

# Mathematics

## Teacher Guide

### Primary Grade 4



### Standards Based



**'FREE ISSUE  
NOT FOR SALE'**

Papua New Guinea  
Department of Education



# Mathematics

## Teacher Guide

Primary  
Grade 4

Standards Based



Papua New Guinea  
Department of Education

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

First Edition

Published in 2017 by the Department of Education

© Copyright 2017, Department of Education, Papua New Guinea

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or any means, electronic, mechanical, photocopying, recording or otherwise without the prior written permission of the publisher.

*Graphic Design & Layout by David Kuki Gerega*

**ISBN 978-9980-56-582-3**

## **Acknowledgements**

The Primary Mathematics Grade 4 Teacher Guide was developed by the Curriculum Development Division of the Department of Education and coordinated by Mary Norrie assistance from the Subject Curriculum Group (SCG).

Special acknowledgement is extended to Teacher Colleges Lecturers, Standard Officers, and other stakeholders such as Non-Government Organization for their contributions in the development of this document through Syllabus Advisory Committee (SAC) and Basic Education Board of Studies (BEBOS) and other consultative writing workshops.

Special acknowledgement to Professor Masami ISODA of Tsukuba University, Japan for his technical expert advice for the development of Grade 4 Mathematics Teacher Guide.

# Contents

Secretary's Message	iv
Introduction	1
Planning and Programming	8
Yearly Overview	9
Teaching Content - Sample Guided Lesson	13
Assessment, Recording and Reporting	143
Resouces	148
Abbreviation	149
Glossary	150
References	151

# Secretary's Message

This Mathematics Teacher Guide for Grade 4 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 4. 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 4 Mathematics Teacher Guide to be used in all Primary Schools throughout Papua New Guinea.



.....  
**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

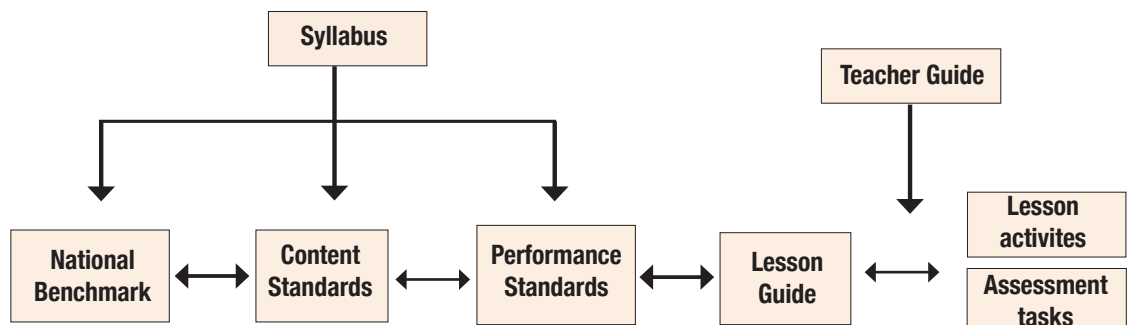
The purpose of the Grade 4 Mathematics Teacher Guide is to assist teachers deliver the mathematics content standards stated in the syllabus.

## 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 has the recommended knowledge, processes, skills and attitudes for each of the content standards and sample assessment tasks and showing 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 4 Mathematics is a build-up of what is covered at the elementary and Grade 3. 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.

## Key Features

The Grades 3, 4 & 5 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.

Mathematics has two aspects, 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 and representing, ordering, sequencing, grouping.

## 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, ASK, 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, ASK and teaching and learning activities provided. Teachers are required to use the ASK to develop lesson objectives for the given teaching and learning activities for each lessons.



## How to use the Teaching/Learning content guide

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 organise 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 blackboard for a mathematics lesson is also provided with the lesson.

# Introduction

## Sample Lesson

**Sub-topic:** Large Numbers

**Topic:** Large Numbers

**Content Standards: 4.1.1** Extend learned number and place value to read, write, and order numbers up to 10 million and more using base 10 numerals and compare numbers using inequality signs.

### Teaching and Learning Activities

**Lesson objectives:** By the end of the lesson the students will be 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 value chart  
Become interested in large numbers and their place value

- (A) Identify and read large numbers according to their place value
- (S) Think about how to represent Large number using base blocks
- (K) Think of how to read and write a large numbers

### Lesson Sequence

Write 8 600, 12 407, 50,000, and 9700 on the board.

Ask students to tell you which of these numbers is largest? 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

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

Answers  
**35, 813**  
**153,038**

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

### Activity 3

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

# Introduction

Million	Hundred Thousand	Ten Thousand	Thousand	Hundred	Tens	Units/ones
		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

## Preparation of Board Plan

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



**Today's lesson**

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

Mathematical activities are various activities related to mathematics where students are actively engaged to discover the properties of Number and Geometrical figures based on what they have learned and apply in their life and other situation.

Mathematical activities are usually done through problem solving with rich mathematical thinking which includes various questioning on problem situations such as for finding methods and better ideas in solutions. Mathematical activities also include explanations for sharing ideas on various representations such as changing /translating representations to find the beautiful and reasonable pattern.

Mathematical activities are easily done if students acquire the fluency for operations and reasoning. These mathematical activities in the classroom are necessary for developing mathematical thinking and proficiency, and provide opportunities for students to feel the joy of thinking and learning, and utilize and appreciate mathematics in their lives. Through the reflection of mathematical activities students are able to appreciate the value of mathematics such as simple, easier, reasonable, general, and beautiful and in harmony. Students are able to learn mathematics by and for themselves through those activities.

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 to other subjects and Integrated study.

## Grade 4 Mathematical Activities

Activities / Experience	Enjoy using various ways of representing numbers and figures with situations to explain its appropriateness
<b>Performance Activities</b>	<p><b>a.</b> Compare, estimate and represent larger numbers and explain relative size of numbers using number line and place value chart</p> <p><b>b.</b> Investigate how to represent decimal numbers using base 10 materials</p> <p><b>c.</b> Compare and explain the relative size and structure of decimal numbers using measuring tools.</p> <p><b>d.</b> Compare areas of rectangles and squares and explain how to represent the area with numbers</p> <p><b>e.</b> Use tape diagrams and measuring containers to represent fractions larger than one (1).</p> <p><b>f.</b> Use mathematical sentence, tape diagrams and objects to find rules of calculation.</p> <p><b>g.</b> Use line graphs to represent the changes in various situations.</p>

# Introduction

<b>Assessment</b>	<ol style="list-style-type: none"> <li>1. Appreciate the use of number lines/ base 10 materials, place value chart for comparing place value of numbers</li> <li>2. Demonstration with appreciation using number lines and base 10 materials to represent decimal numbers.</li> <li>3. Enjoy using formula of square and rectangle to find area.</li> <li>4. Demonstrate with appreciation how to represent fractions larger than one using tape diagrams and measuring containers.</li> <li>5. Enjoy finding rules of division for various situations.</li> </ol>
-------------------	--

<b>Activities / Experience</b>	<b>Enjoy using various ways of questioning through situations set by themselves</b>
--------------------------------	---

<b>Performance Activities</b>	<ol style="list-style-type: none"> <li>a. Pose questions for larger numbers and decimal numbers.</li> <li>b. Pose questions for estimating numbers.</li> <li>c. Pose questions for multiplication and division problems.</li> <li>d. Pose questions for comparing size of fractions.</li> <li>e. Pose questions on expressions and order of calculations.</li> <li>f. Pose questions on finding the size of angles .</li> <li>g. Pose questions on how to find the area of squares and rectangles.</li> <li>h. Pose questions for finding properties of rectangular prism and cubes.</li> <li>i. Pose questions on the relationships of quantities which change together.</li> <li>j. Pose questions on line graphs.</li> </ol>
-------------------------------	---

<b>Assessment</b>	<ol style="list-style-type: none"> <li>1. Enjoy posing questions for larger numbers and decimal numbers.</li> <li>2. Enjoy posing questions for estimating numbers.</li> <li>3. Enjoy posing questions for multiplication and division problems.</li> <li>4. Enjoy posing questions for comparing size of fractions .</li> <li>5. Enjoy posing questions on expressions and order of calculations.</li> <li>6. Enjoy posing questions on finding the size of angles.</li> <li>7. Enjoy posing questions on how to find the area of square and s and rectangles.</li> <li>8. Enjoy posing questions on the relationships of quantities which change together.</li> <li>9. Enjoy posing questions on the relationships of quantities which change together.</li> </ol> <p>Enjoy posing questions on line graphs</p>
-------------------	---

<b>Activities / Experience</b>	<b>Enjoy thinking about how to calculate and develop proficiency for calculation</b>
--------------------------------	--

<b>Performance Activities</b>	<ol style="list-style-type: none"> <li>a. Use rules of division to find easier ways of dividing</li> <li>b. Use formula to calculate area</li> <li>c. Enjoy calculating accurately and effectively</li> <li>d. Use rounding for estimating the answer of calculations</li> <li>e. Enjoy making decision for appropriate using of exact calculation or estimation depending on the context</li> </ol>
-------------------------------	--

<b>Assessment</b>	<ol style="list-style-type: none"> <li>1. Appreciate ways of calculating using the rule of division.</li> <li>2. Enjoy using formula to calculate area of square and rectangle</li> <li>3. Calculate accurately and find miss-calculations</li> </ol>
-------------------	---

# 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, weekly timetable. The Grade (3) overview illustrates a year's plan of Teaching and Learning activities. 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 4. 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 more than 30 minutes to complete a particular activity.

Below is a sample of how mathematics can 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
<b>10:00 - 10:30</b>	<b>RECESS</b>				
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
<b>12:00 - 1:00</b>	<b>LUNCH</b>				
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		

# Yearly Overview

Strand	Topics	Lsn #	Lesson titles
<b>Number &amp; Operation</b>	Larger Numbers	1	Review of Grade 3 work (1)
		2	Review of Grade 3 work (2)
		3	3-Digit Number Reading
		4	Million - Place Value
		5	Representing of Large Number
		6	Calculating Large Numbers
		7	Exercise
		8	Rules of Division
		9	Rules Between Divisor and Quotient
	Division	10	Relationship between Mathematical Sentence
		11	Division of Tens and Hundreds
		12	Exercise
		13	Thinking about How to Calculate.
		14	Present Finding on how to calculate
		15	Comparison of Angles (1)
		16	Comparison of Angles (2)
<b>Quantities and Measurement</b>	Sizes of Angles	17	Identifying Sizes of Angles
		18	How to Express the sizes of Angles
		19	How to Use a Protractor
		20	Triangle Rulers
		21	Exercise
		22	Division by One-Digit Number
		23	Division By two-Digit Number
<b>Number and Operation</b>	Division by one-digit Numbers	24	How to Divide in Vertical Form
		25	Division by 2-digit in Vertical Form
		26	3-Digit Number $\div$ 1 Digit Number
		27	Dividing in Vertical Form
		28	What kind of Expression
		29	Exercise
		30	Making Various Quadrilaterals.
		31	Perpendicular Lines (1)
		32	Perpendicular Lines (2)
<b>Geometrical Figures</b>	Perpendicular and parallel Lines	33	Parallel Lines
		34	Exploring Parallel Lines
		35	Drawing Parallel Line
		36	Exercise
		37	Various Quadrilaterals
		38	Parallelograms
		39	Properties of Parallelogram

# Yearly Overview

Strand	Topics	Lsn #	Lesson titles
<b>Geometrical Figures</b>	Quadrilaterals	40	How to Draw Parallelogram
		41	Rhombus
		42	Characteristics of Rhombus
		43	Angles and Size of Parallelograms
		44	Diagonals of Quadrilaterals
		45	Making Shapes by connecting Points
		46	Make Patterns by Tessellating Quadrilaterals
		47	Exercise
		48	Division by two-Digit Number (1)
		49	Division by two-Digit Numbers (1)
		50	How to Make a Temporary Quotient (1)
		51	How to Make a Temporary Quotient (2)
<b>Number and Operation Review</b>	Division by two-Digit Number	52	Division by two-Digit Numbers (2)
		53	Division Where 0 is a Quotient
		54	Division in Various Countries
		55	Rules of Division and Multiplication
		56	Exercise
		57	Length of a Jump
		58	Review
		59	Understanding Line Graphs
		60	Reading Line Graphs
<b>Data and Mathematical Relations</b>	Line Graphs	61	Drawing Line Graph
		62	Ideas for Drawing a Line Graph (1)
		63	Ideas for Drawing a Line Graph (2)
		64	Exercise
		65	Introduction of Rounding Numbers
		66	Rounding (1)
<b>Number and Operation</b>	Round Numbers	67	Rounding (2)
		68	Rounding (3)
		69	Rounding Up and rounding Down
		70	Rough Estimates (1)
		71	Rough Estimates (2)
		72	Exercise
		73	Multiples and Common Multiples
		74	How Multiples Make Patterns in Numbers
		75	Common Multiples (1)
		76	Common Multiples (2)



# Yearly Overview

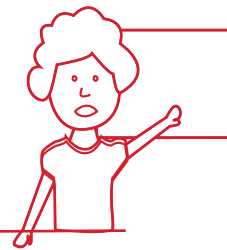
Strand	Topics	Lsn #	Lesson titles
<b>Number and Operation</b>	Multiple and Divisors	77	Divisors and Common Divisors
		78	Common Divisors
		79	The Relationship between Multiples and Divisors
		80	Prime Numbers
		81	Even and Odd Numbers
		82	Exercise
		83	Represent the Expression (1)
		84	Represent the Expression (2)
		85	The Order of calculation
		86	Rules of Calculation
<b>Number and Operation</b>	Rule and order of calculations	87	Calculation of Whole numbers (1)
		88	Calculation of Whole numbers (2)
		89	Exercise
		90	Area
		91	Area of a Parallelogram
		92	Area of rectangles and square
		93	Area of a Figure Composed Rectangles and squares
		94	Unit for Large Areas (1)
<b>Quantities and Measurement</b>	Units of Area	95	Unit for Large Areas (2)
		96	Unit for Large Areas (3)
		97	Exercise
		98	How to Represent Decimal Numbers
		99	How to Represent the Remaining Part
		100	Structure of Decimal Numbers
		101	Addition of Decimal Numbers
		102	Subtraction of Decimal Numbers
<b>Number and Operation</b>	Decimal Numbers	103	Exercise
		104	Decimal Numbers x Whole Numbers
		105	Decimal Numbers $\div$ Whole Numbers
		106	Express Ideas on Arrangement of Data
		107	Arrangement of Table
		108	Arrangement of Data
	Thinking about How to Calculate	109	Exercise
		110	Calculation of decimal number x Whole Number (1)
		111	Calculation of decimal number x Whole Number (2)
		112	Calculation of decimal number x Whole Number (3)

# Yearly Overview

Strand	Topics	Lsn #	Lesson titles
<b>Data and Mathematical Relations</b>	Arrangement of Data	113	Calculation of decimal number $\times$ Whole Number (4)
		114	Calculation of decimal number $\div$ Whole Number (1)
		115	Calculation of decimal number $\div$ Whole Number (2)
		116	0 as the Quotient in the Ones Place
		117	Dividing continuously
<b>Number and Operations</b>	Multiplication and Division of Decimal Numbers	118	Division Problems (1)
		119	Division Problems (2)
		120	What kind of Expression?
		121	Exercise
		122	Review
		123	Fractions Larger than one (1)
		124	Fractions Larger than one (2)
		125	Fractions Larger than one (3)
		126	Equivalent Fractions
<b>Number and Operations</b>	Fractions	127	Addition of Fractions (1)
		128	Addition of Fractions (2)
		129	Subtraction of Fractions (1)
		130	Subtraction of Fractions (2)
		131	Exercise
		132	Rectangular Prisms and Cubes
		133	Nets of Rectangular Prism and Cubes (1)
		134	Nets of Rectangular Prism and Cubes (2)
		135	Nets of Rectangular Prism and Cubes (3)
<b>Geometrical Figures</b>	Rectangular Prisms and Cubes	136	Relationship Between Faces and Faces, Edges and Edges (1)
		137	Relationship Between Faces and Faces, Edges and Edges (2)
		138	Relationship Between Faces and Edges (1)
		139	Relationship Between Faces and Edges (2)
		140	How to Represent Position
<b>Data and Mathematical Relations</b>	Quantities which change together	141	Exercise
		142	Quantities which change together
		143	Changing Quantities and Graphs
		144	Mathematical Sentence Using $\square$ and $\bigcirc$
		145	Mathematical Sentence Using $\square$ and $\bigcirc$
		146	Exercise

# TEACHING CONTENT

---



Sample Guided Lessons

## Topic: Large Numbers

**Content Standards:** 4.1.1 Extend learned number and place value to read, write, and order numbers up to 10 million and more using base 10 numerals and compare numbers using inequality signs.

### 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

- Show interest in reading and writing larger Numbers.
- Become interested in large numbers and their place value.
- Enjoy writing and reading large numbers.

### Skills

- Recognize and read the population of different provinces.
- Write large numbers correctly in the place values.
- Identify place value of given numbers.
- Read and write the numbers up to billion.

### Knowledge

- Understand the ways to read and write large numbers.
- Understand how to represent large numbers and their place value.
- Understand the meaning and representation of large numbers.
- Understand and use three digit number system to read billions.

### Mathematical thinking

- Think about how to represent large numbers and explain.
- How to write and read numbers larger 100 million.
- Think how to represent large numbers in the correct place value.

# TEACHING CONTENT - SAMPLE GUIDED LESSONS

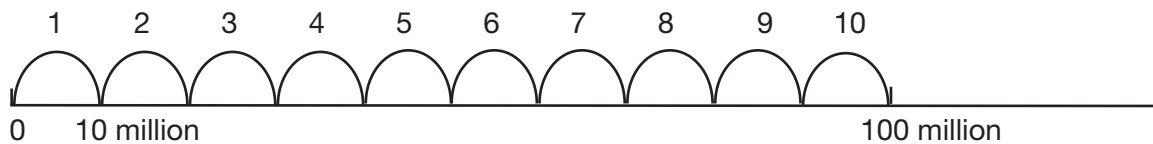
## Back Ground Notes

A good way to help with reading large numbers is to break the numbers into small pieces. Anytime a number is divided by a comma we can split the number into pieces that is simple to read such as grouping the number into 3-digits. Example; 325, 354,032. This could be read as 3 hundred twenty-five million, three hundred fifty-five thousand, and thirty\_ two

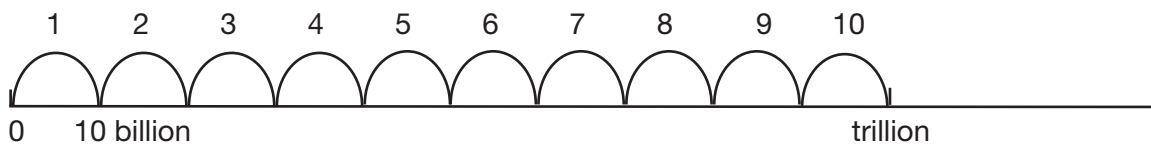
On the chart for the number system of whole numbers a new unit is given in every 3-digit as shown.

Trillions			Billion			Millions			Thousands			Ones		
100 trillion	10 trillion	Trillion	100 billion	10 billion	Billion	100 million	10 million	Million	100 thousand	10 thousand	Thousand	Hundred	Tens	Ones
						1	0	0	0	0	0	0	0	0
					1	0	0	0	0	0	0	0	0	0
			1	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0	0	0	0

The number that is 10 sets of 10 million is written as 10000000, and is read as one hundred million. One hundred million is a number with 10 000 sets of 10 thousand.



10 sets of 100 billion is written as 1 000 000 000 000 and is called as trillion. It is also written as one trillion. 1 trillion is a number with 10000 sets of one hundred million.



Any whole number (integer), no matter how big it is, can be written using the following digits; 0,1,2,3,4,5,6,7,8,9.

# TEACHING CONTENT - SAMPLE GUIDED LESSONS

## L.1 REVIEW GRADE 3 WORK (1)

### Teaching and learning activities (60 min)

Explain to students how to read large numbers and their place value. Tell them that For easier reading of larger numbers, numbers are grouped into 3-digit and a comma is placed before the next group to indicate the place value of each set. On the chart for the number system of whole numbers a new unit is given in every 3-digit shown.

Trillions			Billion			Millions			Thousands			Ones		
100 trillion	10 trillion	Trillion	100 billion	10 billion	Billion	100 million	10 million	Million	100 thousand	10 thousand	Thousand	Hundred	Tens	Ones
						1	0	0	0	0	0	0	0	0
					1	0	0	0	0	0	0	0	0	0
			1	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0	0	0	0

1. Read and write the of population the provinces in Papua New Guinea.

Name of province	Population	Year
Morobe Province	674,810	2010
NCD	364,125	2010
WHP	362, 850	2010
New Ireland Province	194,067	2010
Gulf Province	106,197	2010
Manus Province	60,485	2010

2. Write the population figures of the provinces listed above on the place value table and ask the students to complete the table

#### Place value table

Provinces	H TH	TTH	THousands	Hundreds	Tens	Ones
NCD	3	6	4	1	2	5
WHP	3	6	2	8	5	0
New Ireland province	1	9	4	0	6	7
Gulf Province	1	0	6	1	9	7
Manus Province	6	6	0	4	8	5

## L.1 REVIEW GRADE 3 WORK (1)

3. Write figures for the following number words.

- (a) Three hundred and fifty thousand five hundred and thirty
- (b) Eighty six thousand four hundred and fifty-five
- (c) Nine hundred and seventy three thousand, one hundred and twenty - two

Answers:

- a. 350,380    b. 86,455    c. 973,122

# TEACHING CONTENT - SAMPLE GUIDED LESSONS

## L2. LARGE NUMBERS IN GRADE 3 (2)

Teaching and learning activities  (60 min)

1. Read the population of the four region of PNG and write them on the chart.

Country	Population
Southern	1, 456,250
Highlands	2,854,874
Momase	1,867,657
New Guinea Islands	1,096,543

	Billion			Millions			Thousands			Ones		
	100 billion	10 billion	Billion	100 million	10 million	Million	100 thousand	10 thousand	Thousand	Hundred	Tens	Ones
Southern						1	4	5	6	2	5	0
Highlands												
Momase												
Islands												

2. Write the following numbers.

- (a) The number that is the sum of 10 sets of one hundred is written as
- (b) The number that is written as 10 sets of 10 thousand is written as
- (c) The number that is written as 10 set of 100 thousand is written as
- (d) The number that is written as 10 set of 1 million is written as

Answers

1000, 100 000, 1000 000, 100 000 000

## L3. LARGE NUMBERS

Teaching and learning activities  (60 min)

For easier reading of larger numbers, numbers are grouped into 3-digit. On the chart for the number system of whole numbers a new unit is given in every 3-digit as shown below.

Trillions			Billion			Millions			Thousands			Ones		
100 trillion	10 trillion	Trillion	100 billion	10 billion	Billion	100 million	10 million	Million	100 thousand	10 thousand	Thousand	Hundred	Tens	Ones
						1	3	0	4	4	1	0	0	0
						3	6	0	3	1	0	0	0	0

1. Let's practices reading larger numbers from the chart and fill in the rest of the numbers.

- (a) 130, 441.000      (b) 3,603, 100,000
- (c) 21,452,731,600    (d) 234,534,000,000

2. Give the value of the number that is underlined in each set of numbers.

- (a) 643,254,000      (b) 980, 945, 000,000
- (c) 743,582,000

3. Use the numbers in the table to fill in the  (box) for each number sentence.

Trillions			Billion			Millions			Thousands			Ones		
100 trillion	10 trillion	Trillion	100 billion	10 billion	Billion	100 million	10 million	Million	100 thousand	10 thousand	Thousand	Hundred	Tens	Ones
			9	8	0	1	3	0	4	4	1	0	0	0

4. Write the number that is the sum of  9 sets 1 hundred billion and 8 sets of 10 billion.
5. The number that is the sum of  sets of 10 million and 4 sets of 1 hundred thousand, sets ten thousand and 1 set of one thousand.

# TEACHING CONTENT - SAMPLE GUIDED LESSONS

## L4. LARGE NUMBERS

Teaching and learning activities  (60 min)

- Write the number that is 10 thousand times 10 thousand in the table below. Place the numbers correctly in the correct position.

$$10\ 000 \times 10\ 000 = 10\ \text{thousand sets of } 10\ \text{thousand} = 100,000,000$$

Trillions			Billion			Millions			Thousands			Ones		
100 trillion	10 trillion	Trillion	100 billion	10 billion	Billion	100 million	10 million	Million	100 thousand	10 thousand	Thousand	Hundred	Tens	Ones

- Let's practice reading and writing larger numbers on the place value chart.

- 10 thousand times 100 million
- 10 thousand times 10 million

Trillions			Billion			Millions			Thousands			Ones		
100 trillion	10 trillion	Trillion	100 billion	10 billion	Billion	100 million	10 million	Million	100 thousand	10 thousand	Thousand	Hundred	Tens	Ones

- Do the following exercise? Write the following in numbers.

- The number that is 20 sets of 1 million and 345 sets of 100 thousand
- The number that is 4 sets of 1 billion, 7 sets of 100 thousand and 3 sets of 10 thousand

- Write the following in numbers

- Ten times 6 million
- Hundred times 40 thousand
- $\frac{1}{10}$  of 80 thousand (example) if its  $80\ 000 = 8000$ .  $\frac{1}{10}$  is same as dividing by 10.
- $\frac{1}{10}$  of 800 million

## L5. REPRESENTATION OF LARGE NUMBERS

Teaching and learning activities  (30 min)

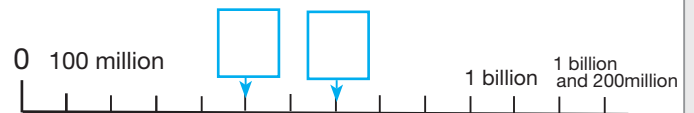
The activity is to help students understand how to represent and write larger numbers on the number line.

- Fill in the  with the numbers

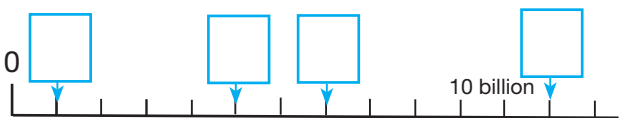
(a)



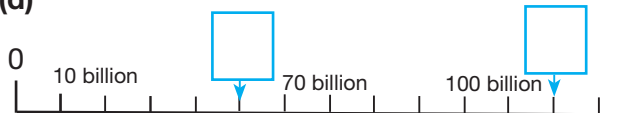
(b)



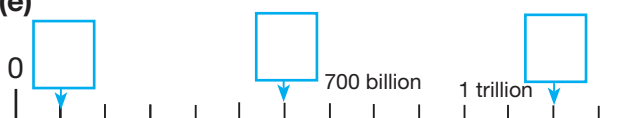
(c)



(d)



(e)



- Draw a number line and represent the following numbers.

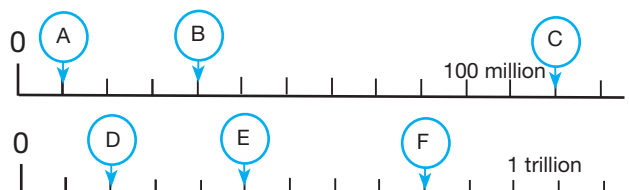
- 300 million
- 900 million
- 1 billion and 500 million

- Fill the  with the appropriate inequality sign.

(a)  $110\ 950\ 000$    $111\ 095\ 000$

(b)  $213\ 610\ 000$    $203\ 161\ 000$

- Read the numbers from (a) to (f) on the following number lines





## L6. CALCULATING LARGE NUMBERS

### Teaching and learning activities (60 min)

Read the problem and calculate the sum and differences. In Port Moresby City a sport stadium was built. It cost K3 300 000 000 to build the stadium and K1 200 000 000 to purchase the land. How much is the total cost for purchasing the land and building the stadium?

1. Write a math expression working in groups of 2 or 3.  $1200\ 000\ 000\ 000 + 3\ 300\ 000\ 000\ 000$  or 1200 million + 3 300 million.
2. Think about how to calculate  $1\ 200\ 000\ 000 + 3\ 300\ 000\ 000$ .
  - (a) What is the difference between the cost of purchasing, the land and building the stadium?
  - (b) Explains the meaning of “Sum and Difference”.
  - (c) Find the difference of 3 300 000 000 and 1 200 000 000 000
3. Let’s find the difference in the following problem.
  - (a) The sum of 1 billion, 700million and 2 billion and 900 million 2 million and 350 thousand plus 5 million and 150 thousand.
  - (b) Find the difference of 23 billion and 8 billion, Million and 700 million minus 69 billion and 200million.
4. The National library of Papua New Guinea has monthly budget of 650 000 Kina to purchase books.
  - (a) How much is the annual budget?
  - (b) Write the math expression and calculate the answer.  
 $650\ 000 \times 12\ \text{months} = 7\ \text{million}\ 8\ \text{hundred}\ \text{thousand}\ (7\ 800\ 000\ 000)$

## L6. CALCULATING LARGE NUMBERS

5. The government spent 350 000 Kina to buy 5 days lunch and accommodation for a special meeting.

- (a) How much was the daily budget ?
- (b) Write a math expression and calculate the answer.

$350\ \text{thousand} \div 5\ \text{days} = 70\ \text{thousand}\ \text{kina}/\ \text{day}$   
(K70 000/ day)

## L7. EXERCISE

### Teaching and learning activities

 (60 min)

1. Fill the  with the correct numbers.

- (a) The number that is 10 sets of 10 million is
- (b) The number that is 10 sets of 100 billion is
- (c) 100 million is  sets of 10 thousand.
- (d) 1 trillion is  sets of 100 million.
- (e) The seven on 72000000000000 means 7 sets of .

2. Read and write large numbers. Write the following numbers in figures

- (a) The number that is the sum of 46 sets of 1 trillion and 2375 sets of 100 million.
- (b) The number that is the sum 20 sets of 10 trillion and 45 sets of 10 billion.
- (c) The number that is 10 times of 180 billion.
- (d) The number that is  $\frac{1}{10}$  of 23 trillion.

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

Calculate the following expressions

- (a) 38 billion and 300 million + 42 billion and 900 million.
- (b) 73 million and 510 thousand – 3 million and 960 thousand.
- (c) 5 million and 260 x 5.
- (d) 7 billion and 200 million ÷ 8.

### Exercise

Solve the following problem using vertical form

- (a) 416 + 254    (b) 527+381    (c) 652 + 194
- (d) 590 -241    (e) 708 – 474    (f) 905 – 328

**Note:** Use activity 1 and 3 as assessment for the topic.

# TEACHING CONTENT - SAMPLE GUIDED LESSONS

## Number and Operation

**Content Standard: 4.1.3** Extend learned division to divide by two digit numbers in vertical form.

### Teachers Notes

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

The students will be able;

### Attitude

- Students enjoy and appreciate recognizing situations of division problems and represent the given situations using figures and expressions.
- Appreciate and apply different ways of calculations based on  $56 \div 4$  and enjoy calculating.
- Appreciate and use rules of division and calculations for distributing things equally to divide tens and hundreds as dividend equally to one digit number.

### Knowledge

- Understand the rules of division and its usefulness in solving division problems.
- understand division in relation to rules and relationships between mathematical sentences in division.
- Understand the relationships between division and multiplication.
- Understand Tens and Hundreds  $\div$  by 1-digit number can be calculated as 1-digit number divide by 1-digit number by making a unit of ten and hundred.

### Skills

- Use rule of division to identify relationship the between two mathematical sentences.
- Use rule of division in dividing by ten and hundred.
- Apply rules of division using multiplication table to solve division problems.
- How to calculate when the division is 1-digit number and the dividends is a 2-digit number such as  $80 \div 4$ .
- Find and apply the rules of division to calculate when the dividends and divisors are the same and the quotient is unknown.
- Recognize and make sense of the given situation using a math expression and relate it to their everyday life.

### Mathematical thinking

- Think about a problem and identify rules and process to use in solving the problem.
- Think about a given situation and make math expression and calculate.

# TEACHING CONTENT - SAMPLE GUIDED LESSONS

## Back ground Notes

Division is an operation that tells us the number of groups that can be made out of a number of Items or the number of items that should be there in a group. The symbol ' $\div$ ' represents division. For example, the division number sentence  $8 \div 2 = 4$  says that there are four groups of 2's in 8.

- **Dividend:** In a division problem, the number that is to be divided is called the dividend. In the division number sentence  $9 \div 3 = 3$ , 9 is the dividend.
- **Divisor:** In a division number sentence, the number that divides the dividend is called the divisor. In the division number sentence  $9 \div 3 = 3$ , 3 is the divisor.
- **Divisible:** A number is said to be divisible by another number, if, in the process of division, the remainder is zero. In the division number sentence  $9 \div 3 = 3$ , 9 is divisible by 3 as there is no remainder.
- **Quotient:** Upon division, the number obtained other than the remainder is called the quotient. In the division number sentence  $9 \div 3 = 3$ , 3 is the quotient.
- **Remainder:** Remainder is the number that is left over after dividing. In the division number sentence  $9 \div 2 = 4 \text{ R } 1$ , 1 is the remainder as 9 is not divisible by 2.

### Example: 1

$$\begin{array}{l} 18 \div 2 = 9 \\ \downarrow \boxed{3} \times \\ 18 \div 6 = 3 \end{array} \div \boxed{3}$$

In this example of 18 shows the relationship between the multiples and the common factors. The multiples are 9, 6, 3 and 2 or as mentioned earlier. The common factor is 18 because it is divisible by all those multiples

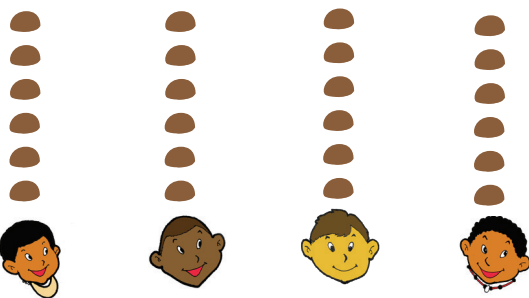
# TEACHING CONTENT - SAMPLE GUIDED LESSONS

## L8. RULES OF DIVISION

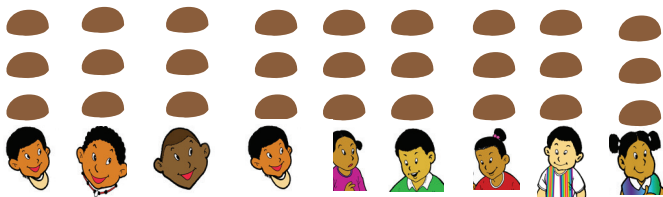
Teaching and learning activities  (60 min)

- Find the rules of division between the divisor and the answer (quotient) on  $24 \div 4$  and  $24 \div 8$ .  
 “There are 24 chocolates. They are divided equally among  children.”  
 “There are 24 chocolates. They are divided equally among  children.”

- Put the various numbers into the  and find the answer.



For each child



For each child

- If chocolates are divided among 4 children, how many will each child receive?
- If there are 8 children, how many chocolates will each child receive?
- If chocolates are divided among 4 children.  
 $24 \div 4 = \square$ .
- If chocolates are divided among 8 children.  
 $24 \div 8 = \square$ .

### Rule

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

- Put different numbers in the  and check the relationships between the  and the answer (quotient).
- Explain the relationships between the dividend and the quotient to find the rule and complete filling in the   $12 \div 3 = 4$  and  $27 \div 3 = 9$ .

## L9. RULES BETWEEN DIVISOR AND QUOTIENT

Teaching and learning activities  (60 min)

For every situation provided, allow the students to read the given problem and come up with their own ideas on how to solve the problem using the rules of division.

If the divisor was twice as large the answer will be.....

$$\begin{array}{l} 12 \div 3 = 4 \\ \downarrow \times \boxed{2} \times \\ 24 \div 3 = 8 \end{array} \left. \begin{array}{l} \\ \\ \end{array} \right\} \times \boxed{2}$$

$$\begin{array}{l} 27 \div 3 = 9 \\ \downarrow \times \boxed{2} \times \\ 9 \div 3 = 3 \end{array} \left. \begin{array}{l} \\ \\ \end{array} \right\} \div \boxed{2}$$

- There are  cakes. If each child receive 3 how many children have cakes?  
 (a) Put different numbers in the  and check the relationship between the  and the answer (quotient).   $\div 3$ .

$24 \div 3 = 8$	$9 \div 3 = 3$
$27 \div 3 = 9$	$6 \div 3 = 2$
$12 \div 3 = 4$	$18 \div 3 = 6$

- What rules are there for dividend and the answer quotient?
- What rules are there between the divisor and the answer (quotient) ?

$$\begin{array}{l} 12 \div 2 = 6 \\ \downarrow \times \boxed{\phantom{00}} \\ 12 \div 4 = 3 \end{array} \left. \begin{array}{l} \\ \\ \end{array} \right\} \div \boxed{\phantom{00}}$$

$$\begin{array}{l} 12 \div 3 = 4 \\ \downarrow \times \boxed{\phantom{00}} \\ 12 \div 6 = 2 \end{array} \left. \begin{array}{l} \\ \\ \end{array} \right\} \div \boxed{\phantom{00}}$$

Solve the following problem

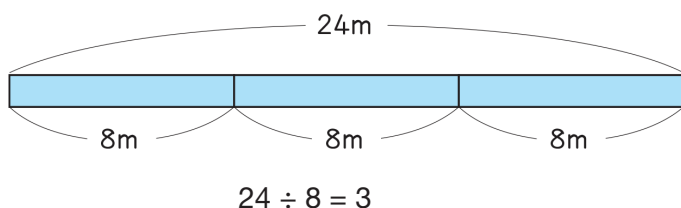
- What is the least number of marbles that can satisfy the following situation?  
 Put the marbles in 2 piles with no leftovers  
 Put the marbles in 5 piles with no leftovers  
 Put the marbles in 7 piles with no leftovers  
 To solve this problem, you can play around with the marbles until you find the correct combination. However, you could get the least common multiple of 2, 5, and 7.  
 $LCM(2,5,7) = 70$ . You need 70 marbles

## L10. RELATIONSHIP BETWEEN MATHEMATICAL SENTENCE

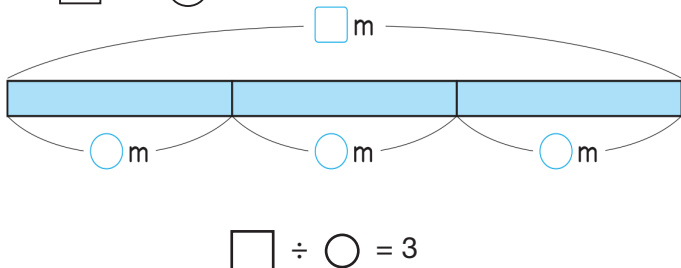
Teaching and learning activities  (60 min)

Write a division sentence from the situation given. Represent the situation given on a tape diagram.

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



2. Write this as a division sentence using the  and .



3. Find the correct number for  and the . Study the mathematical sentences below and explain your thinking.

Are there any rules for the relationship between the mathematical sentences?

$24 \div 8 = 3$	$18 \div 6 = 3$
$3 \div 1 = 3$	$27 \div 9 = 3$
$12 \div 4 = 3$	$9 \div 3 = 3$
$6 \div 2 = 3$	

**Expected answer.**

It is found in the 3 Multiplication table.

4. Write these mathematical sentences  $12 \div 4 =$  and  $6 \div 2 = 3$  and compare.

$$\begin{array}{r} 6 \\ \times \square \\ \hline 12 \end{array} \div 2 = 3$$

$$\begin{array}{r} 12 \\ \div \square \\ \hline 6 \end{array} \div 4 = 3$$

## L10. RELATIONSHIP BETWEEN MATHEMATICAL SENTENCE



If the dividend and the divisor are both multiplied by , the answers are same.

If the dividend and the divisor are both divided by , the answers are the same.



5. Use the rules of division to find the correct number for the .

(a)  $32 \div 8 = 8 \div \square$

(b)  $14 \div 2 = \square \div 8$

## L11. DIVISION OF TENS AND HUNDREDS

### Teaching and learning activities

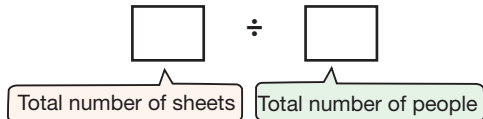
 (60 min)

Read the given problem. Write a math expression and calculate using the rules of division.

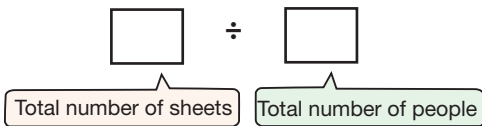
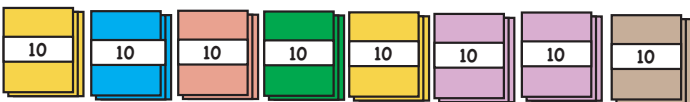
- If you were to divide 80 coloured papers equally between 2 people, how many will each get?



- Write a math expression.



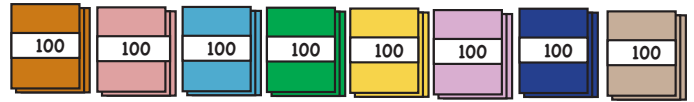
- Write an expression by using groups of 10 sheets.



- Identify the number of groups made when 80 colored papers are grouped into 10 sheets or sets of 10s. Write the expression using arrows.
- If you were to divide 800 colored papers equally between 2 people, how many will each get? Write a math expression.

How many sheets of paper do we need in each group which are represented by the expression to  $8 \div 2$  ?

## L11. DIVISION OF TENS AND HUNDREDS



How many will each person receive?

### Exercise

- (a)  $60 \div 2 =$       (b)  $80 \div 4 =$       (c)  $600 \div 2 =$   
 (d)  $800 \div 4 =$

## L12. EXERCISE

Teaching and learning activities ⌚ (60 min)

1. Fill in the  box with the number by using the rules of division.

(a)  $18 \div 2 = 9$   
 $\downarrow \times 3$   
 $18 \div 6 = 3 \leftarrow$   $\div$

(b)  $30 \div 6 = 5$   
 $\downarrow \div 2$   
 $30 \div 3 = \leftarrow$   $\times$

(c)  $10 \div 2 = 5$   
 $\downarrow \times 4$   
 $40 \div 2 = \leftarrow$   $\times 4$

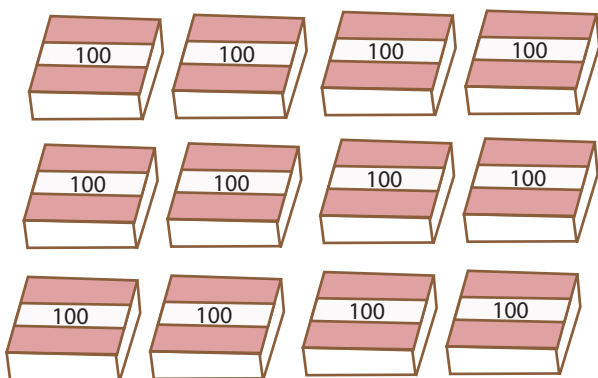
(d)  $16 \div 2 = 8$   
 $\downarrow \div 2$   
 $8 \div 2 = 4 \leftarrow$   $\div$

2. Lets calculate the following

- (a)  $40 \div 4 =$     (b)  $60 \div 3 =$     (c)  $50 \div 5 =$   
 (d)  $300 \div 3 =$     (e)  $400 \div 4 =$     (f)  $900 \div 3 =$

3. Read the following problem and think about how to solve it. Kila must divide 1200 paper into bundles of 300. How many bundles can he make?

