Mathematics

Teacher Guide

Primary
Grade 5

Standards Based

Papua New Guinea

Department of Education

Mathematics

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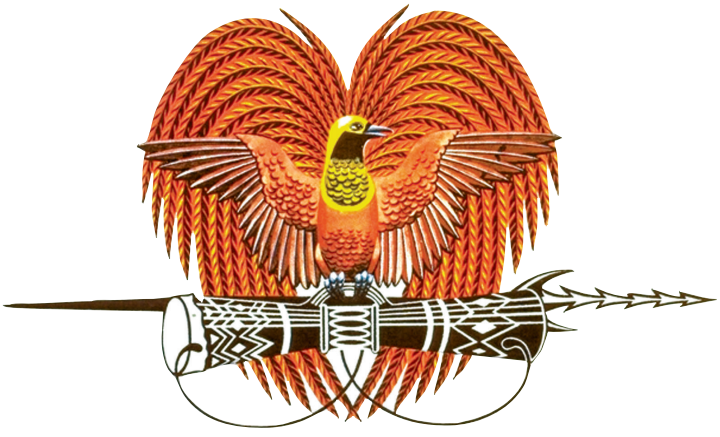

Papua New Guinea
Department of Education

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Secretary's Message

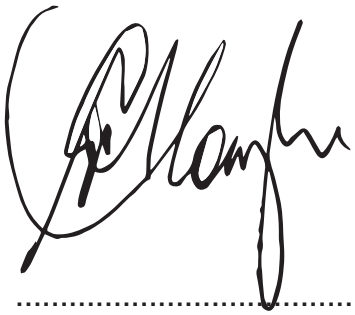
This Mathematics Teacher Guide for Grade 5 was developed as a support document for the implementation of Mathematics syllabus for grades 3, 4 & 5. The document provides guidelines for teachers on how to plan and program teaching and learning activities. It also contains sample guided lessons and assessments tasks with suggested teaching and learning strategies that teachers can use to work towards the achievement of content standards in the syllabus.

The importance of mathematics curriculum is to ensure that all students will achieve mathematical standards of the 21st century that will serve them well in their lives and help them to compete locally and globally. The curriculum will engage learners to be mathematically literate and will think critically and creatively. It is therefore vital for the mathematics curriculum to support every learner to reach their full potential.

The Teacher Guide reflects the essential knowledge, skills, attitudes and values that students are expected to acquire and demonstrate at the end of Grade 5. It is designed to promote a firm understanding of practical everyday mathematical concepts, thus raising the standards in mathematics. It also provides an excellent vehicle to train the mind, and to develop its capacity to think logically, abstractly, critically and creatively.

Teachers are encouraged to read this teacher guide carefully to become familiar with the content so that they can be confident to try out new concepts and strategies and to teach the content well. They can also adjust to suit the needs of their students.

I commend and approve this Grade 5 Mathematics Teacher Guide to be used in all Primary Schools throughout Papua New Guinea.



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DR. UKE W. KOMBRA, PhD
Secretary for Education

Introduction

This Teacher Guide must be used together with the Grades 3, 4 and 5 Mathematics Syllabus in teaching and learning mathematics. It provides guidelines about how to plan and program teaching and learning for Mathematics with sample yearly programs. Further expanded and detailed descriptions for the content standards with sample teaching contents in which teachers can use to work towards the achievement of the content and performance standards.

Purpose

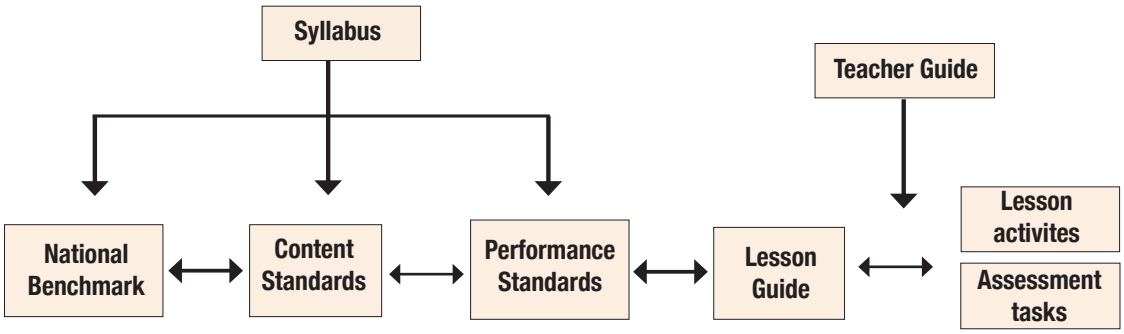
The purpose of the Grade 5 Mathematics Teacher Guide is to assist teachers deliver the mathematics content standards stated in the syllabus.

How to Use the Teacher Guide

The teacher guide must be used side by side with the syllabus when planning and teaching Mathematics lessons. It is also vital for you as a teachers consider about;

- how the lesson will be delivered,
- the time required to undertake different activities,
- how to engage students so that learning is active and participatory,
- the materials and resources required for the lesson,
- how the blackboard will be organized and structured,
- the depth of knowledge to be acquired,
- the necessary skills and attitudes to model,
- how to assess what is taught.

The teacher guide also includes recommended knowledge, processes, skills and attitudes for each of the content standards as well as sample assessment tasks and how to record and report students' achievements. You are encouraged to select and adapt the strategies and processes illustrated in the guide to meet the needs of your students.



Links with other grade

The content of Grade 5 Mathematics is a build-up of what is covered at the elementary and Grades 3 & 4 . Thus, learning is seen more progressive than isolated as students move from one level to another. It is very important to ensure that learning is contextual so that the knowledge, understanding, skills acquired are meaningful and practical.

Introduction

Key Features

The Primary Mathematics Syllabus and Teacher Guide are based on three fundamental learning principles:

1. We learn best when we build new learning on what we already know
2. We learn well when we recognize an immediate use or need for what is to be learned
3. We use many ideas and skills in a coordinated way to solve real problems.

The main goal for mathematics education is to empower all students to;

Reason mathematically; communicate mathematically; solve problems using mathematics and make connections within mathematics and between mathematics and other fields.

The key features found in this teacher guide are mathematical activities, teaching and learning contents, Blackboard planning and preparation, Process of Mathematical Thinking for mathematics lessons. It is important to allow students to think about a mathematical problem, how to solve that problem and explain their ideas on how to solve the problem.

Ways of teaching Mathematics lesson
(T/L Approaches)

- Presenting of the Mathematical Problem
- Work to solve the Problem (Individual/Groups)
- Verifying the solution and
- Reflecting on the process and solution

Teaching and Learning content

The Teaching and Learning content contains the mathematical activities to nurture students' competency to think mathematically while experiencing the joy of mathematical activities as they learn the content of each domain and make connections among them.

This teacher's guide highlights Topics, subtopics, KAS, Mathematical Thinking, Teaching and Learning activities for Grade 5 Mathematics content. It explains what is to be taught and how the lesson is to be taught.
Each sub-topic has a Content standard, KAS, and teaching and learning activities provided. Teachers are required to use the KAS to develop lesson objectives for the given teaching and learning activities for each lessons.

How to use the Teacher guided lesson

The Teaching and Learning Content is organized into Teachable activities.
When using this teachers Guide you should:

- Read and understand the teaching and learning activities (contents) provided carefully.
- Plan and prepare the teaching and learning activities for the lesson, including preparation of special equipment as required by the lesson.
- Use the exercises and problems provided as assessment for the students at the end of each topic.
- Study the sample black board plan and follow the steps for the blackboard plan for each lesson and organizes your black board plan for every lesson.

Teachers are encouraged to use the sample lesson plan as a guide to plan the mathematics content provided for each Topic. A sample of how teachers can plan and use their blackboards for a mathematics lesson is also provided with the lesson.

Introduction

Sample Lesson

Below is a **sample lesson plan** of how teachers can plan their Mathematics lessons using the specific content given for each topic and sub topic.

Strand: Number and Operation
Topic: Large Numbers
Sub-topic: Large Numbers
Lesson# 01:

Content Standards: 5.1.3 Use base 10 System representation to compare and convert whole number to decimal numbers.

Lesson objectives: By the end of the lesson the students will able to read and write numbers up to 100, 000.
Materials: Number cards (1-8), PVC (Place Value Chart), base 10 place value blocks

Key Concept (KAS)
Understand the value of large numbers and how to represent them using base 10 place vale chart
Become interested in large numbers and their place value

Identify and read large numbers according to their place value
Think about how to represent Large number using base blocks

Lesson Sequence
Write 8 600, 12 407, 50,000, and 9700 on the board.
(Ask the students to identify the largest and the smallest? Which number is the smallest?
(Ans: 50,000, 8,600)

Have students read aloud what they wrote on their papers, and to explain to the class how they figured out the larger or smaller numbers.

Activity 1
Ask students, how they would read the numbers below on the place value table.

Answers
35, 813
152,038

Million	Hundred Thousand	Ten Thousand	Thousand	Hundred	Tens	Units
		3	5	8	1	3
	1	5	2	0	3	8

Introduction

Activity 2

Draw a place value table and place the numbers below in the right column.

(a) 10 000 **(b)** 4, 793 **(c)** 634, 529 **(d)** 73,476 **(e)** 874, 612

million	Hundred Thousand	Ten Thousand	Thousand	Hundred	Tens	units
		1	0	0	0	0
			4	7	9	3
	6	3	4	5	2	9
		7	3	4	7	6
	8	7	4	6	1	2

Prepartion of Board Plan

Todays lesson

Review
Read these numbers and explain their place value
8,000 ,50,000, 600,000

Let us think about how to read and write numbers larger than 100 thousand?

M	H Th	TTh	Th	H	T	U
		3	5	8	1	3
	1	5	2	0	3	8

Practice

Draw a place value table and place the numbers below in the right column

a. 10 000 b. 4, 793
c. 634, 529 d. 73,476
e. 874, 612

M	H Th	TTh	Th	H	T	U
		1	0	0	0	0
			4	7	9	3
	6	3	4	5	2	9

Introduction

Mathematical Activities for Grade 5

You can incorporate these activities into your lessons to have the mathematics lessons become;

- More students centered activities and more proactive with rich content.
- More fun to students.
- Easier to understand by students.
- More compelling and elaborative.
- More innovative with various discussions
- Creative and exploratory.
- Connected to daily life and natural phenomena.
- Easier to think about activities that relate mathematics and other subjects and Integrated Study.

Activities / Experience	**Extend their competency and deepen their understanding to represent numbers, quantities and geometric figures using various ways.**
Performance Activities	a. Use base 10 materials and place value chart to compare and understand the system of decimal numbers and whole numbers. b. Use tape diagrams to represent multiplication and division of whole numbers with decimal numbers and decimal numbers with decimal numbers. c. Compare the size of fractions and equivalent fraction using fraction measuring cup, fraction wall, number line and paper folding. d. Use tables, graphs, fraction measure cups, pictures of concrete objects, semi-concrete objects to represent the size of the two quantities and find the measure per quantity. e. Compare the area of rectangular and square garden with blocks, square papers and represent the area with numbers. f. Use square paper to design the nets to represent prism. g. Use square paper, cube units, 1 litre tanks and different sized boxes to determine the volume. h. Use 1litre tanks to determine the volume of various shaped objects and a meter cube to determine large volume. i. Investigate properties of geometrical figures such as regular polygons, circles and solids. j. Investigate and represent mathematical relations using concrete materials, pie charts, bar graphs and tables in various ways.
Assessment	1. Appreciate the use of base 10 materials and place value chart to compare and understand the system of decimal numbers and whole numbers. 2. Demonstrate the use of tape diagram with appreciation to represent multiplication and division of whole numbers with decimal numbers and decimal numbers with decimal numbers. 3. Demonstrate with appreciation the use of measuring cup, fraction wall, number line and paper folding to Compare the size of fractions and equivalent fraction 4. Use tables, graphs, fraction measure cups, pictures of concrete objects, semi-concrete objects to represent the size of the two quantities and find the measure per quantity. 5. Compare the area of rectangular and square garden with blocks, square papers and represent the area with numbers. 6. Use square paper to design the nets to represent prism. 7. Use square paper, cube units, 1 liters tanks and different sized boxes to determine the volume. 8. Use square paper, cube units, 1 liters tanks and different sized boxes to determine the volume. 9. Use 1litre tanks to determine the volume of various shaped objects and a meter cube to determine large volume. 10. Investigate properties of geometrical figures such as regular polygons, circles and solids. 11. Investigate and represent mathematical relations using concrete materials, pie charts, bar graphs and tables in various ways

Introduction

Activities / Experience	Enjoy using various ways of questioning through situations set by themselves
Performance Activities	a. Pose questions on base 10 materials and place value chart to compare and understand the system of decimal numbers and whole numbers. b. Pose questions on tape diagrams to represent multiplication and division of whole numbers with decimal numbers and decimal numbers with decimal numbers. c. Pose questions on compare the size of fractions and equivalent fraction using fraction measuring cup, fraction wall, number line and paper folding. d. Pose questions on tables, graphs, fraction measure cups, pictures of concrete objects, semi-concrete objects to represent the size of the two quantities and find the measure per quantity. e. Pose questions on compare the area of rectangular and square garden with blocks, square papers and represent the area with numbers. f. Pose questions on square paper to design the nets to represent prism. g. Pose questions on square paper, cube units, 1litre tanks and different sized boxes to determine the volume. h. Pose questions on 1litre tanks to determine the volume of various shaped objects and a meter cube to determine large volume. i. Pose questions on investigate properties of geometrical figures such as regular polygons, circles and solids. j. Pose questions on investigate and represent mathematical relations using concrete materials, pie charts, bar graphs and tables in various ways.
Assessment	1. Enjoy posing questions on comparing and understanding the system of decimal numbers and whole numbers. 2. Enjoy posing questions on tape diagrams to represent multiplication and division of whole numbers with decimal numbers and decimal numbers with decimal numbers. 3. Enjoy posing on compare the size of fractions and equivalent fraction using fraction measuring cup, fraction wall, number line and paper folding. 4. Enjoy Posing questions on tables, graphs, fraction measure cups, pictures of concrete objects, semi-concrete objects to represent the size of the two quantities and find the measure per quantity. 5. Enjoy posing on compare the area of rectangular and square garden with blocks, square papers and represent the area with numbers. 6. Enjoy posing on square paper to design the nets to represent prism. 7. Enjoy posing on square paper, cube units, 1litre tanks and different sized boxes to determine the volume. 8. Enjoy posing on 1litre tanks to determine the volume of various shaped objects and a meter cube to determine large volume. 9. Enjoy posing on investigate properties of geometrical figures such as regular polygons, circles and solids. 10. Enjoy posing on investigate and represent mathematical relations using concrete materials, pie charts, bar graphs and tables in various ways.

Introduction

Activities / Experience	Enjoy thinking about how to calculate and develop proficiency for calculation
Performance Activities	a. Calculate multiplication and division of whole numbers with decimal numbers and decimal numbers with decimal numbers. b. Calculate the population density. c. Calculate the measurement per unit quantity or amount of work per unit. d. Calculate the average. e. Find the volume of rectangular prism and cubes, large volumes and volume of various shapes. f. Add and subtract fractions with different denominators. g. Find the area of figures such as triangles and quadrilaterals. h. Find the percentage of quantities.
Assessment	1. Calculate accurately multiplication and division of whole numbers with decimal numbers and decimal numbers with decimal numbers. 2. Enjoy using formula to find area and volumes of various shapes. 3. Calculate division with and without remainders accurately 4. Calculate measurement per unit quantity or amount of work per unit accurately 5. Calculate accurately fractions with different denominators. 6. Interpret and analyses data in tables and graphs

Process of Mathematical Thinking

Mathematics has two aspects. It is both a body of knowledge and a set of processes. As processes can only be developed through content. The teachers' task is to present the selected content in a way which will assist the development of these processes.

Processes of Mathematical thinking include:

- analyzing
- classifying
- comparing
- counting
- inferring
- explaining
- estimating
- organizing
- patterning
- synthesizing
- representing.

Planning and Programming

1. Importance of planning and programming

Mathematics topics and lessons should be;

- carefully sequenced so that students have the skills and knowledge needed to complete tasks,
- more fun and enjoyed by students,
- creative and exploratory,
- require mathematical thinking,
- relevant to students needs and interests,
- inclusive for all students as much as possible,
- making links across subjects where possible,
- consistent with national education policies such as assessment policies.

2. How to Plan and Program

The planning and programming will require; yearly plan, termly plans and weekly timetable. The Grade (3) of overview illustrates a year's plan of Teaching and Learning activities for terms (1 & 2) and Terms (3 & 4). Teachers are encouraged to look carefully at each guided plan and develop daily lessons

3. Time Allocation

Mathematics is to be timetabled for 240 minutes per week for grade 5. Teachers can use the time allocation to do their timetable or program according to their school program. Topics and activities may vary in length however; you can plan for double periods of 60 minutes to complete a particular activity.

Below is a sample of how mathematics can be timetabled.

Time	Monday	Tuesday	Wednesday	Thursday	Friday
8:00 - 8:15	Assembly	Assembly	Assembly	Assembly	Assembly
8:15 - 8:30	Listening	Oral Express	Listening	Oral Expression	Listening
8:30 - 8:45	Spelling	Spelling	Hand Writing	Christian Religious Education	Talking
8:45 - 9:00	Talking	Talking	Talking		Block Time
9:00 - 9:30	Mathematics	Mathematics	Mathematics	Reading	Reading
				Reading	Reading
10:00 - 10:30	**RECESS**				
10:30 - 11:00	Mathematics	Mathematics	Mathematics	Mathematics	Mathematics
11:00 - 11:30	Science	Science	Science	Science	Wr Expression
11:30 - 12:00	Social Science	Social Science	Social Science	Science	Social Science
12:00 - 1:00	**LUNCH**				
1:00 - 1:30	Written Sentence	Written Sentence	Written Sentence	Written Sentence	Written Expression
1:30 - 2:00	Health	Health	Health	Arts	Arts
2:00 - 2:30	Arts	Block Time	PE	PE	Sport
2:30 - 3:00	PE	Arts	Block/Time		

Planning and Programming

Lesson Overview for Grade 5

Strand	Topics	Lsn #	Lesson titles
Number and Operation	Decimal Numbers and Whole Numbers	1	Comparison of Decimal Numbers and whole numbers
		2	10 Times and 100 Times of a Number
		3	$\frac{1}{10}$ and $\frac{1}{100}$ Number
		4	Exercise
Quantities and Measurement	Measurement Per Unit	5	Average
		6	Finding Mean (1)
		7	Finding Mean (2)
		8	Measurement Per Unit Quantity
		9	Population Density
		10	Weight Per Unit Quantity (1)
		11	Weight Per Unit Quantity (2)
		12	Weight Per Unit Quantity (3)
		13	Per Unit Quantity -Time (1)
		14	Per Unity Quantity - Time (2)
		15	Exercise
Number and Operation	Multiplication of Decimal Numbers	16	Whole Numbers x Decimal Numbers (1)
		17	Whole Numbers x Decimal Numbers (2)
		18	Whole Numbers x Decimal Numbers (3)
		19	Decimal Numbers x Decimal Numbers (1)
		20	Decimal Numbers x Decimal Numbers (2)
		21	Multiplication of Decimal Numbers Smaller than 1
		22	Rules of Calculation (1)
		23	Rules of Calculation (2)
		24	Exercise
Geometrical Figures	Congruence and Angles of Figures	25	Congruent Figures
		26	Congruent Triangles
		27	Congruent Quadrilaterals
		28	Draw Congruent Quadrilateral
		29	Exercise
	Angles of Triangles and Quadrilateral	30	Angles of Triangle (1)
		31	Angles of Triangles (2)
		32	Angle of Triangles (3)
		33	Angle of Quadrilaterals (1)
		34	Angles of Quadrilaterals (2)
		35	Angles of Polygons (1)
		36	Angles of Polygons (2)
		37	Anglels of Polygons (3)
		38	Exercise

Yearly Overview

Strand	Topics	Lsn #	Lesson titles
Number and Operation	Division of Decimal Numbers	39	Calculating Whole Number ÷ Decimal Numbers (1)
		40	Calculating Whole Number ÷ Decimal Numbers (2)
		41	Calculating Whole Number ÷ Decimal Numbers (3)
Number and Operation	Division of Decimal Numbers	42	Calculating Decimal Numbers ÷ Decimal Numbers (4)
		43	Calculating Decimal Numbers ÷ Decimal Numbers (5)
		44	Dividing Decimal Numbers Smaller than 1
		45	Division Problems (1)
		46	Division Problems (2)
		47	What kind of calculation would it
		48	Exercise
		49	Comparing Heights (1)
		50	Comparing Heights (2)
Quantities and Measurement	Volumes	51	Volume
		52	Units of Volume
	Formulas for Volumes	53	Formulas for Volume (1)
		54	Formulas for Volume (2)
		55	Larger Volumes (1)
	Large volumes	56	Larger Volumes (2)
		57	Larger Volumes (3)
		58	Larger Volumes (4)
		59	Volumes of Various Shapes
		60	Exercise
		61	Review (1)
	Review	62	Review (2)
		63	Equivalent Fractions
Number and Operation	Fraction	64	Comparisons of Fractions
		65	Common Denominators
		66	Finding Common Denominators
		67	Reducing Fractions
		68	Quotient and Fractions (1)
		69	Quotient and Fractions (2)
		70	Fractions, Decimal and Whole Numbers
		71	Exercise
	Fractions, Decimals and whole Numbers	72	Addition of Fractions (1)
		73	Addition of Fractions (2)
		74	Subraction of Fractions (1)
		75	Subtraction of Fractions (2)
		76	Exercise

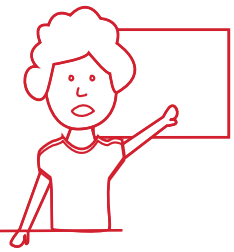
Yearly Overview

Strand	Topics	Lsn #	Lesson titles
Number and Operation	Multiplication and Division of Fractions	77	Fractions & Whole Numbers (1)
		78	Fractions & Whole Numbers (2)
		79	Fractions & whole Numbers (3)
		80	Fraction ÷ Whole Numbers (1)
		81	Fraction ÷ Whole Number (2)
		82	Fraction ÷ Whole Number (3)
		83	Fraction ÷ Whole Number (4)
		84	Exercise
Quantities and Measurement	Area Of Figures Area of Parallelograms	85	Area of Parallelogram (1)
		86	Area of Parallelogram (2)
		87	Area of Parallelogram (3)
		88	Area of Parallelogram (4)
		89	Area of Triangle (1)
	Area of Triangles	90	Area of Triangle (2)
		91	Area of Triangle (3)
		92	Area of Trapezoid
		93	Area of Rhombuses
		94	Think About How to Find the Area
		95	Exercise
Data and Mathematical Relations	Proportion	96	Two Quantities Changing Together
		97	Proportion (1)
		98	Proportion (2)
		99	Proportional (3)
		100	Proportional (4)
		101	Exercise
Geometrical Figures	Regular polygons and circle	102	Regular Polygon (1)
		103	Regular Polygon (2)
		104	Regular Polygon (3)
	Circumference and Diameters	105	Circumference and Diameter (1)
		106	Circumference and Diameter (2)
		107	Circumference and Diameter (3)
		108	Circumference and Diameter (4)
		109	Exercise
		110	Review

Yearly Overview

Strand	Topics	Lsn #	Lesson titles
Geometrical Figures	Solids	111	Prisms and Cylinders (1)
		112	Prisms and Cylinders (2)
		113	Prisms and Cylinders (3)
		114	Prisms and Cylinders (4)
		115	Sketches and Net (1)
		116	Sketches and Net (2)
		117	Sketches and Net (3)
		118	Exercise
Data and Mathematical Relations	Ratios and Graphs	119	Ratio (1)
		120	Ratio (2)
		121	The Ratio of two quantities
		122	Percentage
		123	Ratio Larger than 100%
		124	Ratio Problems (1)
	Problems Using Ratio	125	Ratio Problems (2)
		126	Graphs and Ratio
		127	Circle Graphs
		128	Solving Problems with Graphics (1)
		129	Solving Problems with Graphs (2)
		130	Exercise

TEACHING CONTENT



Sample Guided Lessons

TEACHING CONTENT - SAMPLE GUIDED LESSONS

Strand: **Number and Operations** Topic: **Decimal Numbers and Whole Numbers**

Content Standards: 5.1.3 Use base 10 system representation to compare and convert whole numbers to decimal numbers.

Teachers Notes

Listed below are the expected Attitude, Knowledge, Skills and mathematical thinking to be displayed by the students after learning this topic on Large Numbers.

Students will be able to;

Attitude

- Enjoy posing questions about decimal points and values of numbers.
- Appreciate decimal numbers and their usefulness in real life situations.

Knowledge

- Understand how that there are ways to read and write large numbers
- Understand how place value of large numbers work.
- Understand the meaning and representation of decimal numbers
- Understand the usefulness of decimal numbers

Skills

- Recognize and read decimal correctly
- Compare decimal numbers correctly in the place values
- Identify place value of a given number

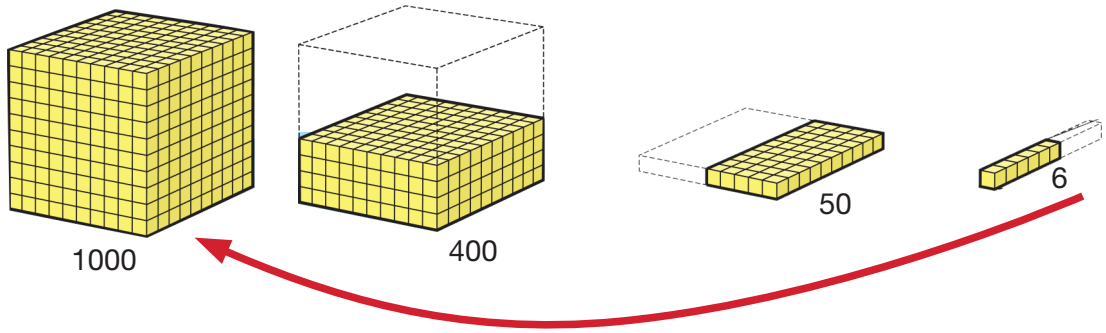
Mathematical thinking

- think about how to read and write decimal numbers
- Think how to represent and calculate decimal numbers and their use in daily life.

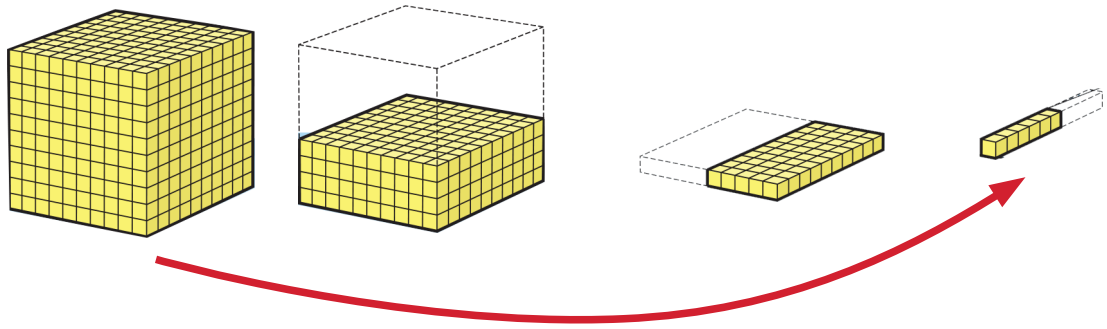
Back ground Notes

In decimal system, any number can be written by using ten basic digits 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9. In decimal system, each digit in a number has a place value, so it is also called ‘place-value system

As we move left each position is 10 times bigger and as we move right each position is 10 times smaller from hundreds to ten to ones but what if we continue past ones. What is 10 times smaller than ones? We must first put a decimal point so we know exactly where the ones position is.



10 times bigger



10 times smaller 1/10 of a number moves the decimal point 1 place to the left.
1/10 of a number moves the decimal point 2 places to the left.

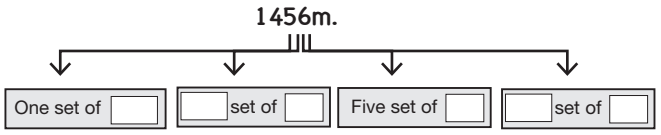
L1. COMPARISON OF DECIMAL NUMBERS AND WHOLE NUMBERS

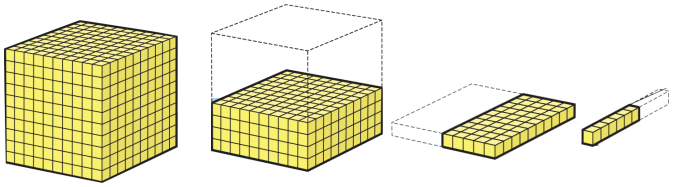
Teaching and learning Activities (60 min)

1. Think about how to compare decimal numbers and whole numbers

(a) Compare the two numbers, 1456 and 1.456 and explain the difference.

The altitude of Godan highland is 1456 m.



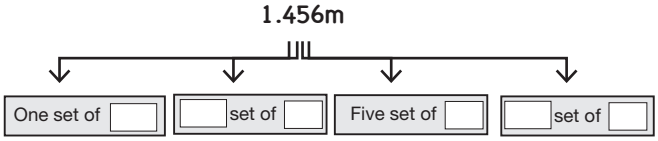


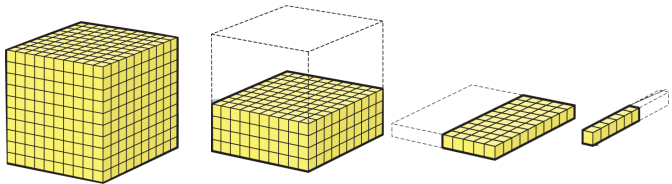
(b) Fill in the ☐ with numbers.
(c) Look at the picture of the blocks, and discuss what you have noticed with your classmates.
(d) Express each number by expression as shown below.

1456 = 1000 + 400 + 50 + 6
= 1000 x ☐ + 100 x ☐ +10 x ☐ +1 x ☐

1.456 = 1 + 0.4 + 0.05 + 0.006
= 1 x ☐ + 0.1 x ☐ + 0.01 x ☐ + 0.001 x

2. Write the decimal number 1.456 as in sets.





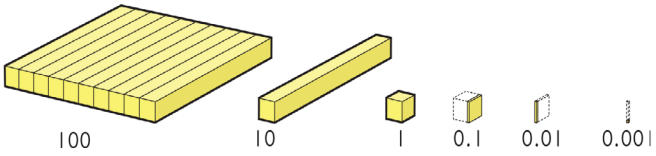
(a) Use the place value chart to write in the altitude of the highland and length of the panel.

L1. COMPARISON OF DECIMAL NUMBERS AND WHOLE NUMBERS

(b) Write each number in the table below.

Thousands	Hundreds	Tens	Ones	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$	
							m
							m

(c) Study the block and think about how to read it. Read the number.



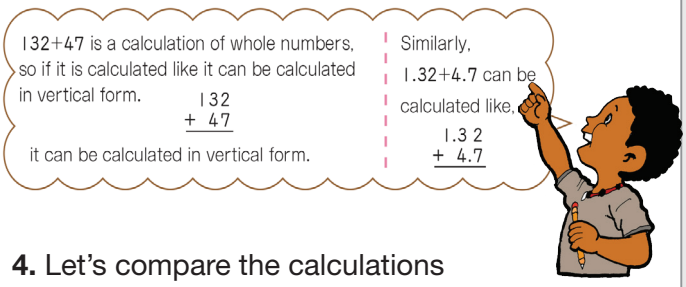
3. Let's think about comparing the system of decimal numbers and whole numbers and discuss what you have noticed with your classmates.
(a) For whole numbers, how many numbers are needed in a place for it to shift to the next higher place? Also how many equal parts must a number be divided for it to shift to the next lower place?
(b) For decimal numbers, ow many numbers are needed in a place for it to shift to the next higher place. Also how many equal parts must a number be divided for it to shift to the next lower place?

Important idea

For both whole and decimal number is shifted o the next higher place when there are 10 in a place, and a number in shifted o the next lower place when it is divided into 10 ( ).
This is the basic idea of the place value system. By using the place value
system any whole or decimal number can be expressed using the ten
0,1, 2 ….9 and a decimal point.

L1. COMPARISON OF DECIMAL NUMBERS AND WHOLE NUMBERS

(c) Think of how to calculate whole and decimal numbers.



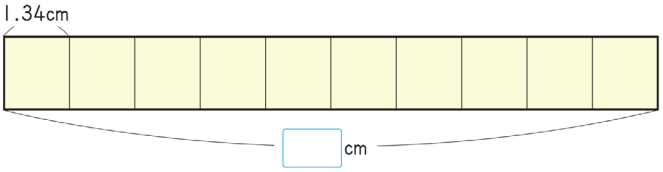
4. Let's compare the calculations
132 + 47 and 1.32 + 4. 7.

What do you think of Aoi's way of calculation?
Explain your opinions to your classmates

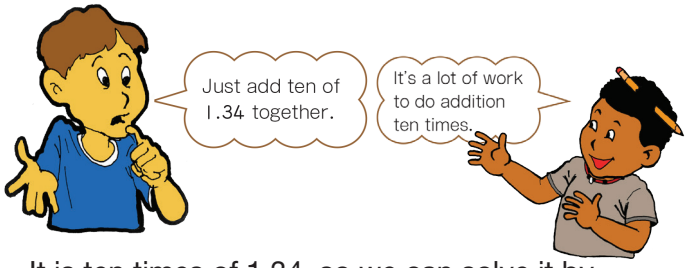
L2. 10 TIMES AND 100 TIMES OF A NUMBER

Teaching and learning Activities (60 min)

1. Think about what happens to numbers when multiplied by 10 and 100. Read and solve.
10 stickers, each of them 1.34 cm wide are line up as shown below.
How many cm is the total length?



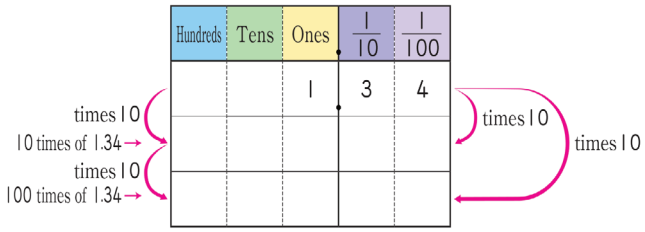
Example of students thinking and ideas



It is ten times of 1.34, so we can solve it by doing 1.34 x 10 = ☐

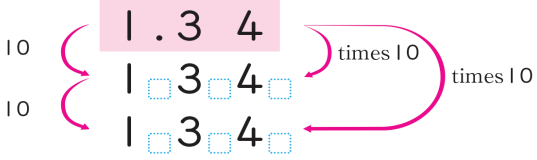
1.34
x 10

2. Write the total lengths when there are 10 stickers and 100 stickers in the table below.



3. Tell your friends what you have noticed.

4. Write in the decimal points when 1.34 is multiplied by 10 and 100.



Exercise

1. Write the numbers when 23.47 is multiplied by 10 and 100.

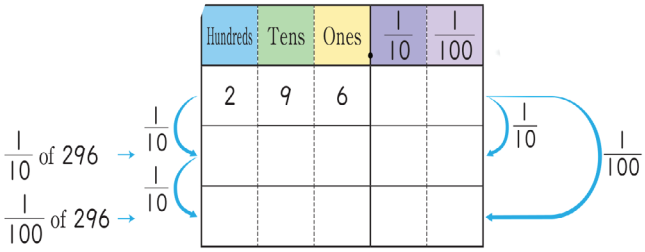
2. How many times of 8.72 are 87.2 and 872?

L.3 $\frac{1}{10}$ AND $\frac{1}{100}$ OF A NUMBER

Teaching and learning activities (60 min)

1. Let's study the number that $\frac{1}{10}$ are and $\frac{1}{100}$ of a number.

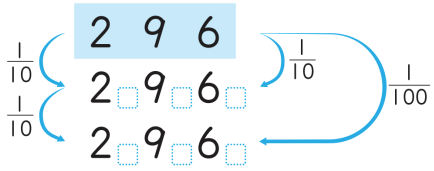
(a) Calculate and $\frac{1}{10}$ of $\frac{1}{100}$ 296, and write the answer in the table below.



$\frac{1}{10}$ **of 296** is as follows:
$\frac{1}{10}$ **of 200** is 20
$\frac{1}{10}$ of **90** is **9**
$\frac{1}{10}$ of 6 0.6
20 ÷ 9 ÷ 0.6 = 29.6
Then $\frac{1}{10}$ **of 296 is 29**

(b) What rules are there?

(c) Write the decimal points of numbers that are $\frac{1}{10}$ and of $\frac{1}{100}$ 296 in the table below.



Exercise

Answer the following questions.

(a) Write the numbers that are $\frac{1}{10}$ and $\frac{1}{100}$ of 30.84.

(b) What are 6.32 and 0.632 as a multiple of 63.2?

L.4 EXERCISE

Teaching and learning activities (30 min)

1. Fill in the ☐ with numbers.

(a) 86.1 = ☐ x 8 ÷ ☐ x 6 ÷ ☐ x 1

(b) 0. 0072 = ☐ x 7 + ☐ x 2

2. Fill in the ☐ to summarise common features on decimal Numbers and whole numbers.

(a) For both whole numbers and decimal numbers, when there are ☐ set of a number it is shifted one place higher, and when a number is divided into ☐ parts it is shifted one place lower. Whole and decimal numbers are both based on the place value system.

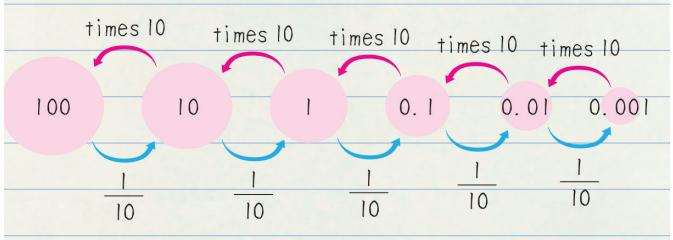
(b) Any whole or decimal number can be expressed by using the ☐ digits from 0 to 9 and decimal point.

3. Write numbers that are 10 times and 100 times of 36.05 and also write number that are $\frac{1}{10}$ and $\frac{1}{100}$ of 36.05.

An arrow diagram is used to show what we've understood.

Write what you have learned about this topic on decimal numbers in your book.

(a) Decimal numbers and whole numbers
(b) What I understood.
(c) For both whole numbers and decimal numbers, when there are 10 sets of a number, it is shifted to the next higher place value.



L.4 EXERCISE

Teaching and learning activities (30 min)

Some Facts

- A number that is 10 times or $\frac{1}{10}$ of number can be made by moving a decimal point.
  $\frac{1}{10}$ times of 1.3 is 13.4 $\frac{1}{10}$ of 1.3 is 0.13

Strand: **Measurement of Quantity** Topic: **Mean**

Content Standard: 5.2.3 Understand the meaning of mean and measurement per unit and apply it to solve problems.

Teacher's Notes

Listed below are the expected Attitude, Knowledge, Skills and mathematical thinking to be displayed by the students after learning this topic on Large Numbers.

Students will be able to;

Attitude

- Enjoy investigating and representing mathematical relations using concrete materials, pie charts, bar graphs and tables in various ways
- Appreciate ideas shared by peers on how to find mean.

Knowledge

- Understand that mean and average mean the same.
- Measured value

Skills

- Explore through practical activities to explain what mean is using graphs.
- Define what mean is using tables.
- Find the average of measured value.
- Investigate the average of measured value.
- Calculate mean using real life situations
- Identify how crowded people are in a particular area.
- Explain and work out the population density of a particular place.
- Identify, explain and calculate the weight of objects per length or area.

Mathematical thinking

- Think about how find the mean and explain what it is.
- Think about how to represent and calculate mean using real life situations.
- Think about how to calculate the average measured.

Back Ground

Average

Average – general English word

Mean – computation word (the celcel command to calculate the mean is "average (cell range)". There is basically no difference between mean and average. The mean is the average of all numbers and is sometimes called the arithmetic mean. To calculate mean, add together all of the numbers in a set and then divide the sum by the total count of numbers.

Set of scores

10, 12, 11, 15, 13, 9

Sum of scores 10 +12 + 11 + 15 + 13 + 9 = 70

Number of scores 6

Average = 70/6 = 11.67

In a question we ask what is the mean?

They are the same thing,

ie. Mean = average = $\frac{\text{sum of scores}}{\text{Number of scores}}$

L5. AVERAGE

Teaching and learning activities

(60 min)

1. Study the two tables and discuss the meaning of the two tables.
Number of laps Vagi made around the school ground

Days	Day 1	Day 2	Day 3	Day 4	Day 5	Total
Number of laps	9	7	11	6	7	40

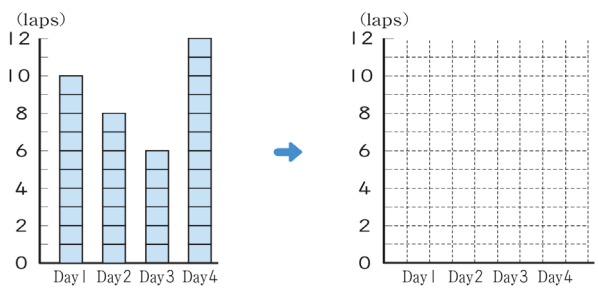
Number of laps Kip made around the school ground

Days	Day 1	Day 2	Day 3	Day 4	Day 5	Total
Number of laps	10	8	6	13	36	40

Important Point
Terms such as 'if' and 'then' are used when something is assumed or estimated. It is often used in mathematics when the conditions are altered to get the conclusion.

3. Use the tables of results above to discuss these questions ?
(a) Who had better preparations?
(b) If you look at the totals who has more runs?
(c) Why are their totals different?
(d) If Kip had not taken one day off, how many laps would he have done?

4. If Vagi and Kip had run the same number of lap's every day, how many laps would it be per day?
If we suppose that Vagi ran the same total of laps as last week, but ran the same number of laps every day, how many laps would she run per day?
If we suppose that Jonah ran the same total number of laps as last week, but ran the same amount every day, how many laps would he have run per day?



L5. AVERAGE

Teaching and learning activities

(60 min)

Exercise

Leka and Avia collected empty cans in 5 days. The tables below show the number of cans

collected each day by Leka and Aiva.
Answer the questions below.

Number of cans Leva collected

Days	Day 1	Day 2	Day 3	Day 4	Day 5	Total
Number of laps	10	16	10	14	50	40

Number of cans Aiva collected

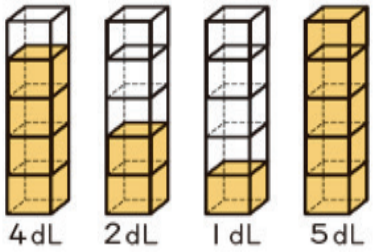
Days	Day 1	Day 2	Day 3	Day 4	Day 5	Total
Number of laps	15	20	10	5	20	70

L6. FINDING MEAN (1)

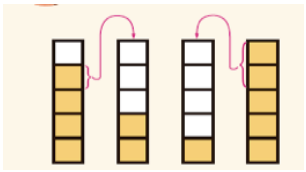
Teaching and learning activities (60 min)

The process of making different sized measured to a new measure evenly is called averaging.

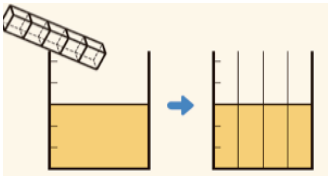
1. The containers below contain different amounts of juice. Find the average of the juice in the containers.



Expected ideas



Move from larger to smaller amount of juice



Pour all the juice together and then divide the juice among the containers

2. Think about how to calculate the average measure.

$$(4 + 2 + 5) \div 4 = \square$$

Total juice in 4 containers; number of containers; average juice per container

To average the measure for containers, we divide the total for 4 containers by 4.

Important Point.
The same number or measure which is averaged from some numbers or measure is called mean of original numbers or measure.

