ 2 = 18 Answer: 18 km/h
T Confirm students' answers using 3 chart.
T 2 Change km/h to m/min.
S Solve: 18 km : 18 × 100 =18000 m,
1 hour = 60 mins,18000 ÷ 60 = 300
Answer: 300 m/min
S Solve 3, convert 300 m/min to m/sec.
1 minute = 60 sec.
300 ÷ 60 = 5 Answer: 5 m/sec
TN Change the speed per hour to speed per minute for 2 and speed per minute to speed per second for and 3 to find the answers.

3 Important Point

T/S Explain the important point in the box .

4 Complete the Exercise.

S Solve the exercises.
T Confirm students' answers.

5 Walking Speed

T/S Read and understand the given situation. Do activity during recess time.

6 Summary

T What have you learned in this lesson?
S Present ideas on what they have learned.
T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan (Lesson 61)

Date: Chapter 9: Speed Sub-Chapter/Topic 1: Speed Lesson: 1 of 3

Main Task: Let's think about how to compare which is faster.

MT 1

Distances and Times

Groups	Distance (m)	Time (seconds)
Ⓐ	20	5
Ⓑ	15	5
Ⓒ	15	4

1 Which student is the fastest? Compare.
Comparing Ⓐ and Ⓑ → A is faster.
Comparing Ⓑ and Ⓒ → C is faster.
Comparing Ⓐ and Ⓒ → ? is faster.
A & C Both time and distance are different.

Speed can be compared if the time or the distance is the same.

Same time
The distance that the student covered in 1 minute.
Same time, different distances.

Same distance
The time needed to travel the distance.
Same distance, different times.

2 Compare by calculating metres travelled in one second.
(A) 20 ÷ 5= 4m (B) 15÷5=3m (C)15÷4=3.75m

3 Compare by calculating how many seconds it took to travel 1 metre.
(A) 5 ÷ 20= 0.25 sec (B) 5÷15=0.333sec
(C)4÷15= 0.266' sec
Answer: (A) is the fastest.

Speed is expressed as distanced per unit of time.
Speed = distance÷time

2 1 Which company truck is fastest?
540 ÷ 6=90km 320÷4=80km
Answer: Horks is faster

Speed is expressed in various ways depending on the unit of time. Speed is a kind of measurement per unit.
Speed per hour... Speed expressed by the distance traveled in an hour.
Speed per minute... Speed expressed by the distance traveled in a minute.
Speed per second... Speed expressed by the distance traveled in a second.

2 What is Kasawari's speed per hour?
80km per hour

Exercise
(Refer to TM for Questions and Answers)

Summary
- Speed can be compared if the time or distance is the same.
- Speed is expressed as distance per unit of time.

Speed = distance ÷ time

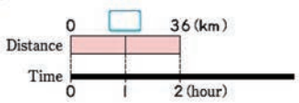
Sample Blackboard Plan (Lesson 62)

Date: Chapter 9: Speed. Sub-Chapter/Topic 1: Speed Lesson: 2 of 3

Main Task :Let's think about changing speed from per hour to minutes and seconds.

Review

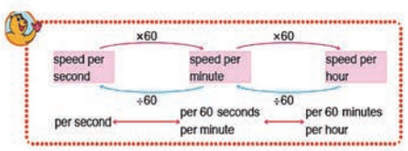
MT 3 A marathon runner ran 36km in 2 hours.



1 What is his speed in Km/h (kilometer per hour) ?
36 ÷ 2= 18 Answer: 18km/h

2 What is his speed in m/m (metre per minute) ?
18000 ÷ 60 = 300 Answer: 300m/min

3 What is his speed in m/s (metre per second)?
300 ÷ 60 = 5 Answer: 5m/sec



Walking Speed
Measure how long it takes for you to walk 50 m and calculate your walking speed per second, per minute, and per hour.

Exercise
(Refer to TM for Questions and Answers)

Summary
When converting speed from:
- seconds to minutes to hour, we divide by 60
- hour to minutes to seconds, we multiply by 60.

Unit 9

Unit: Speed
Sub-unit: 1. Speed
Lesson 3 of 3

Textbook Page : 082
Actual Lesson 063

Lesson Objectives

- To think about and calculate distance when speed and time are given.
- To think about and calculate time when speed and distance are given.

Prior Knowledge

- How to find speed.
- Various unit of speed

Preparation

- Tape diagrams and tables

Assessment

- Find the distance or time when the other two quantities are known. F
- Solve the exercises correctly. S

Teacher's Notes

Students should be able to understand the derivation of speed, distance and time using the formula:

Speed = Distance ÷ Time
Distance = Speed × Time
Time = Distance ÷ Speed

It is also important for the students to understand the meaning of formulas. Remind them that If the distance is the same, the shorter time is faster, and if the time is the same, the longer distance is faster.

Finding Distance and Time

Find distance using speed and time.

4 There is a car travelling at 40 km per hour.

1 How many km would it travel in two hours? $40 \times 2 = 80$ Answer: 80 km

2 How many km would it travel in three hours? $40 \times 3 = 120$ Answer: 120 km

Distance = speed × time

In 1 and 2, each car has travelled x km each.

①			×2
Distance (km)	40	x	
Time (hour)	1	2	
			×2

②			×3
Distance (km)	40	x	
Time (hour)	1	3	
			×3

Find time using speed and distance.

5 A cyclist travels 400 m per minute. How many minutes does he take to travel 2400 m? Answer: 6 minutes

If the time he takes is x, let's find the answer!

Distance = speed × time

$2400 = 400 \times x$

$x = 2400 \div 400$

			×x
Distance (km)	400	2400	
Time (hour)	1	x	
			×x

Time = Distance ÷ speed

Let's think by drawing diagram.

Exercise

Priscilla walks at the speed of 80 m per minute.

① How many m will she walk in 5 minutes? $80 \times 5 = 400$ Answer:400m

② How many minutes will it take for her to walk 2000 m ? $2000 \div 25 = 25$ Answer: 25minutes

82 = □ ÷ □

Lesson Flow

1 Review the previous lesson.

T Introduce the Main Task. (Refer to the BP)

2 Finding distance using speed and time.

T/S 4 Read and understand the given situation.

TN Use the tape diagram and the table to find the known and unknown quantities.

T 1 How many km would it travel in two hours?

S 40 × 2 = 80, Answer: 80 km

T 2 How many km would it travel in three hours?

S 40 × 3 = 120, Answer: 120 km

T Confirm students' answers using the formula; Distance = Speed × Time

3 Finding time using speed and distance.

T 5 Read and understand the given situation.

TN Use the tape diagram and the table to find the known and unknown x values.

S Find the answer based on the given figures and tables.

$x = 2400 \div 40$ 0, $x = 6$

Answer: 6 minutes

T Confirm students' answers using the formula Time = Distance ÷ Speed

4 Complete the Exercise.

S Solve the exercises.

T Confirm students' answers.