Think about how to find the answer by using the answer of  $12 \div 3 =$

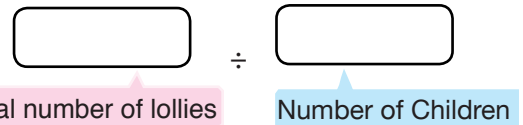


## L13. THINKING ABOUT HOW TO CALCULATE

Teaching and Learning activities ⌚ (60 min)

1. There are 4 boxes with 12 lollies in each. All 48 lollies are divided equally among 3 children. How many lollies will each child receive?

(a) Write a math expression



(b) Think about how to calculate the answer by using what you have learned.

**Note:**

Think about how to calculate your answer in different ways and explain your ideas using figures or representation. Allow students to work out their answers.

2. Go through the different expected for understanding.

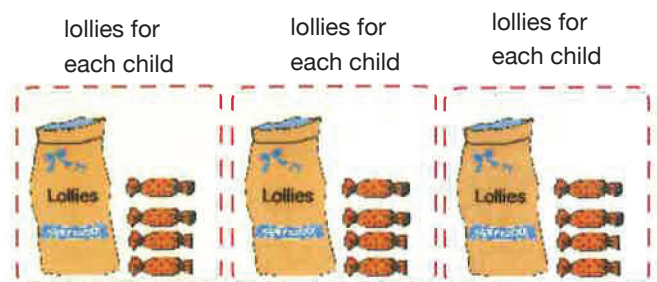
Expected Ideas

Idea. 1

Firstly, distribute a box to each child. And then, divide the remaining 12 lollies to 3 children.

$$12 \div 3 = 4$$

There are 12 lollies in each box, so the amount of lollies for each child will be  $12 + 4 = 16$ .





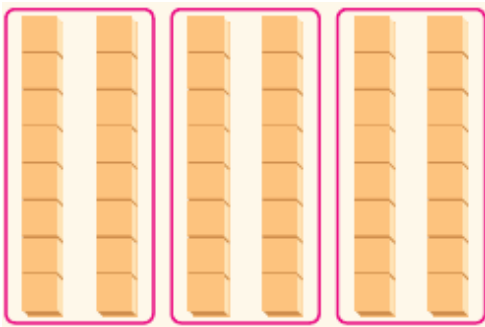
## L13. THINKING ABOUT HOW TO CALCULATE

Teaching and Learning activities  (60 min)

### Idea 2

Thinking based on  $48 \div 6 = 8$ ,  
Multiplication table

I looked for a slot in the multiplication table with 48 is  $8 \times 6 = 48$ .  
Then, I arranged blocks in the shape of  $8 \times 6$  and divide them into 3.



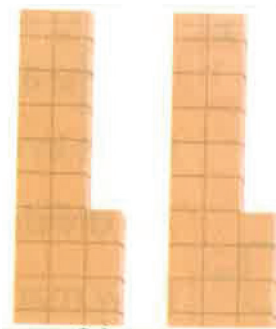
$6 \div 3 = 2$  so,  
 $8 \times 2 = \square$

### Idea. 3

Thinking based on  $24 \div 3 = 8$ ,  
Multiplication table

If you divide 48 by 2 it becomes 24.

48  $\left\{ \begin{array}{l} 24 \div 3 = 8 \\ 24 \div 3 = 8 \end{array} \right.$



There are 2 groups of 8, so  
 $8 \times 2 = \square$

## L14. PRESENT FINDING ON HOW TO CALCULATE

Teaching and learning activities  (30 min)

1. Let's think about how to calculate  $56 \div 4$  and write a report on how we divide. Use the following when writing your report.

After exploring, explain your findings to your friends in the following.

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

**Let's think about how to divide  $56 \div 4$**  Write a title.

**1 Ideas and reasoning** Write your ideas about how you solved it.

- First, divide in 4 sets of 10s.
- Then, divide the remaining by 4.

**2 How you solved** Represent your solutions in words, pictures and expressions.

(picture)

①

②

(expression)

①  $40 \div 4 = 10$

②  $16 \div 4 = 4$

Add together to make  
 $10 + 4 = 14$

Answer 14

**3 What you learned** Write down things you understood or found out.

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

Share ideas, methods and identify similarities and differences from their sharing and what they have learnt.

# TEACHING CONTENT - SAMPLE GUIDED LESSONS

**Strand : Quantity and Measurement**

**Topic: Angles**

**Content Standard: 4.2.4** Explore and develop understanding of the meaning and measurement of angles, how to construct and measure angles by calculations.

## Teachers Notes

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

Students will be able to;

### Attitude

- Show interest in drawing and classifying.
- Become interested in using a protractor and triangular ruler to find the degree of an angle.
- Enjoy constructing angles .
- Share idea with their class mates.

### Skills

- Identify and classify angles according to their sizes.
- Read and express the sizes of angles using a protractor.
- Draw and measure angle size of larger angles using a protractor.
- Read angle sizes from the given protractors and measure certain angles using protractors.
- Investigate and identify that the size of the angles are made by rotation.
- Compare size of angles and know the unit for measuring angles (degree <sup>o</sup>)

### Knowledge

- Define and identify angles in various parts of the building and trace angles on a piece of paper.
- Understand the meaning and measurement of angles.
- Names of size of the angle determined by the amount of space between sides and not the lengths of the sides.
- Understand how to use a protractor.
- Understand and see angles as rotations or turns and the meaning of measuring angles.
- Understand and know how to use the protractor to measure size of angles.
- Names of different angles.
- Protractor.

### Mathematical thinking

- Think about ways to measure and construct angles.
- Think about how to draw and certain angles using a protractor.

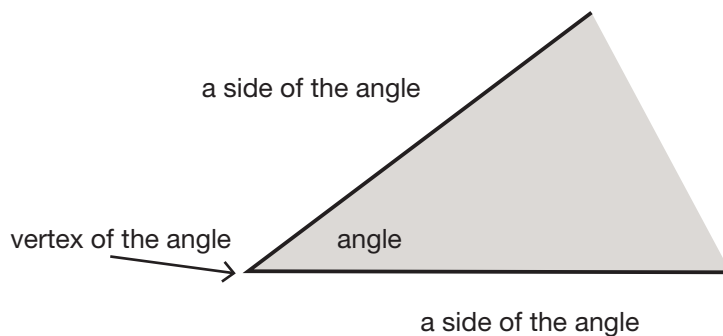
# TEACHING CONTENT - SAMPLE GUIDED LESSONS

## Background Notes

In this topic of angle, the students will have to understand what an angle is and the types of angle that they will be studying about.

The shape that is made from 2 straight lines starting at one point is called “an angle.”

The starting point is called “**the vertex of the angle.**” The 2 straight lines are called “**the sides of the angle.**”



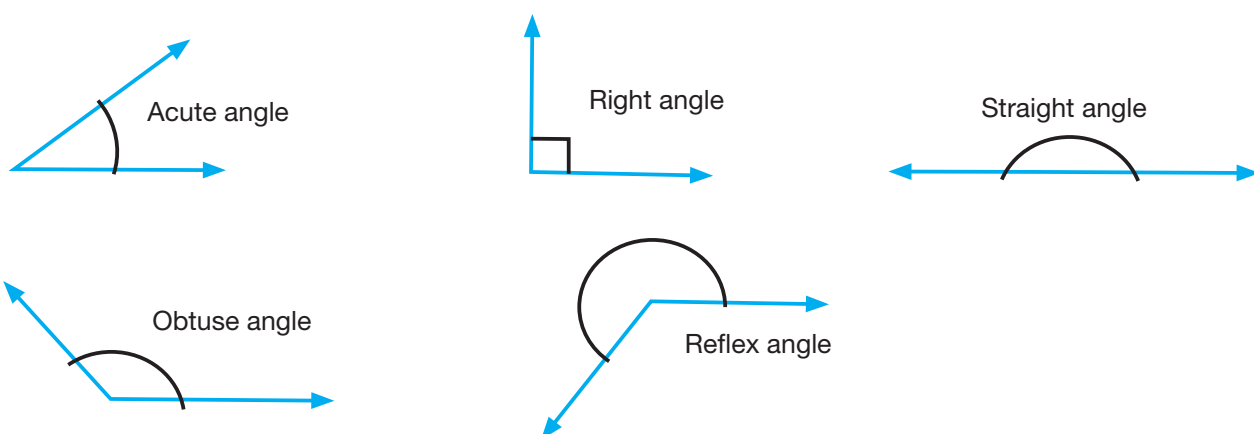
**Vertex** The vertex is the common point at which the two lines or rays are joined. Point B in the figure above is the vertex of the angle  $\angle ABC$ .

**Legs** The legs (sides) of an angle are the two lines that make it up. In the figure above, the line segments AB and BC are the legs of the angle  $\angle ABC$ .

**Interior** The interior of an angle is the space in the 'jaws' of the angle extending out to infinity. See Interior of an Angle

**Exterior** All the space on the plane that is not the interior. See Interior of an Angle

When studying about angles, students need informal experiences of creating, identifying and describing a range of angles. Students have some experience with the basic angles in grade 3. From prior knowledge on angles students will learn formal unit to measure angles.



**The amount of opened space between two sides of an angle is called the “size of an angle.”**

Angles are formed when two rays intersect. Angles are measured in degrees. A complete circle measures 360 degrees.

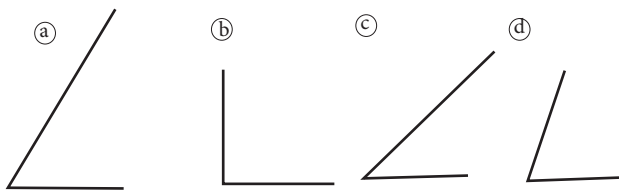
## L15. COMPARISON OF ANGLES (1)

**Teaching and learning activities** ⌚ (60 min)

1. Do the following activity.

(a) Find shapes of angles around the classroom and draw.

(b) Name the angles below.



2. Answer the following questions about the shapes above.

(a) Which is a right angle?

(b) Which is the sharpest?

(c) Draw an arrow to indicate where the angles are in the shapes above.

(d) Where is the vertex?

**Exercise:**

1. Draw 2 sharp angles and 2 right angles.

2. Label them correctly with these parts of angle. (Angle, sides and vertex.)

## L16. COMPARISON OF ANGLES (2)

**Teaching and learning activities** ⌚ (60 min)

1. Look at the mouths of the animals from A to E and compare how wide they open their mouth.



(a) Which animal has opened its mouth the widest?

(b) Which animal has opened its mouth the least?

(c) Write the names of animals in order of how wide their mouth is open to least.

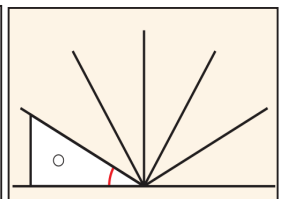
2. Find ways and come up with ideas on how to measure and compare the size of the angles.

**Expected ideas**

Trace the angles on a sheet of paper and compare them by placing one over the other as show.



Measure the size of the angles by making a tool to count how many times the triangle fits the angles as shown.



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

Teacher lets students know that the size of an angle is determined by the amount of space between sides and not the lengths of the sides.

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

# TEACHING CONTENT - SAMPLE GUIDED LESSONS

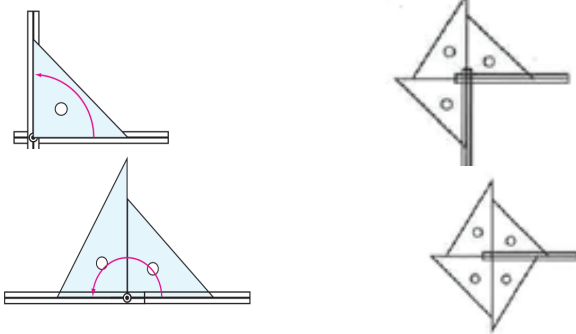
## L17. IDENTIFYING SIZES OF ANGLES

Teaching and learning activities (60 min)

The cardboard bar should be prepared before this lesson by using the information given below.

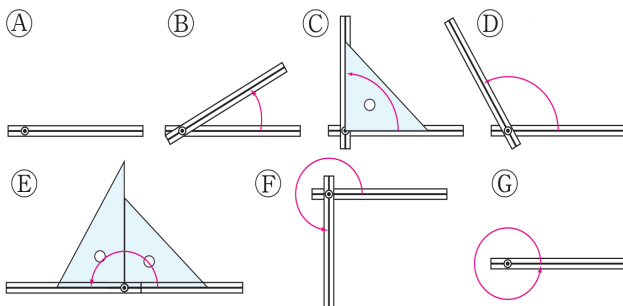
1 Right Angle –  $90^\circ$

3 Right Angles-  $270^\circ$



1. Move the cardboard bars and make different angles A-G and find out what happens to the angles if they move one bar.

If we move one bar, the angle becomes larger



2. Study the diagrams and answer the questions

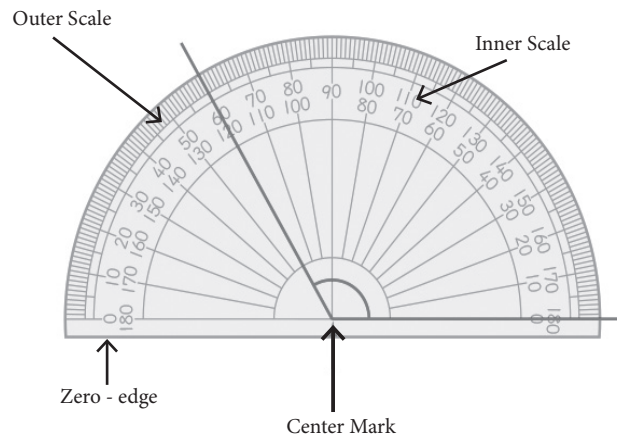
- Which angle is 1 right and 2 right angles?
- Which angle is 4 right angles and is one revolution?
- Which angles are one right angle, 2 right angles and 3 right angles?
- 4 right angles are called 'angles of \_\_\_\_\_'.

## L18. HOW TO EXPRESS SIZES OF ANGLES

Teaching and learning activities (60 min)

The protractor is an instrument of measurement. A protractor is used to construct and measure angles. The simple protractor is an ancient device used for plotting the position of boats on navigational charts. There are different kinds of protractors, but the one used in elementary school is called a simple protractor. We have units for measuring angles and they are called degrees. These are not the same as temperature degrees, even though the same word is used. The simple protractor looks like a semicircular disk marked with degrees, from  $0^\circ$  to  $180^\circ$ .

1. Explain and demonstrates how to use a protractor to measure angles using the description of the 3 steps given.

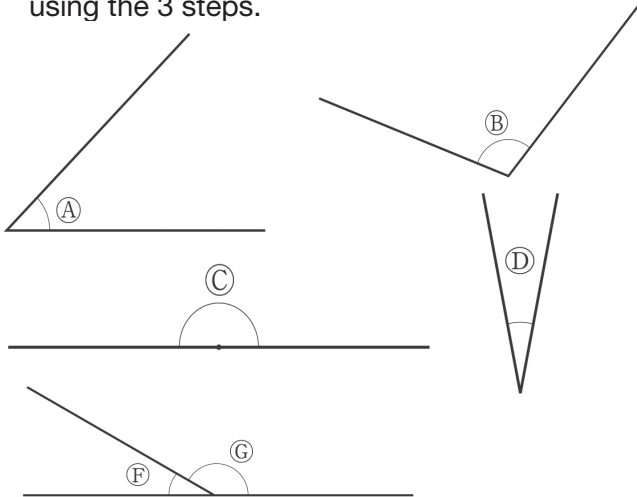


- Put the centre of the protractor the vertex of the angle
- Put the '0' line over one side of the angle
- Read the scale that is over the other side of the angle

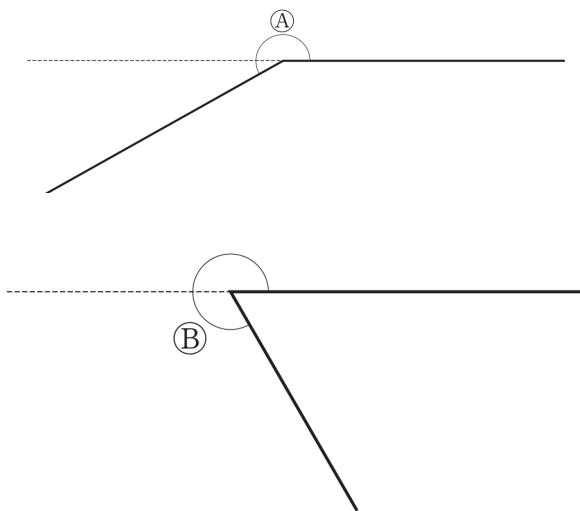
2. Use the 3 steps and measure with a protractor the opening of the mouth for animal B to get the angle measurement as 30 degrees.

## L18. HOW TO EXPRESS SIZES OF ANGLES

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



4. Lets measure the angles that is larger than  $180^\circ$ . Measure angles A & B



## L19. HOW TO USE A PROTRACTOR

Teaching and learning activities

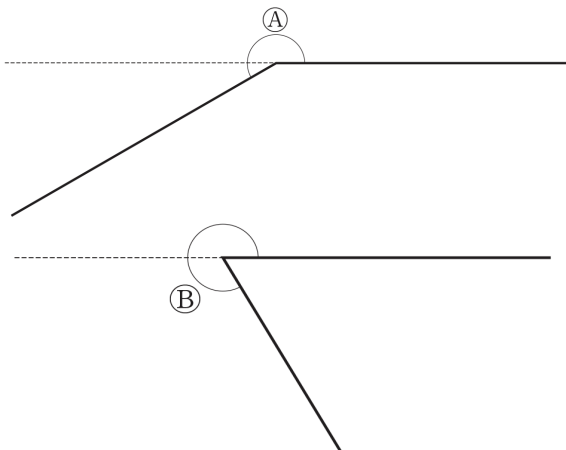
(60 min)

1. Follow the instructions given to draw a  $50^\circ$  angle.

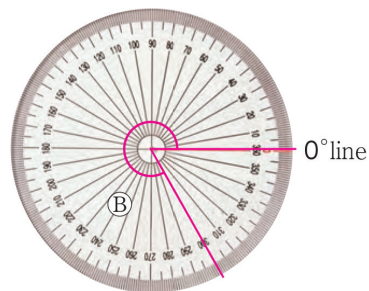
- Draw a straight line from the vertex of the angle. The line should be 5 to 6 cm.
- Place the center of the protractor over the vertex of the angle.
- Place the  $0^\circ$  line over one side of the angle.
- Write a point at the  $50^\circ$  mark.
- Draw a line between the vertex and the point to make the other side of the angle.

2. Lets find a way to measure angles that are larger than  $180^\circ$ .

(How can we use a protractor?)



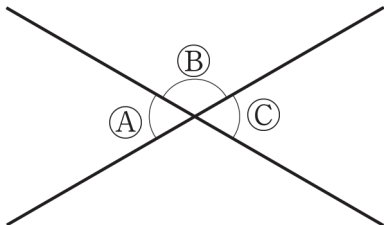
1 right angle =  $90^\circ$ , 4 right angles =  $360^\circ$  and the size of an angle is simply called the angle.



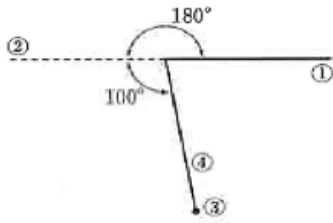
By using a  $360^\circ$  protractor you can measure an angle in one measurement

## L19. HOW TO USE A PROTRACTOR

- (a) The figure below shows two intersecting lines. Angle A is  $60^\circ$ . How many degrees is angle B? Compare angles A and C

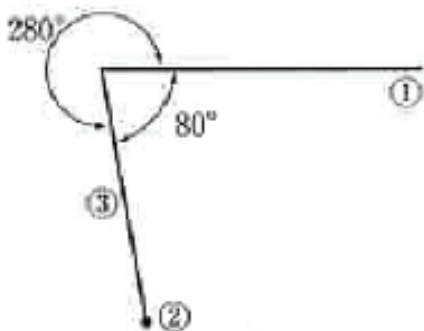


3. Think of ways to draw a  $210^\circ$  angle using a  $180^\circ$  protractor. Allow for students ideas as show



### Using $180^\circ$

- Refer to step number (1) to draw line 1.
- Draw dash lines from the vertex (line 2) to create  $180^\circ$ .
- Draw the line (line 3) from the vertex of line 1 and dash line to create  $100^\circ$ .  
( $280^\circ = 180^\circ + 100^\circ$ )
- Line 1 and line 3 creates the inside angle.



### Using $360^\circ$

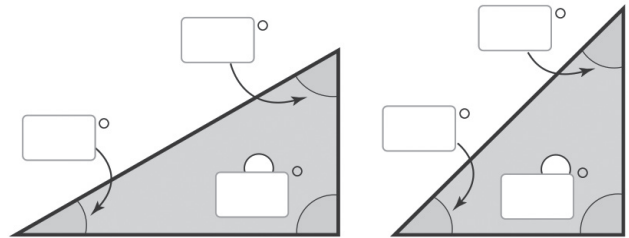
- Use step number (1) to draw line 1.
- Draw line 2 from the vertex of line 1 to measure and mark  $280^\circ$ . ( $360^\circ - 280^\circ = 80^\circ$ )
- Line 1 and 2 creates the inside angle of  $80^\circ$

## L.20 TRIANGLE RULERS

### Teaching and learning activities

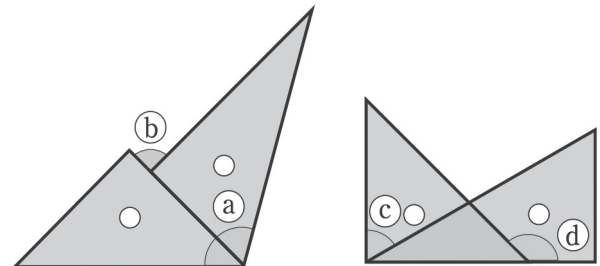
(60 min)

- Investigate angles of triangle rulers (set squares). Use a protractor to measure and confirm the angle of triangular rules below and find the size.



- Use two different triangle rulers to make angles.

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



(a)  $45^\circ + 60^\circ$

(c)  $90^\circ - 30^\circ$

(b)  $180^\circ - 90^\circ$

(d)  $180^\circ - 45^\circ$

- Use Triangle rulers to make different angles for practice. Make a protractor to find the measure of different angles of various slopes around the environment.

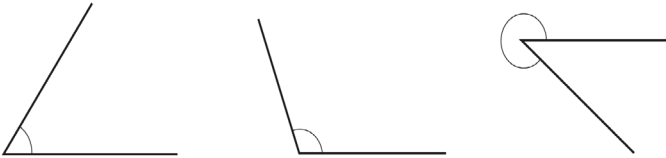
### How to make a protractor.

- Get a square paper.
- Mark fold lines using a ruler.
- Fold along the folding lines and glue the sides.
- Place it on a square base.
- Place the arrow in the axis as shown.
- Paste the axis on the arrow and done.

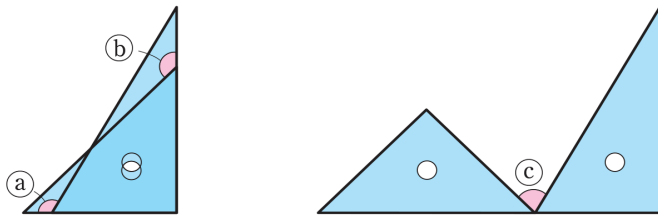
## L21. EXERCISE

**Teaching and learning activities**  (60 min)

1. Measure the following angles and find their sizes



2. Two triangle rulers are used to make angles. Measure angle A, B and C.



3. Draw an angle of :

(a)  $120^\circ$       (b)  $300^\circ$       (c)  $90^\circ$

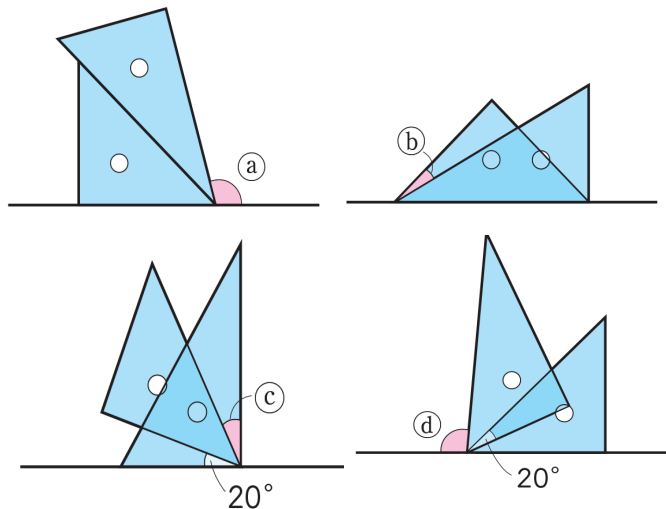
4. Fill in the  with the most appropriate word or number.

(a) The unit  is used to measure the size of angles.

(b) To make  $1^\circ$ , the angle of one revolution is divided equally into  parts.

5. Draw an angle of  $100^\circ$  and  $270^\circ$

6. Two triangle rulers are used to form new angles. Find angles a, b, c and d.



**Note:** Use exercise 3 and 4 assess students understanding on the topic.



# TEACHING CONTENT - SAMPLE GUIDED LESSONS

## Strand 1: Number and Operations

## Topic: Division by Two Digit Numbers

**Content Standard: 4.1.4** Apply learned division to divide numbers in vertical form.

### Teachers Notes

Listed below are the expected Attitude, Knowledge, Skills and mathematical thinking to be displayed by the students after learning this topic on division in vertical form.

Students will be able to;

### Attitudes

- Appreciate processing and calculating divisions in vertical form.
- Enjoy working in groups and presenting their ideas.
- Appreciate other students ideas and views during their discussions.

### Skills

- Apply learned division to calculate in vertical form.
- Explain the process of dividing in vertical form.
- Calculate division in vertical form with 2 and 3 digit numbers.
- Represent the division problems using the tape diagrams and tables.

### Knowledge

- Understand the meanings of the division terms and their position in division.
- Understand the process how to calculate the divisions in vertical form.
- Understand how to do subtraction and multiplication in vertical division.

### Mathematical Thinking

- Explore the calculation process of division in vertical division.
- Explain and think about division without and with remainders.
- Use previous knowledge and skills to calculate in vertical ways.
- Find easy ways or representing the division on tape diagrams and tables.
- Represent in real life situations for example;

# TEACHING CONTENT - SAMPLE GUIDED LESSONS

## Back Ground Notes

How to teach long division or division in vertical form.

Student should learn to do division in vertical form or long division step by step. Instead of showing the whole algorithm to the students at once, we teach it "step by step".

Before a child is ready to learn long division, he/she has to know:

- multiplication tables fairly well,
- basic division concept, based on multiplication tables  
(for example  $28 \div 7$  or  $56 \div 8$ ),
- basic division with remainders (for example  $54 \div 7$  or  $23 \div 5$ )

The basics steps in vertical form or long division is an algorithm that repeat divide, multiple, subtract and drop down the next digit.

**Example:** Divide multiply and subtract drop down the next digit to:

$$\begin{array}{r} 29 \\ 2 \overline{) 58} \\ \underline{-4} \\ 18 \end{array}$$

Divide 2 into 18. Place 9 into the quotient.

$$\begin{array}{r} 29 \\ 2 \overline{) 58} \\ \underline{-4} \\ 18 \\ \underline{-18} \\ 00 \end{array}$$

Multiply  $9 \times 2 = 18$ , write that 18 under the 18, and **subtract**.

$$\begin{array}{r} 29 \\ 2 \overline{) 58} \\ \underline{-4} \\ 18 \\ \underline{-18} \\ 0 \end{array}$$

The division is over since there are no more digits in the dividend. The quotient is 29.

$$\begin{array}{r} 14R3 \\ 6 \overline{) 87} \\ \underline{-6} \\ 27 \\ \underline{-24} \\ 3 \end{array}$$

- a.  $a \div b = \leftarrow b \overline{) a}$
- b. a = dividend
- c. b = divisor
- d. c = quotient

## L22. DIVISION BY 1 DIGIT NUMBER

**Teaching and learning activities** ⌚ (60 min)

Review division learnt earlier in grade 3.

$$a \div b = c \leftrightarrow b \overline{)a}$$

c

a = dividend  
b = divisor  
c = quotient

Write the steps below on the blackboard or chart for student to follow.

$\begin{array}{r} \square \\ 9 \overline{)48} \end{array}$	$\begin{array}{r} 5 \\ 9 \overline{)48} \end{array}$	$\begin{array}{r} 5 \\ 9 \overline{)48} \\ \underline{45} \end{array}$
<i>Equation</i>	<i>Divide</i> →	<i>Multiply</i> ↓

<table style="border-collapse: collapse;"> <tr><td style="border: 1px dashed blue; width: 20px; height: 20px;"></td><td style="border: 1px dashed blue; width: 20px; height: 20px;"></td><td style="border: 1px dashed blue; width: 20px; height: 20px;"></td><td style="border: 1px dashed blue; width: 20px; height: 20px;"></td></tr> <tr><td style="border: 1px dashed blue; width: 20px; height: 20px;"></td><td style="border: 1px dashed blue; width: 20px; height: 20px;"></td><td style="border: 1px dashed blue; width: 20px; height: 20px;"></td><td style="border: 1px dashed blue; width: 20px; height: 20px;"></td></tr> <tr><td style="border: 1px dashed blue; width: 20px; height: 20px;"></td><td style="border: 1px dashed blue; width: 20px; height: 20px;"></td><td style="border: 1px dashed blue; width: 20px; height: 20px;"></td><td style="border: 1px dashed blue; width: 20px; height: 20px;"></td></tr> <tr><td style="border: 1px dashed blue; width: 20px; height: 20px;"></td><td style="border: 1px dashed blue; width: 20px; height: 20px;"></td><td style="border: 1px dashed blue; width: 20px; height: 20px;"></td><td style="border: 1px dashed blue; width: 20px; height: 20px;"></td></tr> </table>																	<p>The order of writing</p> <p>(1) 48</p> <p>(2) )</p> <p>(3) <math>\overline{)48}</math></p> <p>(4) <math>\overline{)48}</math></p>	$\begin{array}{r} 5 \\ 9 \overline{)48} \\ \underline{-45} \end{array}$
		<i>Subtract</i>																

$48 \div 8 = 6$	$48 \div 9 = 5 \text{ remainder } 3$				
↓	↓	↓	↓	↓	↓
Dividend	Divisor	Quotient	Divisor	Quotient	Remainder

1. Pose this problem and work in pairs to solve it.  
We want to divide 48 lollies equally among 9 children. How many pieces will each child receive and how many will remain?

	÷	
Total number of lollies		Total number of children

## L22.

- Follow the step written on the board to solve the given problem. Make an equation as shown. How to divide  $48 \div 9$  in vertical form (long division)
  - Write 5 above the ones place of 48.
  - Write 45 of 9 multiplied by 5 equals 45 from 48.
  - Subtract 45 from 48. The remainder is 3.
  - Check that the remainder of 3 is smaller than the divisor of 9.
- Do this as practice

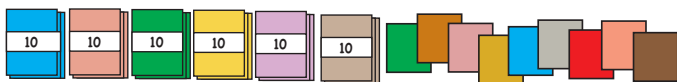
(a) $3 \overline{)15}$	(b) $6 \overline{)36}$	(c) $8 \overline{)80}$
(d) $4 \overline{)32}$	(e) $2 \overline{)12}$	(f) $4 \overline{)24}$

## L23. DIVISION BY TWO-DIGIT QUOTIENT

**Teaching and learning activities**  (60 min)

Study the given situation and think of how to solve it.

1. We want to divide 69 sheets of colored papers equally among 3 students. How many sheets of paper will each student receive?



Write an expression

$$\square \div \square$$

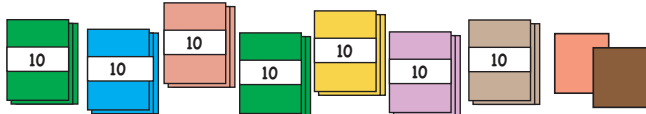
Lets think about how to find the quotient of  $69 \div 3$  by looking at the drawing on the right.

$$69 \div 3$$

$$\begin{array}{l} 69 \div 3 = \square \\ 69 \div 3 = \square \\ \hline \text{Total} \end{array}$$

Tens	Ones

2. We want to divide 72 sheets of coloured papers equally among 3 students. How many sheets of paper will each student receive? Write an expression and think about how to calculate.



Write an expression

$$\square \div \square$$



If we divide by 10 sheets of papers, you will get a remainder.

## L23. DIVISION BY TWO-DIGIT QUOTIENT

### Exercise

Think about how to calculate and solve.

- (a)  $13 \div 2$       (b)  $62 \div 7$       (c)  $32 \div 5$   
 (d)  $57 \div 8$       (e)  $7 \div 3$       (f)  $21 \div 7$   
 (g)  $30 \div 6$       (h)  $54 \div 9$       (i)  $36 \div 4$   
 (j)  $8 \div 2$

# TEACHING CONTENT - SAMPLE GUIDED LESSONS

## L24. HOW TO FIND THE ANSWERS TO DIVISION

Teaching and learning activities  (60 min)

Review steps in division in vertical form and explain that when doing division in vertical form, start from the highest place value as shown. How to divide in vertical form; *example.*  $72 \div 3$ .

Divide 10 place	1. Bring down and divide	2. Multiply & subtract.
$\begin{array}{r} 1 \\ 3 \overline{) 72} \\ \underline{-6} \\ 1 \end{array}$ <p><math>7 \div 3 = 2</math> remainder 1 Write 2 in the tens place.</p>	$\begin{array}{r} 14 \\ 3 \overline{) 72} \\ \underline{-6} \\ 12 \\ \underline{-12} \\ 0 \end{array}$ <p>Bring down the 2 in the ones place. Divide <math>12 \div 3 = 4</math> Write 4 in ones place</p>	$\begin{array}{r} 14 \\ 3 \overline{) 72} \\ \underline{-6} \\ 12 \\ \underline{-12} \\ 0 \end{array}$ <p>Multiply <math>3 \times 4 = 12</math> write that 12 under the 12, and subtract.</p>

1. Mek is dividing  $92 \div 4$  in vertical form. What is his mistake? Correct the mistake and complete the problem.

$$\begin{array}{r} \phantom{0} \\ 4 \overline{) 92} \\ \phantom{0} \end{array}$$



2. Do these problems in vertical form.

- (a)  $54 \div 2$       (b)  $68 \div 4$       (c)  $34 \div 2$   
(d)  $84 \div 3$       (e)  $85 \div 7$       (f)  $94 \div 4$

## L25. DIVISION BY TWO-DIGIT IN VERTICAL FORM

Teaching and learning activities  (60 min)

1. Explain how to divide in vertical form from the two problems using the steps learned.

$$\begin{array}{r} 24 \\ 3 \overline{) 74} \\ \underline{6} \\ 14 \\ \underline{12} \\ 2 \end{array}$$

$$\begin{array}{r} 34 \\ 2 \overline{) 69} \\ \underline{6} \\ 9 \\ \underline{8} \\ 1 \end{array}$$

2. Write and explain how to divide  $92 \div 3$  in vertical form in your exercise book. How to divide  $92 \div 3$ .

$$\begin{array}{r} 3 \\ 3 \overline{) 92} \\ \underline{9} \\ 2 \end{array} \longrightarrow \begin{array}{r} 3 \\ 3 \overline{) 92} \\ \underline{9} \\ 2 \end{array} \longrightarrow \begin{array}{r} 30 \\ 3 \overline{) 92} \\ \underline{9} \\ 2 \end{array}$$

Students' explanation;

$\begin{array}{r} 0 \\ 2 \end{array}$  You do not have to calculate this.

$9 \div 3 = 3$   
Write 3 on the tens place.  
 $3 \times 3 = 9$

Because  $9 - 9 = 0$ , bring down the 2.

Write 0 on the ones place.  
 $3 \times 0 = 0$   $2 - 0 = 2$

### Exercise

Divide in vertical form.

- (a)  $85 \div 7$       (b)  $94 \div 4$       (c)  $86 \div 3$   
(d)  $75 \div 6$       (e)  $68 \div 3$       (f)  $45 \div 2$   
(g)  $85 \div 4$       (h)  $56 \div 5$       (i)  $54 \div 5$   
(j)  $82 \div 4$       (k)  $61 \div 2$       (l)  $42 \div 2$

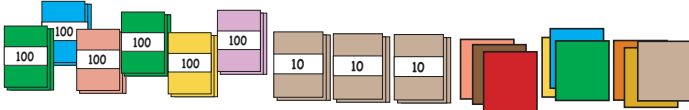
2. 6 students went to collect cans. They found 90 cans. If they divide them Equally, how many cans would each studentw receive?

## L26. 3-DIGIT NUMBER ÷ 1-DIGIT NUMBER

**Teaching and learning activities** (60 min)

Review calculation of 2-digit number ÷ 1-digit number and steps of division in vertical form.

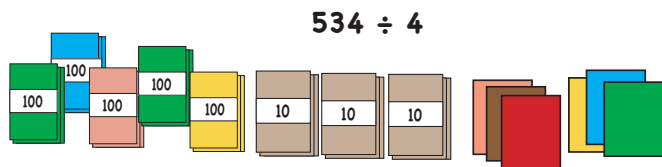
- There are 639 sheets of colored paper. If the papers are divided equally into 3 group. How many sheets of paper will there be in each group?



Write an equation.

About how many sheets of paper are in each group?

- There are 536 sheets of paper. The paper is divided equally among 4 students. How many sheets of paper will each student receive? Think about how to calculate the answer.



- Calculate  $536 \div 4$  in vertical form.

- Do these problems in vertical form.

- |                  |                  |                  |
|------------------|------------------|------------------|
| (a) $482 \div 2$ | (b) $264 \div 2$ | (c) $936 \div 3$ |
| (d) $848 \div 4$ | (e) $628 \div 4$ | (f) $861 \div 7$ |
| (g) $725 \div 5$ | (h) $867 \div 3$ |                  |

**Exercises:**

Do these problems vertically.

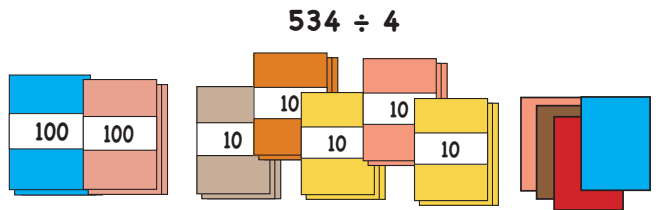
- |                 |                 |                 |                 |
|-----------------|-----------------|-----------------|-----------------|
| (a) $78 \div 3$ | (b) $96 \div 8$ | (c) $38 \div 2$ | (d) $55 \div 5$ |
| (e) $48 \div 4$ | (f) $77 \div 6$ | (g) $56 \div 3$ | (h) $90 \div 7$ |

## L27. DIVIDING IN VERTICAL FORM

**Teaching and learning activities** (60 min)

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

Think about how to calculate  $254 \div 3$  in vertical form.



- Can they divide the paper without opening the bundles of 100?
- Think about this problem by changing the stacks of 100 into stacks of 10. 250 is sets of 10 and 4 sets of 1.

More Examples:

- (a)  $420 \div 3$

- (b)  $859 \div 8$

<p>(a) <math display="block">\begin{array}{r} 140 \\ 3 \overline{)420} \\ \underline{3} \phantom{0} \\ 12 \\ \underline{12} \\ 0 \\ \underline{0} \\ 0 \end{array}</math></p>	<p>(b) <math display="block">\begin{array}{r} 140 \\ 3 \overline{)420} \\ \underline{3} \phantom{0} \\ 12 \\ \underline{12} \\ 0 \\ \underline{0} \\ 0 \end{array}</math></p>
---	---

<p>(a) <math display="block">\begin{array}{r} 107 \\ 8 \overline{)859} \\ \underline{8} \phantom{0} \\ 5 \phantom{0} \\ \underline{0} \phantom{0} \\ 59 \\ \underline{56} \\ 3 \end{array}</math></p>	<p>(b) <math display="block">\begin{array}{r} 107 \\ 8 \overline{)859} \\ \underline{8} \phantom{0} \\ 59 \\ \underline{56} \\ 3 \end{array}</math></p>
---	---

Check the answers as follows:

**(Divisor) x (Quotient) + (Remainder) = (Dividend)**

- Do these problems in vertical form:

- |                  |                  |                  |
|------------------|------------------|------------------|
| (a) $740 \div 2$ | (b) $650 \div 5$ | (c) $840 \div 6$ |
| (d) $810 \div 3$ | (e) $742 \div 7$ | (f) $618 \div 3$ |
| (g) $958 \div 9$ | (h) $825 \div 4$ |                  |

**Exercises:**

- |                  |                  |                  |
|------------------|------------------|------------------|
| (a) $420 \div 5$ | (b) $100 \div 5$ | (c) $125 \div 5$ |
| (d) $603 \div 6$ | (e) $432 \div 8$ |                  |

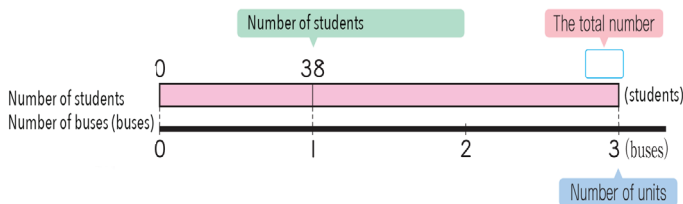
# TEACHING CONTENT - SAMPLE GUIDED LESSONS

## L28. WHAT KIND OF EXPRESSION

**Teaching and learning activities** ⌚ (60 min)

1. Read the problem given and solve it.

The fourth grade students went on an excursion to the zoo in 3 buses. There were 38 students on each bus. How many students were there in all

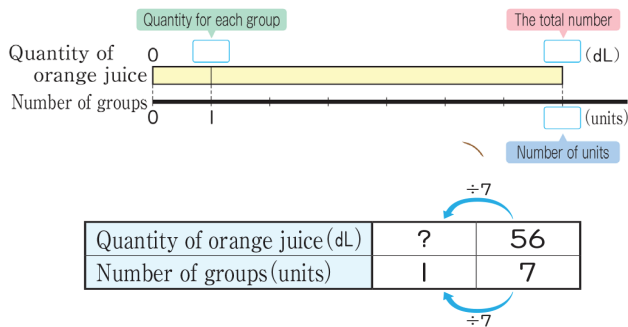


2. There is 56 dL of orange juice. The juice is divided among 7 groups. How much will each group receive?

What is known?

What do you want to know?

Write what is known in the diagram and find the answer.



3. 48 boys are participating in a competition. If each group has 4 boys, how many groups are there?

(a) What is known?

(b) What do you want to know?

(c) Write what is known in the diagram and find the answer.

4. There are 436 pencils as prizes for a school competition. The pencils are divided into sets of 3. How many sets of pencils are there? How many more pencils are needed to make 150 sets?

## L29. EXERCISE

**Teaching and learning activities** ⌚ (60 min)

1. Think about how to calculate the following problem vertical form.

Do these problems using vertical form.

