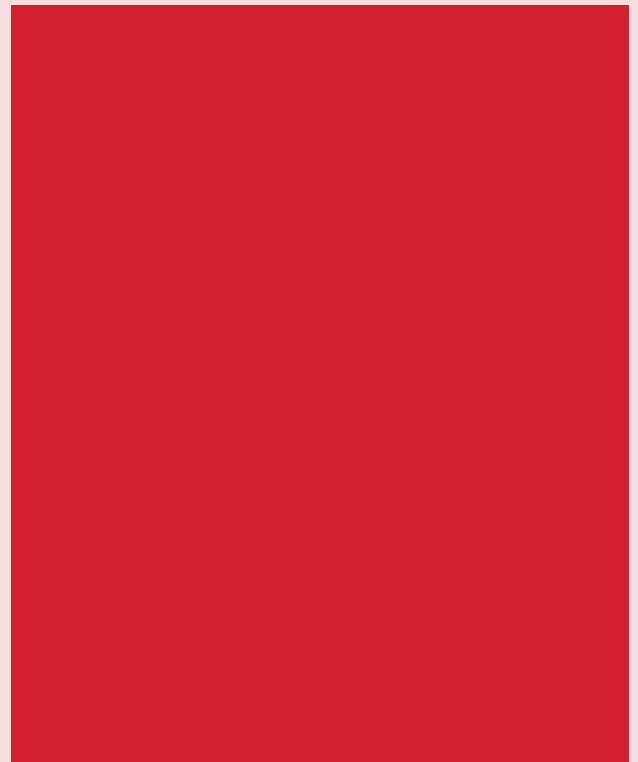


Mathematics

Teacher Guide

Primary Grade 3



Standards Based



**'FREE ISSUE
NOT FOR SALE'**

Papua New Guinea
Department of Education

Mathematics

Teacher Guide

Primary
Grade 3

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

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Contents

Secretary's Message	iv
Introduction	1
Planning and Programming	9
Yearly Overview	10
Teaching Content - Sample Guided Lessons	14
Assessment, Recording and Reporting	125
Abbreviation	129
Glossary	130
References	132

Secretary's Message

This Mathematics Teacher Guide for Grade 3 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 3. 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 3 Mathematics Teacher Guide to be used in all Primary Schools throughout Papua New Guinea.



.....
DR. UKE W. KOMBRA, PhD
Secretary for Education

Introduction

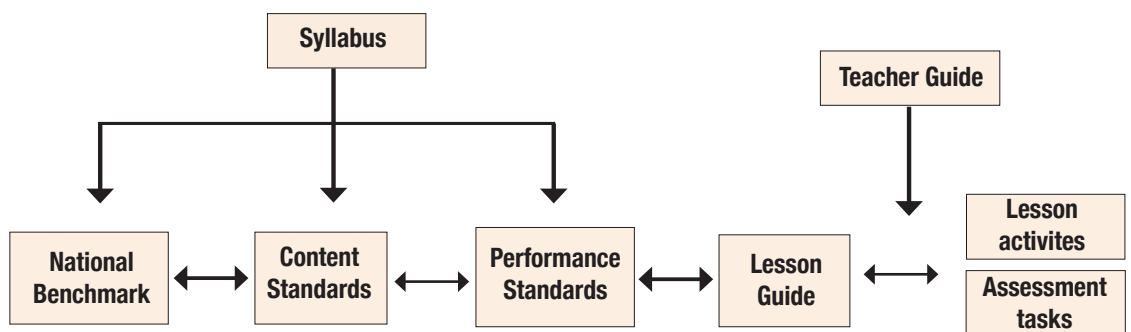
This teacher Guide must be used together with the Grades 3, 4 and 5 Mathematics Syllabus in teaching and learning mathematics. It provides guidelines about how to plan and program teaching and learning for Mathematics with sample yearly programs. Further expanded and detailed descriptions for the content 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 3 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 contains the content overview, yearly and termly plan. These plans can be used to plan teaching and learning programs throughout the year. The teacher guide provides lesson titles and guided lessons that will be used to plan the contents in mathematics. The plans should link what students already know and what they need to learn. The lessons taught should be playful, fun and used by students for their everyday living.



The teacher guide illustrates key parts of the mathematics syllabus. It provides practical ideas about how to use the syllabus and why the teacher guide and syllabus should be used together. The teacher guide explains ways you can plan and develop teaching and learning and assessment programs.

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

Introduction

Key Features

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

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

The main goal for mathematics education is to empower all students to; reason mathematically; communicate mathematically; solve problems using mathematics and make connections within mathematics and between mathematics and other fields.

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.

The key feature found in this teacher guide are mathematical activities and guided lesson plans and teaching and learning approaches.

Way 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 mathematics 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, key concepts (ASK-MT), teaching and learning activities for Grade 3 Mathematics content. It explains what is to be taught and how the lesson is to be taught. Each lesson has a sub topic content standard, key concepts (ASK-MT), and teaching and learning activities provided. Teachers are required to use the key concepts ASK-MT to develop lesson objectives for the given teaching and learning activities for each lesson.

Introduction

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 provided.
- 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 evaluations provided as assessment for the students at the end of each topic.
- study the sample black board plan and follow the steps to plan for every lesson.

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

Introduction

Sample Lesson Plan

Topic : Addition and Subtraction

Sub-topic: Addition of 3-digit number

Lesson Title: Addition of 3 digit number in vertical (1)

Duration: 60mins

Content Standards

3.1.2 Extend learned addition and subtraction to add and subtract 2 to 4-digit numbers.

Lesson objectives

By the end of the lesson the students will be able to add 3-digit numbers using place values and different representations.

Materials: Number cards (1-8), PVC (Place Value Chart), base 10 place value blocks

Key Concept (ASK-MT)

- (A) Share their ideas on how to add 3-digit numbers vertically using representation
- (S) Add 3-digit numbers vertically using representations
- (K) Understand how to add 3-digit numbers vertically using representations
- (MT) Think of ways to calculate 3-digit numbers vertically

Lesson Sequence

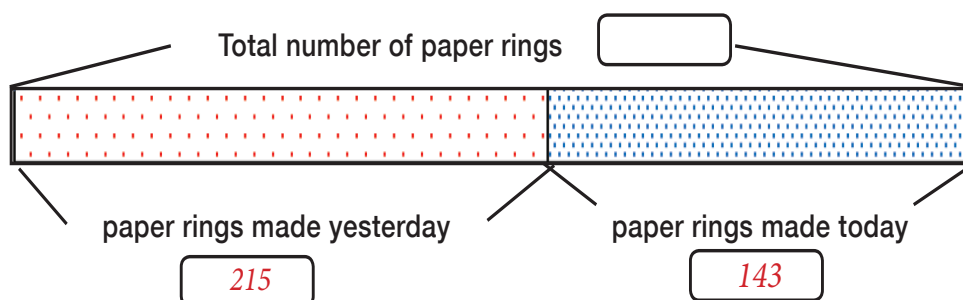
Introduction

There are 13 red marbles and 24 yellow marbles. How many marbles are there in all?

- (a) Write a Math expression $13 + 24$.
- (b) Let's think about how to add?

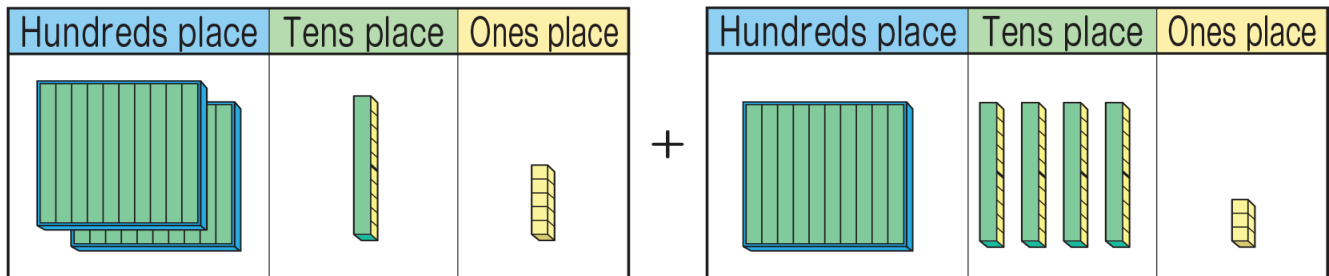
Body

1. Let's remember the addition of 2-digit number and think of how to do this. For the party decoration, we made 215 paper rings yesterday and today 143. How many paper rings did we make altogether?



Introduction

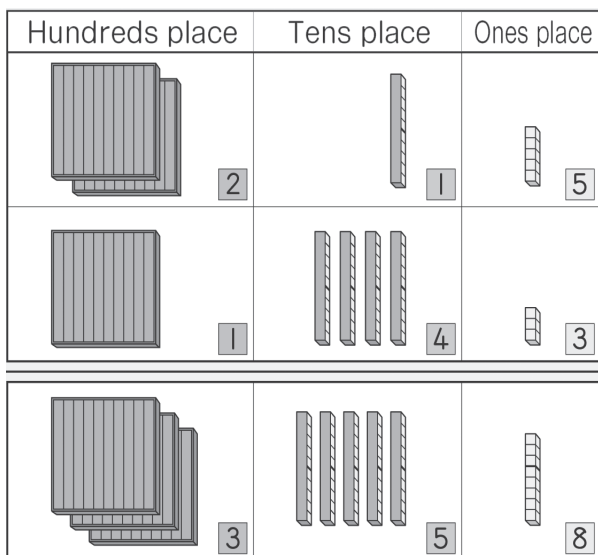
- (a) Write a Math expression.
 (b) Estimate how large is the answer? $200 + 100$ (about 300)
 (c) Let's think about how to add three digit numbers using representation.



Expected Ideas

Idea.1

Line up the place values, and then put the numbers in accordance.



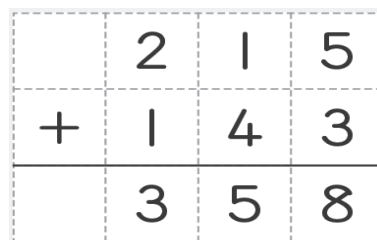
2 + 1 for the sets of 100s

1 + 4 for the sets of 10s

5 + 3 for the ones

Idea.2

Calculate vertically like the addition of 2 digit numbers.



How to Add $215 + 143$ in Vertical Form

$$\begin{array}{r} 215 \\ + 143 \\ \hline \end{array}$$

Vertically line up the numbers according to their place values.

$$\begin{array}{r} 215 \\ + 143 \\ \hline 358 \end{array}$$

$2 + 1 = 3$ $1 + 4 = 5$ $5 + 3 = 8$

- Add 3-digit without carrying in vertical.
- Vertically line up the numbers according to their place value.

Exercise

1. Lets calculate

- (a) $153 + 425$ (b) $261 + 637$ (c) $437 + 320$ (d) $507 + 205$

Introduction

Sample Blackboard Plan

Let's add 3-digit numbers vertically without carrying using representations

1. Review

There are 13 red marbles and 24 yellow marbles. How many marbles are there in all?

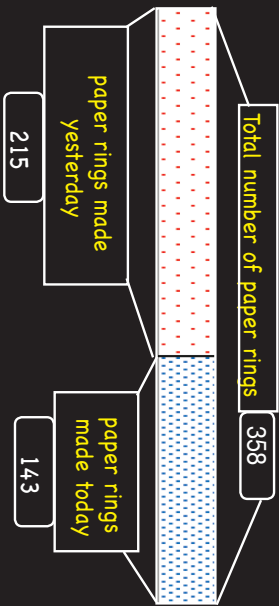
- Write the Math expression $13 + 24$

$$\begin{array}{r} 13 \\ + 24 \\ \hline 37 \end{array}$$

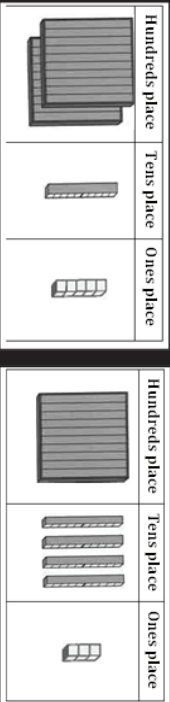
- Let's think about how to add?

2. Today's Learning

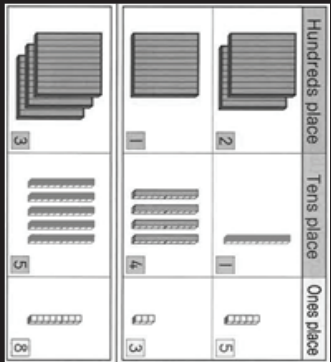
Activity: For the party decoration, we made 215 paper rings yesterday and today 143. How many paper rings did we make altogether?



- Write the Math expression ($215 + 143$)
- Estimate how large is the answer? (300)
- Let's think about how to add three digit numbers using representation



Idea.1



2 + 1 for the sets of 100s
1 + 4 for the sets of 10s
5 + 3 for the ones

Idea.2

	2	1	5
+	1	4	3
	3	5	8

3. Practices

- 153 + 425

Exercise

- 261 + 637
- 437 + 320

$$\begin{array}{r} 1 \quad 2 \quad 3 \\ 153 \quad 216 \quad 437 \\ + 425 \quad + 637 \quad + 320 \\ \hline 578 \quad 898 \quad 578 \end{array}$$

4. Summary

- Add 3-digit without carry in vertical.
- Vertically line up the numbers according to their place value

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 3 Mathematical Activities

Unit 4: Health Services

Activities/Experience	Enjoy using various ways of representing numbers and figures with situations to explain its appropriateness
Performance Activities	<ol style="list-style-type: none">Compare, estimate and represent larger numbers and explain relative size of numbers using number line and place value chart.Compare and explain the relative size of fraction, structure of fraction showing the relation with decimal number using various measuring tools.Compare areas of rectangles and squares and explain how to represent the area with numbers.Use tape diagrams and measuring containers to represent fractions larger than one.Use mathematical sentence, tape diagrams and objects to find rules of calculation.Use line graphs to represent the changes in various situations.
Assessment Task	<ol style="list-style-type: none">Appreciate the use of number lines and base 10 materials, place value chart for comparing place value of numbers.Demonstration by using number lines and base 10 materials to represent decimal numbers.Enjoy using formula of square and rectangle to find area.Demonstrate how to represent fractions larger than one using tape diagrams and measuring containers.Enjoy finding rules of division for various situations.

Introduction

Activities/Experience	Enjoy using various ways of questioning through situations set by themselves
Performance Activities	<ol style="list-style-type: none"> a. Pose questions for larger numbers and estimating numbers. b. Pose questions for multiplication and division problems. c. Pose questions for comparing size of fractions. d. Pose questions on expressions and order of calculations. e. Pose questions on finding the size of angles. f. Pose questions on how to find the area of squares and rectangles. g. Pose questions for finding properties of rectangular prism and cubes. h. Pose questions on the relationships of quantities which change together. i. Pose questions on line graphs.
Assessment Tasks	<ol style="list-style-type: none"> 1. Enjoy posing questions for larger numbers and estimating numbers. 2. Enjoy posing questions for multiplication and division problems. 3. Enjoy posing questions for comparing size of fractions. 4. Enjoy posing questions on expressions and order of calculations. 5. Enjoy posing questions on finding the size of angles. 6. Enjoy posing questions on how to find the area of square and s and rectangles. 7. Enjoy posing questions on the relationships of quantities which change together. 8. Enjoy posing questions on line graphs.
Activities/Experience	Use rules to estimate and calculate accurately
Performance Activities	<ol style="list-style-type: none"> a. Use rules of division to find easier ways of dividing. b. Use formula to calculate area. c. Enjoy calculating accurately and effectively. d. Use estimate for the answer of calculations. e. Enjoy making decision for appropriate use of exact calculation or estimation depending on the context.
Assessment Task	<ol style="list-style-type: none"> 1. Appreciate ways of calculating using the rule of division. 2. Enjoy using formula to calculate area of square and rectangle. 3. Calculate accurately and find miss-calculations.

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,
- promote mathematical thinking,
- should be relevant to students needs and interests,
- should be inclusive for all students as much as possible,
- should be making links across subjects where possible,
- should be 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. Teachers are encouraged to look carefully at each guided plan and develop daily lesson activities.

3. Time Allocation

Mathematics is to be timetabled for 240 minutes per week for grade 3. 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	Reading	Talking
8:45 - 9:00	Talking	Talking	Talking		Block Time
9:00 - 9:30	Mathematics	Mathematics	Mathematics	Hand writing	Reading
				Mathematics	Mathematics
10:00 - 10:30	RECESS				
10:30 - 11:00	Mathematics	Mathematics	Mathematics	Mathematics	Mathematics
11:00 - 11:30	Science	Science	Science	Science	Written Expression
11:30 - 12:00	Social Science	Social Science	Social Science	Science	Social Science
12:00 - 1:00	LUNCH				
1:00 - 1:30	Written Sentence	Written Sentence	Written Sentence	Written Sentence	Written Expression
1:30 - 2:00	Health	Health	Health	Arts	Arts
2:00 - 2:30	Arts	Block Time	PE	CRE	Sport
2:30 - 3:00	PE	Arts	Block Time		

Yearly Overview

Strand	Topics	Sub-topic	Lsn #	Lesson Titles
Number & Operation	Review of Grade 1 & 2 Addition & Subtraction of 1- 2 digit	Addition of 1 digit	1	Addition story
			2	Addition Cards
		Subtraction of 1 digit	3	Subtraction story
			4	Subtraction cards
		Cardinals & ordinal	5	Hundreds, tens and ones
		Mental Calculation	6	Mental Addition
			7	Mental Subtraction
		Using Tape daigram	8	Addition or Subtraction
		Addition & Subtraction of 2-digiit numbers	9	Addition in vertical Form (1)
			10	Addition in vertical Form (2)
			11	Subtracting in vertical Form (1)
			12	Subtracting in vertical Form (2)
	Addition & Subtraction of 3 digit	Addition of 3 - digits numbers	13	Addition of 3-digit number in vertical (1)
			14	Addition of 3-digit number in vertical (2)
			15	Addition of 3-digit number in vertical (3)
			16	Addition of 3-digit number in vertical (4)
		Subtraction 3 - digits numbers	17	Subtracting 3-digit number in Vertical (1)
			18	Subtracting 3-digit number in Vertical (2)
			19	Subtracting 3-digit number in Vertical (3)
			20	Subtracting 3-digit number in Vertical (4)
			21	Subtracting 3-digit number in Vertical (5)
		Calculate larger numbers	22	Calculate larger numbers
	Different way of Calculations	23	Easier way to Calculate	
		24	Mental Calculation	
	What kind of calculation	25	Using representation to calculate	
	Review	26	Evaluation - Addition & Subtraction of 3 digit numbers	
	Review of Gr 1 & 2 Multiplication	Meaning of Multiplication	27	Meaning of Multiplication (1)
			28	Multiplication Table 1 (row of 2)
		Multiplication Table	29	Multiplication Table 2 (row of 2)
			30	Multiplication Table 1 (row of 5)
			31	Multiplication Table 1 (row of 5)
			32	Multiplication table 1
	33	Multiplication table 2		
	Multiplication	The Rules of multiplication	34	Multiplier and Multiplicand (1)
			35	Multiplier and Multiplicand (2)
			36	Multiplier and Multiplicand (3)
			37	Order of Multiplying in Multiplication
		Multiplication with 0	38	Multiplying with 0 (1)
			39	Multiplying with 0 (2)
			40	Multiplying by 10
		How to calculate	41	Various method of explaining calculations
	Review	42	Evaluation - Multiplication	

Yearly Overview

Strand	Topics	Sub-topic	Lsn #	Lesson Titles	
Quantities & Measurement	Duration & Time	Short time	43	Short time	
			44	Changing seconds into minutes & seconds	
			45	Timetables (schedules)	
		Duration of time	46	Duration of time (1)	
			47	Duration of Times (2)	
Review	48	Evaluation - Time & Duration			
Number & Operation	Multiplication in vertical form	Multiplication with tens & hundreds	49	Multiply by sets 10 and 100	
		Calculate (2-digit number) \times (1-digit number)	50	Calculate 2-digit number by 1-digit number (1)	
			51	Calculate 2-digit number by 1-digit number (2)	
			52	Calculate 2-digit number by 1-digit number (3)	
		Calculate (3-digit number) \times (1-digit number)	53	Calculate 3-digit number by 1-digit number (1)	
			54	Calculate 3-digit number by 1-digit number (2)	
		Mental Calculations	55	Calculate mentally	
	Review	56	Evaluation - Multiplication in vertical form		
	Division	Division	Division	57	Understanding Division
				58	Finding the number for one child
				59	Making division worded problems (1)
				60	More division problems
				61	How many students can share (1)
				62	How many students can share (2)
				63	Making division worded problems (2)
		Dividing with 1 or 0	64	Dividing with 1 or 0	
		Rules of calculation	65	Rules of calculation (1)	
			66	Rules of calculation (2)	
	Review	67	Evaluation of Division		
	Division with remainders	Dividing with remainders	68	Dividing with remainders	
		Various Division Problem	69	Divisor and the size of remainder	
			70	Division Problems with remainder	
	Review	71	Evaluation of Division with remainders		
	Geometrical Figures	Circles & Sphere	Circles	72	Knowing about circles
				73	Drawing a round shape
				74	Drawing radius & diameter
75				Drawing a circle of same kind	
76			Designing Patterns		
Sphere			77	Let's learn about Sphere	
Review	78	Evaluation - Circle & Sphere			
Number & Operation	Larger Numbers	Ten thousands place	79	Ten thousands place (1)	
			80	Ten thousands place (2)	
		Structure of larger	81	Structure of larger numbers (1)	

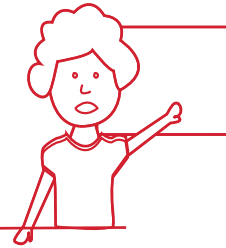
Yearly Overview

Strand	Topics	Sub-topic	Lsn #	Lesson Titles
Number & Operation	Larger Numbers	Structure of larger	82	Structure of larger numbers (2)
		10 Times, 100 Times and Divided by 10	83	10 Times and 100 Times
			84	Divided by 10 and 100
		Addition & Subtraction	85	Addition and Subtraction of Larger numbers (1)
			86	Addition and Subtraction of Larger numbers (2)
Review	87	Evaluation - Large numbers		
Quantities & Measurement	Length	How to measure	88	Longer length
			89	Using tape measure
			90	Using various measuring tools
		Kilometer	91	Measuring Distance
			92	How long is 1km
Review	93	Evaluation - Length		
Geometrical Figures	Triangles	Isosceles & Equilateral Triangle	94	Making Triangles
			95	Sorting Triangle (1)
			96	Sorting Triangle (2)
			97	Isosceles Triangle
			98	Is this Equilateral Triangle?
		How to Draw Triangles	99	Drawing Isosceles Triangle
			100	Drawing Equilateral Triangle
			101	Making Triangle using paper
		Triangles and Angles	102	Explore Triangles and Angles
			103	Compare the sizes of angles
Designing Patterns	104	Making shapes using triangles		
Review	105	Evaluation - Triangle		
Data & Mathematical Relation	Tables & Graphs	Tables	106	Representing data in Tables
		Bar Graphs	107	Reading Bar Graph (1)
			108	Reading Bar Graph (2)
		Drawing Bar Graphs	109	How to draw a bar graph
		Putting tables together	110	Combining tables
Review	111	Evaluation - Tables & Graphs		
Number & Operation	Multiplication of 2-digit numbers	Multiplication by 20,30,.90	112	Multiplying by a larger multiplier
		How to Calculate(1)	113	(2-digit Number) x (2- digit Number) 1
			114	(2-digit Number) x (2- digit Number) 2
			115	(2-digit Number) x (2- digit Number) 3
		How to Calculate(2)	116	(3-digit Number) x (2- digit Number) 1
			117	(3-digit Number) x (2- digit Number) 2
		Making Tapes	118	Tape diagram in Multiplication
119	Tape diagram in Division			
Review	120	Evaluation - Multiplication 2- digit numbers		
Quantities & Measurement	Weight	How to represent weight	121	Comparing weights
			122	Understanding unit gram

Yearly Overview

Strand	Topics	Sub-topic	Lsn #	Lesson Titles
Quantities & Measurement	Weight	How to represent weight	123	Measuring units of weight in gram
			124	Understanding unit kilogram and tonne
			125	Measuring units of weight in kilogram
			126	Relationship in units of measurement
			127	Amount of Block and Weight
		Calculation of weights	128	Calculating weights
		Reveiw	129	Evaluation - weight
Number & Operation	Fractions	Understanding Fractions	130	Quantities in Fractions (1)
			131	Quantities in Fractions (2)
			132	Quantities in Fractions (3)
			133	Measuring things using Fractions
		Structure of Fractions	134	Structure of Fractions (1)
			135	Structure of Fractions (2)
		Addition & Subtraction	136	Addition and Subtraction of Fraction
Review	137	Evaluation - Fractions		
Data & Mathematical Relation	Math Sentences Using the \square	Mathematical Sentences	138	Representing mathematical Sentences using \square
			139	Math Sentences of Addition
			140	Math Sentences of Multiplication
		Review	141	Evaluation - Math Sentences Using the \square

TEACHING CONTENT



Sample Guided Lessons

Review of Addition & Subtraction of 1- 2 digit numbers

Content Standards

2.1.3 Extend their understanding of addition, subtraction and multiplication to solve simple problems

Key Concepts (ASK-MT)

Attitude

- Enjoy posing various questions for addition to others.
- Enjoy various ways of making additions more than 10.
- Value the use of tape and block diagrams to explain situations for addition and subtraction.