Mean = total ÷ number of items

L6. FINDING MEAN (1)

Teaching and learning activities (60 min)

Exercise

1. Pamela and Joseph counted the number of times they have been entering the classroom in 4 days.

Number of times Pamela entered the classroom

Days	Day 1	Day 2	Day 3	Day 4	Day 5	Total
Number of times	4	6	10	5	5	30

Number of times Joseph entered the classroom

Days	Day 1	Day 2	Day 3	Day 4	Day 5	Total
Number of times	8	4	6	6	24	30

(a) Draw graphs to represent the information in the tables.

(b) If Pamela and Joseph had the same number of times entering the classroom every day, how many times would it be per day?

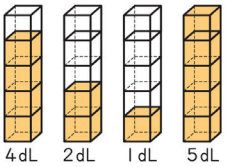
(c) Which of them stayed in the classroom more?

L7. FINDING MEAN (2)

Teaching and learning activities (60 min)

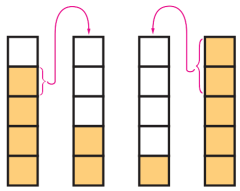
1. Demonstrate by using the 4 containers of water (same size containers) filled with different amount of water. (4ml, 2ml, 1ml,5ml).

Discuss to even the four of them so that each container has the same amount of water?

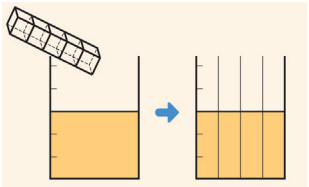


The process of making different size measurements to the new measure evenly is called averaging.

2. Explain and demonstrate how to even the four containers. There will be two ideas as shown in the two pictures below.



Move from larger to smaller amount of juice



Pour all the juice together and then divide the juice among the containers

3. Think about how to calculate the average measured.

(a) What is the total amount of water from the four containers?

(b) How many containers are there?

(c) What operation is suitable to find the aver age? What would the number sentence look like

4. Write an expression

(4 + 2 + 1 + 5) **÷ 4** **=** ☐

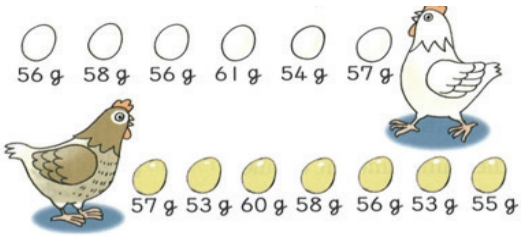
Total water in 4 containers | Number of containers | average juice per container

The same number or measure which is ***averaged*** from some numbers or measures is called ***mean*** of the original numbers.

Mean = Total ÷ Number of items

L7. FINDING MEAN (2)

5. Which of the two chickens laid heavier eggs? Compare by calculating the mean weight of their eggs?



There are some things that cannot be averaged in real life, but if the number and amount is given, the mean can be calculated.

6. The table below shows the number of books 5 students in Esmon's group who read in August What is the mean number of books read by the 5 students? Number of books read

Name	Talmon	Lasmon	Salmon	Esmon	Deimimon
Number of books read	4	3	0	5	2

Even for things that are impossible to be expressed in decimal numbers, like number of books, the mean can be expressed in decimal numbers.

Exercise

1. 10 students have 45 biros. What would be the mean number of biros the students will have?

2. Kip collected 142 cans in 7 days. What would be the mean?

3. Paul ate 33 mangoes in 10 days. What would be the average number of mangoes eaten?

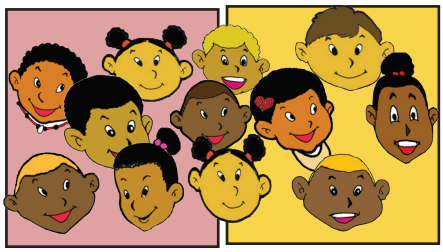
L8. MEASUREMENT PER UNIT QUANTITY

Teaching and learning activities

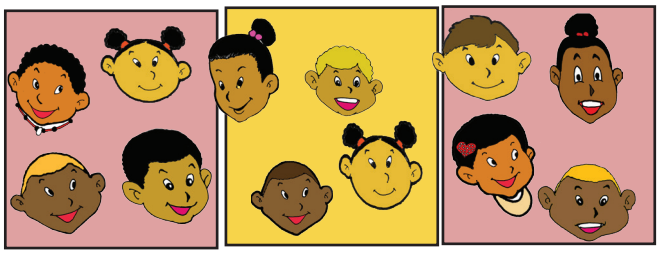
(60 min)

1. Study the number of people stand on each mat and think about how to compare the Crowdedness of the space on the mat.

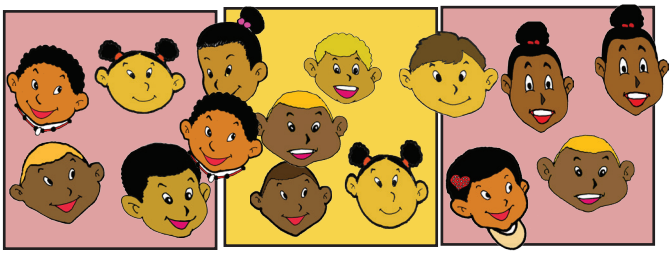
(a) 2 mats, 12 students.



(b) 3 mats, 12 students,



(c) 3 mats, 15 students.



1. Which is more crowded? Compare (b) or (c)?

When the number of mats is the same, the one with ☐ children is more crowded?

Which is crowded? Compare (a) or (b)? ☐
When the number of children are the same, the one with the ☐ mats is more crowded? ☐

Which is crowded? Compare (a) or (c)? ☐

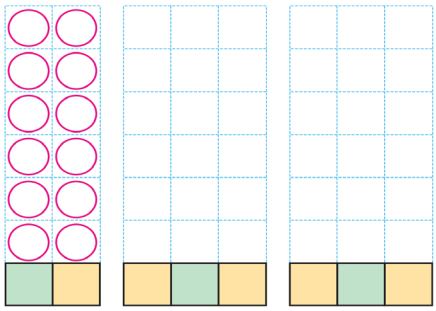
2. Find out if the number of mats are different with the number of students. How can we Find out which is crowed?

Find out how many students are on each of the mats?

L8. MEASUREMENT PER UNIT QUANTITY

Teaching and learning activities

(60 min)



The level of crowding is expressed by 2 measures, the number of the children and the area. Usually we compare the level of crowding using the same unit such as 1 m^2 or 1 km^2. When people are not grouped in an organized way, the number of people per 1 m^2 expresses the mean of crowding.

3. Note that the area of 1 mat is 1 m^2.
How many children are there per 1 m^2?

12 ÷ 2 =
12 ÷ 3 =
15 ÷ 3 =

(Number of children ÷ Area (m^2) = number of children per 1m^2)

Exercise

(a) 10 children are playing in 8 m^2 playing ground. Next to them 10 m^2 where13 children are playing. Which playing ground is more crowded?

(b) There is a ship with 10 rooms and 150 passengers and another ship with 15 rooms and 200 passengers. Which ship is more crowded?

(c) 12 families in the village have 120 m^2 of land to make garden which another family of 15 had 150 m^2 of land to make their garden as well. Which piece of land is more crowded?

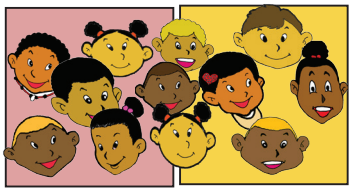
L9. POPULATION DENSITY

Teaching and learning activities

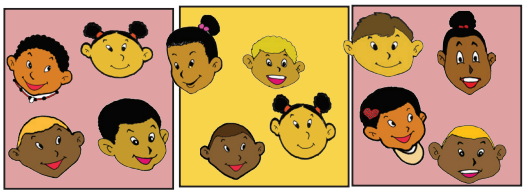
(30 min)

1. What is population density? Refer to the diagrams below to give hints to the students.

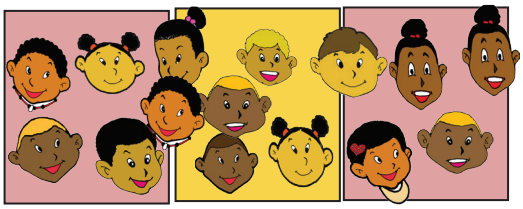
(a) 2 mats, 12 students.



(b) 3 mats, 12 students,



(c) 3 mats, 15 students.



Identify a measured value per quantity per unit. For example, 100 people living in 90 km² of land. What is the number of people per area?

2. Study the table below and answer questions.

Towns	Population (people)	Area (km²)
Popondetta	200 000	80
Rabaul	300 000	50
Goroka	500 000	30

Calculate the numbers of people per 1 km² and see which one is more crowded.

The population per 1 km² is called population density. The crowdedness of the amount of people living in a country or province is compared using population

Exercise

1. Which province has the lowest population density?
2. Which province has the highest population density and why?

L10. WEIGHT PER UNIT (1)

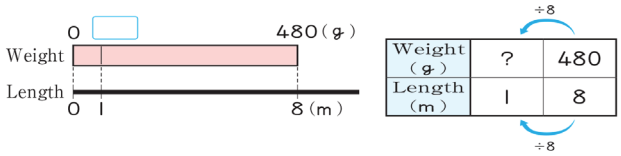
Teaching and learning activities

(30 min)

1. Read the given situation and think about how to solve it. There is a wire that is 8m long and weighs 480g.

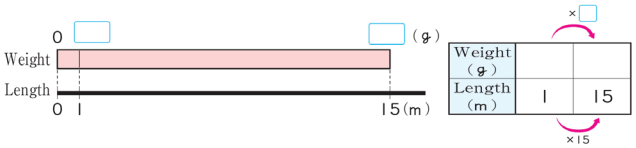
(a) How many grams does this wire weigh per meter?

(b) Represent the relationship of the 4 numbers on the diagram and the table.



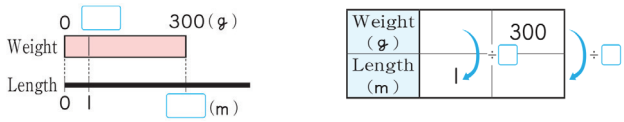
To make 8 into 1, we divide it by 8. So we can get the answer by 480 ÷ 8.

2. How many grams (g) will 15m of this wire weigh? Let's develop an expression by drawing a diagram and a table.



We know the weight of 1m from question one. How are the numbers we already know related to each other?

3. We cut some of the wire and it weighed 300g. How many m long is this piece of wire? Let's develop an expression by drawing a diagram and a table.



Population density and weight per 1 m* are called ***measure per unit quantity.***

Exercise

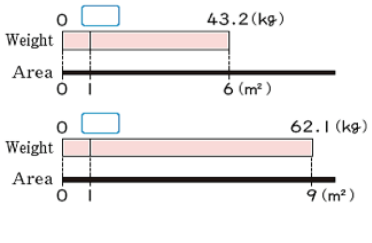
1. There is a wire that is 300m long and weighs 500g. How many grams (g) does this wire weigh per 1m?
2. How many grams (g) will 30m of this wire weigh?
3. We cut some of the wire and it weighed 200g. How many meters (m) long is this piece of wire?

L11. WEIGHT PER UNIT (2)

Teaching and learning activities (60 min)

1. Read the situation given below and think of how to solve it.
Some students grew kaukaus at their school. They got 43.2 kg of kaukaus from a 6 m² field and 62.1 kg kaukaus from a 9 m² field. Which field is better?

2. Compare by using the number of kaukaus per 1m².



Weight (kg)	?	43.2
Area (m²)	1	6

Weight (kg)	?	62.1
Area (m²)	1	9

3. How many kilograms (kg) of orange were harvested per m²? A 180 m² field produced 432 kg oranges. Write an expression by and drawing a diagram. See the example above.

Exercise

1. A 200 m² garden produced 500 kg of potatoes. How many kilograms (kg) were harvested per 1 m?

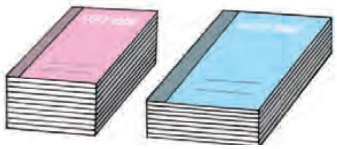
2. Anna planted cucumbers in an area of 60 m² and produced 20 kg of cucumbers. How many kilograms were harvested per 1m?

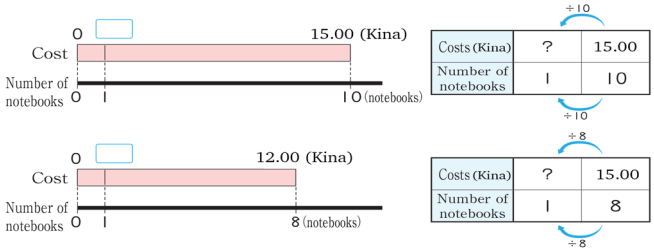
3. An 800 m² field produced 600kg of tomatoes. How many kilograms (kg) were harvested per 1m?

L12. WEIGHT PER UNIT (3)

Teaching and learning activities (60 min)

1. Read the problem given and think of how to solve it.
There are two kinds of notebooks. The first kind cost K15.00 for 10 notebooks. The second kind costs K12.00 for 8 notebooks. Which is more expensive? Compare the cost per notebook.

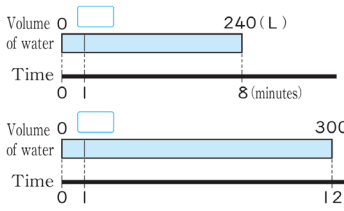




Costs (Kina)	?	15.00
Number of notebooks	1	10

Costs (Kina)	?	15.00
Number of notebooks	1	8

2. Read the following situation and try to solve it
One machine can pump 240L of water in 8 minutes and second machine can pump 300L of water in 12minutes. Which one pumps more water per minute.



Volume of water (L)		
Time (Min.)		

Volume of water (L)		
Time (Min.)		

3. There a two shops selling the same drinks. One shop sells 12 drinks for K18.00 while the second shop sells 10 drinks for K16.00. Use the diagram and table to represent your answers by referring to the example above. Which shop is more expensive?

Explain their answers and commend them for their efforts.

Exercise

Naomi bought 4 meters material to sew her meri blouse that cost her K48.00.

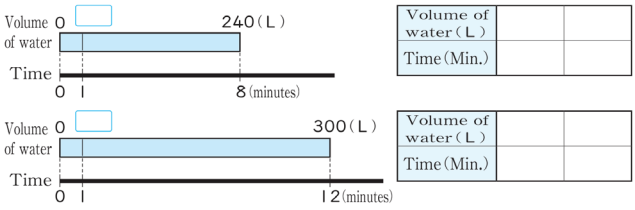
1. How much does 1 meter of material cost?

2. How much does 5 meters of the material cost?

L13. PER UNIT QUANTITY-TIME PER (1) QUANTITY

Teaching and learning activities (60 min)

1. Think of situations where is time measured and for what purpose? Discuss and compare time taken for work done using the diagrams below. Demonstrate and explain how time is calculated per unit quantity.



Volume of water (L)		
Time (Min.)		

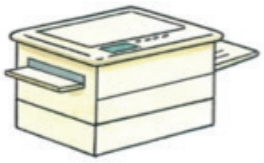
Volume of water (L)		
Time (Min.)		

2. Which water pump pumps more water per minute?

Discuss problem 1. One water machine can pump 240 L of water in 8 minutes and the second water pump machine can pump 300 L of water in 12 minutes.

3. Find out which water pump machine pumps more water per minute? Discuss problem 2.

4. Photocopier machine **A** copies 300 sheets of paper in 4 minutes and photocopier machine B copies 380 sheets of paper in 5 minutes.



(a) Find out which photocopier machine is faster?

Number of sheets		
Time (Min)		

(b) How many sheets of paper can photocopier **A** copy in 7 minutes?

Number of sheets		
Time (Min)		

(c) How many minutes does it take for photocopier **B** to copy 1140 sheets of paper.

Number of sheets		
Time (Min)		

L13. PER UNIT QUANTITY-TIME PER (1)

Teaching and learning activities (60 min)

Exercise

A printing machine can print 350 sheets of paper in 5 minutes.

1. How many sheets of paper can it print in 1 minute?

2. How many sheets of paper can it print in 8 minutes?

3. How many minutes will it take to print 2,100 sheets of paper?

L14. PER UNIT QUANTITY-TIME PER QUANTITY (2)

Teaching and learning activities (60 min)

Explain to students that global warming is one issue that could cause problems such as higher sea levels and effects on food productions. One of the causes of global warming is said to be the increasing level of carbon dioxide in air.
Identify ways to minimize pollution in the air especially in overseas countries. They will discuss of countries they know of which experiences air pollution.

Locate on the world map where Japan is.
Tell the students the lesson for today will be about Japan which is one of the industrialized countries in the world.

(a) Find out by how much carbon dioxide is increasing in Japan. Let's also find out how the carbon dioxide output per person is increasing.

(b) Let's represent the results using the bar charts and line graphs.

Carbon Dioxide Output Per Person in Different Countries (2005)

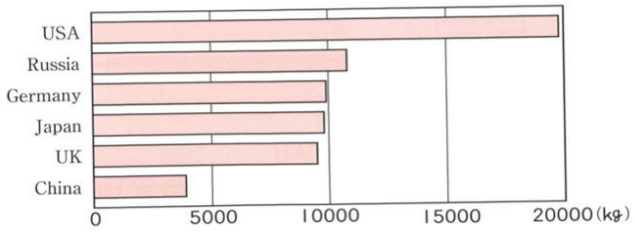
Year	Carbon dioxide output (ten thousands kg)	Population (ten thousand)	Carbon dioxide output per person (kg)
1990	1 14400000	12361	9255
1994	1 21400000	12527	9691
1998	120000000	12647	9488
2002	127900000	12749	10032
2006	127400000	12777	9971

(c) Which year has the highest increase of carbon dioxide per person on average? 2002

L14. PER UNIT QUANTITY-TIME PER QUANTITY

Teaching and learning activities (60 min)

2. The graph below shows carbon dioxide output per person in these industrialized countries. What do you notice? Discuss your opinions with your friends.
Carbon Dioxide Output Per Person in Different Countries (2005)



Exercise

Refer to the bar charts above and answer the following questions;

1. Which country has the highest carbon dioxide output per person?
2. List the countries who have almost between 8 000 kg and 10 000 kg of carbon dioxide per person?
3. Which country has the least output of carbon dioxide per person? Explain why.

L15. EXERCISE

Teaching and learning activities (60 min)

Do these exercises

1. The table below show the number of empty cans Raka picked up in 5 days. What is the mean number of cans he picked up per day?

Number of empty Cans Picked Up

Days	Day 1	Day 2	Day 3	Day 4	Day 5
Number of cans	6	7	5	8	8

2. Which train A or B is more crowded
A 1080 passengers with 6 carriages
B1640 passengers in 8 carriages

3. Read and solve

There are two kinds of coloured pencils. The first kind costs 600 kina for 12 pencils and the second kind cost 400 kina for 8 pencils is more expensive?

4. A 180 m^2 field product 432 kg oranges. How many Kg of orange were invested per m^2 ?

5. Read and solve.
A printer can print 350 sheets of paper in 5 minutes.

(a) How many sheets of paper can it print in 5 minutes

(b) How many sheets of paper can it print in 8 minutes?

(c) How many minutes will it take to print 2100 sheets of paper?

Exercise

1. Do these exercises

(a) 52 x 27 **(b)** 86 x 67 **(c)** 35 x 78

(d) 154 x 48 **(e)** 565 x 64 **(f)** 927 x 32

(g) 5.4 x 4 **(h)** 6.2 x 9 **(i)** 2.5 x 8

Strand: **Number and Operation** Topic: **Multiplication of Decimal Numbers**

Content Standard: 5.1.4 Apply the process of multiplication to multiply a decimal number by decimal number and a whole number by a decimal number.

Teacher's Notes

Listed below are the expected Attitude, Knowledge, Skills and mathematical thinking to be displayed by the students after learning this topic on Large Numbers.
Students will be able to;

Attitude

- Enjoy posing questions on tape diagrams to represent multiplication and division of whole numbers with decimal numbers and decimal numbers with decimal numbers.
- Appreciate solving problems related multiplication and division of decimal numbers.

Skills

- Calculate multiplication and division of whole numbers with decimal numbers and decimal numbers with decimal numbers.
- Pose questions on tape diagrams to represent multiplication and division of whole numbers with decimal numbers and decimal numbers with decimal numbers.
- Use tape diagrams to represent multiplication and division of whole numbers with decimal numbers and decimal numbers with decimal numbers.

Knowledge

- Rules of multiplication and division of decimal numbers.
- Representation of decimal numbers.
- Place value of decimal numbers.

Mathematical thinking

- Enjoy thinking about how to calculate and develop proficiency for calculations in multiplication and division of decimal numbers.

Background

Rules for multiplying decimal numbers:

1. Multiply the numbers just as if they were whole numbers:
- Line up the numbers on the right--do not align the decimal points.
- Starting on the right, multiply each digit in the top number by each digit in the bottom number, just as with whole numbers.
- Add the products.

2. Place the decimal point in the answer by starting at the right and moving the point the number of places equal to the sum of the decimal places in both numbers multiplied.
Example

37.7 x 2.8 = ? --->
37.7 (1 decimal place)
x 2.8 (1 decimal place)
3016
+ 754
105.56 (2 decimal places, move point 2 places left)

3. Here's a short form to use when doing mental calculation: When multiplying a number by a multiple of ten, just move the decimal point one space to the right for every zero.

(a) 10 x 0. 3461 = 3.461 (1 zero, 1space right)

(b) 100 x 0. 3461 = 34. 61 (2 Zeros, 2 space right)

(c) 1000 x 0. 3461 = 346.1 (3 Zeros , 3 space right)

(d) 10, 000 x 0. 3461 = 3461 (4 Zeros, 4 space right)

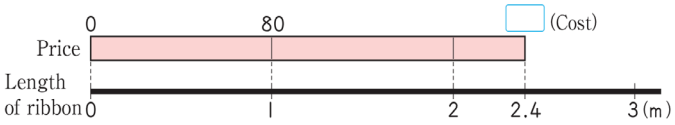
L16. CALCULATING (WHOLE NUMBERS) X DECIMAL NUMBERS (1)

Teaching and learning activities (60 min)

1. Read the given problem and make mathematical expression.

The price of the ribbon is K8 per meter. Find out how much it would cost for 2.4 m.

(a) Draw a number line with a taped diagram as shown .



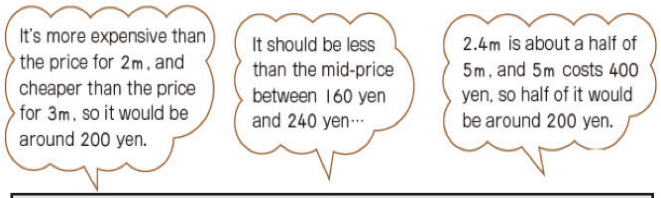
(b) Write an expression.

Expression □

Predict the answer by rounding the number.

Expected Ideas:

It's more expensive than the price for 2m, and cheaper than the price for 3m, so it would be around K200.



Important Points

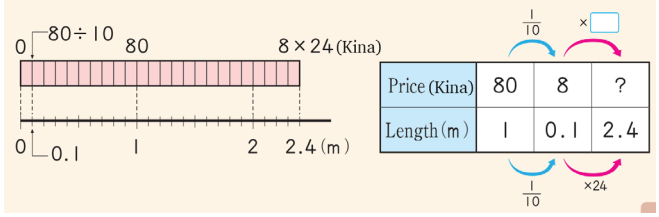
As shown with te length of the ribbon, when the multiplier is a decimal number instead of a whole number, the expression is the same as for multiplication of whole numbers.

(d) Think about how to calculate and explain your ideas as shown.

Price of 0.1m $80 \div 10 = 8$ (Kina)

2.4m is 24 of 0.1m, so,

Price of 2.4m $8 \times$ □ = □ (Kina)



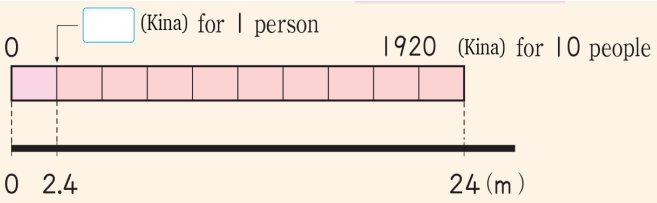
L16. CALCULATING (WHOLE NUMBERS) X DECIMAL NUMBERS QUANTITY (1)

Suppose 2.4m is the amount for 1 person, and then the amount for 10 people would be 24m.

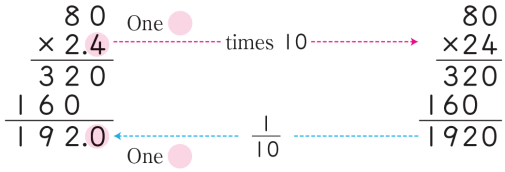
Cost for 1 person $80 \times 2.4 =$ □

10 times ↓ ↑ $\frac{1}{10}$

Cost for 10 people $80 \times 24 = 1920$



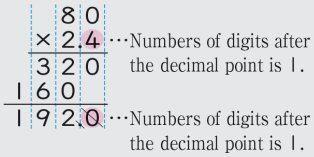
Explain how to multiply 80 x 2.4 in vertical form.



How to Multiply 80 x 2.4 in Vertical Form

(1) We ignore the decimal points and calculate as whole numbers.

(2) We put the decimal point of the product in the same position from the right as the decimal point of the multiplier

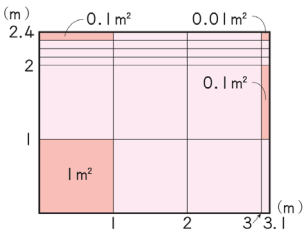


L17. CALCULATING (WHOLE NUMBERS) X DECIMAL NUMBERS (2)

Teaching and learning activities (60 min)

Read and Solve the problem below.

1. A rectangle flower bed has a width of 3 m and 2.5 m in length. What is the area, in m^2,of a rectangular flower bed?



(a) Write an expression.

□ x □ =

6 of 1 m^2 is □ m^2

14 of 0.1 m^2 is □ m^2

4 of 0.01 m^2 is □ m^2

Total □ m^2

(b) Think about how to calculate 2.5 x 3. Approximately what is area in m^2?

(c) Calculate in vertical form?

Exercise

1. Calculate the following in vertical form.

(a) 60 x 4.7 **(b)** 50 x 3.9 **(c)** 7 x 1.6

(d) 6 x 2.7 **(e)** 24 x 3.3 **(f)** 13 x 2.8

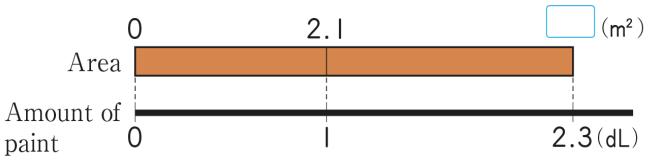
L18. CALCULATING (WHOLE NUMBERS) X DECIMAL NUMBERS (3)

Teaching and learning activities (60 min)

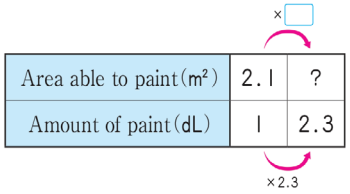
Read the given situation and think about how to solve it.

1. We can paint 2.1 m^2 of wall with 1dL. How many m^2 of wall can we paint with 2.3 dL?

(a) Draw a diagram to indicate what number should be written in the blank space.



(b) Write an expression for the table below.



□ x □

Area able to paint with 1 dL

Amount of paint (dL)

(c) Think about how to calculate the above expression.
Possible ideas from student

We learned how to calculate (Decimal number) × (Whole number).

2.1 × 2.3 = □

10 times ↓ 1/10 ↑

2.1 × 23 = □

thus using the rule of multiplication.

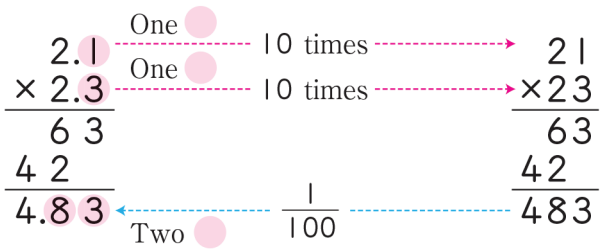
Then it's better to change it into (Whole number) × (Whole number).

2.1 × 2.3 = □

10 times, 10 times ↓ 1/100 ↑

21 × 23 = □

(d) Explain how to multiply 2.1 x 2.3 in vertical form.

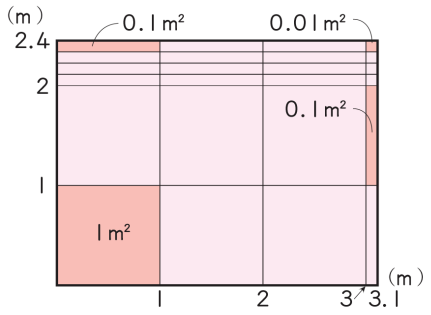


L19. DECIMAL NUMBERS X DECIMAL NUMBERS (1)

Teaching and learning activities (60 min)

Study the rectangular flower bed below and think about how to write an expression.

1. What is the area, in m^2 of a rectangular flower bed that is 2.4m wide and 3.1m long?



6 of 1 m^2 is ☐ m^2

14 of 0.1 m^2 is ☐ m^2

4 of 0.01 m^2 is ☐ m^2

Total ☐ m^2

(a) Write an expression and solve in vertical.

Important Point:
The area of rectangles can be calculated by using the formula even if the lengths of the sides are decimal numbers.
Formula: A = L x W
Don't forget to place in the decimal point in the answer and also the unit.(eg: m^2)

Exercise

1. Do these exercises in vertical form.

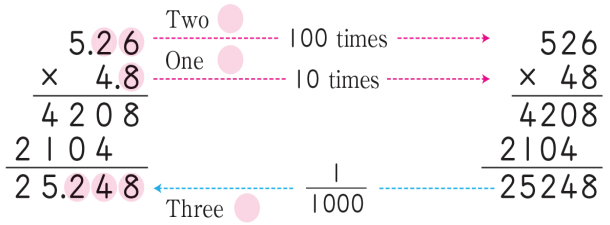
(a) 1.2 x 2.4 **(b)** 8.6 x 1.3 **(c)** 6.4 x 3.5

(d) 2.5 x 2.8 **(e)** 0.2 x 1.6 **(f)** 0.8 x 2.5

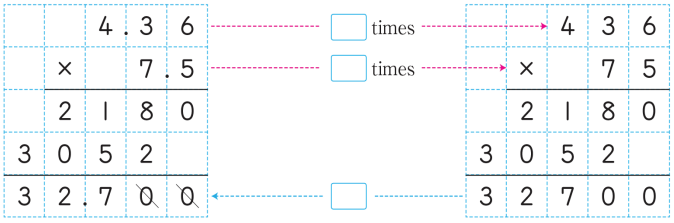
L20. DECIMAL NUMBERS X DECIMAL NUMBERS (2)

Teaching and learning activities (60 min)

Think about how to multiply 5.26 x 4.8 in vertical form. Study the given examples below.



1. Calculate 4.36 x 7.5. in vertical form



Important Idea:
When multiplying in vertical form, place the decimal point on the product by adding the number of places small than the decimal point of the multiplicand and the multiplier and count from the right end of the product.

2. Put decimal points on the products for the following calculation.

(a) 5. 6 × 4. 3 = 2408 (1 6 8 + 2 2 4)

(b) 3. 2 7 × 1.2 = 3 9 2 4 (6 5 4 + 3 2 7)

(c) 1. 4 8 × 2.5 = 3 7 0 0 (7 4 0 + 2 9 6)

Exercise:

1. Do the following exercise in vertical form.

(a) 3.14 x 2.6 **(b)** 4.08 x 3.2 **(c)** 7.24 x 7.5

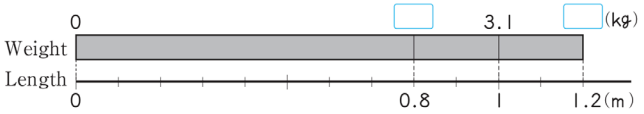
(d) 1.4 x 4.87 **(e)** 4.8 x 2.87 **(f)** 8.2 x 2.25

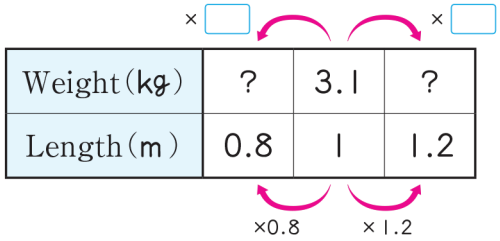
L21. MULTIPLICATION OF DECIMAL NUMBERS SMALLER THAN 1

Teaching and learning activities (60 min)

Study the given problem below and think about how to solve it.

1. The metal bar weigts 3.1 kg per meter. How much is 1.2m and 0.8m of this bar.





Important point

When the multiplier is a decimal number smaller than 1, the product becomes smaller than the multiplicand. Multiplier is a decimal number larger than 1 , multiplicand < product. Multiplier is a decimal number larger than 1, multiplicand > product.

2. Put decimal points on the products and compare the products and the multiplicand.

25	25	0.25	0.25
x 6	x 0.6	x 6	x 0.6
150	150	150	150

Exercise

1. Do these exercises in vertical form

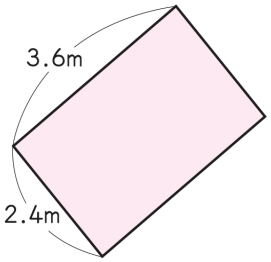
(a) 4.2 x 0.7 **(b)** 6.8 x 0.4 **(c)** 0.8 x 0. 3

(d) 2.17 x 0.6 **(e)** 0.14 x 0.5 **(f)** 0.07 x 0.2

L22. RULES FOR CALCULATION (1)

Teaching and learning activities (60 min)

1. Use rules for calculation to calculate the area of the rectangle and compare.



Student's ideas
Idea 1
3.6 x 2.4 = □ (m^2)

idea 2
2.4m x 3.6 = □ (m^2)

Problem A and B were calculated easily. Explain the reason why the right hand side methods are appropriate.

(a) 3.8 + 2.3 + 2.7 ⟶ 3.8 + (2.3 + 2.7)

(b) 1.8 x 2.5 x 4 ⟶ 3.8 x (2.5 x 4)

Important Point

Calculation Rule (1)

Addition

(1) When 2 numbers are added, the sum is the same even if the order of the numbers is reversed.

■+▲=▲+■

(2) When 3 numbers are added, the sum is the same even if the order of addition is changed.

(■+▲)+●=■+(▲+●)

Multiplication

(1) When 2 numbers are multiplied, the product is the same even if the multiplicand and the multiplier are reversed.

■×▲=▲×■

(2) When 3 numbers are multiplied, the product is the same even if the order of multiplication is changed.

(■×▲)×●=■×(▲×●)

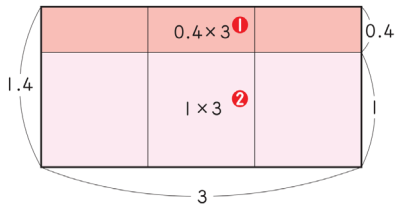
L23. RULES FOR CALCULATION (3)

Teaching and learning activities (60 min)

Study the diagram below and think about how the answer to 1.4 x 3 can be calculated and explain the method used.

$1.4\times3=(1+0.4)\times3$

$=1\times3+0.4\times3$

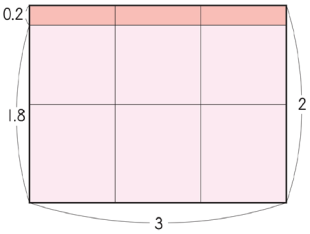


$$\begin{array}{r} 1.4 \\ \times\ 3 \\ \hline 4.2 \end{array}$$

Explain the method used by this diagram.

$1.8\times3=(2-0.2)\times3$

$=2\times3-0.2\times3$



Important for student

Calculation Rule (2)

$(\blacksquare+\blacktriangle)\times\bullet=\blacksquare\times\bullet+\blacktriangle\times\bullet$

$(\blacksquare-\blacktriangle)\times\bullet=\blacksquare\times\bullet-\blacktriangle\times\bullet$

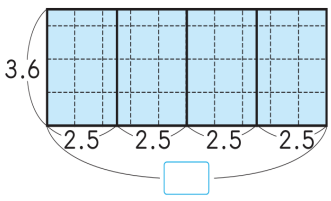
Study the calculation done and explain how the calculation rules are used for easy calculation.

(1) $3.6\times2.5\times4$

$=3.6\times(\square\times\square)$

$=3.6\times\square$

$=\square$



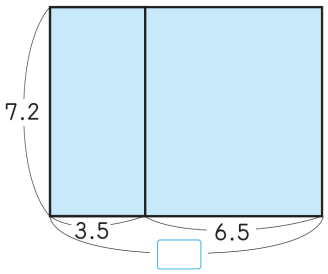
(2)

$7.2\times3.5+7.2\times6.5$

$=7.2\times(\square+\square)$

$=7.2\times\square$

$=\square$



L23. RULES FOR CALCULATION (3)

Do the following exercise. Calculate using the rules of calculation. Show working out.

(a) 6.9 x 4 x 2.5 **(b)** 3.8 x 4.8 + 3.8 x 5.2

(c) 0.5 x 4.3 x 4 **(d)** 3.6 x 1.4 + 6.4 x 1.4

Remember

It is important to remember the multiplication that have products such as 1 and 10.

0.25 x 4 = 1 1.25 x 8 = 10 2.5 x 4 = 10

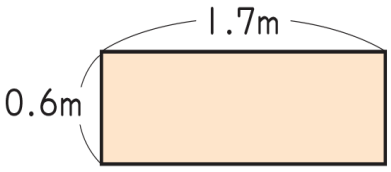
L24. EXERCISE

Teaching and learning activities (60 min)

1. Multiply the following in Vertical Form.

(a) 50 x 4.3	**(b)** 6 x 1.8	**(c)** 26 x 3.2
(d) 3 x 1.4	**(e)** 31 x 3.4	**(f)** 62 x 0.7
(g) 0 . x 0.8	**(h)** 3.5 x 0.9	**(i)** 1.5 x 3.4
(j) 0.3 x 0.25	**(k)** 1.26 x 2.3	**(l)** 4.36 x 1.5

2. Find the area of the rectangle given.



3. Solve the problem
There is a wire that has weight of 4.5g per 1m. Find the weight of 8.6m and the weight of 0.8m of this wire

4. Fill the ☐ with equal and inequality sign.

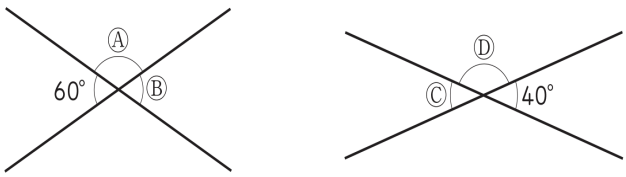
(i) 3.5 x 3.5 ☐ 3.5 (ii) 3.5 x 0.1 ☐ 3.5

(iii) 3.5 x 0.9 ☐ 3.5 (iv) 3.5 x 1 ☐ 3.5

5. Choose numbers from the ☐ below and make problem for multiplication of decimal numbers. Exchange your problem with your friend and solve

1.5	7	0.8	30	2.3	5

6. Find the sizes of the following angle A - D



L24. EXERCISE

Teaching and learning activities (60 min)

Answers:
Ex 1.
(a) 215 (b)10.8 (c) 83.2 (d) 4.2 (e)161.2 (f) 43.4 (g) 0.48 (h) 3.15 (i) 5.1 (j) 0.075
(k) 2.898 (l) 6.54

Ex 2. 1.02 m^2, Ex3. The weight of 8.6 m wire is 38.7g. The weight of 0.8m wire is 3.6 g.
Ex 4. (i) > (ii) < (iii) < (iv) =
Ex 6. A is 120^0, B = 60^0, C=40^0, D=140^0

Strand 1: **Geometrical Figures** Topic: **Congruence and Angles of figures**

Content Standard: 5.3.1 Investigate and understand the properties of congruent triangles and quadrilaterals.

Teacher's Notes

Listed below are the expected Attitude, Knowledge, Skills and mathematical thinking to be displayed by the students after learning this topic on Large Numbers.
Students will be able to;

Attitude

- Enjoy posing question on how to draw congruent figures.
- Appreciate other students idea and drawing.

Skills

- identify congruent figures by superimposing them through a combination of rotations, reflections and translations
- draw congruent figures using geometrical instruments
- determine the condition for two circles to be congruent
- match sides and angles of two congruent polygons
- recognise congruent figures in tessellations, art and design work (reflecting)
- interpret and use scales in photographs, plans and drawings found in the media and/or other learning areas
- enlarge diagrams such as cartoons and pictures
- apply geometrical facts, properties and relationships to solve problems such as finding unknown sides and angles in diagrams

Knowledge

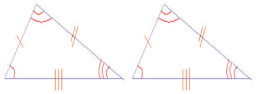
- using the term 'similar' for any two figures that have the same shape but most vary in size
- name the vertices in matching order when using the symbol lll in a similar statement
- determine the shape, angle size and the ratio of matching sides are preserved in similar figures
- determine the scale factor for a pair of similar polygons
- determine the scale factor for a pair of circles
- calculate dimensions of similar figures using the enlargement or reduction factor
- choose an appropriate scale in order to enlarge or reduce a diagram

Mathematical thinking

- Think about how to calculate the average measurement
- Justify their solutions to problems by giving reasons using their own words

Background

Congruent means that two shapes match exactly . It would also indicates that
The shapes have the same sizes and shapes, even though their orientations
may differ. You can move congruent shapes in any direction; they will still
be congruent. Congruent shapes have the same size and the same shape.In other words, if you place an object in front of a mirror, the image that you see is congruent or " equal " to the object
When shapes are congruent, all corresponding sides and angles are also congruent.
Look at the following two triangles. You should notice that some sides and some angles have one marking. Others have more than one marking.



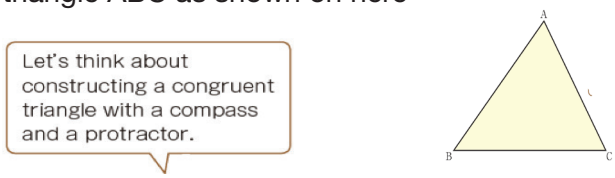
L25. CONGRUENT FIGURES

Teaching and learning activities

(60 min)

Two figure are congruent if they fit by laying on top of one another

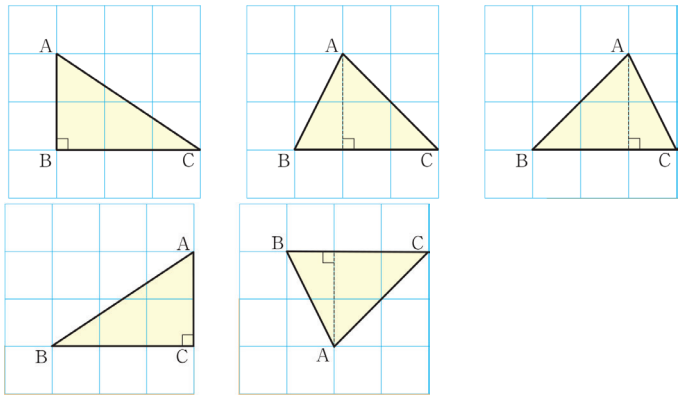
Think about how to draw a triangle congruent to triangle ABC as shown on here



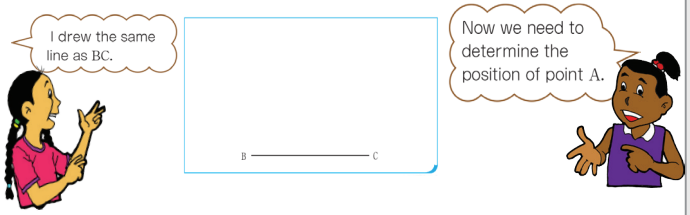
Asa drew a triangle on a 1cm grid sheet. He ask his friends to draw the same figure. He explain the shape by words on the board as shown.

What kinds of triangles can you draw from Asa's explanation?