(a)  $78 \div 3$       (b)  $96 \div 8$       (c)  $38 \div 2$

(d)  $55 \div 5$       (e)  $48 \div 4$       (f)  $77 \div 6$

(g)  $56 \div 3$       (h)  $90 \div 7$       (i)  $83 \div 2$

(j)  $81 \div 4$

2. Let's calculate

(a)  $548 \div 4$       (b)  $259 \div 37$       (c)  $624 \div 3$

(d)  $624 \div 3$       (e)  $367 \div 9$       (f)  $457 \div 6$

(g)  $543 \div 5$       (h)  $963 \div 8$       (i)  $728 \div 6$

3. Read the problem and solve.

Tau and his 5 friends are going to fold 360 paper cranes. If everybody folds the same number of paper cranes, how many cranes will each child make?

- What is known?
- What do you want to know?
- Write what is known in the diagram and find the answer

4. There are 436 pencils as prizes for a school competition. The pencils are divided into sets of 3. How many sets of pencils are there? How many more pencils are needed to make 150 sets?

5. Think about how to calculate in vertical form  $293 \div 4$ . Fill the  $\square$  box with correct numbers.

(a) The first place of the quotient is the  $\square$ .

(b) The remainder in the tens place means 2 sets of  $\square$ .

(c) The calculation in the ones place is  $\square \div 3$ .

e.g.

3	)	2	9	4

## L29. EXERCISE

**Teaching and learning activities**  (60 min)

6. Lets divide in vertical form.

(a)  $34 \div 4$       (b)  $50 \div 6$       (c)  $72 \div 5$

(d)  $86 \div 2$       (e)  $86 \div 2$       (f)  $70 \div 5$

(g)  $97 \div 6$       (h)  $67 \div 3$       (i)  $174 \div 6$

(j)  $759 \div 4$       (k)  $589 \div 7$       (l)  $177 \div 3$

(m)  $828 \div 3$       (n)  $240 \div 5$       (o)  $914 \div 7$

7. Solve the following problem.

There are 125 students who must race in groups of 6.

(a) How many groups of 6s are there

(b) If they make a group of remainder, how many students are there in that group

8. Find all whole numbers which the quotient will be 8 when divided by 6.



# TEACHING CONTENT - SAMPLE GUIDED LESSONS

## Strand : Geometrical Figures

## Topic: Quadrilaterals

**Content Standard: 4.3.1** Investigate and understand properties of various types of quadrilateral using vertex, angles, sides, parallel line, perpendicular lines and diagonals.

### 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 Perpendicular lines.

Students will be able to;

### Attitude

- Show interest in drawing line and figures.
- Enjoy identifying and naming lines drawn.

### Knowledge

- Understand the difference between lines segments, rays, parallel lines and perpendicular lines and be able to make a connection with these concepts to the “real world.”
- Understand that two rays joining together in a vertex make an angle.
- Understand the terms in relation to perpendicular lines in order to create their own lines, rays, and angles.

### Skills

- Compare and contrast parallel lines and perpendicular lines, in writing, providing a real world connection.
- Name a labelled example of a point, line, line segment, ray, and a right angle.
- Draw and label examples of a point, line, line segment, ray, and a right angle.
- Creating models of parallel lines, perpendicular lines, and intersecting lines will prepare students for subsequent lessons involving distinguishing between parallelograms and rectangles.
- Identify and define a point, line, line segment, ray, and a right angle (as opposed to acute or obtuse angles).
- accurately describe parallel and perpendicular lines.
- draw a perpendicular to a line from a point on the line by applying geometrical properties eg constructing an isosceles triangle.
- draw a perpendicular to a line from a point off the line by applying geometrical properties eg constructing a rhombus.
- use ruler and compasses to construct angles of  $60^\circ$  and  $120^\circ$  by applying geometrical properties.

### Mathematical thinking

- Think about creating models of parallel lines, perpendicular lines, and intersecting lines will prepare.
- Students for subsequent lessons involving distinguishing between parallelograms and rectangles.
- Think about how to compare and contrast parallel lines and perpendicular lines, in writing, providing a real world connection.

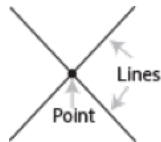
# TEACHING CONTENT - SAMPLE GUIDED LESSONS

## Back ground Notes

Lines are One Dimension

A line is the shortest distance between two points. It has length, but no width, which makes it is one-dimensional.

Wherever two or more lines meet, or intersect, there is a point, and the two lines are said to share a point:



## Line segments and rays

There are two kinds of lines: those that have a defined start- and endpoint and those that go on for ever.

Lines that move between two points are called line segments. They start at a specific point, and go to another, the endpoint. They are drawn as a line between two points, as you would probably expect.

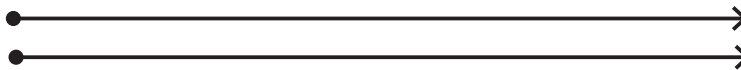


The second type of line is called a ray, and these go on forever. They are often drawn as a line starting from a point with an arrow on the other end:

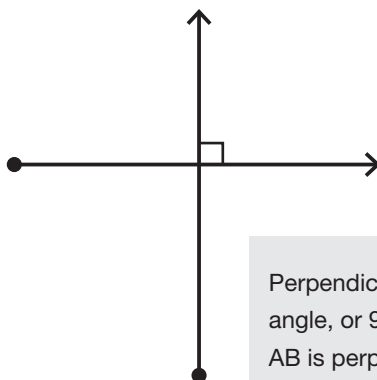


## Parallel and perpendicular lines

There are two types of lines that are particularly interesting and/or useful in mathematics. **Parallel** lines never meet or intersect. They simply go on forever side by side, a bit like railway lines:



**Perpendicular lines** intersect at a right angle,  $90^\circ$ :



Perpendicular means “at right angles”. A line meeting another at a right angle, or  $90^\circ$  is said to be perpendicular to it. In the figure above, the line AB is perpendicular to the line DF.

If the extended line of one line intersects perpendicularly with the other line even if we cannot see the intersection point itself, the two lines are perpendicular.

## L30. 3-DIGIT NUMBER ÷ 1-DIGIT NUMBER

Teaching and learning activities (60 min)

- Free drawing of lines found around the environment or classroom and explain.
- Display types lines with names to compare and confirm what they have drawn.

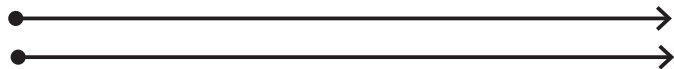
### Line Segments and Rays

The second type of line is called a ray, and these go on forever. They are often drawn as a line starting from a point with an arrow on the other end:



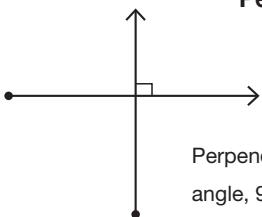
The second type of line is called a ray, and these go on forever. They are often drawn as a line starting from a point with an arrow on the other end:

### Parallel and Perpendicular lines



Parallel lines never meet or intersect. They simply go on forever side by side, a bit like railway lines:

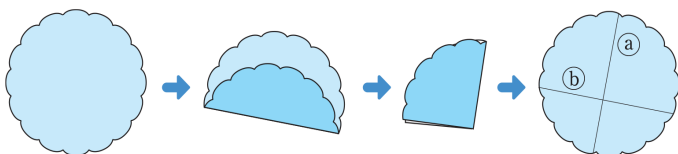
### Perpendicular line



Perpendicular lines intersect at a right angle,  $90^\circ$ .

Two lines are perpendicular if they intersect at right angles or "A line meeting another line at a right angle, or  $90^\circ$ ."

- Lets explore perpendicular line. Let student identify the perpendicular line on the chart and explain.
- Lets fold paper to make perpendicular lines.

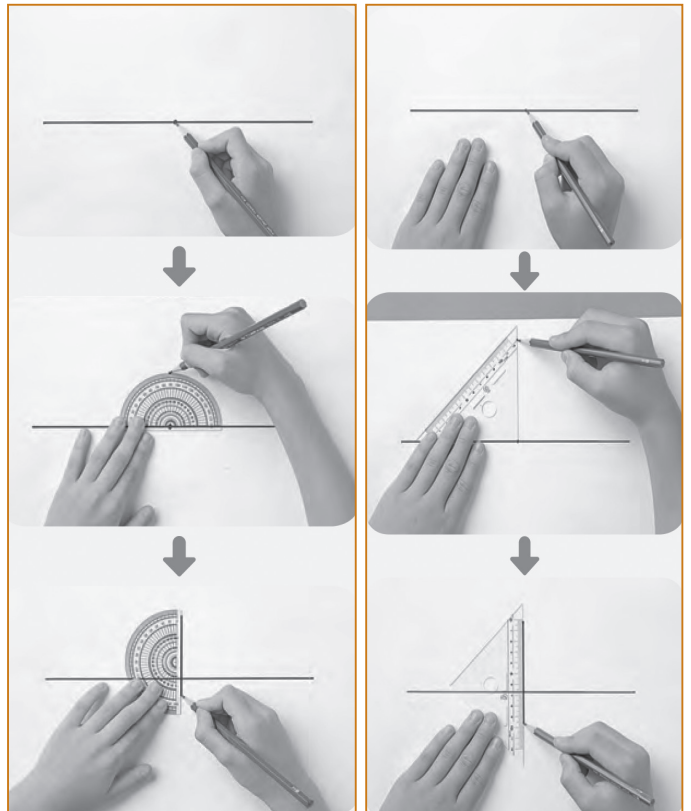


- Using folded paper or triangular rulers let's find perpendicular lines.

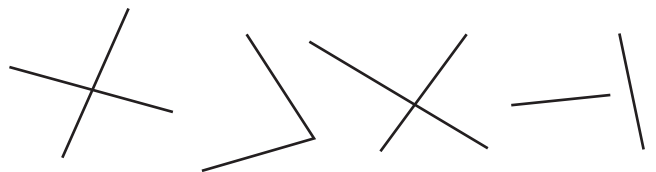
## L31.PERPENDICULAR LINES (1)

Teaching and learning activities (60 min)

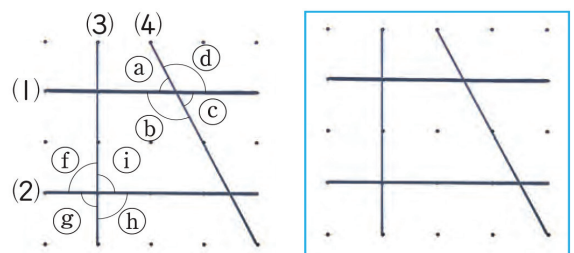
- Let explore how to draw perpendicular line. Using the ideas below. First draw perpendicular line using a protractor and second use a triangular ruler.



- Which of the lines below are perpendicular?



- Let's find perpendicular lines. Ask students to explain why they say it is perpendicular.



- Let's draw perpendiculars and explain how it is drawn.

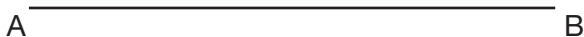
## L32. PERPENDICULAR LINES (2)

**Teaching and learning activities** ⌚ (60 min)

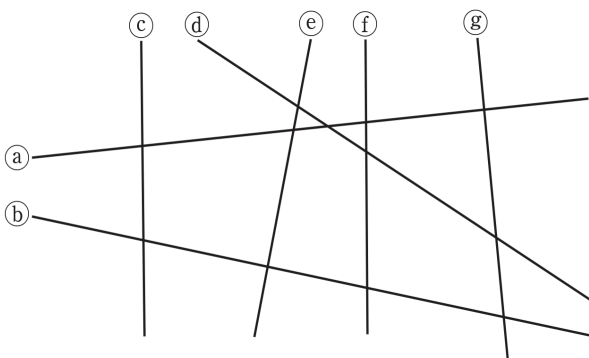
1. Let's draw lines that are perpendicular  
Draw a line that...

(a) Passes through point B and perpendicular to line A .

(b) Passes through point C and perpendicular to line A.



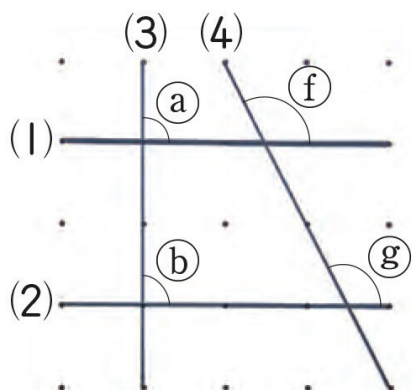
2. Which lines are not perpendicular?



## L33. PARALLEL LINES

**Teaching and learning activities** ⌚ (60 min)

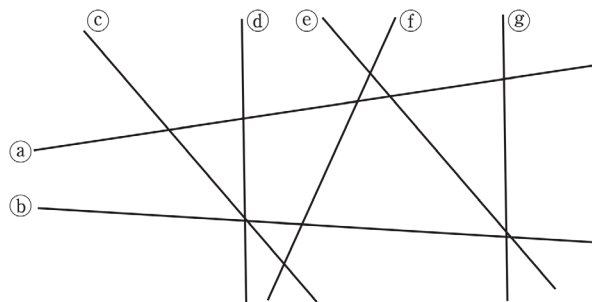
1. Let us explore quadrilaterals. At what angle do lines 1 and 2 intersect with 3



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



3. The lines (1) and (2) are parallel lines.  
Measure angles (f) and (g) and compare



How to draw parallel lines. A square and a ruler can be used to construct parallel lines.

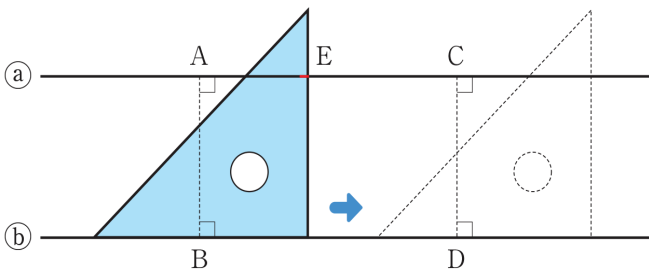
1. place the edge of the set square against the ruler and draw a line along one of the other as shown
2. Hold the ruler still and slide the set square into new position.
3. Draw a line along the same edge that you use in step1

**L34. EXPLORING PARALLEL LINES**

**Teaching and learning activities** ⌚ (60 min)

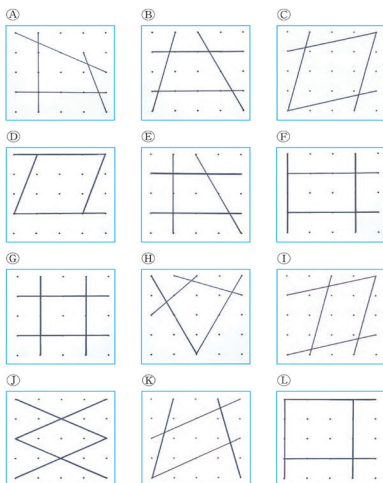
Explain to student that the distance between 2 parallel lines is equal at every point and they never cross no matter far they extended.

1. The lines a and b below are parallel. Lets think about the following.



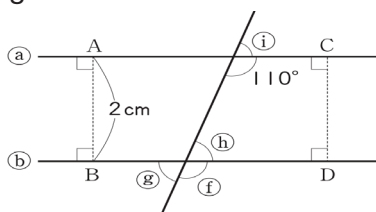
- (a) Compare the distance AB and CD.
- (b) If you extend lines a and b. will they intersect.
- (c) When you place a triangle ruler on lines a and b, it intersect line a at E. If you slide on line b, what will happen with point E?

2. Find pairs of parallel lines from the figures below.



3. Lines a and b are parallel

- (a) Find the values of angles f, g, h and i.
- (b) Find the length of line CD.

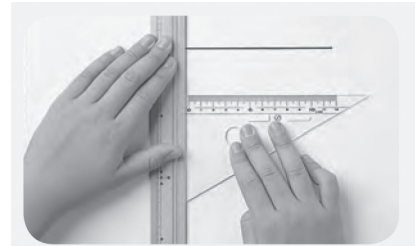


**L35. DRAWING PARALLEL LINES**

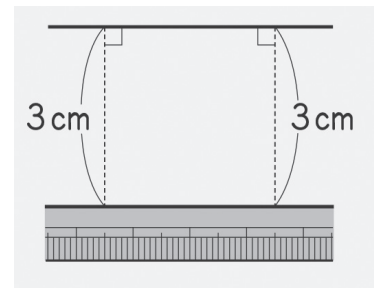
**Teaching and learning activities** ⌚ (60 min)

1. Let explore how to draw parallel lines. Read Asa and Vagis method and explain the reason why their methods are appropriate.

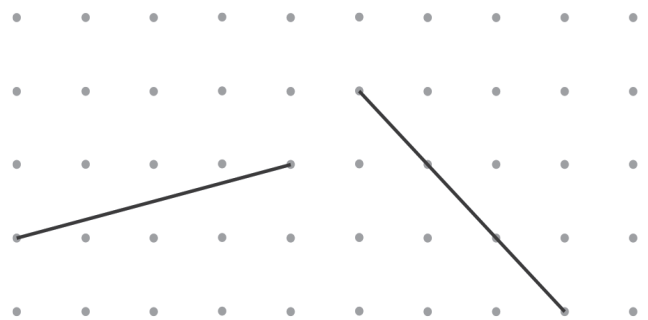
Asa's idea



Vagi's idea



2. Connect the dots to make draw parallel lines.



3. Draw lines with the following coordinates.

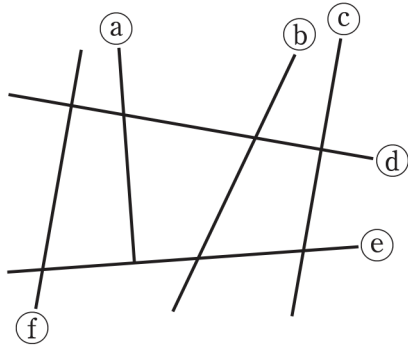
- (a) Draw a line that passes point A and parallel to line a.
- (b) Draw two lines parallel to line a and 2cm apart.

## L36. EXERCISE

**Teaching and learning activities** ⌚ (60 min)

Complete the following exercises in our exercise books.

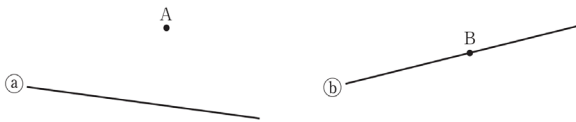
1. Which lines are perpendicular?



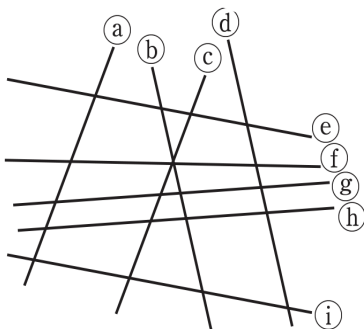
2. Draw lines with the following conditions

(a) Passing through point A

(b) Passing through point B and perpendicular to b.  
And perpendicular to a.



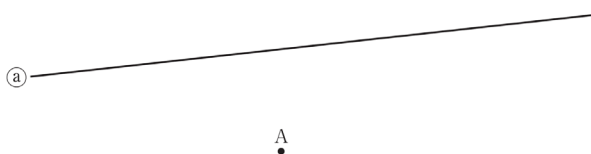
3. Which lines are parallel lines?



4. Draw the following lines.

(a) The line that goes through point A and is parallel is to line a.

(b) The lines c and d that are each 1 cm from line a and parallel to a.



# TEACHING CONTENT - SAMPLE GUIDED LESSONS

## Strand: Geometrical Figures

## Topic: Quadrilaterals

**Content Standards: 4.3.1** Investigate and understand properties of various types of quadrilaterals using vertex, angles, sides, parallel lines, perpendicular lines and diagonals.

### 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 Quadrilaterals.

Students will be able to;

### Attitude

- Show interest in drawing and classifying various quadrilaterals.
- Become interested in discovering the different types of quadrilaterals
- Appreciate what they drawn
- 

### Knowledge

- Understand the meaning of quadrilateral.
- The size of the angle is determined by the amount of space between sides and not the lengths of the sides

### Skills

- Compare and describe special groups of quadrilaterals
- Make tessellating designs by reflecting, translating and rotating
- describe designs in terms of reflecting, translating and rotating (Co
- describe objects in the environment that can be represented by two-dimensional

### Mathematical thinking

- Be able to think about how to write and read large numbers

Classify, construct and determine properties of triangles and quadrilaterals

Complete simple numerical exercises based on geometrical properties

Classifies, constructs, and determines the properties of triangles and quadrilaterals

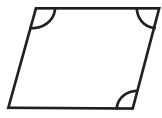
# TEACHING CONTENT - SAMPLE GUIDED LESSONS

## Back ground information

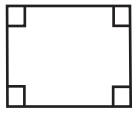
### Quadrilateral

Quad means four. Lateral means sides. Quadrilateral means “four sides.” It is 2 dimensional (a flat shape) closed (the lines join up and has straight sides).

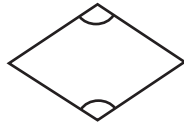
Types of quadrilaterals



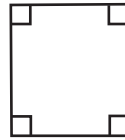
Parallelogram



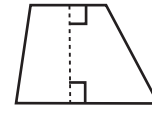
Rectangle



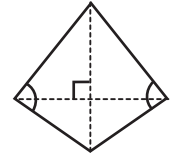
Rhombus



Square



Trapezoid (US)  
Trapezium (UK)

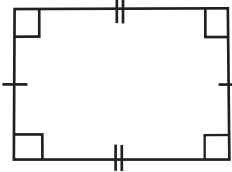


Kite

### Properties of quadrilaterals

- Four sides (edges).
- Four vertices.
- The interior angles add up to 360 degrees.

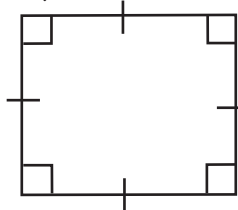
### Rectangle



A rectangle is a four sided shape where all four angle are right angles and opposite sides are parallel and of equal length.

□ means “right angle” | and || show equal sides.

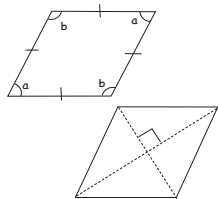
### Square



**Definition:** A square has all sides equal and every angle is a right angle ( $90^\circ$ )  
And opposites are parallel.

□ Means “right angle” | shows all side equal.

### Rhombus

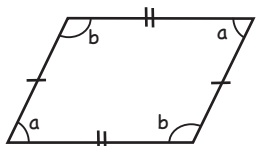


**Definition:** four sided where all sides have equal length,  
opposite sides parallel and opposite angles are equal

Another interesting thing is that the diagonals (dash lines in figure b) meet in the middle right angle. In other words they bisect (cut in half) each other at right angle.

A rhombus is sometimes called a rhomb or diamond.

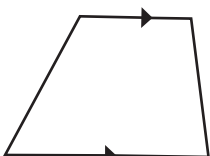
### Parallelogram



A parallelogram **has opposite sides parallel and equal in length. Also opposite angles are equal. Angles “a” are the same and angle “b” are the same.**

**Note:** Rectangle, square, and rhombuses are all parallelograms.

### Trapezoid



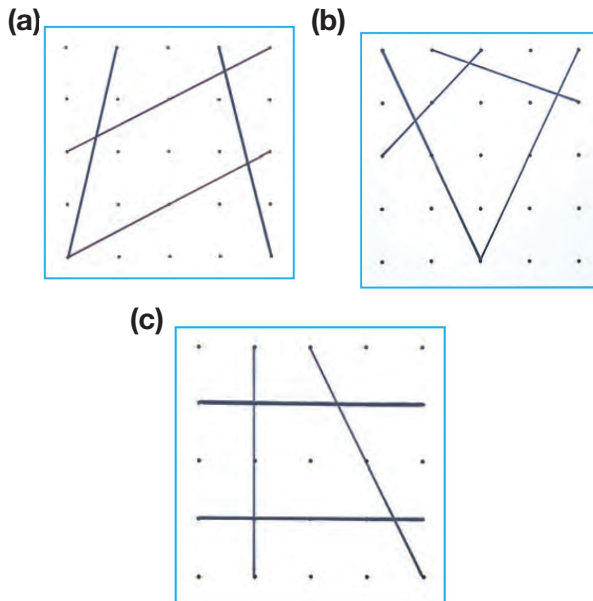
a trapezoid has a pair of opposite sides parallel.



## L37. VARIOUS QUADRILATERALS

Teaching and learning activities ⌚ (60 min)

- Find parallel lines in the quadrilateral below and colour parallel lines with the same colour.



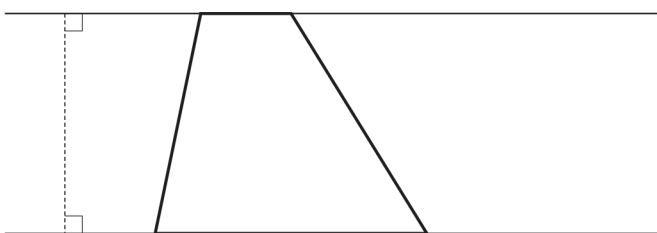
Name the characteristics of the quadrilaterals

Expected Ideas: They have one pair of parallel lines.

- Look for trapezoids around the school environment



- Think about how to draw a trapezoid using two parallel lines. Explain the shape drawn



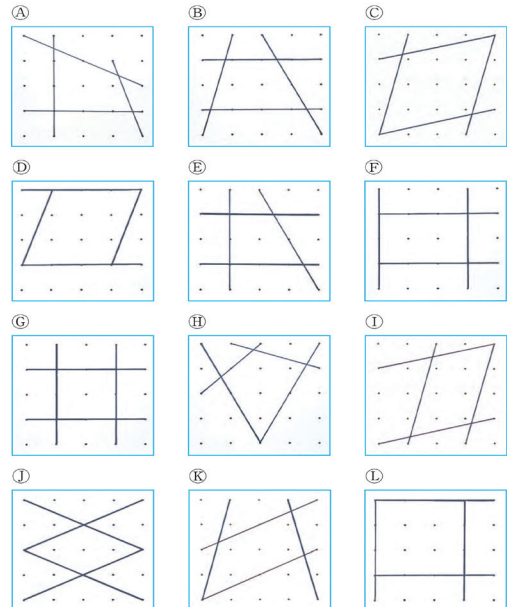
A quadrilateral that has one pair of parallel sides is called a *trapezoid*

## L38. PARALLELOGRAMS

Teaching and learning activities ⌚ (60 min)

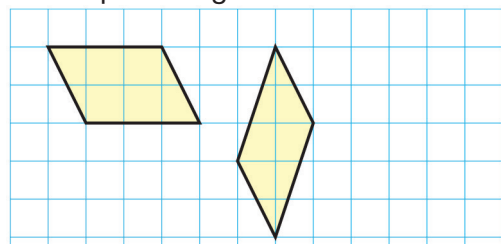
- which of the quadrilaterals below have two pairs of parallel lines.

Eg. D and I



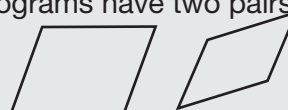
Present quadrilaterals C, D, F, G, I, J and L again.

- Define the term 'parallelogram' in your own words and write them in your exercise books. (C and J have different shapes, both have two pairs of parallel lines so they are called parallelograms).
- Let's look for parallelograms in our surrounding. (Take photos or find images of parallelograms) Examples: banisters of stairs, tiles Ensure to confirm parallelogram by presenting two pairs of parallel lines.
- Exercise: Let's use a grid paper or ruled lines to draw parallelograms.



### Summary:

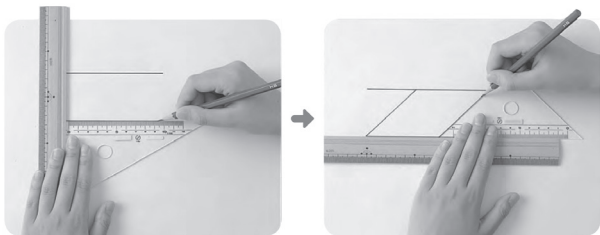
Parallelograms have two pairs of parallel sides.



## L39. PROPERTIES OF PARALLELOGRAMS (2)

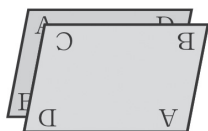
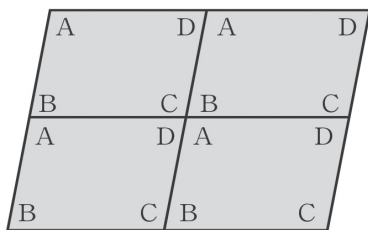
**Teaching and learning activities** ⌚ (60 min)

1. Use a triangle ruler to draw various shapes of parallelograms in their exercise books.

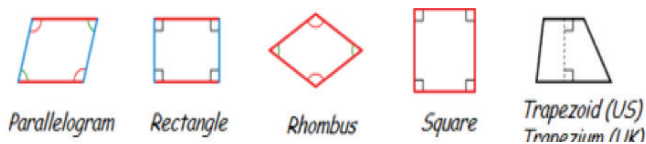


2. Let's confirm the properties of parallelograms by investigating from the pictures shown

- (a) The lengths of opposite sides.
- (b) The size of opposite angles.



3. What is the sum of two adjacent angles in a parallelogram?



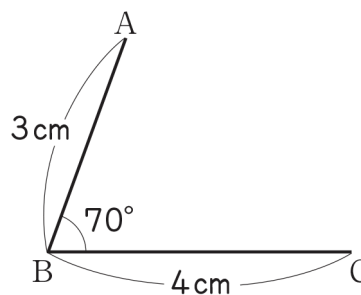
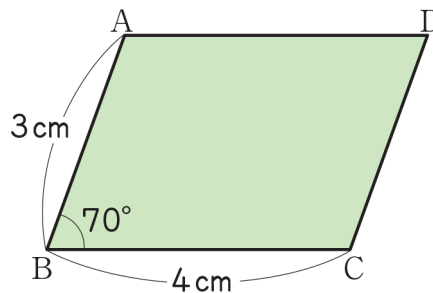
Study the figures above and answer the questions.

- (a) Which shapes have their opposite sides parallel?
- (b) Which shapes have their opposite sides equal in length?
- (c) Which shapes have all sides equal?
- (d) Which shapes have all sides equal? Which shapes have all their angles right angles?

## L40. HOW TO DRAW PARALLELOGRAMS

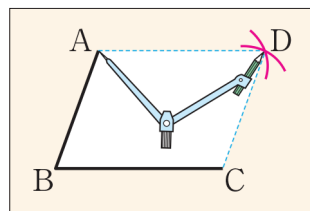
**Teaching and learning activities** ⌚ (60 min)

1. Draw a Parallelogram like the one shown and think about its characteristics.

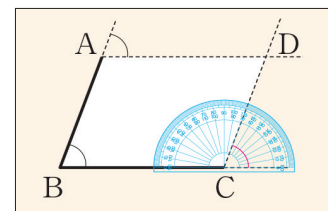


2. study the 2 ideas below and explain Raka and Asa's methods of drawing.

**Raka's idea**



**Asa's idea**



**Raka's method of drawing a parallelogram**

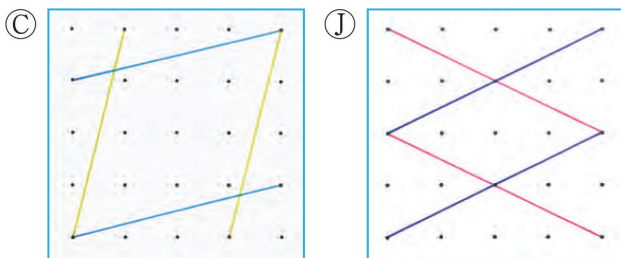
The opposite sides of parallelogram are parallel and equal

2. Use a compass to determine point D.
  - (a) Using a compass, take the length of BC from A and draw an arc.
  - (b) Using a compass, take the length of AB from C and draw an arc.
  - (c) The intersection of markings is D.

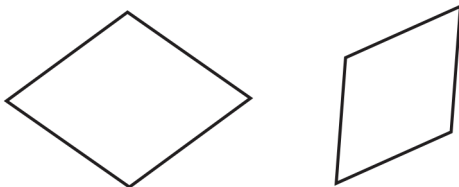
## L41. RHOMBUS

**Teaching and learning activities** ⌚ (60 min)

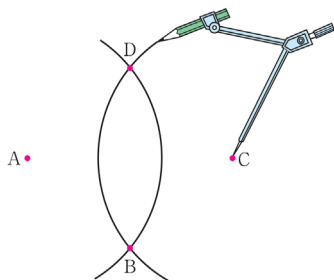
- Realize that lengths of 4 sides are equal by using compasses or rulers.
- Compare the four sides of quadrilaterals C and J.



- Understand that the length of the four sides of a Rhombus are equal.
- Let's define the term 'rhombus'. (Children write and present to the class).



- Connect the four points in order and identify the quadrilateral formed.



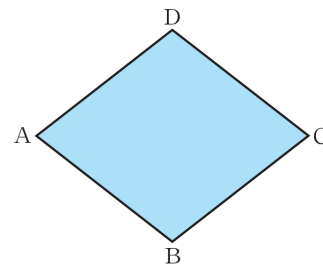
Instructions to follow

- Connect point A, B, C and D in order to make a quadrilateral.
  - Measure lengths of sides and sizes of angles.
  - Realize that 4 sides are all equal by using compass or rulers.
- What quadrilateral did you form? (allow for students ideas)

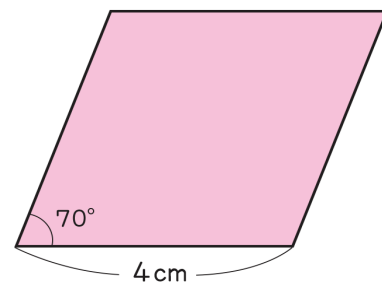
## L42. CHARACTERISTIC OF RHOMBUS

**Teaching and learning activities** ⌚ (60 min)

- check the following characteristic of the rhombus that you drew on the previous lesson.
  - Are the opposite angles equal?
  - Are the opposite sides parallel?



- Confirm that the other three sides are also 4 cm because all 4 sides of rhombus are equal.
- Let's think about how to draw a rhombus with the sides of 4 cm and one angle of  $70^\circ$ .



Expected Ideas from students: "I drew with a compass because the length of all four sides are equal in a rhombus"

### Exercise

Identify some rhombuses in our surroundings. (Use library or computers / internet)



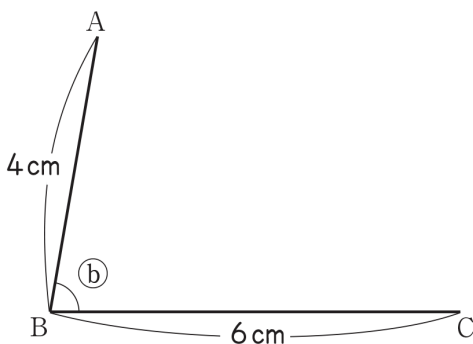
## L43. ANGLES AND SIZES OF PARALLELOGRAMS

**Teaching and learning activities** ⌚ (60 min)

1. Let's draw a parallelogram with sides 4 cm and 6 cm long.

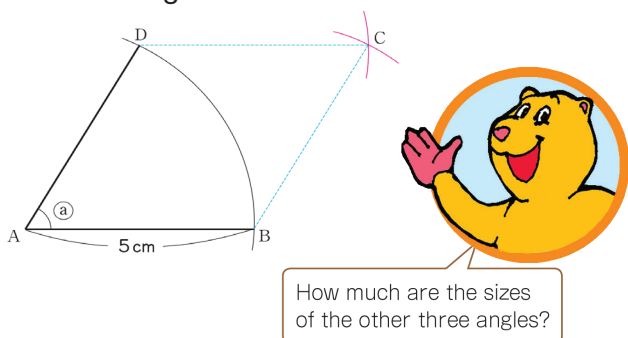
(What quadrilateral will it be when the angle b is 90°?)

Think of a quadrilateral which meets the conditions "opposite sides are parallel and equal in length and all four angles are 90°)



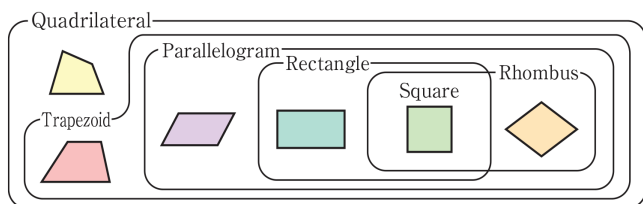
2. Draw a rhombus with the sides of 5 cm. Change angles of an intersection of sides 60°, 120°) what quadrilateral is this?

T/N: Point C is an intersection. Children will realize that a direction of a parallelogram will be opposite depending on whether angle B will be smaller or larger than 90°.



3. Discuss things found by drawing a rhombus with each other and summarize learning.

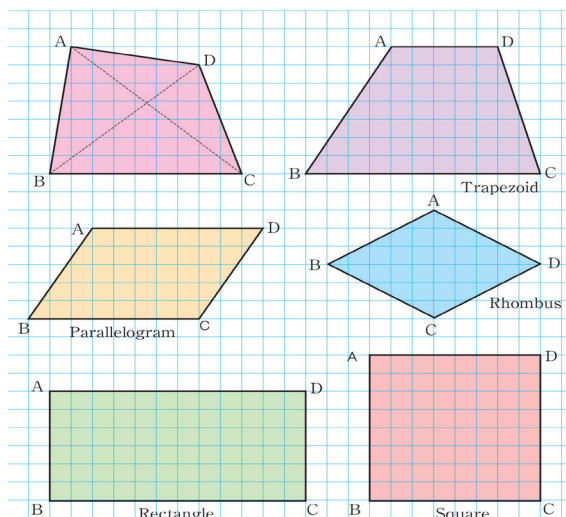
### Relationships of Quadrilaterals



## L44. DIAGONALS OF QUADRILATERALS

**Teaching and learning activities** ⌚ (60 min)

1. Draw lines to connect the opposite vertices of different quadrilaterals.



(Lines drawn by connecting the vertices are called diagonal lines.)

2. Identify and complete exercises below using the given characteristics.

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

\_\_\_\_\_

Quadrilateral(s) with 2 diagonals that are equal in length. \_\_\_\_\_

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

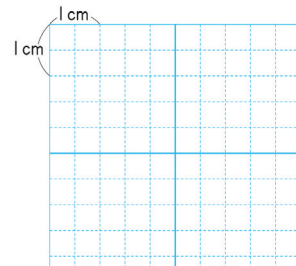
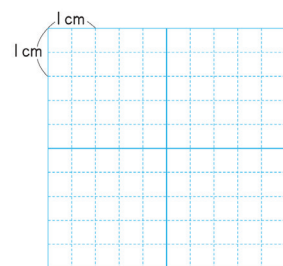
\_\_\_\_\_

Quadrilateral(s) with 2 diagonals that are divided in half where they intersect. \_\_\_\_\_

3. Draw quadrilaterals using the characteristics. (Length of the diagonal lines should be the same measurement to the lengths given).

A rhombus with 4 cm and 3 cm diagonals.

A square with 4 cm diagonals.

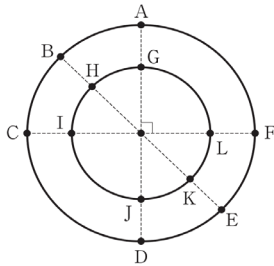


**L45. MAKING SHAPES BY CONNECTING POINTS**

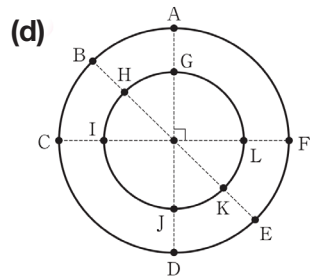
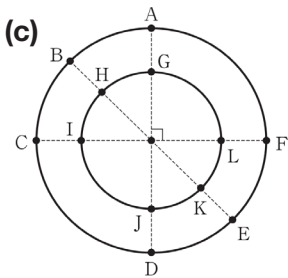
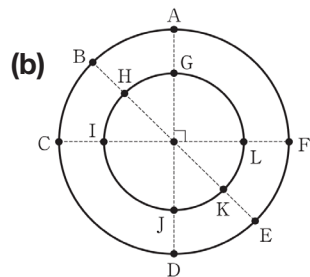
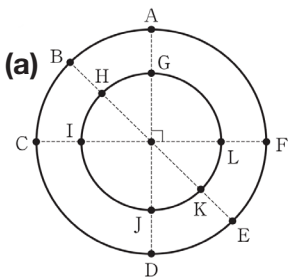
**Teaching and learning activities** ⌚ (60 min)

1. What quadrilateral can you make? Discuss the kind of quadrilaterals formed based on the characteristics learnt previously;

- (a) B,C,E and F
- (b) G,I,J and L
- (c) G,C,J and F
- (d) A,H,D and K



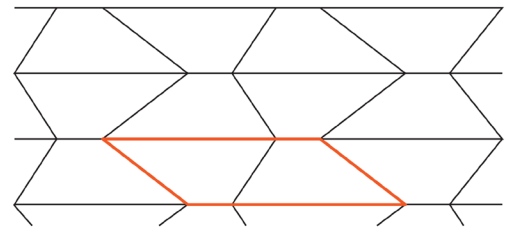
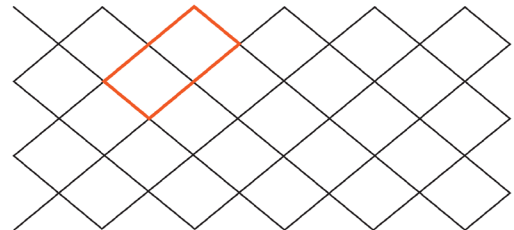
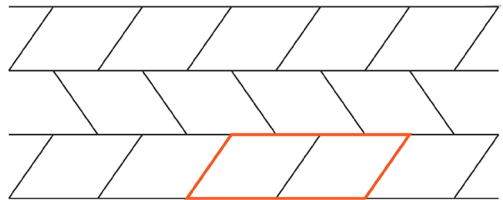
2. Complete exercises 1,2,3 and 4 by joining dots/points to draw quadrilaterals. (Ensure to check that the students are drawing their quadrilaterals correctly.)



**L46. MAKING PATTERN BY TESSELLATING QUADRILATERALS**

**Teaching and learning activities** ⌚ (60 min)

1. Colour the tessellation patterns of each quadrilateral with colour pencils in the textbook.



2. Identify some places where tessellation patterns are used.



- Find quadrilaterals used for tessellation patterns.
  - Know simple combinations of colors can make various tessellation patterns.
3. Draw an illustration on tessellation patterns using the example below. (Examples; mats, bilum or baskets around us.)

## L47. EXERCISE

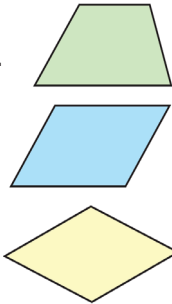
**Teaching and learning activities** ⌚ (60 min)

1. write the correct words in the words in the by  looking at the figures on the right.

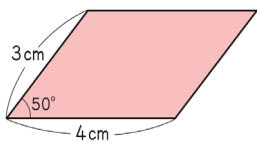
(a) A quadrilateral that has one pair of  opposite sides is called .

(b) A quadrilateral in which the opposite sides are both  is called .

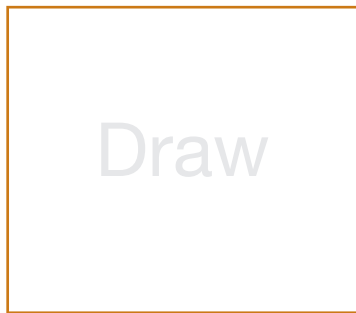
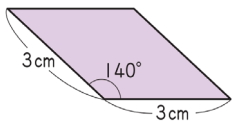
(c) A quadrilateral in which all 4 sides are  in length is called .