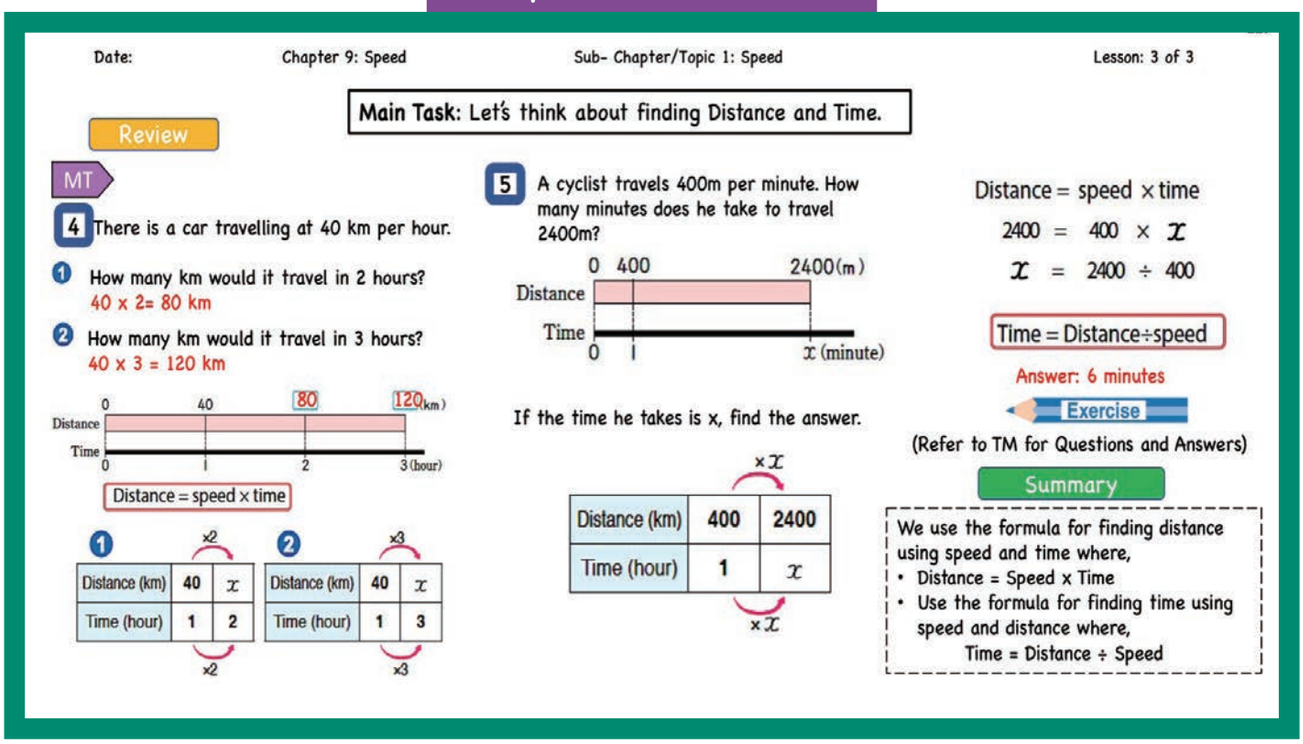
5 Summary

T What have you learned in this lesson?

S Present ideas on what they have learned.

T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan



Unit 9

Unit: Speed
Sub-unit: 2. Speed and Graphs
Lesson 1 of 1

Textbook Page : 083
Actual Lesson 064

Sub-unit Objectives

- To solve word problems on speed by completing tables or graphs.

Lesson Objectives

- To solve word problems on speed by completing tables or graphs.

Prior Knowledge

- How to find speed, time and distance.
- Various unit of speed

Preparation

- Graph papers and Table

Assessment

- Solve word problems on speed by completing tables or graphs considering the relationship between distance and time. F S
- Solve the exercises correctly. S

Teacher's Notes

In this lesson, students should be able to confidently find the distance and time travelled using the given speed to complete tables and represent the information on a graph to solve problems.
Students should be able to use the distance and times as the cordinates to plot and complete their graphs.

2 Speed and Graphs

1 Joshua's father is walking from his house to a bus stop at a speed of 100 m per min. 10 minutes after his father had gone, Joshua noticed his father's wallet in the house. He then, started to go after his father by bicycle at a speed of 300 m per minute.
The road distance between his house and the bus stop is 3 km.

1 Let's complete the following table to represent the relationship between the time in minutes and the distance in m for Joshua's father.

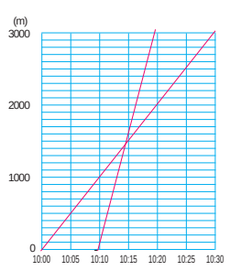
Time (minutes)	0	5	10	15	20	25	30
Distance (m)	0	500	1000	1500	2000	2500	3000

2 Let's draw the line graph below to represent the relationship between time in minutes and distance in m for Joshua's father.

Time (minutes)	0	5	10
Distance (m)	0	1500	3000

3 Let's complete the table to represent the relationship between the time in minutes and the distance in m for Joshua's ride by bicycle.

4 Let's add Joshua's line graph below to represent the relationship between the time in minutes and the distance in m for his ride by bicycle.
Actually, Joshua followed his father 10 minutes after his father's departure at 10 o'clock.



5 At what time did Joshua catch up with his father? 10:15 am
Let's read it from the graph.

□×□= 83

Lesson Flow

1 Review the previous lesson.

2 Representing the speed for Joshua's father on a table and graph.

T Introduce the Main Task. (Refer to the BP)
T/S 1 Read and understand the given situation.
T 1 Ask the students to complete the table using the speed of 100 m/min .
S Complete the table.
T 2 Ask the students to draw the line graph representing Joshua's father's speed.
S Draw the line graph.
T Confirm students' answers.

3 Representing the speed for Joshua's bike ride on a table and graph.

T 3 Ask the students to complete the table using the speed of 300 m/min.
S Complete the table with answers.
T 4 Ask the students to draw the line graph representing Joshua's speed on the same graph.
S Draw the graph representing Joshua's speed.
TN Joshua's graph will start at 10:10 am because he left 10 minutes after his father's departure.

4 Identifying the point of intersection as the meeting point.

T 5 Ask students to find the time when Joshua caught up with his father using the graph?
TN The point where the two lines cross or intersect is the time when Joshua caught up with his father. This happened 5 minutes after Joshua departed.
S Locate the point of intersection as the meeting point. Answer: 10:15 am.
T Confirm students' answer on the graph.

5 Summary

T What have you learned in this lesson?
S Present ideas on what they have learned.
T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan

Date: Chapter 9: Speed Sub- Chapter/Topic: Speed and Graphs Lesson: 1 of 1

Main Task: Let's solve word problems using tables and graphs.

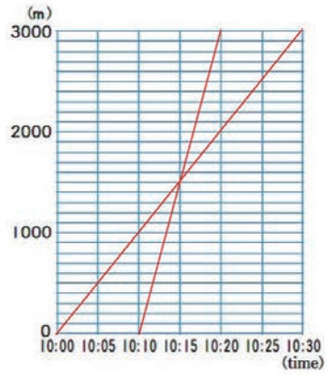
Review

MT

1 1 Complete the table to represent the relationship between time and distance for Joshua's father.

Time (minutes)	0	5	10	15	20	25	30
Distance (m)	0	500	1000	1500	2000	2500	3000

2 Draw the line graph representing the relationship between time in minutes and distance in metres for Joshua's father.



3 Complete the table to represent the relationship between time in minutes and distance in meters for Joshua's bike ride.

Time (minutes)	0	5	10
Distance (m)	0	1500	3000

4 Add Joshua's line graph to represent the relationship between time and distance for his ride. Actually, Joshua followed his father 10 minutes after his his father's departure at 10 o'clock.

5 At what time did Joshua catch up with his father? Answer: 10:15 am

Summary

- We compare the relationship between time and distance to find speed.
- A line graph is used to represent speed appropriately.
- The point of intersection is where two lines on a graph intersect or cross each other.

Unit 9

Unit: Speed
Exercise, Problems and Evaluation
Lesson 1 and 2 of 2

Textbook Page : 084 and 085
Actual Lesson 65 and 66

Lesson Objectives

- To confirm their understanding on the concepts they learned in this unit by completing the Exercise, Problem and Evaluation Test confidently.

Prior Knowledge

- All the contents learned in this unit.

Preparation

- Evaluation Test

Assessment

- Solve the exercises and problems correctly. F S

Teacher's Notes

This is the last lesson of Chapter 9. Students should be encouraged to use the necessary skills learned in this unit to complete all the Exercises and solve the Problems in preparation for the evaluation test. The test can be conducted as assesment for your class after finishing all the exercises. Use the attached evaluation test to conduct assesment for your class after finishing all the Exercises and Problems as a seperate lesson.

EXERCISE

1. A blue PMV truck travels the distance of 210 km in 3 hours, and a maroon PMV truck travels the distance of 160 km in 2 hours.