Skill

- Explain different types of addition situations with the terms such as more, increase, altogether.
- Addition and subtraction of 1 and 2 digit numbers using tape and block diagram.
- Draw diagrams to decide addition or subtraction.

Knowledge

- Understand cardinal and ordinal number.
- Understand Base Ten Place Value System until 120 hands.
- Properties of addition and subtraction
 - “Part, Part and Whole: addition”
 - “Whole, Part and Part: subtraction”
 - “Difference between Part and Part: subtraction”.

Mathematical thinking

- Think about ideas of adding and subtracting 1 and 2 digit numbers.
- Think about ideas of using diagrams to add and subtract.

Background

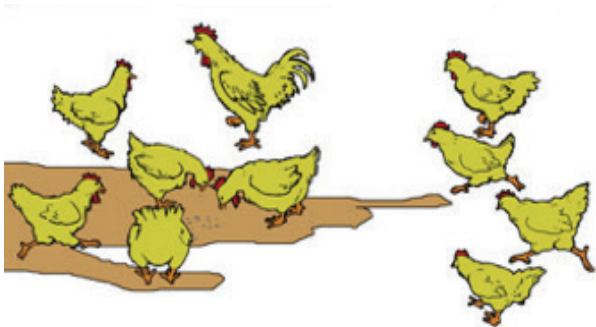
In this topic the main focus is to make students aware of situations where addition and subtraction may be applied. Think about ways to calculate 1-2 digit numbers addition and subtraction that are the inverse of those addition facts. They are expected to master calculations and investigate the properties of the additions and subtractions. By using these properties students are expected to master calculation and verify the results.

LESSON 1 ADDITION STORY

Teaching and Learning activities ⌚ (30 min)

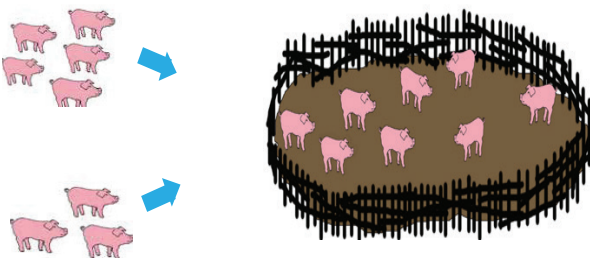
- Making Addition math story.

1. Lets make a math story of $6 + 4$



There are chickens. more chickens come in. How many chicken are there in?

2. Lets make a math story of $5 + 3$.



There are pigs. more pigs come in. How many pigs are there in?

Exercise

1. Let's make up math stories for the following.

- (a) $4 + 5$ (b) $4 + 3$ (c) $6 + 3 + 1$

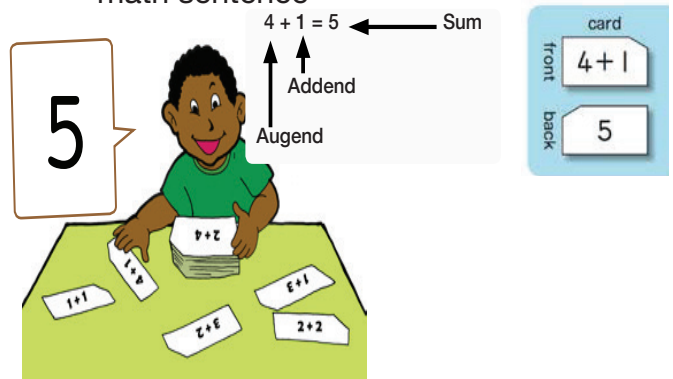
LESSON 02. ADDITION CARDS

Teaching and Learning activities ⌚ (30 min)

- Using representation to add up to 10

1. Let's use addition cards of answers up to 10.

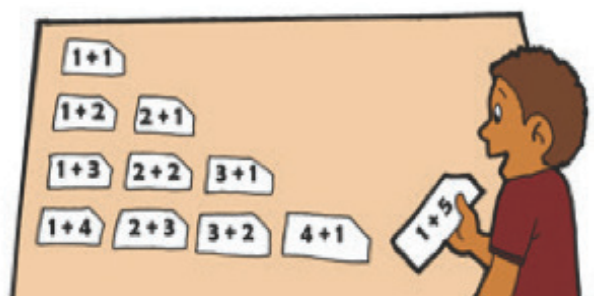
Note "Say the number" and "read the math sentence"



2. Find the cards with the same answer and line them up and explain the arrangement of cards which have the same answer?

(a) Find the cards with the same answer.

(b) line up the cards and explain the arrangement of cards which have the same answer.



L3. SUBTRACTION STORY

Teaching and Learning activities ⌚ (30 min)

- Making up Subtraction math story.

1. Lets make a math story of $8 - 2$



There are flying foxes hanging on the tree. flying foxes flew away. How many flying foxes are left hanging ?

2. Lets make up a math story.



There are boys and there are girls. What is the difference?

3. Let's make up math stories for the following.

- (a) $8 - 5$ (b) $10 - 7$ (c) $3 + 7 - 7$
 (d) $12 - 5 - 2$

L4. SUBTRACTION CARDS

Teaching and Learning activities ⌚ (30 min)

- Understanding minuend, subtrahend and difference.

1. Let's use subtraction cards of which minuends are up to 10.

Note "Say the number" and "read the math sentence"

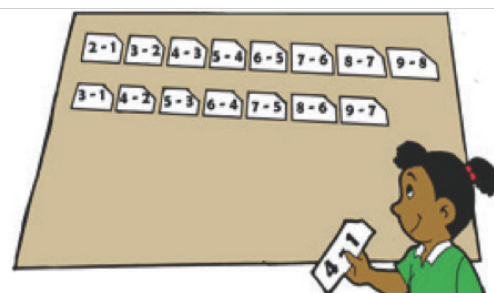


2. Find the cards with the same answer and line them up and explain the arrangement of cards which have the same answer.

(a) Let's find the cards with the same answer



(b) Line up the cards and explain the arrangement of the cards with the same answer.



TEACHING CONTENT - SAMPLE GUIDED LESSONS

L5. HUNDREDS, TENS AND ONES

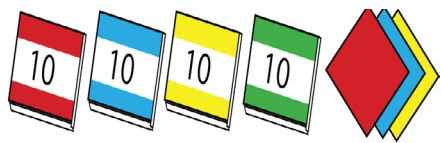
Teaching and Learning activities ⌚ (30 min)

- Calculation using various representations.

1 How many are there?



eggs



sheets

2. Fill each with a number.

(a) 3 tens and 7 ones make .

(b) 25 is tens and ones.

(c) 4 tens and ones make 46.

(d) 40 is tens.

3. Fill each with a number.



4. Let's fill the with a number.

Sets of 10 galip nuts and galip nuts.



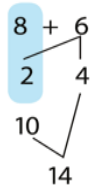
Room for boxes	Room for singles
Tens Place	Ones Place
<input type="text"/>	8
<input type="text"/> 28	

L6. MENTAL ADDITION

Teaching and Learning activities ⌚ (30 min)

- Mental calculation using split calculation.

1 Expected ideas (Spilt calculation)



Split 6 into 2 and 4

$$8 + 2 = 10$$

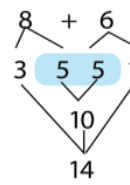
$$10 + 4 = 14$$



Split 6 into 2 and 4

$$8 + 2 = 10$$

$$10 + 4 = 14$$



Split 8 into 3 and 5

Split 6 into 5 and 1

$$5 + 5 = 10$$

$$3 + 10 + 1 = 14$$

2 Find the answer and explain how to calculate.

(a) $9 + 4$ (b) $8 + 3$ (c) $7 + 5$

(d) $6 + 5$ (e) $3 + 9$ (f) $5 + 6$

(g) $4 + 7$ (h) $5 + 8$ (i) $7 + 6$

(j) $8 + 9$ (k) $9 + 6$ (l) $6 + 8$

- Add mentally using cards.

3 Let's fill in the addition cards.

$9+9$	$8+9$	$7+9$	$+9$	<input type="text"/>	<input type="text"/>	<input type="text"/>	$2+9$
$9+8$	<input type="text"/>	$7+$	<input type="text"/>	<input type="text"/>	$4+8$	<input type="text"/>	
$9+7$	$8+$	$7+6$	<input type="text"/>	<input type="text"/>	$4+7$		
$9+$	$8+6$	<input type="text"/>	<input type="text"/>	$5+6$			
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>				
<input type="text"/>	<input type="text"/>	$7+4$					
<input type="text"/>	$8+3$						
$9+2$							

Think about which place will you fill in first and explain the ways of the arrangements.

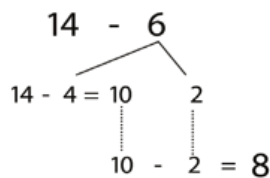
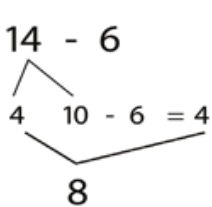
TEACHING CONTENT - SAMPLE GUIDED LESSONS

L7. MENTAL SUBTRACTION

Teaching and Learning activities ⌚ (30 min)

- Mental calculation.

1 Think about how to calculate $14 - 6$.



Split 14 into 4 and 10

Split 6 into 4 and 2

$$10 - 6 = 4$$

$$14 - 4 = 10$$

$$4 + 4 = 8$$

$$10 - 2 = 8$$

- Subtract these mentally

2 Find the answer and show how you worked out your answer.

- (a) $17 - 9$ (b) $15 - 7$ (c) $11 - 4$ (d) $13 - 6$
 (e) $12 - 7$ (f) $11 - 5$ (g) $11 - 8$ (h) $12 - 8$
 (i) $13 - 9$ (j) $17 - 8$ (k) $12 - 4$ (l) $6 - 8$

- Subtract mentally using cards

3 Let's fill in the subtraction.

cards.

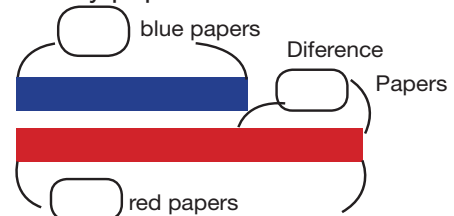
11-2	12-3	13-4	14-5	15-6	16-7	17-8	
11-3		13-5	14-6	15-7	16-8	17-9	
11-4	12-5	13-6	14-7	15-8	16-9		
11-5	12-6	13-7		15-9			
11-6	12-7		14-9				
	12-8	13-9					
11-8	12-9						
11-9							

L8. ADDITION OR SUBTRACTION

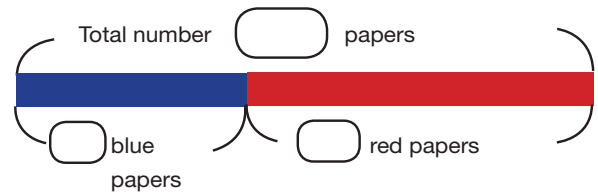
Teaching and Learning activities ⌚ (30 min)

- Understanding minuend, subtrahend and difference.

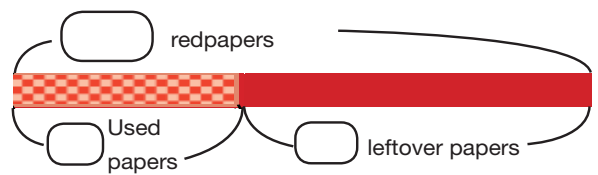
(a) How many papers are there in total?



(b) Which colour is more and by how many?



(c) I used 25 red papers. How many red papers are left?



2 Class 3A has 29 children and Class 3B has 31 children.

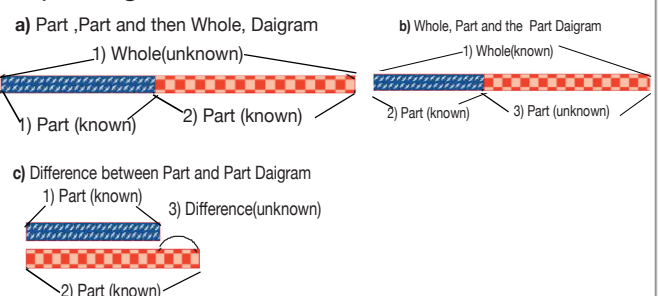
(a) What is the difference between the number of children in two classes?



(b) How many less are the children in class 3A than class 3B?

(c) How many more are the children in class 3B than class 3A?

Tape daigram.



TEACHING CONTENT - SAMPLE GUIDED LESSONS

L9. ADDITION IN VERTICAL FORM (1)

Teaching and learning activities ⌚ (60 min)

- Adding in vertical form without carrying.

1 Let's think about how to calculate using vertical form.

13 + 24 can be written vertically by putting numbers in the same columns.

How to add 13 + 24 using Vertical Form

$$\begin{array}{r} 13 \\ + 24 \\ \hline \end{array}$$

$$\begin{array}{r} 13 \\ + 24 \\ \hline 37 \end{array}$$

Line up the numbers according to their place value

Add numbers in the ones place, and numbers in the tens place.

$1 + 2 = 3$ $3 + 4 = 7$

Let's find the answers vertical form.

(a) 31 + 57 (b) 18 + 40 (c) 50 + 36

(d) 20 + 70

- Adding in vertical form with carrying.

2 There are 38 picture books and 27 reference book in Vagi's classroom.

How many books are there altogether.

How to add 38 + 27 using Vertical Form

$$\begin{array}{r} 38 \\ + 27 \\ \hline \end{array}$$

$$\begin{array}{r} 38 \\ + 27 \\ \hline 65 \end{array}$$

Line up numbers according to their place value. Add the ones place first.

$8 + 7 = 15$. The ones place is . Carry 1 ten to the tens place

1 ten was carried so $3 + 2 + 1 = 6$. The tens place is .

Let's find the answers in vertical form.

(a) 14 + 29 (b) 28 + 16 (c) 59 + 36

(d) 72 + 18 (e) 56 + 4 (f) 8 + 44

Exercise

1. Let's find the mistakes and explain the mistake with bock diagram.

$$\begin{array}{r} 27 \\ + 65 \\ \hline 82 \end{array}$$

$$\begin{array}{r} 56 \\ + 3 \\ \hline 86 \end{array}$$

L10. ADDITION IN VERTICAL FORM (2)

Teaching and learning activities ⌚ (60 min)

- Adding in vertical form with carrying.

1 Let's explain the algorithm with block diagram.

$$\begin{array}{r} 74 \\ + 65 \\ \hline 139 \end{array}$$

Tens place Ones place

Hundreds place

Find the answers in vertical form.

(a) 93 + 86 (b) 63 + 71 (c) 67 + 80
(d) 20 + 90

- Adding in vertical form with carrying.

2 Let's explain the algorithm with block diagram.

$$\begin{array}{r} 48 \\ + 87 \\ \hline 135 \end{array}$$

Tens place Ones place

Hundreds place

Note: Algorithm is a method used to find an answer using certain number of steps.

Exercise

1. Let's add in vertical form.

(a) 35 + 96 (b) 58 + 62 (c) 27 + 78

(d) 15 + 85 (e) 6 + 97 (d) 100 + 400

TEACHING CONTENT - SAMPLE GUIDED LESSONS

L11. SUBTRACTION IN VERTICAL FORM (1)

Teaching and learning activities ⌚ (60 min)

- Subtracting in vertical form.

Let's find the answers in vertical form.

- (a) $76 - 32$ (b) $56 - 40$ (c) $58 - 5$
 (d) $98 - 18$ (e) $43 - 42$ (f) $30 - 20$

1 Let's explain subtraction in vertical form using block diagram.

	4	5
	2	7

How to add $45 - 27$ using Vertical Form

Line up numbers in each column.

Borrow 1 ten as 10 ones, so $15 - 7 = 8$. The ones place of the answer becomes .

1 ten has been borrowed by the ones place. So $3 - 2 = \square$.

Tens Place **Ones Place**

1 Borrow 1 ten as 10 ones

$3 \quad 3 - 2 \quad 2 \quad 15 - 7$

2. Let's find the answers in vertical form.

- (a) $41 - 19$ (b) $70 - 56$ (c) $26 - 18$
 (d) $90 - 88$ (e) $92 - 8$ (f) $40 - 7$

L12. ADDITION OR SUBTRACTION

Teaching and learning activities ⌚ (60 min)

- Subtracting with borrowing / regrouping.

1 Let's explain subtraction in vertical form with borrowing or regrouping.

2. Let's find the answers in vertical form.

- (a) $132 - 41$ (b) $109 - 53$ (c) $146 - 60$
 (d) $132 - 47$ (e) $120 - 61$ (f) $106 - 59$
 (g) $105 - 58$ (h) $100 - 39$ (i) $102 - 17$
 (j) $102 - 7$ (k) $900 - 500$ (l) $1000 - 200$

3. Let's find the 35 appropriate number in each box.

①
$$\begin{array}{r} \square 8 \\ + 2 \square \\ \hline 64 \end{array}$$

②
$$\begin{array}{r} 8 \square \\ - \square 9 \\ \hline 58 \end{array}$$

TEACHING CONTENT - SAMPLE GUIDED LESSONS

NO - Addition & Subtraction of 3-digit numbers

Content Standards

3.1.2 Extend learned addition and subtraction to add and subtract 2 to 4-digit numbers.

Key concepts (ASK-MT)

Attitude

- To be able to share ideas on how to make problems of add 3-digit with carry once and carry twice.
- To be able to share ideas on how to subtract 3-digit numbers with borrowing once or twice.
- Appreciate easier ways of calculation to get the answer quickly.

Skills

- Add 3-digit numbers with carrying over once and twice in vertical form.
- Write addition and subtraction problems.
- Explain subtraction of 3-digits numbers from 3-digit number, where tens place of subtrahend is 0 and with borrowing in vertical form.
- Solve addition and subtraction of 2-digit numbers mentally.
- Subtract 3-digits numbers with borrowing once and twice from tens place to ones place. hundreds place to tens place and ones place to hundred place.
- Write a math expression of addition and subtraction.

Knowledge

- Recognize the given situation where addition and subtraction is used.
- Understand the situation of the sentence problem with the use of tape diagram and make mathematical expression based on relational diagram to solve the problem.
- Understand and learn about the process of carrying and borrowing.

Mathematical thinking

- Think about ways on how to add and subtract 3-digit numbers to 3-digit numbers without carrying and borrowing.
- Think about ways in how to calculate 3-digit numbers added to 3-digit numbers with carry over once and twice from tens place to ones place and from hundreds place to tens place.
- Think about how to calculate in case of carrying up to the tens place which becomes empty place (zero)
- Think about ways on how to subtract 3-digit numbers from 3-digit numbers by borrowing once and twice from tens place to ones place or from hundreds place to tens place.

Back Ground Notes

Teaching and learning in this topic is subject to addition and subtraction of three digit numbers. Children use the skills and knowledge acquired from the work on 1 – 2 digits to further develop and enhance problem solving skills in addition and subtraction with confidence.

Assessment Plan

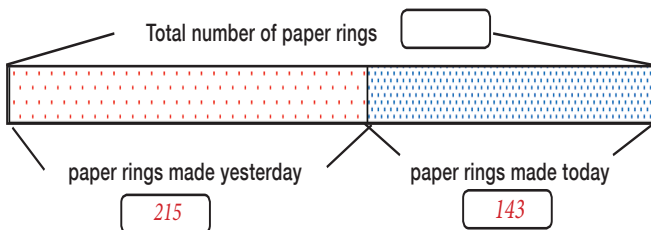
What to Assess			How to Assess	
Topic	Assessment Task	Lsn	Ass. Criteria	Scoring Key
Addition & Subtraction	1. Students use the process of addition and subtraction in column to write the sum and difference of two and three digit numbers. 2. Solve simple word problems.	26	Q.1.1-1.7	3 - Evidence of carry and addition in vertical with correct answer.
			Q.2.1-2.2 and Q.3.1-3.2	2 - Correct answer only. 1- Evidence of carry and addition in vertical is shown. 0 - Incorrect answer/Blank.
			• Solve Subtraction problem	2 - Show math expression correctly. 1 - Partly. 0 - Incorrect answer/blank.
			• Solve Addition problem	

L13. ADDITION OF 3-DIGIT NUMBERS IN VERTICAL FORM (1)

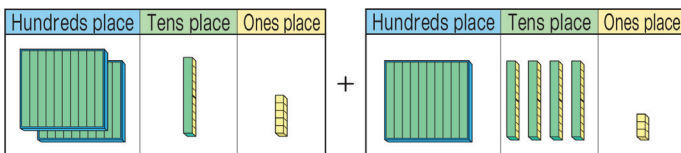
Teaching and learning activities ⌚ (60 min)

- Addition of 3-digit numbers in vertical form (1).

1. Let's remember the addition of 2-digit number and think of how to do this. For the party decoration, we made 215 paper rings yesterday and today 143. How many paper rings did we make altogether?

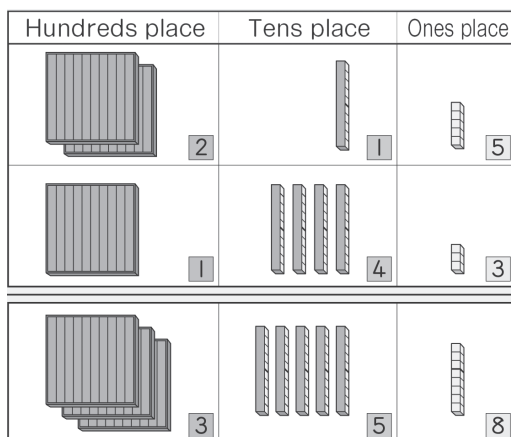


- (a) Write a Math expression. ($215 + 143$)
- (b) Estimate how large is the answer?
 $200 + 100$ (about 300)
- (c) Let's think about ways to add three digit numbers using representation.