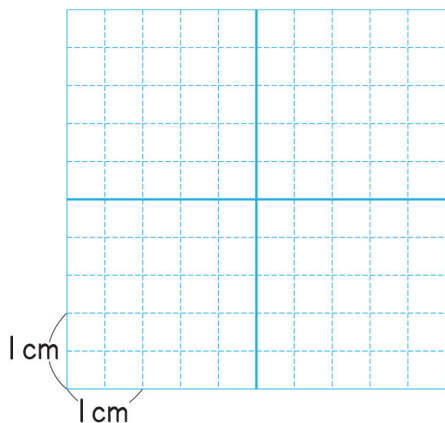
2. Draw parallelogram like the ones shown below.



②



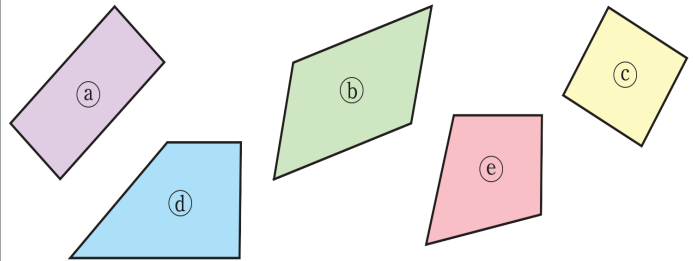
3. Draw a rhombus with diagonals that are 5 cm and 3 m in length.



## L47. EXERCISE

**Teaching and learning activities** ⌚ (60 min)

4. From the quadrilaterals below. Choose two quadrilaterals with different properties from the rest and explain.



(a) D and e are not in the group.

(b) a and c look different from others.

(c) Draw the diagonal for each figure

Expected ideas from students

(a) why did child a think that d and e are not in the group?

(b) Why did child b thinks that a and c are not in the group?

(c) According to child c which quadrilaterals are not in the group?

# TEACHING CONTENT - SAMPLE GUIDED LESSONS

**Strand: Number and Operation**

**Topic: Division**

**Content Standards: 4.1.3** Extend learned division to divide by two digit numbers in vertical form.

## 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 division in vertical form.

Students will be able to;

## Attitudes

- Appreciate processing and calculating divisions in vertical form.
- Enjoy working in groups and presenting their ideas.
- Appreciate other students ideas and views during their discussions.

## Skills

- Apply learned division to calculate in vertical form.
- Explain the process of dividing in vertical form.
- Calculate division in vertical form with 2 and 3 digit numbers.
- Represent the division problems using the tape diagrams and tables.

## Knowledge

- Understand the meanings of the division terms and their position in division.
- Understand the process how to calculate the divisions in vertical form.
- Understand how to do subtraction and multiplication in vertical division.

## Mathematical Thinking

- Explore the calculation process of division in vertical division.
- Explain and think about division without and with remainders.
- Use previous knowledge and skills to calculate in vertical ways.
- Find easy ways or representing the division on tape diagrams and tables.
- Represent in real life situations for example;
- If you cut a ripe mango into 10 pieces for 5 children, how many pieces of mango will each child get?
- If you cut a ripe mango into 12 pieces for 5 children, how many pieces of mango will each get and how many pieces will be left over.

# TEACHING CONTENT - SAMPLE GUIDED LESSONS

## Back Ground Notes

How to teach long division or division in vertical form.

Student should learn to do division in vertical form or long division step by step. Instead of showing the whole algorithm to the students at once, we teach it "step by step".

Before a child is ready to learn long division, he/she has to know:

- multiplication tables fairly well,
- basic division concept, based on multiplication tables (*for example*  $28 \div 7$  or  $56 \div 8$ ),
- basic division with remainders (*for example*  $54 \div 7$  or  $23 \div 5$ )

The basics steps in vertical form or long division is an algorithm that repeat divide, multiple, subtract and drop down the next digit.

**Example:** Divide multiply and subtract drop down the next digit to:

$$\begin{array}{r} 29 \\ 2 \overline{) 58} \\ \underline{-4} \\ 18 \end{array}$$

$$\begin{array}{r} 29 \\ 2 \overline{) 58} \\ \underline{-4} \\ 18 \\ \underline{-18} \\ 00 \end{array}$$

$$\begin{array}{r} 29 \\ 2 \overline{) 58} \\ \underline{-4} \\ 18 \\ \underline{-18} \\ 0 \end{array}$$

Divide 2 into 18. Place 9 into the quotient.

Multiply  $9 \times 2 = 18$ , write that 18 under the 18, and **subtract**.

The division is over since there are no more digits in the dividend. The quotient is 29.

$$\begin{array}{r} 14R3 \\ 6 \overline{) 87} \\ \underline{-6} \\ 27 \\ \underline{-24} \\ 3 \end{array}$$

- a.  $a \div b = \leftarrow b \overline{) a}$
- b. a = dividend
- c. b = divisor
- d. c = quotient



## L48. DIVISION BY TWO-DIGIT NUMBERS (1)

**Teaching and learning activities** ⌚ (60 min)

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

There are 6 boxes with 10 pieces of candies each. These candies are to be divided equally among 20 students. How many pieces will each student get?



$$\begin{array}{ccc} \boxed{60} & \div & \boxed{20} = \boxed{\phantom{00}} \\ \text{Total number} & & \text{Total number of students} \end{array}$$

### Expected Ideas

Idea 1.

By using the rules of division

$$\begin{array}{l} 60 \div 20 \\ \downarrow \div 2 \downarrow \div 2 \\ 30 \div 10 \\ \downarrow \div 5 \downarrow \div 5 \\ 6 \div 2 \end{array}$$

The number of each student is found in the same way as when we divide 6 candies between two students.

Idea 2.

The number we want is the number in  $\boxed{\phantom{00}}$  of  $\boxed{\phantom{00}} \times 20 = 60$ .  
If we give 1 piece to each child,  
 $\boxed{1} \times 20 = 20$  and if we give 2 pieces to each child,  
 $\boxed{2} \times 20 = 40$  so...

Idea 3.

If I think of 2 groups of 10 children and divide 6 boxes between the 2 groups...



## L48. DIVISION BY TWO-DIGIT NUMBERS (1)

**Teaching and learning activities** ⌚ (60 min)

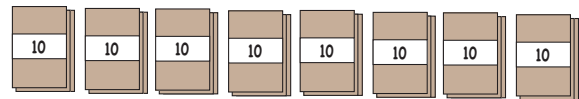
1. Let's think about how to divide by 2-digit numbers using the 3 ideas given.

There are 80 sheets of coloured paper. Each student receives 20 sheets of paper. How many students will receive the paper?

Write an expression and calculate.

$$\boxed{\phantom{00}} \div \boxed{\phantom{00}} = \boxed{\phantom{00}} \quad \text{How many sets of 20 are there in 80?}$$

Ideas. Think of stacks of 10 sheets,



$$8 \div 2 = \boxed{\phantom{00}}$$

By using the rules of division

$$\begin{array}{l} 80 \div 20 = \boxed{\phantom{00}} \\ \downarrow \div 2 \downarrow \div 2 \\ 40 \div 10 = \boxed{\phantom{00}} \\ \downarrow \div 5 \downarrow \div 5 \\ 8 \div 2 = \boxed{\phantom{00}} \end{array}$$

2. Read the situation problem and solve.

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

Write a mathematical sentences.

$$\boxed{\phantom{00}} \div 30 = \boxed{\phantom{00}} \text{ remainder } \boxed{\phantom{00}}$$

### Exercise

Calculate the following.

- (a)  $60 \div 30$       (b)  $160 \div 40$       (c)  $70 \div 20$   
(d)  $320 \div 60$

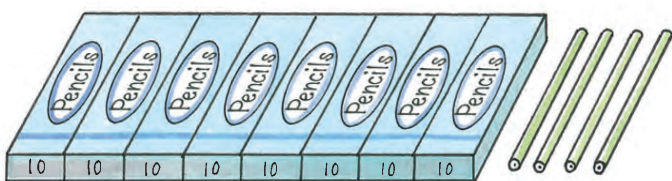
# TEACHING CONTENT - SAMPLE GUIDED LESSONS

## L49. IN VERTICAL FORM

**Teaching and learning activities** ⌚ (60 min)

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

There are 84 pencils to be divided among 21 students. How many pencils will each student receive?

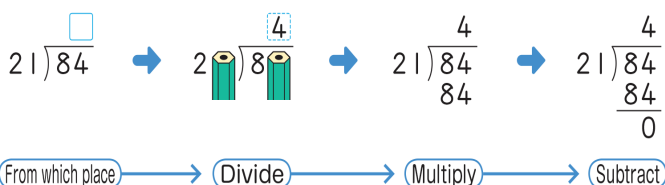


1. In which place value is the quotient written first? We cannot do "8 divided by 21", can we?

(a) Think of  $80 \div 20$  and guess the quotient from  $8 \div 2$ .  $2 \overline{)84}$

(b) Is the quotient 4? Check it.  $2 \overline{)84}$

How to Divide  $84 \div 21$  in Vertical Form



### Exercise

Calculate the following.

- (a)  $99 \div 33$     (b)  $84 \div 42$     (c)  $63 \div 21$   
 (d)  $64 \div 32$     (e)  $48 \div 23$     (f)  $97 \div 32$   
 (g)  $29 \div 13$     (h)  $91 \div 44$

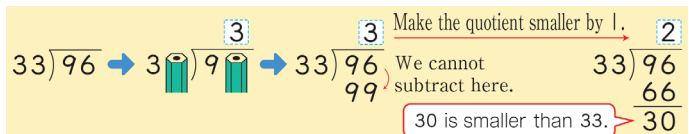
## L50. HOW TO MAKE A TEMPORARY QUOTIENT (1)

**Teaching and learning activities** ⌚ (60 min)

1. Think about how to divide  $96 \div 33$  in vertical form.  $33 \overline{)96}$

(a) Let's think of  $90 \div 30$  and guess the quotient from  $9 \div 3$ .

(b) Is the quotient correct?



2. Think about how to divide  $68 \div 16$  in vertical form.

1. Make an temporary quotient
2. Multiply the divisor and temporary quotient
3. Replace it with a number that is smaller by 1.
4. Make the temporary quotient smaller

Think of  $60 \div 10$  .....

But  $16 \times 6 = 96$  that too big ....

How about this time? Still too big.

Yeah! 4 is the correct quotient

Remember! The first guess of the quotient is called the temporary Quotient. If the quotient is too large we have to replace it with a quotient that is smaller by 1.

### Exercise

Solve

- (a)  $56 \div 14$     (b)  $60 \div 12$     (c)  $68 \div 24$   
 (d)  $79 \div 15$     (e)  $70 \div 14$     (f)  $69 \div 15$   
 (g)  $97 \div 16$     (h)  $72 \div 15$

# TEACHING CONTENT - SAMPLE GUIDED LESSONS

## L51. HOW TO MAKE A TEMPORARY QUOTIENT (2)

Teaching and learning activities ⌚ (60 min)

1. Think about how to divide  $170 \div 34$  in vertical form.

Divide  $170 \div 34$  in a vertical form.

A quotient is not written here.

$$34 \overline{)170}$$

(a) In which place value is the quotient written?

$$\begin{array}{r} \square \\ 34 \overline{)170} \end{array}$$

(b) Think of  $170 \div 34$  and make a temporary quotient.

How to Divide  $170 \div 34$  in Vertical Form

$$34 \overline{)170} \rightarrow \begin{array}{r} 5 \\ 34 \overline{)170} \\ \underline{170} \\ 0 \end{array} \rightarrow \begin{array}{r} 5 \\ 34 \overline{)170} \\ \underline{170} \\ 0 \end{array}$$

From which place value → Divide → Multiply → Subtract

2. Think about how to divide  $326 \div 36$  in vertical form.

Divide  $326 \div 36$  in a vertical form.

(a) In which place value is the quotient written?

(b) Think of  $320 \div 30$  and make a temporary quotient.

How to Divide  $326 \div 36$  in Vertical Form

$$36 \overline{)326} \rightarrow \begin{array}{r} 9 \\ 36 \overline{)326} \\ \underline{324} \\ 2 \end{array} \rightarrow \begin{array}{r} 9 \\ 36 \overline{)326} \\ \underline{324} \\ 2 \end{array}$$

From which place value → Divide → Write again → Multiply → Subtract

- A quotient guessed first is called as temporary quotient written.
- Two steps are needed for this temporary quotient to become a true quotient.
- Confirm that (divisor) x (quotient) equals to dividend.
- Confirm that a number subtracted is smaller than a divisor.

### Exercise

Solve

- (a)  $255 \div 51$     (b)  $284 \div 71$     (c)  $191 \div 24$   
 (e)  $218 \div 18$     (f)  $208 \div 21$     (g)  $217 \div 25$   
 (h)  $257 \div 18$     (i)  $143 \div 18$

## L52. DIVISION BY 2-DIGIT NUMBERS (2)

Teaching and learning activities ⌚ (60 min)

1. Read the situation problem and write a mathematical sentence.

There are 322 sheets of crafting paper. They are to be divided equally among 14 students.

How many sheets of paper will each student receive?

(a) Write an Expression.

Can 3 stacks of 100 pieces of paper be divided among 14 children without dividing the stacks?



(b) In which place value is the quotient written.

(c) If stacks of 100 are changed into bundles of 10, how many stacks of 10 are there?

(d) Divide the stacks of 10 among 14 students.

$$\square \div 14$$

(e) If stacks of 100 are changed into bundles of 10, how many stacks of 10 are there?

(f) Divide the stacks of 10 among 14 students.

$$\square \div 14$$

(g) How many sheets of paper will student received Think about how to divide  $322 \div 14$  in vertical form.

### Exercise

Calculate the following.

- (a)  $736 \div 16$     (b)  $810 \div 18$   
 (c)  $851 \div 26$     (d)  $585 \div 39$   
 (e)  $612 \div 36$     (f)  $578 \div 23$

## L53. DIVISION WHERE 0 IS A QUOTIENT

**Teaching and learning activities** ⌚ (30 min)

1. Think about how to divide  $607 \div 56$  in vertical form and divide.

$$56 \overline{)600}$$



(a) In which place value is the quotient written?

$$56 \overline{)607} \quad \boxed{1}$$

(b) What number is written in the ones place of the quotient?

$$\begin{array}{r} 56 \overline{)607} \\ \underline{56} \\ 47 \end{array}$$

2. The Division of  $859 \div 21$  in vertical form is shown below.

Explain the division methods in A and B

<p>(A)</p> $\begin{array}{r} 40 \\ 21 \overline{)859} \\ \underline{84} \\ 19 \\ \underline{00} \\ 19 \end{array}$	<p>(B)</p> $\begin{array}{r} 40 \\ 21 \overline{)859} \\ \underline{84} \\ 19 \end{array}$
--	--

3. Do the exercise below in vertical form.

- (a)  $705 \div 34$    (b)  $913 \div 13$    (c)  $856 \div 42$   
 (d)  $531 \div 26$    (e)  $576 \div 56$    (f)  $942 \div 47$

Check the following division and correct the mistake.

(a) 
$$\begin{array}{r} 24 \\ 22 \overline{)446} \\ \underline{44} \\ 6 \end{array}$$
   (b) 
$$\begin{array}{r} 24 \\ 31 \overline{)645} \\ \underline{62} \\ 25 \\ \underline{31} \end{array}$$
   (c) 
$$\begin{array}{r} 24 \\ 57 \overline{)704} \\ \underline{57} \\ 34 \end{array}$$

## L54. DIVISION IN VARIOUS COUNTRIES



**Teaching and learning activities** ⌚ (30 min)

1. Let us compare how division is used to solve problems in different countries.

The division below shows how divisions are solved in other countries. Compare them to how divisions are solved in vertical form in Papua New Guinea.

$$984 \div 23$$

(a) Explain how division are done in Germany and Canada

Germany	Canada
 $\begin{array}{r} 42 \\ 2 \\ 10 \\ 30 \\ \hline 984 : 23 \\ -690 \\ \hline 294 \\ -230 \\ \hline 64 \\ -46 \\ \hline 18 \end{array}$	 $\begin{array}{r} 984 \overline{)23} \\ \underline{92} \\ 42 \\ \underline{64} \\ 46 \\ \underline{18} \end{array}$

In Germany, they start with a smaller temporary quotient and then repeat.



(b) Compare how divisions are solved in Papua New Guinea, Canada, and Germany. Discuss their good points.

$$\begin{array}{|c|c|c|c|c|} \hline & & & & \\ \hline 2 & 3 & ) & 9 & 8 & 4 \\ \hline & & & & & \\ \hline & & & & & \\ \hline & & & & & \\ \hline \end{array}$$

(c) Calculate  $898 \div 28$  with the methods of each countries.

# TEACHING CONTENT - SAMPLE GUIDED LESSONS

## L55. RULES OF DIVISION AND MULTIPLICATION

**Teaching and learning activities** ⌚ (30 min)

- Do these calculation by using the rules of division.

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

(a)  $1500 \div 500 = \square$   
 $\downarrow \div \square \quad \downarrow \div \square$   
 $\square \div \square = \square$

(b)  $24000 \div 3000 = \square$   
 $\downarrow \div \square \quad \downarrow \div \square$   
 $\square \div \square = \square$

- Compare two mathematical sentences and find rules about multiplication

(a)  $40 \times 6 = 240$   
 $\downarrow \times \square \quad \downarrow \div \square$   
 $80 \times 3 = 240$

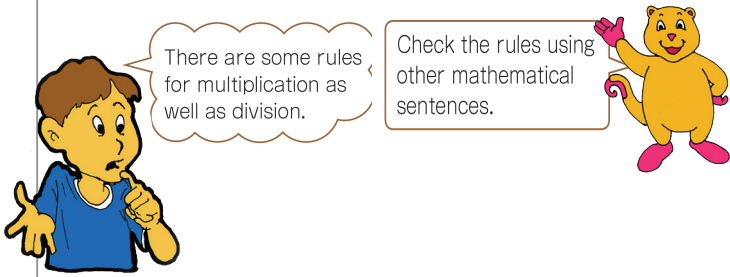
(b)  $80 \times 3 = 240$   
 $\downarrow \div \square \quad \downarrow \times \square$   
 $40 \times 6 = 240$

(c)  $40 \times 6 = 240$   
 $\downarrow \times \square \quad \downarrow \times \square$   
 $80 \times 6 = 480$

(d)  $80 \times 6 = 480$   
 $\downarrow \div \square \quad \downarrow \div \square$   
 $40 \times 6 = 240$

(e)  $40 \times 6 = 240$   
 $\downarrow \times \square \quad \downarrow \times \square$   
 $40 \times 12 = 480$

(f)  $40 \times 12 = 480$   
 $\downarrow \div \square \quad \downarrow \div \square$   
 $40 \times 6 = 240$



There are some rules for multiplication as well as division.

Check the rules using other mathematical sentences.

## L56. EXERCISE

**Teaching and learning activities** ⌚ (30 min)

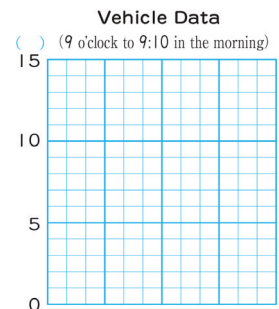
Do the following exercises.

- Divide in vertical form.

(a)  $40 \div 20$    (b)  $240 \div 60$    (c)  $130 \div 40$   
 (d)  $96 \div 32$    (e)  $97 \div 27$    (f)  $85 \div 19$   
 (g)  $344 \div 43$    (h)  $385 \div 56$    (i)  $411 \div 45$   
 (j)  $672 \div 28$    (k)  $453 \div 17$    (l)  $738 \div 24$

- There were 113 eggs. You must divide them equally amongst 12 students. How many can you divide per child and where will be the remainder?
- From a tape which is 7m 60 cm long. How many 50 cm long tapes can you cut and how many cm will remain?
- The table below represents the data of vehicles which drove pass the front of a school from 9 o'clock to 10 past 9 in the morning. Represent it on the graph.

Types of vehicle	Number of vehicles
Car	10
Bus	6
Trucks	2
Others	4



- Use the multiplication table below to do the following Division. Explain the rule of division used.

$$72 \div 12 = (8 \times 9) \div (4 \times 3)$$

$$= (2 \times 9) \div 3$$

$$= (2 \times 3) \div 1$$

$$= 6$$

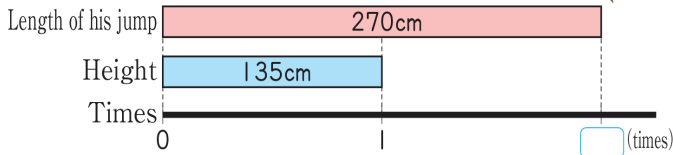
		Multiplier								
		1	2	3	4	5	6	7	8	9
Multiplicand	1	1	2	3	4	5	6	7	8	9
	2	2	4	6	8	10	12	14	16	18
	3	3	6	9	12	15	18	21	24	27
	4	4	8	12	16	20	24	28	32	36
	5	5	10	15	20	25	30	35	40	45
	6	6	12	18	24	30	36	42	48	54
	7	7	14	21	28	35	42	49	56	63
	8	8	16	24	32	40	48	56	64	72
	9	9	18	27	36	45	54	63	72	81

## L57. DIVISION WHERE 0 IS A QUOTIENT

**Teaching and learning activities** ⌚ (30 min)

1. Asa is 135 cm tall. He jumped 270 cm. how many times of his height did he jump?

Consider the height 1 times.



cm	135	270
Times	1	?

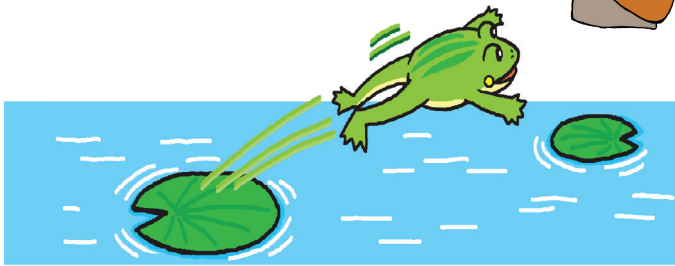
$\div 135$      $\div 135$



2. An athlete jumped 8 m 50 cm in a long jump competition. His height is 170 cm. how many times his height did he jumped?
3. A frog can jump 40 times of its length.
- (a) The length of a frog is 5 cm. how many m can it jump?
- (b) If you are able to jump 40 times your height. How many cm can you jump?

cm	5	?
Times	1	40

$\times 40$      $\times 40$



## L58. REVIEW

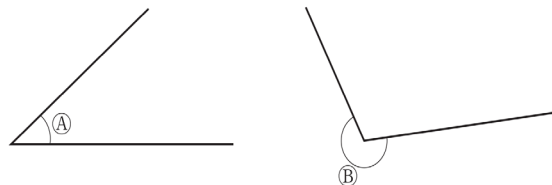
**Teaching and learning activities** ⌚ (30 min)

Complete the following review exercises

1. Fill the  with the numbers.
- (a) 510 billion 700 million is  sets of 100 billion.  Sets of 10 billion,  sets of 100 million combine.
- (b) 6 trillion and 40 billion is  sets of trillion. And  sets of 10 billion combined.
2. Calculate these problems in vertical form.
- (a)  $73 \div 3$       (b)  $63 \div 4$       (c)  $56 \div 2$   
 (d)  $93 \div 9$       (e)  $398 \div 2$       (f)  $67 \div 8$   
 (g)  $816 \div 4$       (h)  $646 \div 7$       (i)  $96 \div 16$   
 (j)  $87 \div 21$       (k)  $329 \div 45$       (l)  $615 \div 68$   
 (m)  $483 \div 21$       (n)  $938 \div 74$       (o)  $547 \div 52$   
 (p)  $721 \div 37$

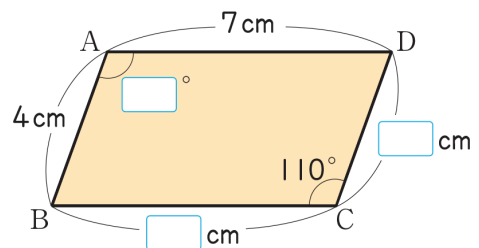
3. Read the problem and solve.  
 There are 460 colored papers. If you divide the papers equally among 6 students. How many will each child receive? And how many will remain?

4. What is the size of the angles below?

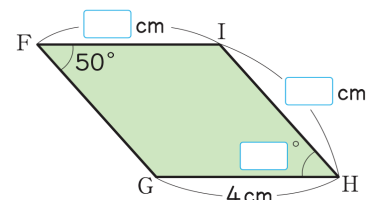


5. Fill the  with number.

① Parallelogram



② Rhombus



# TEACHING CONTENT - SAMPLE GUIDED LESSONS

**Strand: Date and Mathematical Relations**

**Topic: Line Graphs**

**Content Standards: 4.4.2** Extend learned knowledge on tables and graphs to represent data and read line graphs.

## 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:

- Show interest in drawing and reading a line graph.
- Appreciate information collect and graphed.

## Skills:

- Naming and labelling the horizontal and vertical axes.
- Drawing a line graph to represent any data that demonstrates a continuous change eg hourly temperature.
- Determining a suitable scale for the data and recording the scale on the vertical axis.
- Using the scale to determine the placement of each point when drawing a line graph.
- Interpreting a given line graph using the scales on the axes.

## Knowledge:

- Understand information on line graph and interpret it.
- Understand a given data and represent it on a line graph.
- Understand how to determine suitable scale for given data in line graph construction.
- Understand how to read a line graph.
- Know what a line graph is.

## Mathematical thinking

- Think about how to write and read large numbers.
- Think how to represent large in the correct place value.

# TEACHING CONTENT - SAMPLE GUIDED LESSONS

## Background Notes

A Graph that uses lines to show changes in temperature is called a **line graph**. Line graphs are usually used to show dependent data, and particularly trends over time.

Definition of various parts of a line graph.

On a Line you will find the following:

**Title:** The title of the line graph tells us what the graph is about.

**Labels:** The horizontal label across the bottom and the vertical label along the side tells us what kinds of facts are listed.

**Scales:** The horizontal scale across the bottom and the vertical scale along the side tell us how much or how many.

**Points:** The points or dots on the graph show us the facts.

**Lines:** The lines connecting the points give estimates of the values between the points.

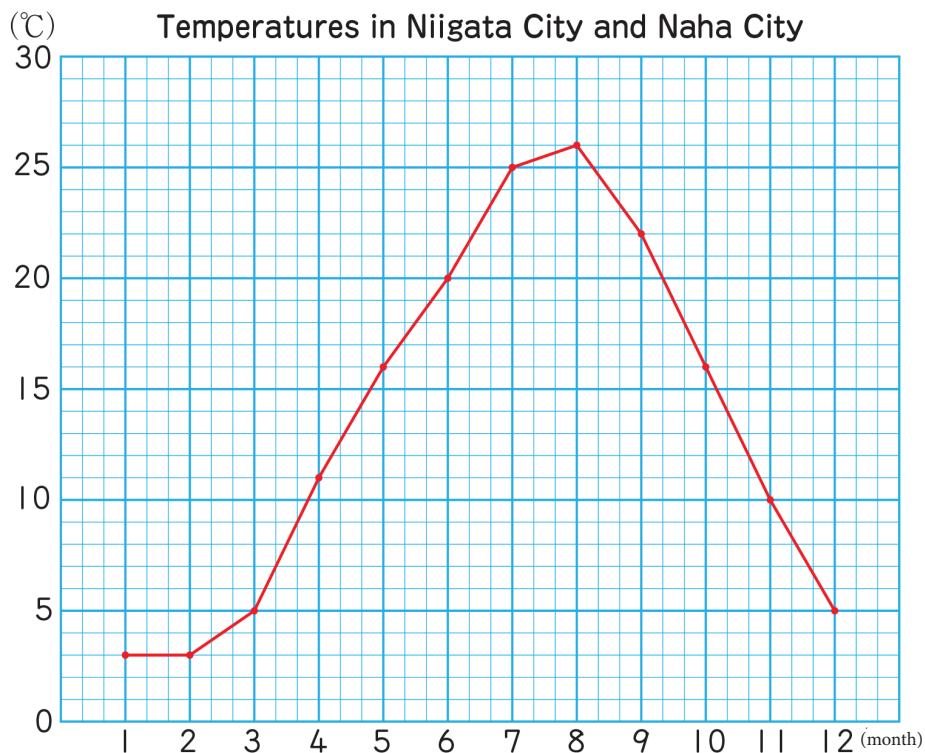
Graphs have two axes, the lines that run across the bottom and up the side. The line along the bottom is called the horizontal or x-axis, and the line up the side is called the vertical or y-axis.

The x-axis may contain categories or numbers. You read it from the bottom left of the graph.

- The y-axis usually contains numbers, again starting from the bottom left of the graph.

The numbers on the y-axis generally, but not always, start at 0 in the bottom left of the graph, and move upwards. Usually the axes of a graph are labelled to indicate the type of data they show.

Sample of a line Graph.

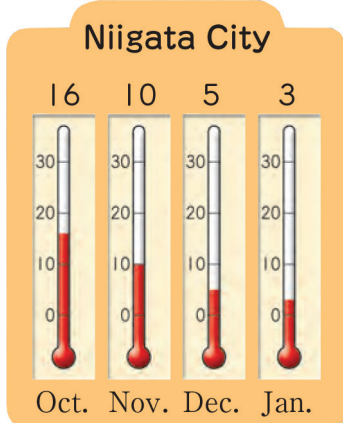




## L59. UNDERSTANDING LINE GRAPHS

**Teaching and learning activities** ⌚ (30 min)

- Study the table for Niigata city and Naha city and discover the changes in temperatures of the two cities from month to month and explain differences.

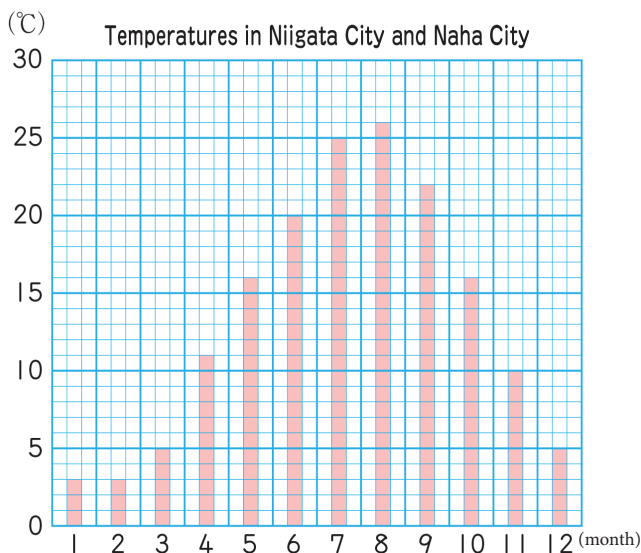


Temperatures in Niigata City and Naha City (°C)

Month	1	2	3	4	5	6	7	8	9	10	11	12
Niigata City	3	3	5	11	16	20	25	26	22	16	10	5
Naha City	17	17	19	21	24	27	29	28	27	25	22	18

Use the information on the table above to explain the differences in changes of the two cities from month to month.

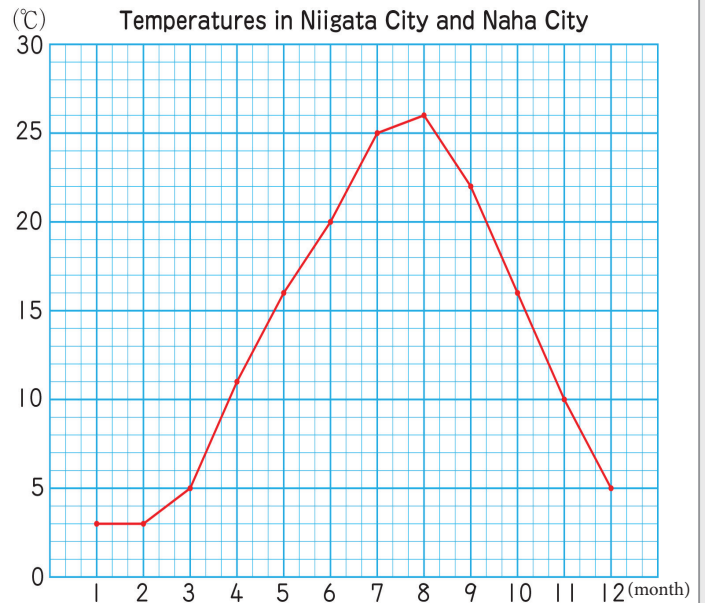
- Study the bar graph below that shows the changes in temperature of each month. Explain the way temperature changes and the difference



## L60. READING LINE GRAPHS

**Teaching and learning activities** ⌚ (60 min)

- Use the same information from the bar graph in the previous lesson to make a line graph.



- Use the line graph above to do exercise 1- 3.

- What aspects are represented by the vertical axis and horizontal axis?
- What is the temperature, in degrees Celsius, in March?
- In which month is the temperature 16 degrees Celsius?

- Use the Use same information from the bar graph from the first lesson. Draw a line graph of the temperature changes of Naha city.

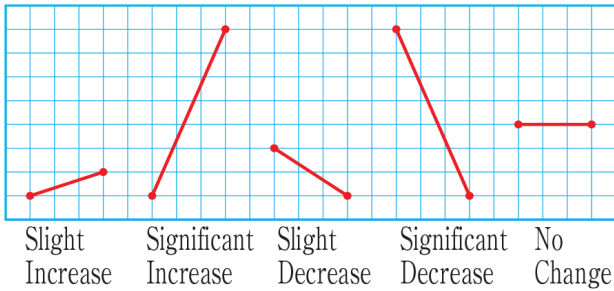
- In which month is the temperature highest in each city and what is the highest temperature in each city?
- How does the temperature change? Compare the differences in the changes between Niigata city and Naha city.
- Between which consecutive months in which city does the temperature change most?

We can easily compare the difference if we draw them in the same graph sheet.

## L60. READING LINE GRAPHS

**Teaching and learning activities** ⌚ (60 min)

4. Let's talk about the advantages of using line graphs. Below are some words you can use when comparing or reading a line graph.



### Exercise

For which of the following aspects A to F is it better to use a line graph?

- A. Your body temperature taken at the same time everyday.
- B. The types and numbers of vehicles that passed by your school in a period of ten minutes.
- C. The numbers of children in your class with your favourite fruits.
- D. The temperature recorded every hour at one place.
- E. The heights of the children in your class.
- F. Your height that was measured on each birthday.

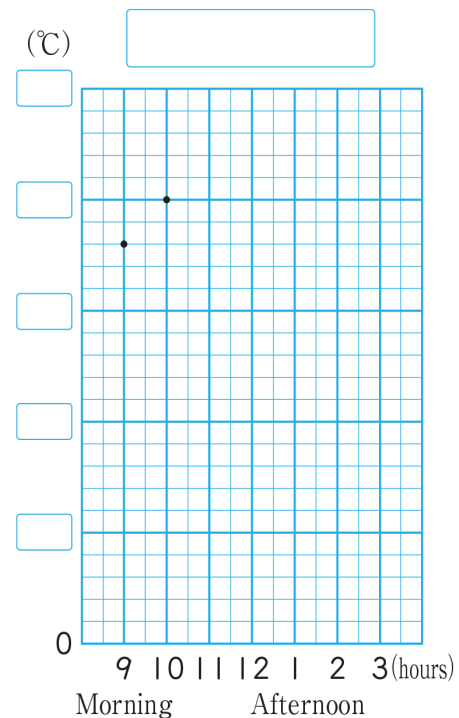
## L61. DRAWING LINE GRAPHS

**Teaching and learning activities** ⌚ (60 min)

1. Draw a line graph using the data of the temperature in the day for September 16th.

Follow the given steps.

- (i) On the horizontal axis, write the time with equal spacing.
- (ii) Write a scale on the vertical axis to express temperatures up to 24 degrees.
- (iii) Write dots on the table for each temperature and time.
- (iv) Connect the dots with a line.
- (v) Write a title and the units.



### Exercise

1. Let the students record the temperature in the classroom and draw a line graph.

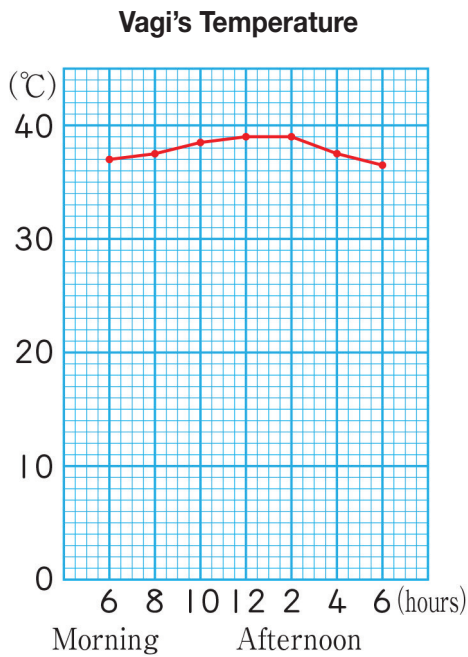
Important Ideas:

Let's check the difference in the temperature between places near the corridor. For comparison, draw line graphs on the same sheet.

**L62. IDEAS FOR DRAWING LINE GRAPHS (1)**

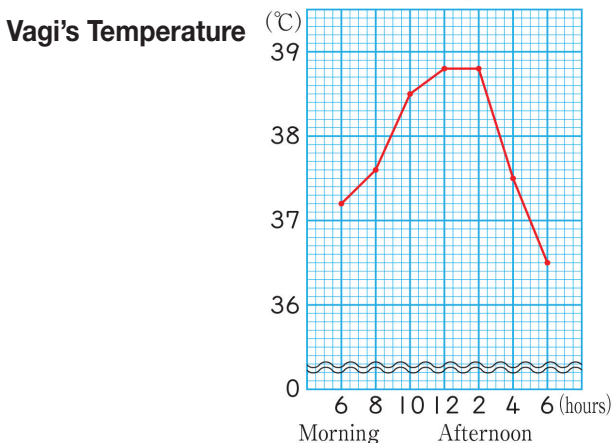
**Teaching and learning activities** ⌚ (60 min)

- Study Vagi's temperature and answer the following question below.  
Vagi got a cold. She took her body temperature and expressed it as a line graph.



How many points on the scale are there for 1 degree Celsius?

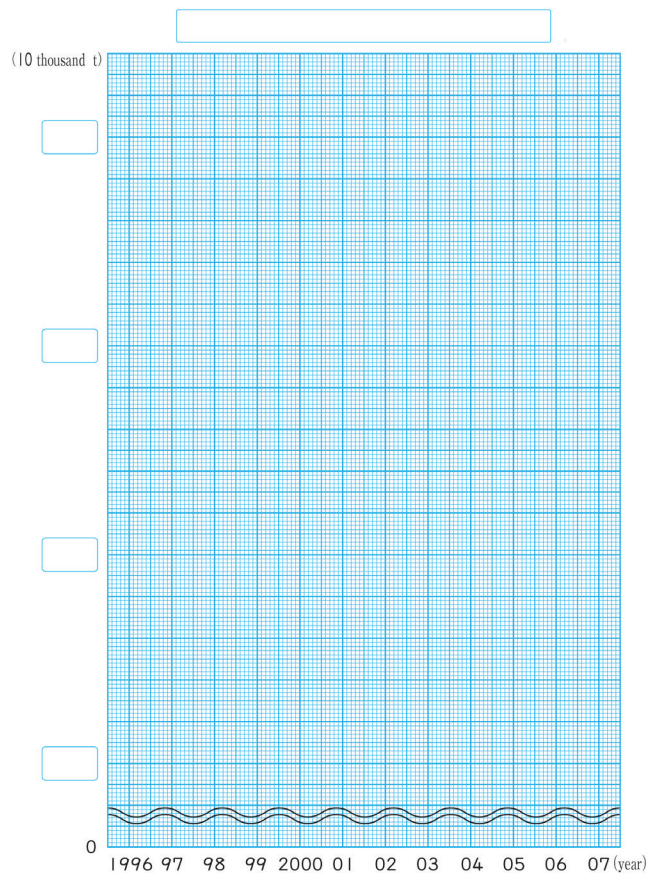
- What was her temperature, in degrees Celsius, at 8 o'clock in the morning?
- Vagi redrew the graph as shown below to make the change in her temperature easier to see. What was her idea?



**L62. IDEAS FOR DRAWING LINE GRAPHS (1)**

**Teaching and learning activities** ⌚ (60 min)

- By how many 0C did her temperature rise between 6 o'clock in the morning and 8 o'clock in the morning?
  - Between which times did her temperature change the most?
  - How did Vagi's temperature change?
  - What was Vagi's temperature in degree Celsius at 9 o'clock in the morning?
- Let's study the table on the right that shows the amount of used papers and collected papers.
    - Draw line graphs on the left by considering the scales on the vertical axis.



## L62. IDEAS FOR DRAWING LINE GRAPHS (1)

Teaching and learning activities ⌚ (60 min)

The Amount of Used and Collected Papers  
(10 thousand tons)

Year	Amount of used	Collected papers
1996	3076	1577
1997	3119	1654
1998	2998	1657
1999	3062	1706
2000	3176	1833
2001	3107	1912
2002	3065	2005
2003	3093	2044
2004	3138	2151
2005	3138	2232
2006	3154	2283
2007	3130	2332

(b) What can you read from the graph?

## L63. IDEAS FOR DRAWING LINE GRAPHS (2)

Teaching and learning activities ⌚ (60 min)

Let's show the data in the line graph.

1. The table below shows the records of the lengths of shadows in June and December.

Length of Shadows(December 21)

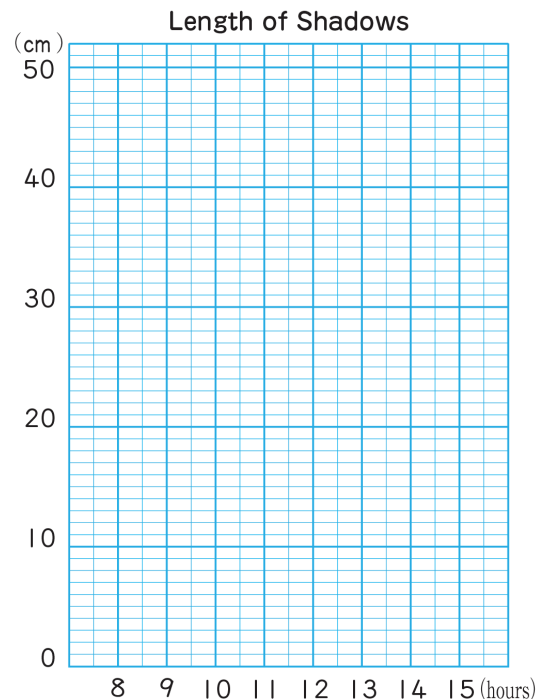
Time (hours)	8	9	10	11	12	13	14	15
Length of shadows (cm)	51	27.8	20	16.8	16.3	18.1	23.1	36.1

Length of Shadows(June 21)

Time (hours)	8	9	10	11	12	13	14	15
Length of shadows (cm)	12.1	7.9	4.9	2.8	2.1	3.5	6	9.3

2. Present the information using a line graph.

- (a) Between which consecutive hours is the biggest difference?  
 (b) What can be understood by the graph?