Page 80

① What is the speed of the blue PMV truck in km per hour? 70 km/h

② What is the speed of the maroon PMV truck in km per hour? 80 km/h

2. Let's fill in the blanks in the table below and compare their speed.

Pages 80 and 81

	The speed per hour	The speed per minute	The speed per second
Small airplane	270 km	4.5 km	75m
Racing car	240 km	4 km	$66\frac{2}{3}$ m
Sound	1224 km	20.4 km	340 m

3. It takes 4 minutes for a car travelling at a speed of 48 km per hour to pass the Highway.

Page 82

① What is the speed of the car per minute? $48 \div 60 = 0.8$ 0.8 km/min

② What is the length of the highway in m? $4 \times 0.8 = 3.2$ 3.2 km

Grade 6 Do you remember?

Let's calculate the area of the circles.

① Radius 3 cm 28.26 cm^2 ② Radius 20 cm 1256 cm^2

③ Diameter 10 cm 78.5 cm^2 ④ Diameter 40 cm 1256 cm^2

PROBLEMS

1. It takes 3 and half hours between Port Moresby and Brisbane airports by flight. The distance between the 2 Airports is 2100 km. How many km per hour does the airplane travel?

● Calculating speed.

$2100 \div 2\frac{1}{2} = 840$ km/h

2. A train is travelling at 1.8 km per minute and another train travelling at 100 km per hour. Which is faster?

● Changing the denomination of speed.

$1.8 \times 60 = 108$ km/h Answer: 1.8 km/h is faster

3. A cyclone is moving at 25 km per hour.

● Knowng distance, speed and time.

① How many km will the cyclone travel in 12 hours? $25 \times 12 = 300$ km

② If the speed of the cyclone does not change, how many hours will it take to move 400 km away? $400 \div 25 = 16$ hours

4. Kali takes 12 minutes to walk from her house to the school. Her speed is 70 m per minute. How far is the distance from her house to the school in km?

● Getting the distance.

$70 \times 12 = 840$ Answer: 840 metres

5. Salomie's walking speed is 60 m per minute.

● Knowng distance, speed and time.

① How many m can she walk in 15 minutes if she maintains this speed? $60 \times 15 = 900$ Answer: 900 metres

② How many kilometres per hour (km/h) can she walk? $60 \times 60 = 3600$ Answer: 3.6 km

③ The distance between Salomie and her aunty's house is 16.2 km. How many hours and minutes will it take for her to get to her aunty's house? $16200 \div 60 = 270$ mins

Answer: 4 hours 30 minutes

Lesson Flow

1 Complete Exercise 1 ① - ②.

S Calculate the speed for bus A and B.
T Confirm students' answers.

2 Complete Exercise 2.

S Calculate speed to complete filling in the table and compare them.
T Confirm students' answers.

3 Complete Exercise 3 ① - ②.

S Answer the questions by calculating the speed and distance.
T Confirm students' answers.

4 Complete Problem 1.

S Read and understand the problem and solve it by calculating the speed.
T Confirm students' answers.

5 Complete Problem 2.

S Solve the problem by comparing speed to find which train is faster.
T Confirm students' answers.

6 Complete Problem 3 ① - ②.

S Read and understand the problem and solve questions ① and ②.
T Confirm students' answers.

7 Complete Problem 4.

S Solve the problem.
T Confirm students' answers.

8 Complete Problem 5 ① - ③.

S Read and understand the problem and solve the question.
T Confirm students' answers.

9 Complete the Evaluation Test

TN Use the attached evaluation test to conduct assesment for your class after finishing all the exercises and problems as a seperate lesson.
S Complete the Evaluation Test.

End of Chapter Test **Date:**

Chapter 9: Speed	Name:	Score / 100

1. Find distance, speed or time taken. [3 x 20 marks = 60 marks]

(1) Distance for a person to walk for 3 hours in 4 km per hour.

$3 \times 4 = 12$

Answer: 12 km

(2) Speed of a bicycle travelling 8.4 km in 24 minutes.

$8.4 \div 24 = 0.3$

$8400 \div 24 = 300$

0.3 km/min or 300 m/min

Answer: 300 m/min

(3) Time taken for a bus travelling 1 km in a speed of 20 m per second.

$1000 \div 20 = 50$

Answer: 50 seconds

2. An airplane travels 2600 km in 4 hours. How many hours does it take to travel 3900 km? [20 marks]

$2600 \div 4 = 650$

$3900 \div 650 = 6$

Answer: 6 hours

3. The speed of a car is 20 m per second. Find the speed per minute and per hour. [2 x 10 marks = 20 marks]

$20 \times 60 = 1200$

$1.2 \times 60 = 72$

Speed per minute: 1200 m per minute

Speed per hour: 72 km per hour

End of Chapter Test **Date:**

Chapter 9: Speed	Name:	Score / 100

1. Find distance, speed or time taken. [3 × 20 marks = 60 marks]

(1) Distance for a person to walk for 3 hours in 4 km per hour.

Answer:

(2) Speed of a bicycle travelling 8.4 km in 24 minutes.

Answer:

(3) Time taken for a bus travelling 1 km in a speed of 20 m per second.

Answer:

2. An airplane travels 2600 km in 4 hours. How many hours does it take to travel 3900 km? [20 marks]

Answer:

3. The speed of a car is 20 m per second. Find the speed per minute and per hour. [2 × 10 marks = 20 marks]

Speed per minute: Speed per hour:

Chapter 10 Volume

1. Content Standard

6. 2. 4. Students will be able to investigate the process of calculating the volume of prisms and cylinders using other perimeters and find the volume and have confidence using the formula.

2. Unit Objectives

- To calculate volume of solid shapes.
- To think about how to find the volume of prisms and cylinders.
- To determine the volume of a prism and cylinder by calculation of base and height.

3. Teaching Overview

Students learned the formula to find the volumes of cubes and quadrangular prisms.
In this unit, students will learn generalization of finding the volume of solids.

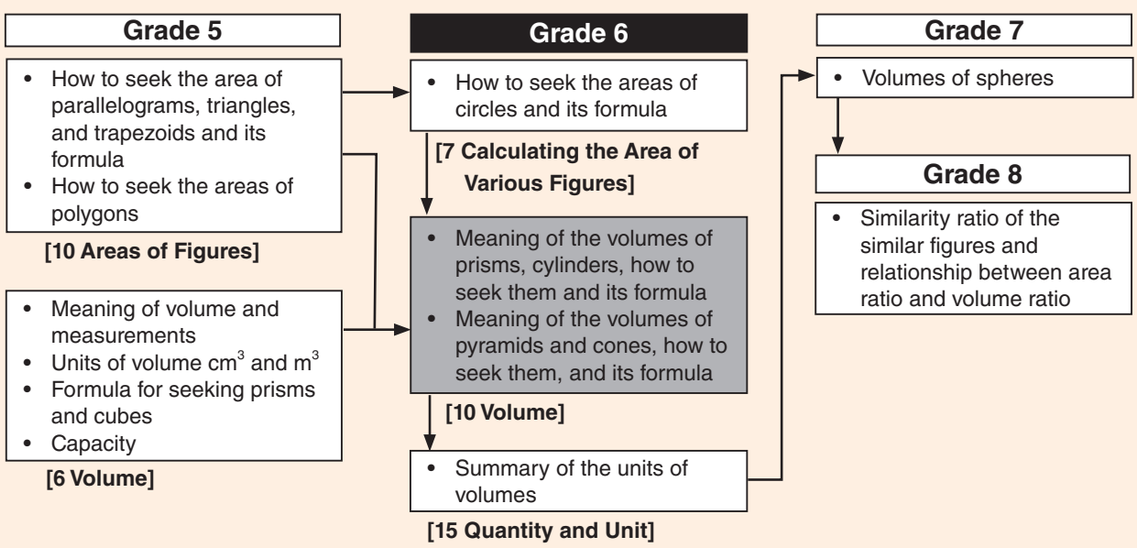
Volume of Prisms :

Students already learned the formula for finding the volume of a prism as length × width × height.
In this topic, it will be generalised as base area × height.

Volume of Cylinders :

Students are to find out that the way of interpreting the formula for finding the area of prisms will be applied for cylinders.