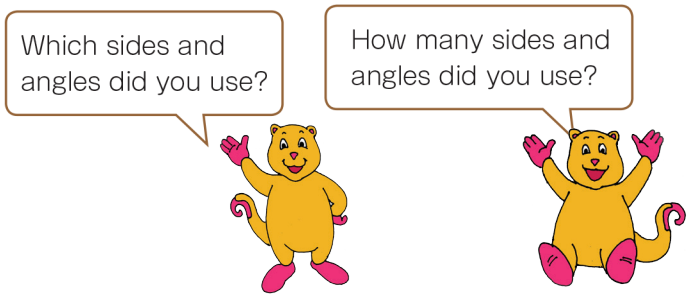
Possible expected answers from students



Think about how to use a compass and a protractor for drawing a congruent shape.



Discuss how to locate point A. Use the discussion points below.



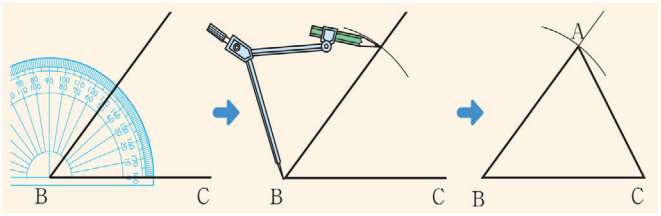
L25. CONGRUENT FIGURES

Teaching and learning activities

(60 min)

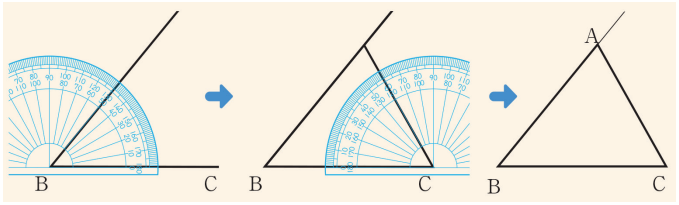
Idea 1

Measure the lengths of two sides and the angle between them for drawing.



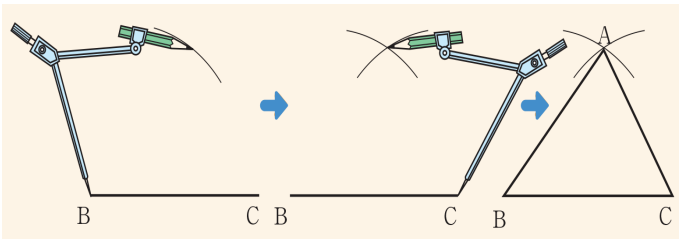
Idea 2

Measure two angles and the length between them for drawing.

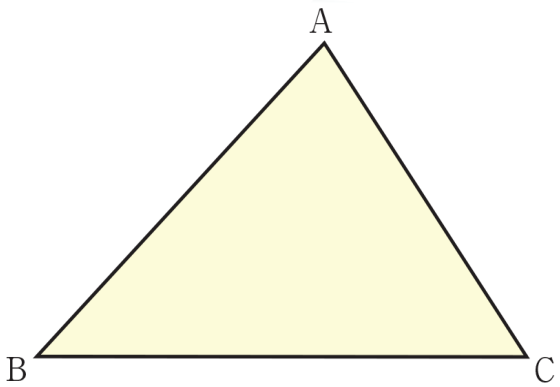


Idea 3

Measure all three sides for drawing.



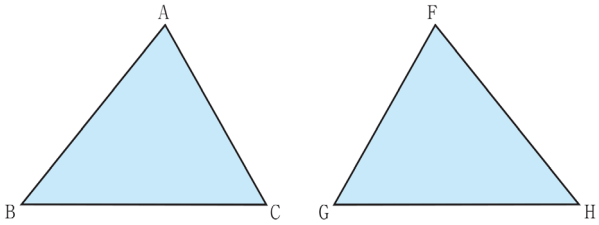
Draw a triangle congruent to Triangle ABC as shown.



L26. CONGRUENT TRIANGLES

Teaching and learning activities (60 min)

Study the triangles below. Discuss and confirm whether the two triangles can match when fitted by laying on one another.



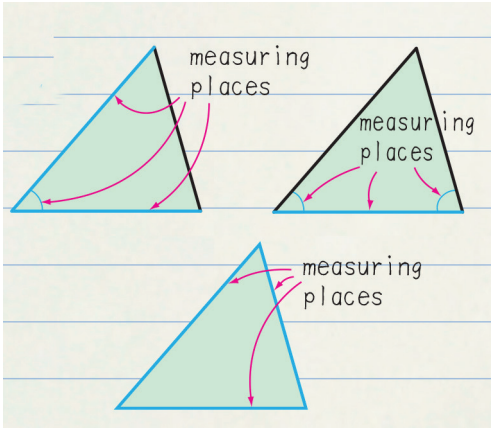
Two figures are also congruent if they match when reversed. In congruent figures, the matching points, match. The sides and the matching angles have; **corresponding vertices, corresponding sides** and **corresponding angles.**

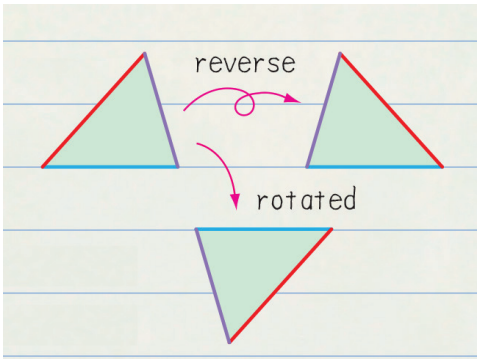
In the above figures: triangle ABC and DEF, describe the corresponding side. Also compare the lengths of corresponding sides
Describe corresponding angles and compare their sizes,

Important Points

- Two figures are congruent if they fit by laying on top of one another
- There are 3 ways for drawing a congruent triangle.
- The diagrams on the right show the places for measuring
- Two triangles are also congruent if they match by flipping over
- Compass can be use as a tool to copy the same lengths.
- Matching sides and angles are called corresponding sides and angles **Interesting**
- The rotated or reflected figure is congruent
- There are three conditions for congruence between two triangles.
- And four conditions for quadrilaterals.
- It is interesting that triangles with all 3 equal angles are not always congruent

L26. CONGRUENT FIGURES





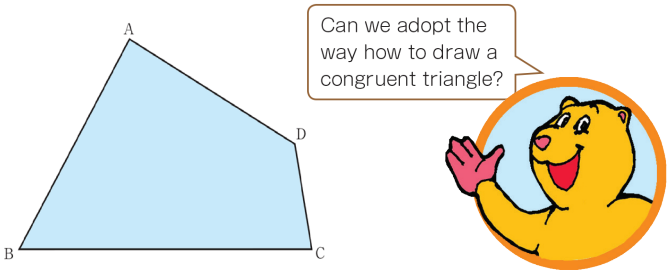
What was difficult?
Finding the corresponding sides and angles when the figure is reversed.

Good ideas
Drawing a congruent triangle requires only a compass and does not need to measure angles?

L27. CONGRUENT QUADRILATERALS

Teaching and learning activities (60 min)

1. Think about how to draw a quadrilateral which is congruent to quadrilateral ABCD as shown



2. What did you find? Explain.

Draw the four sides of quadrilateral ABCD.

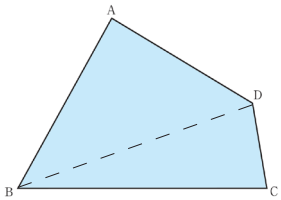
3. Draw a quadrilateral using the same measurement
Are they congruent?

Important

Quadrilaterals may have the same sides but may not be congruent when drawing.

4. Use diagonal lines to form triangles
Now let's see if we can draw congruent quadrilaterals using triangles

Check the exercises and emphasize:

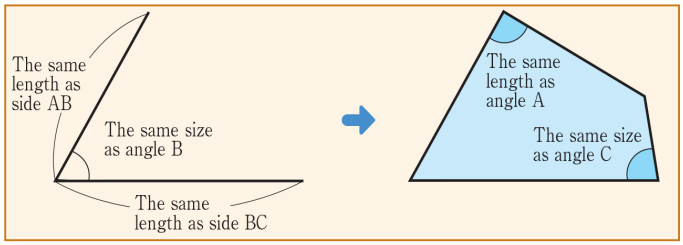


When we split quadrilaterals into triangles it is much easier to draw congruent triangles.

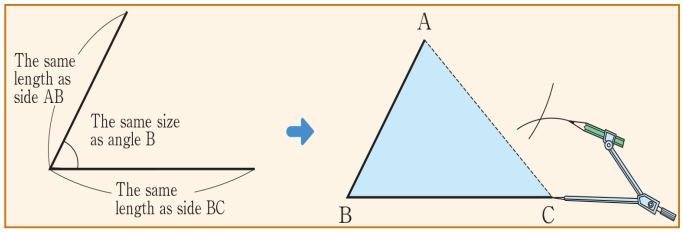
5. Let's discuss how to draw a congruent quadrilateral. How can we locate the fourth point?
Use the idea above and follow to draw a congruent quadrilateral with ABCD sides.

L27. CONGRUENT QUADRILATERALS

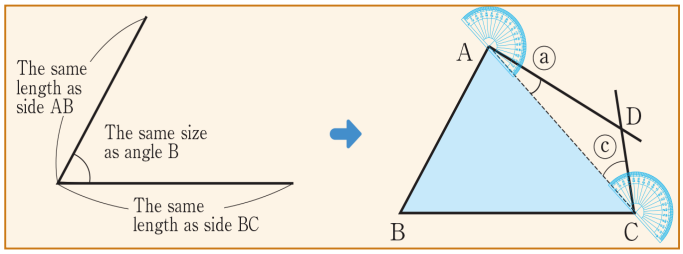
Idea 1
Measure angle A and C, and determine point D.



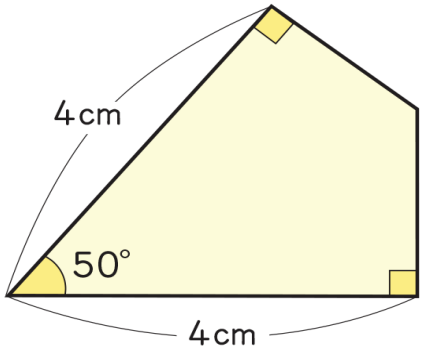
Idea 2
Use Yuri's for drawing a congruent triangle to determine point D on quadrilateral. Measure sides AD and CD.



Idea 3
Use Yuto's idea for drawing a congruent triangle to determine point D on quadrilateral. Measure angles which are subtended by diagonals AC and sides.



6. Draw a congruent quadrilateral to the one shown below.



L28. DRAW A CONGRUENT QUADRILATERAL

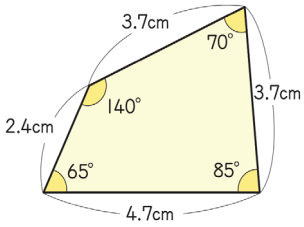
Teaching and learning activities (60 min)

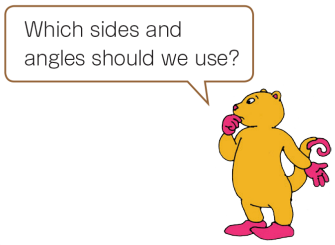
1. Think about how to draw a quadrilateral from previous lesson.

What are the conditions of drawing a congruent quadrilaterals.

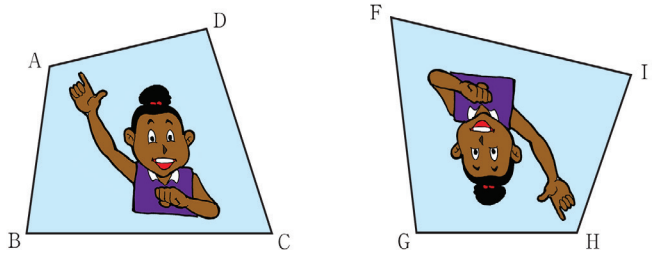
- Measure two angles and determine the fourth point.
- Measure two sides and use a protractor to determine the fourth point.
- Measure angles which are subtended by diagonals and sides using a protractor.

Draw a congruent quadrilateral as shown below.





2. The quadrilaterals below are congruent. Describe the corresponding vertices, sides



(a) The corresponding vertices to A is G
Write down on your notebook the other corresponding sides.

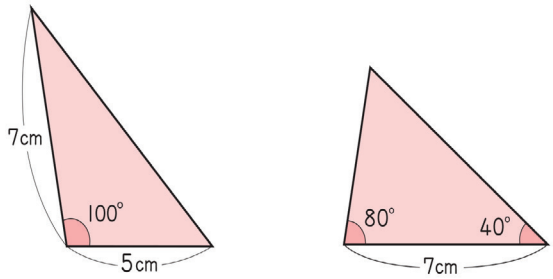
(b) The corresponding side to AB is GH
Write down on your notebook the other corresponding angles.

(c) The corresponding angle to A is G
Write down on your notebook the other corresponding angles.

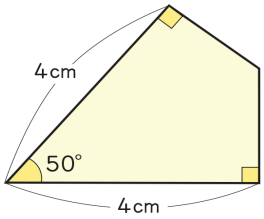
L29. EXERCISE

Teaching and learning activities (60 min)

1. Draw a triangle with the following conditions
(a) A triangle with sides 4cm, 7cm and 8cm.
(b) A triangle with sides 5cm, 8cm and angle 75° between them.
(c) A triangle with angles 45° and 60° and a side 6cm between them.



2. Draw a congruent quadrilateral to the on below.



Exercise

1. Do these exercises

(a) 120 + 60 **(b)** 243 + 29 **(c)** 684 + 55

(d) 254 + 523 **(e)** 675 + 167 **(f)** 493 + 728

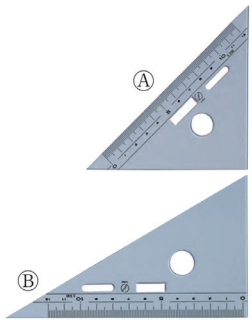
(g) 180 - 70 **(h)** 383 - 47 **(i)** 742 - 68

(j) 947 - 816

L30. ANGLES OF TRIANGLES (1)

Teaching and learning activities (60 min)

1. Think about how to draw a quadrilateral which is congruent to quadrilateral ABCD as shown

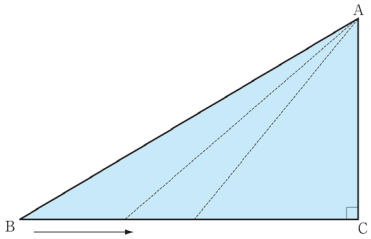


2. What did you find? Explain.

(a) ☐ **(b)** ☐

In the right triangle below. We are going to move vertex B towards C.

(i) How does the value of angle B change?
(ii) How does the value of angle A change?
(iii) Is there any relationship between the changes in angle B and angle A?



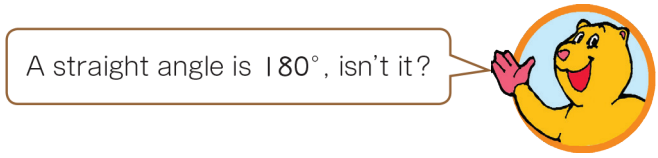
Look at the change in the sum of angle A and angle B.

Angle A (degrees)	60	50				
Angle B (degrees)						
Sum (degrees)						

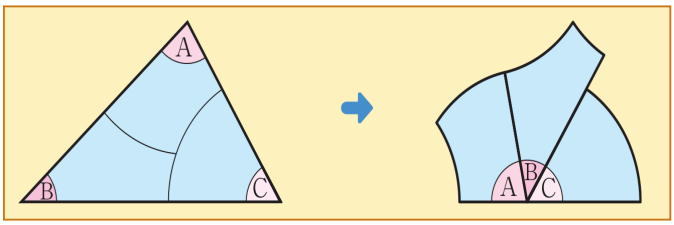
What did you find about the sum 03 angles in the right triangles from the table above?

L31. ANGLES OF TRIANGLES (2)

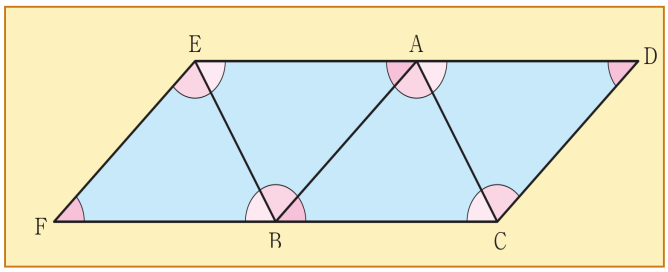
Teaching and learning activities (60 min)



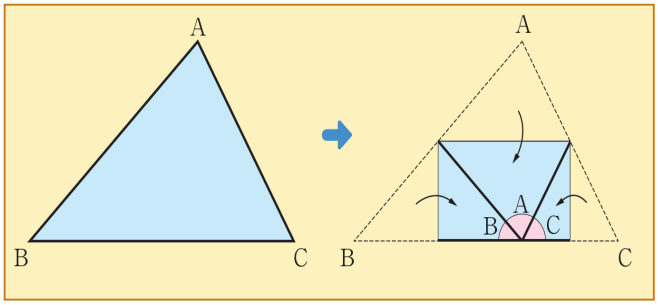
1. Draw a triangle and measure the angles with a protractor.
The sum of the 3 angles is ☐ °.
Cut out the 3 angles and place the as shown.



2. Draw triangles with the same shape and size. Cut and make a contiuous pattern without any gaps as shown



3. Fold a triangle to connect the 3 angles.

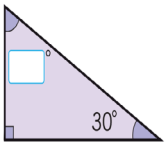


L32. ANGLES OF TRIANGLES (3)

Teaching and learning activities (60 min)

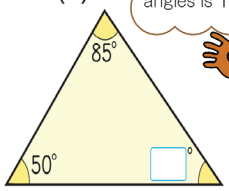
1. Calculate and fill in the ▢ with the correct number

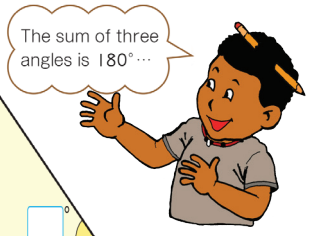
(a)



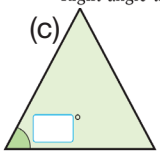
Right angle triangle

(b)



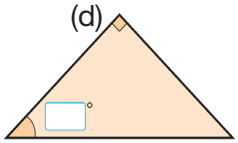


(c)



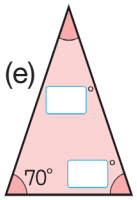
Eguilateral triangle

(d)



Isosceles triangle

(e)



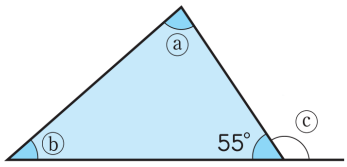
Isosceles triangle

2. Think about how to find the angles of the triangle below.

(a) Find the sum of angle a and b.

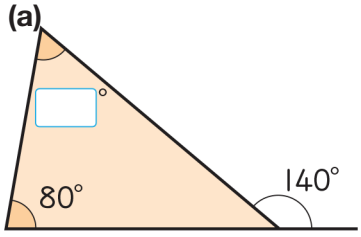
(b) What is angle c ?

(c) What can you conclude about the relationship among the angles a, b, and c?

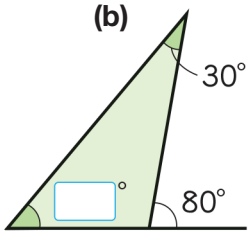


3. Calculate and fill in the ☐ with correct number.

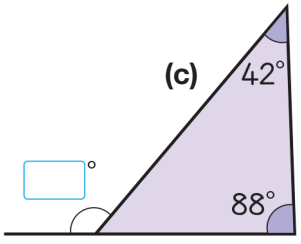
(a)



(b)



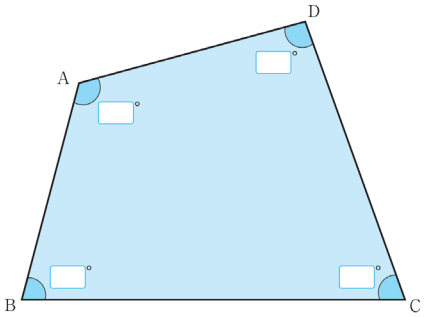
(c)



L33. ANGLES OF QUADRILATERAL (1)

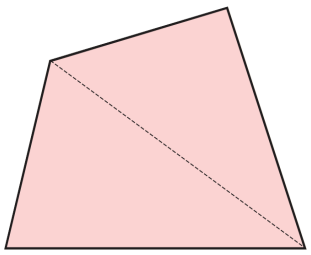
Teaching and learning activities (60 min)

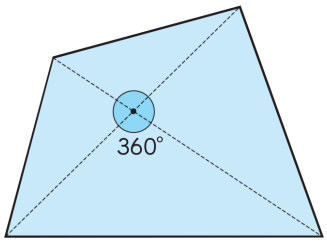
Explore the sum of four angles in quadrilaterals in various.



Measure the four angles with a protractor.
Calculate through dividing the quadrilateral by diagonals.

Ideas
Divide by a diagonal. There are triangles inscribed. Therefore ☐ x 2 = ☐

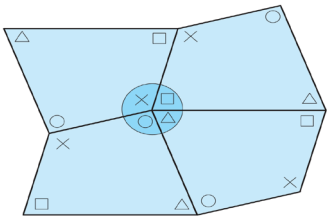




Divide a quadrilateral into four by diagonals.
Therefore four triangles inscribed ☐ x 4 = ☐
Subtract the extra

Explore the sum through tessellation

Share findings or ideas with others

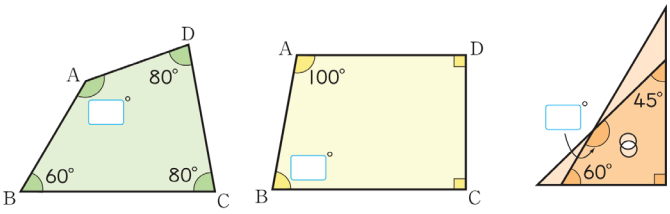


Write here.

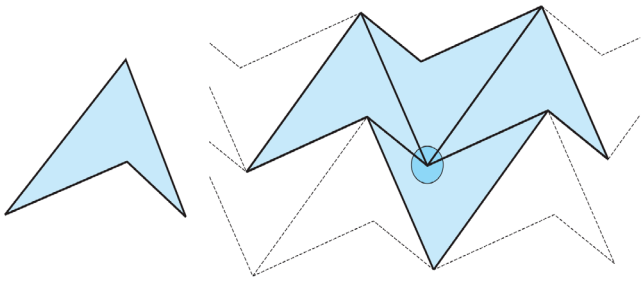
L34. ANGLES OF QUADRILATERAL (2)

Teaching and learning activities (60 min)

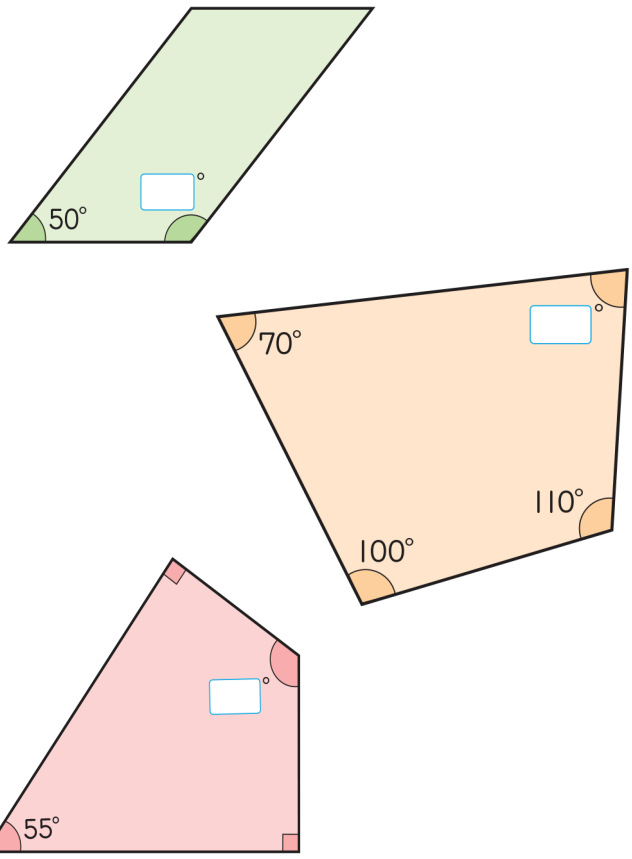
In any quadrilateral the angle sum is 360°.
Calculate and fill the ☐ with correct reading.



Find the sum of 4 angles using the shape given.
And check, Is it 360°.



Fill in the ☐ with the correct angle number.

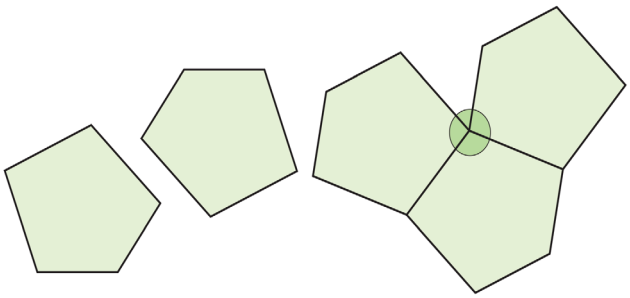


L35. ANGLES OF POLYGONS (1)

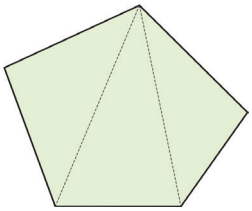
Teaching and learning activities (60 min)

A pentagon is a 5 sided figure.
Explore how to find the sum of 5 angles in a pentagon.

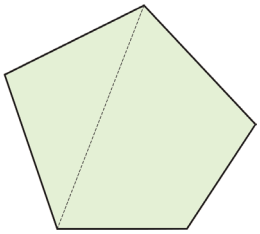
1. Can you tessellate?



Important point to remember
In the case of a pentagon the figure cannot be tessellated. For tessellation of figures, the sum of angles must meet at one vertex which is 360°.



Draw diagonals and divide into ☐ triangles.
Therefore, 180° x ☐ = ☐ 0



Divide a pentagon into a triangles and a quadrilateral.

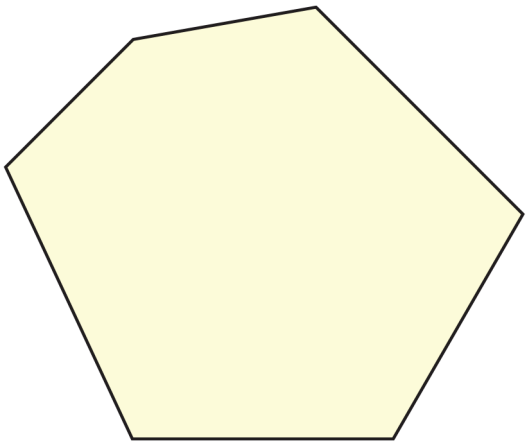
Therefore 180°+ ☐ ° = ☐ °

Important Point.
In any pentagon, the sum of 5 angles is 540° degrees.

L36. ANGLES OF POLYGONS (2)

Teaching and learning activities (60 min)

Lets explore another polygon. Find out the sum of 6 angles in a hexagon.
Think about how to find the sum of 6 angles and write it down. Use the figure below.



In any hexagon, the sum of angles is ☐ °

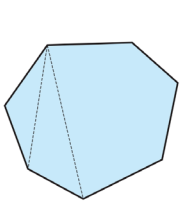
Important Point
A shape which is surrounded by only straight lines, such as Triangles, Quadrilateral, Pentagons, Hexagons, etc.. is called **Polygon.**
In a polygon, each straight line that connects any two vertices other than adjacent ones is called **diagonals**

L37. ANGLES OF POLYGONS (3)

Teaching and learning activities (60 min)

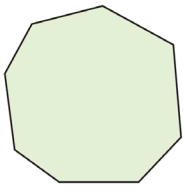
Fill in the table showing the relationship for the sum of angles in polygons.

	Triangle	Quadrilateral	Pentagon	Hexagon	Heptagon	Octagon	Nonagon
The number of triangles made by the diagonals from one vertex in a polygon		2	3	4			
The sum of angles	180°	360°	540°	720°			



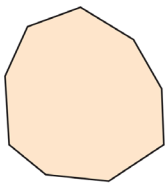
Heptagon

180° × ☐ = ☐ °



Octagon

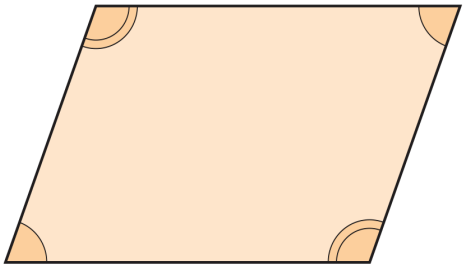
180° × ☐ = ☐ °



Nonagon

180° × ☐ = ☐ °

The opposite angles of parallelogram.
Use what you learnt to explain that the opposite angles of a parallelogram are equal.



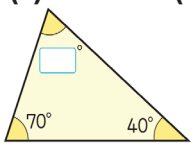
Draw diagonals, what do you discover?

L38. EXERCISE

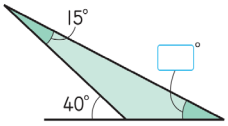
Teaching and learning activities (60 min)

1. Calculate and fill in the ☐ with the correct numbers.

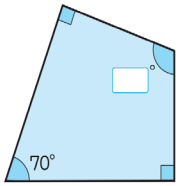
(a)



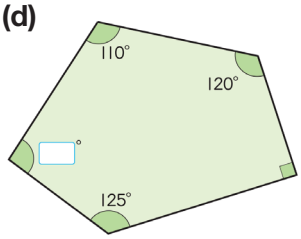
(b)



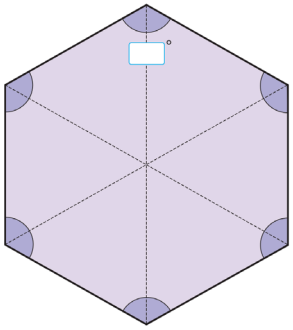
(c)



(d)



(e) A hexagon is developed by 6 equilateral triangles.



2. Do these exercises

(a) 24 ÷ 2	**(b)** 69 ÷ 3	**(c)** 96 ÷ 4
(d) 44 ÷ 11	**(e)** 72 ÷ 12	**(f)** 92 ÷ 23
(g) 168 ÷ 3	**(h)** 675 ÷ 9	**(i)** 464 ÷ 8
(j)1288 ÷ 48	**(k)** 333 ÷ 37	**(l)** 969 ÷ 17

Strand: **Number and Operation** Topic: **Division of Decimal Numbers**

Content Standards: **5.1.6** Extend the understanding of fractions and their calculations to compare the size of the fraction.

Teacher's Notes

Listed below are the expected Attitude, Knowledge, Skills and mathematical thinking to be displayed by the students after learning this topic on Large Numbers.
Students will be able to;

Attitude

- Enjoy posing questions on tape diagrams to represent multiplication and division of whole numbers with decimal numbers and decimal numbers with decimal numbers

Skills

- Pose questions on tape diagrams to represent multiplication and division of whole numbers with decimal numbers and decimal numbers with decimal numbers
- Use tape diagrams to represent multiplication and division of whole numbers with decimal numbers and decimal numbers with decimal numbers
- Demonstrate the use of tape diagram with appreciation to represent multiplication and division of whole numbers with decimal numbers and decimal numbers with decimal numbers
- Calculate multiplication and division of whole numbers with decimal numbers and decimal numbers with decimal numbers

Knowledge

- Representation of decimal numbers and whole numbers
- Multiplication and division
- Place value

Mathematical thinking

Think about how to calculation decimal numbers
Think about how to place decimal point in the correct place

Background Notes

Dividing with decimal numbers works like the same normal division in vertical form. The one difference is the decimal point,

Example: divide 4.35 by 5

Expression: 4.35 ÷ 5

Dividing with decimals work exactly like regular long division…with just one difference

Example: divide 3.25 by 5;
Divide in the usual way 3.25 $5\overline{)3.25}$

And put the decimal point right above the other one

Next go on as usual and calculate

$$\begin{array}{r} .4 \\ 5\overline{)3.25} \\ \underline{20} \\ 3 \end{array} \longrightarrow \begin{array}{r} 5\overline{)3.25} \\ \underline{-\ 20} \\ 35 \\ \underline{-\ 35} \end{array}$$

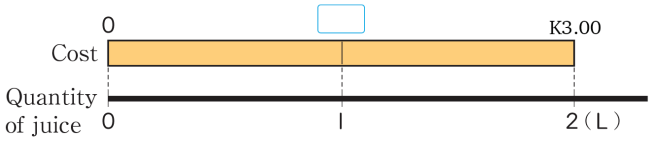
So 3.25 ÷ 5 = .65
Sometimes, you'll see this as 0.65

L39. CALCULATING WHOLE NUMBER ÷ DECIMAL NUMBERS (1)

Teaching and learning activities (60 min)

1. Think about how to calculate a whole number by a decimal number.
Asa and Vagi went to the supermarket to buy juice.

(a) How much is the cost of 1litre for the 2 L carton?

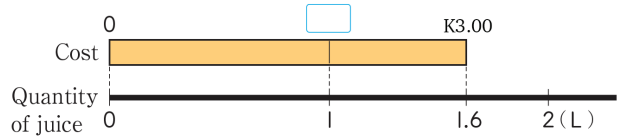


(b) Write a mathematical expression for the situation problem.

Cost (Kina)	?	K3.00
Quantity of juice (L)	1	2

(÷2 above, ÷2 below)

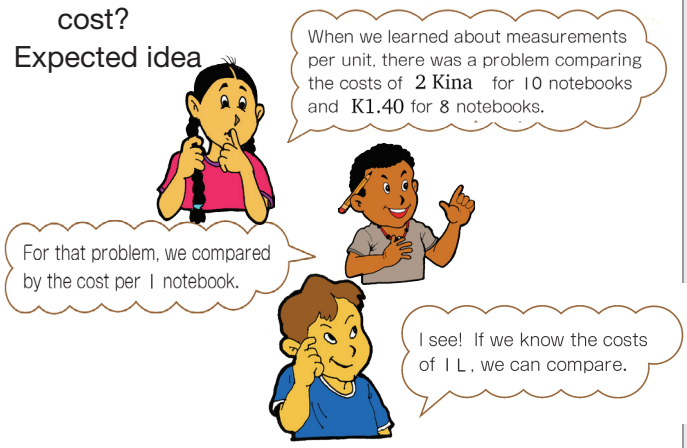
2. How much is the cost of 1 L for the 1.6L carton?



(a) Write a mathematical expression for the situation problem.

(b) Approximately how much would be the cost?

Expected idea



Important Point
As shown with the quatity of juice, when the divisor is a decimal number instead of a whole number, the expression is the same as for division of whole numbers and means to calculate the quantity per unit.

L40. CALCULATING WHOLE NUMBER ÷ DECIMAL NUMBERS (2)

Teaching and learning activities (60 min)

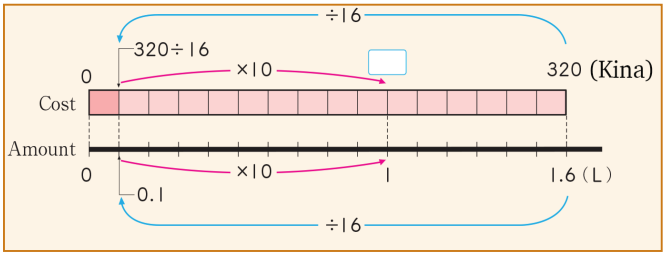
1. Think about how to calculate. 320 ÷1.6

Can the rules of division be use here?

If we find out cost of 0.1L first, then we can find the cost of 1 L from that number

Explain the ideas below.
Idea 1

1.6 L is 16 sets of 0.1 L, so,
Cost of 0.1 L 320 ÷ 16 = 20 Kina
10 times of 0.1 L is the cost of 1 L, so
Cost of 1 L 20× ☐ = ☐ Kina



Idea 2
If I buy juice 10 times of 1.6 L, the price will also become 10 times more. However, the cost per 1 L is the same.

Cost of 1 L when I buy 1.6 L of juice 320÷1.6=☐ (Kina)
10 times 10 times
Cost of 1 L when I buy 16 L of juice 3200÷16=200 (Kina)

2. Which idea corresponds to each of the two tables shown below?
Discuss what the two ideas have in common.

(i)

Cost(Kina)			320
Quantity(L)		1	1.6

(×10 above, ÷16 above, × ☐ below, ÷ ☐ below)

(ii)

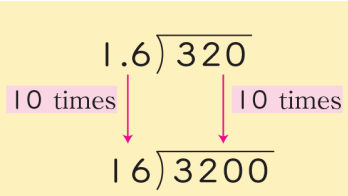
Cost(Kina)		320	
Quantity(L)	1	1.6	

(÷16 above, ×10 above, ÷ ☐ below, × ☐ below)

L40. CALCULATING WHOLE NUMBER ÷ DECIMAL NUMBERS (2)

Teaching and learning activities (60 min)

3. Explain how to divide 320 ÷1.6 in vertical form.



Note:

The rules of division can be applied to division of decimal numbers as well.

Important Point

In division, the answer does not change if the dividend and divisor are multiplied by the same numbers. When we divide a number by a decimal number, we can calculate by changing the dividend and divisor into whole numbers by using this rule of division.

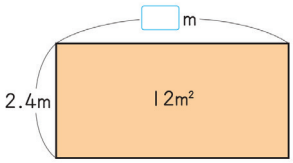
L41. CALCULATING WHOLE NUMBER ÷ DECIMAL NUMBERS (3)

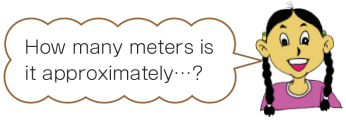
Teaching and learning activities (60 min)

Read the problem and think about how to divide in vertical form.

1. There is a rectangle flower bed that is 2.3 m long and has an area of 12 m^2 .

(a) How long is the width in meters?

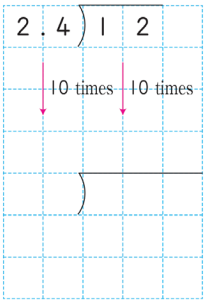




(b) Write an expression and think about how to divide in vertical Form.

(c) let think about how to calculate.

(d) let's think about how to divide in vertical form.



Exercise:

1. Do these exercises.

(a) 9 ÷ 1.8 **(b)** 91 ÷ 6 **(c)** 6 ÷ 4.8

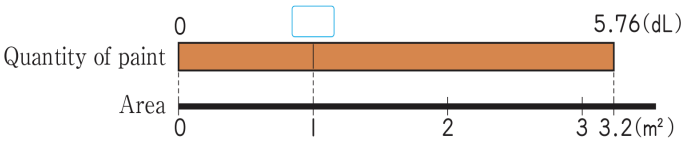
L42. CALCULATING DECIMAL NUMBER ÷ DECIMAL NUMBERS (4)

Teaching and learning activities

(60 min)

Read the problem and think about how to solve the problem. Use diagrams to help you think.

1. We used 5.76 dL of paint to paint 3.2m² wall. How many dL of paint will use to paint a 1m² wall?



(a) Write an expression.

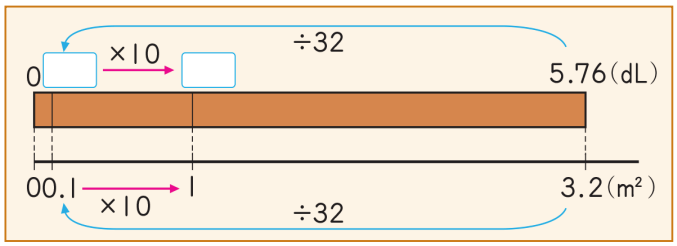
Quantity of paint (dL)	?	5.76
Area (m²)	1	3.2

(b) Think about how to divide in vertical form.

Expected ideas

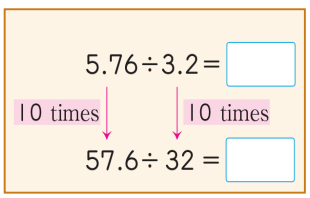
Idea 1

Paint needed for 0.1 m is 5.76 ÷ 32 = 0.18 (dL)
Paint needed for 1 m will be 10 times of that, so
0.18 x 10 = □ (dL)

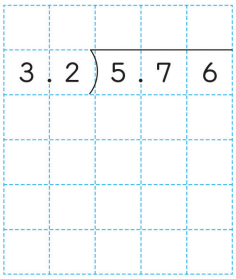


Idea 2

I will apply rules of to Change the divisor into a whole number 10 times



2. Use the ideas above to divide in vertical form.



L42. CALCULATING DECIMAL NUMBER ÷ DECIMAL NUMBERS (4)

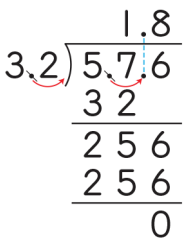
Teaching and learning activities

(60 min)

How to Divide Decimal Numbers in Vertical Form.

(1) Multiply the divisor by 10,100. or more to make it a whole number, and move the decimal point to the right accordingly.

(2) Multiply the dividend by the same amount as the divisor, and move the decimal point to the right accordingly.



(3) The decimal point of the answer comes at the same place as where the decimal point of the divdend has been moved to.

(4) The, calculate as if this is the divsion of whole numbers.

L43.CALCULATING DECIMAL NUMBER ÷ DECIMAL NUMBERS (5)

Teaching and learning activities (60 min)

Read and solve the problem given.

1. There is a rectangular flower bed that has an area of 8.4 m^2 and length of 2.8 m. How many meters is the width?

(a) Write a mathematical expression.

□ ÷ □ = □

(b) Divide in vertical form and find the answer.

2. A metal bar is 1.5 m and weighs 4.8 kg. How many kg will 1 m of this bar weigh?

(a) Write a mathematical expression.

□

(b) Think about how to calculate.

(i) By what number should we multiply the divisor and the dividend?

(ii) Think of 48 as 48.0 to continue with division

```
      3.
1.5 ) 4.8.0
      4 5 ↓
      3 0
```

Why is there no quotient in on place?

(3) Think about how to divide 3.23 ÷ 3.8.

```
      0.8 5
3.8 ) 3.2.3
      3 0 4
        1 9 0
        1 9 0
            0
```

Exercise

1. Divide in vertical form.

(a) 9.52 ÷ 3.4 **(b)** 9.88 ÷ 2.6 **(c)** 7.05 ÷ 1.5

(d) 8.5 ÷ 1.7 **(e)** 7. 6 ÷ 1.9 **(f)** 9.2 ÷ 2.3

(g) 36.9 ÷ 1.8 **(h)** 3.06 ÷ 4.5 **i)** 0.49 ÷ 3.5

4. Read and solve

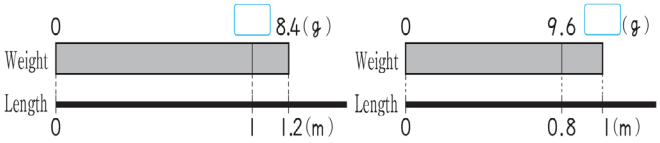
There is a rectangular flower bed that has an area of 36.1 m^2 . The length is 3.8 m. How many meters is the width?

L44. DIVIDING BY DECIMAL NUMBERS SMALLER THAN 1

Teaching and learning activities (60 min)

Red the given problem and solve.

1. There is a thin wire that is 1.2 m and 8.4 g and a thick wire that is 0.8 m and a 9.6 g. Let's find the weight of 1 m for each wire.



(a) How many g does 1m of the thin wire weigh? Write an expression and calculate. □

(b) How many g does 1m of the tick wire weigh? Write an expression and calculate. □

(c) Compare the quotients and dividends of each of them.

(d) Calculate 9.6 ÷ □ by putting numbers into the □ apart from 0.8. Discuss what you notice

Important Point

When a number is divided by a number smaller than 1, the quotient becomes larger than the dividend.

Exercise:

1. Do these exercise in vertical form

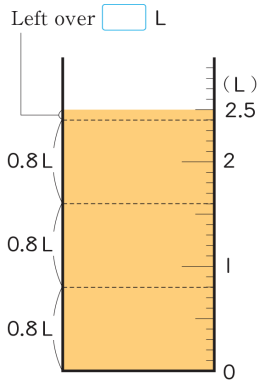
(a) 4.9 ÷ 0.7 **(b)** 3.2 ÷ 0.4 **(c)** 1.5 ÷ 0.3

(d) 0.9 ÷ 0.6 **(e)** 0.4 ÷ 0.5 **(f)** 0.2 ÷ 0. 8

L45. DIVISION PROBLEM (1)

Teaching and learning activities (60 min)

1. Study the problem given and think about how to solve it. Vagi had 2.5 L of juice. He poured 0.8 L into each bottle.How many bottles of 0.8 L of juice does Vagi have, and how many L of juice is left over?