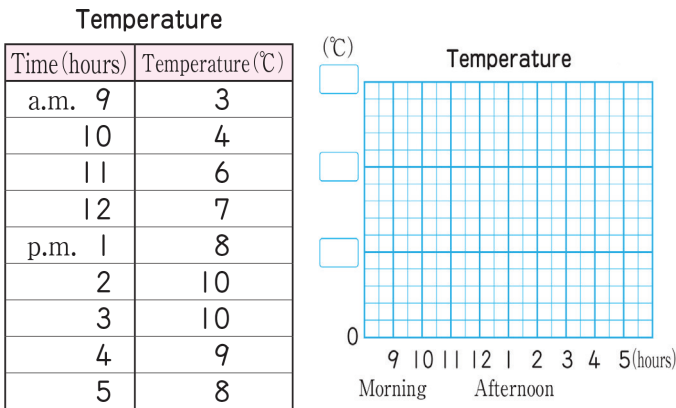


## L64. EXERCISE

**Teaching and learning activities** ⌚ (30 min)

Complete the exercises given.

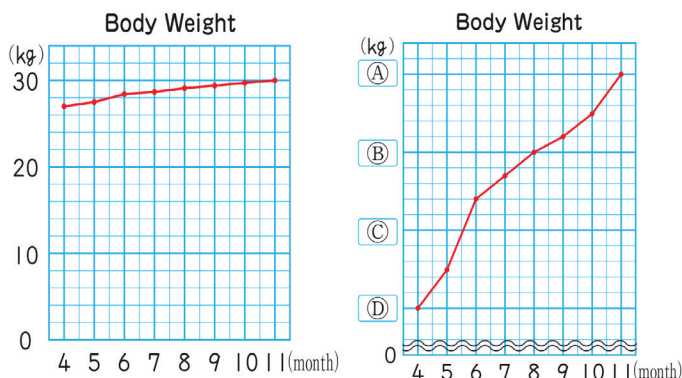
The table below shows how the temperature changes. Draw a line graph from the data in the table.



2. Consider the conditions A~D and decide which ones are better expressed as line graphs.

- (a) The height of the children in your class in April.
- (b) Your height as it was measured every April.
- (c) The temperature that was recorded at a particular time everyday.
- (d) Temperature that was recorded in different places at the same time.

3. The graph below shows how Asa's weight changed. He redrew it below to make it easier to read.



# TEACHING CONTENT - SAMPLE GUIDED LESSONS

**Strand: Number and Operation**

**Topic: Round Number**

**Content Standard : 4.1.2** Understand the meaning of approximation and rounding numbers

## 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 Rules of division.

Student will be able to;

### Attitude:

- Appreciate how to estimate and round number in daily life.
- Enjoy activities involving estimating and round numbers.

### Knowledge:

- Place value relationships such as 10 thousand = 100 hundreds = 1000 tens = 10 000 ones.
- The meaning of round numbers and explain them.
- Applying an understanding of place value and the role of zero to read, write and order numbers of any size.

### Skills:

- Recognise stating place value of any digit in large numbers.
- Ordering numbers of any size in ascending or descending order.
- Rounding numbers when estimating.
- Pose problems involving estimating and rounding numbers.
- Identify some of the ways numbers are used in our lives.
- Explain how estimation of numbers is used in everyday contexts.
- Compare and explain the relative size of large digit numbers.
- Solve a variety of problems using problem-solving strategies, including:
  - trial and error
  - drawing a diagram
  - working backwards
  - looking for patterns
  - using a table

### Mathematical thinking:

- The rule of estimation and rounding of numbers and how and when to used them.
- Solving problems using estimation and rounding.

## Back ground

### Rules for Rounding

Estimation is an important part of mathematics and our daily lives. Estimation is done when making budget for shopping, lengths of time, distance and many other physical quantities.

Estimation and rounding is a handy tool in our everyday life. Students need to learn the way of correct rounding numbers based on the convention of rounding up if the last digit is five or more and leaving the number if the last digit is zero to four.

To round off whole numbers

1. Find the place value you want the "rounding digit" and look to the digit just to the right of it.
2. If the digit you are rounding is followed by 5, 6, 7, 8, or 9, we can have the number changed and add 1 and replace the number to the right with 0 and round the number up.
3. If the number you are rounding is followed by 0, 1, 2, 3, or 4, we can have the number changed and replace number to the right with 0 and round the number down. Numbers can be rounded to the nearest ten, the nearest hundred, the nearest thousand, and so on.

To round off a decimal number

The same rules applies for the decimal numbers

1. Find the place value you want the "rounding digit" and look to the digit just to the right of it.
2. If the digit you are rounding is followed by 5, 6, 7, 8, or 9, round the number up.
3. If the number you are rounding is followed by 0, 1, 2, 3, or 4, round the number down. Numbers can be rounded to the nearest tenths, the nearest hundredths, the nearest thousandths, and so on.

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

# TEACHING CONTENT - SAMPLE GUIDED LESSONS

## L65. EXPRESSING NUMBERS AS A ROUND NUMBER

**Teaching and learning activities** ⌚ (30 min)

Read the following problem and do an

1. Present this problem to the students. Tau wanted to buy a packet of rice which cost K4.65. What amount should he give to the storekeeper? K4.00 or K5.00. Students can discuss and give the answer. Ask them to explain their answer.

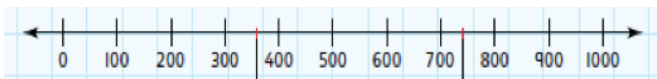
2. Introduce the new lesson on round numbers by introducing the students to these words 'round, approximate'

Round means to change to the nearest possible unit, above or below

Approximate means to guess or give an answer which is near enough to the correct answer without calculating or measuring

3. Solve this problem

Lets think about how to express approximate numbers and how to use them on the scale of hundred kina is the price of a digital camera. K360, is it closer to K400 or K300? How should you express it?



4. The table below shows the number of student in a province. How many student in elementary, primary and secondary school in that province in terms of ten thousands? Express your answer as Round Numbers.

	Elementary school	Primary school	Secondary school
Number of students	71238	39562	33695

(a) Think about how to express the number of primary and secondary students as round numbers in the 10 thousands place value on a number line.

(b) Which place value should we consider?

## L66. ROUNDING (1)

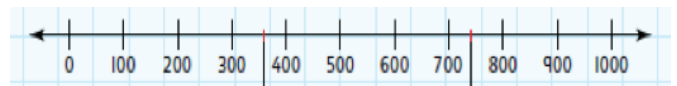
**Teaching and learning activities** ⌚ (30 min)

Explain that when we want to express a number as a round number to the nearest ten thousand we have to look at the thousands place and the number on the right

For example to 33695

To the nearest 10 thousand, 3695 is smaller than 5000 so we think of it as 0.0000  
33695 ~ 30 000

1. Round the price of a digital camera to the nearest hundred



2. The population of some of the province in Papua New Guinea are displayed in the table.

Name of province	Population	Year
Morobe Province	674,810	2010
NCD	364,125	2010
WHP	362, 850	2010
New Ireland province	194,067	2010
Gulf Province	106,197	2010
Manus Province	60,485	2010

(a) What is the population in hundred thousand for each province?

(b) What is the population in 10 thousand for each province?

3. Round the following numbers to the nearest thousand:

(a) 14 389 (b) 9 520 (c) 29 610 (d) 56 239  
(e) 3 492

4. Round to the nearest ten thousand:

(a) 24 987 (b) 24 033 (c) 37 096  
(d) 295 474 (e) 77 330

5. Round to the nearest hundred thousand:

(a) 929 689 (b) 754 300 (c) 103 232  
(d) 222 678 (e) 965 123



## L67. ROUNDING (2)

**Teaching and learning activities** ⌚ (30 min)

Explain that Estimation and rounding is a handy tool in our everyday life. Rounding numbers to the nearest ten, hundred or thousand when estimating.

Students need to learn correct rounding of numbers based on the convention of rounding up if the last digit is five or more and leaving the number if the last digit is zero to four.

1. Round the following numbers to the first place and second place from the largest place value. Think about which place value should we round and write the round numbers in the table.

	7869	4139	52630
Round number by the first higher place	8000		
Round number by the second higher place	7900		
Round number by the third higher place	7870		

2. Round the following numbers to the nearest place value indicated.

Hundreds

(a) 847    (b) 333    (c) 2 978    (d) 5 496

Thousands

(a) 3 467    (b) 67 534    (c) 543 796    (d) 48 435

3. Think of a number and write about your number following the example provided.

*E.g:* My number is 57. It has 5 in the tens column. This is worth 50. It is 60 when it is rounded to the nearest 10. It is even. It is in the 5 times table and so on.

- (a) Make any two-digit number. Write it below. Write down 5 facts about this number, as in the example above.
  - (b) Pick another two-digit number. Write it below. Write down 5 facts about this number.
  - (c) Pick any three-digit number. Write it below.
  - (d) Write down 5 facts about this number.
4. Pick a different three-digit number. Write it below. Write down 5 facts about this number.

## L68. ROUNDING (3)

**Teaching and learning activities** ⌚ (30 min)

Explain and allow student to complete the practices activities on rounding. Use the information provided to complete the task.

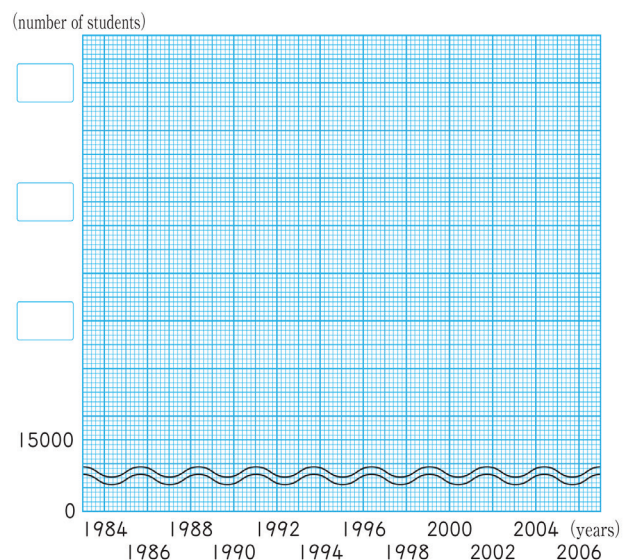
1. Read the numbers on the table below of an elementary and primary school in Jiwaka province.

Round of the number of students to the nearest 10 thousand.

Year	Number of students
1984	30293
1986	29087
1988	26787
1990	24516
1992	22865
1994	21643
1996	20566
1998	19430
2000	18531
2002	17771
2004	17135
2006	17176

2. Draw a line graph using the number of students rounded off to the nearest 10 thousand. Think about what scale to use for the graph. Use this as an example.

The number of elementary and Primary students in Jiwaka Province



## L69. ROUNDING UP AND DOWN

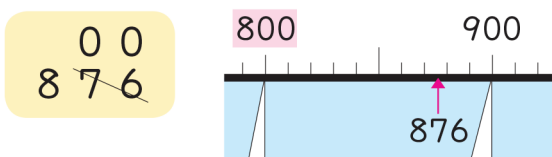
**Teaching and learning activities** ⌚ (30 min)

Explain that there are several ways to get to approximate numbers: Rounding Numbers.

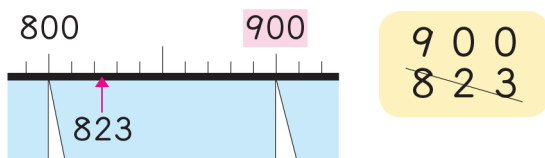
Rounding down numbers and rounding up number

1. Read the given situations and think about how to round the numbers.

There were 876 sheets of paper. If piling the papers in 100 sheets, how many piles can we make?



2. There were 823 people going on a trip by buses. One bus can carry 100 people. How many buses are needed for the trip?



**Exercise.**

1. Round to the second highest places number by rounding down.

(a) 28 138      (b) 3699      (c) 42 500  
(d) 9 810

2. Round to the first highest place number by rounding up.

(a) 28 138      (b) 3699      (c) 42 500  
(d) 9 810

## L70. EXERCISE

**Teaching and learning activities** ⌚ (30 min)

Explain to the student that estimate is the rough calculation of round number.

1. The table below shows the number of people who visited zoo in a day. About how many people in terms of thousands visited the zoo on that day? All student think and come up with their ideas

Day	No of People
Morning	2784
Afternoon	3428



Idea 1

Add the number of people in the morning and afternoon  $2784 + 3428 = 6212$ . Round the Number to the nearest thousand and get 6000



Idea 2

Round the numbers for morning and afternoon to the nearest thousands.  
 $2784 \rightarrow 3000$   
 $3428 \rightarrow 3000$   
 Then add the two numbers.  
 $3000 + 3000 = 6000$


- (a) About how many people in terms of thousands visited the zoo on this day?
- (b) How many more people visited the zoo in the afternoon than in the morning, in terms of hundred.

2. The weight of an elephant is 6270 kg. the weight of Kip is 38 kg. By how many times is the weight of the an elephant to Kip's weight.  
 $6270 \div 38$

Estimate the size of the quotient by rounding the dividend and divisor to their highest place.



## L71. EXERCISE

**Teaching and learning activities**  (30 min)

Complete all the exercises

1. Round the following numbers to the nearest ten thousand.  
(a) 47560    (b) 623845    (c) 284999
2. Round the following numbers in the hundreds place to thousands.  
(a) 38500    (b) 5132 91    (c) 49781
3. Round the following numbers to the second highest place  
(a) 67325    (b) 748500    (c) 195000
4. Answer the following questions.
  - (a) Which of the numbers below becomes 38000 when rounded to the nearest thousand.
  - (b) Which numbers become 39000 when rounded up to the nearest thousands.

38478, 37400, 38573, 37501, 38500,  
37573, 3890, 3799

# TEACHING CONTENT - SAMPLE GUIDED LESSONS

## Strand: Number and Operation

## Topic: Multiples and Divisors

**Content Standard: 4.1.10** Understand the properties of numbers and apply such properties to identify the component of numbers

### 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 Rules of division.

Students will be able to;

### Attitude:

- Appreciate how to estimate and round number in daily life.
- Enjoy activities involving estimating and round numbers .

### Knowledge:

- Place value relationships such as 10 thousand = 100 hundreds = 1000 tens = 10 000 ones.
- The meaning of round numbers and explain them.
- Applying an understanding of place value and the role of zero to read, write and order numbers of any size.

### Skills:

- Recognise stating place value of any digit in large numbers.
- Ordering numbers of any size in ascending or descending order.
- Pose problems involving estimating and rounding numbers.
- identify some of the ways numbers are used in our lives.
- Explain how estimation of numbers is used in everyday contexts.
- Compare and explain the relative size of large digit numbers.
- Solve a variety of problems using a table.

### Mathematical thinking:

To understand that mathematical expression of multiplication and division represent one amount.  
understand how to calculate four mixed operations

Preparation

Aspect of Assessment

(F) Think about how to calculate four mixed operations.

(F) Practice to master the skills of calculation of four mixed operations

# TEACHING CONTENT - SAMPLE GUIDED LESSONS

## Background

### Multiples

Multiples of 3 are whole numbers multiplied by 3 like  $3 \times 1$ ,  $3 \times 2$ ,  $3 \times 3$ .....  
 $0$  of  $3 \times 0$  is not a multiple of 3.

When you learn your times table in grammar school you were learning multiples of a number. To get these numbers, you multiplied by 1, 2, 3, 4 and 5 which are integers.

A multiple of a number is a number that number multiply by an integer. Integers are negative as well as positive, so other multiples of 2 are 2, 4, 6, 8 and 10. Would  $5 \times 3.1$  be considered a multiple? Yes because even though 3.1 is not an integer, it is a multiple by an integer so  $5 \times 3.1$  would be considered a multiple of 3.1

### Divisors

Divisors can be any number with which you want to divide another number (dividend).

Example;  $14 \div 2 = 7$  2 is the divisor. Divisors can also mean, a number that divides an integer evenly .

The whole numbers by which 12 can be divided with no remainder are called called divisors of 12. 1, 2, 3, 4, 6, 12.....divisors of 12

### Common multiples of 3 and 4 and their least common multiples.

The numbers that are divisors of both 12 and 18 are called common divisors of 12 and 18. The largest of all common divisors is called greatest common divisor.

# TEACHING CONTENT - SAMPLE GUIDED LESSONS

## L72. MULTIPLES AND COMMON MULTIPLES

**Teaching and learning activities** ⌚ (30 min)

1. Play a “ clap Number “ game.

When the “ clap number” is 3, every third person in the line or circle claps and say his or her number, such as third person in the line says claps and says 3. The next person would be 6 and 9..... can also use other numbers for the clap game.

2. On the table below write numbers in the table and colour the numbers that were clap on in the game.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22								

3. Put colour on the number line below. Discuss how the groups of coloured numbers are.

31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60

4. Clap by multiples of 2. Find the relationship of numbers clapped.

Circle the clapped numbers on the number line below.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32

33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48

49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64

### Exercise

Stack boxes of biscuits with a height of 5 cm.

1. What is the total height of six boxes?
2. Which multiple is the total height?
3. Write the first 5 numbers of the following multiples

(i) Multiples of 8

(ii) Multiples of 9

## L73. EXERCISE

**Teaching and learning activities** ⌚ (30 min)

Study the multiples of 2 in the tables below. How do the multiples of 2 line up?

Let's check the multiples of other number. Circle the multiples of 3.

Multiples of 2

Multiples of 3

1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40	31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50	41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60	51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70	61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80	71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90	81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100	91	92	93	94	95	96	97	98	99	100

Select any two numbers for the multiples and circle their multiples on the tables

Multiples of

Multiples of

1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40	31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50	41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60	51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70	61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80	71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90	81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100	91	92	93	94	95	96	97	98	99	100

# TEACHING CONTENT - SAMPLE GUIDED LESSONS

## L74. COMMON MULTIPLES (1)

Teaching and learning activities  (60 min)

1. Lets play “ clap number” by raising hands at the multiples of 2 and clapping at the multiples of 3.

Example:

1	2	3	4	5	6	7
1	2	3	4	5	6	7
1	2	3	4	5	6	7
1	2	3	4	5	6	7

For 6, raise hands and clap at the same time right?

Are the any other numbers which children raise hands and clap at the same time like 6.

2. Find the numbers that are multiples of both 2 and 3.

1	2	3	4	5	6	7	8	9	10	11	12	13	14
---	---	---	---	---	---	---	---	---	----	----	----	----	----

3. Write down the common multiples of 2 and 3.

4. What is the number of the least common multiple of 2 and 3?

A number that is a multiple of both 2 and 3 is called common multiple. The smallest of all common multiples is called least common multiple

For example : 2 and 3

2, 3, 6, 8, 10, 12, 14, 16, 18, 22, 24

3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36,

Therefore 6,12, 18, 24, are all common multiples of 2 and 3.

## L75. ROUNDING (3)

Teaching and learning activities  (60 min)

1. Think about how to get the common multiple of 3 and 4 and least common multiples.

Four friends found the ways to determine common multiples as follows. Let's read their ideas and describe each methods in sentence and explain their ideas to your friend.

Jimmi

Multiples of 3

3, 6, 9, 12, 15,18, 21, 27, 30, 33, 36

Multiples of 4

4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48

I find the common numbers from the the multiples of 3 and 4.



Tommy

Multiples of 3

3, 6, 9, 12, 15,

X x x 0 x

18, 21, 27.....

X x x



Alinsa

Multiples of 4

4, 8, 9,12, 16, 20

x x 0 x x,

24, 28, 32, 36

0 x x 0



Kila

Multiples of 3

3, 9, 12,

4, 8, 12

12 x 2 = 24     12 x 3 = 36



Making tapes of multiples

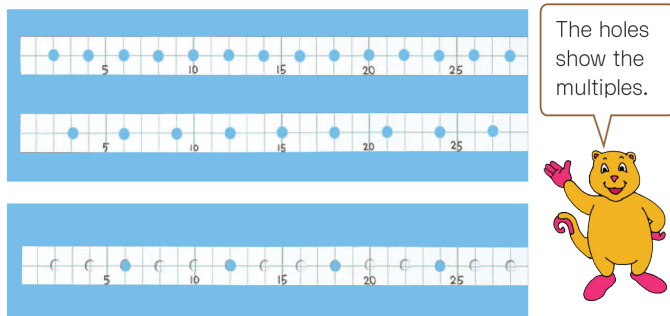
Place the tape of multiples od 2 on the top of the tape of multiples of. The common multiples of 2 and 3 are where the hole on both tapes overlap

## L75. ROUNDING (3)

**Teaching and learning activities** ⌚ (30 min)

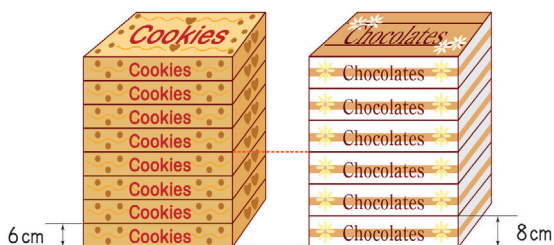
### 2. Making tapes of multiples

Place the tape of multiples of 2 on the top of the tape of multiples of 3. The common multiples of 2 and 3 are where the hole on both tapes overlap



The least common multiples of 3 and 4 is 12. All common multiples of 3 and 4 are multiples of the least common multiple.

### 3. Cookies boxes with height of 8 cm and chocolates candy boxes with a height of 8 cm are stacked.



- The total height of the cookies boxes are multiplied of what number?
- The total height of the candy boxes are multiples of what number?
- At what height will the total height of the cookie boxes and chocolate boxes be equal? How many boxes are in each stack?
- Write the first 3 numbers where the height of stacks are equal.

### Exercise

- Write the first 4 common multiples for each of the following groups of numbers. Find the least common multiples.
  - (5, 2)
  - (3, 9)
  - (4, 6)
- Stacks boxes with the height of 6cm and 9 cm. What is the smallest number where the total heights of the two stacks are equal?

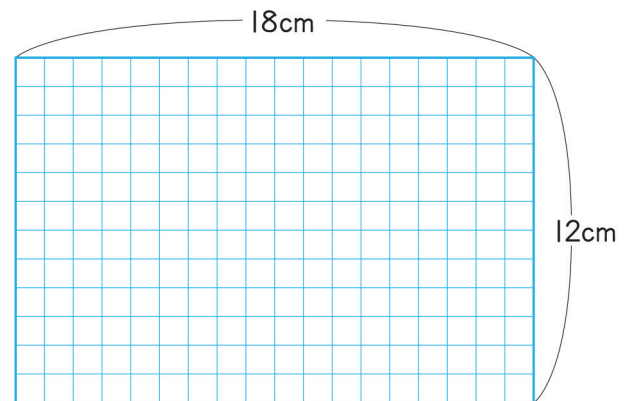
## L76. DIVISORS AND COMMON DIVISORS

**Teaching and learning activities** ⌚ (30 min)

### 1. Study the diagram below and think about how to calculate the width and length the frame.

We want to put squares in this frame so there are no gaps. How do we calculate the proper width and length of this frame?

Place squares of the same size in the a 12 cm x 18 cm rectangle. How long is each side of the square?

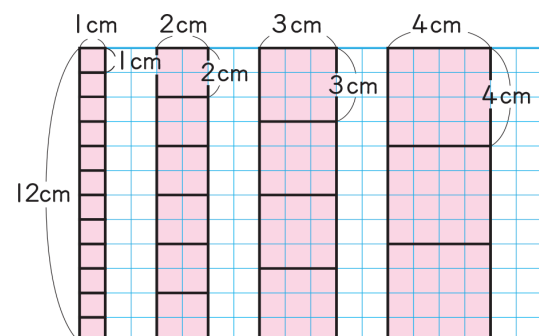


First, think of the length of the sides of the squares when the squares are lined up vertically without any gaps.

How many cm is each side of the squares when they are lined up vertically over a 12 cm length without any gaps?

### 2. The length of the sides of the squares when lined up vertically over 12 cm length without any gaps are 1 cm, 2 cm, 3 cm, 4 cm and 12 cm.

Divide 12 by 1, 2, 3, 4, 6, and 12 one by one.



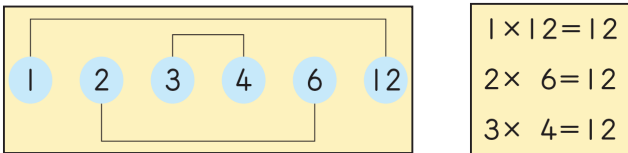


# TEACHING CONTENT - SAMPLE GUIDED LESSONS

## L76. DIVISORS AND COMMON DIVISORS

Teaching and learning activities (30 min)

What can you find when divisors of 12 are grouped as shown. Below



Any number is divisible by 1 and itself.

How many cm can the sides of the squares be when lined up vertically and horizontally with out any gaps?

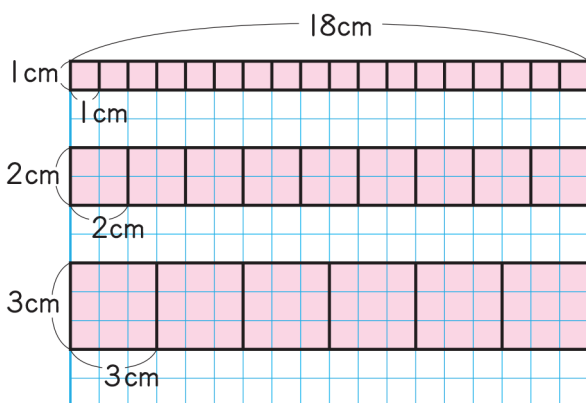
Next, think about the length of the sides of the squares when the squares are lined up horizontally without any gaps.



The length of the sides when lined up horizontally over a 18cm length without any gaps are 1 cm, 2 cm, 3 cm, 6 cm, 9 cm and 18 cm.

18 is included because we think only horizontally.

1,2,3,6,9,18 are divisor.....18.



## L77. COMMON DIVISORS

Teaching and learning activities (30 min)

1. Lets find the common divisors of the following situation given below.

(a) How many cm can the sides of the squares be when lined up vertically and horizontally with out any gaps?

Height.... (1) (2) (3) 4 (6) 12 (cm)

Width.... (1) (2) (3) (6) 9 18 (cm)

The numbers that are divisors of both 12 and 18 are called **common divisors** of 12 and 18. The largest of all common divisors is called **greatest common divisor**.

The common divisors of 12 and 18 are 1, 2, 3 and 6.

(b) What is the greatest common divisor of 12 and 18?

The common divisors of 12 and 18 are 1, 2, 3 and 6.

(b) What is the greatest common divisor of 12 and 18?

2. Let's think about how to find the common divisors of 18 and 24. Two friends calculated common divisors in different ways on their notebooks but did not complete. Complete their notebook by considering their thinking.

Divisors of 18,	(1), (2), (3), (6), 9, 18
Divisors of 24,	(1), (2), (3), 4, (6), 8,

3. Find all the common divisors. And find the greatest common divisors.

(a) (8,16) (b) (15, 20) (c) (12, 42)

(d) (13, 9)

There are some pairs of numbers like '4', that have only 1 as a common divisor.

**Exercise**

1. Find all the divisors of 6, 8, and 36, respectively.

2. Write all the common divisors of 8 and 36.

3. We want to divide 8 pens and 12 notebooks equally amongst children.

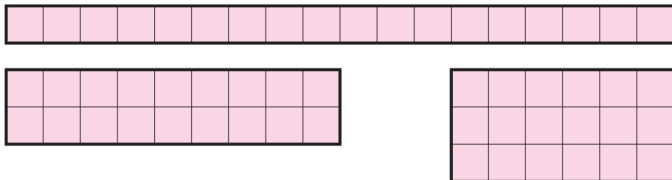
4. What should be the appropriate numbers of children for distribution?

## L78. THE RELATIONSHIP BETWEEN MULTIPLES AND DIVISORS

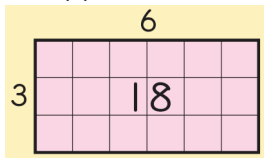
**Teaching and learning activities** ⌚ (30 min)

1. Let's think about the divisors of 18

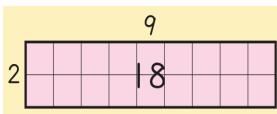
(a) Find the divisors of 18 by arranging 18 square cards to make rectangles.



(b) Is 18 a multiples of the divisors you found in (a)?



3 and 6 are divisors of 18.  
18 is a multiples of 3 and 6.



2 and are  divisors of 18.  
18 is a multiples of  and 9.

### Exercise

Let's write all the common divisors of the following pairs of numbers. Find the greatest common divisor for them.

(a) (9, 18)      (b) (4, 11)      (c) (12, 24)

## L79. PRIME NUMBERS

**Teaching and learning activities** ⌚ (60 min)

Some number like 2, 3, 5 and 7, are divisible by only 1 and itself. Find such numbers from among the following numbers. Divide by 2, 3, 4...in order to find them.

2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21
22	23	24	25	26	27	28	29	30	31
32	33	34	35	36	37	38	39	40	41

### Important Point

A number that can be divided only by one and itself is called prime number. One is not a prime number.

1. Let's represent whole numbers by a product form of prime number.

(a) Express 6 by product form of a prime number

(b) Express 30 by product form of a prime number.

$$30 = 5 \times 6$$

$$= 5 \times 3 \times 2$$

(c) Determine divisors of 30 by using the expression of (b) of above.

**Hint:** 2, 3 and 5 are easily find as divisors.

Divisors of 30 is the product of the combination of prime numbers.

2. Let's determine the greatest common divisor of 24 and 30 by using a prime number.

$$24 = 4 \times 6$$

$$= 2 \times 2 \times 2 \times 3$$

$$36 = 6 \times 6$$

$$= 2 \times 3 \times 2 \times 3$$

$$= 2 \times 2 \times 3 \times 3$$

When the multiple representation of prime numbers products are compared it is common

to,  $2 \times 2 \times 3 = 12$

$24 = 2 \times 2 \times 2 \times 3$

then the greatest common divisor is 12.

$36 = 2 \times 2 \times 3 \times 3$

## L79. PRIME NUMBERS

**Teaching and learning activities** ⌚ (60 min)

3. Discuss about how to determine the greatest common multiple of 24 and 36 by using a prime number.

Using multiple representation of a prime number products, let's find the numbers that should be multiplied to get the same products?

$$24 \times \square = 2 \times 2 \times 2 \times 3 \times \square$$

$$36 \times \square = 2 \times 2 \times 3 \times 3 \times \square$$

4. Let's use the theory of Sieve of Eratosthenes find prime numbers.

Determine a prime number that is less than 100 by the next procedure.

- (i) Erase 1.
- (ii) Leave 2 and erase multiple of 2.
- (iii) Leave 3 and erase multiple of 3.

Like this, leave the first numbers and erase its multiples. Using this method, a prime number like 2, 3, 5, 7, 11, etc, are left. By this method, find a prime number until 100.

This method is known as Eratosthenes who was mathematician in Ancient Greece and the name is taken from him and called Sieve of Eratosthenes.

2	3	4	5	6	7	8	9	10	
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

How many prime numbers are there?



## L80. COMMON DIVISORS

**Teaching and learning activities** ⌚ (30 min)

1. Divide numbers from 0 to 20 into 2 groups by writing them alternately in the two rows below. Start with 0 in the upper row and then 1 in the lower row, upper row, lower row ....sequentially.

(a) What kind of number are divided in these two rows?

0,

1,

(b) Divide the numbers in each row by 2

2. Divide the whole numbers into two groups as shown below

(a)

0, 18, 36

176, 212

(b)

1, 19, 37

177, 213

(i) In which group does 23 belong? How about 98?

(ii) What rule did you apply for dividing?

### Important Points

For the whole numbers, the numbers that can be divided by 2 without remainder are called even numbers and numbers that can be divided by 2 and leave a remainder 1 are called odd numbers.

3. Where can we use odd and even numbers? Think of place where numbers are used?

## L81. EXERCISE

**Teaching and learning activities**  (30 min)

1. Let's think about numbers up to 50.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50

- (a) Make a list of the multiples of 3.
  - (b) Make a list of the multiples of 3 and 7.
  - (c) Make a list of the common multiples of.
  - (d) Make a list of the divisors of 28.
  - (e) Make a list of the divisors of 32.
  - (f) Make a list of the common divisors of 28 and 32.
2. Write the 3 common multiples of the following pairs of numbers. Then find the less common multiples.
- (a) (3, 6)      (b) (8, 10)      (c) (3, 5)
3. Find all common divisors of the following pairs of numbers. Then find the greatest common factor.
- (a) (6, 12)      (b) (18, 20)      (c) (32, 42)

# TEACHING CONTENT - SAMPLE GUIDED LESSONS

**Strand: Number and Operation**

**Topic: Expressions and Calculations**

**Content Standard:** 4.1.5 Understand the rules and order of calculations in a mathematical expression

## Teacher Notes

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

The students will be able to:

## Attitude

- Appreciate the basic natural laws for mathematical expressions.
- Enjoy using commutative law, associative law and distributive law.
- Enjoy solving various problems exchanging among friends.

## Skills

- Use commutative law, associative law and distributive law to solve number problems.
- Solve number problems involving four individual operations.
- Make various problems from stories.
- Competently use the four operations to calculate to solve number problems.

## Knowledge

- Familiar with the four operations of whole numbers.
- Understand commutative law, associative law and distributive law of calculations.
- Master the order of calculations of four mixed operations and calculations with parenthesis.

## Mathematical Thinking

- Think about why commutative law and associative law work in addition and multiplication.
- Think about the meaning of distributive law.
- Think about how to calculate large numbers using the four operations.

## Background

Students are expected to develop competency in calculations through operations and apply numbers in practical situations to develop number sense.

We use ( ) to show a section that is calculated first like the total cost.

In an expression that includes addition, subtraction, multiplication and division, multiplication and division are calculate first even if there is no brackets ( ).

If you write the expression in order using an equal sign like above, the calculations can be Be easier.

## Oder of Calculation

An expression is usually calculated in order from the left.

1. Do operations within grouping symbols. If a ( ) is included, do the section inside the ( ) first.
2. Do multiplication and division anf they appear, from left to right. If the +, -, x, and ÷ are mixed, do multiplication and division first.
3. Do addition and subtraction as they appear, from left to right.

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

Addition

$$\blacksquare + \blacktriangle = \blacktriangle + \blacksquare$$

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

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

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

Multiplication

$$\blacksquare \times \blacktriangle = \blacktriangle \times \blacksquare$$

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

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

# TEACHING CONTENT - SAMPLE GUIDED LESSONS

## L82. REPRESENT THE EXPRESSIONS (1)

**Teaching and learning activities** ⌚ (60 min)

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

Vagi went shopping with 500 Kina. She bought a note book for 12 Kina, a calculator for 150 kina and a mobile phone for 250 Kina.

- (a) How much money does Vagi have left?
- (b) Discuss and write your ideas down in their exercise book.

Expected Ideas 1.

Can all items be bought? First how many kina do I have left if a calculator and a phone was bought?

2. Write the above idea as mathematical sentences.

$$500 - \square = \square$$

Idea 2.

Why don't we think about the total first?

Study the second idea and write a mathematical sentence.

(a) Write the second as mathematical sentence.

$$12 + 150 + 250 = \square \quad 500 - \square =$$

(b) Write the first idea as a mathematical sentence.

$$5000 \square - \square =$$

(c) Write the second idea as a mathematical sentence.

$$500 - \square (\square) =$$

money in hand      Total Cost      Reminder

3. Math stories for the following expressions.

(a)  $(1000 + 2000) \times 4$     (b)  $(3500 - 350) \div 3$

(c)  $632 - (312 + 230)$

## L83. MATH STORIES AND EXPRESSIONS

**Teaching and learning activities** ⌚ (60 min)

1. Read the situation and think about how to write a mathematical expression and calculate the answer.

Socks that cost K3.50 are sold at 30 toea discount. If you pay 10 kina. How much change do you get?



(a) Find the answer by representing this question as a mathematical sentence

2. Make Math stories for the following Expression.

(a)  $700 - (500 + 180)$     (b)  $500 - (450 - 40)$

Encourage student's thinking

Buying things that cost 500 kina and 180 kina

What kind of story can I make to put in side ( ).

(a)  $400 - (50 + 300)$     (b)  $600 - (150 - 110)$

3. Vagi had 250 kina. He bought 6 shirt at the cost of 20 kina and a bag for 15 kina.

Write math expression.

## L84. RULES FOR CALCULATION

**Teaching and learning activities** ⌚ (30 min)

- Read the given problem and solve it.  
Asa bought a racket for 90 Kina and two shuttlecocks for 5 kina each.
- Write an expression to find the total cost.
- Think about the order of calculation.

$$900 + 100 \times 2$$

Cost of a racket      Cost of shuttlecocks

If we calculate  $900 + 100$  first, what does it mean?



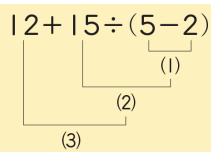
- The admission fee to an amusement park is K12. 00 for an adult and half for a student. Find the total fee for 2 adult and 1 student.

**2 adults and 1 student**

$$\boxed{\phantom{000}} + \boxed{\phantom{000}}$$

Admission fee for 2 adults      Admission fee for 1 student

- Think about how to calculate.  
 $12 + 15 \div (5 - 2)$



- Calculate the expression in numerical order (1), (2) and (3)

$$12 + 15 \div (5 - 2) = 12 + 15 \div 3$$

$$= 12 + 5$$

$$= \boxed{\phantom{00}}$$

### 4. Exercise

- |                              |                            |
|------------------------------|----------------------------|
| (a) $12 \div 2 \times 3$     | (b) $12 \div (2 \times 2)$ |
| (c) $(5 + 4) \times (6 - 2)$ | (d) $5 + 4 \times (6 - 2)$ |
| (e) $90 - 50 \div (4 + 6)$   | (f) $(90 - 50) \div 4 + 6$ |
| (g) $12 + 24 \div 4$         | (h) $75 - 10 \times 6$     |
| (i) $8 \times 5 + 20 \div 5$ |                            |

## L85. RULES FOR CALCULATION

**Teaching and learning activities** ⌚ (60 min)

- Calculate the following expressions A, B, C, and D in an easier way. Think about why they are calculated as shown
- $5 + 397 \rightarrow 397 + 5$
  - $389 + 234 + 266 \rightarrow 389 + (234 + 266)$
  - $55 \times 25 \times 4 \rightarrow 18 \times (25 \times 4)$
  - $18 \times 25 \times 4 \rightarrow$



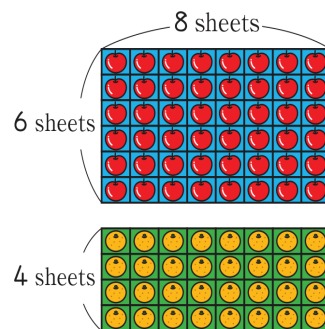
We can do that if the calculations are addition or multiplication.

Can we do calculations of subtraction and division in the same way?



- A: Order of addition is changed.  
B: Order of addition is changed by using parenthesis.  
C: Multiplicand and multiplier are changed.  
D: Order of multiplication is changed by using parenthesis.

- There are 2 sheets of stickers blow. How many stickers are there altogether?



Expected ideas

- $6 \times \boxed{\phantom{00}} + 4 \times \boxed{\phantom{00}} = 48 + \boxed{\phantom{00}}$
- $(6 + \boxed{\phantom{00}}) \times 8 = \boxed{\phantom{00}} \times 8 = \boxed{\phantom{00}}$

- A store sells fish for 20 kina each and gives a 2 kina discount for each fish, so Raka bought 6 fish. How much is the total cost. Represent this as expressions using 2 methods.

A.  $\boxed{\phantom{000}} - \boxed{\phantom{000}}$

B.  $(\boxed{\phantom{000}}) \times \boxed{\phantom{000}}$

Calculate the following

- $(4 + 16) \times 3$
- $5 \times (14 - 9)$
- $25 \times 4 + 15 \times 4$
- $30 \times 7 - 28 \times 7$



# TEACHING CONTENT - SAMPLE GUIDED LESSONS

## L86. CALCULATION OF WHOLE NUMBERS

**Teaching and learning activities** ⌚ (60 min)

1. Read the problem, make mathematical expression and calculate in vertical form  
Study the how to do calculation of whole numbers

*It is good to calculate in vertical form.*

*Addition and subtraction should be calculated according to the place column*

*In multiplication it is good to separate the multiplier according to the place values*

*In division we divide, multiply, subtract and bring down and repeat*

Read the problem, make mathematical expression and calculate in vertical form

There are 613681 boys and 586534 girls in the fourth grade.

What is the total number of children in the fourth grade?

Expression :

How many ten thousands students are there approximately?

6	1	3	6	8	1
+	5	8	6	5	3



There are many place values. So you should calculate by order according to their place values.



Which is the largest number, boys or girls? And what is the difference?

Expression:

## L87. CALCULATION OF WHOLE NUMBERS

**Teaching and learning activities** ⌚ (60 min)

Read the story, think about the kinds of problem we can make

An athletic festival was held at Port Moresby city. Participants of the competition. The budget for the participation award was 120000 kina and 500 participation awards were prepared. And 45 lunch boxes for the officials at 450 kina each were also prepared. 1758 men and 1564 women came to the festival that day, including the spectators. Various events were held in the morning and the 100 meter dash attracted the most number of participants, 18 groups of 7 took part. Stalls were also opened. 147 takoyi at 250 kina ND 184 yakisoba at 320 kina were sold. When the festival ended they were still short of 43 participation awards. It seems that they should prepare more participation awards for next year.

Do the Exercise

- (a)  $3064 + 1987$       (b)  $5006 + 3997$   
 (c)  $6102 - 2938$       (d)  $4000 - 3016$   
 (e)  $383 \times 247$         (f)  $738 \times 952$   
 (g)  $2652 \div 26$         (h)  $8.6432 \div 67$

## L88. EXERCISE

**Teaching and learning activities** ⌚ (30 min)

Do the following Exercises

Use the rules of calculation to complete the exercise

- |                                      |                                     |
|--------------------------------------|-------------------------------------|
| <b>(a)</b> $500 - (80 + 250)$        | <b>(b)</b> $650 - (430 - 60)$       |
| <b>(c)</b> $(40 + 50) \times 7$      | <b>(d)</b> $6 \times (18 - 3)$      |
| <b>(e)</b> $120 \div (12 - 4)$       | <b>(f)</b> $(37 + 18) \div 5$       |
| <b>(g)</b> $(11 - 4) \times (8 + 7)$ | <b>(h)</b> $(14 + 22) \div (9 - 5)$ |
| <b>(i)</b> $18 \times 8 \div 4$      | <b>(j)</b> $18 \times (8 \div 4)$   |
| <b>(k)</b> $28 - 3 \times (13 - 8)$  | <b>(l)</b> $(32 - 18) + 4 \times 5$ |
| <b>(m)</b> $1549 + 79328$            | <b>(n)</b> $45625 - 3088$           |
| <b>(o)</b> $351 \times 205$          | <b>(p)</b> $9792 \div 34$           |

Express the following questions as one expression and find the answer.

1. There were 60 sheets of paper. I used 15 sheets of paper yesterday and 20 sheets of paper today. How many sheets of paper are left?

$$60 - ( \square + \square )$$

2. There were 5 dozen pencils. The children used 40 pencils.

How many pencils are left?

$$\square \times 5 - \square$$

3. there were 100 sheets of coloured papers 18 students received 4 sheets each. How Sheets of paper are left?

$$\square - 4 \times \square$$

4. Asa paid 500 kina for 6 carton of SP bottle that costed 80 kina each. How much is the change did he receive back?

$$\square - \square \times \square$$

5. A pencil that costed 90 toea each and eraser that costed 50 toea each make on set.

There are 15 sets . how much is the total

cost?  $(\square + \square) \times 15$

6. calculate the following

**(a)**  $8 + 12 \times 3$       **(b)**  $40 - 12 \div (6 \div 2)$

**(c)**  $40 \times 8 - 5 \times 24$       **(d)**  $36 \div 6 \times 8 \div 12$

7. make math stories from the following expressions.