Expected Ideas
Idea.1

Line up the place values, and then put the numbers in accordance.



L13. ADDITION OF 3-DIGIT NUMBERS IN VERTICAL FORM (1)

Expected Ideas

Idea. 2

Calculate vertically like the addition of 2- digit numbers.

	2	1	5
+	1	4	3
	3	5	8

Addition algorithm for $215 + 143$ in vertical form?

215	215	215
$+143$	$+143$	$+143$
358	358	358

$2+1=3$
 $1+4=5$
 $5+3=8$

Vertically line up the numbers according to their place value.

- Add 3-digit without carrying in vertical.
- Vertically line up the numbers according to their place value.

Exercise

1. Lets calculate.

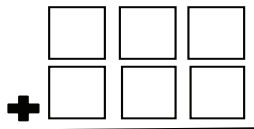
- (a) $153 + 425$
- (b) $261 + 637$
- (c) $437 + 320$
- (d) $507 + 205$

L14. ADDITION OF 3-DIGIT NUMBERS IN VERTICAL FORM (2)

Teaching and learning activities ⌚ (60 min)

- Write addition problems for 3-digit numbers and compare addition Problems with carry overs.

1 Let's write numbers in to make addition problems for 3 – digit numbers.



- 2 How many carry overs?
 (a) Which problems do you have to carry once?
 (b) Which problems do you have to carry twice?

Kuri 248 + 187 -----	Valo 537 + 167 -----	Tiki 174 + 265 -----	Yuri 865 + 746 -----	Raka 238 + 546 -----
-------------------------------	-------------------------------	-------------------------------	-------------------------------	-------------------------------

- Calculate vertically with carry once.
- 3 Let's think about how to add 238 + 546 in vertical form.

(a)

 (b) What is the difference to 215 + 143

Exercise

1. Let's calculate the following mathematical expressions in vertical form.
- (a) 502 + 205 (b) 432 + 136
 (c) 305 + 602 (d) 625 + 201
 (e) 243 + 156

L15. ADDITION OF 3-DIGIT NUMBERS IN VERTICAL FORM (3)

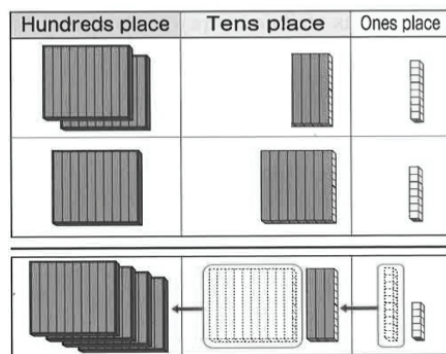
Teaching and learning activities ⌚ (60 min)

- Add 3 digit numbers with carry over once from tens place to hundreds.
- 1 Let's think about how to add 174 + 265 in vertical form.

	1	7	4
+	2	6	5

- Add 3 digit number with carry over twice.
- 2 Let's explain how to add 248 + 187 in vertical form.

Expected explanation.



$$\begin{array}{r}
 248 \\
 + 187 \\
 \hline
 435
 \end{array}$$

Summary

When adding large numbers in a vertical form, the best way is to start adding from the ones to the larger.

Exercise

1. Let's calculate the following mathematical expressions in vertical form.
- (a) 145 + 438 (b) 316 + 457 (c) 305 + 607
 (d) 680 + 227 (f) 293 + 186 (g) 563 + 271
 (h) 360 + 280 (i) 422 + 92

TEACHING CONTENT - SAMPLE GUIDED LESSONS

L16. ADDITION OF 3-DIGIT NUMBERS IN VERTICAL FORM (4)

Teaching and learning activities ⌚ (60 min)

- Add 3 digit numbers with carry over twice where tens place zero.

- 1 Let's think about how to add $537 + 167$ in vertical form. Also, try calculating after switching the addend and augends, and check whether the answer incorrect.

	5	3	7
+	1	6	7

Remember

$$\begin{array}{r} 537 \\ + 167 \\ \hline \end{array}$$

↑ ↑
Augend Addend

- Make up addition problems with carry over once and twice.
- 2 Let's make up addition problems of 3 digit numbers with the answer 653 and the following condition; Carry up once and Carry up twice.

Expected Ideas

- When the ones place carries up first, to calculate the one place; find 2 numbers which add up to 13.
4 and 9, 5 and 8, 6 and 7
Next, calculate the tens place, due to the round up from ones place, find 2 numbers which add up to 4. 0 and 4, 1 and 3, 2 and 2,
- Then, calculate the hundreds place, find two numbers which adds to 6.
1 and 5, 2 and 4, 3 and 3

Exercise

1. Let's calculate the following mathematical expressions in vertical form.

(a) $293 + 186$ (b) $335 + 196$ (c) $189 + 442$
 (d) $427 + 378$ (e) $532 + 369$ (f) $215 + 485$

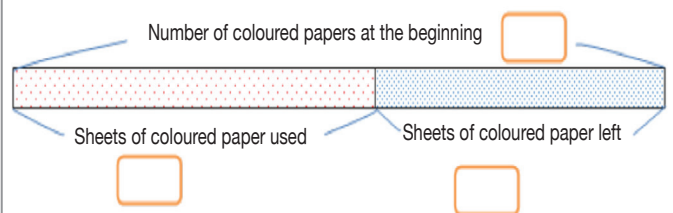
L17. SUBTRACTION OF 3-DIGIT NUMBERS IN VERTICAL FORM (1)

Teaching and Learning activities ⌚ (60 min)

- Subtraction of 3-digit number without borrowing.

- 1 There were 328 sheets of coloured paper. For the party decoration, 215 sheets of the coloured paper were used. How many sheets of coloured papers were left.

(a) Lets explain using the tape diagram.

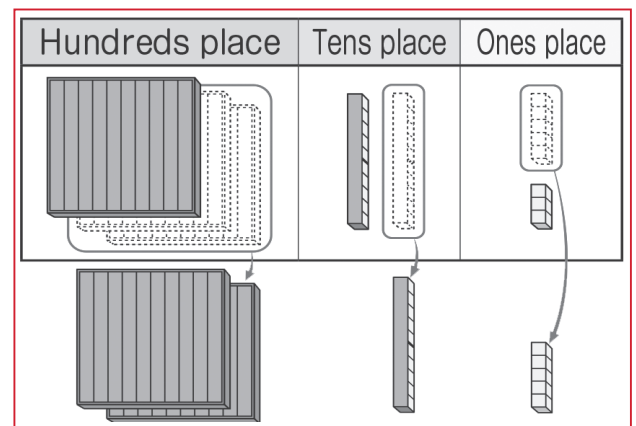


(b) Let's think about how to subtract three digit numbers.

Hundreds place	Tens place	Ones place

Expected Ideas

1) Using block diagram.



3-2 for the sets of 100s 2-1 for the sets of 10s 8-5 for the 1s

$$328 - 215$$

L17. SUBTRACTION OF 3-DIGIT NUMBERS IN VERTICAL FORM (1)

Expected Ideas

2) Vertical Calculation

I subtract using vertical form as for the subtraction of 2-digit numbers.

$$\begin{array}{r} 328 \\ - 215 \\ \hline 113 \end{array}$$

How to Subtraction 328 - 215 in Vertical Form

$$\begin{array}{r} 328 \\ - 215 \\ \hline 113 \end{array}$$

$3-2=1$
 $2-1=1$
 $8-5=3$

Vertically line up the numbers according to their place value.

Exercise

1. Lets calculate the following mathematical expressions in vertical form.

- (a) $768 - 534$ (b) $879 - 412$ (c) $647 - 317$
 (d) $965 - 864$

L18. SUBTRACTION OF 3-DIGIT NUMBERS IN VERTICAL FORM (2)

Teaching and learning activities ⌚ (60 min)

- Write different subtraction problems of 3-digit numbers with borrowing.

1 Let's write numbers in to make subtraction problems for 3 – digit numbers.

- Discuss each problem question written.

2 Let's find out whose problem is similar to yours and discuss the 3 questions.

Eva 329 $- 173$	Akira 692 $- 458$	Mote 500 $- 163$	Bala 305 $- 178$	Naiko 425 $- 286$
-------------------------	---------------------------	--------------------------	--------------------------	---------------------------

- (a) Which problems do you have to borrow once?
 (b) Which problems do you have to borrow twice?
 (c) Which problems do you have to borrow from hundreds?

Summary

- When subtracting large numbers in vertical form, the best way is to start subtracting from the ones to the largest.

Exercise

1. Let's calculate in vertical form

- (a) $510 - 176$ (b) $242 - 64$
 (c) $432 - 136$ (d) $604 - 247$
 (e) $293 + 186$ (f) $563 + 271$ (g) $360 + 280$
 (h) $422 + 92$

TEACHING CONTENT - SAMPLE GUIDED LESSONS

L19. SUBTRACTION OF 3-DIGIT NUMBERS IN VERTICAL FORM (3)

Teaching and learning activities ⌚ (60 mins)

- Subtraction with borrowing once.

1 Greg bought 250 marbles. He gave 123 marbles away to Graham. How many marbles does Greg have?

Let's think about how to subtract in vertical form.

(a) $692 - 458$

(b) $329 - 173$

	6	9	2
-	4	5	8

	3	2	9
-	1	7	3

- Subtraction with borrowing twice.

2 Mary received K425 from the sale of her flower pots. She paid K286 for her school fee.

How much is left?

Let's explain how to subtract $425 - 286$.

Expected Ideas of explanation.

1) Using block representation.

Hundreds place **Tens place** **Ones place**

① Borrow 1 from the tens place ② $15 - 6$

③ Borrow 1 from the hundreds place ④ $11 - 8$

	4	2	5
-	2	8	6
		1	10
	4	2	5
-	2	8	6
		3	10
	4	2	5
-	2	8	6
		3	10
	3	2	5
-	2	8	6
		3	9

L19. SUBTRACTION OF 3-DIGIT NUMBERS IN VERTICAL FORM (3)

Expected Ideas of explanation.

2) Vertical calculation.

Exercise

1. Let's calculate in vertical form.

(a) $540 - 513$ **(b)** $825 - 451$ **(c)** $526 - 483$

(d) $424 - 185$ **(e)** $821 - 373$

TEACHING CONTENT - SAMPLE GUIDED LESSONS

L20. SUBTRACTION OF 3-DIGIT NUMBERS IN VERTICAL FORM (4)

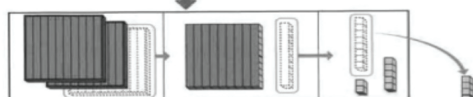
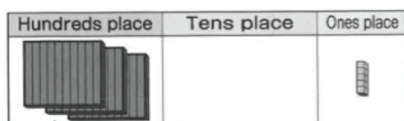
Teaching and learning activities ⌚ (60 mins)

- Subtracting 3 digit numbers containing one zero in between the numbers.

1 Let's explain how to subtract $305 - 178$ in vertical form.

Expected Ideas of explanation.

1) Using block representation.



- ① Borrow from hundreds place ② Borrow from tens place ③ $15 - 8$



- ④ $2 - 1$ ⑤ $9 - 7$

$$\begin{array}{r} 305 \\ - 178 \\ \hline \end{array}$$

$$\begin{array}{r} 2 \quad 9 \quad 10 \\ 3 \quad 0 \quad 5 \\ - 1 \quad 7 \quad 8 \\ \hline \end{array}$$

$$\begin{array}{r} 2 \quad 9 \quad 10 \\ 3 \quad 0 \quad 5 \\ - 1 \quad 7 \quad 8 \\ \hline \square \quad \square \quad 7 \end{array}$$

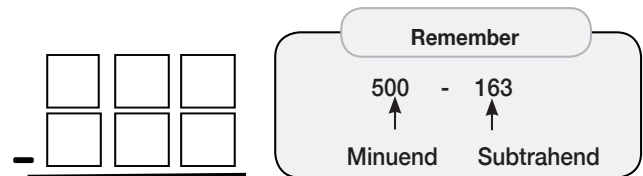
2) Vertical calculation.

Note:

Allow the students to think about how to calculate subtraction problems of 3 digit numbers with borrowing in vertical form when dealing with zeros in between. Encourage students to apply prior knowledge and explain their Ideas.

L20. SUBTRACTION OF 3-DIGIT NUMBERS IN VERTICAL FORM (4)

2 Let's explain how to subtract $500 - 163$ in vertical form.



For subtraction, we calculate using vertical form as follows.

- Calculate the numbers in the same place value, starting with ones.
- When you cannot subtract, borrow from the superior place, and calculate.

Exercise

1. Let's calculate in vertical form.

- (a) $405 - 286$ (b) $602 - 198$ (c) $402 - 107$
 (d) $702 - 46$ (e) $800 - 197$ (f) $200 - 38$
 (g) $700 - 403$ (h) $600 - 9$

TEACHING CONTENT - SAMPLE GUIDED LESSONS

L21. SUBTRACTION OF 3-DIGIT NUMBERS IN VERTICAL FORM (5)

Teaching and learning activities ⌚ (60 mins)

- Find subtrahend and minuend when difference is given.
- 1** Let's subtract 3 - digit numbers that gives the answers 356 with following conditions;
- (i) Borrowing once (ii) Borrowing twice.

Act. **1** When we cannot subtraction from ones place. First for calculating the ones place borrow from the tens place so there will be 2 numbers on ones place which become 6 after subtraction. 5 and 9, 4 and 8, 3 and 7, 2 and 6, or 1 and 5 Next, to calculate the tens place, remember the number 1 which was borrowed for the ones place. It means finding 2 numbers on the tens place which become 6 after subtraction. 6 and 0, 7 and 1, 8 and 2, 9 and 3 Then, to calculate the hundreds place, find 2 numbers which becomes 3 after subtraction. 4 and 1, 5 and 2, 6 and 3, 7 and 4, 8 and 5, or 9 and 6

3 5 6

Exercise

1. Let's calculate.

- (a) $700 - 463$ (b) $600 - 299$ (c) $200 - 95$

L22 CALCULATING LARGER NUMBERS

Teaching and learning activities ⌚ (60 mins)

- Discuss and explain how to calculate number using carrying and borrowing methods.
- 1** Let's explain how to calculate using the carrying up and borrowing.

(a) $865 + 746$

	8	6	5
+	7	4	6

(b) $1248 - 936$

	1	2	4	8
-		9	3	6

(c) $1000 - 895$

	1	0	0	0
-		8	9	5

- Calculating larger numbers using prior knowledge.

2 Lets calculate these

(a) $4175 + 3658$

	4	1	7	5
+	3	6	5	8

(b) $6073 + 3927$

	6	0	7	3
+	3	9	2	8

(c) $3925 - 1947$

	3	9	2	5
-	1	9	4	7

(d) $1000 - 5089$

	1	0	0	0
+	5	0	8	9

Exercise

1. Let's calculate in vertical form.

- (a) $525 + 913$ (b) $258 + 745$
 (c) $483 + 517$ (d) $1237 - 414$
 (e) $3125 - 567$ (f) $1002 - 946$
 (g) $4563 - 403$ (h) $2606 + 3198$

TEACHING CONTENT - SAMPLE GUIDED LESSONS

L23. EASIER WAY TO CALCULATE

Teaching and learning activities ⌚ (60 mins)

- Easier ways of calculation.

1 Let's calculate easily.

(a) $298 + 120$

(b) $500 - 198$

① $298 + 120$

When you add 2 to the addend and make 300, calculating becomes easier. You added 2 to the addend, so you subtract 2 from the number augends.
 $298 + 120$ add 2 subtract 2
 $300 + 118 = 418$
 Answer 418

① $298 + 120$

When you add 2 to the addend and make 300, calculating becomes easier. You added 2 to the addend, so you subtract 2 from the number augends.
 $298 + 120$ add 2 subtract 2
 $300 + 118 = 418$
 Answer 418

2 Using the idea in Activity.1, use easier ways for the following problems.

(a) $308 + 197$

(b) $305 - 99$

Summary

In addition, the answer does not change by adding some addends and subtracting the same addends to the augends.

In subtraction, the answer does not change by adding some number to both the subtrahend and the minuend.

Exercise

1. Let's use easier ways to calculate the following expression.

- (a) $525 + 913$ (b) $258 + 745$ (c) $483 + 517$
 (d) $1237 - 414$

L24. MENTAL CALCULATION

Teaching and learning activities ⌚ (60 mins)

- Changing the order of calculation.

1 Let's think about how to calculate $875 + 47 + 63$ in different order.

When you are adding 3 numbers or more the order of calculations does not change the answer
 $(875 + 47) + 63 = 875 + (47 + 63)$

Note: The bracket () is a symbol that means you should calculate the numbers inside first.

- Mental Calculation.

2 Let's calculate mentally.

(a) $35 + 46$

Idea.1

Idea.2

Calculate in vertical form,
 (i) $5 + 6 = 11$
 (ii) $3 + 4 + 1 = 8$ then 81.

Calculate in vertical form,
 (i) $5 + 6 = 11$
 (ii) $3 + 4 + 1 = 8$ then 81.

(b) $81 - 27$

Exercise

1. Let's calculate easier.

- (a) $525 + 913$ (b) $258 + 745$ (c) $18 + 6$
 (d) $38 + 41$ (e) $68 + 29$ (f) $52 + 18$
 (g) $23 - 8$ (h) $45 - 24$ (i) $71 - 46$
 (j) $90 - 76$

TEACHING CONTENT - SAMPLE GUIDED LESSONS

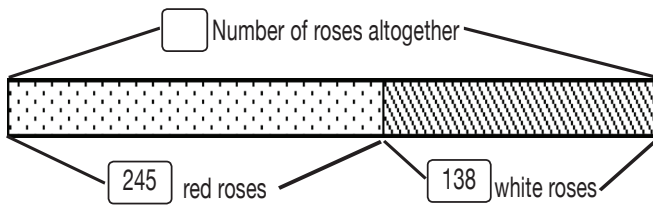
L.25 USING REPRESENTATION TO CALCULATE

Teaching and learning activities ⌚ (60 mins)

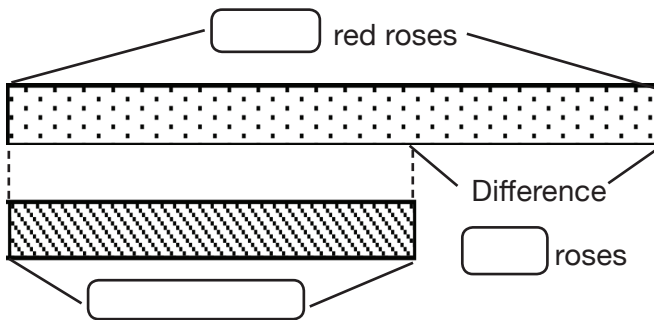
- Calculate using representation.

1 There are 245 red roses and 138 white roses blossomed.

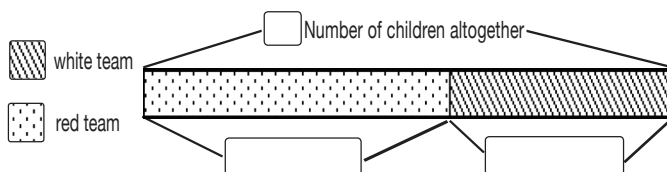
(a) How many roses blossomed?



(b) Which colour blossomed most?



2 There are 605 children in Kaori's school. In a sports day, children are divided into red and white teams. There are 298 children in the red team. How many children are in the white team?



- Make diagram representation of the math story.

3 Let's think about how to represent math story in a diagrammatic and solve it.

The grade 3 students gathered 118 cartons of can cokes. And the grade 4 students gathered 20 cartons more than grade 3 students. How many cartons did grade 4 students gathered?

L.26 EVALUATION OF ADDITION AND SUBTRACTION OF 3 BY

Teaching and learning activities ⌚ (60 mins)

- Discuss and explain how to calculate number using carrying and borrowing methods.

Name: _____ Score: ___/___

Topic: Addition and Subtraction

1. Calculate in vertical form

① $383 + 264$

$$\begin{array}{r} 383 \\ + 264 \\ \hline 647 \end{array}$$

② $897 + 436$

$$\begin{array}{r} 897 \\ + 436 \\ \hline 1333 \end{array}$$

③ $1347 + 4458$

$$\begin{array}{r} 1347 \\ + 4458 \\ \hline 5805 \end{array}$$

④ $413 - 245$

$$\begin{array}{r} 413 \\ - 245 \\ \hline \end{array}$$

⑥ $897 - 436$

$$\begin{array}{r} 897 \\ - 436 \\ \hline 261 \end{array}$$

⑦ $6000 - 5236$

$$\begin{array}{r} 6000 \\ - 5236 \\ \hline 764 \end{array}$$

2. In a building, there are 1200 stair steps from the ground floor to the top floor. Peter climbed up 618 stair

steps. How many steps left to the top floor

① Write a Math expression $1200 - 618$

② Answer: 582

3. Hilda collected 186 stones. Nick collected 298 stones. How many stones did they collected in total?

① Write a Math expression $186 + 298$

② Answer: 484

NO: Review Lessons - Meaning of Multiplication

Content Standards

2.13 Extend their understanding of addition, subtraction and multiplication to solve simple problems

Key concepts (ASK-MT)

Attitude

- Enjoy and appreciate the use of block diagrams for explaining.
- Enjoy and share ideas of adding two digit numbers using vertical form.
- Appreciate and value the use of properties of addition and subtraction.

Skill

- Add and subtract in vertical form.
- Add and subtract using block diagram.

Knowledge

- Understand numbers 1-20.
- Understand composing and decomposing numbers.
- Understand Base Ten Place Value System up to 120.
- Understand the properties of addition and subtraction.

Mathematical thinking

- Review ideas of adding and subtracting 1 and 2 digit numbers.
- Review ideas of using diagrams to add and subtract.

Background

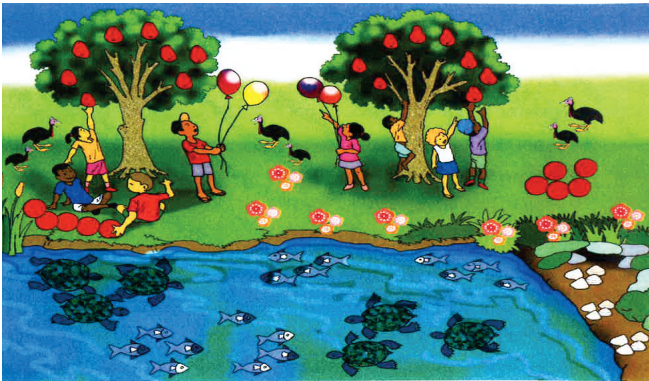
This topic is the introductory lessons to multiplication. They are aimed at conditioning the children to see patterns in a set of numbers and to formulate the rules, factor of increment and by using these rules, they are expected to recite the times table of the single digit numbers, i.e. 2 to 9.

L27 MEANING OF MULTIPLICATION 1

Teaching and learning activities ⌚ (60 mins)

- Using situations to make multiplication sentences.

1. Let's represent a situation with a multiplication sentence.



① 3 groups of 4 shells

groups, in each group, makes shells

② Mathematics Sentence: x = shells

2 Children with 2 balloons

(a) children, with each child, makes balloons

(b) Mathematics Sentence: x = balloons

③ how many cassowaries are there?

(a)

(b) Mathematics Sentence:

- Understanding meaning and how to express mathematical sentence of multiplication.

L27 MEANING OF MULTIPLICATION 1

2. There are pieces of tape . What are the lengths of 1 piece, 2 pieces and 3 pieces of tape in cm?

1 pieces

$$1 \times 2 = 2$$

2 pieces

$$\boxed{2} \times 2 = \boxed{4}$$

3 pieces

$$\boxed{3} \times 2 = \boxed{6}$$

Exercise

(a) How many?