4. Related Learning Contents



Unit 10

Unit: Volume
Sub-unit: 1. Volume of a Prism
Lesson 1 of 2

Textbook Page : 086
Actual Lesson 067

Sub-unit Objectives

- To understand how to find the volume of prisms.

Lesson Objectives

- To find out the volume formula by applying the idea of base and their layers.

Prior Knowledge

- Formula for area and volume of cubes and quadrangular prisms.

Preparation

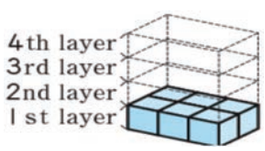
- Sample cubes and rectangular boxes.

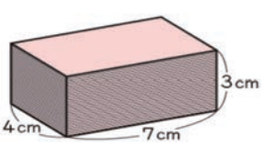
Assessment

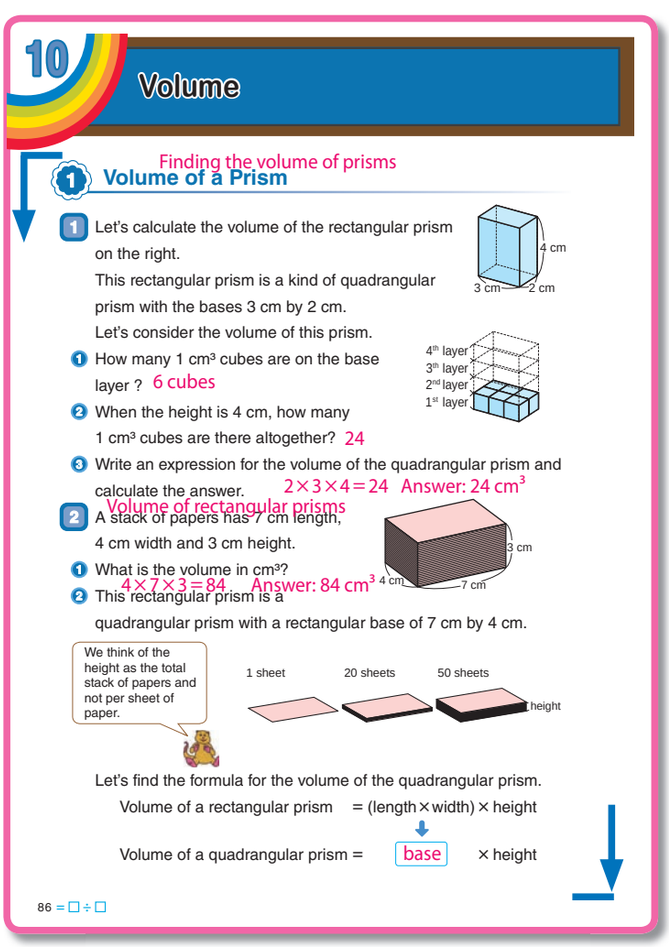
- Explain how to find the volume with base area and idea of layers. F
- ECalculate the volume of the quadrangular prisms. F
- Explain the formula for finding the volume of prisms. S

Teacher's Notes

Quadrangular prism has quadrilateral on their base. It may be a square, rectangle or regular quadrilateral.
If the base of the prism is not a square or rectangle we cannot use the idea of unit cube, but if we use the base area, we can calculate the volume, since the area is similar to the number of cubes in the first layer.






10 Volume

Finding the volume of prisms
1 Volume of a Prism

1 Let's calculate the volume of the rectangular prism on the right.
This rectangular prism is a kind of quadrangular prism with the bases 3 cm by 2 cm.
Let's consider the volume of this prism.
1 How many 1 cm³ cubes are on the base layer ? 6 cubes
2 When the height is 4 cm, how many 1 cm³ cubes are there altogether? 24
3 Write an expression for the volume of the quadrangular prism and calculate the answer. 2×3×4=24 Answer: 24 cm³

4 cm, 3 cm, 2 cm

4th layer, 3th layer, 2nd layer, 1st layer

Volume of rectangular prisms
2 A stack of papers has 7 cm length, 4 cm width and 3 cm height.
1 What is the volume in cm³?
2 This rectangular prism is a quadrangular prism with a rectangular base of 7 cm by 4 cm.
4×7×3=84 Answer: 84 cm³

3 cm, 4 cm, 7 cm

We think of the height as the total stack of papers and not per sheet of paper.

1 sheet, 20 sheets, 50 sheets, height

Let's find the formula for the volume of the quadrangular prism.
Volume of a rectangular prism = (length × width) × height
Volume of a quadrangular prism = base × height

86 = □ ÷ □

Lesson Flow

1 Find the volume of prisms by using the idea of unit cube.

T/S 1 Read and understand the given situation.

TN Find the volume of prism by using the idea of unit cube.

T 1 Let students to explain how to find the volume of the first layer of cubes.

S Number of cubes in the base first layer is 6.

T 2 Ask students how to find the total number of 1 cm^3 cubes when the height is 4 cm.

S Think of the height as the total number of layers. Volume of 1st layer is 2 × 3 = 6 cubes. There are 4 layers. 6 cubes × 4 layers = 24 cubes. Volume of requtanguler prism is 24 cm^3 .

T 3 Ask students to write an expression for the volume of a quadrangular prism.

S Think about the mathematical expression of volume of the quadrangular prism.
Number of cm^3 in the base layer × number of layers.
Expected Expressions: number of cubics in base layer × number of layers.

T Introduce the Main Task. (Refer to the BP)

2 Think about how to find the volume of a quadrangular prism.

T/S 2 Read and understand the given situation.

S 1 What is the volume in cm3?.

TN Explain what is quadrangular prism. Refer to the teacher's notes.

S Calculate 4 × 7 × 3 = 84 cm^3.

T 2 What is the relationship between the 1st layer and the area of base?

S The relationship between the 1st layer and the area of base is the same.

T Confirm the area by multiplying the **base area × height** to calculate the volume for the given stacks.
1 sheet, 20 sheets and 50 sheets.

S Write the formula for rectangular prism.
Volume = length × width × height
Volume of Quadrangular prism,
V = base × height

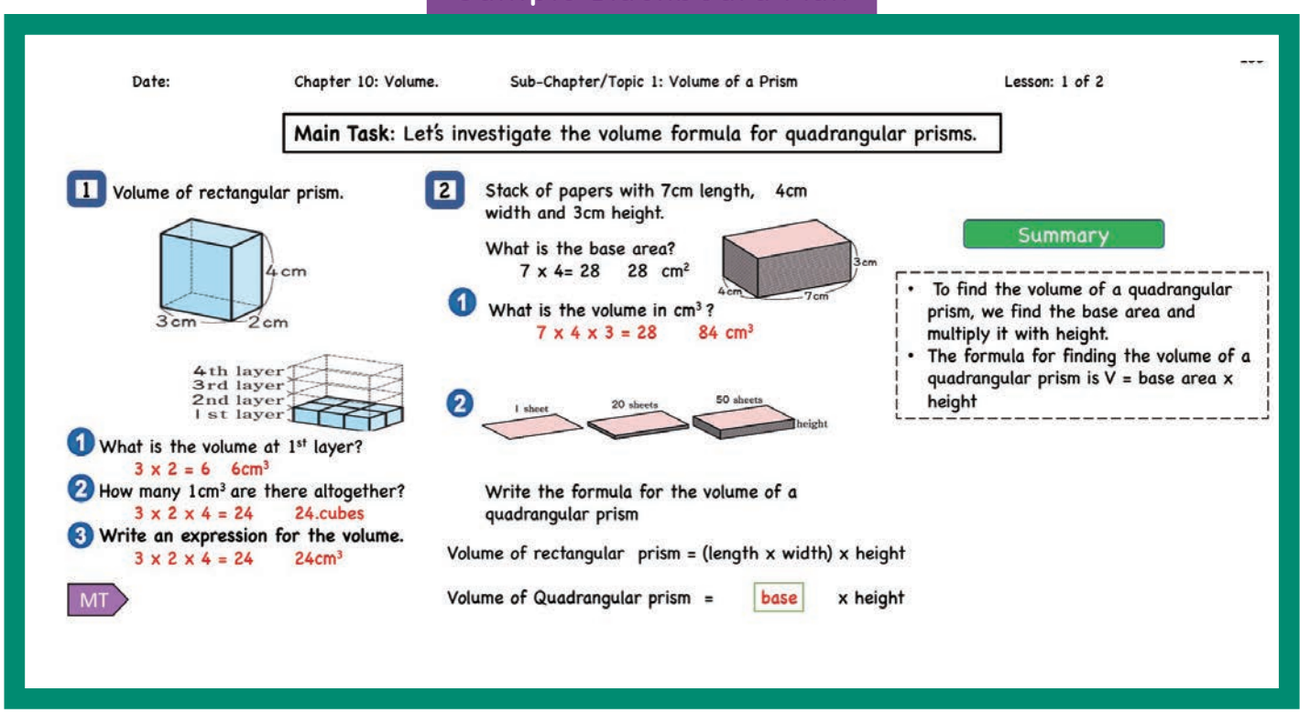
3 Summary

T What have you learned in this lesson?