(a) Write an expression ☐

(b) The calculation is sown on the right. If the left over is 1 L in this case, what will happen? Write down what you think.

(c) Where should we put the decimal point of the remainder?

```
      3.
0.8)2.5.
    2 4
    ---
      1
```

hint: When we calculate, we are assuming that 0.8 L is 8 dL and 2.5 L is 25 dL . That means the remainder 1 is actually ..

Dividend = Divisor x Quotient + Remainder.

2.5 = 0.8 x 3 + ☐

In division of decimal numbers, the decimal point of the remainder comes at the same place as the original decimal point of the dividend.

Exercise

(a) Solve this problem

8 kg of rice is divided into bags 1.5 kg, how many bags of 1.5 kg rice will be filled and how many kg of rice will be left over?

L46. DIVISION PROBLEM (2)

Teaching and learning activities (60 min)

Read the give problem and think about how to solve.

1. Vagi weigh a 2.4 m long metal bar, and it was 2.84 kg. How many kg does 1 m of this bar weighs?

```
     1.183
2.4)2.8.4
   2 4
   ---
     44
     24
     ---
     200
     192
     ---
      80
      72
      --
       8
```

(a) Write an expression

(b) The calculation carried out is shown on the. What will be the answer?

(c) Round the quotient to the thousandth place and give the answer to the nearest hundredth.

Important Point

When numerator is not divisible by denominator, or when the numbers become too long, the quotient is rounded

Exercise

Do the following exercises

1. Round the quotient to the thousandths place.

(a) 2.8 ÷ 1.7 **(b)** 5 ÷ 2. 1 **(c)** 9.4 ÷ 3

(d) 61.5 ÷ 8.7 **(e)** 0.58 ÷ 2.3 **(f)** 19.2 ÷ 0.49

2. Which is greater? Fill the ☐ with inequality signs.

(a) 125 ÷0.8 ☐ **(b)** 125 ÷ 1.2 ☐ 125

3. We distributed 3 L of milk into 0.18 L per cup. How many cups can we fill? How many litters of milk will be left over?

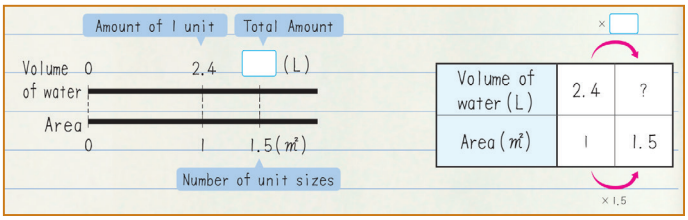
L47. WHAT KIND OF CALCULATION WOULD IT BE

Teaching and learning activities (60 min)

Read the problem given and think about how to solve it. Draw diagrams to help you think.

1. Asa watered a 1 m^2 flower bed with 2.4 L of water. How many L of water will Asa use to water a 1.5 m^2 flower bed?

estimate: Water needed for 1.5 m^2 will probably be more than water for 1 m^2

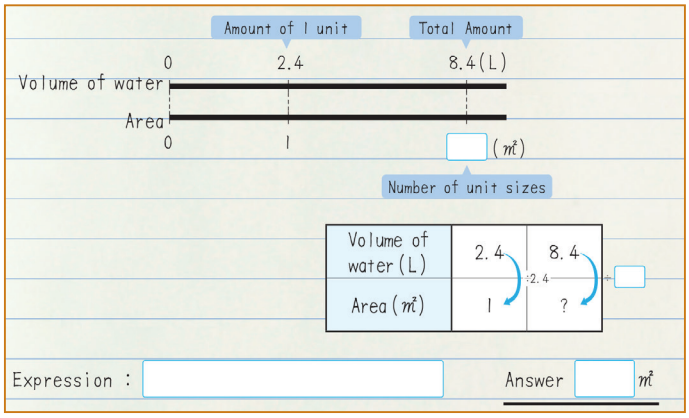


Number of Unit of sizes

Expression: ☐ ÷ ☐ =

2. Kip used 4 L of water to water 2.5 m^2 . How many L will Kip use to water 1 m^2 ?

Approach: Use the amount of 1 unit size to calculate the number of unit size.



3. Raka used 2.4 L of water to water 1m^2. How many m^2 can Raka water with 8.4 L?
Read the questions made by Moro and think about what to do.
Approach: Use the amount of 1 unit size to calculate the number of unit size.

Expression: ☐

Answer: ☐ m^2

L47. WHAT KIND OF CALCULATION WOULD IT BE

Teaching and learning activities (60 min)

3. Raka used 2.4 L of water to water 1 m^2. How many m^2 can Raka water with 8.4 L?
Read the questions made by Moro and think about what to do.
Approach: Use the amount of 1 unit size to calculate the number of unit size.

Expression: ☐

Answer: ☐ m^2

Read the given problem and solve

4. There is a panel that weighs 2.5 kg for 1 square meter. The weight of 3.8 square meter of this panel is ☐ kg.

(a) Fill the ☐ with an appropriate number.

(b) Make a multiplication problem by changing the numbers and words.

(c) Make a division problem by changing the numbers and words.

L48. EXERCISE

Teaching and learning activities (30 min)

1. Solve these in vertical form

(a) 12 ÷ 1.7 **(b)** 36 ÷ 1.8 **(c)** 40 ÷1.6

(d) 7.2 ÷ 2.4 **(e)** 9.8 ÷1.4 **(f)** 8.1÷ 2.7

(g) 7.2÷ 0.9 **(h)** 8.4 ÷ 0.6 **(i)** 0.3 ÷ 0.8

(j) 9.1÷ 3.5 **(k)** 5.4 ÷ 1.2 **(l)** 2.2 ÷ 5.5

(m) 0.87÷ 0.6 **(n)** 14.8 ÷ 1.6

2. Solve the division problem

(a) 9.8 ÷ 0.6 **(b)** 6.23 ÷ 0.23 **(c)** 9.72 ÷ 1.6

3. Read and solve.

I poured 3.4 L of juice into cups of 0.8 L each. How many cups of 0.8 L juice will I have and how many L of juice will be left over?

4. Round the answer to the nearest thousandths place

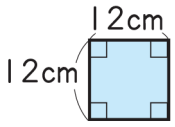
(a) 0.84 ÷ 1.8 **(b)** 5.18 ÷ 24 **(d)** 8.07 ÷ 0.96

5. Read and solve

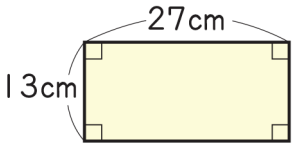
There is a wire that weighs 5.8 g for 0.7 m. About how many g will 1 m of this wire weigh? For answering the quotient at the nearest tenth. round the quotient to the hundreth place.

6. Find the area of the following figures

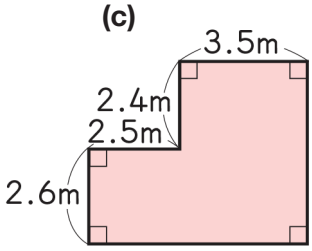
(a)



(b)



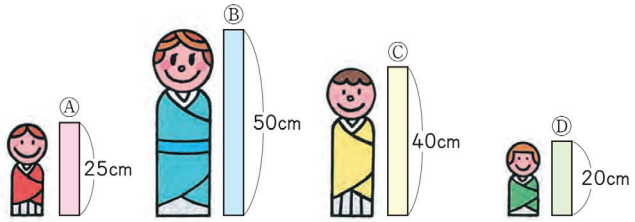
(c)



L49. COMPARING HEIGHTS (1)

Teaching and learning activities (60 min)

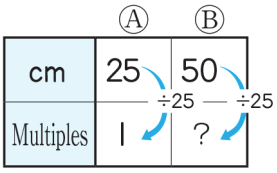
1. Compare the heights of the dolls below and solve each problem.

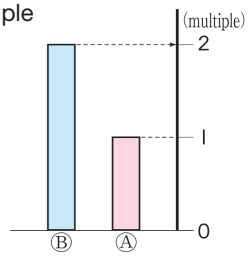


(a) How many times is the height of A to B?

50 ÷ 25 = ☐

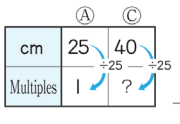
Height of B height of A multiple

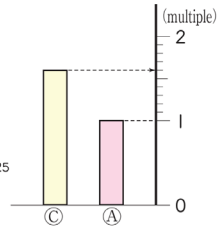




(b) By how many times is the height of A to C? When C is measured with A there is a remainder, thus, we need to express the answers as decimals number by dividing the height between 1 and 2 into equal parts.

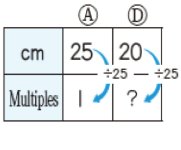
☐ ÷ ☐ = ☐

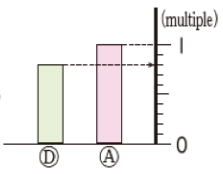




(c) By how many times is the height of A to D? since D is smaller than A this multiple will be a number that is smaller than 1.

☐ ÷ ☐ = ☐





L50. COMPARING HEIGHTS (2)

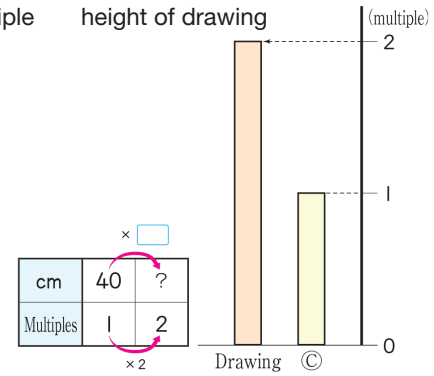
Teaching and learning activities (30 min)

1. We are going to draw a picture of dolls based on doll C.

(a) if we draw a doll twice the height of C. what will be the height of the new doll?

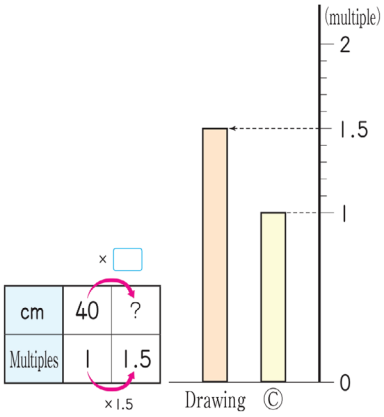
40 x 2 = ☐

Height of C Multiple height of drawing



(b) To make the drawing of the doll 1.5 times the height of C. how many cm should it be? The height of 1.5 times, is when the length between 1 and 2 is divide into 10 equal parts.

☐ x ☐ = ☐



(c) To make the drawing of the doll 0.6 times the height of C, how many cm should it be? The height multiplied by 0.6 will become smaller than when it is multiplied by 1, so it will be smaller than the original height.

Strand: **Quantities of Measurement** Topic: **Volumes**

Content Standard: 5.2.2 Understand the units of volume and develop the formula of volume and measure

Teacher's Notes

Listed below are the expected Attitude, Knowledge, Skills and mathematical thinking to be displayed by the students after learning this topic on Large Numbers.

Attitude

- Participate collaboratively in the lesson activities.
- Enjoy comparing sizes of boxes etc. and exploring their quantities in volumes.
- Enjoy finding the unit of volume in cubic meters and centimetres.
- Enjoy discovering the volume of prisms and calculations.

Skills

- explore the quantity of volumes in cm^3 and m^3
- use unit blocks and boxes to represent the quantity of volumes
- find volumes of various 3 dimensional objects and their expressions
- read and write the volume of the objects
- calculate the volumes of the prisms
- use the formulas to calculate large volumes
- compare and find relationship with water and volumes
- calculate the volumes in litres and kilolitres.

Knowledge

- Standard unit of volumes (cm^3,m^3) quantity of volumes.
- The meaning of volume and its representations.
- Volume of the solids are made up of 1cm cube or 1 m cube
- Formulas for Volume (2) rectangular prism = length x width x height (l x w x h)
- Larger Volumes – 1 m^3 = 1000000 cm^3.
- Conversion of cubic centimetres to millilitres and litters are measured in cubic meters
  1 cm x 1 cm x 1 cm = 1 mL, 10 cm x 10 cm x 10 cm = 1 mL.
- Larger Volumes (4) – 1000 L = 1kL.

Mathematical thinking

- Compare the sizes of boxes.
- Explain the quantity of volumes in cm^3 and m^3.
- Investigate and make different shapes.
- Investigate the formulas for volumes.
- Explore large volumes and compare their relationships.

Background Notes

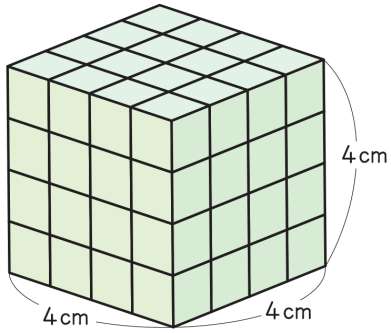
What is Volume?

Volume is the space occupied by an object or substance (solid, liquid or gaseous). It is expressed in cubic units because it is the sum of three measurement (length, width and depth) multiplied together. The units for volume is cubic units such as cm^3 and m^3 .

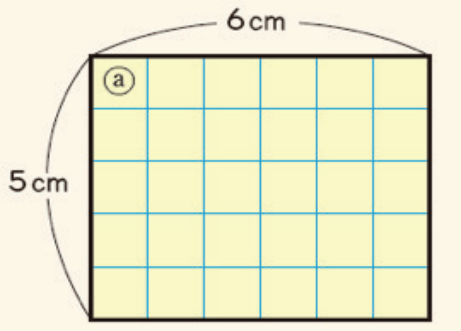
The volume can be calculated for simple geometric shapes such as
- Cubes: Volume = side x side x side
- Parallelepiped: Volume = length x width x height

as well as spheres, cones, pyramids etc..

Volume is measured in units cubed 3
How many cubes will fit into a solid object?



Area is measured in units squared
How many squares will fit into a flat space?



Basic Formula for calculating volume
Length x width x height (depth)

Example:

Volume = 4cm x 4cm x 4cm = 64 cm^3

Finally, the volume is expressed in cubic unit. Therefore, if the unit you are using is meter, the volume is expressed in cubic meter or $meter^3$.

The basic formula can be extended to cover the volumes of cylinders and prism. To find the volume of cylinders and prism, simply have another shape: a circle for cylinders, a triangle, hexagon or any other polygons for a prism.

Finally, the volume is expressed in cubic unit. Therefore, if the unit you are using is meter, the volume is expressed in cubic meter or meter.
Volume of a cylinder = π x r^2 x h

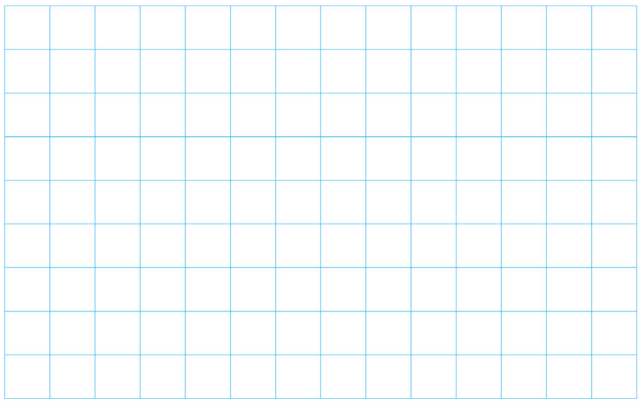
Example:

r = radius = 5 cm
Height = 10 cm
Volume = 3.14 x 25 x 10
= 785 cm^3

L51. EXERCISE

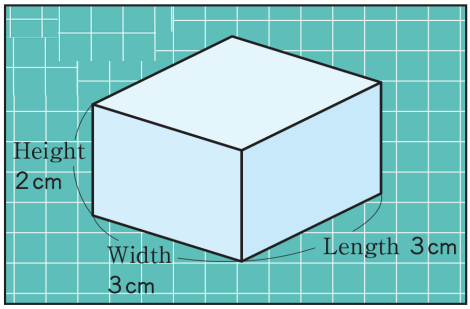
Teaching and learning activities (60 min)

1. Draw the development of a rectangular prism and cube on a square pare as shown below. How can you make the largest box.

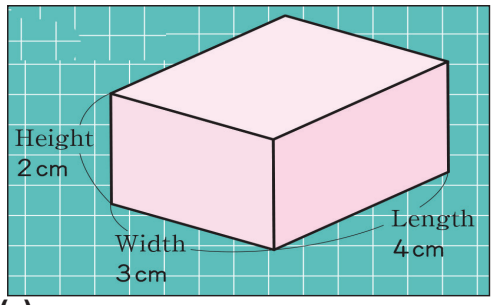


2. Study the boxes drawn by three children. Compare and explain which box is largest among the three?

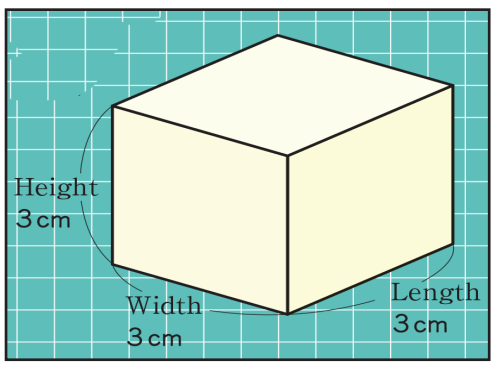
(a)



(b)



(c)



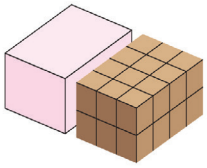
L51. EXERCISE

Teaching and learning activities (60 min)

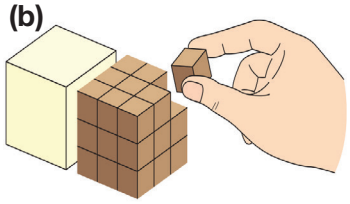
3. Think about how to compare the size of boxes. We make the same solids by using 1 cm cubic block.
Compare the number of cubes need to make box B and C below and fill in the ☐.

Points to remember
We use the unit square of cm^2 area

(a)



(b)



B needs ☐ boxes

C needs ☐ boxes

☐ Needs ☐ more boxes.

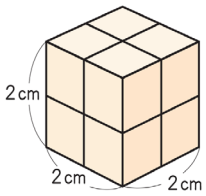
L52. UNITS OF VOLUME

Teaching and learning activities (60 min)

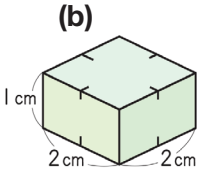
Study the solids below and answer the question below.

1. How many 1 cm cubes are needed for the following rectangular prisms and cube?

(a)



(b)



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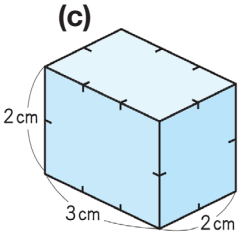
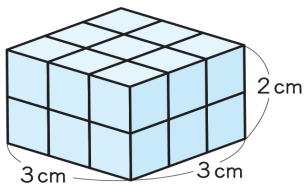


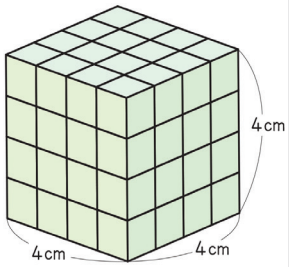
Important Points:
The size of solid represented by a number of units is called **volume**
1 cm cube is used as a unit for volume. We represent volume by counting the number of cube units.

2. Find the volume of the following rectangular prism and cubes.

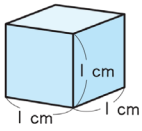
(a)



(b)



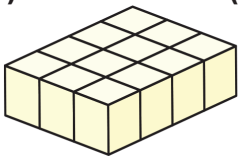
The volume of a cube with 1 m edges is called **1 cubic meter** and is written as 1 m^3.



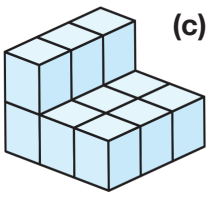
Exercise

1. Use 12 cubes of 1 cm^3 and make different shapes (following are 3 example below)

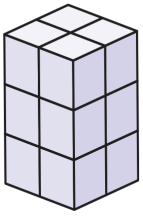
(a)



(b)



(c)

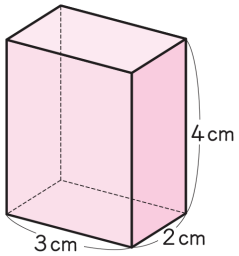


L53. FORMULAS FOR VOLUME (1)

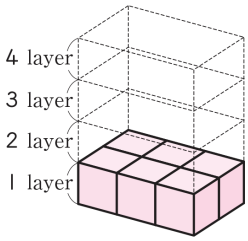
Teaching and learning activities (60 min)

1. Study the rectangular prism below and think about how to find the volume.
How many 1 cm^3 cubes are on the bottom layer?

(a) How many layers are there?



(b) How many layers are there



(c) What is the volume rectangular prism above?

3 × 2 × 4 = ☐

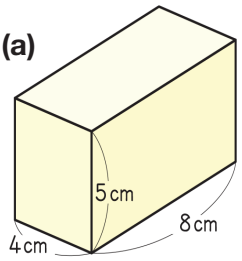
Number of length | Number of width | Number of height | Total number

Important Points:
The volume of rectangular prism is expressed in the following formula, using length, width and height .

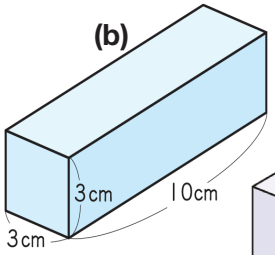
Volume of rectangular prism = Length x width x height

2. Find the volumes of the prisms below

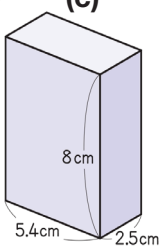
(a)



(b)



(c)

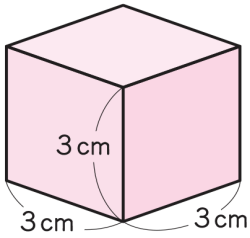


L54. FORMULAS FOR VOLUMES (2)

Teaching and learning activities (60 min)

1. Find the volume of the cube below

(a) How many 1 cm^3 cubes are there in this cube?



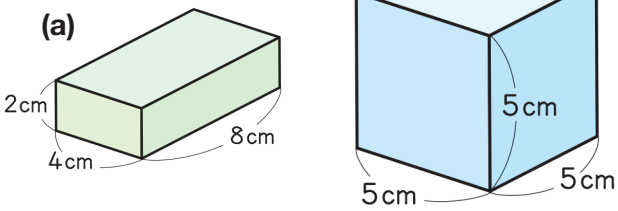
(b) What is the volume?

The size of length, width, and height of cube are equal, so its formula is;

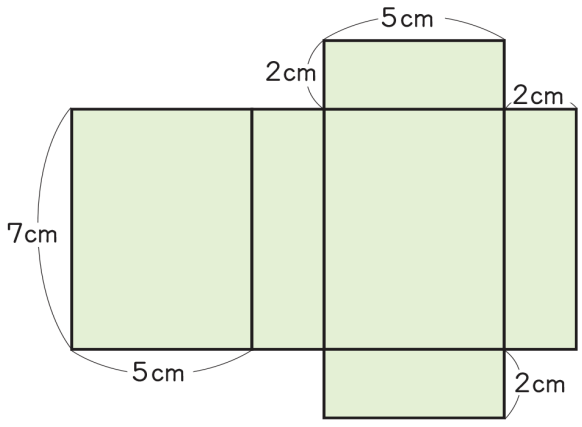
Volume of cube = side x side x side

Exercise

1. Find the volume of rectangular prism and cube below.



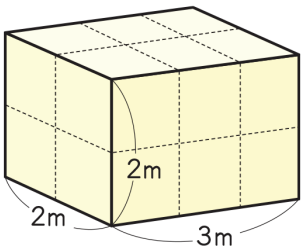
2. Draw the development of a solid below and cut and fold.



L55. LARGER VOLUMES

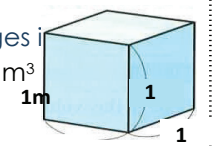
Teaching and learning activities (60 min)

1. Think about how to express the volume of large rectangular prism as the one given



(a) How many 1m cubes are there in this prism?

The volume of a cube with 1m edges i
1 cubic meter and expressed as 1 m^3
1 m^3 **= 1000 000** cm^3



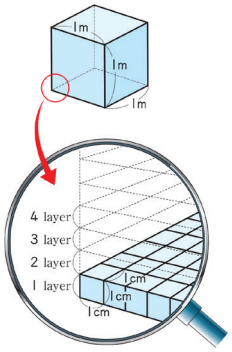
(b) What is the volume of the prism in m^3?

2. Use the formula above. Find how many cm^3 equals to 1 m^3.

(a) How many cm^3 cubes will line up for width and length of 1cm^3 's base?

(b) How many layers are there?

(c) What is the total of 1cm3 cubes and the volume in cubic centimetre?



100 x 100 x 100 = ☐ (cm^3)

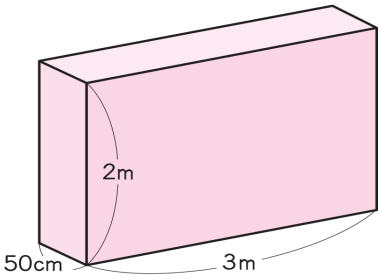
Length Width Height Volume

1 m^3 = 1000000 cm^3

L56. LARGER VOLUMES (2)

Teaching and learning activities (30 min)

1. Think about how to calculate the volume of the rectangular prism below and find the volume.

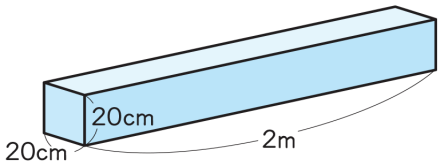


(a) How many cubic metres is this rectangular prism?

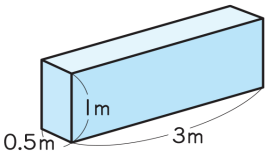
(b) How many cubic centimeters is it?

Exercise

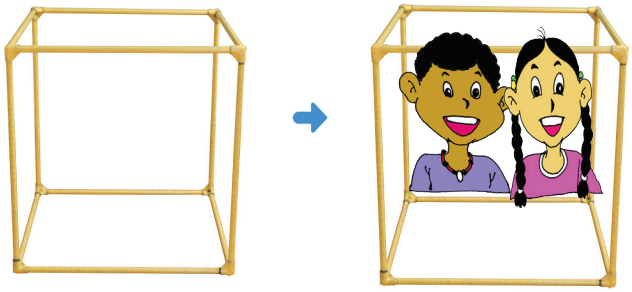
1. What is the volume of this rectangular prism?



2. Find the volume of this rectangular prism both in m^3 and cm^3.



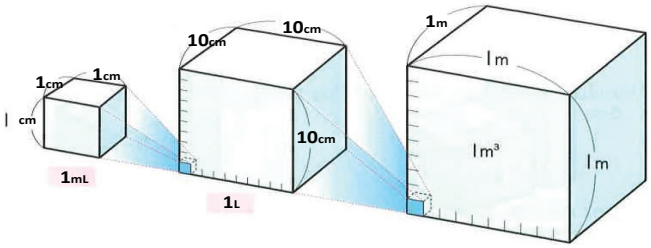
3. How many people can get inside this 1 cm^3 cube?



L57. LARGER VOLUMES (3)

Teaching and learning activities (30 min)

1. Study the diagram below. Find the relationship between the amount of water and volume.

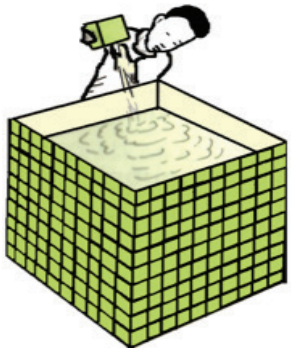


(a) Find the volume in cm^3, of water
1L = ☐ cm^3
Which would fill 1L container

(b) 1L equals 1000 mL. 1 mL = ☐ cm^3
How many cm^3 is 1 mL?

(c) How many L of water will fill $1m^3$ tank
$1m^3$ = ☐ cm^3

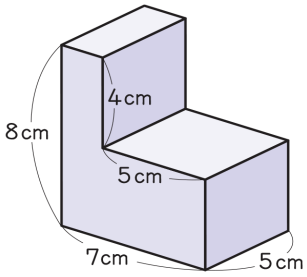
= ☐



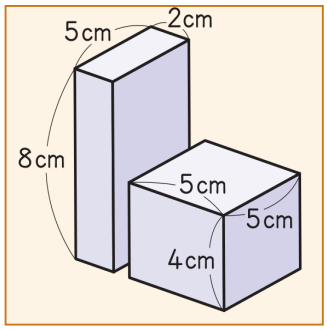
L58. LARGER VOLUMES (4)

Teaching and learning activities (60 min)

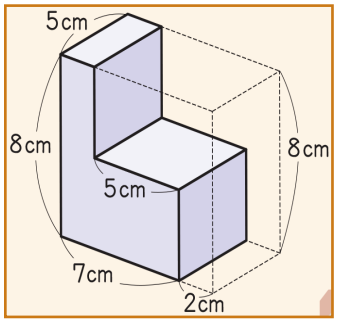
1. Study the solid below and think about how to find the volume.



Idea 1



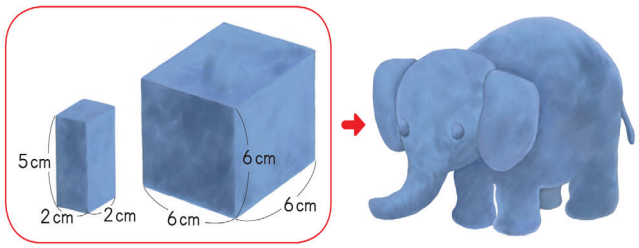
Idea 2



(a) Write down expression and answer by using their ideas.

(b) Discuss with your friend about other ideas.

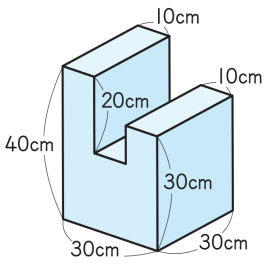
(c) We made an elephant by using cubic and rectangular prism clay below. Find the volume of an elephant.



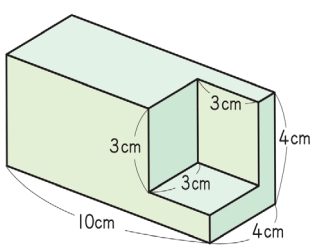
Exercise

1. Find the volume of solid below

(a)



(b)

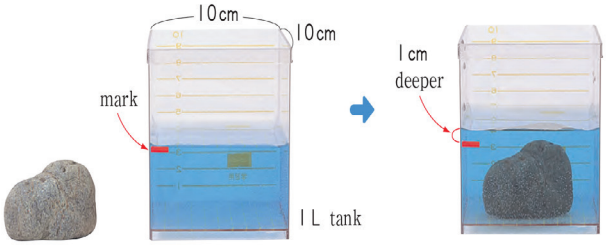


L59. VOLUMES OF VARIOUS SHAPES

Teaching and learning activities (30 min)

Physical objects have volumes. How can we find volume other than cube or rectangular prism? See the example given below. Uneven shapes such as a rock can be calculated by putting in water

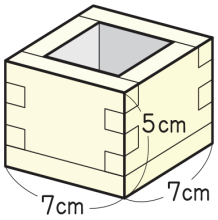
1. When you sink an object in the water, its height will increase by volume of an object. Find the volume of the rock below.



2. Measure the volume of objects. Use a clear glass or tank with measurement to measure volume easily.
Before the measurement estimate the volume.

3. There is a rectangular parallelepiped container as shown below made by 1cm wood.

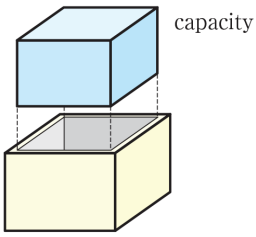
How much water will fill the container? Which length should we know in order to calculate?



L59. VOLUMES OF VARIOUS SHAPES

Teaching and learning activities (30 min)

The size of a container is equal to the volume of water which fills it. This volume is called **capacity** of the container.

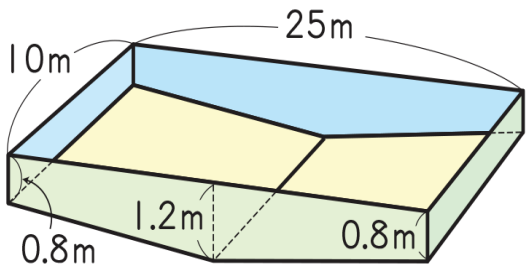


In order to calculate the capacity, we need to know the inside length, width and depth of the containers.

(a) What is the inside length, width and depth of the container in cm?

(b) What is the capacity of the container in cm^3?

4. The diagram below is a sketch of a school pool. Assume that its depth is 1m, and calculate its approximate capacity.

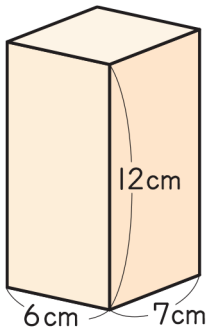


L60.EXERCISE

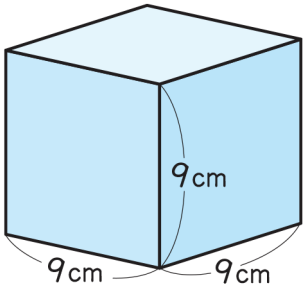
Teaching and learning activities (30 min)

1. Find the volumes of the rectangular prisms and cube below.

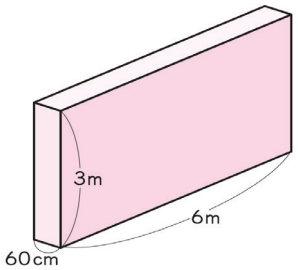
(a)



(b)

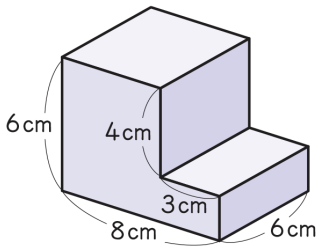


2. What is the volume in m of the rectangular prism below?



3. What is the volume of 400L water in cm^3, and m^3?

4. Find the volume of an object below



Answers:

Ex.1. (a) 504 cm^3 (b) 729 cm^3

Ex.2. 10.8 m^3

Ex.3. 400 000 cm^3 0.4m

Ex4. 216 m^3

L61. REVIEW

Teaching and learning activities (60 min)

1. Fill the ☐ with numbers.

(a) 8.27 = ☐ × 8 + ☐ × 2 + ☐ × 7

(b) 0.206 = 0.1 × ☐ + ☐ × 6

2. Solv the following.

(a) How much is 1 meter?

(b) How much is 7 meter?

3. Read and solve

(a) How much is 1 meter?

(b) How much is 7 meter?

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

The area of Pools and The number of Persons

	Area (m^2)	Number of person
Indoor	400	80
Outdoor	500	120

5. Calculate the following in vertical form.

(a) 4 x 1.6 **(b)** 8 x 0.5 **(c)** 19 x 1.9

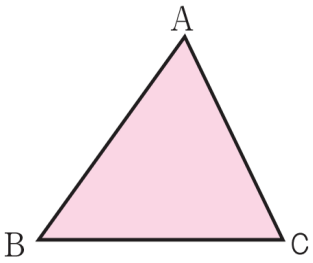
(d) 5.4 x 1.2 **(e)** 2.6 x 0.4 **(f)** 2.8 x 1.5

6. A 1m iron pipe weighs 3.6 kg. what would be its weight when its length is 7.5 and 0.8m?

L62. REVIEW

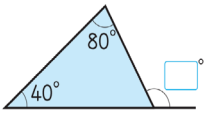
Teaching and learning activities (60 min)

1. Draw a congruent triangle as the one show below. Which length and angle do you need to know in order to draw?

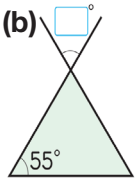


2. Fill the ☐ with the correct angle.

(a)

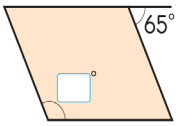


(b)



Isosceles triangle

(c)



Parallelogram

3. Calculate the following in vertical form.

(a) 6 ÷ 1.5 **(b)** 9 ÷ 0.6 **(c)** 1.4 ÷ 3.5

(d) 6.9 ÷ 4.6 **(e)** 3.6 ÷ 2.4 **(f)** 6.1 ÷ 0.4

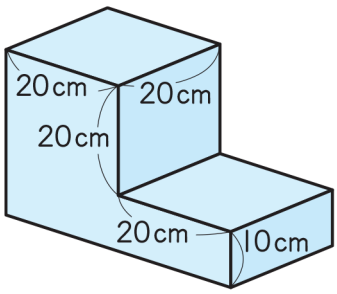
4. Calculate and get the quotient by (whole) number, without decimals and remainder.

(a) 6.1 ÷ 1.7 **(b)** 9.7 ÷ 0.6

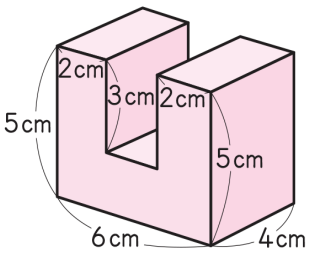
5. There are 13.5 kg of rice. If you eat 0.9 kg of the rice every day. How many days can you eat.

6. Find the volume of the following solids.

(a)



(b)



Strand: **Number and Operation** Topic: **Fraction**

Content Standard: 5.1.6 Extend their understanding of fractions and their calculations to compare size fraction.

Teacher's Notes

Listed below are the expected Attitude, Knowledge, Skills and mathematical thinking to be displayed by the students after learning this topic on Large Numbers.

Students will be able to;

Attitude

- Enjoy posing on compare the size of fractions and equivalent fraction using fraction measuring cup, fraction wall, number line and paper folding.
- Share ideas with other students and respect the views and ideas.

Skills

- Recognize the given situation and think about how to express mixed fractions and improper fractions and fractions larger than 1
- Addition and subtraction of fractions with the same denominator using number line and 1L diagram representations
- Identify Proper Fraction, Improper Fraction and a mixed fraction.
- Identify features to differentiate each fraction as well as their real world correspondence.
- Use a number line to understand that there are equivalent fractions having different denominators and numerators
- Distinguish between a proper fraction, mixed fraction and an improper fraction

Knowledge

- Understanding of various fraction and their representations based on unit fractions.
- Understand fractions larger than 1 and equivalent fractions concept. (4.1.9 a, b)
- Fractions representing sizes less than 1 through understanding denominator and numerator.
- The structure of fractions by understanding the unit fraction.
- Fractions Larger than 1
  How to express and read mixed fractions and improper fractions.
- Relationship between Numerator and Denominator in identifying fractions
- understand the relationship between mixed fractions and improper fractions

Mathematical thinking

- Think about the ways in how to express equivalent fractions based on prior knowledge
- Think of ways on how to express fractions larger than 1 based on prior knowledge.
- Think of ways of changing mixed fractions to improper fractions and vice-versa, and change improper fractions to mixed fractions or whole numbers, and vice-versa.

Background

- Numbers such , 5/4 and 7 1/6 are called **fractions.**
- The fractions such as 2/3, the upper number is called a numerator and the lower number is called a **denominator**
- When the numerator is smaller than the denominator, the fraction is called a **proper fraction.**
- When the numerator is bigger than the denominator, the fraction is called an **improper fraction.**
- The proper fraction whose numerator is 1 is called a unit fraction e.g 1/2
- The **mixed fraction** is composed of a sum of a whole number and a fraction eg. 7+1/6 = 7 1/6
- The fraction can be a measured quantity for example 2/3 meter, a quotient of a division for example 2 ÷ 3 and a value of the ration 2:3
- Fractions can be increased or reduced using **common factors/denominators;** the common factor of ½ to 2/4 is 2 and to 4/8 is 4- however the size of the fraction reduces or increases, it does not change. These are called **equivalent fractions.**
- Lowest common multiples and divisors can be used to find the common factors.

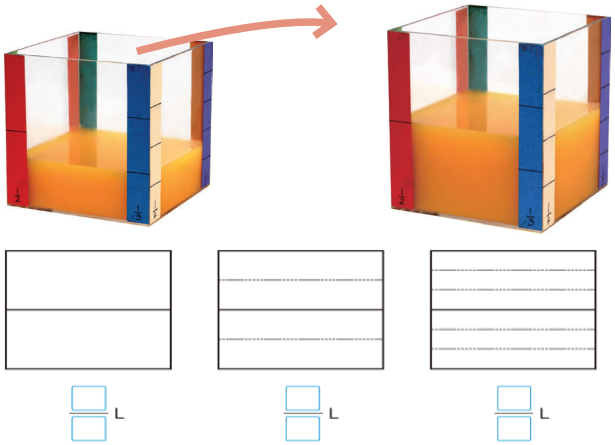
L63. EQUIVALENT FRACTIONS

Teaching and learning activities (60 min)

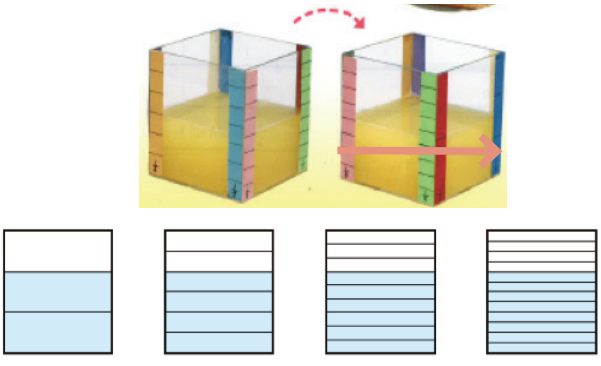
1. Study the diagram of orange juice in the measuring cups and think about how to represent the quantity in each cup. Pour orange juice into a fraction measuring cup.

There is ½ L of juice in the fraction measuring cup. If you draw divided lines as presented below,

(a) Use fractions to represent the quantity of juice marked on each diagram



(b) The same part of a region may suggest more than one fraction. Use fraction to fill in what each diagram represent.



Important Points:

How to find equivalent fractions.

Start with any fractional number → Multiply the numerator and denominator by any number except zero → You have found a fractional number equivalent to the first one

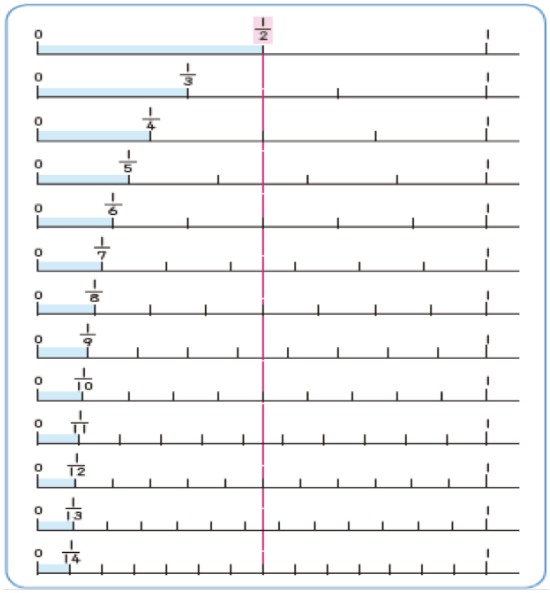
Example: $\frac{3}{4} \times \frac{3}{3} = \frac{9}{12}$ $\quad \frac{7}{10} \times \frac{10}{10} = \frac{70}{100}$

L63. EQUIVALENT FRACTIONS

Teaching and learning activities (30 min)

2. Let's explore the equivalent of fractions by using the number lines.

(a) Study the number lines below and find fractions which are equivalent to ½.