**(a)**  $(1000 + 2000) \times 4$       **(b)**  $(3500 - 350) \div 3$

# TEACHING CONTENT - SAMPLE GUIDED LESSONS

**Strand: Quantity of Measurement**

**Topic: Units of Area**

**Content standards: 4.2.1** Understand the meaning of the units of area and represent areas with numbers

## 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 Area.

The students will be able to:

### Attitude

Share ideas with friends on how to find area using the formula.  
Appreciate the usefulness of calculating area in real live situations.

### Skills

Explore ways to determine the area of squares and rectangles.  
Draw various shapes with same area.  
Comparing quantities using arbitrary units.

### Knowledge

Meaning of the units and measurement of area and determine the area by calculation.  
Relationship of quantity and mathematical expression to find area.

### Mathematical Thinking

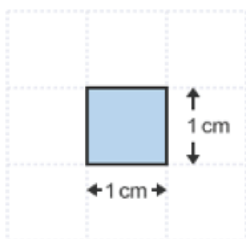
Think about how to find the area of a rectangle and square.  
Think about how to compare area and to express the area using arbitrary units.

## Background

The size is the amount of space surrounded by a line. This size is expressed as a number and is called area.

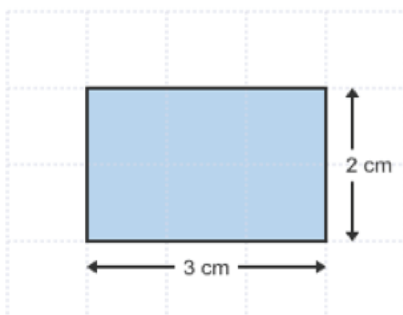
Area is expressed as the number of sets of a unit size.

## Counting squares



A square centimetre is the area within a square with sides of length  $1\text{ cm}$ , as shown above.

We say that it has an area of  $1\text{ cm}^2$  ( $1\text{ cm}$  squared).



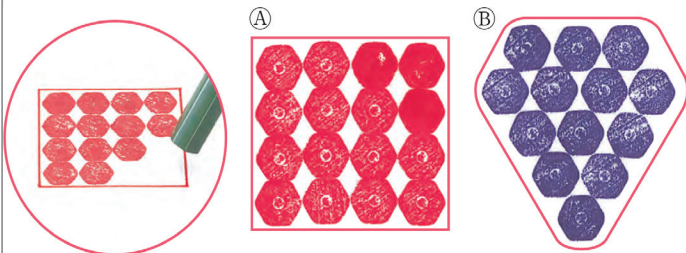
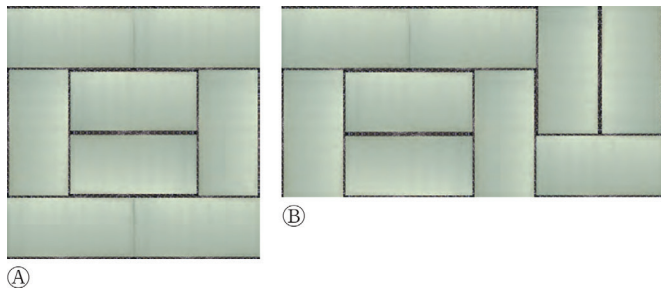
This rectangle contains six squares. Each of the squares has an area of  $1\text{ cm}^2$ , so the area of the rectangle is  $6\text{ cm}^2$ .

The area of a square with  $1\text{ m}$  sides is one square meter and is written as  $\text{m}^2$ .  $\text{m}^2$  is a unit of area just like  $\text{cm}^2$ .

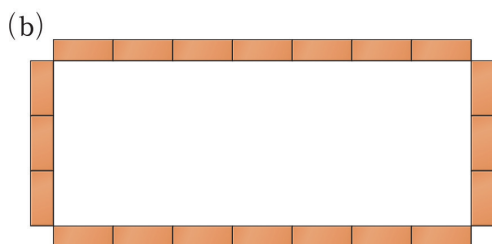
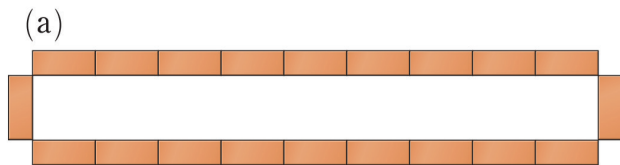
## L89. AREA (1)

Teaching and learning activities (60 min)

Study the pictures below and compare each one and answer the question.  
Which one is larger?

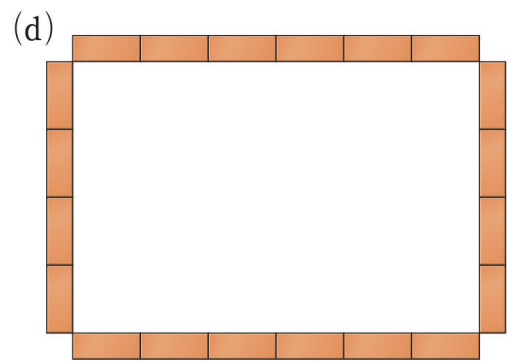
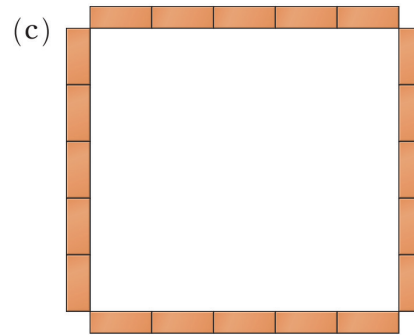


Think of how to make a square and rectangle flower bed with 20 blocks around the edges.



## L89. AREA (1)

Teaching and learning activities (60 min)



1. What rectangles can we make other than a, b, c and d?
2. Which one has the largest area?

Compare the areas of (c) and (d).

Expected ideas

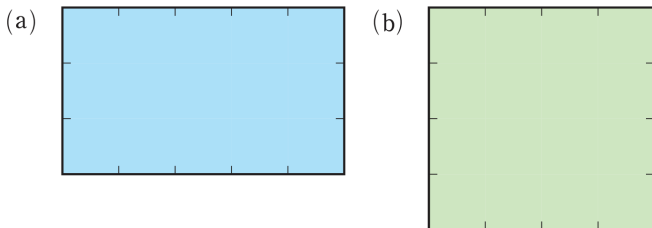
(1) Place one on top of the other and then compare the two sections that stick out.

(2) draw squares of the same size on the blocks.

## L89. AREA (1)

### Teaching and learning activities (30 min)

There are two sheets of coloured paper (a) and (b), which one is larger and how much larger is it? Check by drawing squares with 1 cm sides



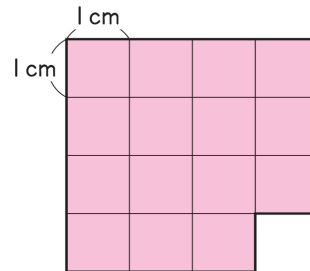
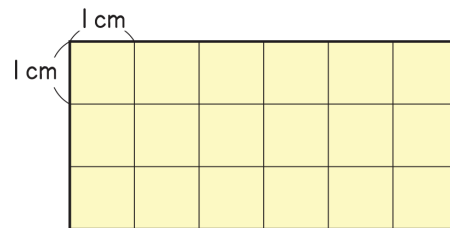
## L90. AREA (2)

### Teaching and learning activities (60 min)

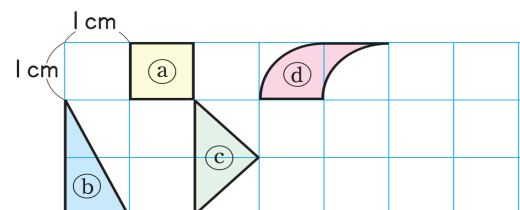
1. Measure the areas of various things by placing some squares with an area of  $1 \text{ cm}^2$ ,



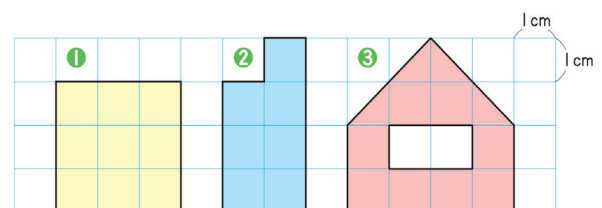
2. What is the area in  $\text{cm}^2$  of these shapes?



3. What is area in  $\text{cm}^2$  of the coloured figures below?



4. What is the area in  $\text{cm}^2$  of coloured figures below?



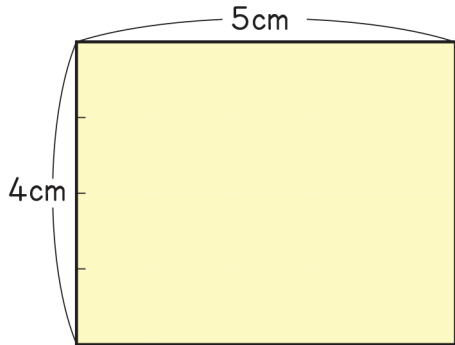
5. Draw different figures, each with an area of  $12 \text{ cm}^2$ .

**L91. AREA OF RECTANGLES AND SQUARE**

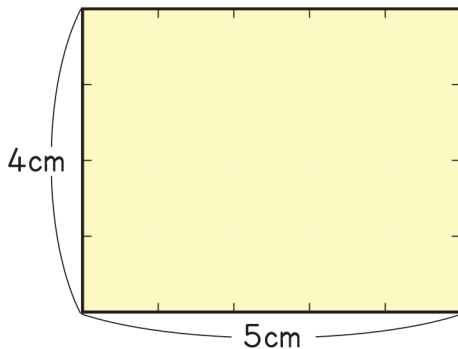
Teaching and learning activities (60 min)

Think about how to find the area of a rectangle on the right  $\text{cm}^2$ .

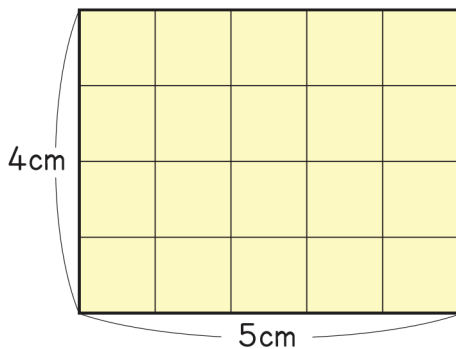
1. The length is 4 cm. How many  $1 \text{ cm}^2$  squares are lined up vertically?



2. The width is 5  $\text{cm}^2$  squares are lined up horizontally.



3. How many  $1 \text{ cm}^2$  square are there in this rectangle? And what is the area in  $\text{cm}^2$  of the Rectangle?



**L91. AREA OF RECTANGLES AND SQUARE**

Teaching and learning activities (60 min)

In the mathematical sentence below 4 represents the length and 5 represents the width.

Number of  $1 \text{ cm}^2$  squares ...  $4 \times 5 = \square$

Number of length    Number of width    Total number

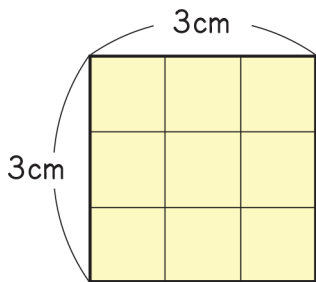
$4 \times 5 = \square$

Length (cm)    Width (cm)    Area ( $\text{cm}^2$ )

## L92. AREA OF RECTANGLES AND SQUARE

**Teaching and learning activities** ⌚ (30 min)

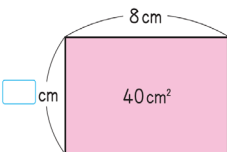
There are two sheets of coloured paper (a) and (b), which one is larger and how much larger is it? Check by drawing squares with 1 cm sides



The area of a square is expressed in the following formula.  
 $\text{Area of a square} = \text{one side} \times \text{one side}$

1. Find the area of the following rectangles and squares

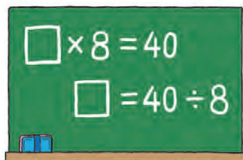
2. Draw a rectangle with  $40 \text{ cm}^2$  area and  $8 \text{ cm}$  width. What is its length in cm?



Think about how to find the answer using the formula for the area of a rectangle.

$$\square \times 8 = 40$$

Length      Width      Area

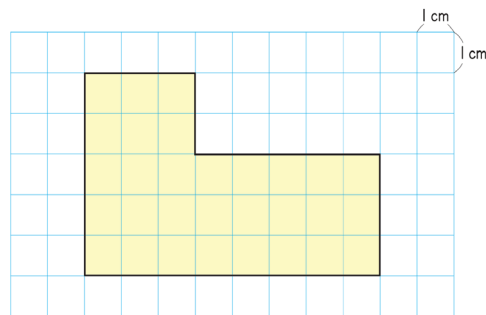


3. Make a rectangle with an area of  $50 \text{ cm}^2$ . If its width is  $10 \text{ cm}$ , what is its length in cm?

## L93. AREA OF FIGURES COMPOSED OF RECTANGLES AND SQUARES

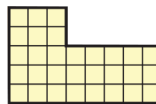
**Teaching and learning activities** ⌚ (60 min)

1. What is the area in  $\text{cm}^2$  of the following figures? Think about how to find the area.

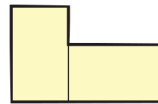


Expected ideas

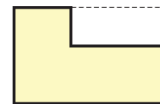
1. Count the number of  $\text{cm}^2$  squares as shown



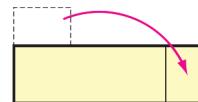
2. Calculate the area by dividing the figure into 2 rectangles as shown



3. Imagine this as large rectangle and then subtract the missing section

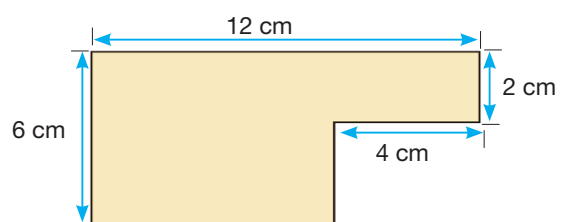


4. Calculate the area by dividing the figure into 2 rectangles as shown



Compare the 4 ideas and discuss how each of them is used for the figure above.

Find the area of the give shape





# TEACHING CONTENT - SAMPLE GUIDED LESSONS

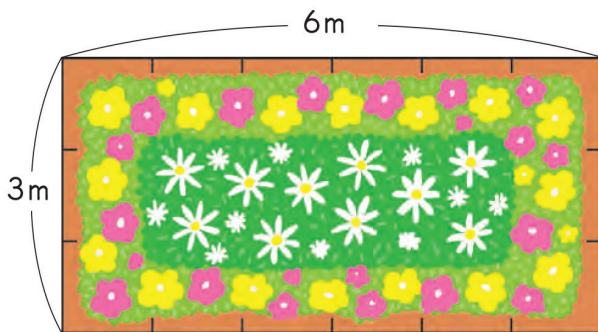
## L94. AREA OF RECTANGLES AND SQUARE

Teaching and learning activities ⌚ (60 min)

1. Let's make a square with 1m sides. How many children can stand on this square?

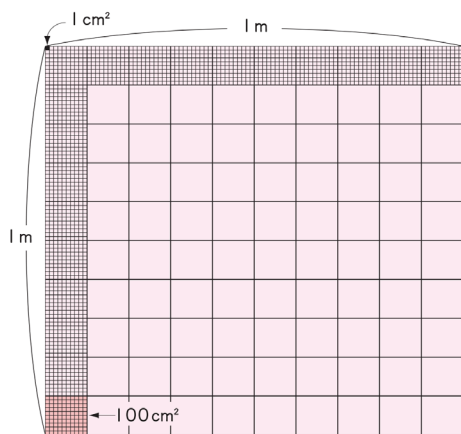
The area of square with 1m sides is called **one square meter** and is written as **1m<sup>2</sup>**. m<sup>2</sup> is a unit of area just like cm<sup>2</sup>.

2. What is the area in m<sup>2</sup> of a flower bed with a length of 3 m and width of 6 m?



3. How many 1 m<sup>2</sup> square can be placed in the flower bed?

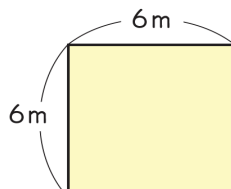
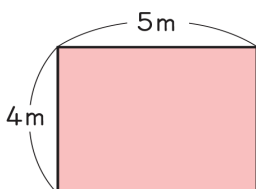
4. Calculate the area of these figures



1 m = 100 cm

100 × 100 =

1 m<sup>2</sup> = 10000 cm<sup>2</sup>



## L95. UNITS FOR LARGE AREAS

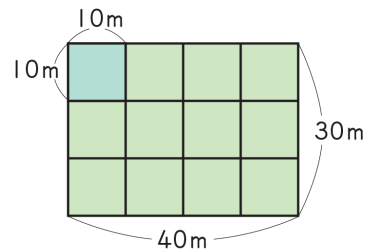
Teaching and learning activities ⌚ (60 min)

Make a newspaper poster with a length of 80 cm and with of 2 m. what is the area of the newspaper in cm<sup>2</sup>? to find the area, we need to express all the lengths using the same unit.

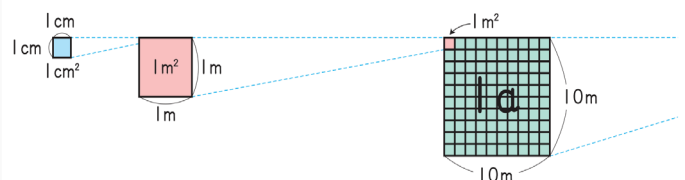
80 × 200 =

There is a rectangular field with a length of 30 m and a width of 40 m.

- How many m<sup>2</sup> is the field?
- How many 10 m squares can be place in the field?



There area 10 square meter is called **one are**, and is written a 1 a. a is used to show area of paddy fields.



1 m<sup>2</sup> = 10000 cm<sup>2</sup>, 1 a = 100m<sup>2</sup>

- What is the area in m<sup>2</sup> of the rectangular plaza with a length of 60 m and a width of 80 m. And what is this in a?
- What is the area in a of the field? Draw a square with an area of 1a on the ground.

## L96. UNITS FOR LARGE AREAS

**Teaching and learning activities** ⌚ (60 min)

There is a square farm with 600 m sides.

What is the area in  $m^2$  of the farm?

How many squares with 100 m sides can

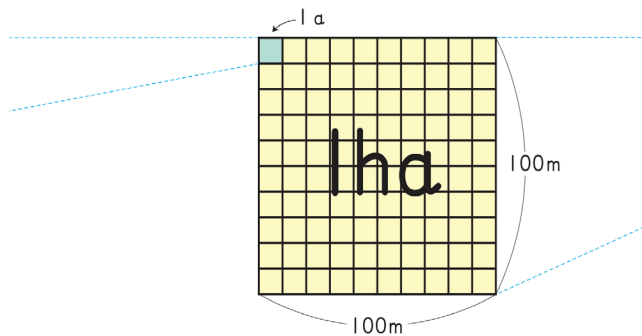
Be place in the farm?



The area of 100 square meter is called **one hectare**, and is written as 1 ha. Ha is used to show the area of a farm and forest

The area of a square with 1km sides is called **one square kilometre** and is written as **1km<sup>2</sup>**. km<sup>2</sup> is used to show large areas such as islands, provinces and countries.

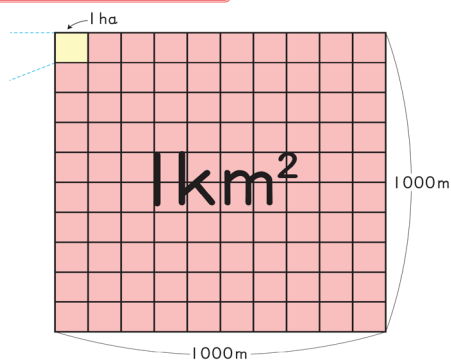
what is the area in ha of the farm?



$$1 \text{ ha} = 10000 \text{ m}^2$$

What is ha in a?

$$1 \text{ km}^2 = 1000000 \text{ m}^2$$



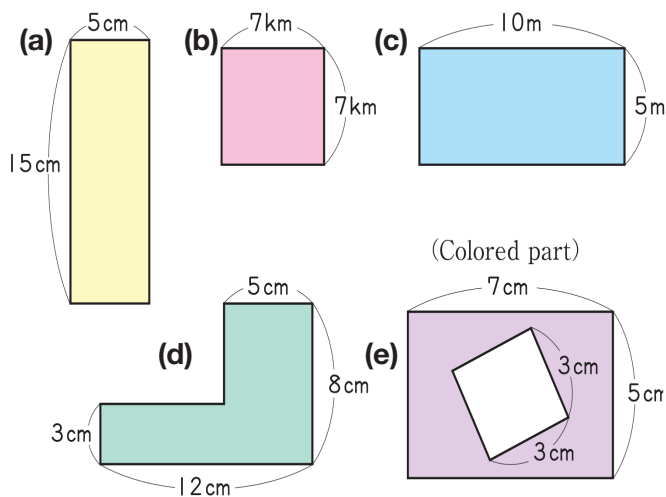
## L97. EXERCISE

**Teaching and learning activities** ⌚ (60 min)

1. Which of the units  should you use to represent the following areas?  $cm^2$ ,  $m^2$ , a, ha  $km^2$ .

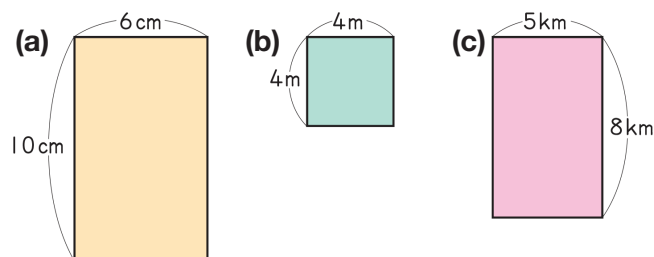
- (a) The area of a school yard
- (b) The area of a notebook
- (c) The area of Papua New Guinea
- (d) The area of a ruby field

2. Find the area of the following figures



3. Draw a rectangle with an area of  $60 \text{ cm}^2$  by determining its length and width.

4. Find the area of the following figures.



5. Answer the following questions.

- (a)  $1m^2$  is equal to  $10000 \text{ cm}^2$ . Let's explain the reason.
- (b) The area of rectangle with a length of 3 cm and a width of 5 cm can be found by  $3 \times 5$ . Let's explain the reason.
- (c) Compare the 4 ideas and discuss how each of them is used for the figure above. Find the area of the given shape

# TEACHING CONTENT - SAMPLE GUIDED LESSONS

## Strand: Number and Operation

## Topic: Introduction of decimal number

**Content Standard: 4.1.6** Understand the meaning of decimals, add and subtract numbers with one decimal place.

### 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 Decimal Numbers.

Students will be able to;

### Attitude

- Enjoy and appreciate recognizing situations of division problems and represent the given situations using figures and expressions.
- Appreciate and apply different ways of calculations based on  $56 \div 4$  and enjoy calculating.

### Skills

- Use rule of division to identify relationship the between two mathematical sentences.
- Use rule of division in dividing by ten and hundred.
- Apply rules of division using multiplication table to solve division problems.
- How to calculate when the division is 1-digit number and the dividends is a 2-digit number such as  $80 \div 4$ .
- To find and apply the rules of division to calculate when the dividends and divisors are the same and the quotient is unknown.
- To recognize and make sense of the given situation using a math expression and relate it to their everyday life.

### Knowledge

- Understand the rules of division and its usefulness in solving division problems.
- To understand division in relation to rules and relationships between mathematical sentences in division.
- Understand the relationships between division and multiplication.
- To understand Tens and Hundreds  $\div$  by 1 digit number can be calculated as 1 digit number divide by 1 digit number by making a unit of ten and hundred.
- To Appreciate and use rules of division and calculations for distributing things equally to divide tens and hundreds as dividend equally to one digit number.

### Mathematical thinking

- Think about a problem and identify rules and process to use in solving the problem.
- To be able to think about a given situation and make math expression and calculate.

# TEACHING CONTENT - SAMPLE GUIDED LESSONS

## Back ground Notes

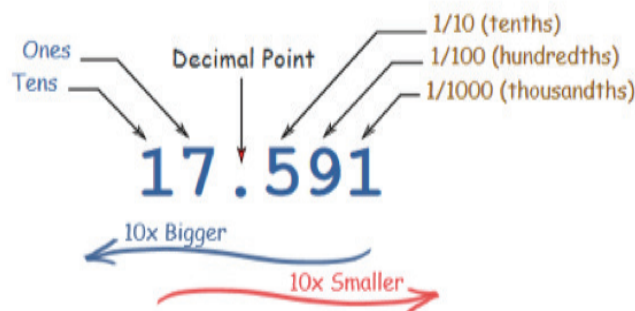
### The meaning of decimal

A decimal 0.342 is a proper fraction, which is a number less than 1. It is part of number 1.

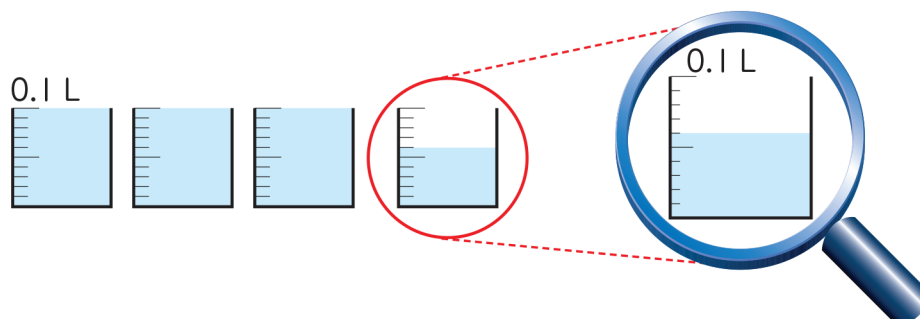
Since our numbering system is based on the powers of 10, it is called a decimal system decem in Latin means 10. In previous lessons we learn about whole numbers which are repeated addition of 1 : 1,2 ,3 ,4 and so on. In the topic of decimal we learn about numbers that are less than 1. They are the numbers we create when we divide 1 into equal parts. These parts of 1 will have the ordinal names of powers of 10. Tenths, hundredths, thousandths and so on. First we have to divide one into ten equal part and each part is called a tenth such 1set of  $0.1 = \frac{1}{10}$  or 2 sets of  $0.1 = \frac{2}{10}$

The decimal point separates the whole number on the left from the decimal digit on the right. Each decimal digit then indicates the number of tenths, hundredths, thousandths and so on. On the left of the decimal is a whole number such as ( 2 ) 2.13 . As we move further left every place gets 10 times bigger. 10 times bigger ← 2.13

The first digit on the right means tenths ( ) such as 1. As we move further right, every place gets 10 times smaller 2.13 → (10 times smaller) and so on, as shown in the example :



In order for students to understand the concept of decimal well it is important to teach using unit quantity such liters, meters and kilometers and so on. Eg: 1 liter, how cups of 0.1L would fill the 1 liter container. The markings on the containers and the different sizes of containers used will help student understand the concept of decimals and the unit idea.



## L98. HOW TO REPRESENT DECIMAL NUMBERS

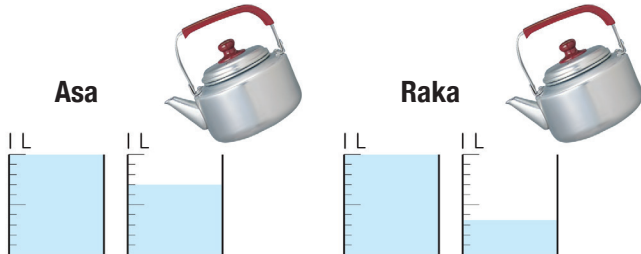
Teaching and learning activities  (60 min)

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

Raka bought some oranges at the super market weighing 1kg 264 g. How many kilograms was the weight o the oranges?



Study the diagram below of the experiment done by two student to find the volume of water contain by two kettles.



Asa and Raka each poured this much water. ‘  
How many liters is in each kettle?’

Expect ideas

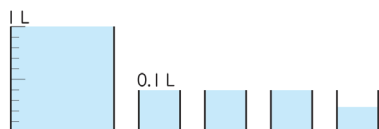
The amount of Asa’s water is 1 L and the remaining part.

Since the part over 1L is 7 sets of 0.1L.....



The amount of Asa’s water is  L.

The amount of Raka’s water is also 1L and remaining part. How can Raka’s water be expressed in Liters?



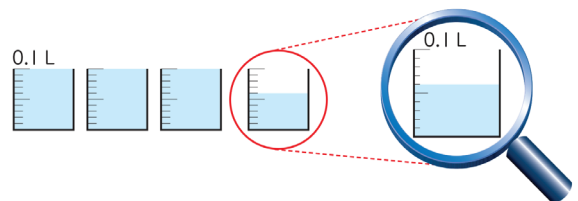
## L98. HOW TO REPRESENT DECIMAL NUMBERS

Teaching and learning activities  (60 min)

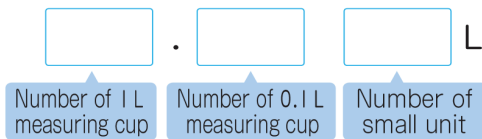
Observation

1. Measure the part over 1L by using a 0.1L measure
2. There is the remaining part smaller than 0.1. How can that be represented?

Measure the remaining part of the amount of water that is less than 0.1L through making the smaller scale by dividing 0.1L into 10 equal parts as shown

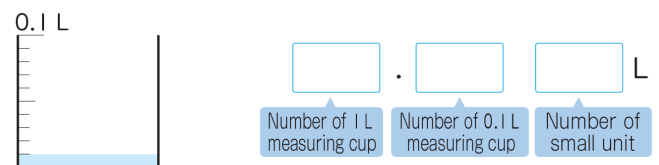


Represent the amount of Raka’s water.



The amount that is obtained by dividing 0.1L into 10 equal parts is written as 0.01L and is read as one hundredth litre or “zero point zero one litre”.

How many litres is the amount of 1 small unit scale?



The amount of Raka’s water is 1.36 L and is read as “one point three six litres”.

1 of 1L	is 1L
3 of 0.1L	is 0.3 L
6 of 0.01L	is 0.06
<u>Total</u>	<u>1.36L</u>

## L99. HOW TO REPRESENT THE REMAINING PART

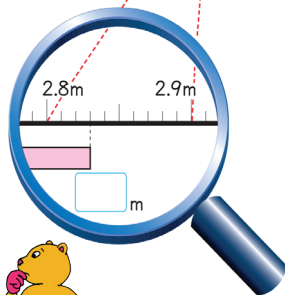
**Teaching and learning activities** ⌚ (60 min)

Read the following situation and solve it

Kip jumped 2 m 83 cm in a long jump.  
Write this length by using only meters as the unit.



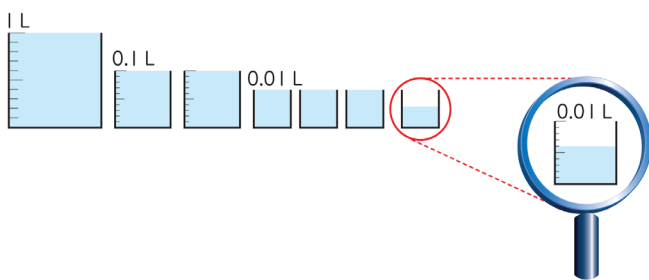
2 of 1 m is  m  
8 of 0.1 m is  m  
3 of 0.01 m is  m  
Total  m



Since 10 cm = 0.1 m,  
1 cm = 0.01 m, right?



Represent the amount of water that Asa poured into a kettle by using litre as the unit.



Measure the remaining part of the amount of water that is less than 0.01L through making the smaller unit scale by dividing 0.01L into 10 equal parts.

.    L

Number of 1 L measuring cup

Number of 0.1 L measuring cup

Number of 0.01 L measuring cup

Number of smaller unit scale

## L99. HOW TO REPRESENT THE REMAINING PART

**Teaching and learning activities** ⌚ (60 min)

Represent 1 kg 264 g by using kilograms as unit.



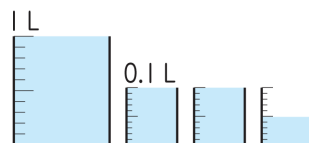
100 g is  $\frac{1}{10}$  of 1 kg  $\rightarrow$  0.1 kg  
10 g is  $\frac{1}{10}$  of 0.1 kg  $\rightarrow$  0.01 kg  
1 g is  $\frac{1}{10}$  of 0.01 kg  $\rightarrow$  0.001 kg

### Exercise

Do the following exercise

1. How many litres are the following amount of water?

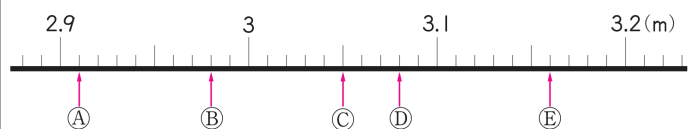
(a)



(b)



Read the following numbers marked by  $\uparrow$ .



Represent the following quantities by using the unit (l) .

1. 1435 mm (m) 2. 42195 m (km) 3. 875 g (kg)

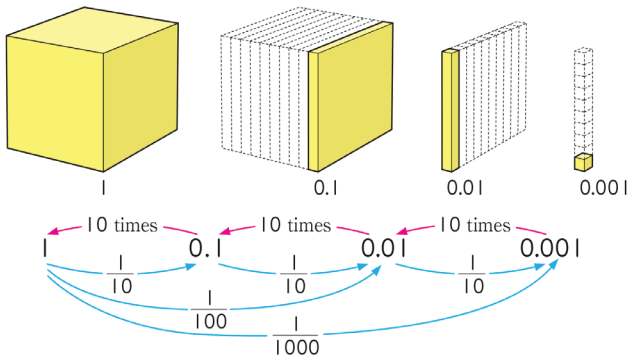
# TEACHING CONTENT - SAMPLE GUIDED LESSONS

## L100. STRUCTURE OF DECIMAL NUMBERS

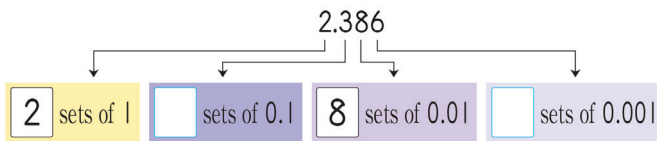
Teaching and learning activities ⌚ (60 min)

Investigate the relationship among 1, 0.1, 0.01 and 0.001

1. Let's look at the relationship among 1, 0.1, 0.01 and 0.001



2. Let's investigate the number 2.386.



### The Place Value in Decimal Numbers

From the first place to the right of the decimal point, the places are as follows.

Tenths place ( $\frac{1}{10}$  place),

Hundredths place ( $\frac{1}{100}$  place),

Thousandths place ( $\frac{1}{1000}$  place)

2	.	3	8	6
Ones place	Decimal point	Tenths place	Hundredths place	Thousandths place

Decimal numbers are represented by setting their places by ten times or  $\frac{1}{10}$  of the place values as with whole numbers.

3. Let's investigate the number 3.254.

(a) 3.254 is the sum of  sets of 1,  Sets of 0.1  Sets of 0.01 and  sets of 0.001.

(b) 3.254 is the sum of  sets of 0.001.

4. Arrange the following numbers in decending order

(a) 0.5, (b) 5, (c) 0.005, (d) 0, (e) 0.05

## L98. HOW TO REPRESENT DECIMAL NUMBERS

Teaching and learning activities ⌚ (60 min)

What is the number 10 times 0.039?

1	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$
0	0	3	9
0	3	9	

10 times

What is the number  $\frac{1}{10}$  of 0.58?

1	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$
0	5	8	

$\frac{1}{10}$

Every number multiplied by 10 moves to the next higher place, and  $\frac{1}{10}$  of every number moves to the next lower place.

### Exercise

1. Complete the following exercise.

(a) Write the number that the sum of 7 sets of 1, 3 sets of 0.1, and 5 sets of 0.001. how many sets of 0.001 make this number?

(b) Multiply the following numbers by 10 and find  $\frac{1}{10}$  of them.

(i) 0.74 (ii) 1.58 (iii) 26.95

Key ideas: dividing by 10 moves every digit one place to the RIGHT

1	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$
0	5	8	
0	0	5	8

$$0.58 \div 10 = 0.058$$

Move the decimal point one step to the left (10 has one zero)

The entire number moves one place to the right on the place value

The place value does not change, the number changes. Each number divided by 10 moves to the next.

# TEACHING CONTENT - SAMPLE GUIDED LESSONS

## L101. ADDITION OF DECIMAL NUMBERS

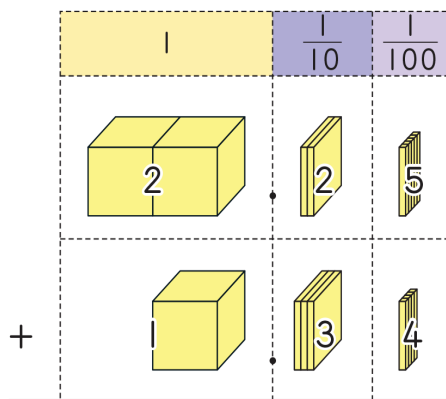
**Teaching and learning activities** ⌚ (60 min)

Read a problem given and think about how to solve.

There is 2.25 L of water in a tank. When 1.34 L of water is poured in to the tank how much water is there altogether?

1. Write an expression.

2. Think about how to add.



Add the numbers according to their place value. If there is no decimal point, it's the same as whole numbers

For adding decimal numbers in vertical form we line up the numbers according to their place values in the same way as the whole numbers.

### How to Add 2.25+1.34 in Vertical Form

$$\begin{array}{r} 2.25 \\ + 1.34 \\ \hline \end{array} \rightarrow \begin{array}{r} 2.25 \\ + 1.34 \\ \hline 3.59 \end{array} \rightarrow \begin{array}{r} 2.25 \\ + 1.34 \\ \hline 3.59 \end{array}$$

Line up the numbers according to their place values.

Calculate each place value in the same way as whole numbers.

Put the decimal point of the sum in the same position as the decimal points above.

## L101. ADDITION OF DECIMAL NUMBERS

**Teaching and learning activities** ⌚ (60 min)

3. Add the following in vertical form.

$2.16 + 0.73$

2	.	1	6
+	0	.	7
			3

$5.74 + 2.63$

5	.	7	4
+	2	.	6
			3

$9.23 + 0.47$

9	.	2	3
+	0	.	4
			7

Let's calculate

(a)  $6.27 + 3.51$

(b)  $8.46 + 0.32$

(c)  $1.54 + 2.38$

(d)  $4.72 + 3.49$

(e)  $9.62 + 0.18$

(f)  $4.25 + 2.75$

(g)  $3.21 + 2.51$

(h)  $8.28 + 0.54$



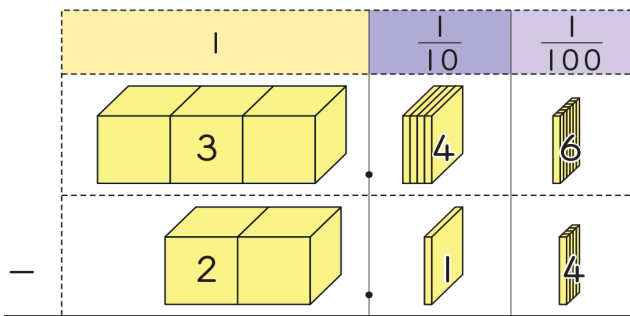
## L102. SUBTRACTION OF DECIMAL NUMBERS

**Teaching and learning activities** ⌚ (60 min)

- Let's read the problem and solve.  
Peter's older brother jumped 3.46m and Peter jumped 2.14 in the long jump. How long

(a) Write an expression

- Let's think about how to subtract decimal numbers.



### Important point

For subtracting decimal numbers in vertical form, we line up the numbers according to their place value in the same way as the whole numbers.

$$\begin{array}{r} 3.46 \\ - 2.14 \\ \hline 1.32 \end{array}$$

- Let's think about how to subtract  $1.25 - 0.67$  and solve.
- Practice  
Do these exercises  
(a)  $5.78 - 3.44$    (b)  $1.54 - 0.23$    (c)  $8.37 - 2.09$   
(d)  $6.48 - 1.92$

- Let's think about how to subtract the following

1  $2.32 - 1.82$

$$\begin{array}{r} 2.32 \\ - 1.82 \\ \hline \end{array}$$

2  $6.71 - 3.9$

$$\begin{array}{r} \phantom{6.}71 \\ - 3.9 \\ \hline \end{array}$$

3  $6 - 0.52$

$$\begin{array}{r} \phantom{6.}00 \\ - 0.52 \\ \hline \end{array}$$

4  $5.03 - 4.25$

$$\begin{array}{r} 5.03 \\ - 4.25 \\ \hline \end{array}$$

## L102. SUBTRACTION OF DECIMAL NUMBERS

**Teaching and learning activities** ⌚ (60 min)

- Read the problem and then try to solve it.  
There is a 2.15 m tape cut off 85 cm length of the tape. How much tape is left?

### Exercise

- (a)  $0.54 - 0.34$    (b)  $1.96 - 0.56$    (c)  $7.28 - 2.4$   
(d)  $9.15 - 8.6$    (e)  $4 - 1.26$    (f)  $3.4 - 1.84$   
(g)  $7.08 - 0.29$    (h)  $4.07 - 1.98$    (i)  $2.03 - 1.65$

- Explain the rules of calculations in decimals and why the following method is appropriate, for example  $\blacksquare = 3.8$ ,  $\blacktriangle = 2.3$ ,  $\bullet = 2.7$ .

(1)  $\blacksquare + \blacktriangle = \blacktriangle + \blacksquare$

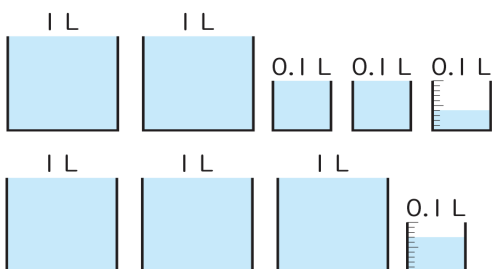
(2)  $(\blacksquare + \blacktriangle) + \bullet = \blacksquare + (\blacktriangle + \bullet)$

## L103. EXERCISE

**Teaching and learning activities** ⌚ (60 min)

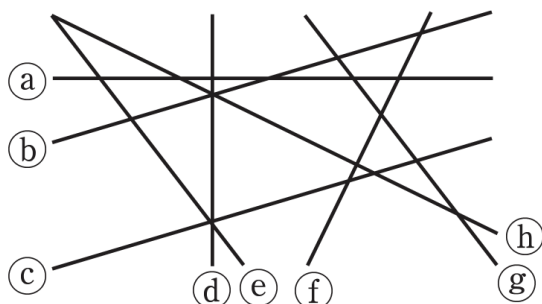
- Let's read the following amounts of water, lengths and weights  
**(a)** 3.92 L    **(b)** 5.17 m    **(c)** 0.05 L  
**(d)** 8.004kg

2. How much is the amount of water?



- Write the sum of 6 sets of 1, 4 sets of 0.1, 9 sets of 0.01 and 3 sets of 0.001
- Multiply the following numbers by 10 and find of them.  
**(a)** 0.46    **(b)** 2.79    **(c)** 18.83
- Add and subtract these decimal numbers  
**(a)**  $2.56 + 2.42$     **(b)**  $5.76 + 4.28$   
**(c)**  $10.8 + 3.45$     **(d)**  $0.87 - 0.17$   
**(e)**  $5.34 - 2.9$     **(f)**  $3.4 - 1.84$

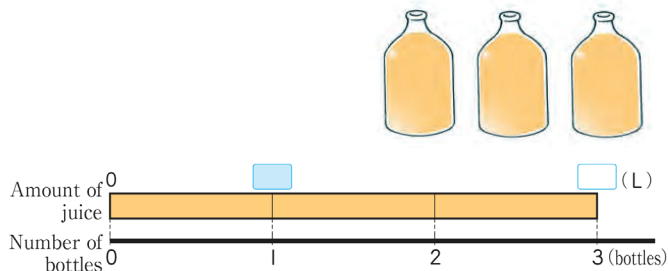
Select perpendicular lines and parallel line the diagram below



## L104. ADDITION OF DECIMAL NUMBERS

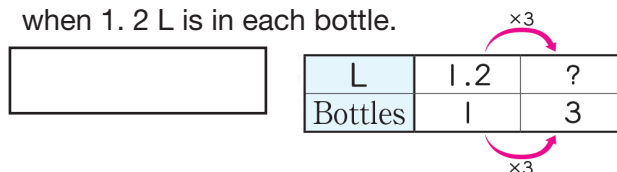
**Teaching and learning activities** ⌚ (60 min)

- Read the problem given and think about how to solve it.  
 There are 3 bottles of juice that contain  L each. How many liters are altogether?