(b) Circle some star to get 4×3




L28. MULTIPLICATION TABLE 1 (ROW OF 2)

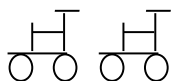
Teaching and learning activities ⌚ (60 mins)

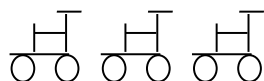
- Using situation to understand the structure of multiplication of table 2.

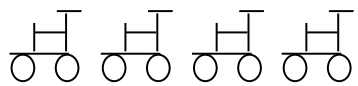
For every bicycle, there are two tyres on a bicycle.


- Calculate the total number of tyres as the number of bicycle increases from 1 to 51.

 $1 \times 2 = \square$

 $2 \times 2 = \square$

 $3 \times 2 = \square$

 $4 \times 2 = \square$

 $5 \times 2 = \square$

 $6 \times 2 = \square$

$7 \times 2 = \square$

$8 \times 2 = \square$

$9 \times 2 = \square$

- Calculate the total number of tyres as the number of bicycle increases from 6 to 9.

$2 \times 9 = 18$ is read as "2(times) 9 is 18".
This way of reading multiplication sentence as a set of the same numbers such as in 2s is called multiplication table of 2.

L29. MULTIPLICATION TABLE 2 (ROW OF 2)

Teaching and learning activities ⌚ (60 mins)

- Understand about how to recite the multiplication table of 2 and practice.

- Let's make multiplication cards for multiplication table of 2 and practise with them.

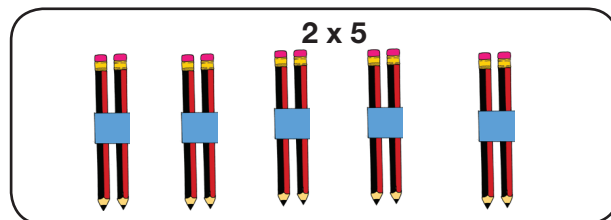
5×2

10

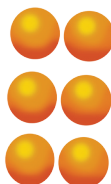
The Multiplication Table of 2

$2 \times 1 = 2$... Two ones are	2
$2 \times 2 = 4$... Two twos are	4
$2 \times 3 = 6$... Two threes are	6
$2 \times 4 = 8$... Two fours are	8
$2 \times 5 = 10$..Two Fives are	10
$2 \times 6 = 12$..Two sixs are	12
$2 \times 7 = 14$...Two sevens are	14
$2 \times 8 = 16$...Two eights are	16
$2 \times 9 = 18$.. Two nines are	18

- Draw a picture for multiplication table of 2.



- Let's write multiplication sentence using the diagram.



$3 \times 2 = 6$

3 sets of 2



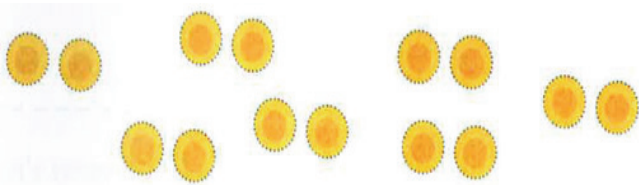
$5 \times 2 = 10$

5 sets of 2

- Making math story using the multiplication of 2.

L29. MULTIPLICATION TABLE 2 (ROW OF 2)

4. Let's make a math story for 7×2 .




Each child makes flour balls. How many flour balls can be made by children?
 $2 \times 7 = 14$.

L30. MULTIPLICATION TABLE 1 (ROW OF 5)

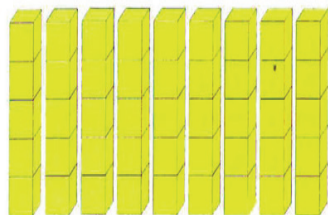
Teaching and learning activities ⌚ (60 mins)

- Using situation to understand the structure of multiplication of table 5.

	$1 \times 5 =$	<input type="text"/>
	$2 \times 5 =$	<input type="text"/>
	$3 \times 5 =$	<input type="text"/>
	$4 \times 5 =$	<input type="text"/>
	$5 \times 5 =$	<input type="text"/>

Repeated Addition
 $2 \times 5 = 5 + 5$

- Let's find the total number of Okari nuts as the number of leaves increases from 6 to 9.

	$6 \times 5 =$	<input type="text"/>
	$7 \times 5 =$	<input type="text"/>
	$8 \times 5 =$	<input type="text"/>
	$9 \times 5 =$	<input type="text"/>

$9 \times 5 = 45$

9 sets of 5

Note:

Allow students to have fun to draw block diagrams to represent 6, 7 and 8.

L31. MULTIPLICATION TABLE 2 (ROW OF 5)

Teaching and learning activities ⌚ (60 mins)

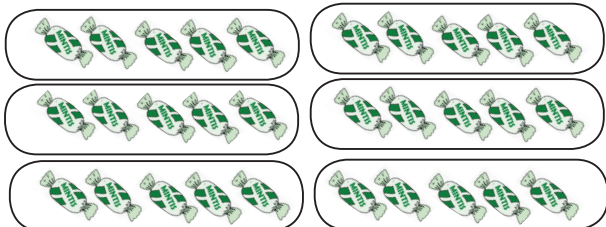
- Understand about how to recite the multiplication table of 5 and practice.

1. Let's make multiplication cards for multiplication table of 5 and practice with them.

6×5	30
--------------	----

2. Draw a picture for multiplication table of 5.

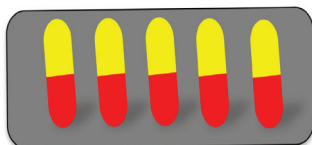
6×5



The Multiplication Table of 5

$1 \times 5 = 5$... One(times) five is 5
$2 \times 5 = 10$... Two five is 10
$3 \times 5 = 15$... Three five is 15
$4 \times 5 = 20$... Four five is 20
$5 \times 5 = 25$... Five five is 25
$6 \times 5 = 30$... Six five is 30
$7 \times 5 = 35$... Seven five is 35
$8 \times 5 = 40$... Eight five is 40
$9 \times 5 = 45$... Nine five is 45

3. Let's write multiplication sentence using the multiplication table of 5.

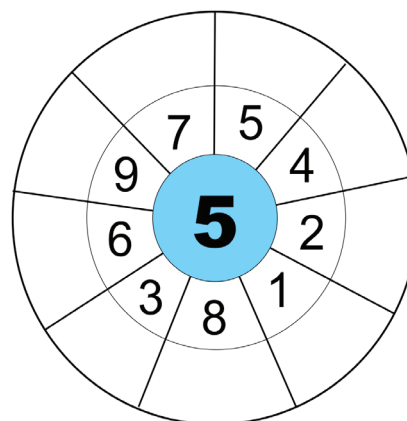


5 tablets of medicine
are in each box

- Practice the multiplication table of 5 based on the circle 4.

L31. MULTIPLICATION TABLE 2 (ROW OF 5)

4. Let's write the answer by multiplying each number in the centre by the number around the circle.



TEACHING CONTENT - SAMPLE GUIDED LESSONS

L32. MULTIPLICATION TABLE 1

Teaching and Learning activities ⌚ (60 mins)

- Think about the patterns of each multiplication table.
1. Let's explain the pattern and memorize it.

The Multiplication Table of 2

1 x 2 = 2 ... One(times) two is 2
 2 x 2 = 4 ... Two two is 4
 3 x 2 = 6 ... Three two is 6
 4 x 2 = 8 ... Four two is 8
 5 x 2 = 10 ... Five two is 10
 6 x 2 = 12 ... Six two is 12
 7 x 2 = 14 ... Seven two is 14
 8 x 2 = 16 ... Eight two is 16
 9 x 2 = 18 .. Nine two is 18

The Multiplication Table of 3

1 x 3 = 3 ..One(times) three is 3
 2 x 3 = 6 ... Two three is 6
 3 x 3 = 9 ... Three three is 9
 4 x 3 = 12 ..Four three is 12
 5 x 3 = 15 ..Five three is 15
 6 x 3 = 18 ..Six three is 18
 7 x 3 = 21 ..Seven three is 21
 8 x 3 = 24 ..Eight three is 24
 9 x 3 = 27 ..Nine three is 27

The Multiplication Table of 4

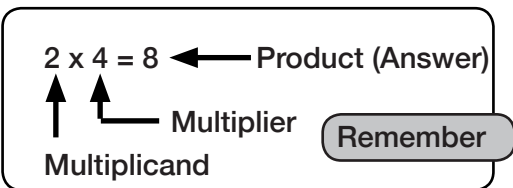
1 x 4 = 4 ... One(times)four is 4
 2 x 4 = 8 ... Two four is 8
 3 x 4 = 12 ... Three four is 12
 4 x 4 = 16 ... Four four is 16
 5 x 4 = 20 ... Five four is 20
 6 x 4 = 24 ... Six four is 24
 7 x 4 = 28 ... Seven four is 28
 8 x 4 = 32 ... Eight four is 32
 9 x 4 = 36 ... Nine four is 36

The Multiplication Table of 5

1 x 5 = 5 ..One(times) five is 5
 2 x 5 = 10 ... Two five is 10
 3 x 5 = 15 ... Three five is 15
 4 x 5 = 20 ... Four five is 20
 5 x 5 = 25 ... Five five is 25
 6 x 5 = 30 ... Six five is 30
 7 x 5 = 35 ... Seven five is 35
 8 x 5 = 40 ... Eight five is 40
 9 x 5 = 45 ... Nine five is 45

2. Think about the patterns of each multiplication table.

Multiplier \ Multiplicand	1	2	3	4	5	6	7	8	9
row of 2	2	4		8		12			
row of 3	3				15				
row of 4	4						28		
row of 5	5		15						
row of 6	6	6							
row of 7	7	14							



L33 MULTIPLICATION TABLE 2

Teaching and Learning activities ⌚ (60 mins)

- Think about the patterns of each multiplication table.
1. Let's explain the pattern and memorize it .

The Multiplication Table of 6

1 x 6 = 6 ... One(times) six is 6
 2 x 6 = 12 ... Two six is 12
 3 x 6 = 18 ... Three six is 18
 4 x 6 = 24... Four six is 24
 5 x 6 = 30 ... Five six is 30
 6 x 6 = 36 ... Six six is 36
 7 x 6 = 42 ... Seven six is 42
 8 x 6 = 48 ... Eight six is 48
 9 x 6 = 56 .. Nine six is 56

The Multiplication Table of 7

1 x 7=7 ..One(times) seven is 7
 2 x 7 = 14 ..Two seven is 14
 3 x 7 = 21 ..Three seven is 21
 4 x 7 = 28 ... Four seven is 28
 5 x 7 = 35 ...Five seven is 35
 6 x 7 = 42 ...Six seven is 42
 7 x 7 = 49 ..Seven seven is 49
 8 x 7 = 56 ...Eight seven is 56
 9 x 7 = 63 ..Nine seven is 63

The Multiplication Table of 8

1 x 8 = 8 ..One(times) eight is 8
 2 x 8 = 8 ... Two eight is 16
 3 x 8 = 24 ..Three eight is 24
 4 x 8 = 32 ...Four eight is 32
 5 x 8 = 40 ...Five eight is 40
 6 x 8 = 48 ...Six eight is 48
 7 x 8 = 56 ...Seven eight is 56
 8 x 8 = 64 ...Eight eight is 64
 9 x 8 = 72 ...Nine eight is 72

The Multiplication Table of 9

1 x 9 = 9 ... One(times) nine is 9
 2 x 9 = 18 ... Two nine is 18
 3 x 9 = 27 ... Three nine is 27
 4 x 9 = 36 ... Four nine is 36
 5 x 9 = 45 ... Five nine is 45
 6 x 9 = 54 ... Six nine is 54
 7 x 9 = 63 ... Seven nine is 63
 8 x 9 = 72 ... Eight nine is 72
 9 x 9 = 81 ... Nine nine is 81

- Memorizing Multiplication table.
2. Let's fill in and find pattern.

3. Let's find easier ways to add all numbers in the table.

TEACHING CONTENT - SAMPLE GUIDED LESSONS

NO - Multiplication

Content Standards

3.1.3 Extend learned Multiplication to multiply numbers up to 3-digit numbers by 1-digit numbers in vertical form.

Key concepts (ASK - MT)

Attitude

- Share their ideas on how to calculate multiplication problems using splitting and mathematical sentences.
- Share their ideas on how to calculate multiplication problems using diagram representations and mathematical sentences.
- Enjoy the point scoring game to understand the rules of multiplication.
- Appreciate the increase and splitting rules of multiplication when multiplying by 10.

Skills

- Calculate using the rules of multiplication (splitting and mathematical sentences).
- Calculate using the rules of multiplication (diagram representations and mathematical sentences).
- Calculate using the rules of multiplication with '0' and '10'.

Knowledge

- Various rules to calculate multiplication problems.
- Use or purpose of the symbol “=”.
- Recognize the properties of multiplication
- Changing order of multiplicand and multiplier in multiplication by using “diagram representations and mathematical sentences”, the answer is the same.
- Use of different multiplication expression to calculate.

Mathematical thinking

- Think of ways to multiply using rules of multiplication and diagram representations.
- Think of ways to multiply mathematical expression with '0' and '10'.
- Think of ways to calculate large numbers using diagrams.
- Think about how to apply the rules of

Background

This topic is the extension of “The meaning of multiplication” and focuses on using the patterns in numbers to solve related problems in multiplication. Special numbers are introduced which have special properties in calculations such as 0 and 10. The children are encouraged to investigate these properties and use logical reasoning to solve multiplication problems.

Assessment Plan

What to Assess		How to Assess	
Topic	Assessment Task	Lsn	Ass. Criteria
Multiplication	1. Complete a written exercise on multiplication.	41	Evaluation - Written Test
			<ul style="list-style-type: none"> • Multiplying with 0 and 103- Evidence of operation shown with correct answer.
			Ass. Criteria
		Q3.1-3.4	<ul style="list-style-type: none"> • Applying rules of multiplications.
			Q1.1-1.3 & Q2.1-2.6 <ul style="list-style-type: none"> • Multiplying with 0 and 10.
			Scoring Key
			3-Evidence of operation shown with correct answer. 2- Correct answer only. 1- Evidence of cooperation shown. 0- Incorrect answer/Blank.
			2- Evidence of rule of multiplication. shown with correct answer. 1- Evidence of rule of multiplication shown with incorrect answer. 0- Incorrect answer/blank

TEACHING CONTENT - SAMPLE GUIDED LESSONS

L34.MULTIPLIER AND MULTIPLICAND (1)

Teaching and learning activities ⌚ (60 mins)

- Understanding rules of Multiplication.
1. Let's think about multiplication table.1
 - (a) How can we get the answer 14?
 - (b) Write all the answers in the blank.
 - (c) Look for the answers 27 and 48 in multiplication table.

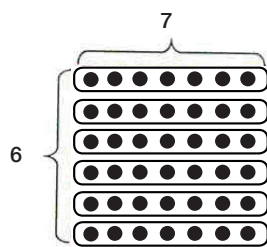
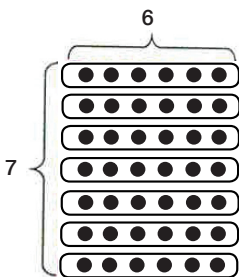
		Multiplier								
		1	2	3	4	5	6	7	8	9
Multiplicand	1									
	2							14		
	3									
	4									
	5									
	6									
	7		14							
	8									
	9									

- Understanding various rules from the expression.
2. Let's find various rules from the expression that has the same answer 7×6 .

What number goes in the below?

$7 \times 6 = \square$

$6 \times \square = \square$



L34.MULTIPLIER AND MULTIPLICAND (1)

When you express this in a mathematical sentence, it can be written as.

$7 \times 6 = 6 \times \square$

This symbol “=” is called **equal**. It is not only used for writing the answer of the calculation, but also used for showing that the expressions or numbers on the left side and the right side are equal. In multiplication, the answers are the same even if the order of the multiplier and the multiplicand are changed.

L35. MULTIPLIER AND MULTIPLICAND (2)

Teaching and learning activities ⌚ (60 min)

- Using increase and decrease rules of multiplication.

- How much larger is the answer for 7×6 than the answer for 7×5 ?



When you express this in a mathematical sentence, it can be written as $7 \times 6 = 7 \times 5 + \square$.

larger by smaller by

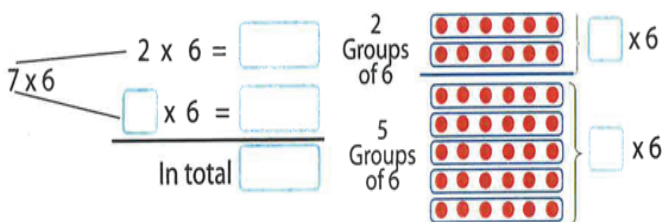
- How much is it smaller from the answer of 7×6 to the answer of 7×7 ?

Also, express this in a mathematical sentence. $7 \times 6 = 7 \times 7 - \square$.

In multiplication, if the multiplier increases by 1, the answer increases only by the multiplicand. Also, if the multiplier is reduced by 1, the answer is reduced by only the multiplicand.

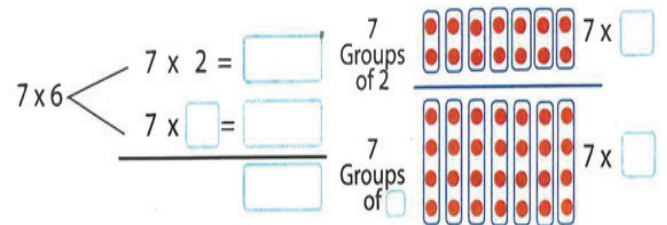
- Split calculation of Multiplier and multiplicand.
- Let's think about what will happen to the answer of 7×6 , if you split the multiplier or the multiplicand?

(a) "Splitting the multiplicand"




L35. MULTIPLIER AND MULTIPLICAND (2)

(b) "Splitting the multiplier"



In multiplication, if we calculate by splitting the multiplicand or multiplier, in total, the answer will be the same.

L36. MULTIPLIER AND MULTIPLICAND (3)

Teaching and learning activities  (60 min)

- Calculate using the rules of multiplication.

1. Akia has difficulties in calculating the answers for 6×8 . Let's give him good hints.

Note: Allow the students to think of rules of multiplication such as splitting multiplicand and multiplier and Increase.

$$6 \times 8$$

Splitting multiplicand

$$6 \times 8 \quad 3 \times 8 = 24$$

$$3 \times 8 = \frac{24}{48}$$

$$6 \times 8$$

Splitting multiplier

$$6 \times 8 \quad 6 \times 4 = 24$$

$$6 \times 4 = \frac{24}{48}$$

2. Increase calculation.

$$8 \times 5 = 40 + 8$$

$$= 48$$

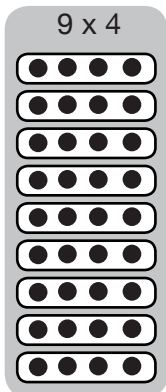
- Representing the order by mathematical sentences.

3. Let's represent the following by using mathematical sentences and diagrams.

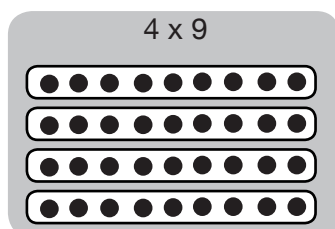
(i) If you exchange the order of the multiply and 19 groups of 44 groups of 9 multiplier in the expression 9×4 , the 9×4 , 4×9 answer will be the same.

$$9 \times 4 = \boxed{4} \times \boxed{9}$$

9 groups of 4



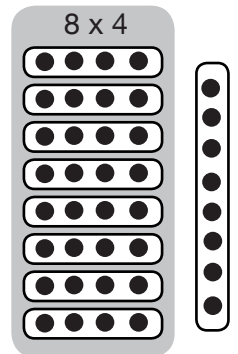
4 groups of 9



L36. MULTIPLIER AND MULTIPLICAND (3)

(ii) The answer for 8×5 will be the same to the answer for 8×4 by adding 8.

$$8 \times 5 = \boxed{8} \times \boxed{4} + \boxed{8}$$



Exercise

1. Let's find the number which applies in the following.

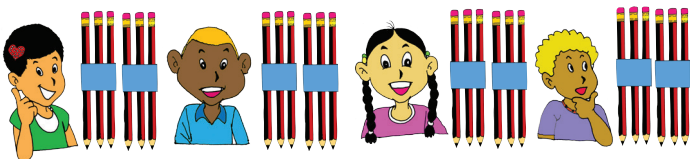
- (a) $8 \times 7 = 7 \times \square$
- (b) $9 \times \square = 3 \times 9$
- (c) 4×6 is bigger than 4×5
- (d) $7 \times 7 = 7 \times \square + 7$

L37. ORDER OF MULTIPLY IN MULTIPLICATION

Teaching and learning activities ⌚ (60 min)

- Representing diagram with mathematical sentences.

- Each child receives two sets of 3 pencils. How many pencils are needed for 4 students?



Let's explain Kila and Vavi's ideas.

Kila's Idea

2 groups of 3
 $2 \times 3 = 6$
 $4 \times 6 =$

Vavi's Idea

4 groups of 2
 $4 \times 2 = 8$
 $8 \times 3 =$

- Order of multiplication using brackets ().

$$2 \times 3 \times 4$$

$$4 \times 2 \times 3$$

The number of pencil for each child

The number of sets

$$(2 \times 3) \times 4 = (4 \times 2) \times 3$$

$$6 \times 4 = 8 \times 3$$

In multiplication, if we change the order of multiplying the multiplicand and the multiplier, the answer is the same.

Exercise

- Let's change the order of multiplying the multiplicand and the multiplier, and calculate.

(a) $2 \times 3 \times 3$ (b) $2 \times 4 \times 3$ (c) $2 \times 2 \times 3$

Expected Answers

(a) $2 \times 3 \times 3 = 6 \times 3 = 18$ (b) $2 \times 4 \times 3 = 8 \times 3 = 24$
 $3 \times 3 \times 2 = 9 \times 2 = 18$ $2 \times 3 \times 4 = 6 \times 4 = 24$

(c) $2 \times 2 \times 3 = 4 \times 3 = 12$
 $2 \times 3 \times 2 = 6 \times 2 = 12$

L38. MULTIPLYING WITH 0

Teaching and Learning activities ⌚ (60 min)

- Recognizing the rule of multiplication in the point scoring game.

Point Scoring Game

In this game, you toss the bottle top caps and gain point cards according to where the bottle caps stop. when 10 bottle caps are tossed, the team with higher score wins.



- Let's see how many points Vagi has?

Vagi's Points

Points of Cards	5	3	1	Total
Number of cards obtained	1	2	7	10
Points	5	6	7	18

1 card of 5 points $1 \times 5 = 5$ $5 \times 1 = 5$
 2 cards of 3 points $2 \times 3 = 6$ $2 \times 3 = 6$
 7 cards of 1 points $7 \times 1 = 7$ $7 \times 1 = 7$

↑
↑
↑
↑
↑
↑

Number of cards Points on cards Points Number of cards Points on cards Points

- Let's see how many points Henao's has?

Henao's Points

Points of Cards	5	3	1	0	Total
Number of cards obtained	1	0	4	0	10
Points	10	0	4	0	14

Write the expressions for calculating the total points.