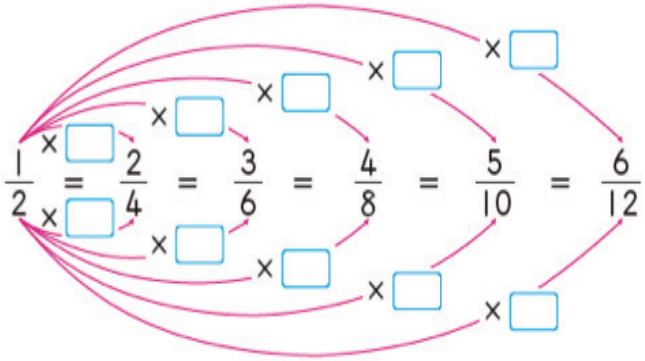


$$\frac{1}{2} = \frac{\square}{4} = \frac{\square}{6} = \frac{\square}{8} = \frac{5}{\square} = \frac{6}{\square} = \frac{\square}{14}$$

(b) Find fractions which are equivalent $\frac{1}{3}$.

$$\frac{1}{3} = \frac{\square}{6} = \frac{3}{\square} = \frac{\square}{12}$$

(c) What numbers are multiplied to each numerator and denominator of the fraction $\frac{1}{2}$ in the problem below?



L64. COMPARISON OF FRACTION

Teaching and learning activities (60 min)

1. Compare the size of the given fraction below.

$\frac{2}{4}$, $\frac{2}{3}$ and $\frac{3}{4}$

$\frac{2}{4}$ and $\frac{3}{4}$ have same denominator so we can compare them

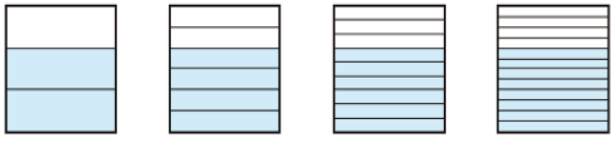
How can we compare the size of $\frac{2}{3}$ and $\frac{3}{4}$

Think about how to compare fraction with different denominators.

Two fractional numbers $\frac{3}{5}$ → Write the fraction with a common denominator $\frac{3}{5} = \frac{9}{15}$, $\frac{2}{3} = \frac{10}{15}$ → Compare the numerators $9 < 10$ → The smaller numerators shows the number $\frac{3}{5} < \frac{10}{15}$, $\frac{9}{15} < \frac{2}{3}$

2. Think about how to compare $\frac{2}{3}$ and $\frac{3}{4}$ use the example above and use the inequality sign to indicate.

Represent $\frac{2}{3}$ in various fraction

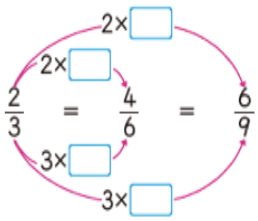


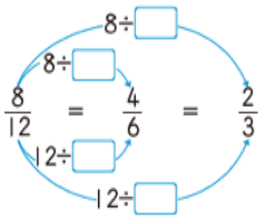
(i) Let's represent $\frac{2}{3}$ by $\frac{1}{6}$, $\frac{1}{9}$ and $\frac{1}{12}$ as for the unit.

L64. COMPARISON OF FRACTION

Teaching and learning activities (60 min)

(ii) Study the diagrams below. Fill in the ☐ and explain the relationship between the numerator and denominators of equivalent fraction.





The size of fraction does not change even if the numerator and denominator are multiplied or divide by the same number.

L65. COMMON DENOMINATORS

Teaching and learning activities (60 min)

1. Complete the fraction equation given below and answer the questions.

(a) $\frac{2}{3} = \frac{2 \times x}{3 \times x} = \frac{\quad}{12}$

What is the numerator for question **(a)**

(b) $\frac{3}{4} = \frac{3 \times x}{4 \times x} = \frac{\quad}{12}$

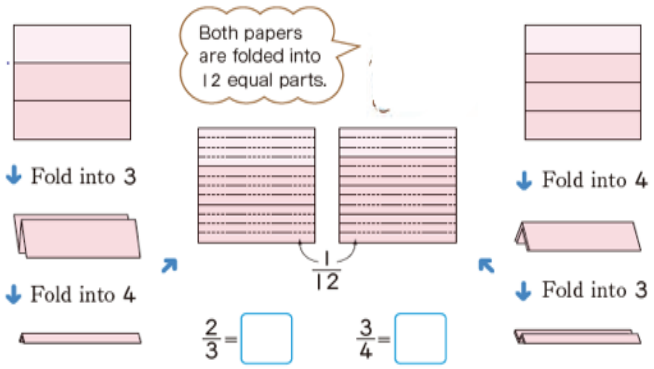
What is the numerator for question **(b)**

(c) Compare $\frac{2}{3}$ and $\frac{3}{4}$ by changing their representation using the same denominator.

$\frac{2}{3} = \square \; \frac{3}{4} = \square$ therefore, $\frac{2}{3} \square \frac{3}{4}$

2. Study how to fold papers to compare the sizes of fractions.

Use the idea to fold square papers to represent $\frac{2}{3}$ and $\frac{3}{4}$ as fractions with the same denominator.



Extended idea

- Fractions have the same denominator but if the numerators are not the same then it means that this fractions are not same size.

L66. FINDING COMMON DENOMINATOR

Teaching and learning activities (60 min)

1. Think about how to compare $\frac{3}{4}$ and $\frac{4}{5}$ by changing them to equivalent fraction with the same denominator.

Use equivalent fractions to make the denominators the same. Then compare the numerators.

Example

$$\frac{1}{2} x \frac{2}{2} = \frac{2}{4}, \frac{4}{8}, \frac{8}{16}, \frac{32}{64}$$

2. Study the two diagrams below and write down fractions with the common denominators.

$\frac{3}{4}$	$\frac{6}{12}$	$\frac{12}{16}$	$\frac{15}{20}$	$\frac{18}{24}$	$\frac{21}{28}$	$\frac{24}{32}$	$\frac{27}{36}$	$\frac{30}{0}$
$\frac{4}{5}$	$\frac{8}{10}$	$\frac{12}{15}$	$\frac{16}{20}$	$\frac{24}{30}$	$\frac{28}{35}$	$\frac{32}{40}$	$\frac{36}{45}$	$\frac{40}{50}$

Important points

The size of a fraction is unchanged if both the numerator and the denominator are multiplied or divided by the same number and compare them having the same denominator. This process is called "reducing or cancelling.

Finding a common denominator means changing fractions with different denominators into equivalent fractions with same denominator.

1. Compare $\frac{2}{3}$ and $\frac{4}{7}$ by changing them into fractions with common denominators.

$\frac{2}{3} = \frac{\square}{21}, \frac{4}{7} = \frac{\square}{21}$ then, $\frac{2}{3} \square \frac{4}{7}$

We can find the common denominator if we multiply denominators of fractions which we would like to compare with.

L66. FINDING COMMON DENOMINATOR

Teaching and learning activities (60 min)

Expected Ideas:

(1)

Multiply the two denominators to get the common denominator.

$$\frac{5}{6}=\frac{5}{6}\frac{x}{x}=\frac{40}{48}$$

(2)

Choose 2, the least 'common multiple of and 8 as the common denominator.

$$\frac{5}{6}=\frac{5}{6}\frac{x}{x}=\frac{20}{24} \qquad \frac{7}{8}=\frac{7}{8}\frac{x}{x}=\frac{21}{24}$$

Exercise

1. Find common denominators and compare.

$\frac{1}{4}$ and $\frac{2}{7}$ the least common of 4 and 7 is $\square$

$\frac{1}{4}=\frac{x\square}{x\square}=\frac{\square}{\square}$, $\frac{2}{7}=\frac{2}{7}\ \frac{x\square}{x\square}=\frac{\square}{\square}$ therefore, $\frac{1}{4}\ \square\ \frac{2}{7}$

2. Complete the following to make equivalent fraction.

(a) $\frac{1}{3}=\frac{}{6}$ **(b)** $\frac{1}{5}=\frac{}{10}$ **(c)** $\frac{3}{10}=\frac{}{100}$ **(d)** $\frac{3}{5}=\frac{}{15}$

(e) $\frac{3}{4}=\frac{}{12}$ **(f)** $\frac{6}{8}=\frac{}{24}$ **(g)** $\frac{2}{6}=\frac{}{30}$ **(h)** $\frac{2}{3}=\frac{}{15}$

3. Compare $1\frac{3}{4}$ and $\frac{11}{6}$ using a common denominator.

We can change mixed fraction improper fraction.

We change improper fraction to mixed fraction.

L67. REDUCING FRACTIONS

Teaching and learning activities (60 min)

1. Read and think about how to look get fraction equivalent to $\frac{24}{36}$

Idea 1

$\frac{24}{36}=\frac{24}{36}\div\frac{2}{2}$

$=\frac{12}{18}=\frac{2}{2}$

$=\frac{6}{9}=\frac{3}{3}$

$=\frac{2}{3}$

Idea 2

$\frac{24}{36}=\frac{24}{36}\div\frac{3}{3}$

$=\frac{8}{12}$

$=\frac{8}{12}\div\frac{2}{2}=\frac{4}{6}$

$=\frac{4}{6}$

(a) What rule is used here?

(b) The two ideas above had different fractions, explain why. (State the conclusion first and the explain why showing a reason)

Important point

Reducing a fraction means dividing the numerator and denominator by a common divisor to make a simple fraction. When we reduce a fraction, we usally divide until we get the smallest numerator and denominator.
Vagi and Kip reduce $\frac{12}{18}$ using the following ideas.
Explain what they did.

Idea 1

$\frac{\cancel{12}^{6}}{\cancel{18}_{9}}=\frac{2}{3}$

Idea 2

$\frac{\overset{2}{\cancel{12}}}{\underset{3}{\cancel{18}}}=\frac{2}{3}$

(a) What are the similarities in their ideas?

(b) What are the differences between their ideas?

L67. REDUCING FRACTIONS

Teaching and learning activities (60 min)

2. Write each of the fraction below in its simplest form.

(a) $\frac{8}{10}$ **(b)** $\frac{16}{20}$ **(c)** $\frac{20}{25}$ **(d)** $\frac{33}{44}$ **(e)** $\frac{60}{100}$ **(f)** $\frac{240}{360}$

3. Fill in the ☐ with inequality signs.

(a) $\frac{2}{3}$ ☐ $\frac{4}{5}$ **(b)** $\frac{1}{2}$ ☐ $\frac{3}{8}$ **(c)** $\frac{5}{6}$ ☐ $\frac{2}{5}$

(d) $\frac{7}{12}$ ☐ $\frac{5}{8}$

L68. QUOTIENT AND FRACTIONS (1)

Teaching and learning activities (60 min)

1. When we divide 2 L milk among ☐ Children equally, how many liters will each child receive?

(a) Enter numbers from 1 to 5 in the ☐ and calculate.

2 ÷ ☐ , 2 ÷ ☐ 2 ÷ ☐ , 2 ÷ ☐ , 2 ÷ ☐

(b) Divide the above into 3 groups based on the answers.

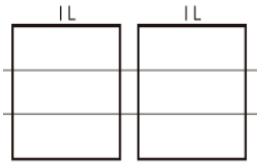
(i) Answers that are whole numbers ( )

(ii) Answers that are expressed exactly as decimal numbers.

(iii) Answers that are not expressed as decimal numbers. ( )

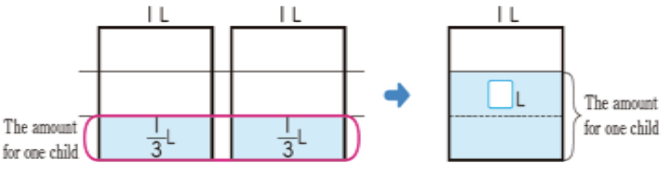
2 ÷ 3 is 0.666…… so this cannot be expressed exactly as a decimal numbers because there is no end.

2. When is divided equally among 3 children, how many liters does each child receive?



(a) Colour the portion for one child.

(b) How many litters in one portion?



The amount for one child when 1L is divided into 3 equal parts ☐ L.

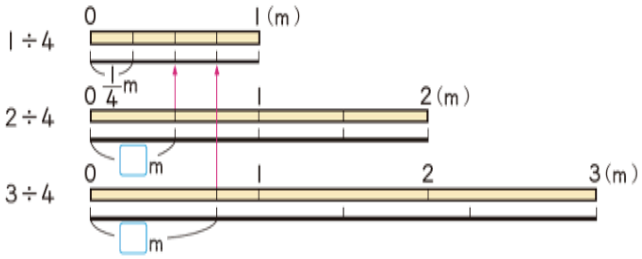
2 ÷ 3 =

The amount for one child when 2L is divided into 3 equal parts ☐ L.

L68. QUOTIENT AND FRACTIONS (1)

Teaching and learning activities (60 min)

2. How many meters is the length of each section when a 3 m string is divided into 4 equal parts?



Write an expression.
What is the length of one section? 3 ÷ 4 = ☐

Important Point
The quotient of a division problem in which a whole number is divided by another whole number can be expressed as a fraction.

. ◯ ÷ ☐ = ◯/☐

The quotient can be expressed precisely as a fraction

Exercise
Represent using a quotient using a fraction.

(a) 1 ÷ 6 = **(b)** 5 ÷ 8 = **(c)** 4 ÷ 3 =

(d) 9 ÷ 7 =

L69. QUOTIENT AND FRACTIONS (2)

Teaching and learning activities (60 min)

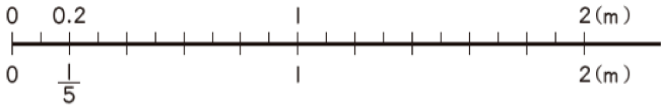
Read the situation below and think about how to solve it.

1. If we divide a 2m tape into 5 equal sections how many meters long is each section?

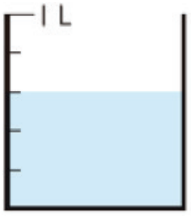
(a) Give the answer as a fraction and as a decimal number.

2 ÷ 5 = ☐/☐ 2 ÷ 5 = ☐

(b) Let's write the location of this fraction and decimal number on the number line.



2. Which is larger $\frac{3}{5}$ L or 0.7 L ?



$\frac{3}{5}$ 3 ÷ 5 = ☐, therefore

$\frac{3}{5}$ ☐ 0.7

To represent a fraction as a decimal or a whole number we divide the numerator by the denominator.

3. Write the following as decimal numbers or whole numbers.

(a) $\frac{3}{10}$ = ☐ **(b)** $\frac{29}{100}$ = ☐ **(c)** $\frac{12}{4}$ = 12 ÷ 4 = ☐

(d) $1\frac{3}{5} = \frac{8}{5} = 8$ ÷ 5 ☐

4. Write 2 and 5 as fractions. Complete the pattern.

(a) 2 = 2 ÷ 1 = $\frac{2}{1}$ **(b)** 5 = 5 ÷ = ☐

(c) 2 = 4 ÷2 = $\frac{2}{4}$ **(d)** 5 = 10 ÷ 2 = ☐

(e) 2 = 8 ÷ ☐ = ☐ **(f)** 5 = 30 ÷ ☐ = ☐

L69. QUOTIENT AND FRACTIONS (2)

Teaching and learning activities (60 min)

When numbers can be expressed as fraction no matter what number you choose for the denominator.

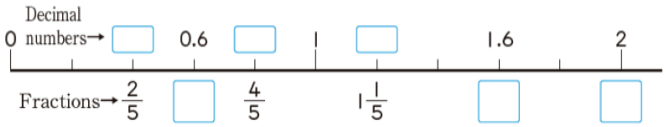
5. Write the following as decimal numbers 0.19 and 1.7.as fraction.

(a) Since 0.19 is 19 sets of 0.01 , we can think this a 19 sets of $\frac{1}{100}$ and get ☐ .

(b) Since 1.7 is ☐ sets of 0.1. we can think of think as 17 sets of ☐ and get ☐

6. Decimal numbers can e expressed as fraction if we choose $\frac{1}{10}$ and $\frac{1}{100}$ as the units.

Fill the ☐ with decimals and fractions



L70. FRACTIONS, DECIMAL AND WHOLE NUMBERS

Teaching and learning activities (60 min)

1. Divide the following fractions into 3 groups

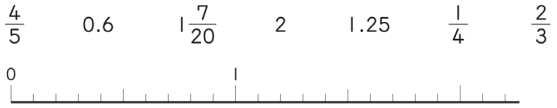
$\frac{8}{10}$ $1\frac{1}{2}$ $\frac{4}{11}$ $\frac{3}{5}$ $\frac{3}{1}$ $2\frac{1}{3}$ $\frac{6}{3}$

(a) whole numbers

(b) accurate decimal numbers

(c) other decimal numbers

2. Put an arrow ↓ for each of these numbers on the number line below.



Whole numbers, decimal numbers and fractions can all be expressed on one number line. That makes it easy to compare numbers.

Exercise

1. Line up the numbers from the smallest.

1. 3 0.75 $\frac{4}{2}$ $1\frac{1}{2}$ $\frac{7}{10}$

2. Change decimal numbers below to fractions

(a) 0.9 **(b)** 0.03 **(c)** 0.25

(d) 0.005 **(e)** 0.5

3. Changes the fractions to mixed and whole numbers

(a) $\frac{7}{5}$ **(b)** $\frac{24}{6}$ **(c)** $\frac{48}{8}$ **(d)** $\frac{15}{10}$ **(e)** $\frac{3}{2}$

L71.EXERCISE

Teaching and learning activities (60 min)

1. Change fractions using common denominators for filling the ☐ with inequality signs.

(a) $\frac{2}{3} \square \frac{1}{2}$ **(b)** $\frac{3}{4} \square \frac{5}{7}$ **(c)** $\frac{1}{6} \square \frac{5}{18}$

(d) $\frac{4}{9} \square \frac{5}{12}$

2. Reduce these fractions

(a) $\frac{4}{8}$ **(b)** $\frac{6}{9}$ **(c)** $\frac{21}{28}$ **(d)** $\frac{16}{24}$ **(e)** $\frac{75}{100}$

3. Represent their quotient by fractions.

(a) 1 ÷ 7 **(b)** 5 ÷ 9 **(c)** 11 ÷ 3

4. Represent fractions as decimals or whole numbers.

(a) $\frac{5}{10}$ **(b)** $\frac{31}{100}$ **(c)** $\frac{18}{6}$ **(d)** $1\frac{1}{4}$

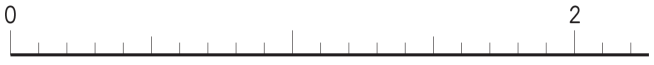
5. represent decimals by fractions.

(a) 0.3 **(b)** 1.9 **(c)** 0.61

(e) 1.11

6. Write ↓ for numbers on the number line.

$\frac{2}{5}$ 0.7 $1\frac{5}{20}$ 1.8 $\frac{7}{5}$

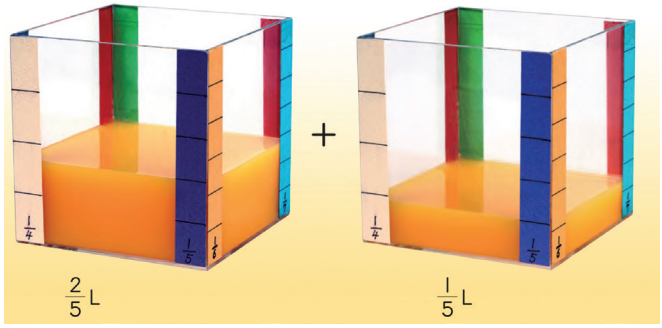


L72. ADDITION OF FRACTION (1)

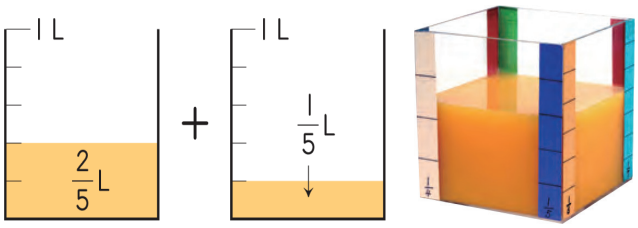
Teaching and learning activities (60 min)

Study the diagrams below and solve the given problem.

1. There were $\frac{2}{5}$ L and $\frac{1}{5}$ L of orange juice in the containers. How many litters are there altogether?

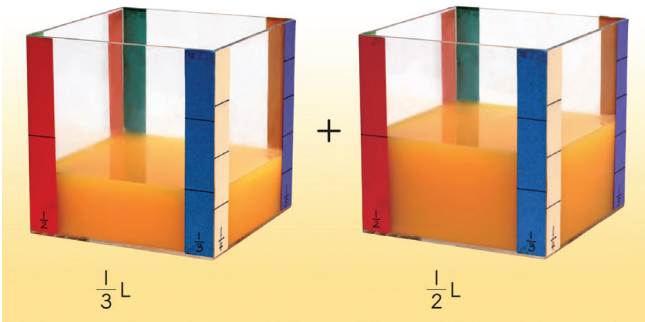


(a) Write an expression and calculate.



(b) Let's calculate.

There were $\frac{1}{3}$ L and $\frac{1}{2}$ L of orange juice in containers. How many litres are there altogether?

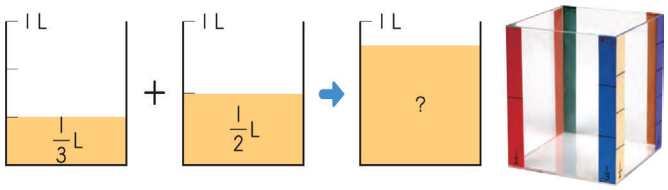


(a) Write an expression.

L72. ADDITION OF FRACTION (1)

Teaching and learning activities (60 min)

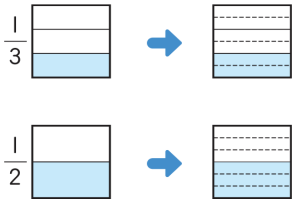
(b) Let's think about how to calculate.



3. Think about how to calculate $\frac{1}{3}+\frac{1}{2}$ and explain how to calculate.

Since the denominators are different, they cannot not be calculates as they are.	We can calculate if we change the denominators to fractions with the same denominators

$\frac{1}{3}+\frac{1}{2}=\frac{\square}{6}+\frac{\square}{6}=\square$



Important points:

- To add fractions with the different denominators, we change the representation of fractions with the same denominator.
- When an answer is improper fraction, change it into a mixed fraction.

Exercise

Calculate the following fractions.

(a) $\frac{2}{3}+\frac{1}{4}$ **(b)** $\frac{1}{2}+\frac{1}{5}$ **(c)** $\frac{2}{5}+\frac{1}{6}$

(d) $\frac{1}{2}+\frac{1}{10}$ **(e)** $\frac{5}{12}+\frac{1}{3}$ **(f)** $\frac{1}{4}+\frac{3}{20}$

L73. ADDITION OF FRACTIONS (2)

Teaching and learning activities (60 min)

1. Think about how to calculate $\frac{3}{10}+\frac{1}{6}$ and explain.

$\frac{3}{10}+\frac{1}{6}=\frac{\square}{\square}+\frac{\square}{\square}$

2. Let's think about how to calculate.

$\frac{1}{3}+\frac{5}{6}=\frac{\square}{\square}+\frac{\square}{6}$

If the answer can be reduce, you should reduce it to a fraction as simple as it could be

3. Put $1\frac{1}{2}$ kg of good into a $1\frac{2}{3}$ kg box. How many kilograms are there altogether?

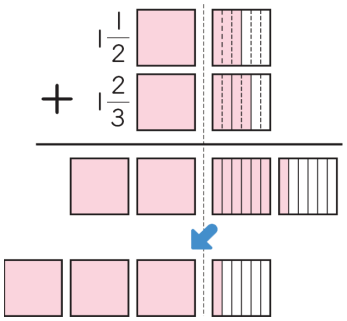
(a) Tau thanks about how to calculate as follows.

Add the parts of whole numbers and the parts

Of proper fractions, respectively

$1\frac{1}{2}+1\frac{2}{3}=1\frac{}{6}+1\frac{}{6}$

$=\square\frac{}{6}$



(b) Vagi first change mixed fractions into improper fractions, and then add them. Calculate the following fractions using Vagi's idea.

Exercise

Do these exercises.

(a) $\frac{3}{8}+\frac{1}{10}$ **(b)** $\frac{4}{5}+\frac{13}{15}$ **(c)** $\frac{11}{12}+\frac{1}{4}$

(d) $1\frac{5}{6}+1\frac{1}{2}$ **(e)** $2\frac{1}{6}+1\frac{1}{2}$ **(f)** $1\frac{2}{3}+2\frac{3}{4}$

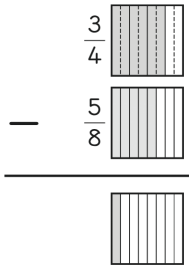
L74. SUBTRACTION OF FRACTION (1)

Teaching and learning activities (60 min)

1. Study the given situation and think about how to subtract fractions with different denominators. There are $\frac{3}{4}L$ of juice and $\frac{5}{8}L$ of milk.

What is the difference between the juice and the milk?

(a) Reduce the fraction and compare the volumes, and then write an Expression



We should change them to fractions with the same denominator

$\frac{3}{4} = \frac{\square}{\square}$ and then $\frac{3}{4} \square \frac{5}{8}$

important point

- For subtracting fractions with different denominators, we can calculate by changing the representation of fraction with the same denominator.

2. Try to Calculate this. What is the difference.

$$\frac{5}{6} - \frac{3}{10} = \frac{\square}{\square} - \frac{\square}{\square}$$

$$= \frac{\square}{\square}$$

$$= \square$$

Exercise

Do these exercises.

(a) $\frac{6}{7} - \frac{3}{4}$ **(b)** $\frac{5}{8} - \frac{1}{4}$ **(c)** $\frac{2}{3} - \frac{1}{6}$ **(d)** $\frac{3}{4} - \frac{7}{10}$

(e) $\frac{7}{15} - \frac{3}{10}$

L75. SUBTRACTION OF FRACTION (2)

Teaching and learning activities (60 min)

1. Think about how to calculate $\frac{7}{5} - \frac{5}{6}$

Calculate these improper fraction to proper fraction.

$$\frac{7}{5} - \frac{5}{6} = \frac{\square}{\square} - \frac{\square}{\square}$$

$$= \square$$

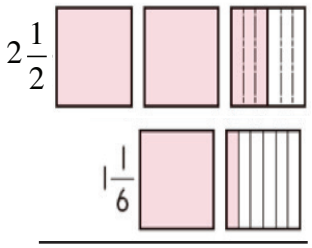
2. Calculate $2\frac{1}{2} - 1\frac{1}{6}$

(a)

$$2\frac{1}{2} - 1\frac{1}{6} = 2\frac{\square}{\square} - 1\frac{1}{6}$$

$$=$$

(b)



3. There is of juice at Kip's house. She drank in a week. How much juice is left?

Write the expression.

Ideas (1)

Change mixed numbers into improper fractions

$2\frac{1}{2}L = \frac{\square}{2}$, $1\frac{5}{6}L = \frac{\square}{6}$

Then, $2\frac{1}{2}L - 1\frac{5}{6}L = \frac{\square}{2} - \frac{\square}{6} = \frac{\square}{6} - \frac{\square}{6} = \frac{\square}{6}$

Now reduce: $\frac{\square}{6} = \frac{\square}{\square}$

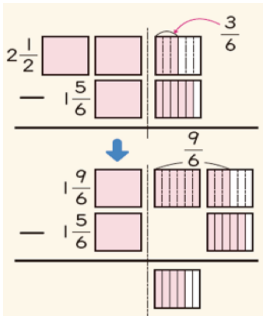
L75. SUBTRACTION OF FRACTION (2)

Teaching and learning activities (60 min)

Ideas (2)

Calculate the parts of whole numbers and proper fraction respectively.

$2\frac{1}{2}\text{L} - 1\frac{5}{6}\text{L} = 2\frac{3}{6}\square 1\frac{5}{6}$



We cannot subtract $\frac{5}{6}$ from $\frac{3}{6}$.

Borrow 1 from 2

$2\frac{3}{6} = 1\frac{9}{6}$

$1\frac{9}{6} - 1\frac{5}{6} = \frac{\square}{6} = \frac{\square}{\square}$

Exercise

Do these exercises.

(a) $1\frac{7}{8} - 1\frac{1}{7} =$ **(b)** $7\frac{3}{4} - 2\frac{1}{6} =$ **(c)** $5\frac{2}{3} - 2\frac{1}{6}$

(d) $5\frac{1}{6} - 3\frac{9}{10} =$ **(e)** $7\frac{1}{4} - 6\frac{11}{12}$

L76. EXERCISE

Teaching and learning activities (60 min)

1. Do these exercises.

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

④ $\frac{5}{6}+\frac{2}{3}$ ⑤ $1\frac{3}{8}+1\frac{1}{2}$ ⑥ $2\frac{5}{6}+4$

⑦ $\frac{7}{9}-\frac{1}{6}$ ⑧ $\frac{11}{12}-\frac{7}{8}$ ⑨ $\frac{8}{7}-\frac{3}{4}$

⑩ $\frac{4}{3}-\frac{1}{4}$ ⑪ $6\frac{5}{7}-2\frac{2}{5}$ ⑫ $3\frac{3}{4}-1$

2. Masahiro has $\frac{3}{4}$ m ribbon. Hiroko has $\frac{4}{5}$ m ribbon.

(a) which is longer and by how many meters?

(b) When you put the two ribbons together, what is the total length of it?

3. Is the following calculation correct? if it is the total length of it? if it is wrong. explain why is it wrong?

$$\frac{1}{3} + \frac{2}{5} = \frac{3}{8}$$

Strand: **Number and Operations** Topic: **Multiplication and Division Fractions**

Content Standard: 5.1.2 Extend learned multiplication and division to multiply and divide decimal numbers by whole number.

Teacher's Notes

Listed below are the expected Attitude, Knowledge, Skills and mathematical thinking to be displayed by the students after learning this topic on Large Numbers.

Students will be able to;

Attitude

- Enjoy posing question
- Appreciate

Skills

- Recognize the given situation and think about how to express mixed fractions and improper fractions and fractions larger than 1
- Addition and subtraction of fractions with the same denominator using number line and 1L diagram representations
- Identify Proper Fraction, Improper Fraction and a mixed fraction.
- Identify features to differentiate each fraction as well as their real world correspondence.
- Use a number line to understand that there are equivalent fractions having different denominators and numerators
- Distinguish between a proper fraction, mixed fraction and an improper fraction

Knowledge

- Understanding of various fraction and their representations based on unit fractions.
- Understand fractions larger than 1 and equivalent fractions concept. (4.1.9 a, b)
- Fractions representing sizes less than 1 through understanding denominator and numerator.
- The structure of fractions by understanding the unit fraction.
- Fractions Larger than 1
  How to express and read mixed fractions and improper fractions.
- Relationship between Numerator and Denominator in identifying fractions
- understand the relationship between mixed fractions and improper fractions

Mathematical thinking

Think about the ways in how to calculate accurately fractions with different denominators.

Think of ways on how to express fractions larger than 1 based on prior knowledge.

Think of ways of changing mixed fractions to improper fractions and vice-versa, and change improper fractions to mixed fractions or whole numbers, and vice-versa.

Background

Numbers such , 5/4 and 7 1/6 are called **fractions.**

- The fractions such as 2/3, the upper number is called a numerator and the lower number is called a **denominator**
- When the numerator is smaller than the denominator, the fraction is called a **proper fraction.**
- When the numerator is bigger than the denominator, the fraction is called an **improper fraction.**
- The proper fraction whose numerator is 1 is called **a unit fraction** e.g 1/2
- The mixed fraction is composed of a sum of a whole number and a fraction eg. 7+1/6 = 7 1/6
- The fraction can be a measured quantity for example 2/3 meter, a quotient of a division for example 2 ÷ 3 and a value of the ration 2:3
- Fractions can be increased or reduced using common factors/denominators; the common factor of ½ to 2/4 is 2 and to 4/8 is 4- however the size of the fraction reduces or increases, it does not change. These are called **equivalent fractions.**
- Lowest common multiples and divisors can be used to find the common factors.

Steps

- Rewritting the whole number as a fraction. To rewrite a whole number as a fraction.simply place the whole number over 1.
- Multiply the numerators of the two fractions.
- Multiply the donominators of the two fractions
- Simplify

Dividing two fraction is the same as multiplying the first fraction by the reciprocal of the second fraction. The first step to dividing numerator and denominator) of the second fraction. Next, multiply the two numerators. Then, multiply the two denominators

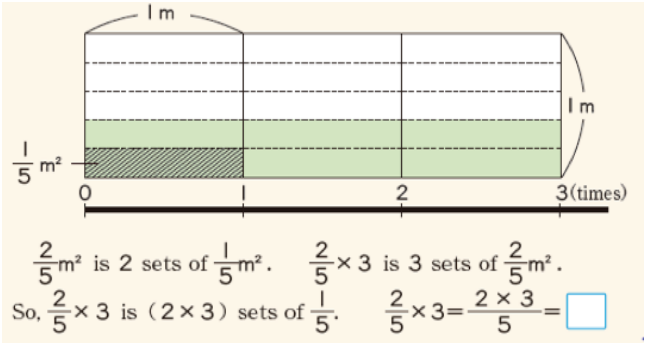
L77. FRACTIONS & WHOLE NUMBERS (1)

Teaching and learning activities (60 min)

Study the diagram and problem given and think about how to solve it.

1. Sprinkle flowerbeds by a watering can. When we use a large watering can, you can sprinkle $2m^2$ for each time. And when we use a small watering can, we can sprinkle $\frac{2}{5}m^2$ for each time.

Expected Idea 1

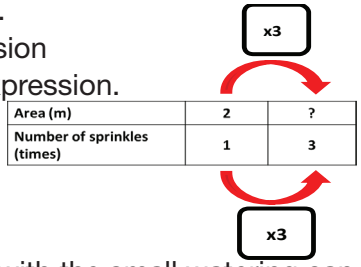


(a) Sprinkle three times with the watering can, what m^2 can we get? Write an expression and find the number

(b) Sprinkle three times with the watering can, how many m^2 can you get? Let's color in the figure below.

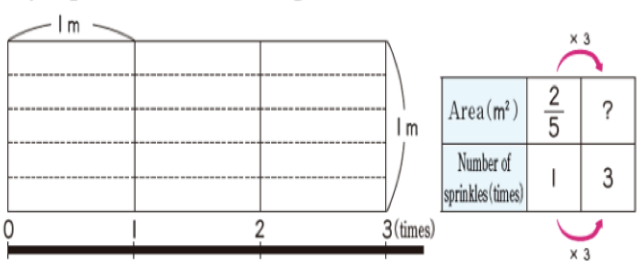
(c) Write an expression

(d) Calculate the expression.



2. Sprinkle 4 times with the small watering can in ex 1, how many m^2 you can water.

(a) Write the expression.



(b) Think about how to calculate

L77. FRACTIONS X WHOLE NUMBERS (1)

Teaching and learning activities (60 min)

Idea 2

Represent this fraction by division, we get $\frac{2}{5} = 2 \div 5$.

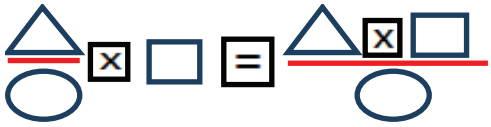
$\frac{2}{5} \times 3 = (2 \div 5)$

Represent this expression as one fraction we get $\frac{2}{5} \times 3 = \frac{2 \times 3}{5}$

$(2\div 5)\times 3=0.4\times 3=1.2$
$(2\times 3)\div 5=6\div 5=1.2$
so, the $\div 5$ and $\times 3$ part can be reversed.

Important points

When we multiply a proper fraction by a whole number, multiply the numerator by the whole number and leave the denominator as it is.



Note:

How do we multiply a fraction by a whole number? Example: $2x\frac{2}{6}=\frac{4}{6}$

Multiply the numerator by the whole number. Do not change the denominator. If the fraction becomes improper, extract the whole number.

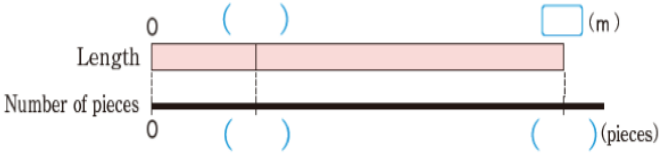
L78.FRACTIONS X WHOLE NUMBERS (2)

Teaching and learning activities (60 min)

Read the given problem and solve.

1. We make 4 pieces of tape that are $\frac{7}{5}$ m long each. How much tape do we need?

(a) The diagram below shows this problem situation. Fill the ( ) with a number.



(b) Calculate

$\frac{1}{6}$ x 5 $\frac{5}{8}$ x 6 $\frac{7}{6}$ x 12 $\frac{3}{5}$ x 7

$\frac{3}{8}$ x 5

Exercise

Do these exercises.

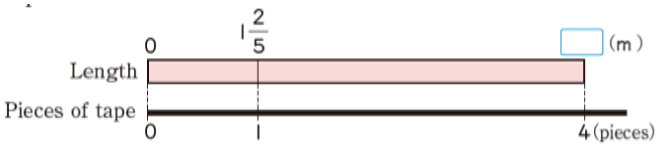
(a) $\frac{2}{5}$ x 2 **(b)** $\frac{5}{3}$ x 4 **(c)** $\frac{3}{9}$ x 2 **(d)** $\frac{7}{6}$ x 4

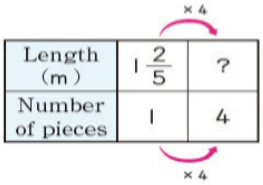
L79.FRACTIONS X WHOLE NUMBERS (3)

Teaching and learning activities (60 min)

study the given problem and think about how to solve it.

1. Vagi makes 4 pieces of tape that are m long each. How much tape do we need?



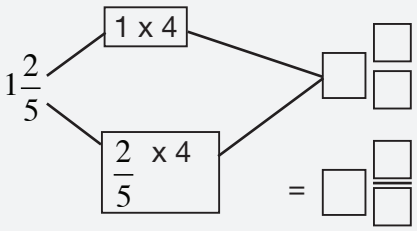


(a) Write an expression that represents the total length of the tape

(b) Approximately how much tape does he need?

(c) Think about how to calculate and explain.

Calculate $1\frac{2}{5}$ in 1 and $\frac{2}{5}$



It easy to estimate the approximate Value in first idea.

Calculate by changing $1\frac{2}{5}$ in to an improper fraction. $1\frac{2}{5}$ x 4 = $\frac{7}{5}$ x 4

=

=

To represent mixed fraction Is simpler to understand the size.

L79.FRACTIONS X WHOLE NUMBERS (3)

Teaching and learning activities (60 min)

When multiplying a mixed fraction by a whole numbers, you can calculate in the same way as proper fraction x whole number by changing mixed fractions to improper fractions.

Exercise

1. Do the following exercises.

(a) $1\frac{3}{7} \times 2$ **(b)** $1\frac{5}{8} \times 4$ **(c)** $2\frac{2}{3} \times 15$ **(d)** $2\frac{5}{6} \times 1$

2. It takes $\frac{2}{5}$ meters of material to make a shirt.

(a) How many meters will it take to make 6 shirts?

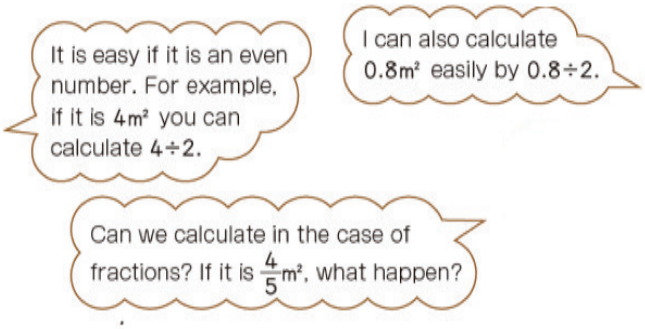
(b) Write an expression and calculate.

L80. FRACTIONS ÷ WHOLE NUMBERS (1)

Teaching and learning activities (60 min)

Think about how to divide fractions with the whole numbers. Let's calculate fractions by dividing with whole numbers.

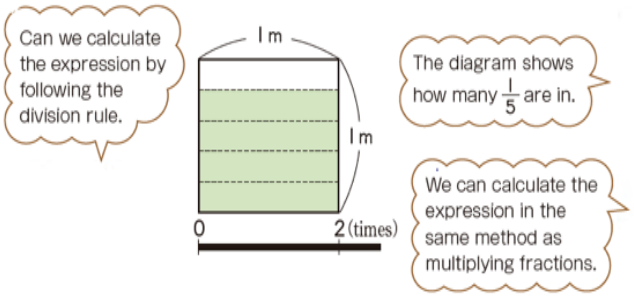
1. Sprinkle flowerbeds with a watering can. Some watering can sprinkle _____ m^2 two times.How many m^2 can this watering can sprinkle at once?



(a) Complete the problem by filling in _____

(b) When _____ is m^2. Write an expression.

(c) Think about how to calculate.



Important Points

- In division the quotient is changed if we multiply divisor and dividend by the same number.
- In multiplication of fraction x whole number, divide a numerator by whole number

L81.FRACTIONS ÷ WHOLE NUMBERS (2)

Teaching and learning activities (60 min)

Read the given problem and think about how to solve it .

1. To make a juice of $\frac{3}{4}$ L , we need 5 oranges. How much juice can we make with 1 orange?

(a) Write an expression. ☐

(b) Let's calculate.(Whose idea do we use)

- we cannot divide the numerator, 3 by 5. Idea 1.
- Then, let the numerator be divisible by 5
- We may apply mikus abd Diakis ideas in this

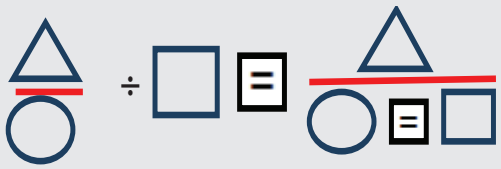
(c) Calculate using the idea on the right.

$$\frac{3}{4} \div 5 = \frac{3 \times 5}{4 \times 5} \div 5$$

$$= \frac{3 \times 5 \div 5}{4 \times 5} = \frac{3}{4 \times 5} = \frac{\square}{\square}$$

Summary

- When we divide a proper fraction by a whole number, we multiply the denominator by the whole number and leave the numerator as it is.



L82.FRACTIONS ÷WHOLE NUMBERS (3)

Teaching and learning activities (60 min)

1. Compare methods (a) and (b) to calculate $\frac{10}{7} \div 4$ (refer to p-22 ex 3)

(a)

$$\frac{10}{7} \div 4 = \frac{10}{7 \times 4}$$

$$= \frac{\cancel{10}^{5}}{\cancel{28}_{14}}$$

$$= \_\_\_\_\_$$

(b)

$$\frac{10}{7} \div 4 = \frac{\cancel{10}^{5}}{7 \times \cancel{4}_{2}}$$

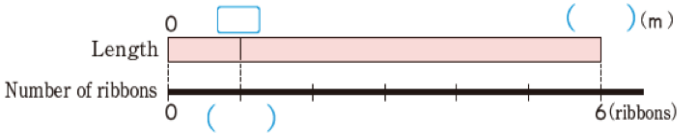
$$= \_\_\_\_\_$$

The calculation would be easier if you reduce the fraction as you calculate.

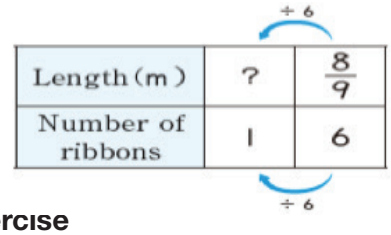
2. There is $\frac{8}{9}$ m long tape. We make 6 ribbons which are all the same in length from this page. How many meters is each ribbon.

(a) The diagram below shown expresses the situation.

(b) Fill the ( ) with numbers.



3. Calculate the length of each ribbon.



Exercise

Do these exercises.