S Present ideas on what they have learned.

T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan



Unit 10: Unit: Volume
Sub-unit: 1. Volume of a Prism
Lesson 2 of 2

Textbook Page : 087
Actual Lesson 068

Lesson Objectives

- Think about and find the volume of triangular prisms or various prisms based on the quadrangular prism.

Prior Knowledge

- How to find the area of the triangle and trapezoid.
- How to find the volume of the quadrangular prisms.

Preparation

- Diagrams of Prisms

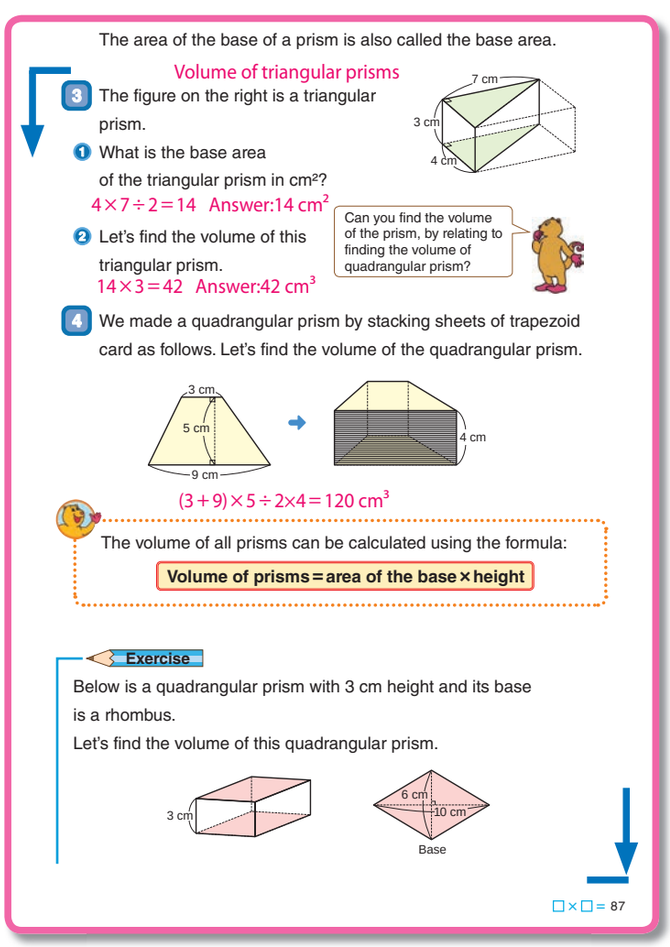
Assessment

- Find the volume of triangular prism. F
- Find the volume of various prisms by applying the formula of quadrangular prisms. F
- Solve the exercises correctly. S

Teacher's Notes

Task 3 can be solved by applying volume of triangular prism with the triangle as the Area of Base.
Students apply the formula for area of rectangles as the area of base then half the volume of the quadrangular prism.
Task 4 and the exercises both have a quadrangular base.
It is easier to find the volume when the area of base is found.

Students should understand the following as a prior knowledge for learning this content
• Meaning of formula for area of triangle in Grade 5.
The bottom of the triangular prism and the side of the quadrangular pyramid are triangular shape.
Methods for determining the area of a square or polygon is based on the method for finding the area of a triangle.
• Identifying a triangle height correctly without any misunderstanding
Capturing the height in a solid accurately is the basis for determining the volume.
• Finding an area of circle correctly using formula.


The area of the base of a prism is also called the base area.

Volume of triangular prisms

3 The figure on the right is a triangular prism.

1 What is the base area of the triangular prism in cm²?
4×7÷2=14 Answer:14 cm²

2 Let's find the volume of this triangular prism.
14×3=42 Answer:42 cm³

Can you find the volume of the prism, by relating to finding the volume of quadrangular prism?

4 We made a quadrangular prism by stacking sheets of trapezoid card as follows. Let's find the volume of the quadrangular prism.

(3+9)×5÷2×4=120 cm³

The volume of all prisms can be calculated using the formula:

Volume of prisms = area of the base × height

Exercise

Below is a quadrangular prism with 3 cm height and its base is a rhombus.
Let's find the volume of this quadrangular prism.

□×□= 87

Lesson Flow

1 Review the previous lesson.

2 Find the volume of the triangular prism.

T/S 3 Read and understand the given situation.
T Ask students to observe the shape and name the shape and the shape of its base.
S The base shape is a triangle therefore it is a triangular prism.
T Introduce the Main Task. (Refer to the BP)
T 1 What is the base area of the triangular prism in cm^2?
S $(7 \times 4) \div 2 = 14$ Answer 14 cm^2
T 2 What is the volume of this triangular prism?
S It is the same as the volume of the quadrangular prism which is base area × height.
Answer: $14 \times 3 = 42$ 42 cm^3
TN Refer to the Kapul to relate when finding the volume of the quadrangular prism.
S From the drawing, the volume of the triangular prism is half of quadrangular prism.
S Base area × height = $(4 \times 7) \times 3 = 84$ (cm^3)
Triangular prism is a half of it. $84 \div 2 = 42$,
Answer is 42 cm^3 is the same as the **base area × height**.

3 4 Find the volume of the quadrangular prism with a trapezoid base.

T/S Read and understand the given situation.
T How can we find the volume?
S It's the same as task 3, Base area × height.
T How can we find the area of trapezoid?
S (Upper base + lower base) × height ÷ 2
S The area of base of trapezoid is
$(3 + 9) \times 5 \div 2 = 30$ 30 cm^2,
The volume is $30 \times 4 = 120$ Answer: 120 cm^3

4 Important Point

T/S Explain the important point in the box .

5 Complete the Exercise.

S Complete the exercise.
T Confirm students' answers.

6 Summary

T What have you learned in this lesson?
S Present ideas on what they have learned.
T Use students' ideas to confirm important concepts of this lesson.

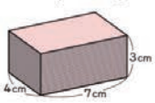
Sample Blackboard Plan

Date: Chapter 10: Volume Sub-Chapter/Topic: Volume of a Prism Lesson: 2 of 2

Main Task: Let's investigate the volume of the triangular prism.

Review

Volume of quadrangular Prism

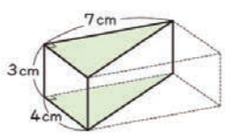


Calculate the volume of the quadrangular prism
Base area 4 x 7 = 28
A= 28 cm^2

Volume
V= base area x height
= 4 x 7 x height
= 28 x 3
= 84 cm^3
Base Area
A= 84 cm^3

MT

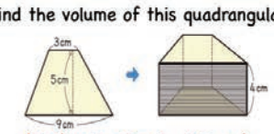
3 Think about how to find the volume of this triangular prism



1 What is the base area of the triangular prism in cm^2?
4x7÷2 = 14 Answer:14 cm^2

2 Find the volume of this triangular prism.
Volume of triangular prism = base area x height = 14 x 3 = 42
Volume 42cm^3

4 Find the volume of this quadrangular prism



$(3+9) \times 5 \div 2 \times 4 = 120$ cm^3

Volume of prism is found by calculating the base area x the height
V= Base area x height

Exercise

(Refer to TM for Questions and Answers)

Summary

To find the volume of all prisms, we use the formula:
Volume of prisms = base area x height.