2 cards of 5 points $1 \times 5 = 5$ $5 \times 1 = 5$
 0 cards of 3 points $0 \times 3 = 0$ $0 \times 3 = 0$
 4 cards of 1 points $4 \times 1 = 4$ $4 \times 1 = 4$
 0 card of 0 points $0 \times 0 = 0$ $0 \times 0 = 0$

Think about how to find the answer for the multiplication with 0

TEACHING CONTENT - SAMPLE GUIDED LESSONS

L39. MULTIPLYING WITH 0

Teaching and learning activities ⌚ (60 minutes)

- Applying the reduce method of multiplication using '0'.
- Let's calculate the total points for 3 point and 0 point cards.
- (a) Calculate the total points for 3 point card 1.

Number of cards	Points on cards	Points
3	3	9
3	2	6
3	1	3
3	0	0

Reduced by 3

- (b) Calculate 2 the total points for 0 point card.

Number of cards	Points on cards	Points
3	4	12
2	4	8
1	4	4
0	4	0

Reduced by 4

Mathematical idea

1(a) The score for the 3 point card.
In the multiplication table, the answer for the row of 3 will be reduced by 3 every time the multiplier is reduced by 1. $3 \times 1 = 3$, so if the multiplier is reduced by 1, the answer is reduced by 3, which makes 3×0 .

Answer : 0 points

Row of 3	Points
$3 \times 5 = 15$	
$3 \times 4 = 12$	Reduced by 3
$3 \times 3 = 9$	Reduced by 3
$3 \times 2 = 6$	Reduced by 3
$3 \times 1 = 3$	Reduced by 3
$3 \times 0 = ?$	Reduced by 3

- Let's discuss the rules for multiplying by 0.2

- (a) What is the total points for Henao?
- (b) In the point scoring game, 2 what does the expression 0×0 mean?

Any number multiplied to 0, will give an answer of 0. Also, multiply 0 to any number, the answer will be 0.

No bottle caps went to 0 point area. 0 point cards.

Exercise

- Let's calculate

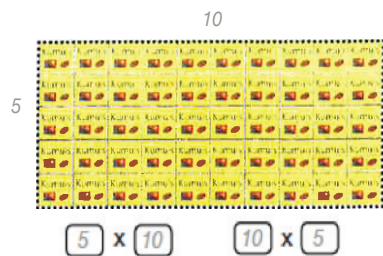
- (a) $6 \times 0 = 0$ (b) $4 \times 0 = 0$ (c) $0 \times 7 = 0$
 (d) $0 \times 5 = 0$ (e) $0 \times 0 = 0$

L40. MULTIPLYING WITH 10

Teaching and learning activities ⌚ (60 min)

- Using the rules of multiplication to multiply by 10.
- How many number of stickers are there in all?
"Let's use different multiplication expression to calculate the number of stickers together."

- (a) Write two expressions to calculate the number of stickers altogether.



- (b) Let's think about how to find answer for 5×10 .

Asa's Idea

In the row of 5, the answer will increase by 5
 $5 \times 9 = 45$
 $5 \times 10 = 50$ (increase by 5)

Kila's Idea

Split multiplier 10 into 2 and 8
 $5 \times 10 = 50$
 $5 \times 2 = 10$
 $5 \times 8 = 40$
 In total 50

- (c) Let's think about how to find answer for 5×10 using different expression.

Expected Mathematical Idea.

Split multiplier 10 into 7 and 3

$5 \times 10 = 50$
 $5 \times 7 = 35$
 $5 \times 3 = 15$
 In total 50

Exercise

- Let's calculate

- (a) $6 \times 10 = 60$ (b) $8 \times 10 = 80$ (c) $10 \times 4 = 40$
 (d) $10 \times 9 = 90$

- Find the answer for 10×102

$5 \times 10 = 50$
 $10 \times 5 = 50$
 100

L41. VARIOUS METHOD OF EXPLAINING CALCULATION

Teaching and learning activities ⌚ (60 min)

- Calculating beyond the multiplication table.


1. Let's write an expression to calculate the total number of lollies by filling the blanks with various numbers and find the answer?

There are 4 packets of lollies, each packet with lollies inside.
How many lollies are there altogether?

$4 \times \square$ How can we get the answers for 12 and 18?

- Using picture and rules of multiplication.

2. There are 4 packets of lollies, each packet with 12 lollies inside.

4	x	12		
Number of packets		Number of lollies for each packet		

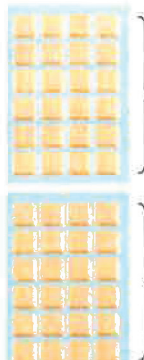
How many lollies are there altogether?

“Let's think about how to calculate and explain using diagrams and expressions”

Expected Ideas

Raka's Idea

12 can be split into 6 and 6.
so there are two 4×6


4×12	$\left\{ \begin{array}{l} 4 \times 6 = 24 \\ 4 \times 6 = 24 \end{array} \right.$		$\left. \begin{array}{l} \\ \\ \end{array} \right\} \begin{array}{l} 4 \times 6 \\ 4 \times 6 \end{array}$
	\hline In total 48		

L41. HOW TO CALCULATE

Expected Ideas

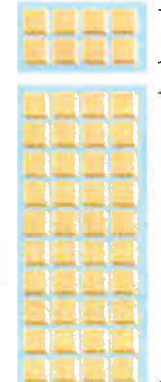
Vavi's Idea

12 can be split into 9 and 3.
use the row of 9 and row of 3

4×12	$\left\{ \begin{array}{l} 4 \times 9 = 36 \\ 4 \times 3 = 12 \end{array} \right.$		$\left. \begin{array}{l} \\ \\ \end{array} \right\} \begin{array}{l} 4 \times 9 \\ 4 \times 3 \end{array}$
	\hline In total 48		

Karo's Idea

Multiplying 10s are easy,
so splitting 12 into 2 and 10 will make

4×12	$\left\{ \begin{array}{l} 4 \times 2 = 8 \\ 4 \times 10 = 40 \end{array} \right.$		$\left. \begin{array}{l} \\ \\ \end{array} \right\} \begin{array}{l} 4 \times 2 \\ 4 \times 10 \end{array}$
	\hline In total 48		

L42. EVALUATION OF MULTIPLICATION

Name: _____ Score ____/____

Topic: Multiplication

1. Michelle played a card game. Following table is the result of the game.

Points of Cards	10	5	3	1	0	Total
Number of cards obtained	1	0	4	0	3	10
Points	20	0	9	2	0	31

(a) What is the score of 10 points card?

Operation: _____ (10 x 2 , 2 x 10)
 Answer : ____ (20)

(b) What is the score of 5 points card?

Operation: _____ (5 x 0 , 0 x 5)
 Answer: ____ (0)

(c) What is the score of 0 points card?

Operation: _____ (0 x 3 , 3 x 0)
 Answer: ____ (0)

2. Calculate.

- (a) $7 \times 0 = \underline{\quad}$ (0) (b) $0 \times 0 = \underline{\quad}$ (0)
 (c) $10 \times 9 = \underline{\quad}$ (90) (d) $3 \times 10 = \underline{\quad}$ (30)
 (e) $3 \times 2 \times 5 = \underline{\quad}$ (30) (f) $8 \times 4 \times 2 = \underline{\quad}$ (64)

3. Fill in the blank.

- (a) $7 \times 5 = 5 \times \underline{\quad}$ (7)
 (b) $6 \times 9 = 6 \times 8 + \underline{\quad}$ (6)
 (c) $8 \times 3 = 8 \times 4 - \underline{\quad}$ (8)
 (d) $(3 \times 2) \times 5 = 3 \times (\underline{\quad}) \times 5$ (2)

TEACHING CONTENT - SAMPLE GUIDED LESSONS

QM - Duration & Time

Content Standards

3.2.3 Develop their understanding of time in hours, minutes and second, and apply in their daily activities.

Key concepts (ASK-MT)

Attitude

- Appreciate the usefulness of time and duration needed for everyday life.
- Value the importance of time.

Skills

- Record short time accurately by using stopwatch.
- Convert time units of seconds and minutes.
- Calculate duration and time.

Knowledge

- Understand duration of time needed for an everyday life.
- Time units of “seconds” which are shorter than minutes.
- Read timetables and expressed time in 24 hour clock.

Mathematical Thinking

- Think about how to record duration of time shorter than minutes.
- Think about time units of “seconds” which are shorter than minutes.

Background

This topic is focus on time and duration calculations and awareness. The children are given the opportunity to use instruments that measure time and read the scales accurately and develop an appreciation for them.

By this the children are confident in using these instruments to give time information and relate to time formats.

What to Assess			How to Assess	
Topic	Assessment Task	Lsn	Ass. Criteria	Scoring Key
Duration & Time	1. Enjoy calculating and converting units of time. 2. Appreciate the units of time by expressing duration of time activity takes.	48	Q1.1-1.4 • calculate and convert units of time. Q2.1-2.1, Q3, Q4, Q5, Q6, • express duration of time activity takes.	2 - correct answer. 1 - Partly (Evidence of conversion and calculation is made known. 0 - Incorrect answer/blank.

TEACHING CONTENT - SAMPLE GUIDED LESSONS

L43. SHORT TIME

Teaching and learning activities  (60 minutes)

- Investigate how to represent short time.
1. Let's stand on one foot. who stood for the longest time,



- (a) Think about how to choose the winner who can stand on one foot the longest time.
 (b) Think about how to compare?

Note:

Allow the students to talk about their experiences freely and have them realize a need of common time unit to record shorter duration, and teach them units of "seconds". Also have the students understand that the duration is quantity of passing from starting to the end of action.

- Understanding time units of seconds which are shorter than minutes.
2. Using a stopwatch, let's record the duration how long you can stand on one foot?

The time taken on one foot	
Name:	Time (second)
Vavi	

Seconds are time units shorter than 1 minute.

1 minute = 60 seconds



How to Capture Duration

Students are often experiencing recording duration even if they don't necessarily use a clock. Therefore, have students talk their experiences freely and have them realize a need of common time unit to record shorter duration, and teach them that units of "seconds." Also, let students understand that duration is quantity of passing from starting to the end of action.

L44. CHANGING SECONDS INTO MINUTES AND SECONDS

Teaching and learning activities  (30 min)

- Conversion of seconds and minutes.

Bethel	1 minute 38 seconds
Fred	1 minute 47 seconds
Jeff	104 seconds

The table show on the right shows the time that Bethel and other students stood on one foot. Who stood the longest?

- (a) Let's represent the time using only seconds, then fill in the blanks.

Bethel 1 minute 38 seconds = seconds

Fred 1 minute 47 seconds = seconds

$$\begin{array}{r} 38 \\ + 60 \text{ 1minute} \\ \hline \end{array}$$

- (b) Let's represent the duration of time using minutes and seconds.

Jeff 104 seconds = minute seconds

$$\begin{array}{r} 104 \\ - 60 \text{ 1minute} \\ \hline \end{array}$$

- Recording of shorter time by using minutes and seconds.

Let's record the time taken for a paper airplane flight, and record many other time represented by different situation.

Note:

Let students carefully use a stopwatch without dropping and hitting and have them learn pushing the buttons when starting and finishing in using a stopwatch.



TEACHING CONTENT - SAMPLE GUIDED LESSONS

L45. HOW TO CALCULATE

Teaching and learning activities ⌚ (30 min)

- Expressing time as “morning and afternoon” in flight schedules.

1. Let’s look at how flight timetables are written.

The table on the right shows a flight schedule. The words “morning and afternoon” are not used. Why?

MONDAY				
FLT	DEP	FROM	TO	ARR
PX852	06:25	POM	PNP	07:00
PX853	07:25	PNP	POM	08:00
PX906	08:45	POM	TBG	10:50
	11:15	TBG	UNG	11:40
PX905	12:05	UNG	POM	14:05
PX964	14:55	POM	GKA	16:05
PX965	16:30	GKA	POM	17:40
PX960	08:30	POM	GKA	09:40
PX961	10:05	GKA	POM	11:15
PX800	12:00	POM	DAU	13:10
PX801	13:35	DAU	POM	14:45
PX856	15:30	POM	PNP	16:05
PX857	16:30	PNP	POM	17:05

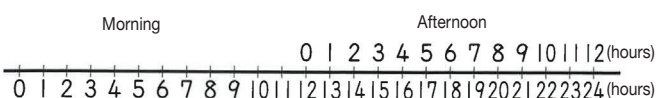
Note:

Let students notice timetables are expressed with the 24 hour clock by having them realize that the words “morning” and “afternoon” are not used.

- Converting 12 hour clock into 24 hour clock.

2. Let’s think about how to convert time expressed with the 12 hour clock into 24 hour clock using the timer, wristwatch or digital devices such as digital clock.

Write the time of 20 minutes past 1 (one) in the afternoon, without using the word, “afternoon”.



Note:

Find situation where the time is expressed with 24 hour clock into 12 hour clock and develop learning activities for students to understand how to read 12hour clock and 24 hour clock, identify the different between 12 hour and 24 hour clock.

L46. CALCULATING TIME (1)

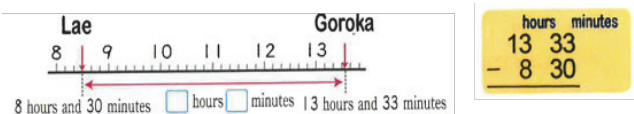
Teaching and learning activities ⌚ (30 min)

- Calculating time duration based on arrival and departure time.

1. Asa wants to travel the Highlands highway from Lae to Mt. Hagen. He thought about the duration it will take him there.

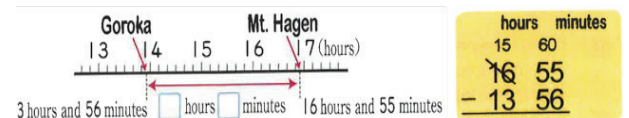


(a) Firstly, he estimates the time he will travel from Lae to Goroka, If he leaves Lae at 8:30 and arrive in Goroka at 13:13, how long will it take him from Lae to Goroka?



13 hours 33 minutes - 8 hours and 30 minutes

(b) If he will board another bus from Goroka to Mt. Hagen, and the bus departs Goroka at 13:56, he will arrive at Mt. Hagen in 6:55. How many hours and minutes will he take him to reach Mt.Hagen from Goroka?



16 hours 55 minutes - 8 hours and 56 minutes

Note: Calculate duration using departure and arrival time.

(c) If you board 3 buses at (1) and (2), how long it will take you in total by bus, answer in hours and minutes?

How to calculate duration

Consider followings when finding out duration and time by calculations. Calculate by using the same time units Convert to “hour” after addition becomes more than 60 minutes. Calculate by converting 1 hour into 60 minutes when minute of time minuend are larger than that of time subtracted.

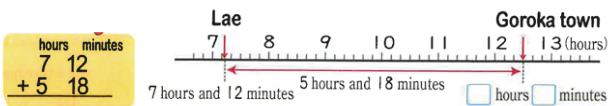
L47. CALCULATING TIME (2)

Teaching and learning activities (60 minutes)

- Calculating total time.

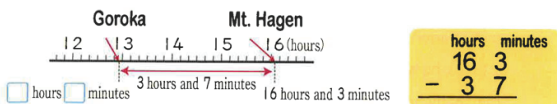
1 Let's find the arrival time and departure time based on departure and arrival time and how long it takes to arrive.

- (a)** The bus "Tulait Tulait" leaves Lae city at 7:12, it will take the duration of 5 hours and 18 minutes to reach Goroka town. At what time will it reach Goroka town?



7 hours and 12 minutes + 5 hours and 18 minutes

- (b)** "Walameinyura" will arrive in Goroka town at 16 hours and 3 minutes, it will take the duration of 3 hours and 7 minutes to reach Mt. Hagen from Goroka. What time will it leave Goroka town?



16 hours and 3 minutes - 3 hours and 7 minutes.

Exercise

1. If you leave your house at 9 hours and 40 minutes in the morning and it took you the duration of 1 hour and 30 minutes to reach the garden. At what time in the morning will you reach the garden.
2. Ray was reading from 4 hours and 40 minutes in the afternoon to 5 hours and 25 minutes in the afternoon of the same day. How many minutes did he spend reading?
3. Anna's school trip takes 2 hours and 45 minutes in the morning, and 3 hours 30 minutes in the afternoon. In total, how many hours and minutes does the school trip takes?

L48. EVALUATION OF TIME AND DURATION

Name: _____

Score ___/___

Topic: Time and Duration

1. Fill in the blank

- 130 seconds = ___ minutes and ___ seconds
(Ans: 2 minutes and 30 seconds)
- 90 minutes = ___ hour and ___ minutes
(Ans: 1 hour and 30 minutes)
- 1 minute 40 seconds = ___ seconds
(Ans: 100 seconds)
- 1 hour and 20 minutes = ___ minutes
(Ans: 80 minutes)

2. Answer the following questions.

- What is the duration between 1 9:20 and 11:00.

(Ans: 1 hour and 40 minutes)
- What time is 1 hour and 45 minutes after 2:00 _____ (Ans: 3:45)
- Nick went to Rugby practice on Sunday morning from 8:30 to 11:00. How many hours and minutes did he practice?

(Ans: 2 hours and 30 minutes)
- If you leave your house at 7:30 and it takes 40 min to reach your school. At what time will you reach your school? _____
_____ (Ans: 8:10)
- Michelle studied Mathematics 40 minutes in the morning and 1 hour and 30 minutes in the afternoon. In total, how many hours and minutes did he study?

(Ans: 2 hours and 10 minutes)
- It takes 1 hour and 10 minutes to go to school. School starts at 8:30. What time do you leave house? _____
(Ans: 7:20)

TEACHING CONTENT - SAMPLE GUIDED LESSONS

NO- Multiplication in Vertical Form

Content Standards

3.1.3 Extend learned Multiplication to multiply numbers up to 3-digit numbers by 1-digit number in vertical form.

Key concepts (ASK-MT)

Attitude

- Share their ideas on how to multiply 2- digit number by 1- digit number.
- Share their ideas on how to multiply complex example of 2- digit number by 1-digit number with carrying once and twice.
- Share their ideas on how to multiply 3-digit number by 1-digit number without and with carrying twice.
- Share their ideas on how to multiply by carrying numbers to the place values and with “0” in vertical form.

Skills

- Multiply 3-digit number by 1-digit number without and with carrying twice.
- Use base 10 block and place value to explain how to multiply 2-digit number by 1-digit number.
- Multiply by carrying numbers to the place values and with “0” in vertical form.
- Multiply 2- digit number by 1- digit number multiply complex example of 2 digit number by 1 digit number with carrying once and twice.
- Calculate maths problems without using vertical form method.

Knowledge

- Understand of how to solve mathematical stories of multiplying 2- digit number by 1- digit number.
- Understanding on how to multiply 3- digit number by 1- digit number without and with carrying and
- Understanding how to multiply by carrying numbers to the place values and with “0” in vertical form.

Mathematical thinking

- Think of how to multiply complex example of 2-digit number by 1-digit number with carrying once and twice.
- Think of how to multiply 3- digit number by 1- digit number without and with carrying and
- Think of how to present the use of 10 block and place value to explain how to multiply 2 digit number by 1 digit number.

What to Assess			How to Assess		
Topic	Assessment Task	Lsn	Ass. Methods	Ass. Criteria	Scoring Key
Multiplication in Vertical form	1. Complete a written exercise on multiplication.	56	Evaluation - Written Test	Q1.1-1.5 • Multiplying 3-digit by 1-digit with regrouping Q3.1-3.4 • Applying rules of multiplications	3 - Evidence of vertical calculation and regrouping with correct answer. 2 - Correct answer only 1- Evidence of vertical calculation and regrouping shown. 0- Incorrect answer/Blank 2 - Evidence of rule of multiplication shown with correct answer. 1 - Evidence of rule of multiplication shown with incorrect answer 0 - Incorrect answer/blank

TEACHING CONTENT - SAMPLE GUIDED LESSONS

L49. MULTIPLYING BY SETS 10S AND 100S

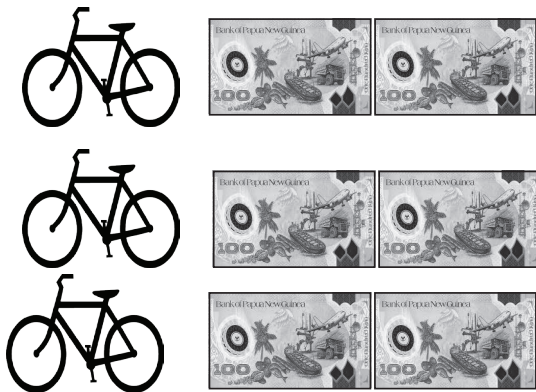
Teaching and learning activities  (60 min)

- Multiplying by sets of 10.

1 A child bought 3 pencils for 40t each. How much is the total cost altogether?



2 There are 3 bicycles for K200 each. How much is the total cost?



Exercise

Let's calculate.

- (a) 20×3 (b) 30×5 (c) 80×2
 (d) 50×6 (e) 300×2 (f) 400×3
 (g) 600×4 (h) 800×5

L50. CALCULATE 2 DIGIT NUMBER BY 1 DIGIT NUMBER (1)

Teaching and Learning activities  (60 min)

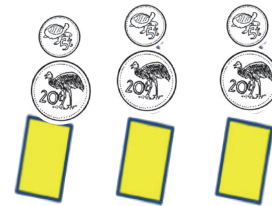
- Calculating 2 digit number by 1 digit number without carrying.

1 A child bought 3 coloured papers which costs 25 toea each. How much is the total cost of the coloured papers altogether? Let's think about how to calculate (2- digit numbers) \times (1-digit number)

For Considering How to Calculate 21×3

1×3 Using the place values, 21 split into 1 on ones and 20 on tens.
 We can calculate 1×3 and 20×3 .

20×3 21×3 $1 \times 3 = \square$
 There are 2 \times 3 sets of 10's block. $20 \times 3 = \square$
 Total \square



Note: For calculating multiplication, we can use vertical form. Let's explain how to Multiply 21×3 in vertical form.

(Using the row of the multiplier in the multiplication table makes the calculation easier)

How to Multiply 21×3 in Vertical Form

Line up the ones and tens place vertically. 1 times 3 equals 3. 3 is in the ones place. 2 times 3 equals 6. 6 is in the tens place.

Exercise

1. Let's calculate.

- (a) 34×2 (b) 23×3 (c) 42×2
 (d) 11×41234

L51. CALCULATE 2 DIGIT NUMBER BY 1- DIGIT NUMBER (2)

Teaching and learning activities ⌚ (60 min)

- Multiplying 2-digit number by 1- digit number with carrying from tens place.

1 Let's think about how to multiply 71×4 in vertical form.

$$\begin{array}{r} 71 \\ \times 4 \\ \hline \end{array} \rightarrow \begin{array}{r} 71 \\ \times 4 \\ \hline \square\square 4 \end{array}$$

1 times 4 is equals 4.
□ is in the ones place.

7 times 4 is equals 28.
8 is in the tens place.
□ is the hundreds place.

2 Let's think about how to multiply in vertical 13×7 in vertical form.

$$\begin{array}{r} 13 \\ \times 7 \\ \hline \end{array} \rightarrow \begin{array}{r} 13 \\ \times 7 \\ \hline \square 1 \end{array}$$

Note: Students must understand that when multiplying in vertical form, they should know where to place each numbers we multiply in their correct places.

Exercise

1. Let's multiply in vertical form.

- (a) 93×3 (b) 41×5 (c) 63×2
 (d) 30×84 (e) 14×7 (f) 13×5
 (g) 24×3 (h) 49×25678

L52. CALCULATE 2 DIGIT NUMBER BY 1 DIGIT NUMBER (3)

Teaching and learning activities ⌚ (60 min)

- Multiplying of 2-digit number by 1-digit number with carrying twice.