(a) $\frac{1}{2} \div 4 =$ **(b)** $\frac{3}{4} \div 2 =$ **(c)** $\frac{5}{6} \div 4$

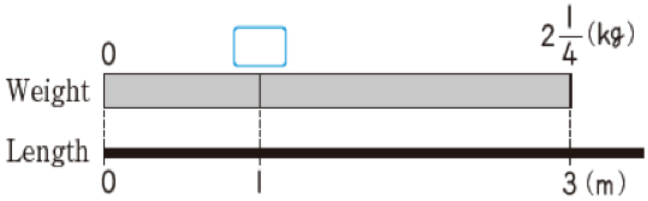
(d) $\frac{7}{8} \div 5 =$ **(e)** $\frac{2}{3} \div 2 =$ **(f)** $\frac{6}{7} \div 3$

L83.FRACTIONS ÷ WHOLE NUMBERS (4)

Teaching and learning activities (60 min)

Think about how to calculate to find the weight and divide mixed fractions into improper fraction.

1. There is an iron stick which is 3m long and weigh $2\frac{1}{4}$kg. How much does it weight?



(a) write an expression that finds the weight per meter.
(b) Is the weight per meter greater than 1Kg?
(c) Think about how to calculate (refer to diagram)
(d) Calculate by splitting into whole number and fraction. (refer to diagram)

Exercise

1. Let's calculate

(a) $1\frac{2}{3} \div 4$ **(b)** $2\frac{5}{8} \div 6$ **(c)** $2\frac{2}{7} \div 8$

(d) $3\frac{1}{2} \div 7$

L84. EXERCISE

Teaching and learning activities (60 min)

1. Calculate the following in fractions.

(a) $\frac{2}{7} \times 3 = \frac{\square \times \square}{\square} = \square$

(b) $\frac{5}{7} \div 3 = \frac{\square}{\square \times \square} = \square$

2. Solve

(a) $\frac{2}{5} x 5$ **(b)** $\frac{7}{9} x 6$ **(c)** $\frac{7}{6} x 8$ **(d)** $2\frac{3}{4} x 12$

(e) $\frac{5}{12} x 3$ **(f)** $\frac{3}{7} x 28$ **(g)** $\frac{9}{14} x 7$ **(h)** $2\frac{3}{10} x 30$

3. Read and solve
Kip drinks $\frac{5}{6}$ L of milk each day. How many liters will be she drink in 3 days ?

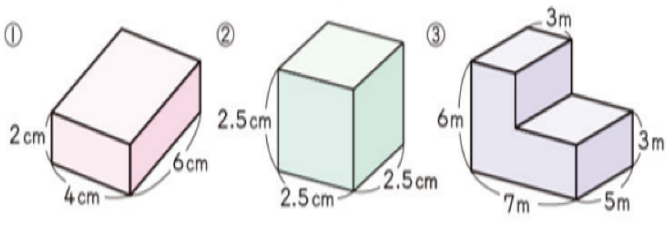
4. Do the following exercise.

(a) $\frac{5}{6} \div 4$ **(b)** $\frac{4}{7} \div 2$ **(c)** $\frac{3}{10} \div 6$ **(d)** $\frac{2}{5} \div 7$

(e) $\frac{3}{2} \div 2$ **(f)** $\frac{7}{10} \div 10$ **(g)** $1\frac{3}{8} \div 3$ **(h)** $2\frac{5}{8} \div 3$

5. Divide $\frac{7}{6}$ L of milk equally into 3 bottles. How many liters will there be in each bottle?

6. Find the volume of the figure below.



Strand: **Measurement** Topic: **Area of Figures**

Content Standard: **5.2.1** Develop the formula to calculate areas of parallelogram,triangle, trapezium,rhombus and understand their transformation.

Teacher's Notes

Listed below are the expected Attitude, Knowledge, Skills and mathematical thinking to be displayed by the students after learning this topic on Large Numbers.

Students will be able to;

Attitude

- Enjoy posing questions on how to compare the area of rectangular and square garden with blocks, square papers and represent the area with numbers.
- Respect other students ideas and explanations on their findings on areas of different shapes.

Skills

- Explore ways to determine the area of squares and rectangles
- Direct comparison of quantities
- Comparing quantities using arbitrary units
- Draw various shapes with same area
- Measure the necessary sides of rectangles and squares and calculate the area.
- Find a side of a rectangle when the area and one side is known.
- Find the area of combined shapes
- Direct comparison of quantities
- Comparing quantities using arbitrary units

Knowledge

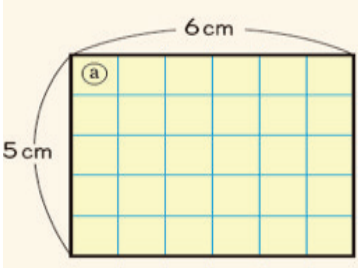
- Meaning of the units and measurement of area and determine the area by calculation
- Units of area such as cm^2, m^2 and km^2
- Unit squares ($1cm^2$) as arbitrary units to compare
- Relationship of quantity and mathematical expression to find area
- Meaning of formula and use it to calculate area of rectangle and square
- Know how to compare area using arbitrary units
- Understand how to compare area using arbitrary units

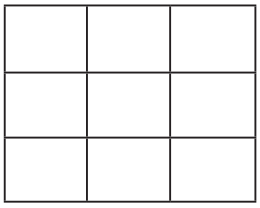
Mathematical thinking

- Think about how to find the area of a rectangle and square
- Think about how to compare area and to express the area using arbitrary units

Background

Area is a measure of how much space there is inside a shape. Calculating area of a shape or surface can be useful in everyday life. The unit to measure area is square meter or square centimetre. (cm^2, m^2, km^2)
To find area of a square and rectangle simply multiply its height by its width. As for the square find the length of one side as each of the sides length is the same so multiply by itself to find the area.
The area is calculated by area formula.
Example:





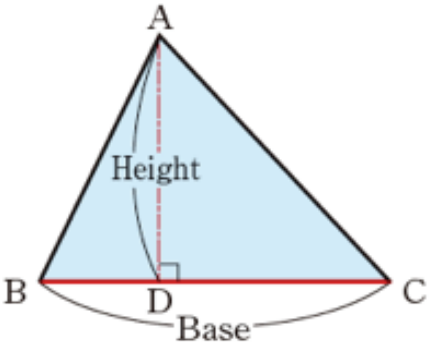
Rectangle

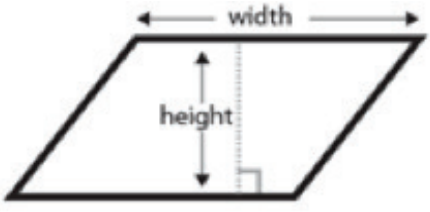
Area = length x width
= 6 cm x 5 cm
= 30 cm^2

Square

Area = a^2 or 3 cm x 3 $\frac{10}{7} \div 4$ cm = 9 cm^2

Triangle:





Parallelogram. 4 sided figure
The area of a parallelogram is calculated in the same way as for a rectangle (height x width) remember that height does not mean the length of vertical sides but the distance between the sides.

The area of a triangle is (height x width) ÷ 2
The height of the triangle is measured as a right angle line from line to the top of the triangle.
Area = b x h x 0.5 or ½
Example
B = base = 20 cm
H = vertical height = 150
Area = 20 cm x 15 cm x 0.5 cm
= 150 cm^2

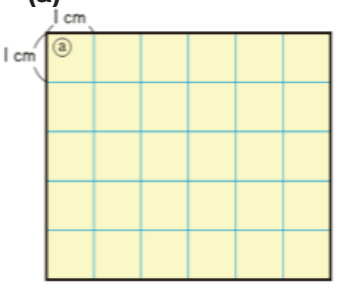
L85. AREA OF PARALLELOGRAM (1)

Teaching and learning activities (60 min)

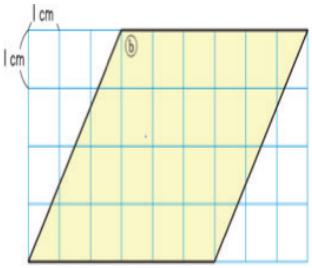
1. Study the situation given and think about how to solve areas of quadrilaterals. Vagi make a frame of paper as shown. Thenframe can change freely by moving. Think of Quadrilaterals made by the frame. Draw 3 different quadrilaterals

2. Look at the picture of quadrilaterals a, b and c shown, Measure the length of all sides of the quadrilaterals and list them down.

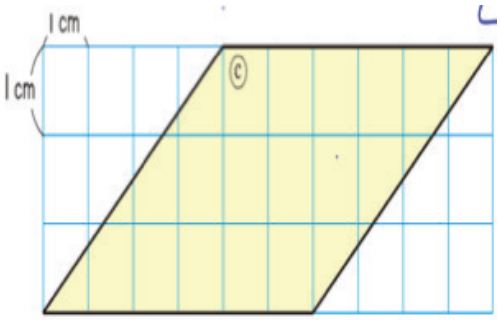
(a)



(b)



(c)



3. Compare the areas of quadrilateral a, b and c.

(a) Are all the perimeters of the parallelogram same?

(b) Are the areas same?

(c) What does the area of a parallelogram depend on?

Think about how to calculate the area of each parallelogram

L85. AREA OF PARALLELOGRAM (1)

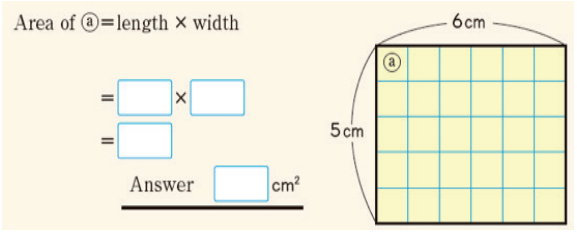
Teaching and learning activities (60 min)

Expected ideas

Idea 1

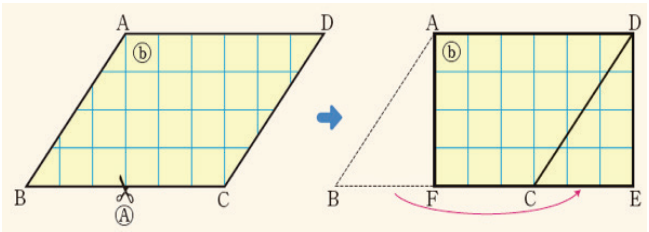
- Since (a) is a rectangle the area is calculated by the area formula

Change parallelogram into rectangle to calculate its area.



Idea 2

If we change a parallelogram into a rectangle, it can be calculated.



The area of the parallelgram ABCD is the same as the area of retangle AFED.

The area of parallelogram

b = the area of rectangle AFED

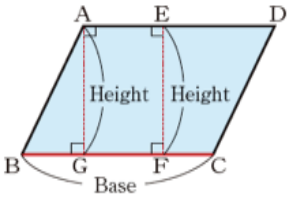
= AF x FE

= ☐ x ☐

= ☐

Answer ☐ cm²

Put one side of a parallelogram the base. Lines AG and EF and other lines. Which are perpendicular to base BC. are all the same length. The length of these line are called height against the base BC.

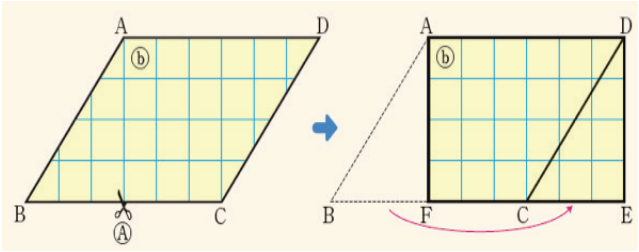


The area of a parallelogram = base x height

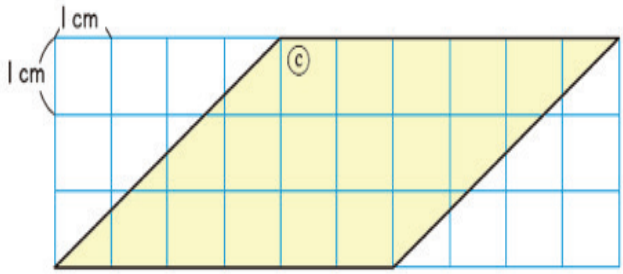
L86. AREA OF PARALLELOGRAM (2)

Teaching and learning activities (60 min)

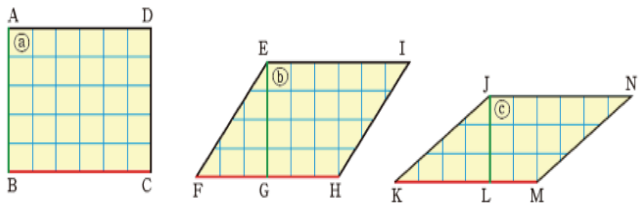
1. Find the areas of the parallelogram below.



(a) Check the lengths of the parallelogram C to find the area and then find the area.

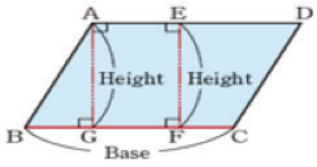


(b) Which lengths do you need to find the area of a quadrilaterals a, b and c



Important points

Put one side of a parallelogram the base. Lines AG and EF and other lines which are perpendicular to base BC, are all the same length. The length of these lines aare called height against the base BC.

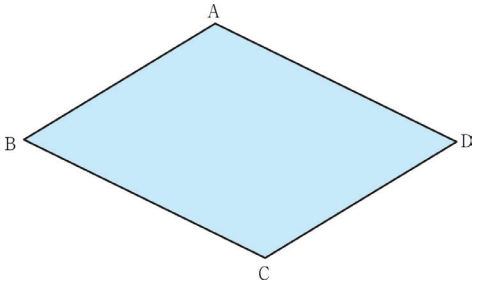


The area of a parallelogram = base x height

L87. AREA OF PARALLELOGRAM (3)

Teaching and learning activities (60 min)

1. Find the area of the parallelogram below.



(a) When side BC is the base, find the area by measuring the height.

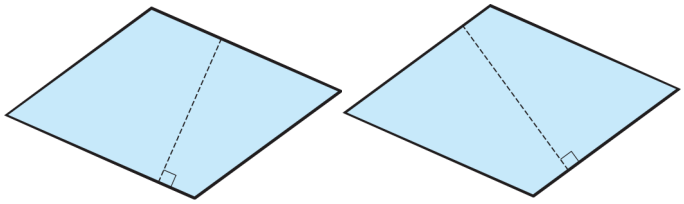
Area = ☐ x ☐ =

(b) Which side CD is the base, find the area by measuring the height.

Area = ☐ x ☐ =

Important Point.

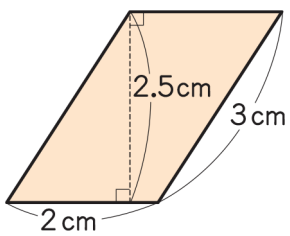
The height depends on the base



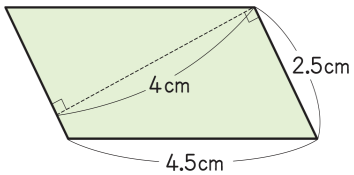
Exercise

Find the area of the following parallelograms.

(a)



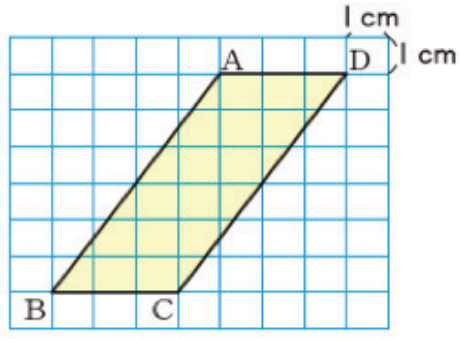
(b)



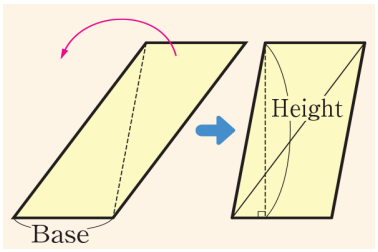
L88. AREA OF PARALLELOGRAM (4)

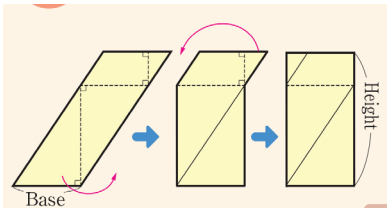
Teaching and learning activities (60 min)

1. Let's think about how to find the area by looking at the figures below and explain.



Expected ideas

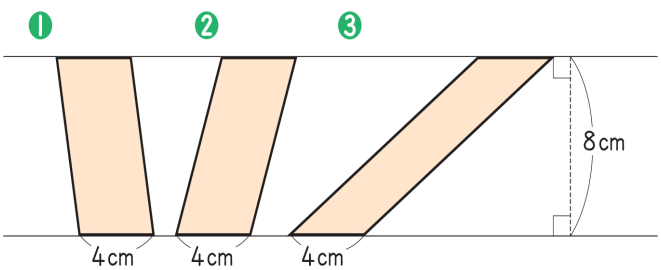




(a) What is the area of the parallelogram in cm^2?

When side BC is the base, the distance between lines A and B is the height at parallelogram ABCD

(b) Find the area of each parallelogram below.

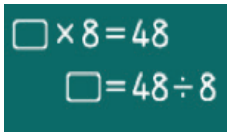


L88. AREA OF PARALLELOGRAM (4)

Teaching and learning activities (60 min)

(c) Think about how to find the area by using the formula for the area of parallelogram.

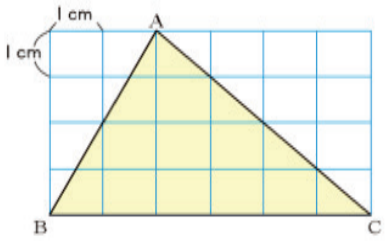
□ x 8 = 48



L89. AREA OF TRIANGLES (1)

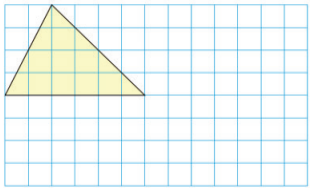
Teaching and learning activities (60 min)

1. Find the areas of the parallelogram below.



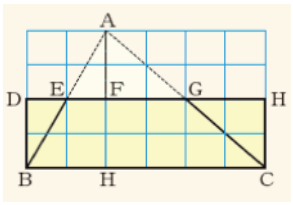
Can we change the triangle to a shape as we know how to find the area.

Write down your idea.

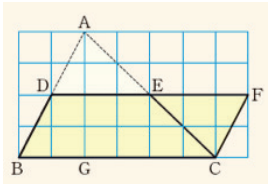


2. Explain the following ideas

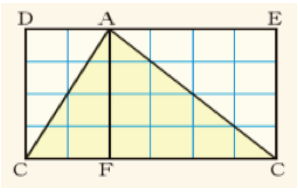
(a)



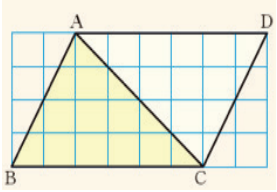
(b)



(c)



(d)



Are there any ideas that are the same a yours?

(i) How are the 4 ideas similar or different ?
(ii) Which one changes the triangle into a rectangle?
(iii) Which one changes the triangle into a parallelogram?

3. Which one change the triangle into other shapes with the same area?

4. Which one change the triangle into other figures with the 2 times area?

L90. AREA OF TRIANGLES (2)

Teaching and learning activities (60 min)

Study the ideas that change the triangles into rectangle or parallelogram, find the sides that have the same length as in the original triangle.

1. Think about how to find the area of a triangle.

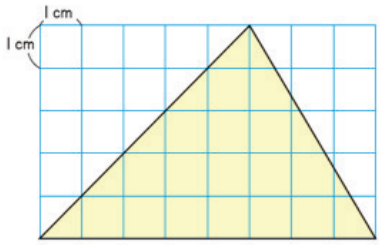
Expected Ideas

Since the length of rectangle is half of AI,
(AI ÷ 2) x BC

Since the height of the parallelogram is half of AG.
Base x (AG ÷2)

Since the area of the triangle is half of the area of rectangle DBCE, and the length of the rectangle is AF. (AF x BC) ÷ 2

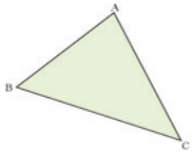
2. Measure the length needed to find the area of the following triangle and then calculate the area.



Important Point
Draw a perpendicular line AD from vertiex A to the opposite side BC of the triangle. Side BC is called base and AD is called height.

Area of triangle = base x height ÷ 2

3. Find the area of the triangle below by measuring the necessary length.

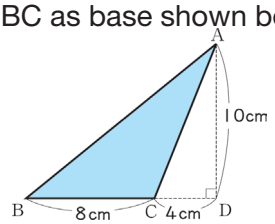


When each of the sides is the base what are the height of the triangles.

L91. AREA OF TRIANGLES (3)

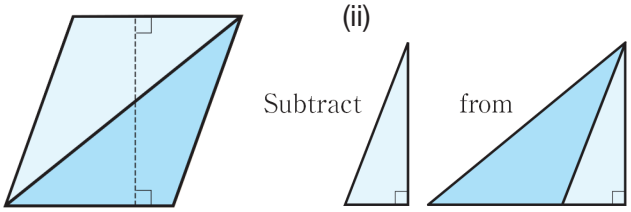
Teaching and learning activities (60 min)

1. Think about how to find the area of a triangle with side BC as base shown below



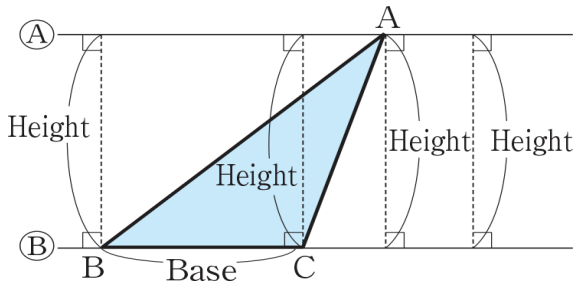
(a) Explain the two ideas below

(i) (ii)



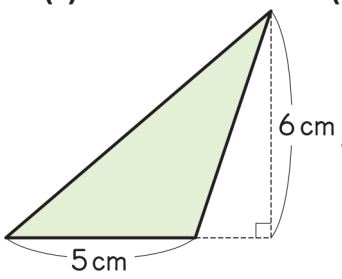
(b) Find the area of triangle that has a base of 8 cm and a height of 10 cm by using the area formula, and then compare with the results in figure 1.

2. Draw a straight line A through a vertex A and parallel to side BC. The distance between line A and line B is height of the triangle when side BC is the base.

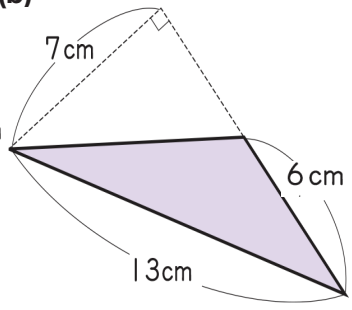


3. Find the area of these triangles

(a)



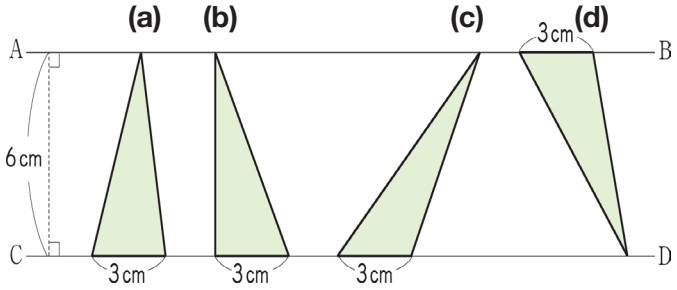
(b)



L91. AREA OF TRIANGLES (1)

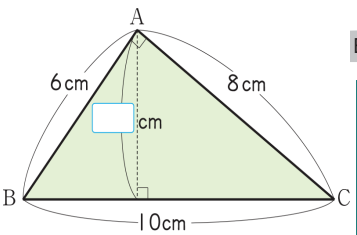
Teaching and learning activities (60 min)

4. In the figure below, straight lines AB and CD are parallel. Find the area of each triangle below.



if the lengths of bases and heights of triangles are equal their areas are equal.

5. The figure below is a right angle triangle. Find the area. When side BC is the base, calculate the height of the triangle.

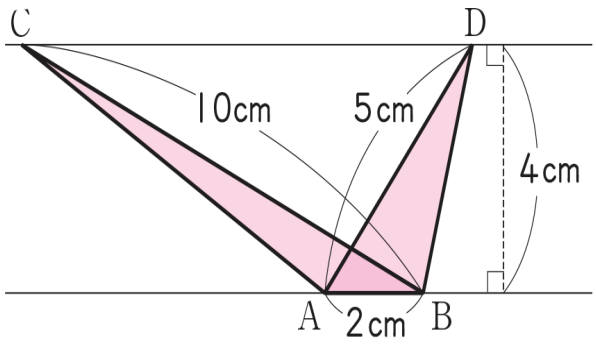


10 x ☐ ÷ 2 = Area

Base height

10×☐÷2=Area
10×☐=Area×2
☐=Area×2÷10

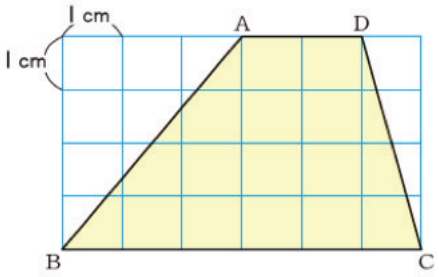
6. Let's find the area of these triangles when sides AD and BC are the base, respectively.



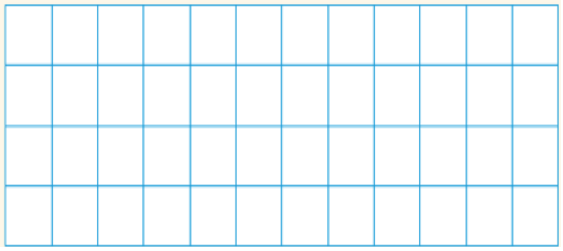
L92. AREA OF TRAPEZOID

Teaching and learning activities (60 min)

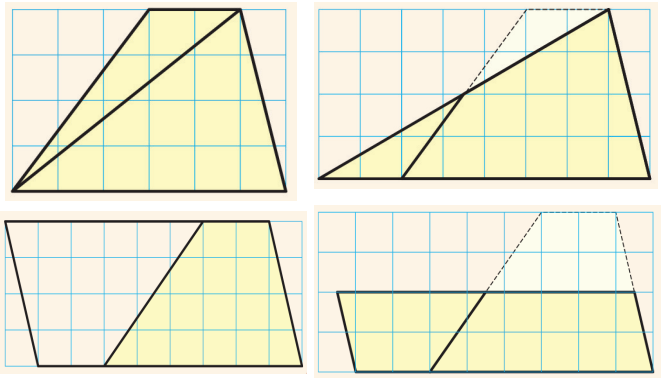
1. Think about how to find the area of the trapezoid below



(a) Change a trapezoid into a parallelogram



2. Let's explain the ideas of 4 children below, and write expressions to find the area of a trapezoids.



3. Discuss how the 4 ideas are similar or different. Think about the formula to find the area of trapezoid using the ideas in the figure 1.

Using the area formula of triangle.

Base x Height ÷ 2

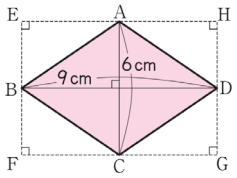
(2 + 6) x ▭ ÷ 2

(lower side + upper side) x Height ÷ 2

L93. AREA OF TRIANGLES

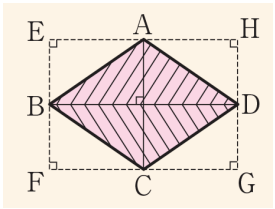
Teaching and learning activities (60 min)

1. Let's think about how to find the area of rhombus.



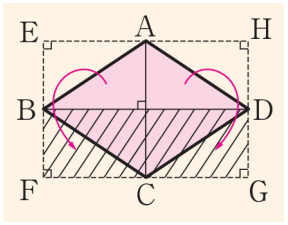
(a) Divide a rohombus into 2 triangles,

9 x (6 ÷ 2) ÷ 2 x 2
Area of triangle



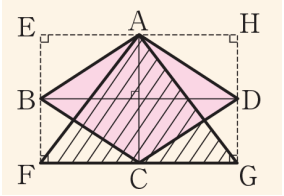
(b) Change a rohombus into the rectangle,since the area can be calculate by lengthx width,

(6 ÷ 2) x 9



(c) Change a rhombus into the triangle, since the base is FG and the height is AC,

9 x 6 ÷ 2



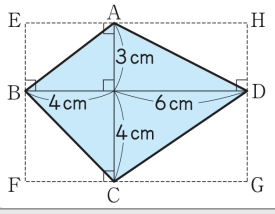
Important Point

The area of rhombus can be found by using the length of 2 diagonals.

Area of rhombus = diagonal x diagonal ÷ 2

(d) Study and discuss the four ideas presented to find different ways to work out the area of a rhombus.

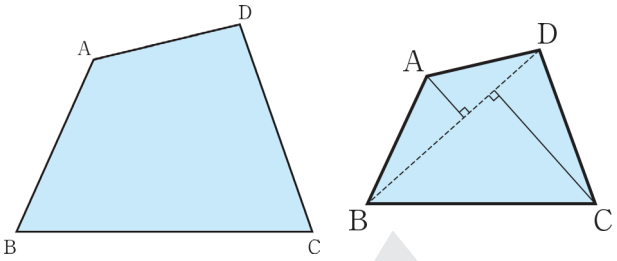
2. Let's think about how to find a quadrilateral with diagonals that have a perpendicular intersection as shown below.



L94. AREA OF TRIANGLES (1)

Teaching and learning activities (60 min)

1. How can we find the area of a quadrilateral as shown below?

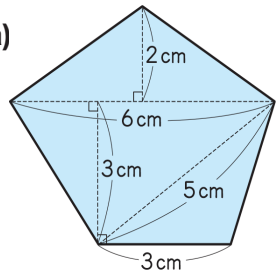


can i divide this shape into other known figure?

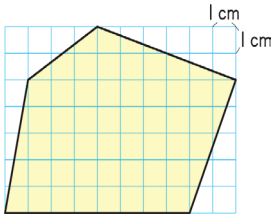
The area of quadrilaterals and pentagon can be found by dividing into serval triangles.

2. Find the area of a quadrilateral and a pentagon as shown below.

(a)



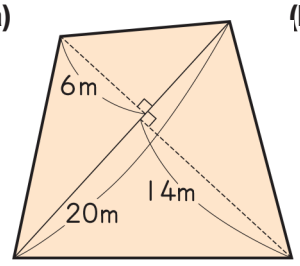
(b)



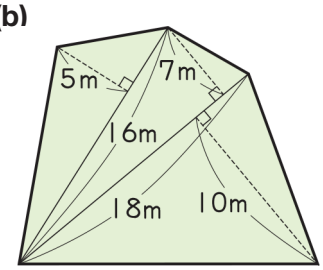
Exercise

1. Find the area of a quadrilateral and a pentagon as shown below.

(a)



(b)

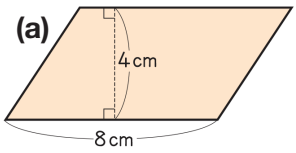


L95. EXERCISES

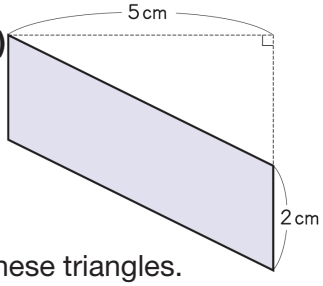
Teaching and learning activities (60 min)

1. How can we find the area of a quadrilateral as shown below?

(a)

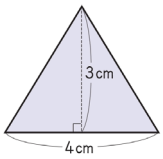


(b)

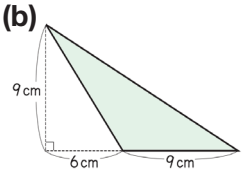


2. Let's find the area of these triangles.

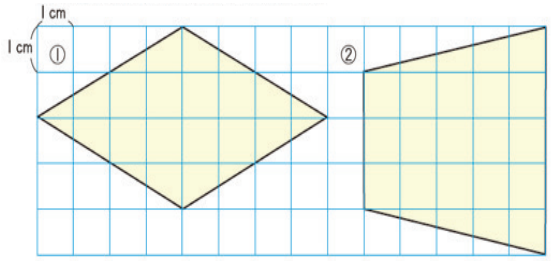
(a)



(b)



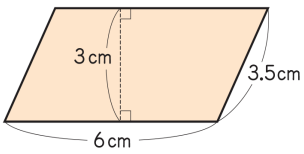
(c) Let's fin the area of rhombus



Exercise

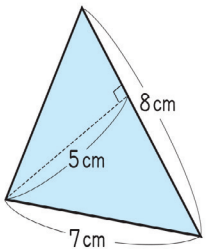
1. Finding the base and the height, and using formula.

(a)

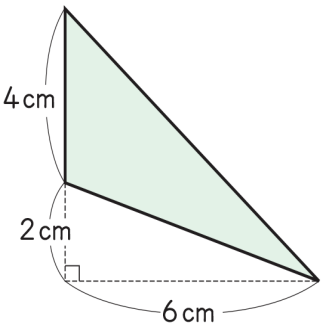


Parallelogram

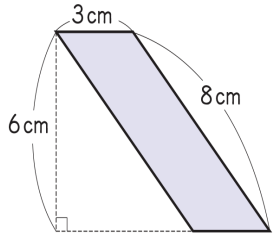
(b)



(c)



(d)



Strand: **Data and Mathematical Relations** Topic: **Ratios and Graphs**

Content standard: **5.4.2** Extend their understanding of data to construct graphs using given scales and quantities.

Teacher's Notes

Listed below are the expected Attitude, Knowledge, Skills and mathematical thinking to be displayed by the students after learning this topic on Large Numbers.
Students will be able to;

Attitude

- Participate collaboratively in the lesson activities
- Share ideas on the changing quantities, and help each other draw up tables and graphs and present collaboratively
- Find out more about changing quantities in everyday life and make mathematical expressions that they can easily find their solutions.
- Enjoy practicing their understanding and skills in everyday situations and contexts
- Enjoy using various ways of questioning to understand situation set or provided.

Skills

- Explain the 2 quantities that are changing- how and why?
- Demonstrate by showing the activity of changing quantities to others
- Represent on table form – record of the changing quantities
- Present on graph form to represent their relationship as direct proportions
- Explain meaning of direct proportions
- Write and read the expressions as mathematical sentences

Knowledge

- Understand that there are quantities that change at various degrees and times through investigations in concrete situations.
- That when one quantity increases, another quantity may decrease at the same time e.g. Length and width of a rectangle.
- Understand these through the representation on tables and graphs
- Apply these understanding in various situations and context.

Mathematical thinking

- Investigate the two changing quantities;
- Increase/decrease in quantities e.g. length of rectangle increases while width of decreases
- The quantities that do not change e.g. perimeter of the rectangle
- Think about changing quantities in time and distance, base and height of parallelogram in shape of figures
- Investigate in time and height, base and area of parallelogram, cost and length of materials,
- Think about changing quantities in various situations and context

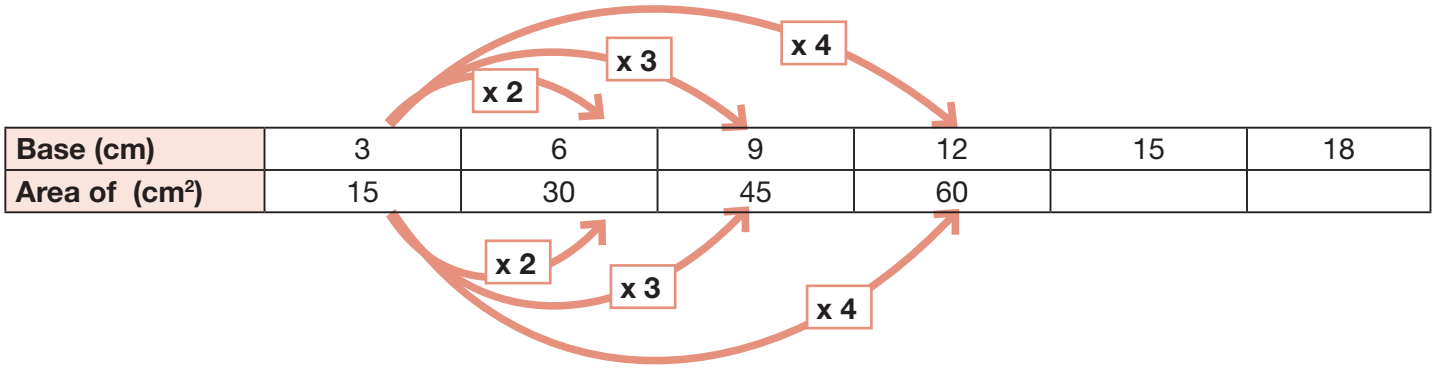
Background

Two changing quantities means 2 quantities changing at the same time e.g. number of mangoes in a box and number of mangoes in the basket. When recorded in a table the quantities can either change by increase or decrease at the same time.
The term for this mathematical expression is called **"proportions"**
If the 2 quantities (A and B) change, two times, three times and so on at the same time, then we can say B is proportional to A.

Direct Proportion

For another example, if 1 lolly cost 20t, 2 lollies cost 40t, and 6 lollies cost K1.20 then cost of lollies is proportional to the number of lollies. As number of lollies increase the cost of lollies increase too. This is called direct proportion.

The proportions can be calculated from the base units e.g. in the case of base and the area of a parallelogram, when base changes by 2 times (3cm x 2 times), the area increases and changes by 2 times and so on, the height stays the same. Then we can say area of the parallelogram is in proportion to the base. When represented on the graph, it will show a **Direct proportion.**



Base (cm)	3	6	9	12	15	18
Area of (cm^2)	15	30	45	60		

L96. AREA OF TRAPEZOID

Teaching and learning activities (60 min)

1. Read the given situation and think about how to solve it.
The length and weight of wires. Fill in the ___

1meter 20 grams	→	2meters ____grams	→	3meters _____grams

(a) Explain what you notice from the diagram above. (when the length of the wire increase the weight also increases). These is said to be two quantities changing together.

2. Read the situation given and solve.
Vagi and Raka transfer 100 oranges sent by his grandfather from a box to a basket.
Study the table below of the number of oranges transferred from a box to a basket and the Total number of oranges.

No of oranges in a basket (oranges	0	20	40	60	80	100
No. of oranges in a box (oranges)	100	80				
Total oranges	100	100				

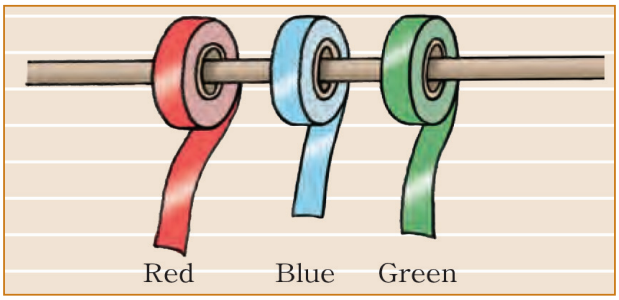
Number of oranges in a box and in a basket

(a) Complete the table by writing in the number of oranges in the box and the total number of oranges.
(b) When they transfer the oranges from a box to a basket, which quantities change together?
(c) Which quantities remain the same?
□ Number of oranges in a basket.
○ Number of oranges in a box.
(d) Write a mathematical sentence of the relation between □ and ○ .
(e) Explain what you have observed from the table.

L97. PROPORTION (1)

Teaching and learning activities (60 min)

1. Find the cost of the ribbons by using a relation of direct proportion.



(a) What is the cost of 2m of a ribbon?

(b) Write down the relationship between length in □ m and cost of ribbons in ○ kina when 1 m of ribbon costs K1.80.

The Length and Cost of Ribbons

The length of ribbon □ (m)	1	2	3	4	5	6
Cost of ribbons ○ (K)	1.80					

When □ increases by 12 m, by how many does ○ increase?

As the length of ribbon increases, the cost also increases together.

2. Look at the table and find an expression.
How can I write an expression?

Think of how to find the rule or correspondence for Numbers from one set of quantities (length of ribbon to another set of quantities (c0st of ribbon).

(a) Write the mathematical sentence as the relation of □ and ○.
(b) When the ribbon costs K5.40, how many metres of ribbon is bought?

L97. PROPORTION (1)

Teaching and learning activities

(60 min)

Important idea

The relationship between the lengths of ribbon is that the length becomes 2,3,4,5 times as much as the original length of ribbon and the cost of ribbon also increases 2,3,4,5 times as much as the original cost of ribbon

Exercise

1. Draw a graph by using the numbers from the completed table done in activity 2 (above).

The Length and Cost of Ribbons

The Length and Cost of Ribbons

The length of ribbon □ (m)	1	2	3	4	5	6	7	8
Cost of ribbons ○ (t)	30							

(a) When there are 1,2,3 and more, find the corresponding values and write the result on the table.

(b) What is the cost of big boy chewing gum proportional to?

L98. PROPORTION (2)

Teaching and learning activities

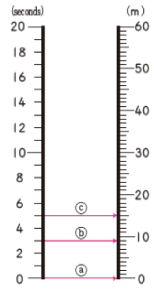
(60 min)

1. Study the table given below on the situation provided.

The table showing the recorded time and height of a parachute moving up and down the parachute tower which is 60 m.

Time and the Height

Time (seconds)	1	2	3	4	5	6	7	8
Height (metres)	30							



(a) How many metres does the parachute rise in zero seconds?

(b) How many metres does the parachute rise in 5 seconds?

(c) How many metres does the parachute cover in 9 seconds?

2. Use the diagram on the right to do the following activities.

(a) In 10 seconds the height rises, where can the arrow be drawn to represent the height.

(b) Use an arrow to mark on the diagram, how many meters is covered in 16 seconds and 18 seconds?

(c) Use an arrow to mark on the diagram, how many seconds it takes to rise 54 meters and 60 meters.

Important Points

There are no metres covered when the parachute does not move up from the start in 0 (zero) seconds

- A height of 9 metres is covered when the parachute moves up from the start in 3 second the height.

3. Study the table and diagram above and work out the time and height of seconds.

Think about how many metres it rises for each seconds? Since it rises 9 metres in 3 seconds, it rises 9 ÷ 3 = □ (m) for each second?

(a) How many metres does the parachute rise in one second from the start?

(b) How would you work out the heights when the times are 12 seconds and 15 seconds? Give reason.

L98. PROPORTION (2)

Teaching and learning activities (60 min)

Exercise

1. Draw a table between the time spent from the start and the height risen by the parachute. The time and height

Time (s) ◯	1	2	3	4	5	6	7	8	9	10
Height (m) □	30									

(a) Put the time spent from the start as □ seconds and the height risen ◯ meters. □ Increases, then ◯ also increases together, write a mathematical sentence with relation to □ and ◯.

(b) Work out heights when the time is 17 seconds and 19 seconds respectively? Explain.

2. Study the table below and explain what happens when the meter and the height change together.

(a) When the time □ seconds increases 2 times, 3 times, 4 times and so on, we record the height change together.

(b) Fill the □ with a number.

2 times 3 times 4 times

Time (s)	1	2	3	4	5	6	7	8
Height (m)	3	6	9	12	15	18	21	24

(c) When the time □ seconds increase 2 times, 3 times, 4 times and so on, how does the height change?

Important Points

If there are two changing quantities □ and ◯, □ change 2 times, 3 times and so on and ◯ is proportional to □

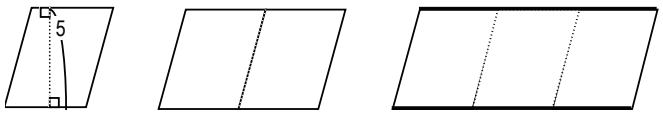
The relationship between the times (s) is that the time becomes 2, 3, times as much as the original number of time (s) and height (m) also increases 2, 3, times as much as the original height (m).

L97. PROPORTION

Teaching and learning activities (60 min)

Read the situation given below and think about how to solve it.

1. This a number of congruent parallelograms that have a 3 cm base and a 5 cm height. Maker larger parallelograms by connecting them as shown below and find area for them.



(a) Find the area formula for a parallelogram and then work out the area of one congruent parallelogram.

(b) Which 2 elements change together?

(c) What element of the parallelogram remains unchanged?

□ = □ x □

(d) What is the area of one congruent parallelogram?

(e) Write down the relationship between the base and the area of the parallelogram on the table below.

The Base and Area of a parallelogram.