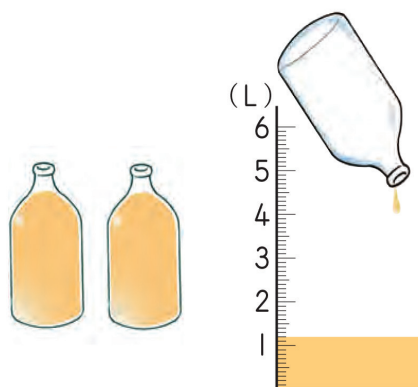
If we enter 2 L, then  $2 \times 3 = 6(L)$   
 If we enter 3 L, then  $3 \times 3 = 9$   
 So, if  is a whole number.

- Put various numbers in  for finding the amounts.
- Write the an expression for this situation, when 1.2 L is in each bottle.



- We can write an expression by using amount of one bottle x Number of bottles

- Think about how to calculate the answer by using what you have learned.



If we measure the amount. We can easily get the answer. How can we find the answer by calculation?

# TEACHING CONTENT - SAMPLE GUIDED LESSONS

## L104. ADDITION OF DECIMAL NUMBERS

Teaching and learning activities (60 min)

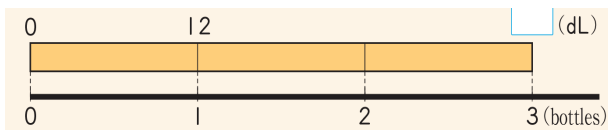
3. Read the ideas below and confirm with your students ideas.

Idea .1

If we change L to dL, we get  $1.2L = 12dL$ .

$$12 \times 3 = 36$$

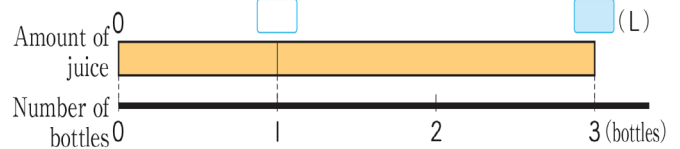
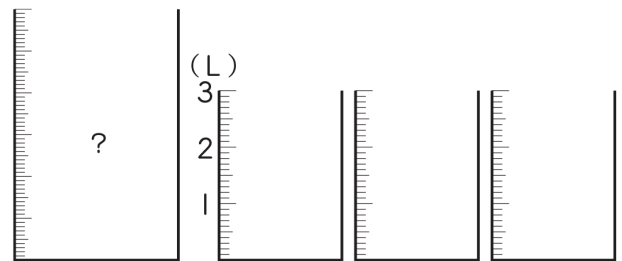
$$36 \text{ dL} = \square \text{ L}$$



## L105. DECIMAL NUMBERS ÷ WHOLE NUMBERS

Teaching and learning activities (60 min)

1. When we divide  $\square$  L of juice into 3 bottles equally, how many litres will each bottle contain?



2. Put various numbers in  $\square$  for finding the amount.

When we put in 6 L, the amount in each bottle is equal to  $6 \div 3 = 2(L)$

When we put in 9L, the amount in each bottle is equal  $9 \div 3 = 3 (L)$ . But if we put in 5.4 L, how can we calculate the answer.

3. Write an expression when we put 5.4L in the blank.

L	?	5.4
Bottles	1	3

$\overset{+3}{\curvearrowright}$   
 $\underset{+3}{\curvearrowleft}$

4. Calculate the amount of one by  
Amount of juice ÷ Number of bottles  
Let's think about how to calculate by using what we have learned.

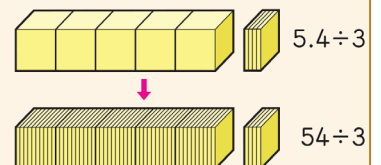
5. How can we calculate the answer if we convert L to dL?  
Can we calculate the answer by using the division of whole numbers

Expected ideas

5.4 is 54 times 0.1.

$$54 \div 3 = 18$$

18 times 0.1 is  $\square$ .



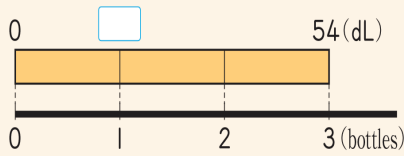
**L105. DECIMAL NUMBERS ÷ WHOLE NUMBERS**

Teaching and learning activities  (60 min)

$5.4 \text{ L} = 54 \text{ dL}$

$54 \div 3 = 18$

$18 \text{ dL} = \square \text{ L}$



I use the structure of decimal numbers and the rules of division.

$$\begin{array}{r}
 5.4 \div 3 = \square \\
 \downarrow \text{10 times} \\
 54 \div 3 = 18 \\
 \uparrow \frac{1}{10}
 \end{array}$$

All three of these calculations of decimal numbers are done by changing into whole numbers. Can you explain these ideas.

- Refer to activity 3, when the amount of juice is 5.1L, how many liters are in each bottle?

# TEACHING CONTENT - SAMPLE GUIDED LESSONS

**Strand:** Data and Mathematical Relations

**Topic:** Arrangement of Data

**Content Standard:** 4.4.3 Explore how to draw and read multi variable data by dimensional tables.

## 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 Arrangement of Data.

Students will be able to

## Attitude

- Appreciate the usefulness of tabulated information as a tool to link ideas and make decisions.

## Skills

- Draw frequency distribution tables and label the columns.
- Abstract information from the table and draw meaningful conclusions.
- Use the table information to draw graphical representation of data to compare and contrast.

## Knowledge

- Grasp the idea of tabulating information in order to make reasonable assumptions.
- Develop awareness of the use of table in data arrangement and form relationships.
- Familiar with the components of the frequency distribution table.
- Use the table information to link to environmental developments.

## Mathematical Thinking

- Logical thinking to draw conclusions and linkages from table information.

## Background

In teaching and learning of this topic, students are expected to acquire sound knowledge on how to interpret data by exploratory data analysis, develop and evaluate opinions formed from given information (inferences), predictions and arguments that are based on data.

# TEACHING CONTENT - SAMPLE GUIDED LESSONS

## L106. ARRANGEMENT OF TABLE (1)

### Teaching and learning activities (60 min)

Read the situation given and find solution to the problem.

Below is a record of Masashi's injuries at school for 3 days. He wants to make a poster to help other student to be more careful. What are some things he should do?

#### Some things to consider

1. What should we write on the poster?
2. What should we investigate?
3. I cannot make a poster if I do not know what we should be more careful of.
4. We may see some important things if we investigate the types of injury and where the injuries took place

#### Record of Injuries

Grade	Time	Locations	Type of injury	Grade	Time	Locations	Type of injury
5	8~9	Corridor	Bruise	1	13~14	Classroom	Scratch
4	10~11	Ground	Cut	2	13~14	Ground	Scratch
5	10~11	Corridor	Bruise	6	14~15	Gymnasium	Sprain
1	12~13	Classroom	Scratch	6	15~16	Ground	Sprained finger
3	13~14	Gymnasium	Scratch	5	8~9	Classroom	Cut
3	13~14	Ground	Fracture	5	10~11	Gymnasium	Scratch
6	14~15	Gymnasium	Scratch	3	10~11	Stairs	Bruise
5	9~10	Classroom	Cut	4	11~12	Gymnasium	Sprain
4	10~11	Ground	Scratch	2	11~12	Ground	Bruise
5	11~12	Gymnasium	Scratch	6	13~14	Classroom	Scratch
3	13~14	Gymnasium	Bruise	4	14~15	Corridor	Bruise

#### Number of Children and Locations

Locations of injury	Numbers of children
Ground	
Corridor	
Classroom	
Gymnasium	
Stairs	
Total	

## L106. ARRANGEMENT OF TABLE (1)

### Teaching and learning activities (60 min)

Follow the steps below to arrange the data on a table.

1. Make a table to see the location and types of injuries
2. Arrange the data in the above table and check the injuries at the school.
3. Where most injuries does happened.
4. What is the common injury?
5. What type of events happened most frequently?
6. Draw a table and check.

From the table drawn explain what you have noticed

## L107. ARRANGEMENT OF TABLE (2)

**Teaching and learning activities** ⌚ (60 min)

Study the injuries table and draw a table as shown. Fill in the table with a number for location and the type of injuries.

Locations and Types of Injuries

Type Location	Cut	Bruise	Scratch	Fracture	Sprained finger	Sprain	Total
Ground							
Corridor							
Classroom							
Gymnasium							
Stairs							
Total							

- What is the most frequent injury by location and type?
- Where did the largest number of injuries happen?
- What can you calculate from the above table?

Let's make the same investigation at your school.



- Make a bar or column graph from the information from the above table and explain to others.

Bar graph

column graph

## L108. ARRANGEMENT OF DATA

**Teaching and learning activities** ⌚ (30 min)

Study the table below. Vagi asked his class mates to draw a circle (O) to see if they have any gold fish or birds at home. Answer the questions about the graph.

Goldfish and Bird they have		
Hidenori <input checked="" type="checkbox"/> Goldfish <input checked="" type="checkbox"/> Bird	Kazuhiko <input checked="" type="checkbox"/> Goldfish <input checked="" type="checkbox"/> Bird	Yoko <input checked="" type="checkbox"/> Goldfish <input checked="" type="checkbox"/> Bird
Norie <input checked="" type="checkbox"/> Goldfish <input checked="" type="checkbox"/> Bird	Masao <input checked="" type="checkbox"/> Goldfish <input checked="" type="checkbox"/> Bird	Yuuki <input checked="" type="checkbox"/> Goldfish <input checked="" type="checkbox"/> Bird
Yuusuke <input checked="" type="checkbox"/> Goldfish <input checked="" type="checkbox"/> Bird	Keiko <input checked="" type="checkbox"/> Goldfish <input checked="" type="checkbox"/> Bird	Kazuya <input checked="" type="checkbox"/> Goldfish <input checked="" type="checkbox"/> Bird
Tomoko <input checked="" type="checkbox"/> Goldfish <input checked="" type="checkbox"/> Bird	Fumiko <input checked="" type="checkbox"/> Goldfish <input checked="" type="checkbox"/> Bird	Kazuko <input checked="" type="checkbox"/> Goldfish <input checked="" type="checkbox"/> Bird
Ikue <input checked="" type="checkbox"/> Goldfish <input checked="" type="checkbox"/> Bird	Yoshio <input checked="" type="checkbox"/> Goldfish <input checked="" type="checkbox"/> Bird	Fuyuko <input checked="" type="checkbox"/> Goldfish <input checked="" type="checkbox"/> Bird

- What kind of groups can they make from the way the O are marked?
  - How many children drew 2 O and what kind of group is this?
  - How many children drew 1 O and what kind of group is this?
  - Divide the children who drew 1 O into those who have gold fish and those who have birds. How many children are there each?
  - How many children drew nothing and what kind of group is this?
- Complete the table on the right.
- How many children have only birds?
- How many children have gold fish?

Tomoko <input checked="" type="checkbox"/> Goldfish <input checked="" type="checkbox"/> Bird	Hidenori <input checked="" type="checkbox"/> Goldfish <input checked="" type="checkbox"/> Bird	Kazuhiko <input checked="" type="checkbox"/> Goldfish <input checked="" type="checkbox"/> Bird	Yoko <input checked="" type="checkbox"/> Goldfish <input checked="" type="checkbox"/> Bird
--	--	--	--

(children)

		Goldfish		Total
		Yes	No	
Bird	Yes	2		
	No			
Total				

### Summary

The O represents who has gold fish or bird or both gold fish and bird at home?

## L109. EXERCISE

**Teaching and learning activities** ⌚ (60 min)

1. Study the table of injuries below and make a table of grades and types of injuries.

Record of Injuries

Grade	Time	Locations	Type of injury	Grade	Time	Locations	Type of injury
5	8~9	Corridor	Bruise	1	13~14	Classroom	Scratch
4	10~11	Ground	Cut	2	13~14	Ground	Scratch
5	10~11	Corridor	Bruise	6	14~15	Gymnasium	Sprain
1	12~13	Classroom	Scratch	6	15~16	Ground	Sprained finger
3	13~14	Gymnasium	Scratch	5	8~9	Classroom	Cut
3	13~14	Ground	Fracture	5	10~11	Gymnasium	Scratch
6	14~15	Gymnasium	Scratch	3	10~11	Stairs	Bruise
5	9~10	Classroom	Cut	4	11~12	Gymnasium	Sprain
4	10~11	Ground	Scratch	2	11~12	Ground	Bruise
5	11~12	Gymnasium	Scratch	6	13~14	Classroom	Scratch
3	13~14	Gymnasium	Bruise	4	14~15	Corridor	Bruise

Example of table;

Grades and Types of Injuries (children)

	Cut	Bruise	Scratch	Fracture	Sprained finger	Sprain	Total
1							
2							
3							
4							
5							
6							
Total							

2. We can make different tables from the data.  
Let's make different tables.

(children)

							Total
Total							



# TEACHING CONTENT - SAMPLE GUIDED LESSONS

**Strand: Number and Operation**

**Topic: Multiplication and Division of Decimal Number**

**Content Standard: 4.1.8** 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 division in vertical form.

Students will be able to;

## Attitude

Share ideas with other children on how to divide decimal and

## Knowledge

- Understand how to calculate (Decimal number)  $\times$  (Whole number) in vertical form.
- Decimal number.
- Multiplication of whole number (2-digit)  $\times$  (1-digit).
- Addition and subtraction of decimal number.
- Division of whole number (2-digit)  $\times$  (1-digit).

## Skills

- Understand the meaning of (Decimal number)  $\times$  (Whole number) based on a number line and table.
- Recognize the meaning of multiplication and division of decimal number.
- Calculate multiplication and division when multiplicand or dividend is decimal number.
- Understand the meaning of (Decimal number)  $\times$  (Whole number) based on a number line and table.

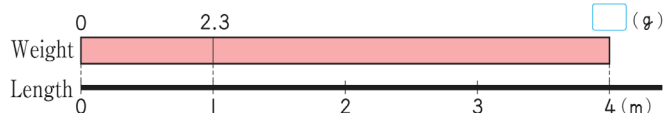
## Mathematical Thinking

- Think about how to calculate (Decimal number)  $\times$  (Whole number) in vertical form.
- Think about how to calculate (Decimal number)  $\times$  (Whole number).

## L110. CALCULATION OF (DECIMAL NUMBER)×(WHOLE NUMBER) (1)

**Teaching and learning activities** ⌚ (60 min)

- Read the problem and solve it. There is a 1 m wire that weigh 2.3 g. how many grams does 4 m of this wire weight?



How to multiple  $2.3 \times 4$  in vertical form.

### How to Multiply $2.3 \times 4$ in Vertical Form

$2.3$	$\rightarrow$	$2.3$	$\rightarrow$	$2.3$	$\rightarrow$	$2.3$	...Number of digits after the decimal point is 1.
$\times 4$		$\times 4$		$\times 4$		$\times 4$	...Number of digits after the decimal point is 1.
$9.2$		$9.2$		$9.2$		$9.2$	

Line up 3 and 4.      Multiply in the same way as with multiplication for whole numbers.      Put the decimal point of the product in the same place as the decimal of the multiplicand.

- (a) Let's write an expression.

g	2.3	?
m	1	4

- (b) Approximately how many grams does it weigh? Let's think about how to calculate.



We can think about how many sets of 0.1 are there.

We can use the rules of multiplication.



- (c) Let's think about how to multiply in vertical form.



Can we do multiplications of decimal numbers in the same way as with whole numbers?

We can calculate by changing decimal numbers to whole numbers.



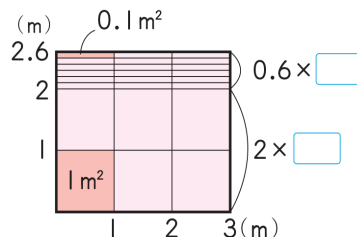
## L111. CALCULATION OF (DECIMAL NUMBER)×(WHOLE NUMBER) (2)

**Teaching and learning activities** ⌚ (60 min)

Read problem and solve the problem.

- What is the area of a flower bed that is 2.6 m wide and 3m long in  $m^2$  ?

- (a) Write an expression and multiply in Vertical form.



6 of  $1 m^2$  is   $m^2$

18 of  $0.1 m^2$  is   $m^2$

Total   $m^2$

- (b) Practice multiplying vertical form.

$$\begin{array}{r} 3.2 \\ \times 6 \\ \hline \end{array}$$

$$\begin{array}{r} 0.8 \\ \times 7 \\ \hline \end{array}$$

### Exercise

Do the following exercise in vertical form.

- (a)  $3.2 \times 3$     (b)  $3.3 \times 3$     (c)  $2.8 \times 2$     (d)  $1.4 \times 3$   
 (e)  $2.4 \times 4$     (f)  $4.3 \times 6$     (g)  $0.7 \times 6$     (h)  $0.8 \times 4$

## L112. CALCULATION OF (DECIMAL NUMBER) × (WHOLE NUMBER) (3)

**Teaching and learning activities** ⌚ (60 min)

1. Think about how to multiply in vertical form and solve the given problem.

(a)

$$\begin{array}{r} 2.5 \times 4 \\ \times \quad 4 \\ \hline \end{array}$$

(b)

$$\begin{array}{r} 0.4 \times 5 \\ \times \quad 5 \\ \hline \end{array}$$

2. Read the given situation and solve.

There are 13 bottles with 1.2 L of orange juice. How many litres are there altogether?



(a) Write an expression.

(b) Multiply in vertical form.

3. Do the following in vertical form.

(a)

$$\begin{array}{r} 1.6 \times 14 \\ \times \quad 14 \\ \hline \end{array}$$

(b)

$$\begin{array}{r} 1.5 \times 18 \\ \times \quad 18 \\ \hline \end{array}$$

(c)

$$\begin{array}{r} \quad 1.2 \\ \times \quad 13 \\ \hline \end{array}$$

### Exercise

1. Multiply in vertical form.

- (a)  $1.5 \times 6$  (b)  $3.6 \times 5$  (c)  $4.5 \times 4$  (d)  $2.5 \times 8$   
 (e)  $0.6 \times 5$  (f)  $0.8 \times 5$  (g)  $0.5 \times 6$  (h)  $0.2 \times 15$   
 (i)  $2.2 \times 12$  (j)  $1.2 \times 31$  (k)  $1.9 \times 14$  (l)  $1.7 \times 15$   
 (m)  $3.4 \times 12$  (n)  $4.8 \times 21$  (o)  $3.5 \times 18$  (p)  $2.9 \times 30$

## L113. ARRANGEMENT OF DATA

**Teaching and learning activities** ⌚ (60 min)

Read the given problem and solve.

There is a 2.35 km long path around a park. You go around a park 3 times by bicycle. How many kilometres did you cycle altogether?

Write an expression.

Think about how to multiply.

$$\begin{array}{r} 2.35 \\ \times \quad 3 \\ \hline \end{array}$$

Even if we have hundredth, we can multiply in vertical form as well as what we already learned.



Practice multiplying the following.

(a)

$0.24 \times 4$


(b)

$0.04 \times 5$


### Exercise

1. Do the following exercise

- (a)  $1.87 \times 2$  (b)  $0.63 \times 5$  (c)  $0.23 \times 4$   
 (d)  $0.12 \times 7$  (e)  $0.08 \times 5$  (f)  $0.15 \times 6$

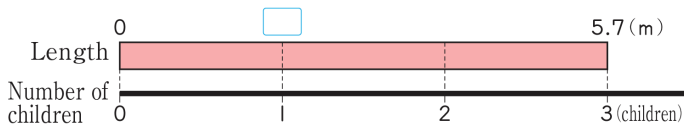
There is a 1 m bar that weighs 1.25 kg. What is the weight of 4 m of this bar in kg?

# TEACHING CONTENT - SAMPLE GUIDED LESSONS

## L114. CALCULATION OF (DECIMAL NUMBER) ÷ (WHOLE NUMBER) (1)

Teaching and learning activities  (60 min)

Divide a 5.7m ribbon equally among 3 children.  
How many meters will each one receive?



m	?	5.7
Children	1	3

↻  
÷3

Write an expression

Approximately how many meters is this? Think about how to divide.

We can calculate by changing decimal numbers to whole numbers.

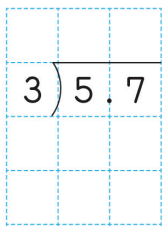


We can think about how many of 0.1 this is.



Think about how to divide in vertical form

Can we calculate the answer just as we did for the division of whole numbers? But where should we put the decimal point of the quotient?



Example of How to Divide  $5.7 \div 3$  in Vertical Form

How to Divide  $5.7 \div 3$  in Vertical Form

$$3 \overline{) 5.7}$$

Put the decimal point of the quotient in the same place as the dividend.

$$3 \overline{) 5.7}$$

When 5 is divided by 3, the quotient is written in the ones place.

$$\begin{array}{r} 1.9 \\ 3 \overline{) 5.7} \\ \underline{3} \phantom{0} \\ 27 \\ \underline{27} \\ 0 \end{array}$$

Then calculate as if this is the division of whole numbers.

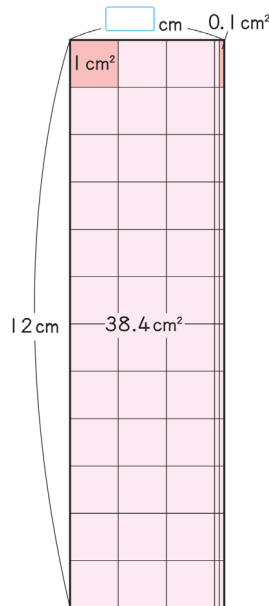
What is the unit for 27?

## L115. CALCULATION OF (DECIMAL NUMBER) × (WHOLE NUMBER) (2)

Teaching and learning activities  (60 min)

1. Solve the problem below.

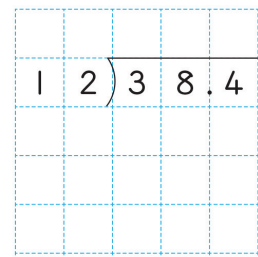
The width of the rectangle with an area of  $38.4 \text{ cm}^2$  and a length of 12 cm.



(a) Write an expression.

(b) Think about how to divide in vertical form and solve the problem in

Vertical form. Example;



Exercise

Do the following exercise in Vertical Form

(a)  $7.5 \div 5$

(b)  $6.4 \div 4$

(c)  $6.8 \div 2$

(d)  $52.9 \div 23$

(e)  $61.2 \div 18$

(f)  $58.8 \div 42$

## L116. CALCULATION OF (DECIMAL NUMBER)÷(WHOLE NUMBER) (3)

**Teaching and learning activities** ⌚ (60 min)

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

When we divide a 4.5m ribbon equally among 9 children, how many meter will each one receive?

$$4.5 \div 9$$

Explain: 1. we put the decimal point of the quotient in the same place as the the decimal point of the dividend and write 0 in ones place of the quotient because 4 is smaller than 9.  
2. since 4.5 is 45 sets of 0.1 we can calculate by using the same method that we used for whole numbers.

$$\begin{array}{r} 9 \overline{)4.5} \\ \downarrow \\ (1) \begin{array}{r} 0. \\ 9 \overline{)4.5} \\ \underline{45} \\ 0 \end{array} \\ \downarrow \\ (2) \begin{array}{r} 0.5 \\ 9 \overline{)4.5} \\ \underline{45} \\ 0 \end{array} \end{array}$$

2. Practice dividing  $1.61 \div 7$  and explain how you divide.

$$\begin{array}{r} 0. \\ 7 \overline{)1.61} \\ \underline{14} \\ 21 \\ \underline{21} \\ 0 \end{array} \quad \begin{array}{r} 0.2 \\ 7 \overline{)1.61} \\ \underline{14} \\ 21 \\ \underline{21} \\ 0 \end{array} \quad \begin{array}{r} 0.23 \\ 7 \overline{)1.61} \\ \underline{14} \\ 21 \\ \underline{21} \\ 0 \end{array}$$

### Exercise

Do the following exercise

1. Divide in Vertical Form

- (a)  $3.5 \div 5$     (b)  $4.8 \div 6$     (c)  $5.4 \div 9$   
 (d)  $1.62 \div 3$     (e)  $2.45 \div 5$     (f)  $3.96 \div 4$

## L117. DIVIDING CONTINUOUSLY

**Teaching and learning activities** ⌚ (60 min)

Read the problem and think about how to solve it.

1. When we divide a 7.3 m ribbon equally among 5 children. How many meters will each one receive?

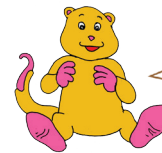
$$7.3 \div 5$$

Show this example and explain

$\begin{array}{r} 1.4 \\ 5 \overline{)7.3} \\ \underline{5} \\ 23 \\ \underline{20} \\ 3 \end{array}$	$\longrightarrow$	$\begin{array}{r} 1.46 \\ 5 \overline{)7.30} \\ \underline{5} \\ 23 \\ \underline{20} \\ 30 \\ \underline{30} \\ 0 \end{array}$
<div style="border: 1px solid red; border-radius: 10px; padding: 5px; width: fit-content; margin: auto;">This means 3 sets of 0.1.</div>		<div style="border: 1px solid red; border-radius: 10px; padding: 5px; width: fit-content; margin: auto;">We can think of this as 30 sets of 0.01.</div>

Division that is continued until the remainder is 0 and is called dividing continuously”.

Practice how to divide  $6 \div 8$  in vertical form.



We can continue to divide.

		0.7
8	6.0	
		56
		4

### Exercise

Divide the following in vertical form.

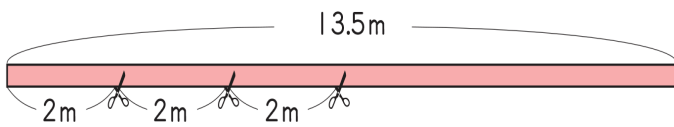
- (a)  $9.4 \div 4$     (b)  $8.6 \div 5$     (c)  $7 \div 5$   
 (d)  $5 \div 8$

## L118. DIVISION PROBLEM (1)

**Teaching and learning activities** ⌚ (60 min)

Solve the given problem.

1. There is a 13.5 m tape. Kila makes a floral decoration by using 2 m tape. Then, how many floral decorations does she make, and how much is left. Use the diagram to explain.



- (a) Write an expression.

m	2	$\div$	13.5
Decorations	1	$\div$	?

The calculation is shown here

$$\begin{array}{r} 6. \\ 2 \overline{) 13.5} \\ \underline{12} \phantom{0} \\ 15 \phantom{0} \end{array}$$

- (a) What is the remainder in meters?  
 (b) What is 15?  
 (c) Where should we put the decimal point of the remainder?

Show and explain

Dividend = divisor  $\times$  quotient + remainder

$$13.5 = 2 \times 6 + \boxed{\phantom{00}}$$

$$\begin{array}{r} 6. \\ 2 \overline{) 13.5} \\ \underline{12} \phantom{0} \\ 15 \phantom{0} \end{array}$$

**Remember**

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

**Exercise**

Solve the given problem

There is a 47.6 m of ribbon. If we cut it into 3 m each, how many 3 m ribbon are there?

## L119. DIVISION PROBLEM (2)

**Teaching and learning activities** ⌚ (60 min)

Solve this problem

1. We divide a 2.3 L of juice equally among 6 children. How many liters does each one receive?

- (a) Write an expression.

L	?	2.3
Children	1	6

$\div 6$  (above the table) and  $\div 6$  (below the table)

- (b) Study the division below. How can you read the answer

- (c) Round the quotient to the hundredths place and give the answer to the nearest tenths

**Remember**

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

$$\begin{array}{r} 0.383 \\ 6 \overline{) 2.3} \\ \underline{18} \phantom{0} \\ 50 \phantom{0} \\ \underline{48} \phantom{0} \\ 20 \phantom{0} \\ \underline{18} \phantom{0} \\ 2 \phantom{0} \end{array}$$

**Exercise**

1. Round the quotient to the hundredths place, and give answer to the tenths.

(a)  $5.5 \div 8$     (b)  $9.9 \div 7$     (c)  $67.8 \div 79$

(d)  $42.9 \div 14$

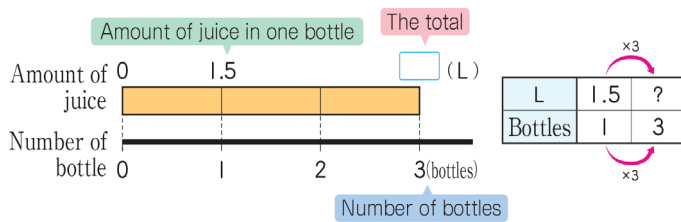
2. Divide a 16.3m tape equally into 3 sections, how many meters is one section? Round the quotient to the hundredths place, and give the answer to the tenths.

## L120. WHAT KIND OF EXPRESSION

**Teaching and learning activities** ⌚ (60 min)

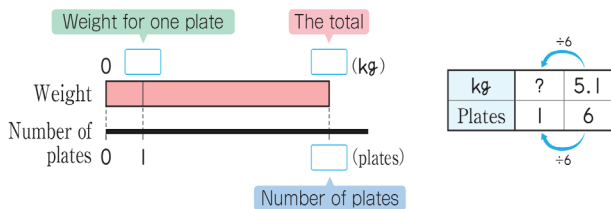
Solve the problem given.

1. There are 3 bottles of juice, each bottle contains 1.5 L of juice. How many litres are there altogether? Use the diagram to help you explain.



2. There are plates with the same weight. The total weight is 5.1 kg. how many kg does each plate weight?

- (a) What is known?  
 (b) What do you want to know?  
 (c) Write what is know in a diagram and find the answer.



3. Divide a 9 m rope equally into 5 sections, how many meters is each section? Draw a diagram and find the answer.

## L121. EXERCISE

**Teaching and learning activities** ⌚ (60 min)

1. Calculate the following in vertical form

- (a)  $5.3 \times 7$     (b)  $9.2 \times 49$     (c)  $70.5 \times 73$   
 (d)  $6.52 \times 4$     (e)  $0.26 \times 8$     (f)  $0.46 \times 5$   
 (g)  $6.5 \div 5$     (h)  $12.6 \div 7$     (i)  $8.1 \div 9$   
 (j)  $49.4 \div 19$     (k)  $65.61 \div 27$     (l)  $15.36 \div 32$

2. Find the quotient and round to the hundredths place and give the answer to tenths.

- (a)  $2.63 \div 3$     (b)  $40.4 \div 6$     (c)  $30.42 \div 14$   
 (d)  $5.6 \div 39$

3. Read and solve

- (a) There is a rectangular flowerbed with an area of 17,1 m<sup>2</sup>. The length is 3m. find the width of this flowerbed.  
 (b) There is 9L of rice that weight 8kg. how many kg does 1 L of this rice weight?  
 Round  
 The quotient to the hundredths place, and give the answer to the tenths.  
 (c) There are 25 books, each book weighs 14 kg. how many kg are there altogether?

4. Draw the following shapes,

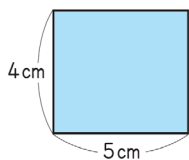
- (a) a parallelogram    (b) a rhombus

## L122. REVISION

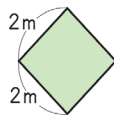
**Teaching and learning activities** ⌚ (60 min)

- Calculate the following in vertical form.  
**(a)**  $874 \times 346$    **(b)**  $769 \times 430$    **(c)**  $351 \times 205$   
**(d)**  $460 \times 3022$    **(e)**  $1976 \div 52$    **(f)**  $5216 \div 32$   
**(g)**  $1680 \div 48$    **(h)**  $2852 \div 28$
- Round the following numbers to the nearest place value indicated below.  
**(a)** 92861 (hundreds place)  
**(b)** 50765 (Thousands place)  
**(c)** 894720 (ten Thousand place)  
**(d)** 387400 (Ten thousand place)
- Develop an expression for the situation given and find the answer.  
 You buy 6 pencils that costs 80 toea each and pay ten kina. How much change from the 10 Kina?
- Find the area of the following shapes.

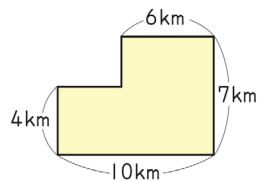
**(a)**



**(b)**



**(c)**



- Calculate the following.

- (a)**  $0.18 + 0.34$    **(b)**  $5.22 + 0.008$    **(c)**  $2.63 - 1.57$   
**(d)**  $8.5 - 4.65$    **(e)**  $2.8 \times 7$    **(f)**  $0.006 \times 15$   
**(g)**  $1.34 \div 2$    **(h)**  $13.6 \div 17$    **(i)**  $9 \div 4$



# TEACHING CONTENT - SAMPLE GUIDED LESSONS

**Strand: Number and Operation**

**Topic: Fractions**

**Content Standard: 4.1.9** Extend the understanding of Addition and subtraction to add and subtract fractions larger than one with same denominator.

## 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 addition and subtraction of Fractions.

Students will be able to;

## Attitude

Share ideas with other children on fraction larger than 1.

## Skills

- Understand the meaning of (Decimal number)  $\times$  (Whole number) based on a number line and table.
- Recognize the meaning of multiplication and division of decimal number.
- Calculate multiplication and division when multiplicand or dividend is decimal number.
- Understand the meaning of (Decimal number)  $\times$  (Whole number) based on a number line and table.

## Knowledge

- Understand how to calculate (Decimal number)  $\times$  (Whole number) in vertical form.
- Decimal number
- Multiplication of whole number (2-digit)  $\times$  (1-digit)
- Addition and subtraction of decimal number.
- Division of whole number (2-digit)  $\times$  (1-digit)

## Mathematical Thinking

- Think about how to calculate (Decimal number)  $\times$  (Whole number) in vertical form.
- Think about how to calculate (Decimal number)  $\times$  (Whole number)

## TEACHING CONTENT - SAMPLE GUIDED LESSONS

### Back ground

Proper fractions are smaller than 1, mixed fractions are larger than 1, and improper fraction are equal to 1 or more than 1.

1. When the denominators are the same, a fraction becomes larger as the numerator increases
2. When the numerator are the same, a fraction becomes smaller as the denominator increases
3. Some fraction have the same value even though both their denominators and numerators are different.

When subtracting of numerators cannot be done in subtraction of mixed fractions calculate by borrowing 1 from whole number part of the subtraction number.

When adding mixed fractions add the sum of whole number parts and the sum of denominator parts. When the sum of the denominator parts becomes improper fractions, carry up a whole number part

The sum of 1L and  $1\frac{1}{3}$  is written as  $1\frac{1}{3}$  L and is read as “one and one third liters”. It is also written as  $1\frac{4}{3}$  L and is read a “four thirds liters”.

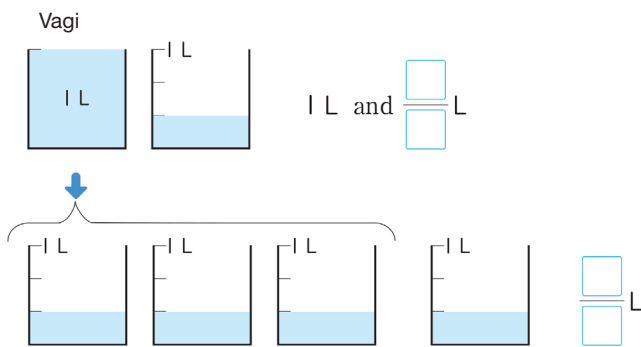
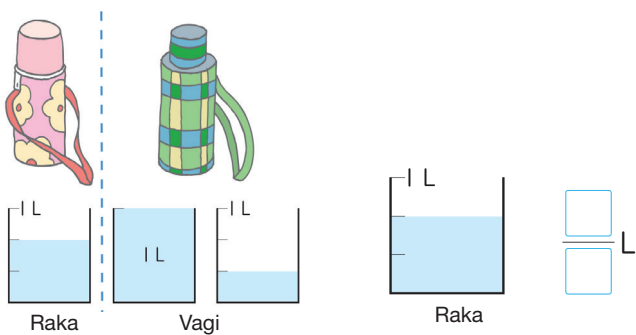
Fractions in which the numerator is smaller than the denominator, like  $\frac{1}{3}$  and  $\frac{3}{4}$ , are called **proper fractions**. Fractions that are the sum of a whole number and a proper fraction, like  $1\frac{1}{3}$  and  $1\frac{3}{4}$ , are called **mixed fractions**. Fractions in which the numerator is equal to or larger than the denominator, like  $\frac{4}{4}$  and  $\frac{7}{4}$ , are called **improper fractions**.

## L123. WHAT KIND OF EXPRESSION

**Teaching and learning activities** ⌚ (60 min)

Read and understand the given situation and give descriptions.

1. Study the water in each glass and answer the questions

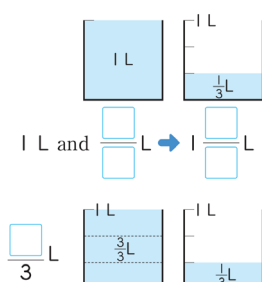


- (a) What are the amount of water in Raka's bottle and Vagi's bottle in litres?  
 (b) There are 4 sets of  $\frac{1}{3}$  L in Vagi's bottle. What do we say when it is more the 1 L?

2. What is the amount of water is in Raka's bottle and Vagi's bottle?

(a) 1 L and how many litres more?

(b) by looking at the figure on the right How many  $\frac{1}{3}$  L can we say?

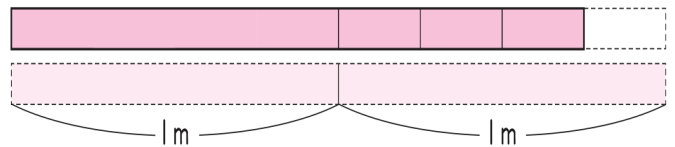


## L124. FRACTIONS LARGER THAN ONE (3)

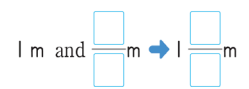
**Teaching and learning activities** ⌚ (60 min)

Think about how to express fractions larger than 1.

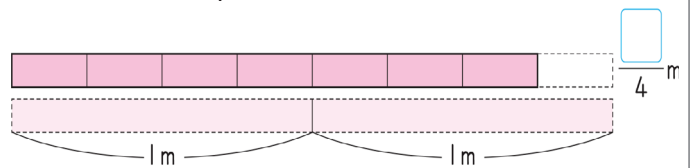
1. How many meters is the length of the tape below?



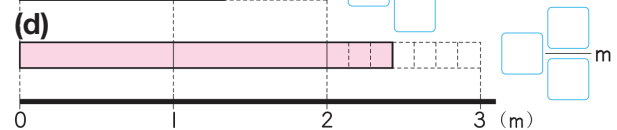
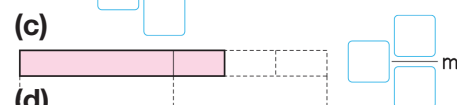
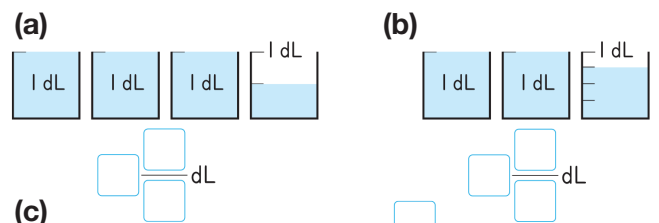
(a) 1 m and how many meter more?



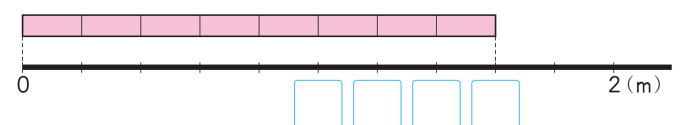
(b) By looking at the figure below, How many  $\frac{1}{4}$  m are there in the tape?



2. write the following lengths and amounts of water as mixed fractions.



3. Write 5 sets of, 6 sets of, 7 sets of and 8 sets of as improper fractions.



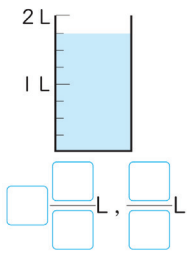
## L125. FRACTIONS LARGER THAN ONE (3)

**Teaching and learning activities** ⌚ (60 min)

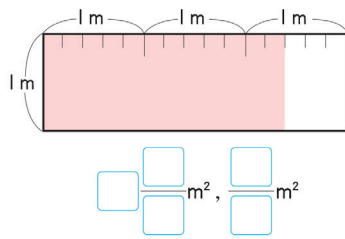
Think about how to change improper fraction to mixed fraction and vice versa.

- Write these fractions as mixed fractions and improper fractions.

(a)



(b)



- Change  $2\frac{4}{5}$  to an improper fraction by marking on the figure below



By looking at the fraction whose denominator is

$$5, 2\frac{4}{5} \text{ is } \frac{5}{5}, \frac{5}{5} \text{ and } \frac{4}{5}.$$

If a unit is  $\frac{1}{5}$ , we get  sets of  $\frac{1}{5}$  by  $5 \times 2 + 4$ .

$$2\frac{4}{5} = \frac{\text{input}}{5}$$

- Change  to a mixed fraction.  is divided into  and

Because  $4/4$  is equal to 1. We get  $7/4 =$

- Change  $15/5$  to a whole number.

### Exercise

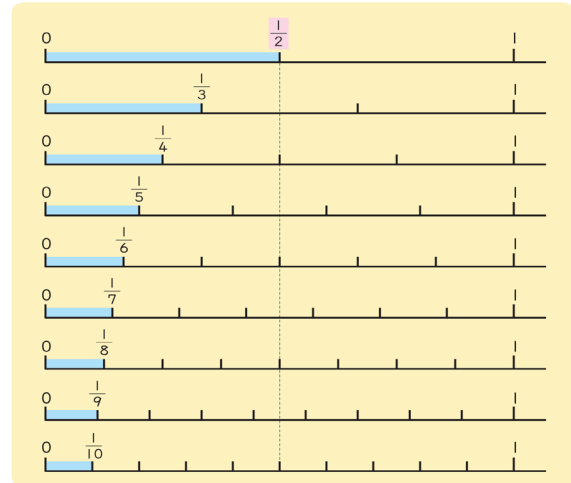
Change mixed fractions to improper fraction, improper fraction to mixed fraction or whole numbers.

$$4\frac{2}{3} \quad 2\frac{1}{6} \quad \frac{13}{4} \quad \frac{9}{5} \quad \frac{8}{2}$$

## L126. EQUIVALENT FRACTIONS

**Teaching and learning activities** ⌚ (60 min)

- Study the following number line.