Unit 10

Unit: Volume
Sub-unit: 2. Volume of a Cylinder
Lesson 1of 2

Textbook Page : 088
Actual Lesson 069

Lesson Objectives

- To find out the volume formula of cylinder by applying the idea of unit cube and the layers made.
- Calculate the volume of cylinder using volume formula V= area of base × height.

Prior Knowledge

- Formula for volume of prism is often written as V = base area × height.
- How to calculate volumes of rectangular prisms.

Preparation

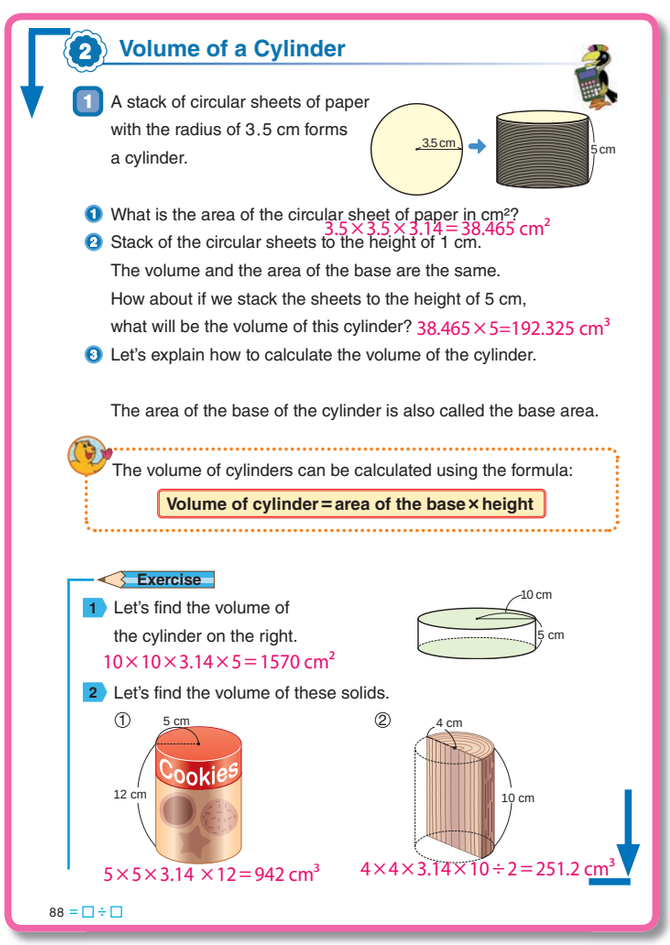
- Diagram for task 1
- Stack of the circular sheet

Assessment

- Find the base area of the cylinder by determining its radius and height. F
- Calculate the volume of a cylinder by applying the formula base area × height. F S
- Solve the exercises correctly. S

Teacher's Notes

For students to understand how to find the volume of a cylinder, the key focus should be to determine the base area in the bottom layer and the height.
The base is a circle. The formula is $A = \pi r^2$. It's necessary to help and confirm thoroughly with them to correctly calculate it.



2 Volume of a Cylinder

1 A stack of circular sheets of paper with the radius of 3.5 cm forms a cylinder.

3.5 cm, 5 cm

1 What is the area of the circular sheet of paper in cm²?
3.5 × 3.5 × 3.14 = 38.465 cm²

2 Stack of the circular sheets to the height of 1 cm.
The volume and the area of the base are the same.
How about if we stack the sheets to the height of 5 cm,
what will be the volume of this cylinder? 38.465 × 5 = 192.325 cm³

3 Let's explain how to calculate the volume of the cylinder.

The area of the base of the cylinder is also called the base area.

The volume of cylinders can be calculated using the formula:

Volume of cylinder = area of the base × height

Exercise

1 Let's find the volume of the cylinder on the right.
10 × 10 × 3.14 × 5 = 1570 cm²

10 cm, 5 cm

2 Let's find the volume of these solids.

① 5 cm, 12 cm, Cookies
5 × 5 × 3.14 × 12 = 942 cm³

② 4 cm, 10 cm
4 × 4 × 3.14 × 10 ÷ 2 = 251.2 cm³

88 = □ ÷ □

Lesson Flow

1 Review the previous lesson.

2 Think about how to find out the volume of a cylinder.

T/S: 1 Read and understand the given situation.
T Introduce the Main Task. (Refer to the BP)
T "If we build up many circular sheets of paper, what can we form?" Demonstrate how to stack sheets of paper.
S Build a cylinder.
T 1 What is the area of the circular sheet of paper with a radius of 3.5 cm.
S Area of a circle = radius × radius × 3.14
$A = 3.5 \times 3.5 \times 3.14 = 38.465\ (cm^2)$
T 2 Ask the students how much is the volume if they build the sheets up to the height of 5 cm.
S $38.465 \times 5 = 192.325$ Answer: $192.325\ cm^3$

3 3 Think about how to calculate the volume of a cylinder.

T Confirm students' calculation results and how to find the volume of a cylinder.
S We can find the volume of a cylinder using same way of finding quadrateral prism.
(V) = base area (circle) × height

4 Important Point

T/S Explain the important point in the box .

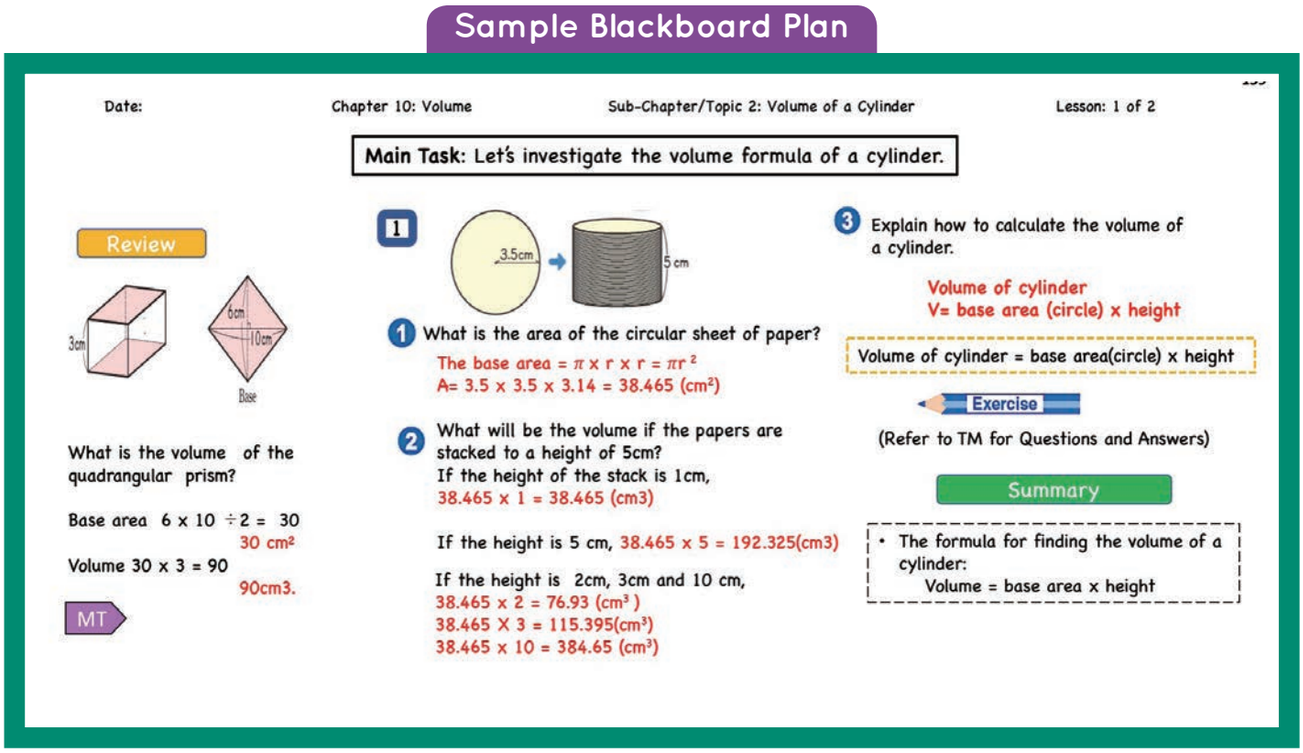
5 Complete the Exercise.