1. Let's think about how to multiply 95×3 in vertical form.

$$\begin{array}{r} 95 \\ \times 3 \\ \hline \end{array} \rightarrow \begin{array}{r} 95 \\ \times 3 \\ \hline \square 5 \end{array} \rightarrow \begin{array}{r} 95 \\ \times 3 \\ \hline 285 \end{array}$$

- Multiplying complex example of 2 digit number by 1 digit number with carrying twice.

2. Let's think about how to multiply 46×7 in vertical form 2.

$$\begin{array}{r} 46 \\ \times 7 \\ \hline \end{array} \rightarrow \begin{array}{r} 46 \\ \times 7 \\ \hline \square 2 \end{array} \rightarrow \begin{array}{r} 46 \\ \times 7 \\ \hline 322 \end{array}$$

6 times 7 is equals 42.
2 is in the ones place.
□ is carried to the tens place.

4 times 7 is equals 28.
□ is in the tens place.
□ is in the hundreds place.

Note: Students must understand that when multiplying in vertical form, they should know where to place each numbers we multiply in their correct places.

Exercise

1. Let's multiply in vertical form

- (a) 95×7 (b) 85×9 (c) 35×9
 (d) 65×8 (e) 84×6 (f) 58×4
 (g) 63×4 (h) 49×5

TEACHING CONTENT - SAMPLE GUIDED LESSONS



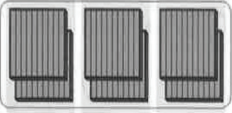
L53. CALCULATE 3 DIGIT NUMBER BY 1 DIGIT NUMBER (1)

Teaching and learning activities  (60 min)

- Calculate 3-digit number by 1-digit number.

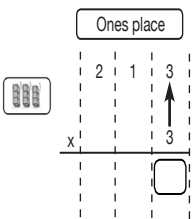
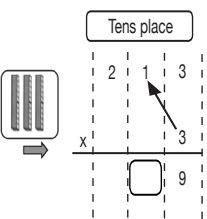
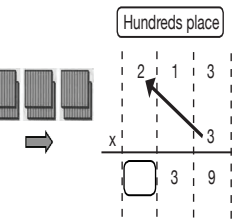
1. There is a 213 meters long path around a pond. You ran around a pond times. How many meters did you run altogether?



	3×3	213×3	$3 \times 3 = 9$
	10×3		$10 \times 3 = 30$
	200×3		$200 \times 3 = 600$
		Total	<input type="text"/>

x

2. Let's explain how to multiply in vertical form.

Ones place	Tens place	Hundreds place
		

Exercise

1. Let's multiply in vertical form.

- (a) 42×2 (b) 423×2 (c) 312×3
 (d) 121×4

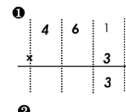
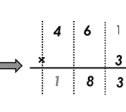
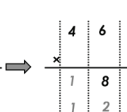
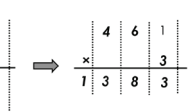
L54. CALCULATE 3 DIGIT NUMBER BY 1 DIGIT NUMBER (2)

Teaching and learning activities

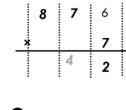
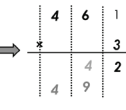
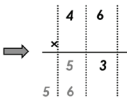
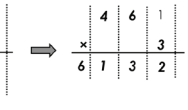
- Calculate 3-digit number by 1-digit number with carrying.

1. Let's explain how to multiply by carrying numbers to the superior place values?

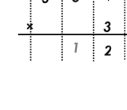
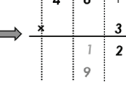
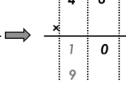
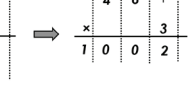
a

			
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b

			
---	--	---	---

c

			
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- Multiplying with "0" in vertical form.

2. Let's explain how to multiply with "0" in vertical form.

320	405	700
$\times 4$	$\times 8$	$\times 6$
<hr/>	<hr/>	<hr/>
1280	3240	4200

Exercise

1. Let's multiply in vertical form.

- (a) 321×4 (b) 413×3 (c) 314×5
 (d) 731×9 (e) 654×3 (f) 492×7
 (g) 420×7

2. You bought 8 balls that cost K12 each. How much is the total cost?



L55. CALCULATE MENTALLY


Teaching and learning activities ⌚ (60 min)

- Multiplying 2-digit number by 1-digit number with carrying from tens place.

1. A candy costs 25 toea. How much is the cost of 3? Let's try to calculate the answer without vertical calculation 25×3 .

Expected Ideas

20×3 is 60, so the answer is larger than 60. The answer is larger than 60 by $5 \times 3 = 15$ 3 times 2 is 60. 3 times 5 is 15, $60 + 15 = 75$

- Easier way of calculation. 
2. You bought 6 pieces of cookies for K1.50 each and 6 chocolates for 80 toea each.
How much is the total cost?

Exercise

1. Let's calculate mentally.

- (a) 34×2 (b) 17×3 (c) 325×6
 (d) 458×9 (e) 33×3 (f) 76×8
 (g) 743×7 (h) 56×6

L56. EVALUATION OF MULTIPLICATION IN VERTICAL FORM

Name: _____

Score ____/____

Complete the following exercise and show your working outs clearly to demonstrate your idea.

1. Calculate

(a) 54×8

$$\begin{array}{r} 54 \\ \times 8 \\ \hline 32 \\ \underline{40} \\ 432 \end{array}$$

(b) 654×5

$$\begin{array}{r} 654 \\ \times 5 \\ \hline 20 \\ \underline{25} \\ 30 \\ \underline{3270} \end{array}$$

(c) 580×6

$$\begin{array}{r} 580 \\ \times 6 \\ \hline 0 \\ \underline{48} \\ 30 \\ \underline{3480} \end{array}$$

(d) 300×3

$$\begin{array}{r} 300 \\ \times 3 \\ \hline 0 \\ 0 \\ \underline{9} \\ 900 \end{array}$$

(e) 109×4

$$\begin{array}{r} 109 \\ \times 4 \\ \hline 45 \\ 0 \\ \underline{5} \\ 545 \end{array}$$

2. Fill in the blank.

For calculating 372×4 , we split it into $2 \times \underline{\quad}$, $70 \times \underline{\quad}$ and $300 \times \underline{\quad}$, and then add the answer for total.

(Ans: 2 minutes and 30 seconds)

3. You bought 6 fishes. Each fish cost K16. How much is the total coins?

Mathematical sentence: _____ (16×6)

Answer: _____ (96 coins)

4. There are 234 students in the school. 6 pencils are given to each student. How many pencils are given to each student. How many pencils are needed in total?

Mathematical sentence: _____ 234×6

Answer: _____ (1404 pencils)

TEACHING CONTENT - SAMPLE GUIDED LESSONS

NO- Introduction to Division

Content Standards

3.1.5 Develop the understanding of partitive and quotient divisions and divide by one digit divisor.

Key concepts(ASK-MT)

Attitude

- Share their ideas on the concept on how to find ‘the number for one child’ or the ‘how many children can share’ and
- Share their ideas of how to make division problems based on given situtaion.

Skills

- Use various representation to express situation(Partitive and Quotative divisions) by math expression’
- Make division problems from mathematical stories and
- Calculate division problems using various calculation method.

Knowledge

- Understand the simple meaning of division and other division terminologies such as equal, share, distribute, amongst and
- Recognize partitive and quotative division.

Mathematical thinking

- Think of about how to represent “Partitive and Quotative Division”.
- Show logical thinking in the steps involved in solving problem using various calculation method.

Background

Partitive division and Quotative division.

There are two different concepts in division ‘partitive division’ and ‘quotative division’

Partitive division

If the number of groups is known, and you are trying to find the number in each group, then the problem is called partitive division problem. In partitive division problem, we know the number of groups. We do not know how many items each group can get.

Quotative division

If the number in each group is known, and you are trying to find the number of groups, then the problem is called quotative division problem. In quotative division problem, we know the number of items each group can get. We do not know to how many groups we can distribute the items.

What to Assess			How to Assess		
Topic	Assessment Task	Lsn	Ass. Methods	Ass. Criteria	Scoring Key
Introduction of Division	3. Complete simple exercises on division.	67	Evaluation - WrittenTest	Q1.1 - Q1.3 • Solve simple problem involving division	2 - Show correct math expression with correct answer. 1 - Shown correct math expression with incorrect answer 0 - Incorrect answer/blank
				Q 2.1 - Q2.8 • Divide 2-digit by 1- digit number	1 - Show correct answers 0 - Incorrect answer/blank

L57. UNDERSTANDING DIVISION

Teaching and learning activities ⌚ (60 min)

- Understanding difference between ‘dividing’ and ‘dividing equally.’

1. Let’s think about how we can distribute the 12 candies equally from the two stories.

Story 1

▶ There are 12 candies.
Let’s share candies amongst 4 children.

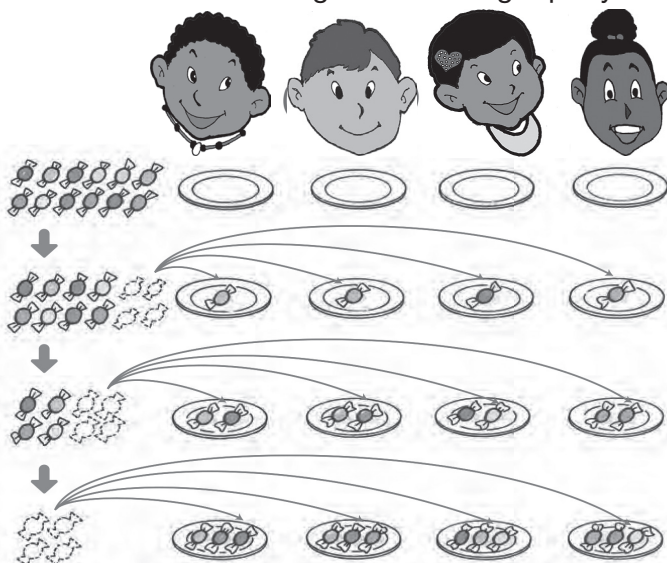


Story 2



Let’s discuss about the differences between two stories and provide the best possible ideas that can make every student happy.

- Think about ‘dividing’ and ‘dividing equally’.



L57. UNDERSTANDING DIVISION

Making mathematical sentences of partitive division.

2. Let’s write mathematical sentences for the following story problems below, and find the number of the blocks give to each person.

(a) Share 6 blocks equally amongst 3 students.



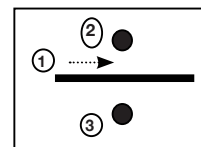
(b) Share 15 blocks equally amongst 5 students.



If you divided 12 candies amongst 4 student equally, each student gets 3. In a mathematical sentence, it can be written as $12 \div 4 = 3$, and read as : 12 divide by 4 equals 3.

$$12 \div 4 = 3 \text{ (Answer 3 Candies)}$$

Total number	Number of student	Number to each student
--------------	-------------------	------------------------






L58. FINDING THE NUMBER FOR ONE STUDENT

Teaching and Learning activities ⌚ (30 min)

• How to find the answer for partitive division using multiplication table.

1. Divide 15 blocks equally amongst 3 children. How many blocks will each student receive?

For 3 children		$3 \times 3 = 9$
For 4 children		$3 \times 4 = 12$
For 5 children		$3 \times 5 = 15$

Number per child
Number of children
Total number

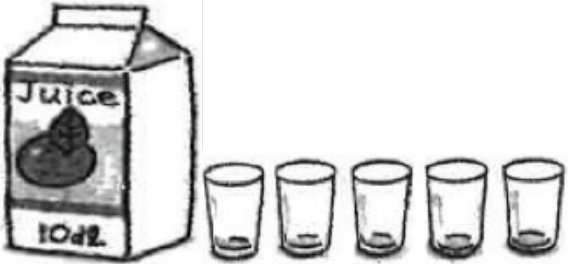


Note: think about the relation of dividing one by one and using multiplication.

• Making math sentences of Partitive division

2. Divide 10 dL of juices equally amongst 5 children.

How many dL of juice dose each one recieve?



10

÷

5

=

2

Answer: 2dL

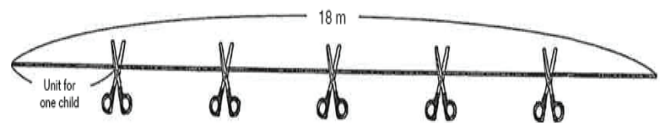
Note: which row of multiplication should we use?

L58. FINDING THE NUMBER FOR ONE STUDENT

• Calculating 2-digit number by 1-digit number without carrying.

Exercise

1. Divide an 18 m skipping rope equally amongst 6 children. How many m of rope does each one receive?



2. Which row of the multiplication table should you use to do this division problem. Find the answers.

(a) $8 \div 2$ (b) $21 \div 7$ (c) $72 \div 9$

(d) $28 \div 4$ (e) $20 \div 5$

Answers

4 3 8 8
row of 4 row of 7 row of 9 row of 4

4
row of 5

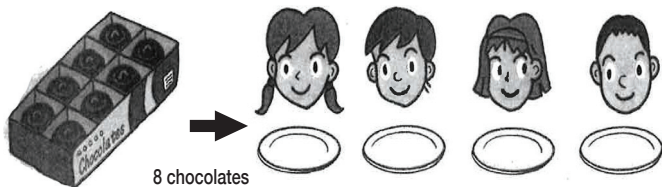
L59. MAKING DIVISION WORD PROBLEMS (1)

Teaching and learning activities ⌚ (30 min)

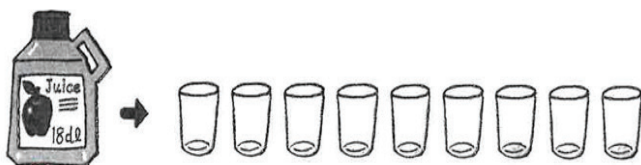
- Making word problem of partitive division.

1. Make a problem that is solved by the division by looking at the picture.

(a)



(b)



'18 dL juice', 'to 9 cups'

Note: Ask the students 'What and how many are dividing?' 'To how many people?' and 'What do we want to know?' so that students are easier to make a problem.

L60. MORE DIVISION PROBLEMS

Teaching and learning activities ⌚ (30 min)

- Multiplying of 2-digit number by 1- digit number with carrying twice.

1. Let's divide.

(a) $14 \div 2$ (b) $27 \div 9$ (c) $40 \div 5$

(d) $32 \div 8$ (e) $12 \div 2$ (f) $18 \div 3$

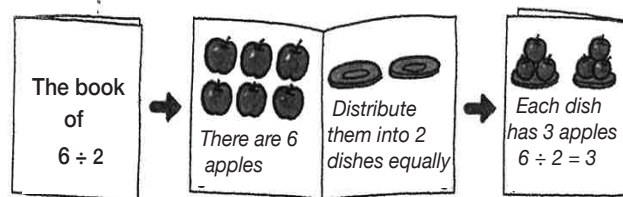
(g) $45 \div 9$ (h) $42 \div 7$ (i) $16 \div 8$

(j) $24 \div 4$ (k) $4 \div 2$ (l) $25 \div 5$

(m) $12 \div 6$ (n) $49 \div 7$ (o) $24 \div 3$

- Making a book showing partitive division.

2. Let's make a book about division 2

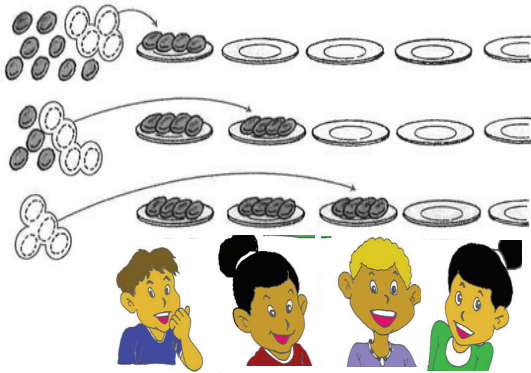


TEACHING CONTENT - SAMPLE GUIDED LESSONS

L61. HOW MANY STUDENT CAN SHARE(1)

Teaching and learning activities  (60 min)

- Understanding quotative division.
- Divide 15 blocks equally amongst 3 students. How many blocks will each student receive?



If you give 4 sweets to each student. How many students can receive?

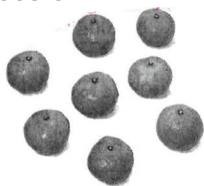
If you divided 12 sweets into 4 sweets to each student, they can be shared by 3 students. In a mathematical sentence, it can be represented by the division and written as $12 \div 3 = 4$

12	\div	4	$=$	3		(Answer 3 Students)
Total number		Number to each student		Number of student		

Note: The division used is a calculation to find how many children when the total number is distributed by the same number to each student. Note: The division used is a calculation to find how many students when the total number is distributed by the same number to each student.

- Making math sentences of quotative division.
- Making mathematical sentences of quotative division.

\square	\div	\square	$=$	\square
Total number		Number to each student		Number of student






Note: Consider which meaning of division is used in problem.

L62. HOW MANY STUDENT CAN SHARE(2)


Teaching and learning activities  (60 min)

- How to find the answer for quotative division using multiplication table.

- If you divide 15 blocks into 3 to each student, how many students can share the blocks?

For 3 children 	$3 \times \square = 9$
For 4 children 	$3 \times \square = 12$
For 5 children 	$3 \times \square = 15$

Number of per child	no. of children	Total number
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The answer for $15 \div 3$ is the number that fits in the \square for $3 \times \square = 15$.

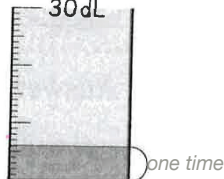
The answer for $15 \div 3$ can be found using the row of 3 in the multiplication table

- Making math sentences of quotative division

- There are 30 dL of milk. If you drink 6 dL at a time, how many times can you drink?

30	\div	6	$=$	5
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Answer: 5 times



- Making a book showing quotative division.

- Let's make a book about division.

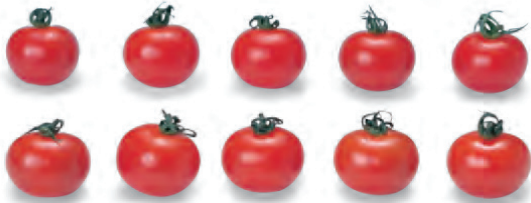
Exercise

- If you divide 24 pencils into 6 pencils to each box, how many boxes can you fill?

L63 . MAKING DIVISION WORD PROBLEMS (2)

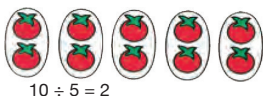
Teaching and learning activities ⌚ (60 min)

- Making two division problem from one math expression.
1. Look at the picture of tomatoes and, make a story problem for $10 \div 5$.



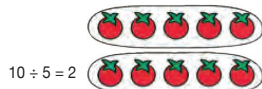
Division to find the number of dishes

Divide 10 tomatoes
equally into dishes.
How many is on each ?



Division to find the number on each dish

There are 10 tomatoes.
 tomatoes are distributed on each
dish. How many are needed?



Let's think about what kind of number and word should be in the to make ' $10 \div 5$ '.

Note: Both answers can be calculated by the row of 5, 5 and 2 makes 10, in multiplication table.

- Making worded problems of partitive and quotative divisions.

2. Let's make a story problems for $32 \div 8$.

Exercise

1. Let's calculate the following divisions. For finding the answer, which row of multiplication table will you use?

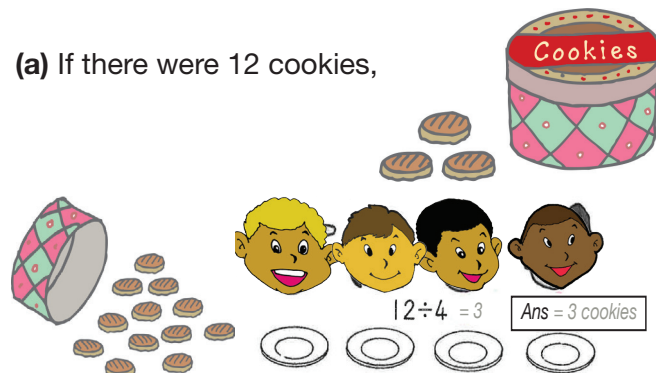
- | | | |
|-----------------|-------------------|-----------------|
| (a) $9 \div 3$ | (b) $24 \div 8$ | (c) $10 \div 2$ |
| (d) $32 \div 4$ | (e) $35 \div 5$. | (f) $6 \div 2$ |
| (g) $36 \div 9$ | (h) $45 \div 5$ | (i) $14 \div 7$ |
| (j) $48 \div 6$ | | |

L64. DIVIDING WITH 1 OR 0

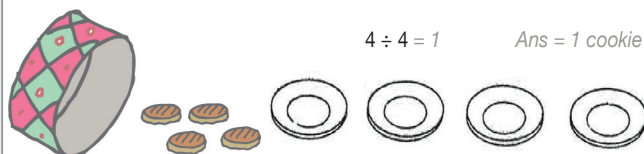
Teaching and learning activities ⌚ (30 min)

- Understanding the meaning of $a \div a$ and $0 \div a$, and how to find the answer.
1. Cookies in the jar will be shared by 4 people, each on getting the same numbers of cookies. How many cookies will each person receive?

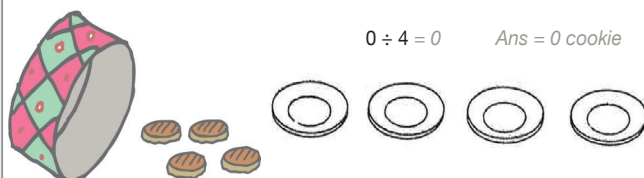
(a) If there were 12 cookies,



(b) If there were 4 cookies,



(c) If there were 0 cookies,



- Understanding the meaning of $a \div 1$, how to find the answer.

2. If you pour 6 dL of juice into 1 dL per cup, how many cups do you need?

$$6 \div 1 = 6 \quad \text{Answer: } 6 \text{ cups}$$

Exercise

1. Let's divide

- | | | | |
|----------------|-----------------|----------------|----------------|
| (a) $6 \div 6$ | (b) $9 \div 9$ | (c) $7 \div 7$ | (d) $0 \div 5$ |
| (e) $0 \div 8$ | (f) $3 \div 1$ | (g) $5 \div 1$ | (h) $1 \div 1$ |
| (i) $8 \div 1$ | (j) $0 \div 10$ | | |



TEACHING CONTENT - SAMPLE GUIDED LESSONS

L65. RULES OF CALCULATION (1)

Teaching and learning activities ⌚ (60 min)

- Rule for the math sentence for division and multiplication.

1. What is the answer for $36 \div 3$?

Expected Ideas

Idea.1
relationship1 between division and multiplication.

$1 \times 3 = 3 \rightarrow 3 \div 3 = 1$	$7 \times 3 = 21 \rightarrow 21 \div 3 = 7$
$2 \times 3 = 6 \rightarrow 6 \div 3 = 2$	$8 \times 3 = 24 \rightarrow 24 \div 3 = 8$
$3 \times 3 = 9 \rightarrow 9 \div 3 = 3$	$9 \times 3 = 27 \rightarrow 27 \div 3 = 9$
$4 \times 3 = 12 \rightarrow 12 \div 3 = 4$	$10 \times 3 = 30 \rightarrow 30 \div 3 = 10$
$5 \times 3 = 15 \rightarrow 15 \div 3 = 5$	$11 \times 3 = 33 \rightarrow 33 \div 3 = 11$
$6 \times 3 = 18 \rightarrow 18 \div 3 = 6$	$12 \times 3 = 36 \rightarrow 36 \div 3 = 12$

From above, $36 \div 3 = 12$ Answer 12

Idea. 2
lining up division sentences of divisor 3.