Base (cm)	3										
Area (cm^2)											

(f) Is the area of the parallelogram proportional to the base? Let's write the reason.

Important Points

As the number of congruent parallelograms increases, the base increases also together with the area while the height remains.

Note:

The relationship between the base and the area is that the base becomes 2,3,4,5 times as much as the original base of parallelogram and the area also increases 2,3,4,5 times as much as the original area of parallelogram.

L97. PROPORTION (1)

Teaching and learning activities (60 min)

2. Think of how to find the rule or correspondence for numbers from one set of quantities (base) to another set of quantities (area of parallelogram).

(a) Look at the table below and find an expression of the base and area of parallelogram

Put the base as □ cm and the area as ◯ cm^2, let's express a mathematical sentence by using □ and ◯

Height of each parallelogram x base = area of parallelogram

5 x □ = area of parallelgram

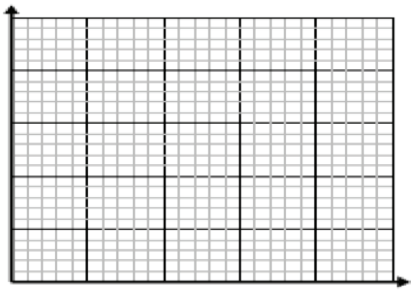
(c) Find the area of the parallelogram with a base of 60cm.

Exercise

Draw a graph by using the numbers from the completed table done in activity 2 (above).

Base (cm)	3							
Area (cm^3)								

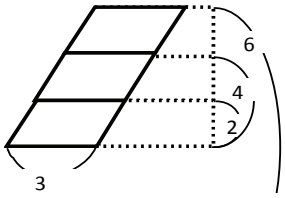
(a) Write points on the graph and connect these points.



The height of a parallelogram is increased as shown on the right.

(a) Write the relationship between the height and the area on the table.

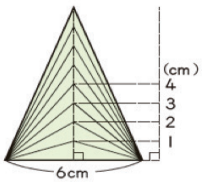
(b) Let's write what you have learnt from the table



L100. PROPORTION (2)

Teaching and learning activities (60 min)

1. Study the triangle below and answer the questions.



(a) The height of triangle is increased in steps of 1 cm as shown on the right, and find the area of triangle.

(b) Write the formula for the area of triangle and investigate which elements change together?

(c) What remains unchanged?

□ = □ x □ ÷ □

(d) Write down the relationship between the height and the area of the triangle.

The height and the Area of Triangle

Height (cm)	1	2	3					
Area (cm^2)	3							

(e) Is the area of the triangle proportional to the height? Write the reason.

(f) Write an expression using □ cm as the base and ◯ cm^2 as the area in question 5, simpler.

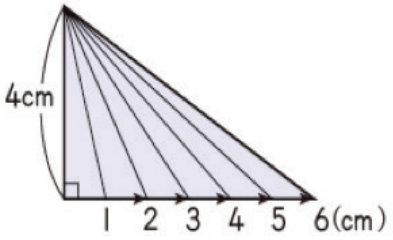
(g) when the area of the triangle is 30 cm^2, what is the height in cm?

Exercise

1. Solve the problem below.

(a) Write the relationship between the base and the area on a table.

(b) When the area of the triangle is 16 cm^2, what is the base in cm?



L101. EXERCISE

Teaching and learning activities (60 min)

1. In their 2 quantities, which quantities is proportional to the other? And if 2 quantities are proportional, write the mathematical sentence as the relation of □ and ○ .

(a) □ cm as the side and ○ cm as the area a square.

(b) □ cm as the length and ○ cm as the width of rectangle with 26 cm long around.

(c) □ Balls and its total cost ○ kina when we buy balls that cost 300 kina each.

(d) Find the relationship □ long and ○ g weight on the table

The length and weight of wire

Length (m)	1	2	3	4	5	6
Weight (g)	3					

2. What will be directly proportional to what?

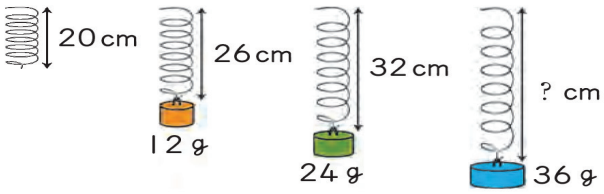
(a) When □ increase by 1, by how many does increase?

(b) Write the mathematical sentence as the relation of □ and ○.

(c) When the length is 2.4 m, find a corresponding weight.

3. Study the diagram of the springs below and complete the table.

Find the extension of the spring by using a relation of directly proportion



Weight (g)	12	24	36
Extension of spring			

(a) From the diagram, fill the table.

(b) Find the extension of spring when the weight is 36 g.

Strand : **Geometrical Figures** Topic: **Regular Polygons, Circles**

Content standard: 5.3.2 Investigate and produce regular polygons and identify the properties of angles.

Teacher's Notes

Listed below are the expected Attitude, Knowledge, Skills and mathematical thinking to be displayed by the students after learning this topic on Large Numbers.

Students will be able to;

Attitude

- Enjoy posing on investigate properties of geometrical figures such as regular polygons, circles and solids.
- Enjoy constructing and naming the regular polygons

Skills

- Investigate properties of geometrical figures such as regular polygons, circles and solids
- identifying and naming pentagons, octagons, trapeziums and parallelograms presented in different orientations
- Identify corners as angles
- labelling the vertex and arms of an angle using capital letters
- classifying special quadrilaterals on the basis of their properties

Knowledge

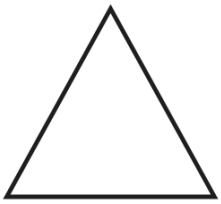
- Names of regular polygons
- Properties of polygons regular
- Sizes of angles
- Number of sides of regular polygons

Mathematical thinking

Investigate properties of geometrical figures such as regular polygons, circles and solids.

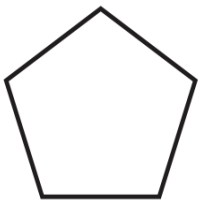
Background Notes

A polygon with all equal sides and all equal size of angle is called requlal polygon

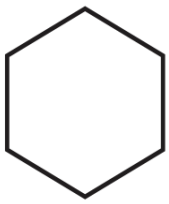


Equilateral triangle

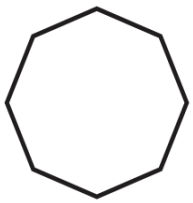
Regular quadrilateral (square)



Regular pentagon



Regular hexagon

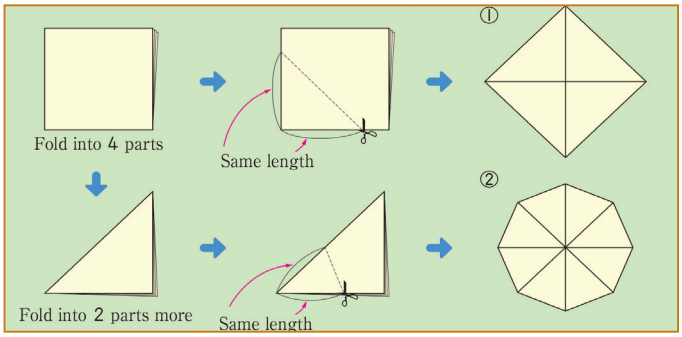


Regular octagon

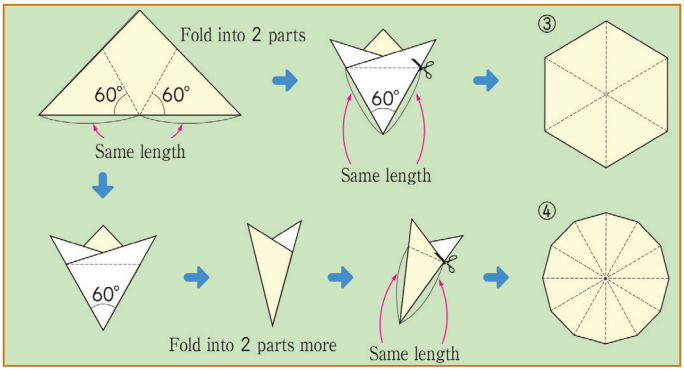
L102. REGULAR POLYGONS (1)

Teaching and learning activities (60 min)

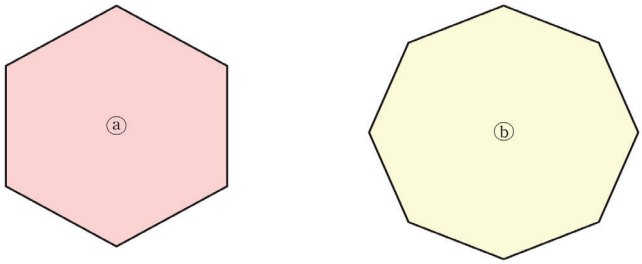
1. Fold the paper as shown and cut. Have you seen these shapes around you.



(a) What are the common amongst 4 shapes 1- 4? What's the differences?



2. Look at the polygons and their sides and angles



(a) How many the number of sides and angles are there?

3. Fill in the table with the number of sides and size of an angle of regular polygons.

	Equilateral triangle	Regular quadrilateral (square)	Regular pentagon	Regular hexagon	Regular octagon
Number of sides					
Side of angle					

L103. REGULAR POLYGONS (2)

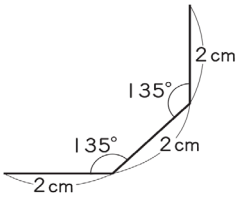
Teaching and learning activities (60 min)

1. Look at the polygons below and find their angles.

(a) Draw regular polygons with 2cm sides and the following angles.

(i) 90° (ii)120° (iii) 135°

When the size of angle increase. What shape does it close ?



(b) In regular polygons drawn, draw diagonal by connecting the opposite vertices.

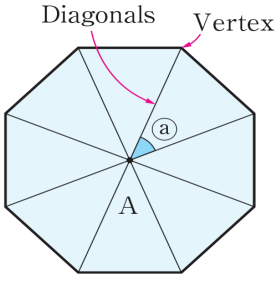
(c) Compare the length between point A and vertexes. : Point A is the intersection of Diagonals.

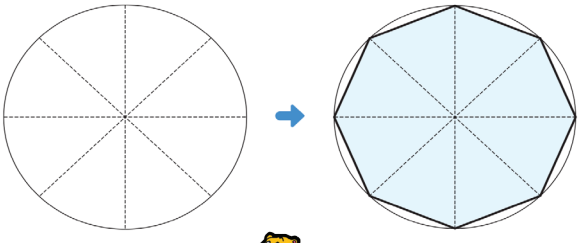
(d) What kind of triangle, which is formed by diagonals?

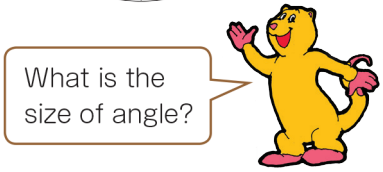
(e) Are the triangles congruent?

(f) What is the size of an angle @ of regular octagon below?

(g) Divide the angles around the centre of the circle into 8 equal parts. Draw a regular Octagon.







L104. REGULAR POLYGONS (3)

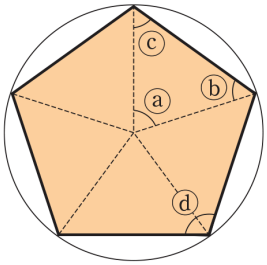
Teaching and learning activities (60 min)

1. Draw a regular pentagon by dividing angles around the centre of circle into 5 equal parts.

(a) What is the size of angles?

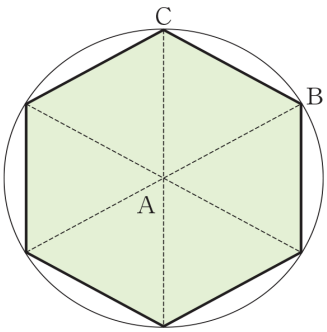
(b) Find the size of angles b, c and d.

(c) Write down properties of regular pentagon in you book.

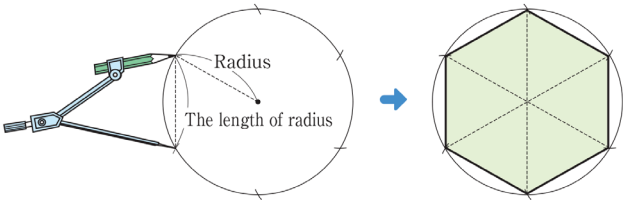


2. Think about how to draw a regular hexagon.

(a) Draw a regular hexagon by dividing angles around centre of circle into 6 equal parts. What kind of a triangle is ABC?



(b) Draw a regular hexagon by dividing the circumference by the length of radius using a compass.



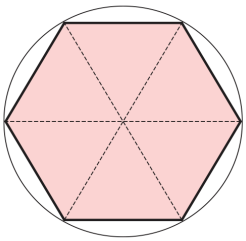
(c) Explain the reason why we can draw by using a compass. Write down properties of regular hexagon in your book.

L105. CIRCUMFERENCES AND DIAMETERS (1)

Teaching and learning activities (60 min)

1. Draw a regular hexagon into which a circle with a 2 cm radius fits.

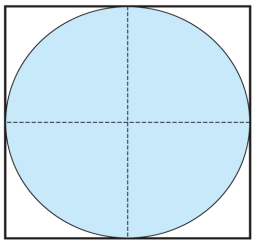
(a) How many times is the diameter of the circle to the length around a hexagon. Compare the length of around a circle with the length around a regular hexagon.



2. Draw a square into which a circle with a 2 cm radius fits.

(a) How many times is the diameter of the circle to the length around a square?

(b) Compare the length of around a circle with the length around a regular hexagon.



Important Point.
The surround of a circle is called **circumference.** The line that bends like a circumference is called **curve**

3. Fill the ☐ with an inequality sign

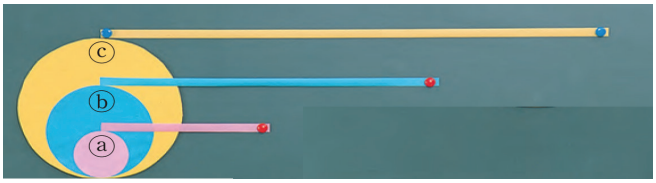
(a) Diameter x 3 ☐ Circumference , Diameter x circumference

(b) What do they mean above? Explain by writing in your exercise book

4. Cut a piece of cardboard to make circle a, b and c which have diameters of 10 cm, 20 cm and 30 cm. Then roll them one complete rotation and investigate how far they advance?

L105. CIRCUMFERENCES AND DIAMETERS (1)

Teaching and learning activities (60 min)



(a) talk about what the distance the circle rolled is related to

(b) Estimate how many centimeters a circle with a 0 diameter will advance in one rotation.

(c) Make sure how many centimeters a circle with a 40 diameter advance.

(d) Write the result on the table below

	a	b	c	
Diameter (cm)	10	20	30	40
Circumference (cm)				

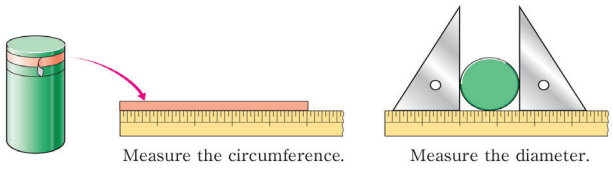
(e) When the diameter increases as by 2 times, 3 times and 4 times, how does the circumference change?

L106. DIAMETERS AND CIRCUFERENCE (2)

Teaching and learning activities (60 min)

1. Lets investigate the relationship between the circumferences and diameter of various circles.

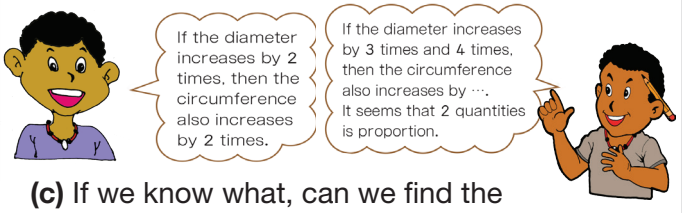
Using a ruler to measure the circumference and diameter.



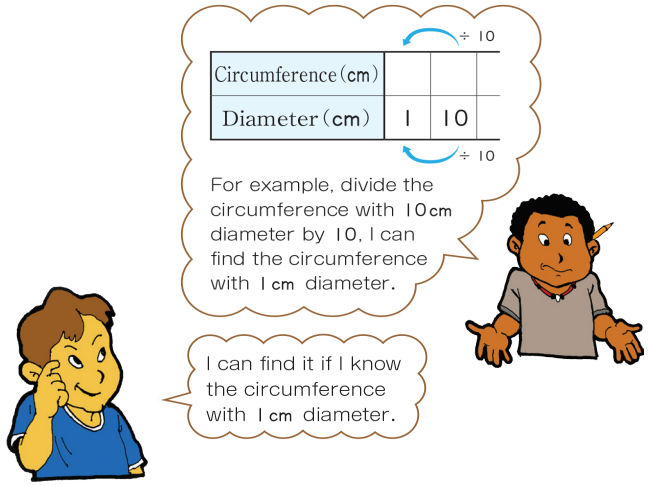
(a) Write the result on the table

	Cardboard ⓐ	Cardboard ⓑ	Cardboard ⓒ	Can	Packing tape
Circumference (cm)					
Diameter (cm)	10	20	30		

(b) Is the circuference and the diameter proportional?



(c) If we know what, can we find the circuference by the diameter?



L107. CIRCUMFERENCES AND DIAMETERS (3)

Teaching and learning activities (60 min)

(a) Approximately, how many times is the diameter to the circumference.

(b) Calculate to the nearest hundredth by rounding the thousandth.

	Card-board (a)	Card-board (b)	Card-board (c)	Can	Packing tape
Circumference (cm)					
Diameter (cm)	**10**	**20**	**30**		
Circumference ÷ Diameter					

The above number is called ratio of circumference.

Ratio of circumference = circumference diameter

The ratio of circumference is a number that continues infinitely like 3.14159..., we usually use 3.14.

(c) Write an expression of the relation between and □, where the circumference is □ cm and the diameter is □ cm.

(d) How many cm long is the circumference of the circle with the diameter of 8 cm diameter?

Circumference = Diameter x 3.14

Note:

- Allow students time to work out their answers in pairs or in their small groups.
- Students present their working out on the white board.
- Go through the main ideas with student after their response and confirm their answers.

L107. CIRCUMFERENCES AND DIAMETERS (3)

Teaching and learning activities (60 min)

Exercise

1. Draw and find the circumference of these circles with these given measurements.

(a) A circle with a 15 cm diameter
(b) A circle with 25 cm radius

2. Draw and find the circumference of these circles with these given measurements.

(a) A circle with a 6 cm diameter

(b) A circle with a 5 cm radius

L108. CIRCUMFERENCES AND DIAMETERS (4)

Teaching and learning activities (60 min)

What is the formula for calculating circumference?
What is diameter?
Let's calculate the diameter of the following picture using the formula given below.
The circumference of a can as shown on the picture is 62.8 cm

If the diameter of the can is ◯ cm, write the mathematical sentence by using the formula.

Circumference = Diameter x 3.14

◯ x 3.14 = 62.8 cm

Note:

- Allow time for the students to work out their answer in their or in pars.
- Select students who have finished to show their working out on the board or ask them to display their completed working out for the others to confirm with their
- Emphasis upon students' response.

Exercise

1. Let's find the diameter of a circle with these circumferences.

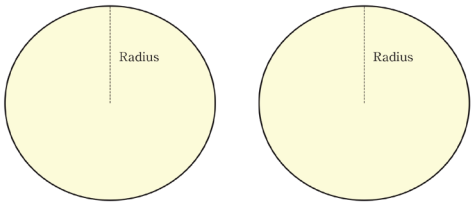
(a) 28.26 cm **(b)** 31.4 cm **(c)** 37.68 cm

L109. EXERCISE

Teaching and learning activities (60 min)

1. Draw the follow polygons based on a circle

(a) **(b)**



2. Find the circumference of these circles.

(a) A circles with a 6 cm diameter

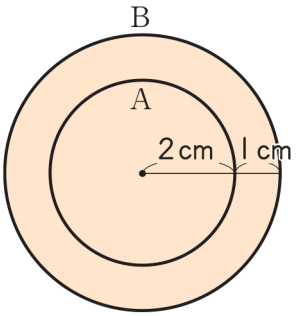
(b) a circle with a 5 cm radius

3. Find the diameter of these circles

(a) A circle with a 6.28 circumference

(b) A circle with a 12.56 circumference.

4. Read the problem and solve.
There are 2 circles A and B as shown below. One has a 2 cm radius, and the other has a radius 1cm larger than the radius of A. then how many cm is the circumference of circle B larger than the circumference of circle A.



5. Calculate the following

(a) 5 x 1.6 **(b)** 28 x 3.8 **(c)** 17 x 0. 78

(d) 1.2 x 2.3 **(e)** 7.6 x 4.3 **(f)** 3.18 x 6.2

L110. REVIEW

Teaching and learning activities (60 min)

Do these exercise in you book.

1. Find 3 common multiples of the following pairs of numbers from smallest to the largest. Then, find the least common multiples.

(a) (9, 12) **(b)** (15, 5) **(c)** (7,11)

2. Find all the common divisors of the following pairs of numbers. Then find the greatest common multiple for them.

(a) (6, 15) **(b)** (14, 28) **(c)** (7, 9)

3. Divide the children into groups. Divide them into groups of 6 children and groups of 7 children, 3 students left and the number of student is less than 50 students . how many students are there?

4. Simplify or reduce the following fractions

(a) $\frac{8}{12}$ **(b)** $\frac{12}{18}$ **(c)** $\frac{30}{45}$ **(d)** $\frac{20}{48}$ **(e)** $\frac{36}{60}$

5. Find the lowest common denominators for the given fractions.

(a) $\left(\frac{4}{9},\frac{2}{3}\right)$ **(b)** $\left(\frac{5}{8},\frac{2}{7}\right)$ **(c)** $\left(\frac{5}{12},\frac{7}{15}\right)$

6. Change the following to fractions

(a) 0.7 **(b)** 2.3 **(c)** 0. 73 **(d)** 1.61

7. Calculate the following fractions.

(a) $\frac{1}{4}+\frac{3}{5}$ **(b)** $\frac{5}{6}+\frac{1}{3}$ **(c)** $1\frac{2}{7}+2\frac{1}{4}$ **(d)** $\frac{3}{4}-\frac{5}{8}$

(e) $\frac{4}{5}-\frac{5}{7}$ **(f)** $6\frac{2}{7}-\frac{2}{3}$

TEACHING CONTENT - SAMPLE GUIDED LESSONS

Strand: **Geometrical Figures** Topic: **Solids**

Content Standard: 5.3.4 Investigate and Identify the properties of Solids (Prism and cylinders)

Teacher's Notes

Listed below are the expected Attitude, Knowledge, Skills and mathematical thinking to be displayed by the students after learning this topic on Large Numbers.
Students will be able to;

Attitudes

- Participate collaboratively in the lesson activities
- Respect others views and ideas about the properties of various solids and enjoy describing the reasons for each solid.
- Be curious and find out about the properties of the solids e.g. the properties of prisms and cylinders.
- Enjoy comparing the properties of solids and defining each solid by their properties.
- Enjoy investigating the properties of solids in their environment.

Skills

- Identify each solid by their property
- Categorize each solid and list their vertices, edges and faces
- Define cylinder by its property
- Define various prisms by their properties
- Make sketches and nets of the solids from paper or card boards
- Draw the nets and also do measurements and create or form the solids using calculation and measuring instruments such as rulers and protractors

Knowledge

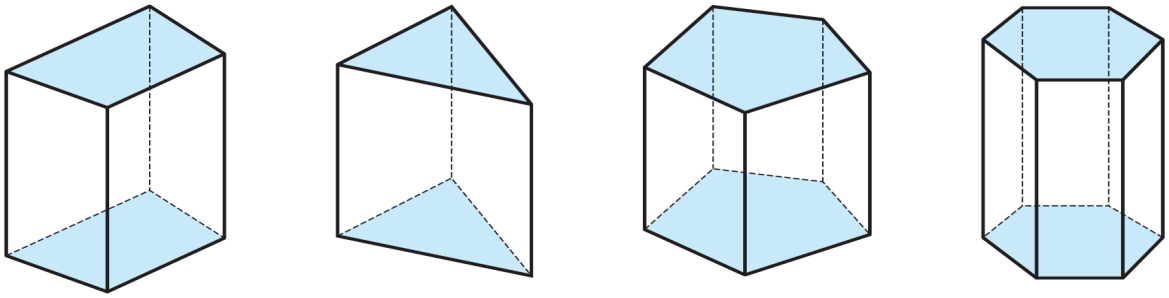
- Understand that there are various solids and can be identified by their properties
- Know how to categorise the solids and list their reasons
- Know that solids are covered by plane and curved surfaces e.g. prisms and cylinders.
- Describe each solid by each property
- Understand how to make nets and sketch the solid figures.

Mathematical Thinking

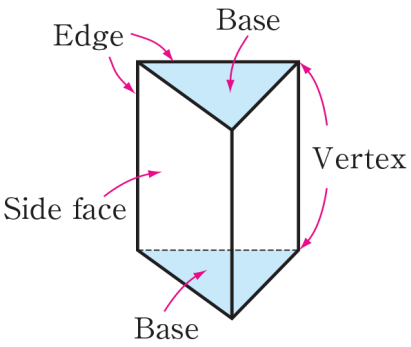
- Investigate the properties of the solids
- How to differentiate the sides on the bases and on the side faces of the solids
- Think about the mathematical expressions of the vertices, edges and faces.
- Think about the bases of the prisms and cylinders because the shape of the base gives the name of the solid.

Background Notes

Solids



The solids like (a),(b),(c) and (d) are called **prisms**
The 2 parallel congruent faces of prism are called bases. and the rectangular faces around the bases are called side faces.
When the bases are triangles, quadrilateral or pentagons, their prisms are called **triangular prism, quadrilateral prism** or **pentagonal prism,** respectively.
Cubes and rectangular prisms are types of prisms.



Solids are shapes which are covered by plane and curved surfaces

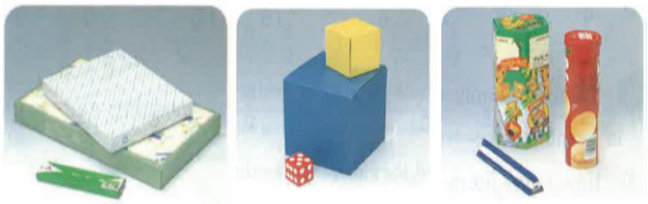
- Prisms have two bases – they are 2 parallel congruent faces (bases)
- The bases make up the name of the prisms and cylinders; if a prism has triangle shape at its two bases then the prism is called a **triangular prism**
  Their properties are categorised into;
  - o Shape of faces
  - o Shape of side faces
  - o Number of vertices
  - o Number of edges and number of faces.
- They can also be identified by their nets.

L111. PRISMS AND CYLINDERS (1)

Teaching and learning activities

(60 min)

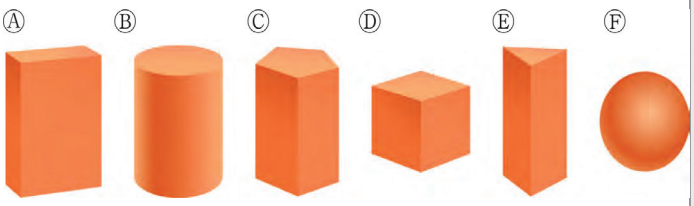
1. Look for various types of solid shapes found within your surroundings similar to what is shown below.



(a) Explain how these solid shapes grouped or categorized?

(b) Play a shape expected game and guess a solid shape in a box by hints.

2. Distribute six boxes with one of the following solids A – F placed inside a box each as shown.



(i) Student to choose a box and feel the kind of solid inside.

(ii) Encourage the student to say what he knows about the shape without looking into the box. "I think the solid I feel can be rolled and is not sharp. (What is it?)

(iii) If the student cannot figure out Solid A-F easily, the audience can also give a hint that helps to figure out the solid easily.

(iv) Ask the student to write down the solid expected into the note book

(v) Take the solid out and confirm the expected answer

(vi) Discuss together with other friends some more hints you find for the solid.

(a) What solid shape can be rolled and has no sharp point?

(b) Can you categorize solid A-F by its appropriate characteristics?

(c) Place solid A-F in the column of its appropriate characteristics.

L111. PRISMS AND CYLINDERS (1)

Teaching and learning activities

(60 min)

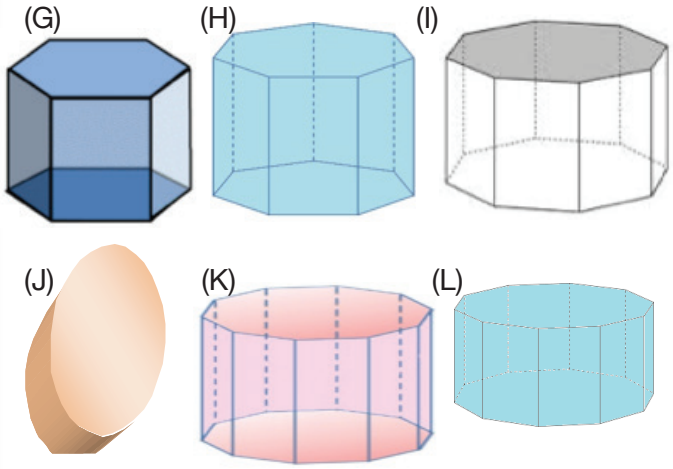
Solids that are covered by planes only	Solids that are covered by planes and curved surfaces	Solids that are covered by curved surface only

Important point

The surface that bends and is not a plane is called a curved surface. A shape that is covered by planes or curved surfaces is called a solid.

Exercise

1. Place solid G-K in the column of its appropriate characteristics.



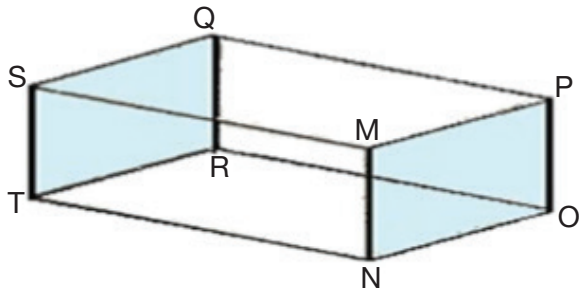
Solids that are covered by planes only	Solids that are covered by planes and curved surfaces	Solids that are covered by curved surface only

L112. PRISMS AND CYLINDERS (1)

Teaching and learning activities

(60 min)

1. For this solid what is the shape of the shaded parallel faces?



2. Give the appropriate name of the above solid shape.

(a) Name two other faces that are shaded and parallel to each other

(b) What kind of plane shape makes up this solid?

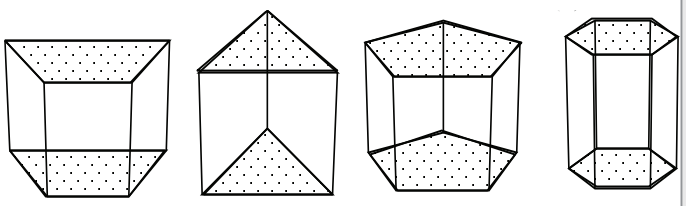
(c) Ask the students to name the solid shape?

3. Given the solids below identify the shapes that make the solid

(a) List the plane shape that form the solid

(b) Name the shaded plane shapes that make up the solids that are parallel

(i) (ii) (iii) (iv)



Important idea

Two congruent polygons are parallel which are covered around by plane rectangles that give its solid shape or form. These solid shapes are called prisms

(c) Complete the table for the following solids from activity 2

Solid	Plane face	Prism name
(i)		
(ii)		
(iii)		
(iv)		

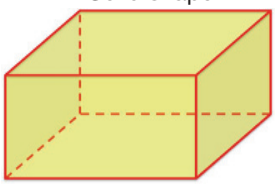
L112. PRISMS AND CYLINDERS (1)

Teaching and learning activities

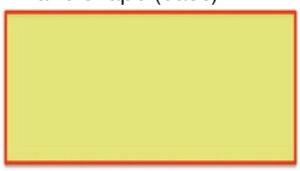
(60 min)

4. Compare a solid shape and with the plane shape that gives its shape.

Solid shape



Plane shape (base)



(a) Write the differences between this solid shape and plane above

(b) Get the students to identify and label the components that differentiate from the plane shape. Length, width and height.

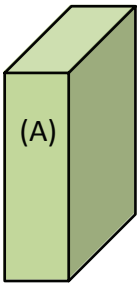
Important Idea

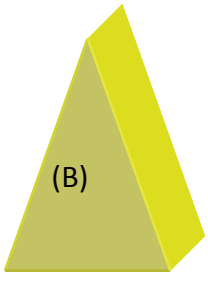
A solid shape has a length, width and height whereas plane shape has only length and width

Exercise

1. Can you name the prisms of these plane shapes

Plane shape	Prism name
Hexagon	
Octagon	
heptagon	
decagon	





L113. PRISMS AND CYLINDERS (3)

Teaching and learning activities

(60 min)

1. Find the physical components that make up each prism in the table below.
How many of the vertices, edges and faces is for each prism?

(a) How many bases in each prism?

(b) How many side faces are around the base? This are called **side faces.**

(c) How many corners are on the prism? This is called the **vertex.**

(d) Where the side faces meet is called the edge. How many side faces are in each prism.

(e) Summarize the vertices, edges and faces of a prism

	Triangular prism	Quadrilateral prism	Pentagonal prism	Hexagonal prism
Shape of base	Triangle			
Shape of side faces	Rectangle			
Number of vertices	3 x 2 = 6			
Number of edges	3 x 2 + 3 = 9			
Number of faces	2 + 3 = 5			

Important idea

The two parallel congruent faces are call ***bases.*** The rectangular faces around the bases are called ***side faces.*** When the bases are triangles, quadrilaterals, pentagons their prisms are called ***triangular prism, quadrilateral prism*** or ***pentagonal prism*** respectively.

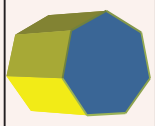
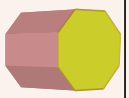
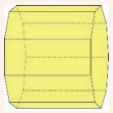
L113. PRISMS AND CYLINDERS (3)

Teaching and learning activities

(60 min)

Exercise

1. Complete the table these prisms

	Heptagonal prism	Octagonal prism	Nonagonal prism	Decagonal prism
				
Shape of base				
Shape of side faces				
Number of vertices				
Number of edges				
Number of faces				

L114. PRISMS AND CYLINDERS (4)

Teaching and learning activities

(60 min)

Knowing that we can find sides on each of the base and sides on the side-faces, we can multiply the 'prime' by the three parts of a prism where the sides are found.

So for edges of a triangular prism,
- o (☐ x 2) + ☐ = ☐; can be written as
- o ☐ x 3 = ☐

Let's substitute 'primes' and check if it is correct
- o (3 x 2) + 3 =9
- o (3 + 3) + 3 = 9 or
- o 3 x 3 = 9

1. Knowing that in any prism there are two bases. We can add two to the **"prime"**
☐ + 3 = ☐
Try this forother prisms.

	Triangular prism	Quadrilateral prism	Pentagonal prism	Hexagonal prism
	☐ - sides prism	☐ - sides prism	☐- sides prism	☐ - sides prism
Number of vertices	☐ x 2	☐ x 2	☐ x 2	☐ x 2
Check expression				
Number of edges				
Check expression				
Number of faces				
Check expression				

Important point

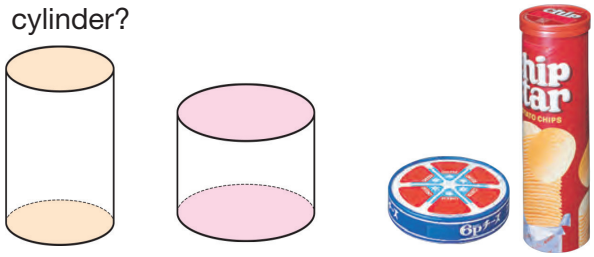
In any given prism the sum of number of vertices which corresponds to the number of sides prism is the number of edges

L114. PRISMS AND CYLINDERS (4)

Teaching and learning activities

(60 min)

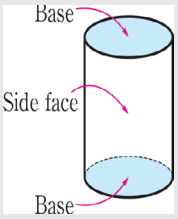
2. Knowing that in a solid prism there are bases, side faces and vertices. Can you find this in a cylinder?



(a) what kind of faces cover the cylinder?
(b) Identify the faces that are parallel in the cylinder
(c) Compare the shapes and the sizes of the 2 parallel faces
(d) Where can we find the side faces on a cylinder?
(e) Where can we find the height of the cylinder? Draw a perpendicular

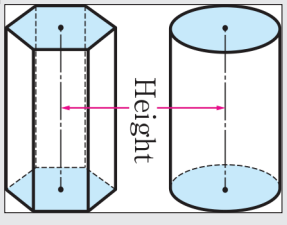
3. Lets draw a sketch so that you can see the whole rectangula prism at once.
(a) Draw a sketch of a cylinder with a radius 2 cm and 6 cm in height using a compass and a ruler
(b) Draw a length of line that is between two base of the cylinder and perpendicular to the two bases.

Important Idea



The shape shown on the right is a **cylinder.** The cylinder has two parallel congruent faces that are circle shaped which are called the **bases,** and the curved surface around the bases is called the **side face**.

The length of line that are between 2 bases and perpendicular to the 2 bases of a prism or cylinder is called the **height**, respectively

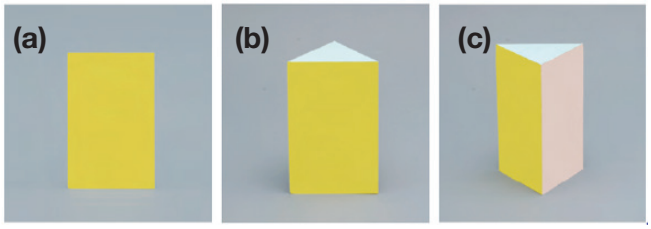


L115. SKETCHES AND NETS (1)

Teaching and learning activities

(60 min)

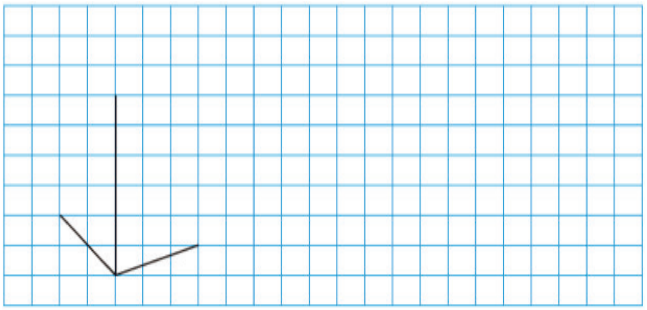
1. There are three ways in which a triangular prism is seen.
Which is the best way you can see the whole triangle at once from this picture?



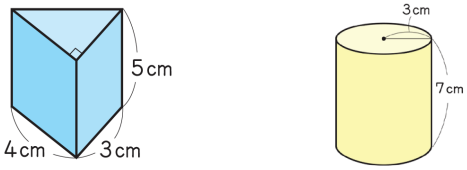
What to consider when drawing the sketch of the triangular prism?

- Identify where the vertices the bases of the prism and the height of the prism will be.
- Mark with dots then use a ruler to connect the dots with straight lines
- Are the bases parallel and the edges parallel to each other

2. Draw the sketch of the triangular prism using a 1 cm square grid as seen in the picture



3. Draw the sketch of the solids below



Important Idea

A sketch is picture drawn to give a quick view of the whole shape.

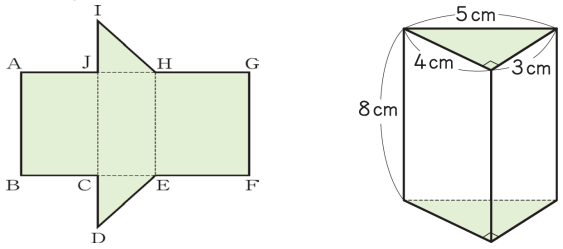
- Mark the position of the vertices with a dot then connect with lines as the edges
- Parallel edges should be drawn parallel in the sketch

L116. SKETCHES AND NETS (2)

Teaching and learning activities

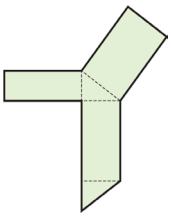
(60 min)

1. Draw the net on a card board to make a triangular prism that is shown below.



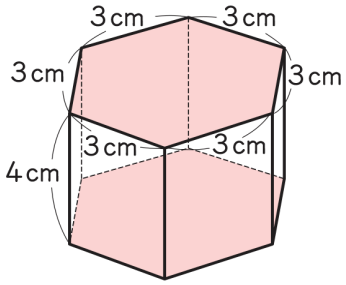
Think of other nets for making a triangular prism

(a) Which parts are the bases and the side faces in the net?
(b) Where does the height correspond in the net?
(c) How many cm are are the length of AB, BC and DE?
(d) When you make the shape, which points are does point A overlap
(e) Fold the net and make the shape



Exercise

1. Make the net for this solid below?

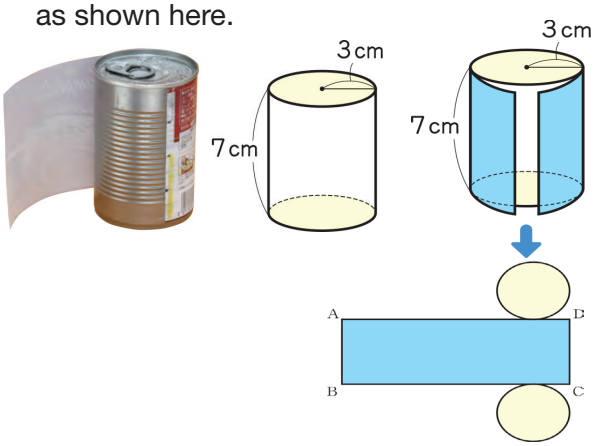


- Given the measurements on the hexagonal prism draw the net on a cardboard
- Study the hexagonal prism. How many bases and side faces does the solid have?
- Identify the height of the prism. How many cm is the height of the prism?
- Draw the hexagonal prism using the measurement given on the picture shown?
- Cut out net of the prism carefully
- Fold the net and make the shape

L117. SKETCHES AND NETS (2)

Teaching and learning activities (60 min)

1. Think about how to draw a net of a cylinder as shown here.



(a) Roll up a sheet of paper with the side face as shown then spread the paper to draw the net

(b) Which is the height of a cylinder equal in a net and how many cm is the height?

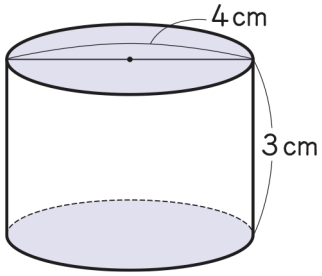
(c) Which base is the length of the line AD on the net?

(1) Width is 3 cm from the center of the circle to the edge. When spread out, it is the length of the cylinder on the net.

(2) How do I calculate the length the line AD and BC?

Important Idea
The net of side face of the cylinder is a rectangular, the length is equal to the height of a cylinder and the width is equal to the circumference of the base

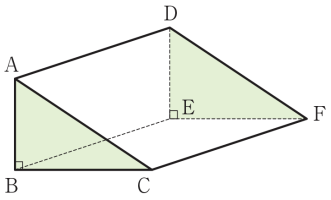
Let's draw the net of a cylinder on the right and make it



L118. EXERCISE

Teaching and learning activities (60 min)

1. Here is a solid shape shown. Answer the questions about the solid?



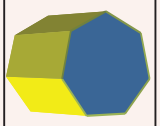
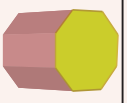
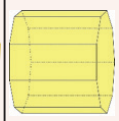
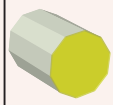
(a) What kind of solid is this?

(b) How much number of faces and edges are there on this solid?

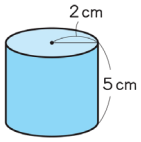
(c) What faces are parallel to face ABC and are perpendicular to face ABC?

(d) Which sides does the height of a solid measure?