S Solve the exercises.
T Confirm students' answers.

6 Summary

T What have you learned in this lesson?
S Present ideas on what they have learned.
T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan



Unit 10: Unit: Volume
Sub-unit: 2. Volume of a Cylinder
Lesson 2 of 2

Textbook Page : 089
Actual Lesson 070

Lesson Objectives
- To investigate the volume of cylinder and pyramid.

Prior Knowledge
- Formula for volume of a cylinder

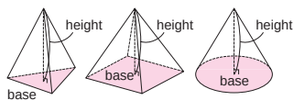
Preparation
- Images for blackboard displays

Assessment
- Investigate the volume of cones and pyramids by comparing to a cylinder and prism. F
- Explain the formula for the volume of the cone and pyramids. S

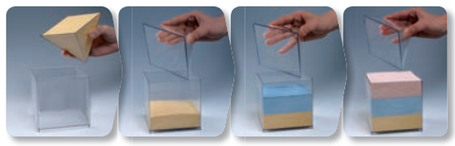
Teacher's Notes
Students should understand how to find the volume of a pyramid and cone by investigating how to derive the formulae.
The volume of pyramid or cone is $\frac{1}{3}$ times the volume of a prism or cylinder.
Volume of:
Cone $= \frac{1}{3} \times 3.14 \times r \times r \times h$
Pyramid $= \frac{1}{3} \times$ base area $\times$ height
It is good to encourage students to think about how to experiment regardless of whether you can actually implement it or not. Students will suggest various ideas such as using clay, using soil and so on. It may also be good to try it as homework.

Comparing Volumes of Various Solids

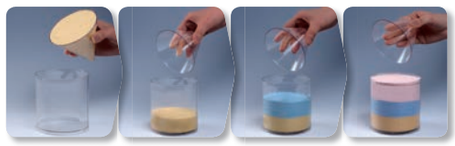
The figures below are called pyramids and cones.
The base of pyramids are polygons such as the pentagon.



2 Let's investigate and compare the volume of the pyramid with that of the cube when their bases and heights are the same.



3 Let's investigate and compare the volume of a cone with that of a cylinder when their bases and heights are the same.



4 From the experiment above, what did you discover?
Let's discuss.

5 Nick used the formula to calculate the volumes of pyramids and cones as shown.
Let's fill in the ☐ with numbers and discuss what he thought.
Volume of pyramid or cone = Area of the base × height × $\frac{1}{\square}$

Lesson Flow

1 Review the previous lesson.

2 Comparing volumes of the shapes of pyramids and cones.

T/S: Read and understand the given situation.
T Describe the pyramid and cone by referring to the pictures in the textbook.
S Understand the shape of pyramids and cones.
T Introduce the Main Task. (Refer to the BP)

3 2 Compare the volume of pyramid and the cube.

S Observe the textbook and think about what is happening.
TN: The base and height must be the same for comparison.
T How are they comparing?
S Fill sand in the pyramid and transfer the sand to the cube. Count how many times they can be able to pour sand into the cube to fill it up.
T How many times more is the size of the cube compared to the size of pyramid?
S 3 times.

4 3 Compare the volume of cone and cylinder.

S Observe the textbook and think about what is happening.
TN The base and height must be same in comparison.
T How are they comparing?
S Fill sand in the cone and transfer the sand to the pyramid. Count how many times they can be able to pour sand into the cylinder to fill it up .
T How many times more is the size of the cylinder compared to the size of cone?
S 3 times.

5 4 Discuss the findings.

S Discuss their findings and share with the class.
S The volume of the prism and cylinder is 3 times more than the pyramid and cone.
The volume of both the pyramid and the cone is $\frac{1}{3}$ the volume of prism and cylinder.

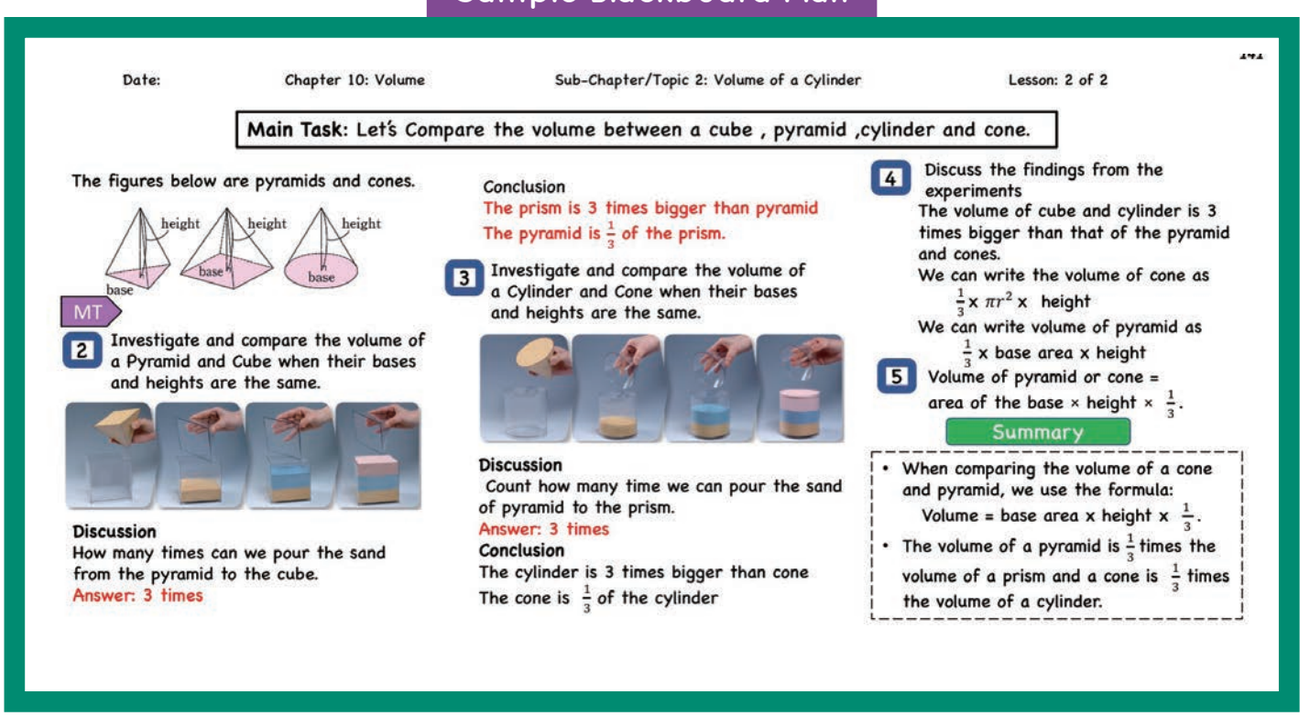
6 5 Understanding the formula for the volume of pyramid and cone.

T/S Conclude that the volume of pyramid or cone is as follows.
Volume of pyramid or cone = area of the base × height × $\frac{1}{3}$.

7 Summary

T What have you learned in this lesson?
S Present ideas on what they have learned.
T Use students' ideas to confirm the important concepts of this lesson.

Sample Blackboard Plan



Unit 10: Unit: Volume
Exercise, Problems and Evaluation
Lesson 1 and 2 of 2

Textbook Page : 090 and 091
Actual Lesson 71 and 72

Lesson Objectives
- To confirm their understanding on the concepts they learned in this unit by completing the Exercise, Problem and Evaluation Test confidently.

Prior Knowledge
- All the contents learned in this unit of Volume.

Preparation
- Evaluation Test.