$3 \div 3 = 1$	$21 \div 3 = 7$	If the dividend increase by 3, the answer will also increase by 1.
$6 \div 3 = 2$	$24 \div 3 = 8$	
$9 \div 3 = 3$	$27 \div 3 = 9$	
$12 \div 3 = 4$	$30 \div 3 = 10$	
$15 \div 3 = 5$	$33 \div 3 = 11$	
$18 \div 3 = 6$	$36 \div 3 = 12$	
From above, $36 \div 3 = 12$		<u>Answer 12</u>

Note:

Think about what kind of rules there are in the ordered operations. Divisor increases 3 by 3 while quotient is increases 1 by 1.

L66. RULES OF CALCULATION (2)

Teaching and learning activities ⌚ (60 min)

- Calculating division with divisor as 1-digit and quotient is 2- digit

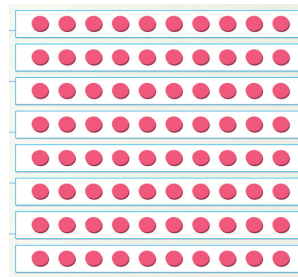
1. What is the answer for the calculation $80 \div 4$? Let's think about using the two methods.

Expected Ideas

Idea 1

$$80 \div 4$$

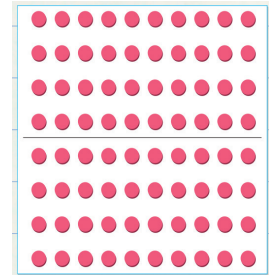
80 could be considered as 8 sets of 10s



Idea 2

$$80 \div 4$$

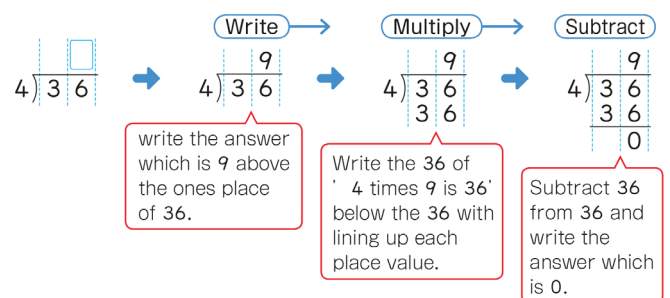
Split the divided into 2 sets



- Calculating division in vertical form.

2. Let's think about how to calculation $36 \div 4$ in vertical form?

Like addition, subtraction and multiplication, division can also be calculated vertically. The vertical form of division is as follows.



How to write $4 \overline{)36}$

(1) 36 (2) $\overline{)36}$ (3) $\overline{)36}$ (4) $4 \overline{)36}$

L67 . EVALUATION OF DIVISION

Name: _____

Score ___ / ___

Complete the following exercises

1. There are 20 apples.

(a) If you distribute the same number of apples to 4 people, how many apples will one person get?

Mathematical expression: _____ (Ans = $20 \div 4$)

Answer : _____ (Ans = 1 person 5)

(b) If you give 4 apples to each person, how many people will get 4 apples?

Mathematical expression: _____ (Ans = $20 \div 4$)

Answer : _____ (Ans = 5 people)

(c) My class has 30 students. We are divided into 6 groups with the same number of students.

How many children are in each group?

Mathematical expression: _____ (Ans = $30 \div 6$)

Answer : _____ (Ans = 5 each)

2. Calculate following divisions.

(a) $9 \div 3$ (Ans = 3) **(b)** $16 \div 8$ (Ans = 2)

(c) $48 \div 6$ (Ans = 8) **(d)** $81 \div 9$ (Ans = 9)

(e) $6 \div 6$ (Ans = 1) **(f)** $5 \div 1$ (Ans = 5)

(g) $0 \div 1$ (Ans = 0) **(i)** $56 \div 8$ (Ans = 7)

3. Make a story problem for $12 \div 3$.
(Ans refer to students work)

TEACHING CONTENT - SAMPLE GUIDED LESSONS

NO- Division with remainders

Content Standards

3.1.6 Extend learned division and different situation to divide with reminders for one divisor.

Key concepts(ASK-MT)

Attitude

- Share their ideas on how to divide with remainders as results.
- Perception and value of division with remainder in real life occurrences.

Skills

- Use various representation to express Partitive division with remainder.
- use multiplication table to calculate division with remainder .
- Calculate division with remainders.

Knowledge

- meaning of division with remainders .
- Relation between a divisor and largeness of remainders.
- Relationship between division and multiplication/subtraction.

Mathematical thinking

- Think about how to calculate division with remainder.
- Think about to confirm division with remainder.
- Show logical thinking in the steps involved in solving problem using various calculation method.

Background

In this topic, children are introduced to divisions of numbers with denominators that are not factors of the numerators and develop understanding that not all problems will have perfect solutions in real life. Student investigate this in division and link the remainders to decimal equivalences of the whole.

Assessment Plan

What to Assess			How to Assess		
Topic	Assessment Task	Lsn	Ass. Methods	Ass. Criteria	Scoring Key
Division with remainder	1. Solve various problems of division with remainders	71	Evaluation - WrittenTest	Q 1.1 - Q 1.4 & Q 2.1 - Q 2.2	1 - Show correct answers 0 - Incorrect answer/blank
				Q2.1 - Q2.8	2 - Show correct math expression with correct answer. 1 - Shown correct math expression with incorrect answer

L68. DIVIDING WITH REMAINDERS

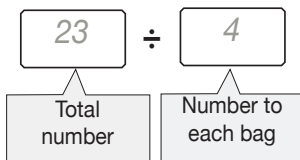
Teaching and learning activities ⌚ (60 min)

- Understanding the expression of division with remainders.

1. There are 20 apples and 23 oranges. Put each type of 4 fruit into separate bag.

Let's discuss how many bags will be filled for 20 apples and 23 oranges. There are 23 oranges. if you put 4 oranges into each bag how many bags do you use?

(a) Write an math expression.1



Note: This is a calculation distributing the same number to each unit, so we can use division

Is there any number that fit in $4 \times \text{input} = 23$

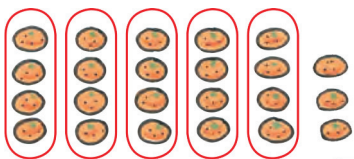
- Calculating divisions with remainders.

2. Let's think about how to calculate divisions with remainders.

Expected ideas

Idea.1

Circle in groups of 4.



Idea. 2

Using row of 4 in the multiplication table.

For 4 bags, $4 \times 4 = 16$, 7 oranges remainder,

For 5 bags, $4 \times 5 = 20$, 3 oranges remainder,

For 6 bags, $4 \times 6 = 24$, 1 orange short

L68. DIVIDING WITH REMAINDERS

There are 5 bags and 3 remainders.



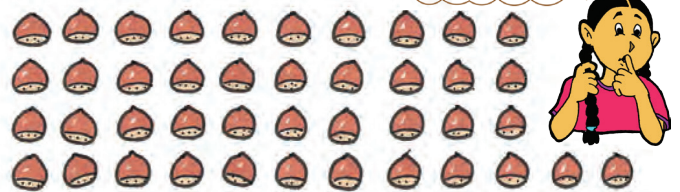
We will write this as follow:
 $23 \div 4 = 5 \text{ remainder } 3$

Answer: 5 bags and a remainder of 3 oranges

As in $23 \div 4$, if you have a remainder, it is "not divisible". In other words, the dividend 23 is not divisible by divisor 4. And as in $20 \div 4$, if we have no remainder, it is called "divisible". In other words, the dividend is divisible by divisor 4.

3. There are 42 chestnuts, distributed to 5 students, equally. How many will each student receive , and what will be the remainder ?

five nines is 45, it's too much, so how about five eights is 40?



Exercise

There are 34 cards. If they give 6 cards to each, how many children can receive card and what is the remainder?

TEACHING CONTENT - SAMPLE GUIDED LESSONS

L69. DIVISOR AND THE SIZE OF REMAINDER

Teaching and learning activities  (60 min)

- Understanding relation between a divisor and the size of remainder.
1. Division problems in which the divisor is 4 are lined up on the right. Let's write the correct numbers in the

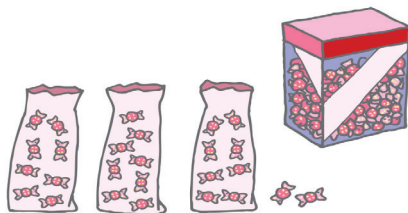
The remainder in division should always be less than the divisor.

Dividend	Divisor	Answer	Remainder
12	÷ 4	= 3	remainder 3
11	÷ 4	= 2	remainder 2
10	÷ 4	= 2	remainder 2
9	÷ 4	= 2	remainder 1
8	÷ 4	= 2	No remainder
7	÷ 4	= 1	remainder <input type="checkbox"/>
6	÷ 4	= 1	remainder <input type="checkbox"/>
5	÷ 4	= 1	remainder <input type="checkbox"/>
4	÷ 4	= 1	No remainder
3	÷ 4	= <input type="text"/>	remainder <input type="checkbox"/>
2	÷ 4	= <input type="text"/>	remainder <input type="checkbox"/>
1	÷ 4	= <input type="text"/>	remainder <input type="checkbox"/>

- How to check answers of division with remainder?
2. You must fill 8 to each bag from 26 candies.
- (a) How many bags will be filled and what is the remainder?
- $26 \div 8 = \text{ } \text{ remainder } \text{ }$
- (b) Let's consider how to calculate for confirming the answer for the above division.

$$8 \times 3 + 2 = 26$$

No. of candies to each bags	No. of bags	Remainder	Total number
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L69. DIVISOR AND THE SIZE OF REMAINDER

Exercise

1. Fix the mistakes in the division below.

- (a) $45 \div 6 = 6 \text{ remainder } 9$ $7 \text{ remainder } 3$
 (b) $55 \div 7 = 8 \text{ remainder } 6$ $7 \text{ remainder } 6$

2. Solve the calculation below, and check the answers.

- (a) $7 \div 4$ (b) $22 \div 3$ (c) $47 \div 9$
 (d) $50 \div 7$ (e) $33 \div 5$

L70. DIVISION PROBLEMS WITH REMAINDER

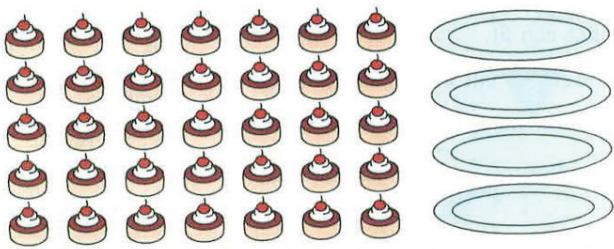
Teaching and learning activities (60 min)

- Solving various division worded problems with remainder.

1. There are 40 balls. John wants to put 6 balls in each box. How many boxes does he need?
2. There are 28 students in Koivi's class.
 - (a) If the class is divide into groups of 51 students, how many group are there and what is the remainder?
 - (b) The class is to be divided into groups 2 without a remainder. How many group of 5 and 6 can they make?



3. Let's make the division problems with remainders.



There are cakes and dishes. Put an equal number of cakes on each dishes. How many cakes will be on each dish, and what will be the remainder ?

L71. EVALUATION - DIVISION WITH REMAINDERS

Name: _____

Score ____/____

Complete the following exercises

1. Calculate the following division and check the answers.
 - (a) $15 \div 4 =$ Check the answer: _____
 - (b) $62 \div 7 =$ Check the answer: _____
 - (c) $6 \div 5 =$ Check the answer: _____
 - (d) $87 \div 9 =$ Check the answer: _____
2. Find the mistakes and write the correct answer.
 - (a) $17 \div 3 = 4$ remainder 4 _____
 - (b) $23 \div 4 = 6$ remainder 1 _____
3. There are 60 balls. Joe wants to put 7 balls in each box. How many boxes does he need?
 Mathematical sentence: _____
 Answer : _____
4. There are 46 cakes. You will distribute the same number of cakes to 8 people equally.
 - (a) How many cakes does each person get and how many cakes are left?

 - (b) How many cakes are needed to distribute 6 cakes for each person?

TEACHING CONTENT - SAMPLE GUIDED LESSONS

GF - Circles and spheres

Content Standards

3.3.2 Investigate the properties of circle and sphere.

Key concepts (ASK-MT)

Attitude

- Enjoy using circles to design various patterns
- Enjoy drawing properties circles
- Appreciate and value the importance of compass and
- Enjoy the play “ ring toss” to understand the meaning of circle.

Skills

- Explain properties of circles
- Design patterns using circles and
- Use various instruments to draw circles

Knowledge

- Meaning of circles and sphere
- Properties of circles such as radius, diameter, centre
- Understand functions of compass and
- Properties of sphere.

Mathematical thinking

- Think about on how to draw circles using various instruments
- Think about the usefulness of circle and sphere daily life and
- Think about how to explore diameter of sphere.

Background

In this topic, children will study the properties of plane and solid figures particularly in circle and sphere and use these properties to make reference to real life applications as in the context of tessellations in PNG arts, applied in weaving, pottery and carvings. Children will gain confidence in drawing such using compass in varying lengths.

Assessment Plan

What to Assess			How to Assess		
Topic	Assessment Task	Lsn	Ass. Methods	Ass. Criteria	Scoring Key
Circles and sphere	1. Draw circles with a given radius or diameter	78	Evaluation - WrittenTest	Q1.1 -Q1.3, Q2, Q4.1 -Q4.3 • Solve simple problem involving circles	1 - Show correct answers 0 - Incorrect answer/blank
				Q3.1 - Q3.3 • Drawing diameter and radius	2 - Show correct measurement 1 - 1.9 cm -1.8 cm/ 2.9 cm - 2.8 cm 0 - Incorrect answer/blank

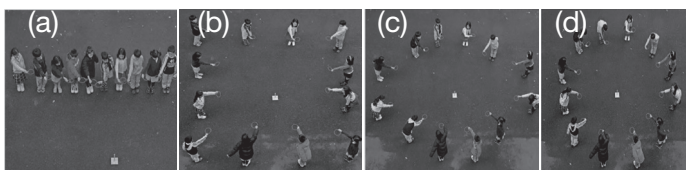
L72. KNOWING ABOUT CIRCLES

Teaching and learning activities ⌚ (60 min)

- Play a ring toss free together.
1. Let's play the game of ring toss from whatever points first to find the importance of making rules to play games.



- How should we line up for a fair game.
2. Think about how everyone can play ring toss on the same conditions. Let's make rules to play ring toss on the same condition.



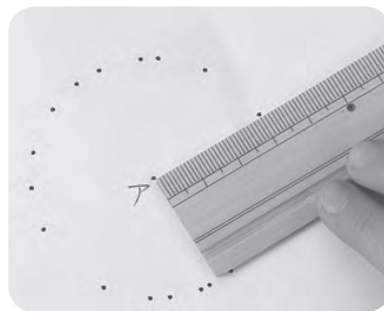
(A) - (D) are various standing formation which standing formation is fair for everyone.

Explain why you choose your answer.

L73. DRAWING ROUND SHAPE

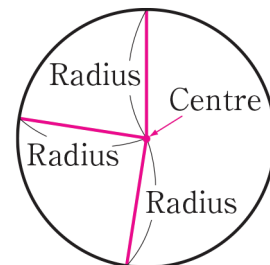
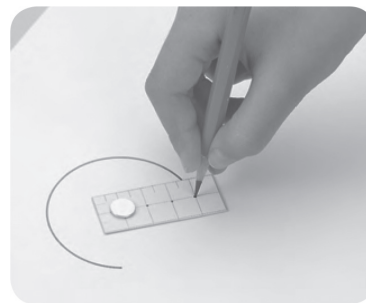
Teaching and learning activities ⌚ (60 min)

- Think about how to draw a round shape and understand meaning of circle.
1. Let's think about how to draw a round shape and understand meaning in terms of circles.
- (a) Draw many points that are all 3cm from point A.



- (b) Use the instrument on the right picture, draw a round shape.

The circle you drew in 1 has a radius of 3 cm. Point A and the pin is the centre of the circle.

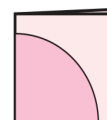
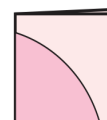
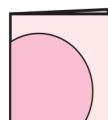


A round shape that is the same distance from one point is called **circle**. This one point is called centre. Straight line from the centre to any point is called **radius**

Exercise

1. Let's draw a circle with a 2 cm radius on the school ground using a rope .
2. Let's make a circle from two times fold a paper.

Who's method is the correct way for circles?



L74. DRAWING RADIUS AND DIAMETER

Teaching and learning activities ⌚ (60 min)

- Using a compass.
- Let's use compass and draw circles.

(a) Draw a circle with 4 cm radius using a compass.

1. Open the compass to the length of the radius



2. Rotate the compass to draw a circle



(b) Draw another circle with a different radius and the same centre.

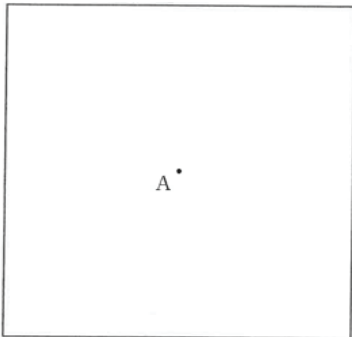
- Making radius and diameter.

2. Draw a circle with A as the centre.

(a) Draw a circle with radius 3 cm.

(b) Draw a radius and then extend it to the circumference.

A straight line drawn from the circumference passing through the centre of the circle to the circumference is called diameter



L74. DRAWING RADIUS AND DIAMETER

- Understanding terms of words related to circle.

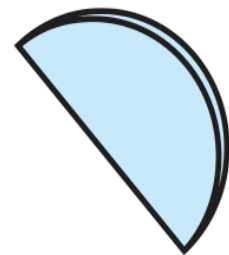
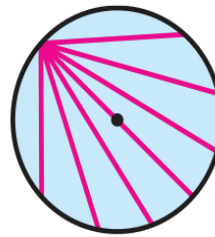
3. Let's fill in the blanks with correct words and numbers.

(a) A diameter is times the radius.

(b) If you fold a circle along its , there are two equal sections.

(c) There are many diameters in a circle and all diameters have the length.

(d) is the longest straight line between two points in the circle.



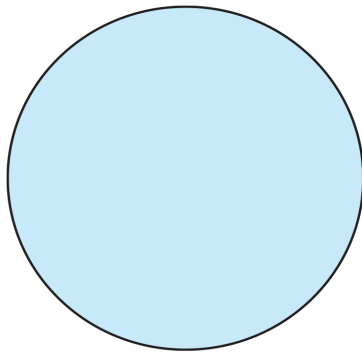
L75. DRAWING A CIRCLE OF SAME KIND

Teaching and learning activities ⌚ (30 min)

- Think about how to find the centre of a circle.
1. How to find the centre of the circle.
Draw a circle that is the same size as the circle on the right using compass.

(a) What do you need for drawing the circle?.

(b) How can you find the centre of the circle?



Exercise

1. Draw circles with the following diameters.
(a) 8 cm **(b)** 12 cm **(c)** 14 cm

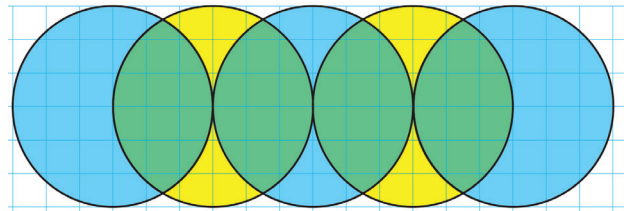
L76. DESIGNING PATTERNS

Teaching and learning activities ⌚ (60 min)

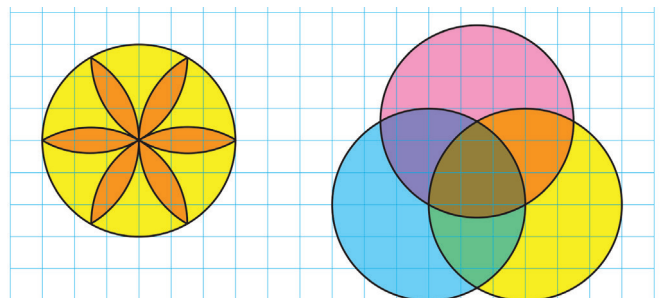
- Draw beautiful pattern using a compass.
1. Let's draw different patterns and pictures using compass.

(a) How to draw (1)

1. Draw a line.
2. Draw a circle putting the center on the line.
3. A point which crosses the circle and the straight line is a center of next circle.
4. Draw a next circle with same radius.
5. repeat the steps from 1- 4.



1. Draw a circle.
2. Draw another circle putting the center on the arc(curve) of the circle.
3. Draw another circle putting the center on the crossing point of 2 circles.



- Uses of Compass.

2. A compass can be used for various purposes other than drawing a circle.

(a) You can divide a straight line into sections of the same length. Try making 3 cm sections on the line below.

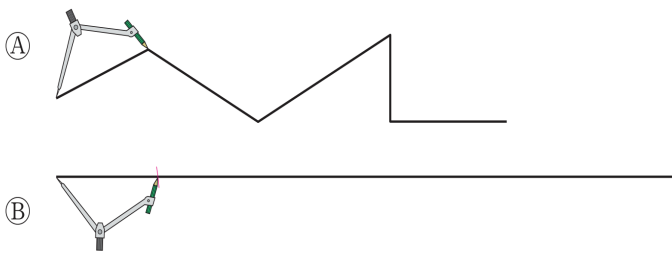


L76. DESIGNING PATTERNS

(b) You can compare transfer the lengths. Which of this straight line is the longest?



(c) You can transfer lengths. Transfer line (A) to line (B). How long is line 'a' compared to line)



L77. LET'S LEARN ABOUT SPHERES

Teaching and learning activities ⌚ (60 min)

- Guess what kind of shape will be made when making shadows of circles and sphere's and try out for real.

1. Explore the shape of a ball

(a) What is the shape of a ball when viewed from above and the side?.

From above



(b) Roll a ball.

From the side



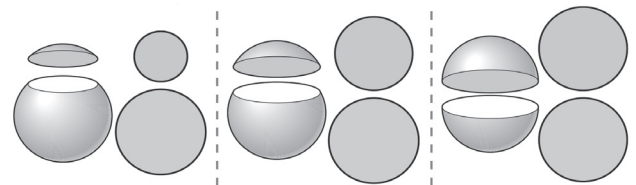
An object that looks like a circle from any direction is called sphere.

(c) Look for things shaped liked a sphere.



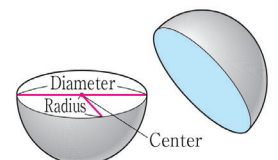
2. What is the shape of the cross-section of a sphere?

(a) Where should we cut to make the largest cross-section from a sphere?



(b) What is the shape of the cross-section?

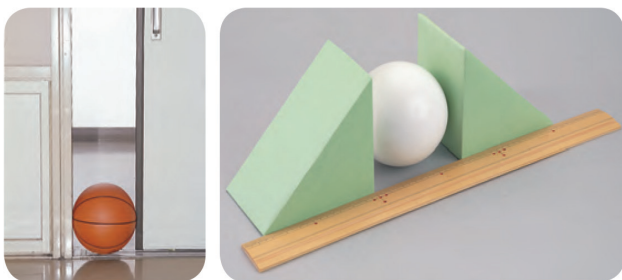
When a sphere is cut in half, the centre, the radius and the diameter of the circle of the cross - section are called centre, radius and diameter of sphere.



L77. LET'S LEARN ABOUT SPHERES

(c) Finding diameter of sphere.