- Read out the following fractions and from smallest to largest.
- Replace the numerators in activity 1 with 2 and read them again from smallest to largest.

**Hint:** when the numerator is the same and the denominators becomes larger, its fraction become smaller.

- Write fractions for that are equivalent to the following fractions.

(a)  $\frac{1}{2} = \text{input} = \text{input} = \text{input} = \text{input}$

(b)  $\frac{1}{3} = \text{input} = \text{input}$

(c)  $\frac{3}{4} = \text{input}$

- Let's look at the number line and find other fractions that are equal to the fractions in 2.
- Let's talk about what you have learned and summarize the results.

### Exercise

Which is larger? Let's fill the  with equality or inequality.

$$\frac{3}{5} \text{ input } \frac{3}{8}$$

$$\frac{3}{7} \text{ input } \frac{5}{7}$$

$$\frac{1}{2} \text{ input } \frac{4}{8}$$

## L127. ADDITION OF FRACTION (1)

**Teaching and learning activities** ⌚ (60 min)

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

Asa and Kip made coffee milk by mixing coffee and milk. How many liters did each one make ?

Think about how many sets of  $\frac{1}{5}$  this is.

**(a) Kip**

Coffee  $\frac{1}{5}$  L      Milk  $\frac{2}{5}$  L

$\frac{1}{5} + \frac{2}{5} = \square$

**(b) Asa**

Coffee  $\frac{3}{6}$  L      Milk  $\frac{4}{6}$  L

$\frac{3}{6} + \frac{4}{6} = \square$

### Exercise

- |                                 |                                 |                                 |
|---------------------------------|---------------------------------|---------------------------------|
| (a) $\frac{2}{4} + \frac{1}{4}$ | (b) $\frac{4}{7} + \frac{1}{7}$ | (c) $\frac{2}{8} + \frac{3}{8}$ |
| (d) $\frac{2}{3} + \frac{2}{3}$ | (e) $\frac{2}{5} + \frac{4}{5}$ | (f) $\frac{3}{9} + \frac{6}{9}$ |

## L128. ADDITION OF FRACTION

**Teaching and learning activities** ⌚ (60 min)

1. Calculate  $1\frac{3}{5} + 2\frac{4}{5}$  using diagrams and explain how to find the sum.

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

$= \square$

$\frac{5}{5} = 1$  (carrying up)

2. Calculate the  $3\frac{4}{7} + \frac{3}{7}$ .

### Exercise

Do the following exercise.

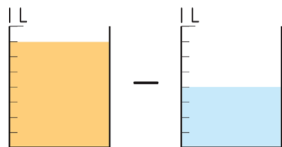
- |                                   |                                   |                                   |
|-----------------------------------|-----------------------------------|-----------------------------------|
| (a) $1\frac{1}{3} + 2\frac{1}{3}$ | (b) $3\frac{2}{7} + 1\frac{3}{7}$ | (c) $4\frac{3}{8} + 2\frac{4}{8}$ |
| (d) $2\frac{2}{6} + 4\frac{3}{6}$ | (e) $3\frac{1}{5} + 5\frac{3}{5}$ | (f) $3 + 3\frac{5}{6}$            |
| (g) $1\frac{2}{3} + 2\frac{2}{3}$ | (h) $1\frac{5}{7} + 1\frac{3}{7}$ | (i) $2\frac{1}{5} + 3\frac{4}{5}$ |
| (j) $2\frac{7}{9} + \frac{4}{9}$  | (l) $\frac{2}{7} + 4\frac{6}{7}$  | (m) $\frac{1}{4} + 2\frac{3}{4}$  |

## L129. SUBTRACTION OF FRACTION

Teaching and learning activities ⌚ (60 min)

1. How many litres is  $\frac{7}{8}$  L of juice than  $\frac{4}{8}$  L of milk?

Think about how to calculate the answer.



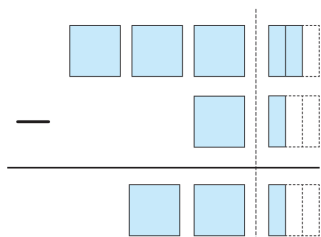
The difference is how many sets of  $\frac{1}{8}$ ?



$$\frac{7}{8} - \frac{4}{8} = \square$$

2. Calculate  $3\frac{2}{3} - 1\frac{1}{3}$ , using diagrams and explain.

$$3\frac{2}{3} - 1\frac{1}{3} = \square \frac{\square}{3}$$



### Exercise

Calculate the following.

(a)  $\frac{3}{4} - \frac{2}{4}$

(b)  $\frac{6}{7} - \frac{2}{7}$

(c)  $\frac{10}{9} - \frac{8}{9}$

(d)  $6\frac{5}{7} - 4\frac{3}{7}$

(e)  $8\frac{2}{5} - 5\frac{1}{5}$

(f)  $7\frac{5}{9} - 4\frac{4}{9}$

## L130. SUBTRACTION OF FRACTIONS

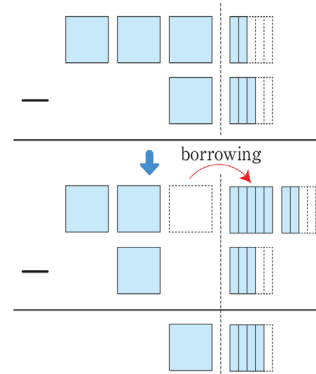
Teaching and learning activities ⌚ (60 min)

Think about how to solve

1. Calculate  $3\frac{2}{5} - 1\frac{3}{5}$  using diagrams and explain.

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

$$= 1\frac{\square}{5}$$



Calculate  $3 - 1\frac{1}{4}$ .

$$3 - 1\frac{1}{4} = 2\frac{\square}{4} - 1\frac{1}{4}$$

$$= 1\frac{\square}{4}$$

### Exercise

Do the following exercises

(a)  $1\frac{2}{4} - \frac{3}{4}$

(b)  $1\frac{4}{9} - \frac{8}{9}$

(c)  $1\frac{1}{6} - \frac{2}{6}$

(d)  $6\frac{2}{7} - 4\frac{5}{7}$

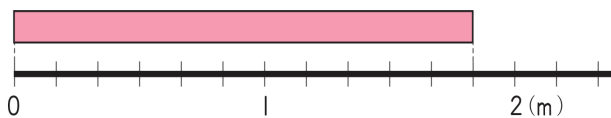
(e)  $9\frac{3}{5} - 3\frac{4}{5}$

(f)  $7\frac{3}{8} - 4\frac{7}{8}$

## L131.EXERCISE

**Teaching and learning activities** ⌚ (60 min)

1. Let's represent the following length as mixed fractions and improper fraction.



2. Let's answer the following fractions

$$1 \frac{2}{5} \quad \frac{1}{6} \quad \frac{10}{7} \quad \frac{3}{3} \quad 2 \frac{1}{8} \quad \frac{1}{2} \quad \frac{9}{8}$$

- (a) Divide these fractions into proper fraction, improper fraction and mixed fractions.  
 (b) Let's change mixed fractions to improper fractions and change improper fractions to mixed fractions or whole numbers.
3. Let's arrange the fractions in ( ) from largest to smallest.

$$\left( \frac{2}{7}, \frac{5}{7}, \frac{6}{7}, \frac{4}{7} \right) \quad \left( \frac{1}{6}, \frac{1}{8}, \frac{1}{5}, \frac{1}{10} \right)$$

$$\left( 2 \frac{1}{8}, 2 \frac{5}{8}, 2 \frac{7}{8}, 2 \frac{3}{8} \right) \quad \left( 3 \frac{2}{9}, 1 \frac{5}{9}, 2 \frac{7}{9}, 4 \frac{1}{9} \right)$$

4. Let's Calculate

$$\frac{3}{5} + \frac{2}{5} \quad 2 \frac{5}{9} + \frac{8}{9} \quad 1 \frac{2}{7} + 2 \frac{2}{7} \quad 4 \frac{2}{3} + 2 \frac{2}{3}$$

$$3 \frac{4}{8} - 1 \frac{3}{8} \quad 1 \frac{5}{9} - \frac{7}{9} \quad 1 - \frac{7}{10} \quad 4 \frac{1}{5} - 2 \frac{3}{5}$$

Hioroko ran  $1 \frac{2}{5}$  km on Sunday morning and  $1 \frac{4}{5}$  km in the evening. How many kilometers did she run altogether? And what is the difference in km?

# TEACHING CONTENT - SAMPLE GUIDED LESSONS

**Strand: Geometrical Figures**

**Topic: Rectangular prism and cubes**

**Content Standard: 4.3.2** Investigate and understand the properties of rectangular prisms and cubes in terms of faces and edges and make models of them.

## 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 rectangular prisms and cubes.

Students will be able to;

## Attitude

- Appreciates shape in daily lives
- Enjoy constructing and identifying the different characteristics of prisms.

## Knowledge

Rectangular prism

- characteristics of rectangular prism and Cubes, Edges, faces and vertex.
- understand that pair of two numbers are needed to express the position on two dimension.
- understand that pair of three numbers are needed to express the position in three dimension.

## Skills

- Make models of rectangular prisms and cubes.
- Make nets.
- Make sketches.
- Express how to make a rectangular prism or cube.

## Mathematical Thinking

- Think about how to position.
- Think about the characteristic of the prism and make models.

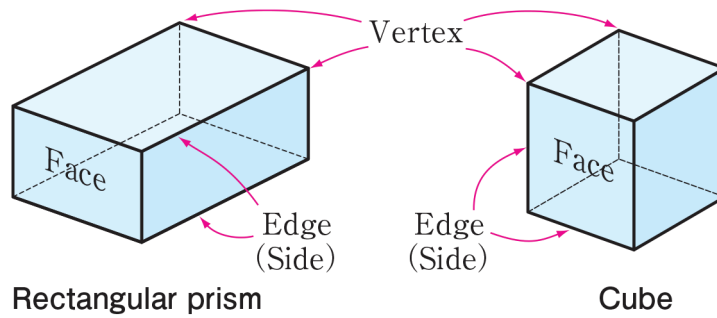


# TEACHING CONTENT - SAMPLE GUIDED LESSONS

## Back ground Notes

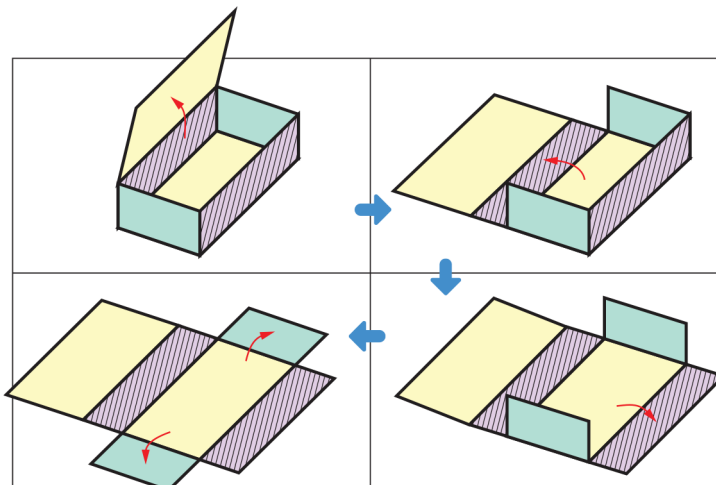
A shape covered only by rectangles or by squares and rectangles is called Rectangular prism.

A shape covered by only squares is called a cube



A flat face like the face of a rectangular prism and cube is called plane.

A Figure drawn on a paper by cutting the edges of a box and unfolding its flat is called net or development



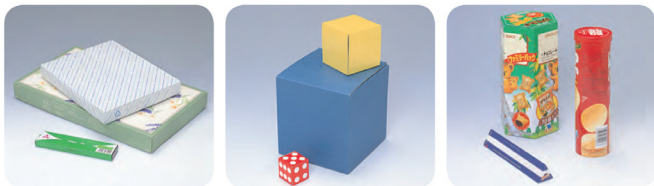
# TEACHING CONTENT - SAMPLE GUIDED LESSONS

## L132. RECTANGULAR PRISM AND CUBE DURATION: 60 MINUTES

**Teaching and learning activities** ⌚ (60 min)

Look for various types of solids figures in our daily lives and categorize them by investigating the faces of solid shapes.

1. Study the shapes below and explain why they are cate this way.

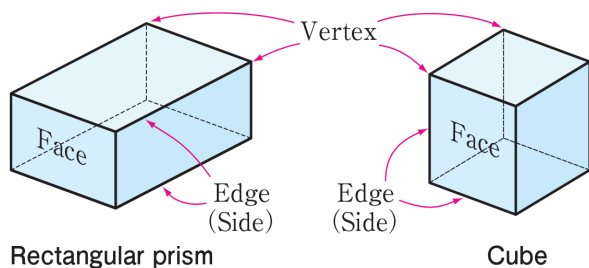


2. Fill in the blanks with numbers and words words

		Rectangular prism	Cube
Face	Shape	Rectangle or square	
	Number of faces		
Edge	Length		
	Number of edges		
Vertex	Number of vertices		

### Summary

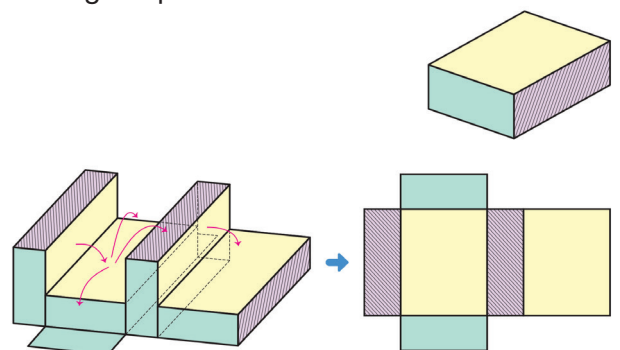
A shape covered only by rectangles or by squares and rectangles is called rectangular prism. A shape covered only by Squares cubel.



## L133. NETS OF RECTANGULAR PRISM AND CUBE (1)

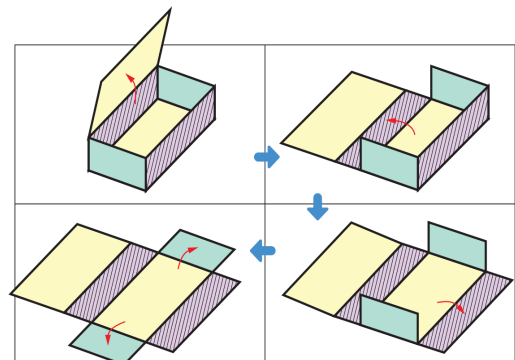
**Teaching and learning activities** ⌚ (60 min)

1. A rectangular prism is shown on the right. Roll and trace it along with its edges respectively.
  - Measure all the sides of the rectangular prism.
  - Trace all faces by rolling the box.
  - Use the figure on the right. Make the rectangular prism.

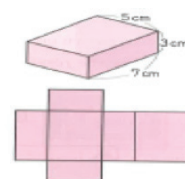


### Important points

- A Figure drawn on a paper by cutting the edges of a box and unfolding its flat is called net or development



2. Let's make a rectangular prism box for storing cards.



- (a) Draw six faces and arrange them for folding.
- (b) Let's fold the shape.

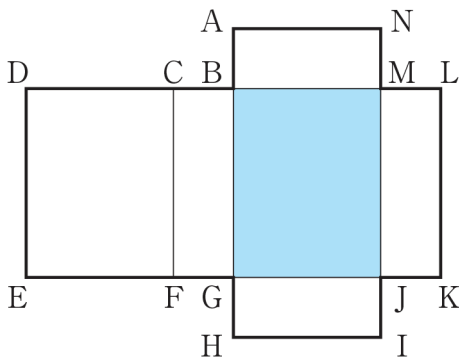
- (c) Which is the appropriate net?

**L134. NETS OF RECTANGULAR PRISM AND CUBE (2)**

Teaching and learning activities (60 min)

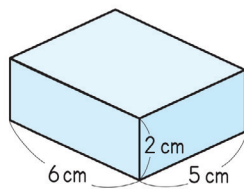
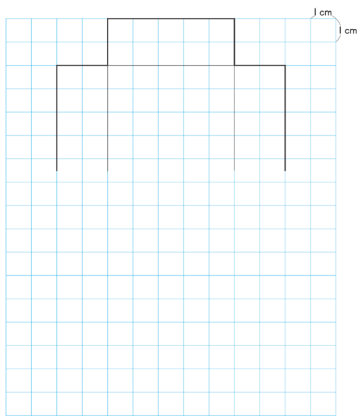
1. Let's fold the net as shown on the right.

- (a) Color the face opposite to the blue face BGJM.
- (b) Circle the points that overlap point L.
- (c) Color the side that overlaps with the edge EF



2. Let's make a rectangular prism box as shown on the right?

(a) Draw the rest of the net as show below.



3. Copy the net on a sheet of paper and fold.

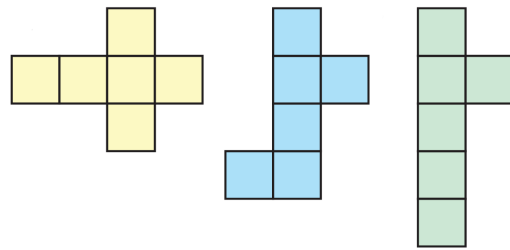
**L135. NETS OF RECTANGULAR PRISM AND CUBE (3)**

Teaching and learning activities (60 min)

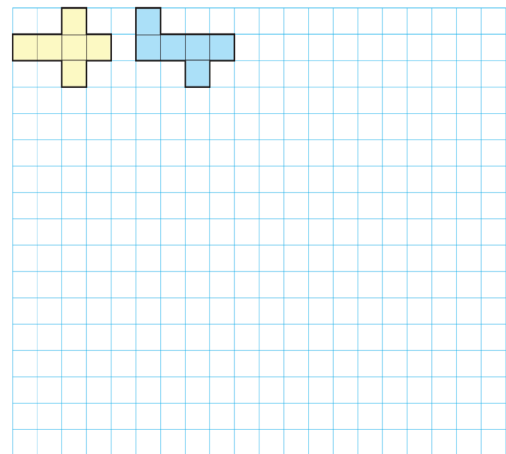
Let's draw a net that can be folded to make a cube with 5 cm edge.



1. Which net can be folded to make a cube?



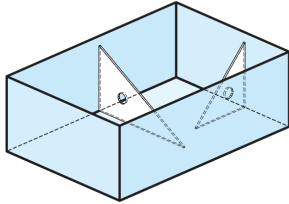
2. Let's draw different nets that make cubes.



## L136. NETS OF RECTANGULAR PRISM AND CUBES (4)

Teaching and learning activities (60 min)

1. Take off the top of rectangular prism and put the right angle of a set-square against the inner faces.



2. Place a tool to measure the right angles on the outer faces of a cube as shown on the right.

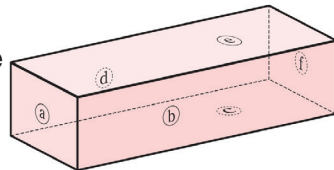


### Important point

Any adjacent two faces of a rectangular prism and cube are perpendicular to each other.

3. Look at a rectangular prism box on the right.

- (a) Which faces are perpendicular to one another?
- (b) Which faces are not perpendicular to one another?



### Summary

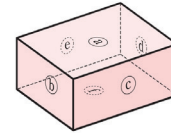
Two faces are parallel when they never intersect each other such as b) and d), c and e

## L137. RELATIONSHIPS BETWEEN FACES AND FACES, EDGES AND EDGES

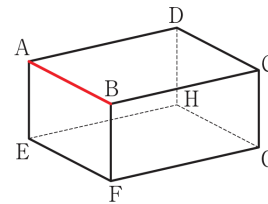
Teaching and learning activities (60 min)

Think about how to find pairs of parallel faces.

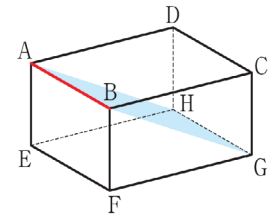
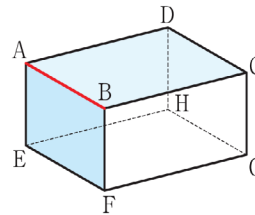
1. Let's find the pairs of parallel faces. The figure on the right shows a rectangular prism box.



- (a) Which edges are perpendicular to edges AB?



- (b) Which edges are parallel to edges AB?



2. Let's check the cubes in the same as you did in 3, 4, and 5.

### Exercise

Look for the following in the classroom.

- (a) Faces that is parallel to the floor.
- (b) Faces that is perpendicular to the floor.

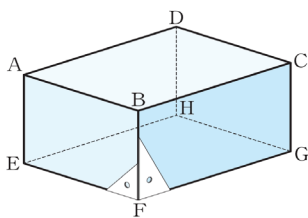
**L138. RELATIONSHIPS BETWEEN FACES AND EDGES, EDGES AND EDGES**

**Teaching and learning activities** ⌚ (60 min)

1. Think about how to find perpendicular edges from a rectangular prism on the right. The figure on the right shows a rectangular prism.

(a) Is the edge BF perpendicular to face EFGH?

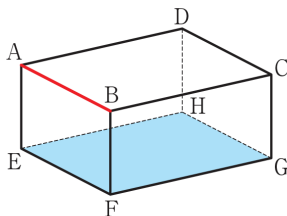
(b) What other edges are perpendicular to face EFGH?



2. The figure on the right shows a rectangular prism

(a) Is edge AB parallel to face EFGH?

(b) What other edges are parallel to face EFGH?



**Exercise**

Look for edges that are perpendicular to the floor in your classroom. And look for edges that are parallel to the floor.

**L139. SKETCH**

**Teaching and learning activities** ⌚ (60 min)

Think about how to sketch a diagram.

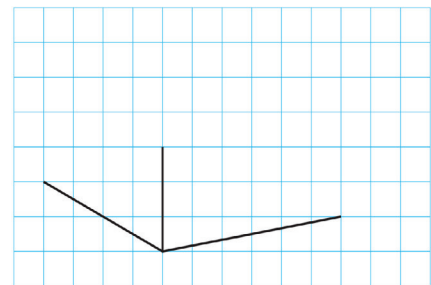
1. Draw a picture so that you can see the whole rectangular prism at once.



(a) From what angle can you see the most faces?

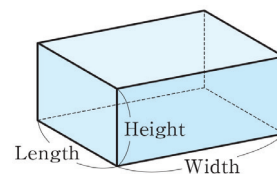
(b) How do the faces look?

Draw the edges that you cannot see as dotted lines.



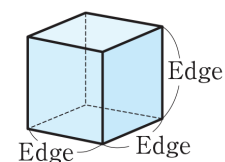
A picture that is drawn to give a quick view of the whole shape is called sketch.

Parallel edges are drawn parallel in the sketch.



The size of a rectangular prism is represented by the width, the length and the height of 3 edges that meet at the same vertex.

The size of cube is represented by the length of an edge.



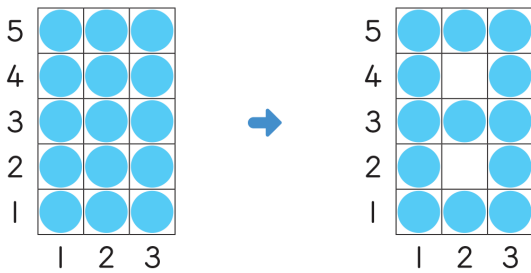
# TEACHING CONTENT - SAMPLE GUIDED LESSONS

## L140. HOW TO REPRESENT POSITION

Teaching and learning activities (60 min)

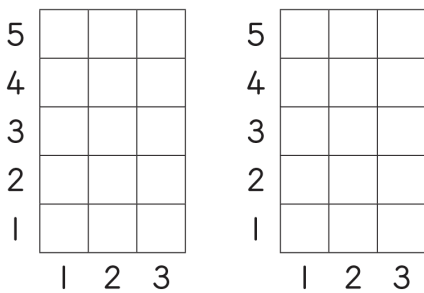
Study the diagrams below and think about how to represent position.

- There are stones as in A.
  - Remove 2 stones and design a symbol of 8.



The position of the stones that have been removed are represented as (2 and 2), (2 and 4).

- Remove stone at (1 and 2) on B, what symbol do the stone show?
- Which stone on B can you remove to design the symbol 0?
- Design the different symbols to show different numbers

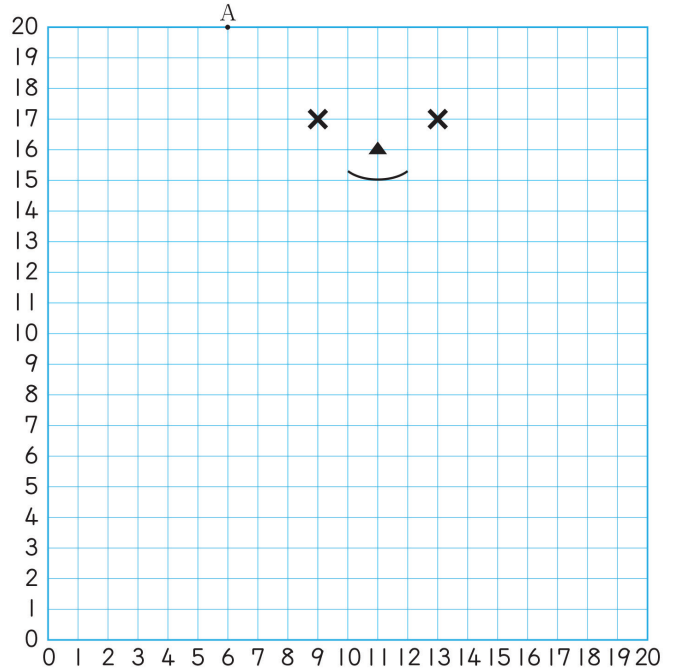


- On the grid paper, the vertical and horizontal axis's are numbered as follows. Point A is represented as (6 and 20). Put the points below in order and correct them with lines.

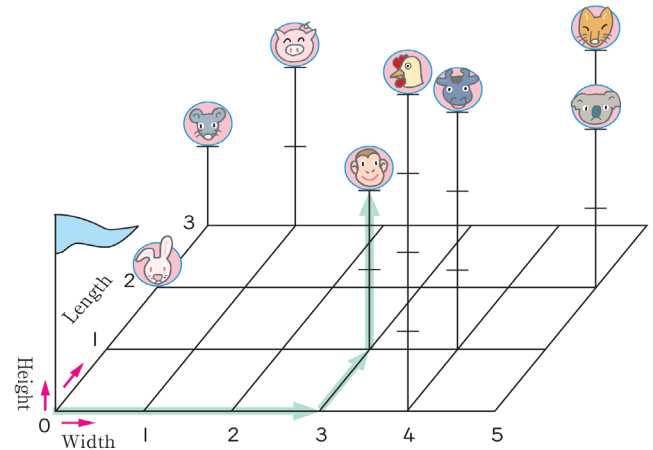
(6 and 20) → (14 and 20) → (14 and 15) → (16 and 12) →  
 (18 and 12) → (18 and 10) → (16 and 10) → (14 and 12) →  
 (13 and 12) → (13 and 0) → (11 and 0) → (11 and 7) →  
 (9 and 7) → (9 and 3) → (7 and 3) → (3 and 5) →  
 (5 and 6) → (7 and 5) → (7 and 12) → (6 and 12) →  
 (6 and 7) → (4 and 7) → (4 and 15) → (6 and 15) →  
 (6 and 20)

## L140. HOW TO REPRESENT POSITION

Teaching and learning activities (60 min)



- Based on the standing position of the flag, represent the position of animals using numbers.



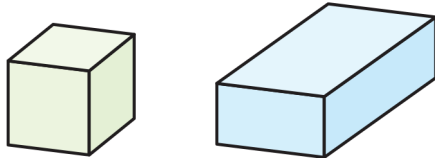
Every position in the space is represented by a list of three numbers. The position of the monkey is 3 width, 1 length and 2 height. We represent it by (3, 1, 2).

- Represent the position of the animals.
- What animal is at position (4, 1, 3)?

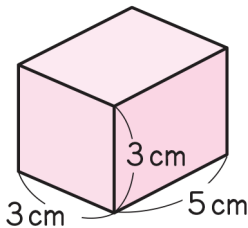
## L141. RELATIONSHIPS BETWEEN FACES AND EDGES, EDGES AND EDGES

**Teaching and learning activities** ⌚ (60 min)

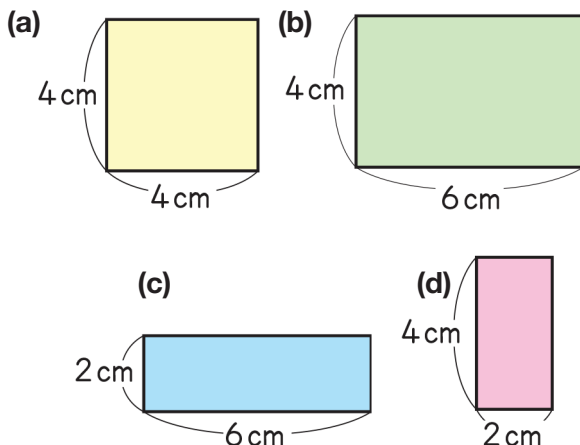
- Fill in  with the correct words for each sentence.
  - Rectangular prisms and cubes are categorized by the shape of .
  - Rectangular prisms are covered only by  or only by rectangles and squares. Cubes are covered only by .
  - The number of edges for both rectangular prism and cube is . The number of vertices for both rectangular prism and cube is .



- Draw the nets of a rectangular prism on the right.



- Read, think about the problem and solve. There are number of sheets of paper of different sizes shown below. Make a Rectangular prisms and cubes by using them. How many sheets of papers of each size are there in each shape?



# TEACHING CONTENT - SAMPLE GUIDED LESSONS

## **Strand: Data and Mathematical Relation** **Topic: Two Quantities Changing Together**

**Content Standard 4.4.1** Explore quantities changing together and find patterns and explain the patterns by sum, difference, product, quotient and represent it by mathematical sentence with box (□) and circle (○) rd:

### **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 two quantities changing together (ratio).

Students will be able to;

### **Attitudes**

- 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.

### **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.
- Emphasize that as the width of the rectangle increases, the length of the rectangle made by the same rope decreases at the same time while the perimeter remains unchanged.
- 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

Quantities are the numbers such as water, time, and amount of water weight, angles and area that you have learnt

In our surroundings, there are some quantities that change as another quantity changes. When we look for the rules on how 2 quantities change together, we draw the table for finding the rule easily .

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**

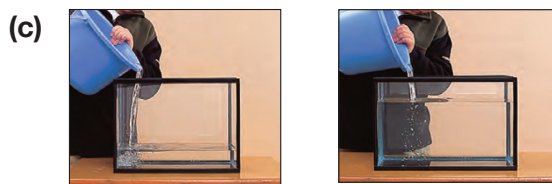
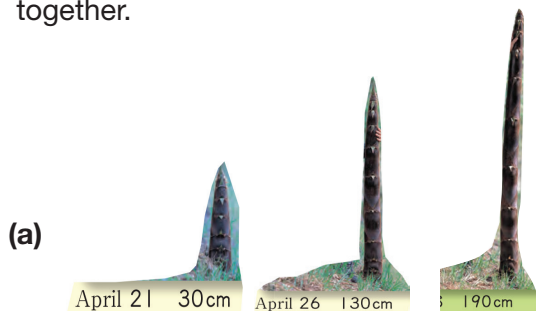
The proportions can be calculated from the base units e.g. in the case of base and the area of a parallelogram, when base changes by 2 times (3 cm x 2 times), the area increases and changes by 2 times and so on, the height stays the same. Then we can say area of the parallelogram is in proportion to the base. When represented on the graph, it will show a direct proportion.

# TEACHING CONTENT - SAMPLE GUIDED LESSONS

## L142. TWO QUANTITIES WHICH CHANGE TOGETHER

Teaching and learning activities (60 min)

1. Find the relationship of 2 quantities changing together.



Look for quantities that change together in A, B, C, and D.

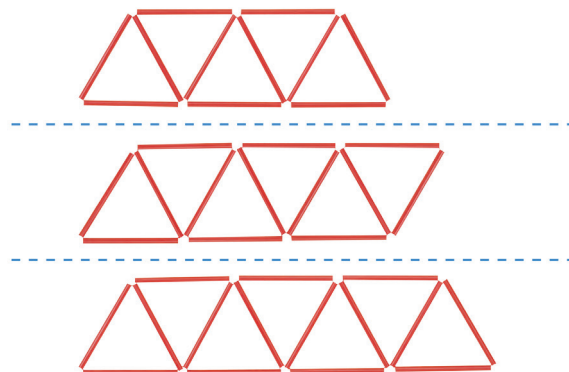
How are they changing together? Write in the table below.

	Things that change together	How they change
(a)	and	
(b)	and	
(c)	and	
(d)	and	

## L142. TWO QUANTITIES WHICH CHANGE TOGETHER

Teaching and learning activities (60 min)

3. Make Equilateral triangles that are lined up horizontally by using straws of the same length.



4. Look for two quantities which change together from the above. Study how to change the number of equilateral triangles and straws.

Number of Equilateral Triangles and Straws

Number of equilateral triangles										
Number of straws										

5. When the number of Equilateral Triangles increase by 1, by how many does the number of straws increase?

6. When we make 10 Equilateral Triangles, how many straws do we need

# TEACHING CONTENT - SAMPLE GUIDED LESSONS

## L143. CHANGING QUANTITIES AND GRAPHS

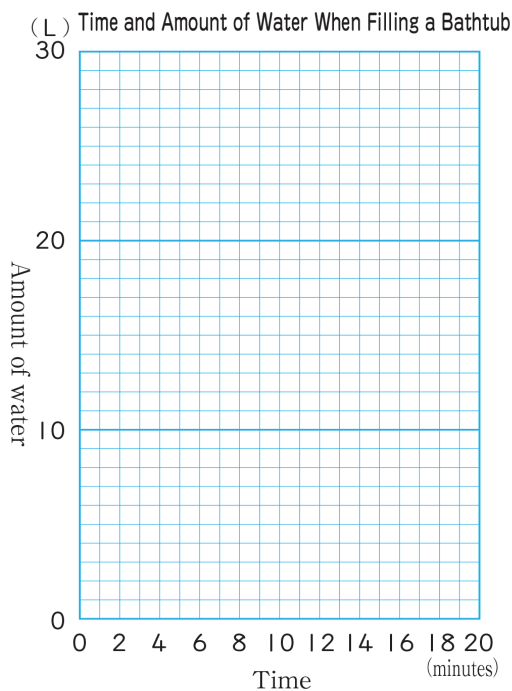
**Teaching and learning activities** ⌚ (60 min)

1. The table below shows how the amount of water and time change as a bathtub is fill.

Time and Amount of Water When Filling a Bathtub

Time (minutes)	0	2	4	6	8	10	12	14
Amount of water (L)	0	3	6	9	12	15	18	21

- (a) Write points on the graph by using the numbers on the table.
- (b) Connect the points with a line
- (c) What is the amount of water in L 7 minutes after starting to fill the both tubs?
- (d) How many litres of water will there be after 20 minutes?



2. Another bath tub was filled with water as shown on the table below.

Time and Amount of Water When Filling a Bathtub

Time (minutes)	0	4	8	12	16
Amount of water (L)	0	3	6	9	12

## L144. MATHEMATICAL SENTENCE USING ○ AND □

**Teaching and learning activities** ⌚ (60 min)

Read and think about how to calculate the following.

1. When the number of steps is □ and its height is ○, express mathematical sentence by using □ and ○.

height of each steps x number of steps = height ( find the height when there are 40 steps

$$15 \times \square = \bigcirc$$

Raka's classroom was on the third floor. The children decided to use the stairs to measure the height from the floor on the first floor to the floor on the third floor.

As the number of stairs increases, how does the height of the first floor change?

There are 40 steps between the first and third floors. Write the number of steps and the height of the first floor in the table.

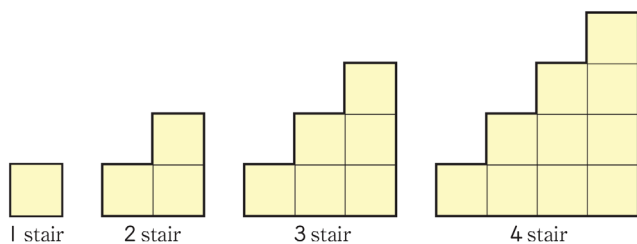
Number of Steps and Height

Number of steps (steps)	1	2	3	4	5	6	7	8
Height (cm)	15	30						

## L145. MATHEMATICAL SENTENCE USING ○ AND □

**Teaching and learning activities** ⌚ (60 min)

Arrange a square paper with 1 cm side and make the following.



- (a) How long cm are the length around 1 stair and 2 stairs?  
 (b) Study how the number of stairs and the length around the stairs change.

Number of Stairs and the Length Around the Stairs

Number of stairs	1	2	3	4	5	6	7
Length around stairs (cm)	4	8					

- (c) When the number of stairs increase by 1, how long does the length around the stairs increase?  
 (d) When the number of stairs is □ and the length of around stairs is ○, show the relationship by mathematical sentence.  
 (e) When the number of stairs is 8, how many cm is the length around the stairs? And when the length around stairs is 40 cm, what is the number of stairs?

### Exercise

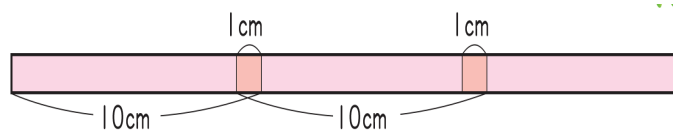
I buy sheets of drawing paper at 20 toea each. When the number of sheets I buy is □ and the cost is ○, express the relationship between □ and ○ as mathematical sentence.

## L146. EXERCISE

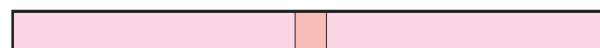
**Teaching and learning activities** ⌚ (60 min)

Look at the relationships between the 2 quantities written below.

- In which one is “both quantities are increasing” and in which one is “one increasing and one decreasing”.
  - The distance that a car travels and the quantity of fuel used.
  - The time that you are riding on the train that started at one station and the distance from the train to the next station
  - The quantity of orange juice consumed and the remaining amount
- the children are going to connect 10cm tapes as shown in the figure below. The length of each section overlapping is 1 cm.



- (a) if we connect 2 pieces of tape in this way, What is the total length in cm?



- (b) Write the number in the table below  
 Number of Pieces of Tape and the total Length

Number of Pieces of Tape and Total Length

Number of piece of tape	1	2	3	4	5	6	7	8	9
Total length (cm)	10								

3. Calculate the following

$8.6 \times 68$	$24.8 \times 65$	$0.79 \times 5$
$5.1 \div 3$	$32.2 \div 7$	$45.6 \div 48$
$\frac{5}{9} + \frac{8}{9}$	$1\frac{3}{4} + \frac{3}{4}$	$6\frac{1}{5} + 3\frac{4}{5}$
$\frac{5}{6} - \frac{1}{6}$	$3\frac{5}{8} - 1\frac{7}{8}$	$2 - 1\frac{2}{3}$

# Assessment, Reporting and Recording

## Assessment

There are 3 types of assessments that teachers are expected to use when they are teaching the lessons. These are;

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

# Assessment, Reporting and Recording

'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 one week 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.

Method: Checklist

- Add in vertical form correctly

Assessment Task

1. Students take homework;
2. Teacher collects homework on addition with 3 digit numbers
3. Marks students work

Marking Criteria

Marks
8 -10 place in correct place value position for each digit of numbers and adds correctly in vertical form
5 - 7 place in correct place value position for each digit of numbers and but encounters problem in addition
0 - 4 correct numbers but placed incorrectly and got an incorrect answer

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, Reporting and Recording

## 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						

Sample Students Assessment Record Sheet

Std. Name	Ass 1	Ass 2	Ass 3	Ass 4	Ass 5	Ass 6	Ass 7	TOTAL (22)	%	ACH. LEVEL	Comments/ Eva
	3	3	3	2	1	6	4				
John	2	1	2	3	2	3	1	14	64	SA	Above 50%
SCORE	9										
TOTAL	6										
%	67										
AC.LEVEL	SA										
Comments											

# Assessment, Reporting and Recording

## 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, Reporting and Recording

## Assessment Processing

SUBJECT ASSESSMENT PERIODIC SHEET																						
Teacher: <b>Mr.Jones</b>					<b>MATHEMATICS</b>										Term: <b>ONE</b>							
Assessment.task					GRADE	T 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								
NO.	SURNAME	NAME	SEX	GRADE	GRADE	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

$$Test = \left( \frac{T1 + T2 + \dots + T7}{TEST\ TOTAL\ SCORE} \right) \times 60$$

Example

$$Test = \left( \frac{11 + 7 + 15}{15 + 15 + 20} \right) \times 60 = 40$$

$$Weekly = \left( \frac{W1 + W2 + \dots + W7}{WEEKLY\ TOTAL\ SCORE} \right) \times 40$$

Example

$$Weekly = \left( \frac{15 + 7 + 10 + 27}{25 + 25 + 15 + 50} \right) \times 40 = 21$$

% 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)

# 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
<b>analysing</b>	Studying something very closely, breaking something into components, examining a structure, expressing something using mathematical terms
<b>Bench Marks</b>	Set criteria of the content standards that have to be achieved by the end of each grade level, grade 2,5,8,10,12
<b>commutative</b>	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.
<b>Inferring</b>	Coming to a conclusion or forming an opinion about something on the basis of evidence or reasoning.
<b>inequality signs</b>	State of being unequal; less than $<$ and more than $>$ are unequal signs
<b>Math Syllabus</b>	Contains the policy on Mathematics content that has to be implemented in all schools and grades that is subjected.
<b>Math Teacher Guide</b>	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.
<b>Quotient</b>	Result of the divisions e.g. $10 \div 2=5,5$ is the quotient of the division
<b>Standard Based Education</b>	The structure of the education system is to be standard and of quality expectations from the global and vision 2050
<b>Standard Based Curriculum</b>	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.
<b>Synthesising</b>	Combining of various components into a whole – to combine different ideas, influence or objects into new whole
<b>validating</b>	To confirm something and find its proof
<b>Verifying</b>	To prove that something is true by examination, investigation or comparison
<b>Tessellation</b>	To fit together something without leaving any spaces,e.g. geometric figures
<b>Addend</b>	A number that is added to another in an addition problem Example: $2 + 3 = 5$ . The addends are 2 and 3.
<b>Congruent figures</b>	Figures that have the same size and shape
<b>Composite number</b>	A whole number that has more than two factors Eg; 9 is a composite number since its factors are 1, 3, and 9.
<b>Place value</b>	A place value number system based on grouping by tens; each place has a value 10 times the value of the place at its right.
<b>decimal point</b>	A symbol used to separate dollars from cents in money and to separate the ones place from the tenths place in decimals. Eg
<b>dividend</b>	The number that is to be divided in a division problem Eg: $35 \div 5 = 7$ . The dividend is 35.
<b>Divisible</b>	Capable of being divided so that the quotient is a whole number and the remainder is zero. Eg: 21 is divisible by 3.
<b>divisor</b>	The number that divides the dividend .Eg: $18 \div 3 = 6$ The divisor is 3.

# References

NDOE 2016, Mathematics Junior 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

NSW Department of School Education © 1989, Mathematics K-6, reprinted 1994 by Board of Studies with permission

**'FREE ISSUE - NOT FOR SALE'**