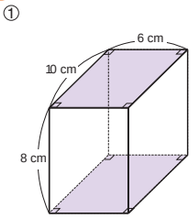
Assessment
- Solve the exercises and problems correctly. F S

Teacher's Notes
This is the last lesson of Chapter 10.
Students should be encouraged to use the necessary skills learnt in this unit to complete all the exercises and solve the problems in preparation for the evaluation test.
The test can be conducted as assesment for your class after finishing all the exercises.
Use the attached evaluation test to conduct assesment for your class after finishing all the exercises, problems and review as a seperate lesson.

EXERCISE

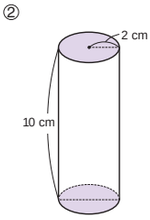
1 Let's find the volumes of the solids below. Pages 86 to 88

①



480 cm³

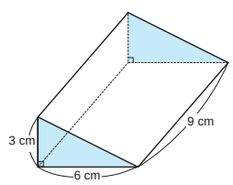
②



125.6 cm³

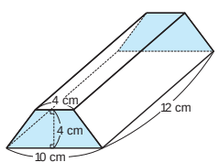
2 Let's find the volumes of the following solids. Pages 87 to 89

①



81 cm³

②



336 cm³

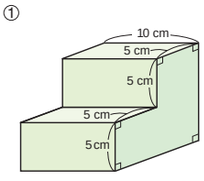
Let's calculate. Grade 5 Do you remember?

① 1.2×3 3.6 ② 3.7×3 11.1 ③ 2.5×4 10
④ 5.1×1.2 6.12 ⑤ 4.8×3.3 15.84 ⑥ 6.2×5.1 31.62
⑦ 1.87×7 13.09 ⑧ 2.46×1.8 4.428 ⑨ 9.72×7.3 70.956

PROBLEMS

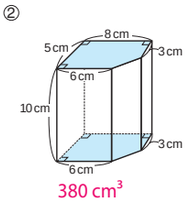
1 Let's find the volume of the solids below.
● Understanding how to find the volume of prism.

①



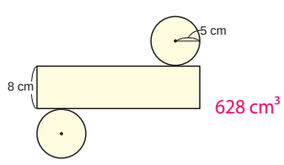
750 cm³

②



380 cm³

2 Let's find the volume of the solid figure constructed from the net shown.
● Understanding the volume of solid from the net.



628 cm³

2 Let's find the volume of a 20 t coin.

r = 2.8 ÷ 2 = 1.4
1.4 × 1.4 × 3.14 = 6.154
6.154 × 0.2 = 1.23 cm³

90 = □ ÷ □

□ × □ = 91

Lesson Flow

1 Complete Exercise ① and ②.

S Calculate the volume for the solids ① and ②

2 Complete the Do You Remember exercise.

S Calculate the Decimal number × Whole number, Decimal number × Decimal number.

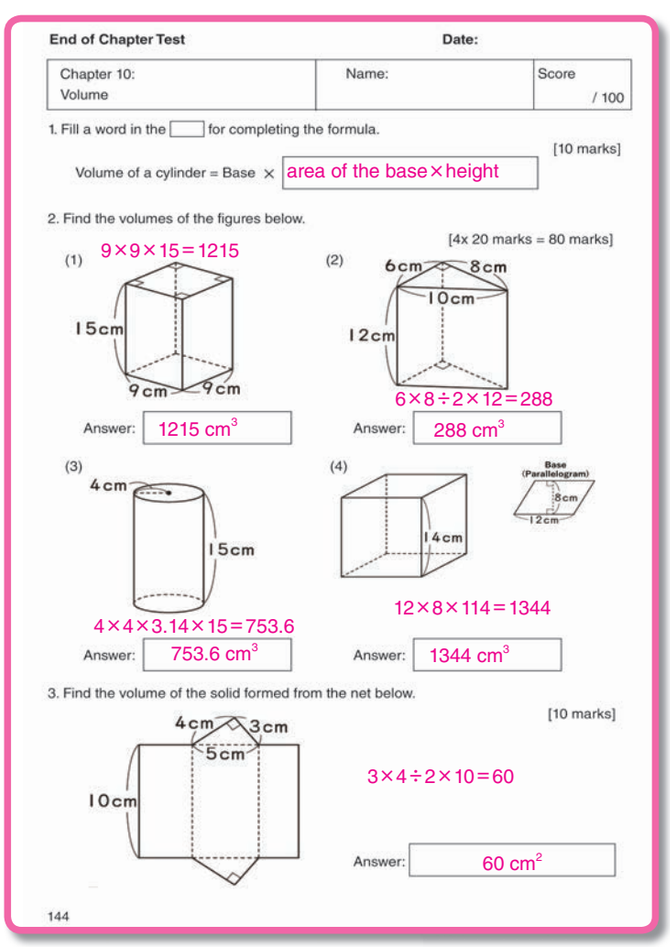
3 Solve Problems ① to ③.

S ① Solve the problems by finding the volume of solids ① and ②.
② Solve the problem by studying the net of the solid and calculate the volume.
③ Solve the problems by finding the volume of solids.

4 Complete the Evaluation Test.

TN Use the attached evaluation test to conduct assesment for your class after finishing all the exercises and problems as a seperate lesson.

S Complete the evaluation test.



End of Chapter Test **Date:**

Chapter 10: Volume	Name:	Score / 100

1. Fill a word in the ☐ for completing the formula. [10 marks]

Volume of a cylinder = Base × area of the base × height

2. Find the volumes of the figures below. [4x 20 marks = 80 marks]

(1) 9×9×15=1215

Answer: 1215 cm^3

(2)

6×8÷2×12=288

Answer: 288 cm^3

(3)

4×4×3.14×15=753.6

Answer: 753.6 cm^3

(4)

12×8×114=1344

Answer: 1344 cm^3

3. Find the volume of the solid formed from the net below. [10 marks]

3×4÷2×10=60

Answer: 60 cm^2

144

End of Chapter Test **Date:**

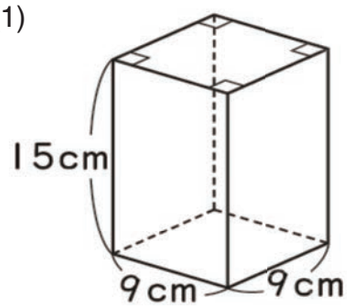
Chapter 10: Volume	Name:	Score / 100

1. Fill a word in the ☐ for completing the formula. [10 marks]

Volume of a cylinder = Base × ☐

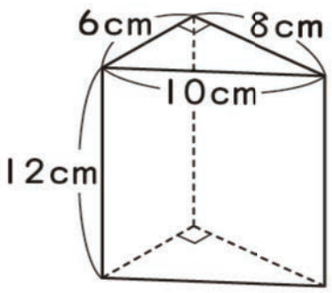
2. Find the volumes of the figures below. [4 × 20 marks = 80 marks]

(1)



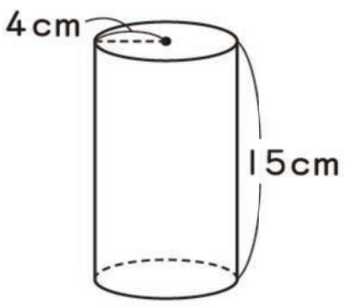
Answer: ☐

(2)



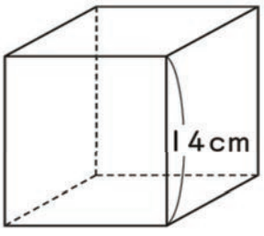
Answer: ☐

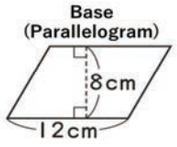
(3)



Answer: ☐

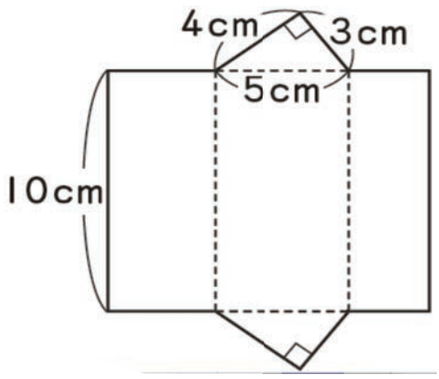
(4)





Answer: ☐

3. Find the volume of the solid formed from the net below. [10 marks]



Answer: ☐