2. Fill in the table with the correct information about the prisms

	Heptagonal prism	Octagonal prism	Nonagonal prism	Decagonal prism
				
Shape of base				
Shape of side faces				
Number of vertices				
Number of edges				
Number of faces				

3. What solid shape is this?



(a) Find the width of the side face when you draw the net of the cylinder.

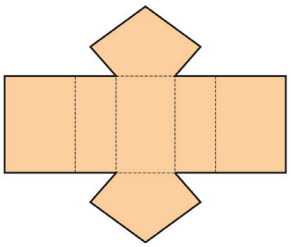
(b) Calculate the area of the circle using 3.14 as the ratio of the circumference and round this to the nearest hundredth.

L118. EXERCISE

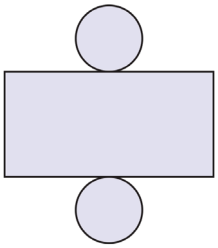
Teaching and learning activities (60 min)

4. What solid shapes cane we make from these nets?

(a)

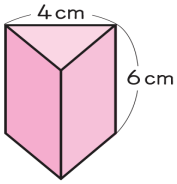


(b)

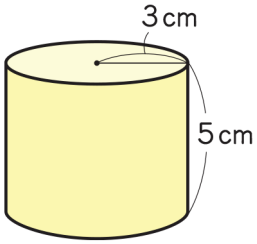


5. Draw the following nets.

(a) A triangular prism that has the base of equilateral triangle with 4 cm sides and 6 cm height.



(b) A cylinder that has the base of a circle with a 3cm radius and 5cm height



Strand: **Data and Mathematical Relations** Topic: **Ratio and Graphs**

Content Standard: 5.4.2 Extend their understanding of data and statistics to construct graphs to scale of given quantities.

Teacher's Notes

Listed below are the attitudes knowledge, skills and mathematical thinking for the topic on Ratios and Graphs. Refer to them and use them when planning your lessons.
Students will be able to;

Attitude

Work collaboratively to discuss information presented on graphs

Skills

- Represent and compare results of data using tables.
- interpret ratios as ordered pairs and plot the points associated with a ratio
- reading and interpreting tables, charts and graphs
- using ratio to compare quantities of the same type
- writing ratios in various forms eg, 4:6, 4 to 6
- Simplifying ratios eg 2:4= 1:2, 0.
- applying the unitary method to ratio problems
- dividing a quantity in a given ratio
- interpreting and calculating ratios that involve more than two numbers
- calculating speed given distance and time

Knowledge

Mathematical Thinking

Students need to be provided with opportunities to discuss what information can be drawn from the data presented. Think about the meaning of the information and to put it into their own words.

Background Notes

A number that expressed by the derived quantity when the basic quantity is made 1, like shooting result is called **ratio**

Ratio = compared quantity ÷ basic quantity

We use ratios to make comparisons between two things. When we express ratios in words, we use the word “to”--we say “the ratio of something to something else.” Ratios can be written in several different ways: as a fraction, using the word “to”, or with a colon.

Let’s use this illustration of shapes to learn more about ratios. How can we write the ratio of squares to circles, or 3 to 6? The most common way to write a ratio is as a fraction, 3/6. We could also write it using the word “to,” as “3 to 6.” Finally, we could write this ratio using a colon between the two numbers, 3:6. Be sure you understand that these are all ways to write the same number.

Make sure your child can identify the difference between ratio and total quantities . for; example, in the purple paint mixture, the ratio of of blue to red of 4:3. The does not necessarily mean that every mixture would have 4 red and 3 blue cans. It mean we would have 4 red for every 3 blue cans.

A proportion is an equation with a ratio on each side. It is a statement that two ratios are equal. 3/4 = 6/8 is an example of a proportion. When one of the four numbers in a proportion is unknown, cross products may be used to find the unknown number. This is called solving the **proportion.**

L119. RATIO (1)

Teaching and learning activities

(60 min)

The table below shows the goal scoring of Toua and his friends. Think about how to compare the results and discuss opinions.

Toua	● ● ✕ ● ● ✕ ●
Ari	● ● ✕ ✕ ● ✕ ● ✕ ✕ ●
Sam	✕ ● ● ● ✕ ✕ ● ● ✕ ●

● Goals
✕ Missed shots

1. Compare the shooting results and express the results as numbers on a table. (example shown below)

	Toua	Ari	Sam
Number of goals	5	5	6
Number of shots	8	10	10

(a) compare the results of Toua and Ari (**5 out of 8** and **5 out of 10**)
(b) compare the results of Ari and Sam (**5 out of 10** and **6 out of 10**)
(c) compare the results of Toua and Sam (**5 out of 8** and **6 out of 10**)
(d) Think about how to compare the results of Ari and Toua.

Expected ideas;

Express them on graphs of the same.

$\frac{5}{8}$ 

Change fraction to decimal numbers

$\frac{5}{8} = 5 \div 8$
$= 0.625$
$\frac{6}{10} = 6 \div 10$
$= 0.6$

Reduce fractions

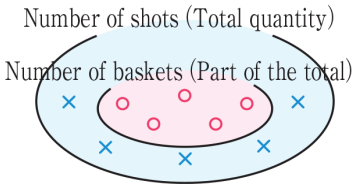
$\frac{5}{8} = \frac{25}{40}$ $\frac{6}{10} = \frac{24}{40}$

L119. RATIO (1)

Teaching and learning activities

(60 min)

(e) Explain the 3 ideas in words.
(f) Express the result of Ari as number.
If we put the total number of goals the score will be one part of this total.



Important Idea
Result = Number of Goals ÷ Number of shots
(can be expressed as fractions (part of the total) (total quantity)

2. The table below shows the shooting record of Ari. Express the result as numbers.

Game 1	● ● ● ● ●
Game 2	✕ ✕ ✕ ✕ ✕

L120. RATIO (2)

Teaching and learning activities

(60 min)

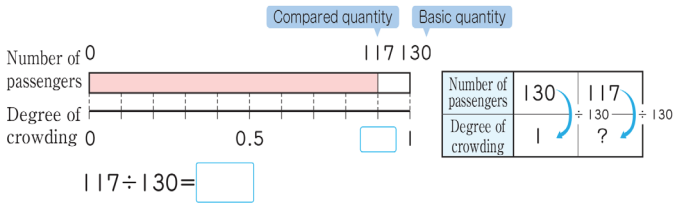
1. Study the table below and think about how to solve the problem
Which plane is more crowded?

Number of Passengers and Seats

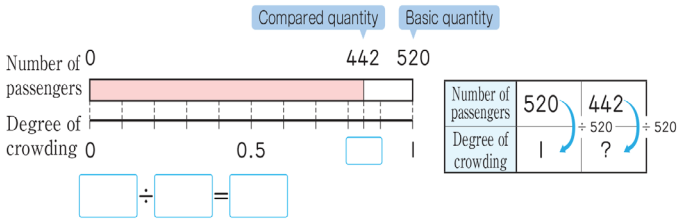
	Small plane	Large plane
Number of passengers	117	442
Number of seats	130	520

The degree of crowding is represented as a number that allows comparing the number of passengers when the number of seats is made

(a) Find the degree of crowding of the small plan.



(b) Find the degree of crowding of the large plan.



Important point

A number that is expressed by the derived quantity when basic quantity is made 1, like a shooting result or crowding, is called ratio.
The degree of crowding of small plane on the previous page is 117 ÷ 130 = 0.9.
A degree of crowding of 0.9 means that the number of passengers is 0.9 when we make the total number of seats 1.

L120. RATIO (2)

Teaching and learning activities

(60 min)

Ratio = compared quantity ÷ base quantity.

Small Plane

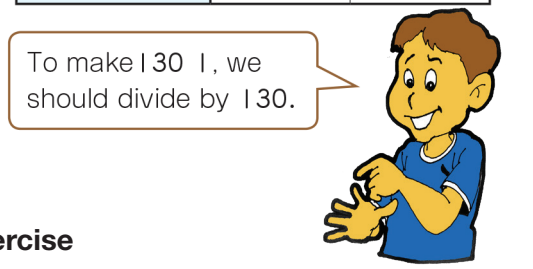
	Number of seats	Number of passengers
Number of passengers	130	117
Ratio	1	0.9

÷ 130 ÷ 130

Large Plane

	Number of seats	Number of passengers
Number of passengers	520	442
Ratio	1	0.85

÷ 520 ÷ 520



Exercise

1. Find the ratio of the problem given.

(a) A Ratio of correct answer, when 6 problems out of 10 were answered correctly.

(b) A ratio of games won when a term won 6 out of 6 soccer games.

(c) A ratio of winning lots, when someone drew 7 lots then all were blank.

(d) There are 75 children at a party including Asa. There are 15 children from the fifth grade.

2. Find the ratio of the fifth grade children based on the total number of children at the party.

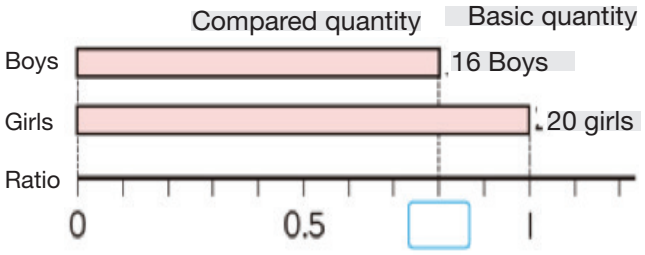
L121. THE RATIO OF 2 QUANTITIES

Teaching and learning activities (60 min)

Study the problem given below and think about how to solve it.

Proportion between two quantities can be expressed even if one of them is not a part of the other.

1. There are 16 boys and 20 girls in Raka's class. Find the ratio of the number of boys to the number of girls.



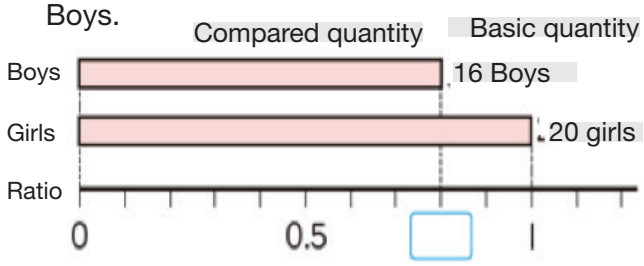
16 ÷ 20 = ☐

Compared quantity — Basic quantity

	Boys	Girls
Number of children	16	20
Ratio	?	1

(÷20 from Boys to Ratio; ÷20 from Girls to 1)

2. In Raka's class from the above story, find the ratio of the number of girls to the number of Boys.



	Boys	Girls
Number of children	16	20
Ratio	1	?

(÷16 from Boys to 1; ÷16 from Girls to Ratio)

20 ÷ 16 = ☐

Compared quantity — Basic quantity

Important Points

The ratio will change if we change the basic quantity. In some cases, the ratio will become Larger than 1.

Strand: **Data and Mathematical Relations** Topic: **Percent**

Content Standard: 5.4.3 Use percentage and compare data set of different sizes.

Teacher's Notes

Listed below are the attitudes knowledge, skills and mathematical thinking for the topic on percentages. Refer to them and use them when planning your lessons.
Students will be able to;

Attitude

- Share ideas on how to compare data set of different sizes
- Enjoy single space represent simple fraction as decimal or percentage.
- Appreciate single calculation of percentages

Skills

- Represent and compare results of data using tables.
- Interpret percentages as ordered pairs and plot the points associated with a ratio
- Calculate simple percentages of quantities
- Calculate prices following percentage discounts
- Representing simple fractions as a decimal and as a percentage
- Calculating simple percentages (10%, 20%, 25%, 50%) of quantities e.g. 10% of $200 = of $200 = $20
- Find equivalence between halves, quarters and eighths; fifths and tenths; tenths and hundredths
- Recognize percentages in everyday situations

Knowledge

- relating a common percentage to a fraction or decimal e.g '25% means 25 out of 100 or 0.25' equating 10% to, 25% to and 50% to
- Symbol of percent
- Relate a common percentage to a fraction or decimal.

Mathematical Thinking

- Think of how to solve problem relating to percent.
- Think of how percent is used in daily lives.

Back ground

Important Points

Percent means parts of per 100. The ratio 0.01, which is decimal number is called **percent** and is written as 1%. To calculate a percentage of percentage, convert both percentages to fraction of 100, or to decimal, and multiply them

L122. PERCENTAGE

Teaching and learning activities

(60 min)

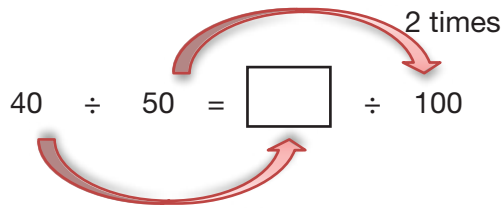
1. Read and solve

There are 40 passengers in a bus that has 50 seats.

Find the degree of crowding on the bus.

40 ÷ 50 = ☐

(a) Express this ratio by making the basic quantity 100.



2. Solve the following problem

(a) A 15 seater bus has 3 passengers on board. Find the degree of crowding. **(3÷15)**

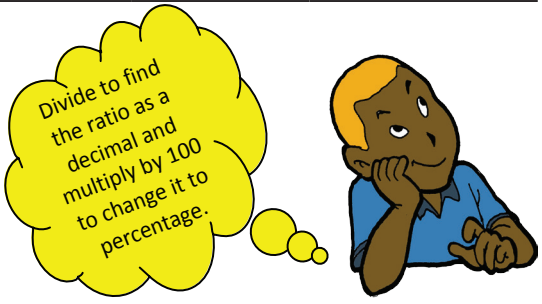
(b) In 5f class, there are 30 boys and 20 girls. Find the ratio of boys to the number of girls. **(30 ÷ 20 = 1.5)**

(c) Express the ratio above as a percentage.

(d). There are 40 passengers in a bus that has 50 seats. Find the degree of crowding on the bus. 40 ÷ 50 = ☐

Express the degree of crowding of the bus as a percentage.(complete this table)

Number of passengers	40 ÷ 50	50 ÷ 50
Ratio (decimal numbers)	? x 100	? x 100
Percentage (%)	?	100



L122. PERCENTAGE

Teaching and learning activities

(60 min)

If we multiply a ratio that is expressed as a decimal number by 100, it will become a percentage.

6. Changing the following ratio from decimal numbers to percentages and from percentages to decimal numbers.

(a) 0.75 **(b)** 0.8 **(c)** 0.316

(d) 16% **(e)** 2%

Exercise

1. Vali and his friends kept a record of the vehicles on the road in front of their school for 20 minutes.

(a) Express the ratio of each type of vehicle to the total number of vehicle in percentage to complete the table.

(b) What is the total of the percentages?

Type of vechicle	Number of vehicles	Percentage (%)
Cars	63	45
Trucks	35	
Motorcycles	21	
Buses	7	
Others	14	
Total	**140**	

L123. RATIO LARGER THAN 100%

Teaching and learning activities

(60 min)

Study the situations given and solve them.

1. Use the same idea from the lesson on per centages to calculate ratios larger than 100%
One car of a train can hold 120 passengers. Find the degree of crowding on the train as percentage.

(a) Find the degree of crowding for the first car.

$108 \div 120 \times 100 = \square$

(b) Find the degree of crowding for the second car.

$144 \div 120 \times 100 = \square$

2. Use the idea and the sample activities above to do the next activity.

Number of passengers and Capacity of the bus

	8 am	10 am	Afternoon
Number of passengers (people)	65	18	26
Capacity (people it can hold)	50	50	50

(a) Express the degree of crowding in each time

(b) At what time is the bus most crowded?

5. Solve the problem below

Moki scored 1 run from 4 balls in a game of cricket. The ratio of the total number of runs to balls faced is called batting average.

(a) Find the batting average for Moki

	Bats	Runs
Moki	4	1
Nou	5	2
Boe	5	3

L123. RATIO LARGER THAN 100%

Teaching and learning activities

(60 min)

Runs	Bats	Batting average
●	●	
●	●	
●	●	
1 ÷	4	☐

Find the batting average of Nou and Kenji.

Exercise

1. Change the following ratio from decimal numbers to fraction.

(a) 0.2 **(b)** 0.125 **(c)** 0. 25 **(d)** 0.75

(e) 0. 5

2. Change the following fraction to percentage

(a) $\frac{1}{3}$ **(b)** $\frac{2}{5}$ **(c)** $\frac{3}{4}$

L124. RATIO PROBLEM (1)

Teaching and learning activities

(60 min)

1. A painter is painting a wall that has an area of 24 m². He has painted 25% of the wall. How many m² did he paint?

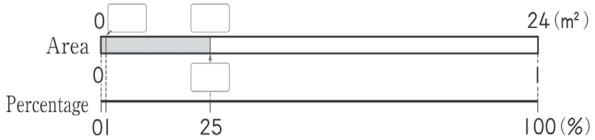
(a) Let's find by using these ideas.

	Basic quantity	1 %	Compared quantity
Area (m²)	24	0.24	?
Percentage (%)	100	1	25
	(i)	(ii)	(iii)

(i) If he painted 24 m², it would be 100% of the total area.

(ii) 1% of the area is, 24 ÷ 100 = 0.24

(iii) 25% of the area is, 0.24 × 25 = ☐



Now solve the problem by finding the compared quantity.

(a) Find the area by changing 25% to a decimal number.

24 × 0.25 = ☐

Basic quantity | Ratio | Compared quantity

Area (m²)	24	?
Ratio	1	0.25

× 0.25 ↓ ↑ × 0.25

Compared quantity = basic quantity × ratio

Important Idea

When solving problems involving compared quantity, change the percentage (%) to a deci mal and multiply.

2. Use the idea of finding compared quantity to solve this problem.

(a) There is a lottery where 5% of the tickets are winning tickets. If they make 80 tickets, how many prizes do they need?

L124. RATIO PROBLEM (1)

Teaching and learning activities

(60 min)

Compared quantity = basic quantity × ratio(decimal)

Exercise

1. Solve the following problems.

(a) There is a train with a capacity of 80 passengers in each car. When the degree of crowding is 110%, how many passengers are there?

(b) Kari's mother bought a shirt at a 20% discount that had an original price of K60. How much did she pay lessthan the original price.

Ken's idea:
Since it is a 20% discount, K60 × 0.2 = ☐ is the amount discounted.

Muli's idea:
Since it is a 20% discount, she can buy the shirt at 80% of the original price.
K60 × 0.8 = ☐

L125. RATIO PROBLEM (2)

Teaching and learning activities

(60 min)

1. Solve the problem below by investigating how to find the basic quantity using Lina's family field. Lina's family has a flower garden that is part of a large field.
The area of the garden is 60 m². Which is equal to 20 % of the the field. How many m² is the field?

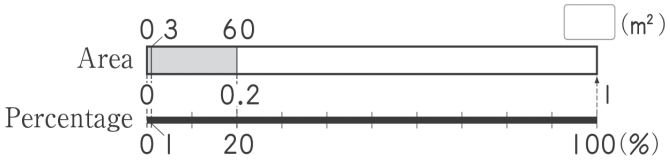
	Basic quantity	1 %	Compared quantity
Area (m²)	?	3	60
Percentage (%)	100	1	20

× 100 ÷ 20

(3) × 100 (2) ÷ 20 (1)

(a) Let's find by using these ideas

(i) 20% of the area of the field is 60 m²
(ii) 1% of the area is 60 ÷ 20 = 3
(iii) 100% of the area is 3 × 100 = ☐
x 100 ÷ 20



2. Put the toal area of the field ☐ m². Write an expression to calculate the area of the flower garden and then find the correct number for

(a) Since 20% of the area is 0.2, x 0.2 = ☐

(b) 60 ÷ 0.2 = ☐

Compared quantity | Ratio | Basic quantity

÷ 0.2

Area (m²)	?	60
Ratio	1	0.2

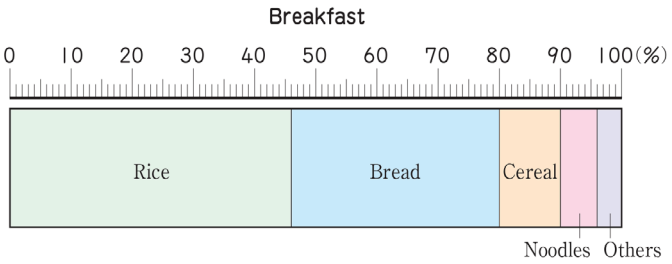
÷ 0.2

L126. RATIOS AND GRAPHS

Teaching and learning activities

(60 min)

1. The band graph below shows the result of breakfast by children in the fifth grade.



(a) What is the percentage of rice compared to the total number of children?

(b) What are the percentages of bread, cereal and noodles compared to the total number of children?

(c) Using the information from the band graph above, do the following activity.

2. There are 50 children in the fifth grade.

(a) Find the number of children for each type of breakfast

(b) What is the total number of children from the calculations above?

(c) Correct the exercise and explain band graphs

3. Complete the table below by finding the percentages.

Causes of accidents in the First Grade

Cause	Number of children	Percentage (%)
Running out on the street	11	
Crossing the street outside a crosswalk	4	
Crossing the street on a red light	3	
Walking behind and in front of cars	3	
Others	2	
Total	23	

L126. RATIOS AND GRAPHS

Teaching and learning activities

(60 min)

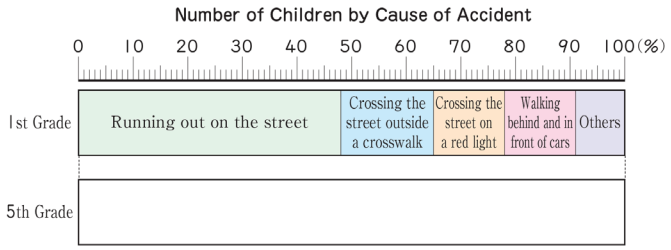
Causes of accidents in the Fift Grade

Cause	Number of children	Percentage (%)
Running out on the street	8	
Crossing the street outside a crosswalk	9	
Crossing the street on a red light	4	
Walking behind and in front of cars	2	
Others	5	
Total	28	

Correct the Activity and draw a Band Graph to represent this information in Percentages

(a) Let's find each ratio to the total and around to the nearest hundreth by rounding to the thousandth. Then find each percentage and write them in table.

(b) Draw a band graph of the Fifth Grade. "Other" is drawn last even if it is a larger number.



(c) let's discuss about your finding base on the two band graphs.

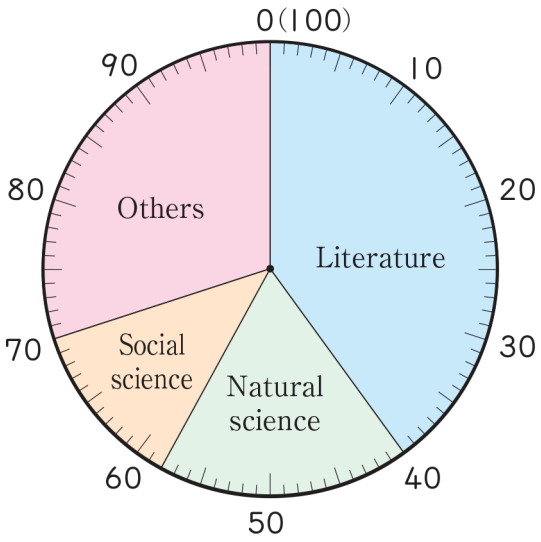
L127. CIRCLE GRAPH

Teaching and learning activities

(60 min)

Study the pie graph below and answer questions based on the information

1. The graph below shows the types of books at Mero's school library and their ratios.



Important Points

A graph that is drawn as a circle is a circle graph. It is also known as a pie graph.

Important Ideas

Compared quantity = basic quantity × percentage ratio (decimal)

(a) What is the percentage of literature compared to the total number of books?

(b) What are the percentages of natural sciences and social sciences?

(c) There are 3600 books in the library. How many of each are there?

Exercise

1. A student spends about 25% of a day in school. About how many hours is the student in school?

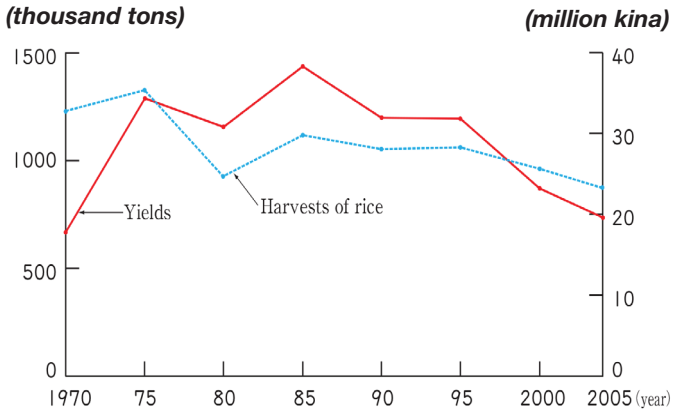
L128. SOLVING PROBLEMS WITH GRAPHS (1)

Teaching and learning activities

(60 min)

1. Study the line graph and answer the following questions.

Harvest of Rice and Its Yields



(a) How many thousand tons was the harvest in 2005?

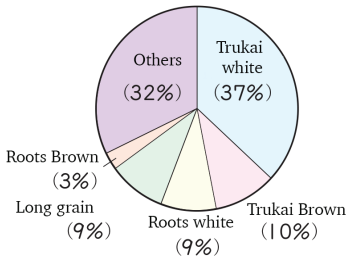
(b) How much in millions were the other crops valued at in 2005?

(c) How much did others crops earn in the year 2000?

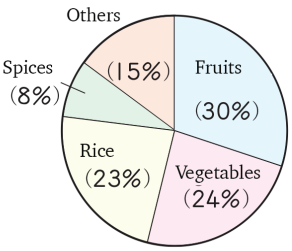
2. Vagi's opinion on the size of harvest of rice and its yield. When the harvest of rice increase, its yield increases together

When the harvest of rice increases its yield increase together

Ratio of Harvest of Kindsof Rice



Ratio of Yields of Kinds of Agriculture



L128. SOLVING PROBLEMS WITH GRAPHS (1)

Teaching and learning activities

(60 min)

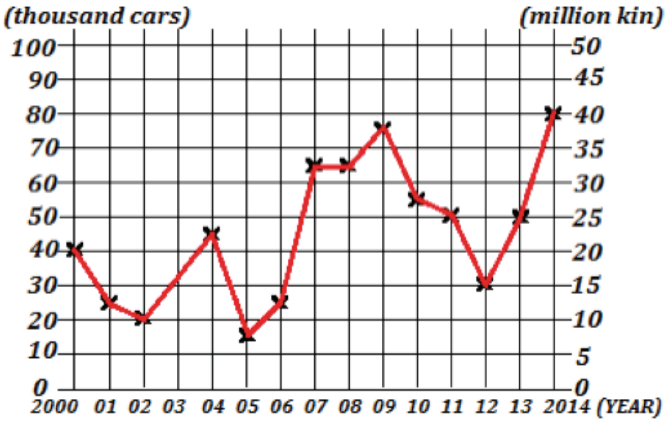
1. The band graph below shows the result of breakfast by children in the fifth grade.

Important Idea

Line graphs can be a useful way to present pairs of data on one graph. Line graphs are constructed by joining a number of points formed by ordered pairs together.

Now, interpret this graph and do the activity.

Toyota Vehicle Sale



Exercise

Use the information from the line graph to answer these questions.

1. Which two years sold the same number of cars?

2. How much is the difference between the best and the worst sale?

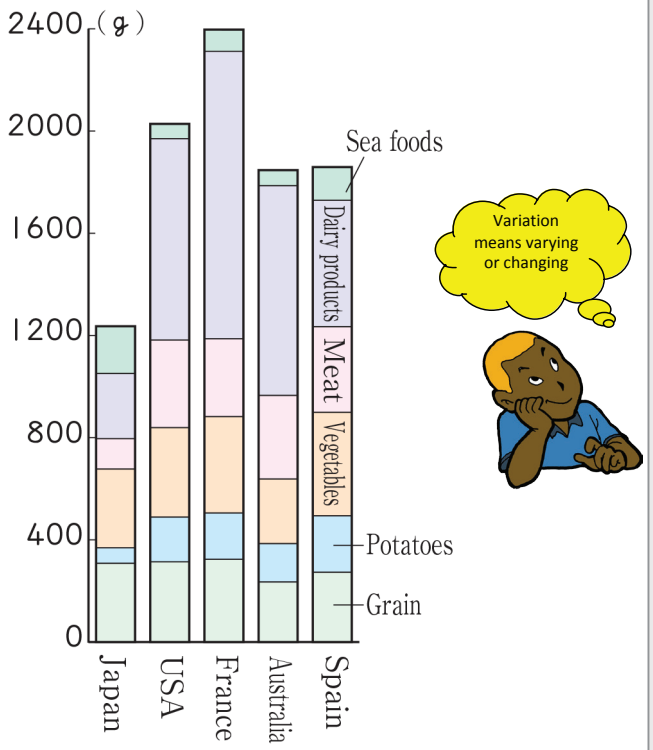
3. How much in millions did the company make since year 2000?

L129. SOLVING PROBLEMS WITH GRAPHS (2)

Teaching and learning activities (60 min)

Study the bar graph and answer questions based on the information on the graph.

Comparison of different food that were eaten (2002).



1. Which part of the graph do we read to find the type of food that a country eats in a day?

(i) How do we compare and find the percentage of the consumption of vegetables?

(ii) How can we identify the variation of the consumption of vegetables in Japan?

2. Vagi wrote down what he knew from the information on the bar graph. Choose which of the ideas are not correct and explain.

(i) The percentage of the seafood consumption in Japan remain unchanged for 35 years.

(ii) The percentage of grain consumption in Japan is almost the same as in France.

(iii) The percentage of vegetable consumption in Japan is decreasing.

(iv) The percentage of the seafood consumption in Japan is relatively high compared to other countries.

L129. SOLVING PROBLEMS WITH GRAPHS (2)

Teaching and learning activities (60 min)

Important Idea

Bar graphs are used to represent data in terms of bars with equal width. Only one axis has a scale with data while the other may represent colour or information about countries, types of vegetables, number of things,etc.

3. Use the information from the bar graph, calculate the percentage of each food type for USA.

Sea-food – 50 grams _____%

Dairy products -750 grams _____%

Meat – 370 grams _____%

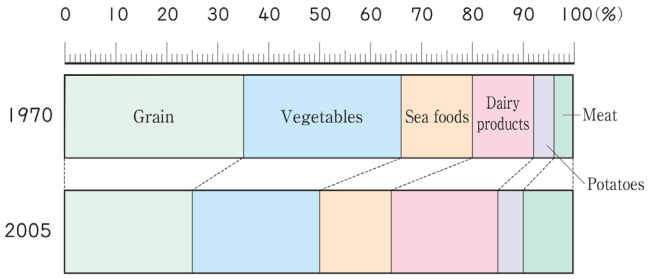
Vegetables – 330 grams _____%

Potatoes – 200 grams _____%

Grain – 300 grams _____%

Exercise

The information on the graph below shows the variation of food eaten in a day.



Important Idea

Amount ÷ Total ×100 = % Use the idea of finding quantity as a percentage

(a) Which food's consumption have increased over the past 35 years?

(b) Describe the variation of the consumption of Vegetables.

(c) Which type of food has remained unchanged in variation?

L130. EXERCISE

Teaching and learning activities (60 min)

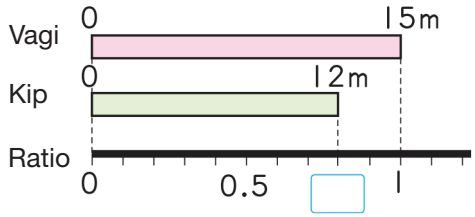
1. Find the following ratio

(a) When there are 7 correct answers for 10 problems. What is the ratio of correct answers?

(b) They played 4 games and won all 4. What is the ratio of winning?

2. Read the problem given and solve.

Vagi has a 15 m of tape. Kip has a 12 m tape. Find the ratio of the length of Vagi's tape to the length of Vagi.



3. Read and solve
When you buy something with a price of 600 kina, you have to pay 630 kina because of the consumption tax. What percentage of the selling price is the money?

5. Read and solve
There are 300 eggs, but 4% of the eggs are broken. How many eggs are broken?

Exercise

1. Do these exercises

(a) $\frac{1}{5}+\frac{7}{10}$ **(b)** $\frac{5}{6}+\frac{2}{9}$ **(c)** $1\frac{1}{2}+2\frac{1}{4}$ **(d)** $2\frac{3}{8}+1\frac{5}{12}$

(e) $\frac{3}{4}-\frac{1}{2}$ **(f)** $\frac{9}{10}-\frac{3}{4}$ **(g)** $\frac{7}{6}-\frac{2}{3}$ **(h)** $5\frac{1}{7}-2\frac{4}{5}$

Assessment, Reporting and Recording

Assessment

There are 3 types of assessments that teachers are expected to use when they are teaching the lessons.

1. Assessment *for* Learning
2. Assessment *as/in* Learning
3. Assessment *of* Learning

1. Assessment *for* Learning

'Assessment ***for*** learning' is also known as classroom assessment. It is an ongoing process that arises out of the interaction between teaching and learning. It is not used to evaluate learning but to help learners learn better. It does so by helping both students and teachers to see:

- the lesson objective and the criteria for the lesson,
- the progress of the student as a learner in relation to the lesson objective,
- where they need to link to the next lesson.

Sample of Assessment

Below are two different approaches the teacher can choose and prepare for each lesson.

a. Ask oral questions in reference to the lesson.
For example, teacher posing a revision problem referring to addition with 2-digit numbers and asking the following questions directly to the students to get their responses.

1. How many marbles are there from 13 red marbles and 24 yellow marbles? 38 marbles altogether.
2. How did you get the answer?
3. Can you show the mathematical expression on the blackboard? Student should show hands and teacher selects one male and female to show their work on the blackboard.
4. Teacher and students agree with the process of addition with 2-digit numbers in vertical form.
5. Can we be able to do addition with 3-digit numbers?

b. Peer group discussions.

For example, the activity on "let's think about addition with 3-digit numbers" Teacher write the problem on paper rings "For the party decoration, we made 215 paper rings yesterday and today we made 143 paper rings"

1. Students represent the problem on the tape diagram correctly.
2. Write the expression and show on blackboard.
3. Add in vertical form to find the solution.
4. Teacher check their work to for addition of 3-digit numbers in vertical form.
5. Teacher evaluate and link addition of 2-digit numbers to 3-digit numbers.

Method: Checklist

- Analyse information on a record sheet correctly.
- Transfer the information to a table in numerical form.
- Tally the information correctly.

2. Assessment *as or in* Learning

'Assessment ***as*** *or* ***in*** Learning' is the use of a task or an activity to allow students the opportunity to use assessment to further their own learning and occurs during the lesson period.

Sample Assessment Task

Teacher and student Activity

- Teacher provides place value cards and blocks to each group.
- Teacher allows students to use their ideas to do vertical calculation.
- Student show using the place value blocks and cards.
- Show on the vertical addition.
- Share their ideas and let students learn from these ideas
  eg. Kawagoe's idea and Mono's ideas - place value chart and vertical calculation
- Teacher assess their understanding of the objective of addition by 3 digit numbers.

Method: Checklist

- Add in vertical form correctly

3. Assessment *of* Learning

'Assessment ***of*** learning' is the use of a task or an activity to measure, record and report on a student's level of achievement in regards to specific learning expectations.These are often known as summative assessments.

This assessment sample (of learning) can be given at the end of the week. Students will be given oneweek to complete the task. The teacher should guide them from time to time to complete the task and collect them at the end of the week for marking and recording.

Sample Assessment Task

1. Students take homework
2. Teacher collects homework on addition with 3 digit numbers
3. Marks students work

Method: Checklist

- Add in vertical form correctly

Assessment, Reporting and Recording

Yearly Assessment Plan

Sample

Assessment Task	Assessment Method	Assessment Criteria	Recording Method
Write given numbers in word or figures eg. 24, twenty four	Work sample	A. Read and write given numbers correctly B. Read but cannot write given numbers correctly C. Read and write figure only D. Cannot read and write the number in figure and words.	Checklist Portfolios

Assessment Recording Tools

- criterion reference
- checklist
- oral presentation
- group work

Assessment Methods

- observations
- work samples
- portfolios
- tests
- assignments
- projects
- investigations

Sample - Individual Assessment Record Sheet

Assessment	Total Score	Student Score	%	Achievement Level	Content Standard	Evaluation/ Comments
1	3	2	67	SA	3.1.2	Achieved Standard Statement and pass benchmark
Total						

National Achievement Levels - Benchmark

	% Mark	Achievement Level	Explanation
A	Above 85%	Very High Achievement (VHA)	A grade indicating excellent achievement in the course. The student has an extensive knowledge and understanding of the course content and can readily apply this knowledge. In addition, the student has achieved a high level of competence in the processes and skills of the course and can apply these skills to new situations.
B	70 - 84%	High Achievement (HA)	A grade indicating a high level of achievement in the course. The student has a thorough knowledge and understanding of the course content and competence in the processes and skills of the course. In addition, the student is able to apply their knowledge and skills to most new situations.
C	50 - 69%	Satisfactory Achievement (SA)	A grade indicating substantial achievement in the course. The student has demonstrated attainment of the main knowledge and skills of the subject and has achieved a sound level of competence in the processes and skills of the course.
D	20 - 49%	Low Achievement (LA)	A grade indicating satisfactory achievement in the course. The student has demonstrated an acceptable level of knowledge and understanding of the course content and has achieved a basic level of competence in the processes and skills of the course.
E	0-19%	Below Minimum Standard (BMS)	A grade indicating elementary achievement in the course. The student has an elementary knowledge and understanding of the course content and has achieved limited competence in some of the processes and skills of the course.

Assessment Processing

SUBJECT ASSESSMENT PERIODIC SHEET

Teacher: Mr.Jones | MATHEMATICS | Term: ONE

Assessment.task

NO.	SURNAME	NAME	SEX	GRADE	GRADE	Total	WEEKLY	TESTS	W2	W3	W4	W5	W6	W7	W8	T1	T2	T3	T4	T5	T6	T7
							WT.SCORES		WEEKLY MARKS							END OF TERM TESTS						
						100	40%	60%	25	25	15	50				15	15	20				
1	Aihi	Jenny	F	EP	SA	61	21	40	15	7	10	27				11	7	15				

$$TOTAL\,(100) = WEEKLY + TESTS$$

Eg. 61 = 21 + 40

$$Test = \left(\frac{T1 + T2 + \cdots + T7}{TEST\ TOTAL\ SCORE}\right) \times 60$$

Example

$$Test = \left(\frac{11 + 7 + 15}{15 + 15 + 20}\right) \times 60 = 40$$

% Mark	Achievement Level
Above 85%	Very High Achievement (VHA)
70–84%	High Achievement (HA)
50–69%	Satisfactory Achievement (SA)
20–49%	Low Achievement (LA)
0–19%	Below Minimum Standard (BMS)

$$Weekly = \left(\frac{W1 + W2 + \cdots + W7}{WEEKLY\ TOTAL\ SCORE}\right) \times 40$$

Example

$$Weekly = \left(\frac{15 + 7 + 10 + 27}{25 + 25 + 15 + 50}\right) \times 40 = 21$$

Resources

Check each lesson for the resources that are needed and prepare them in advance before you teach the lessons. Good quality resources can enhance learning environment in many ways such as;

- Making learning interesting
- Supporting a range of student ability
- Supporting a range of learning styles and therefore not relying on one way of teaching and learning
- Supporting explanations and understanding
- Reinforcing new ways of working or new concepts
- Supporting a positive learning environment
- Making students think
- help students use correct mathematics words and terms

Resources can be obtained in two ways;

- Ready-made and provided in kits or by the school
  E.g. Clocks, timers, phones, computers and standard geometrical figures such as cones, and other shapes
- Resources and how to make them

Cards – can be made from cardboards or bark of trees etc., place value cards
Sticks – in bundles and make them available
Posters – make number charts, or make patterns of charts
Geometrical figures – tins, boxes, cut out timber in rectangles, squares etc.
Balances – can be made from sticks, strings and cans

Abbreviations

ASK - Attitude, Skills and Knowledge

cm - centimetres

dL - decilitres

DM - Data and Mathematics Relations

g - grams

GF - Geometrical Figures

kg - kilograms

km - kilometres

L - Litres

m - metres

mL - millilitres

mm - millimetres

MT - Mathematical Thinking

NO - Number and Operations

QM - Quantities and Measurements

T/L - Teaching and Learning

t - tonnes

Glossary

Words	Definitions
analysing	Studying something very closely, breaking something into components, examining a structure, expressing something using mathematical terms
Bench Marks	Set criteria of the content standards that have to be achieved by the end of each grade level, grade 2,5,8,10,12
Circumference	The enclosing boundary of a circle
commutative	In reference to exchange or substitution e.g. x+y=10 when x is 7 as in addition; addition and multiplication are commutative processes while subtraction and division are not.
Diameter	A straight line passing side to side through the centre of a figure especially circle and sphere
Difference	The result of subtracting one number from the other
Dividend	The number being divided
Divisor	A number that divides an integer evenly or a factor that will divide the dividend exactly
Equilateral triangle	A triangle in which all three sides are equal. It is also equiangular; all three interior angles are equal and measure 60°
Expression	A mathematical phrase that can contain ordinary numbers, variables (like x or y) and operations (like)
Fraction	A numerical quantity that is not a whole number e.g. , the top number is the numerator and the bottom number is the denominator
Horizontal axis	The line on a graph that runs horizontally (left-right) through zero. It is used as a refer- ence line so you can measure from it; the x-axis.
inequality signs	State of being unequal; less then < and more than> are unequal signs
Inferring	Coming to a conclusion or forming an opinion about something on the basis of evidence or reasoning.
Length	The measurement or extent of something from end to end
Math Syllabus	Contains the policy on Mathematics content that has to be implemented in all schools and grades that is subjected.
Math Teacher Guide	The teaching and learning organised guide that will help the teacher to implement the content from the syllabus so that mathematics content is taught and assessed for each grade.
Minuend	The first number in a subtraction, the number from which another number is to be sub-tracted
Multiplicand	A number that is to be multiplied by another
Multiplier	A number by which another number is multiplied
Ordinals	Number defining the position of something in a series e.g. first, second, third, etc.
Partitive Division	A division problem where you know the total number of groups, and you are try- ing to find the number of items in each group
Product	The answer when two or more numbers are multiplied
Quotative Division	Involves taking a set of size ‘a’ and forming groups of size ‘b’. The number of groups of this size that can be formed, ‘c’ is the quotient of ‘a’ and ‘b’

Glossary

Quotient	The quantity produced by division of two numbers
Radius	A straight line from the centre to the circumference of a circle or sphere, of the diameter
Remainder	The amount “left over” after performing some computation. Normally an integer “left over” after dividing one integer by another to produce and integer quotient
Sphere	A round solid figure with every point on its surface equidistant from its centre e.g. soccer ball
Standard Based Curriculum	Curriculum is of standard and quality as stipulated in the content standards and to be taught, implemented and achieved by each grade across Papua New Guinea.
Standard Based Education	The structure of the education system is to be standard and of quality expectations from the global and vision 2050
Subtrahend	The number that is to be subtracted
Sum	The result of adding two or more numbers
Synthesising	Combining of various components into a whole – to combine different ideas, influence or objects into new whole
Tessellation	To fit together something without leaving any spaces,e.g. geometric figures
validating	To confirm something and find its proof
Verifying	To prove that something is true by examination, investigation or comparison
Vertex	A corner or a point where lines meet
Vertical axis	The line on a graph that runs vertically (up-down) through zero. It is used as a reference line so you can measure from it, the y-axis.
Weight	A body’s relative mass or the quantity of matter contained by it, giving rise to a down-ward force. The heaviness of a person or thing

References

NDOE 2016, Mathematics Grades 3,4 & 5 Primary SBC Syllabus, NDOE, Waigani

NDOE 2004, Mathematics Lower Primary Syllabus, NDOE, Waigani

NDOE 2004, Mathematics Lower Primary Teacher Guide, NDOE, Waigani

Elementary School Teaching Guide for the Japanese Course of Study (grade 1-6), 2010, CRICED, University of Tsukuba

Study with your Friends Mathematics for Elementary School, © Gakkohtosho Co. LTD, Taheshi Nara, Tosho Printing Co., LTD Japan

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