3. Think about How we can find the diameter of sphere?



L78. EVALUATION - CIRCLES AND SPHERE

Name: _____

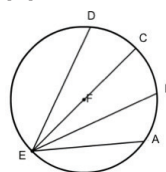
Score ___/___

Complete the following exercises

1. Figure below is a circle and 'A' is a center of the circle.

(a) Which is the longest line? _____

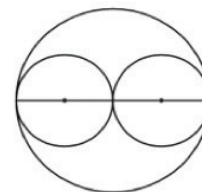
(b) What is the longest line called? _____



2. Two same size circle is put in a circle of a diameter of 12 cm.

How many cm is the diameter and radius of small circle?

Diameter _____ Radius _____



3. Draw following circles.

(a) Radius is 2cm

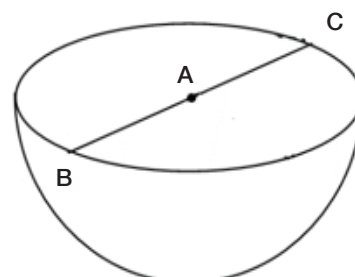
(b) Diameter is 3cm.12

4. Sphere is cut into half.

(a) What is the shape of cross-section of the sphere when viewed from above? _____

(b) What is straight line BC is called? _____

(c) What is point A is called? _____



NO - Larger Numbers

Content Standards

3.1.1 Extend learned number and place value to read and write numbers up to 1,000 000 and more.

Key concepts(ASK-MT)

- Appreciate the perception of larger number in real life and
- Value the importance of learning larger numbers.

Skills

- add and subtract larger numbers using various representation
- read and write numbers more than 10 000
- order large numbers
- use numbers lines to compare numbers and
- use inequality of numbers to compare lager numbers.

Knowledge

- Position of numbers up to 10,000
- properties of circles such as radius, diameter, centre
- Relative size of numbers up to 100, 000 using number line
- inequality of numbers and
- properties of sphere.

Mathematical thinking

- Think about how to compare larger numbers and
- Think about how to calculate larger numbers.

Background

In this topic children expand their knowledge on number skills and correctly name and write numbers with more than 3-digits, order them according to their values on a number line and do comparisons using inequalities. The students are challenged to be familiar with larger numbers by writing the numbers given the description and vice versa.

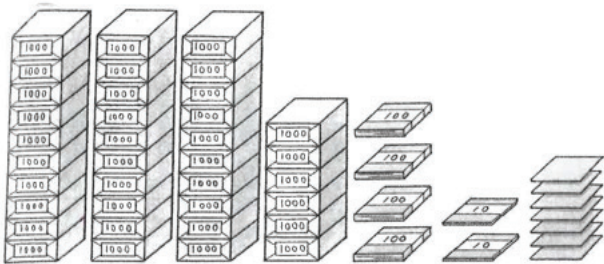
What to Assess			How to Assess		
Topic	Assessment Task	Lsn	Ass. Methods	Ass. Criteria	Scoring Key
Larger Numbers	1. Write given numbers in word or figures.	87	Evaluation - WrittenTest	Q.1.1-1.4	2 - Show correct answers with correct spelling. 0 - Incorrect answer/blank
	2. Write numbers in order of size and numerical value.Calculate larger numbers and Compare			Q.2.1-2.2	1 - Show correct inequality sign 0 - Incorrect answer/blank
				• Add 4 -digit number and 4- digit number with carrying over	3 - Evidence of carry and addition with correct answer. 2 - Correct answer only 1 - Evidence of carry and addition is shown. 0 - Incorrect answer/Blank

L79. TEN THOUSAND PLACE (1)

Teaching and learning activities ⌚ (60 min)

- Ways to Read and write ten thousand place value.

1. How many sheets of paper are there in the figure below ?



(a) If we make bundles of ten thousand sheet how many can we have?

3 sets of ten thousand is written as 30 000 and is read as thirty thousand. It is also written as 30 thousand

(b) How many sheets of paper are there altogether?

Three ten thousand, six thousand, four hundred, two ten and seven ones makes 36427, and it is read as thirty six thousand four hundred and twenty seven

3	0	0	0	0
	6	0	0	0
		4	0	0
			2	0
				7
Ten thousands place	Thousands place	Hundreds place	Tens place	Ones place

L79. TEN THOUSAND PLACE (1)

2. Write the following numbers in numerals while being careful about their place value.

- (a) Twenty - four thousand nine hundred and eighteen.
 (b) Seven thousand eight hundred and sixty.
 (c) Forty thousand.
 (d) The number that is four sets of ten thousand.

Exercise

1. Read the following numbers

- (a) 6472 (b) 3085 (c) 5509 (d) 70346

2. Write the following numbers in numerals.

- (i) Twenty thousand and eight hundred
 (ii) The number with the sum of eight sets of ten thousand, nine sets of thousand, and five.

	Ten thousands place	Thousands place	Hundreds place	Tens place	Ones place
1					
2					
3					
4					

Exercise

1. Read the following numbers.

- (a) 6472 (b) 3085 (c) 5509 (d) 70346

2. Write the following numbers in numerals.

- (a) Twenty thousand and eight hundred.
 (b) The number that is sum of eight sets of ten thousand, nine sets.

L80. TEN THOUSAND PLACE (2)

Teaching and learning activities (60 min)

- Ways to read and write hundred thousand place.
- In 2011, Papua New Guinea’s census static revealed that the number of male living in Eastern Highlands province was 311,000. Let’s think about this number.
 - How many sets of one hundred thousand and one thousand makes this number?
 - Read the number 311,000.

Hundred thousand place	Ten thousand place	Thousand place	Hundreds place	Ten place	Ones place
3	1	1	0	0	0

- Making 6-digit number.
- Let’s make the largest number and the second smallest number by arranging the number cards from 1 to 6.

Exercise

- Read the following numbers
 - The number of elementary and junior high school students in Japan was 2,108,007 in 2007.
 - The number of personal computers used in USA was 397,772.
- Write the following numbers in numerals
 - The population of Chiba prefecture in 2008 was one hundred nineteen thousand and one hundred and seventy - four.
 - In 2009 the number of cars in Japan was one hundred twenty-three thousand and one hundred and forty-four.

L81 . STRUCTURE OF LARGER NUMBERS (1)

Teaching and learning activities (30 min)

- Understanding structure of number up to hundred thousand.
1. Write the following numbers in numerals and read them.
 - (a) The number that is the sum of 3 sets of ten thousand, 7 sets of thousand and 1 hundred.
 - (b) The number that is the sum of 2 sets of ten thousand and 480.
 - (c) The number that is the sum of 7 sets of a hundred thousand and 9 sets of a hundred.
 - Relative size of larger number.
 2. Let's think about 2,450,000.
 - (a) How many sets of hundred thousand and ten thousand and thousand are there in this number?
 - (b) How many sets of 1000 are there to make this number?
 - (c) How many sets of 100 are there to make this number?

24,570,000 is also written as 24 million and 570 thousand

- (d) How many sets of ten million are there to make 100000000?

The number that is 10 sets of ten million is written as 100,000,000, and read as hundred million

L81. STRUCTURE OF LARGER NUMBERS (1)

Exercise

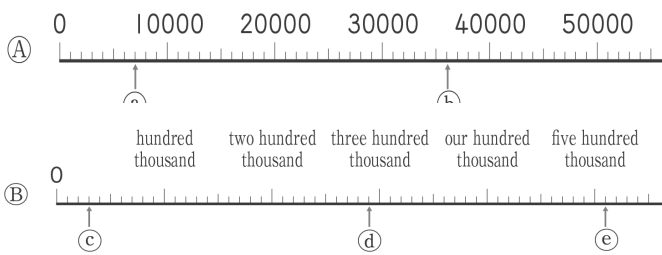
1. Write the following numbers and read them.
 - (a) The number that is sum of 3 sets of ten thousand and 8 sets of thousand.
 - (b) The number that is the sum of 5 sets of hundred thousand, 2 sets of ten thousand, and 9 sets of hundred.

L82. STRUCTURE OF LARGER NUMBERS (2)

Teaching and learning activities (60 min)

- How to show the number on the number line.

1. Let's think about the following number line.



A straight line, on which every marked point with the same length and a number corresponding to the point, is called number line. On the number line, the more rightwards the measure proceeds, the larger the number.

- Draw a number line with a (unit) scale that is 10 thousand, mark with on the line corresponding to the following numbers.

2. Drawing number line.

180 thousand 250 thousand 320 thousand



- Ordering and comparing of the numbers.

3. Fill the with a number.

(a) 99998-----99999 --- -----100001-----

(b) 750 thousand ----- 800 thousand----- -----900 thousand -----

(c) Arrange the following numbers in descending order, and line them vertically on the table on the right.

386020 378916 890000

- Know the meaning and how to use a sign of inequality.

45000 140000

L82. STRUCTURE OF LARGER NUMBERS (2)

Exercise

1. Fill the with a number.

(a) 99900-----99950----- -----
10050-----

(b) 528----- -----532
thousand-----536 thousand

2. Arrange the following numbers in ascending order.

(a) (30001, 190000, 210003, 99900)

(b) (400000, 94000, 170000, 240000)

3. Fill the with the sign of inequality

(a) 54300 64100 (b) 17300

TEACHING CONTENT - SAMPLE GUIDED LESSONS

L83.10 TIMES AND 100 TIMES

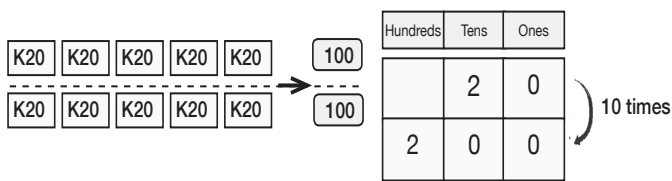
Teaching and learning activities ⌚ (30 min)

- Multiplying by ten times.

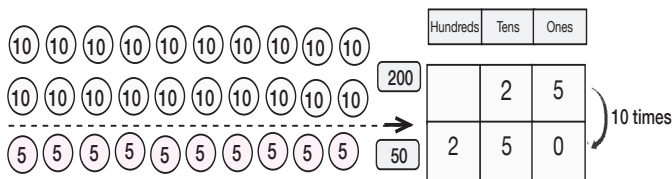
1. Let's calculate by 10 times.

(a) You buy cartons of drink which cost K20 each. How much does 10 cartons of drink cost?

$$20 \times 10 = \square$$



(b) What is 10 times 25?

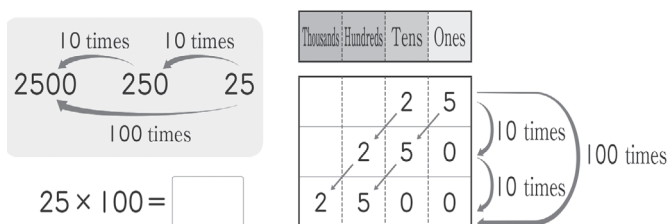


Note: think about 25 as the 25 of 20 and 5.

- Multiplying by hundred times.

2. Let's calculate by 10 times

What is 10 times 25?



Every number multiplied by 10 moves to the next higher place, and then a 0 is added at the end. Also, every number multiplied by 100 moves up 2 places, and then a 00 is added at the end.

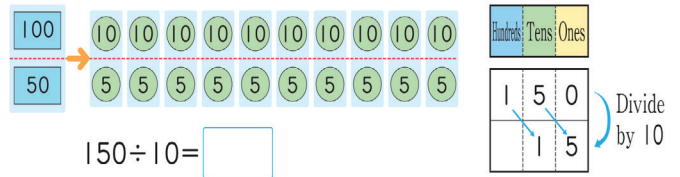
L84. DIVIDE BY 10 AND 100

Teaching and learning activities ⌚ (30 min)

- Multiplying by ten times.

1. Let's divide by 10.

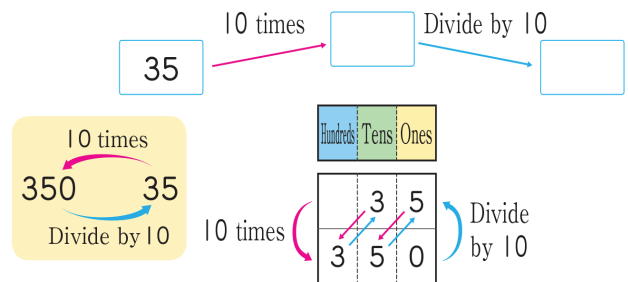
(a) What is 150 divided by 10?



If you divide a number with a 0 in the ones place by 10, every figure moves to the next lower place and the 0 in the ones place will fall off.

- Ten times and Divide by ten.

2. Multiply by ten and divide by 10
Let's make 10 times 35. Then divide the



If we multiply a number by 10, and then divide it by 10, the answer will be the original number

- Relationship between hundred times and Divide by ten.

3. Multiply by hundred and divide by 10 Let's multiply 48 by 100. Then divide the number by 10.

Exercise

1. Multiply the following numbers by 10 and 100, and then, divide them by 10.

- (a) 70 (b) 500 (c) 640 (d) 85

TEACHING CONTENT - SAMPLE GUIDED LESSONS

L85. ADDITION & SUBTRACTION OF LARGER NUMBERS(1)

Teaching and learning activities ⌚ (30 min)

- Adding and carrying larger number.

1. Carrying from thousand place.

Let's add $7356 + 8421$ vertical form.

	7	3	5	6
+	8	4	2	1

In the thousands place, the answer is carried up, so how should we write?



- Addition and subtraction of 4-digit numbers.

2. Adding and subtracting larger numbers.

Let's use the cards with numbers for making

addition and

5

6

7

8

subtraction problems 4-digit numbers.

Michelle's

	6	1	4	5
+	7	3	2	8

Nick's

	4	8	1	2
-	3	5	7	6

- (a) Let's make an addition problem that has the largest answer.
- (b) Let's make up a subtraction problem that has the smallest answer.

L86. ADDITION & SUBTRACTION OF LARGER NUMBERS(2)

Teaching and learning activities ⌚ (30 min)

- Addition and Subtraction of larger.

In 2011, the number of people in Western Highlands Province was 363000. The number of people in East Sepik was 451000. How many people are there in the province of Western highlands and East Sepik altogether.

363 000 is written as 363 thousand.

1. Let's worded problems with larger number .

(a) Write a Math expression.

	+	
--	---	--

(b) Let's think about how to calculate. (allow the children to do their calculation).

2. What is the difference between the people in Western Highlands and East Sepik?

(a) Write a Math expression

	-	
--	---	--

(b) Let's think about how to calculate. (allow the children to their calculation)

Exercise

1. Let's calculate

- (a) $4760 + 7071$ (b) $5634 + 6509$
 (c) $8693 - 3587$ (d) $8606 - 8198$
 (e) $210000 + 370000$ (f) $530000 - 180000$

2. Let's add $187653 + 972784$ in vertical form.

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

L87 EVALUATION - LARGERS NUMBERS

Name: _____

Score ___/___

Complete the following exercises

1. Write the following numbers in numerals.

(a) Eighty seven thousand and three hundred thirty nine. _____

(b) Fifty thousand and twenty three. _____

(c) The number that is the sum of sets of one million, 6 sets of hundred thousand and 3 sets of ten thousand. _____

(d) The number that is 10 times of 5100. _____

2. Compare the two numbers and write the appropriate inequality sign.

(a) 923718 _____ 923781

(b) 104152 _____ 98769

3. Write the missing number.

11000 - _____ - 12000 - 12500 - _____

4. Calculate following operation.

(a) $3184 + 9998$

(b) $6997 + 4003$

TEACHING CONTENT - SAMPLE GUIDED LESSONS

QM - Length

Content Standards

3.2.1 Use their understanding of metre and measure longer distances in Kilometres.

Key concepts(ASK-MT)

Attitude

- How long through is one kilometer the experience of prediction and estimation.

Skills

- Measure the distance accurately using the tape measure
- Predict and measure distance in the surrounding area
- Calculate distance
- Investigate how to use a tape measure
- Use appropriate unit depending on the distance to measure and
- convert from meter to kilometer.

Knowledge

- Measuring tools for measuring long distance or length
- how to use the measuring tools
- meaning of distance and road distance
- relationship between kilometre and metre and
- Kilometer as a unit of length.

Mathematical thinking

- Think of how far you can go in one (1) kilometre and how many minutes does it takes.
- Think about how to measure the distance accurately.
- Think about the effective route by combing the road distance and time.

Background

Teaching and learning in these lessons are geared towards using instruments to measure lengths to expand their knowledge and skills for confidence and accuracy. The children are also encouraged to use units such as metres and kilometres, acquire knowledge where applicable in real life and solve problems relating to length measures.

Assessment Plan

What to Assess			How to Assess		
Topic	Assessment Task	Lsn	Ass. Methods	Ass. Criteria	Scoring Key
Length	1. Complete a written exercise to decide which unit to use for different situations. 2. Convert smaller units to bigger units. Calculate distance	93	Evaluation - WrittenTest	Q1.a – b • Solve simple problem involving length	1 - Show correct answers 0 - Incorrect answer/blank
				Q2 • Measure length	
				Q3a – f • Convert from km to m, m to cm	
				Q4 a - d • Calculate distance in km and m	3 - Evidence of calculation with correct answer. 2 - Correct answer only 1- Evidence of carry and addition is shown. 0- Incorrect answer/Blank

L88 - LONGER LENGTH

Teaching and learning activities ⌚ (60 min)

- Measuring distance.
- Let's think about how to measure the distance Key Questions
 - How should we measure?
 - How long is the length?
 - How can we measure the length in a straight line?
 - The length is approximately 4 times of a 1 m ruler (stick).

Make a group and each group should have a ball. Each group rolls the ball and then compares the distances.

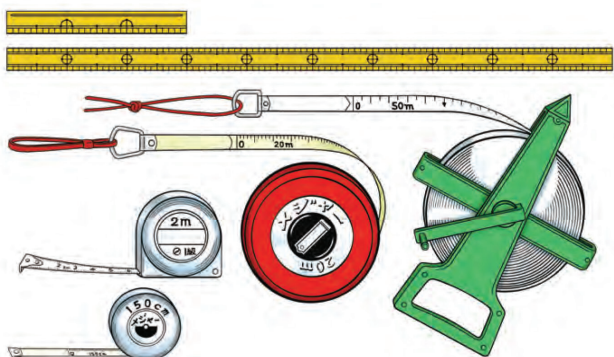
The length between two places along a straight line is called distance

- Know about various the tape measures



Exercise

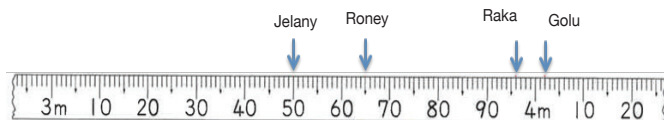
- Measure the circumference of a ball using the tape measure.



L89. USING TAPE MEASURE

Teaching and learning activities ⌚ (60 min)

- Structure of tape measure and how to read tape measure.
- Let's investigate how to use a tape measure?
 - How many metres can we measure?
 - Look for the location of the 0 m line.
 - Jelany and the other three students roll their balls. Write the distance that the balls other friends move in the table.



Distance that each ball moved

Name	Jelany	Roney	Raka	Golu
Distance moved				

- Arua moved 4 m 18 cm. Fill in the table.
- How do you estimate how long is 10 meters? Walk to a point that you think is 10 meters away. And then, let's measure the real length.
 - What can we use to measure the following things?
 - The length and width of a book
 - The height of a desk
 - The length and width of a desk
 - The circumference of a can.....
 - The length and width of a bulletin board ...
 - The length of a hallway

TEACHING CONTENT - SAMPLE GUIDED LESSONS

L90. USING VARIOUS MEASURING TOOLS

Teaching and learning activities ⌚ (60 min)

- Measuring distances within their environment.
- Let's measure various things and think about better ways to measure them.
- (a) Let's make a plan for measuring various things around us (see examples below)



Things to measure	Estimate distance	Actual distance
1. length of of classroom floor		
2. height of classroom door		
3. distance around the school field		
4. length of desk top		
5. distance around the classroom		
6. distance from classroom to		
7. adminstration block		

- (b) Measure the distance accurately.
- (c) Share the result in class.

Things to consider

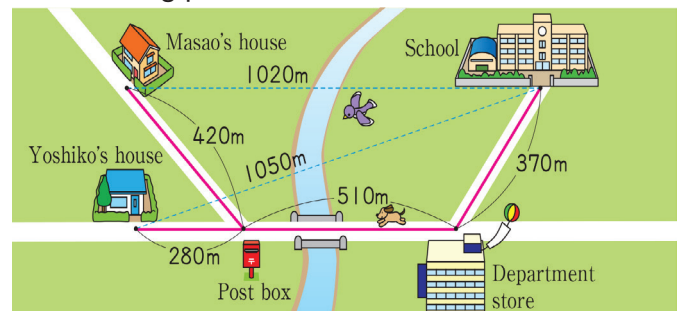
- In a group decide 3 things to measure within their surrounding area.
- Predict the distance before measuring.
- Decide which measuring tool to use.

L91 MEASURING DISTANCE

Teaching and learning activities ⌚ (60 min)

- The meaning of road distance and the distance, and the difference between road distance and distance.

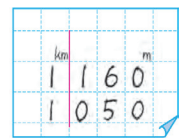
- Look at the map below and answer the following problem.



- How long are the road distance and the distance from the school to Yoshiko's house in meters, respectively?
- How many kilometers and meters are the road distance and the distance from the school to Yoshiko's house in meters, respectively?

Road distance 160m = km m

Distance 050m = km m



1 km 160 m is "one kilometer and one hundred sixty meters"

- Think about how to calculate the distance.
- Study the map and calculate the road distance and direct distance between the school and Masao's house in kilometres and metres.

Note: Think about the way in which the bird flies to and the way in which the dog runs to Yoshiko's house and confirm the difference between the road distance and direct distance between the school and Yoshiko's house.

- The bird flies directly to Wirimbi's house.
- The dog runs along the road to Wirimbi's house.
- Direct distance is the measure of length in a straight line.
- Road distance is the distance along the road.

1000m is called one kilometer

and is written as 1 km.

1 km = 1000m



L92. HOW LONG IS 1 KM

Teaching and learning activities ⌚ (60 min)

- Improving sense of distance.
1. Let's estimate how many complete laps we can make?
 2. Let's estimate how long it will take us to walk 2000 step with 50 cm in each step?
 3. Let's write our findings.

Expected sample record of finding

17 September
1. Our finding at 1km (sports field)
2. Time Taken (30 minutes)
3. Impression 1km is longer than I expected

Note:

Within the group, make a plan to walk one (1) kilometer around the school. Teacher should be careful about the security of their students. The children's safety is paramount. Decide the direction to go and predict how far you can go and how many minutes you can walk. We do not have a tool to measure a longer distance like 1 kilometer at school so the children will use their steps to have a feel or experience the distance of 1 kilometre. Teacher informs the children that every individual's size of step maybe different however for most grade 3 individual step, it is estimated to be about 50 cm and show the distance or length of 50 cm on a one (1) metre ruler.

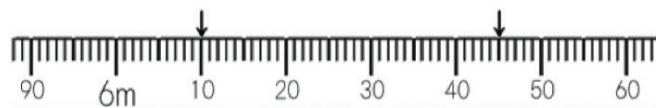
- 1 Step is about 50 cm.
- 100 000 cm is 1 km.
- For 1 kilometre it will be $100\ 000\text{cm} \div 50\text{ cm}$ is about 2000 steps.

L93. EVALUATION - LENGTH

Name: _____ Score ___/___

Complete the following exercises

1. Fill the blank with number or a word.
 - (a) The length between 2 places along a straight line is called _____ (distance).
 - (b) The length measured along the road is called _____ (road distance).
2. How many meters and centimeters are there shown by the (↓) on the tape measures below?



3. Fill the blank.
 - (a) 3 km = _____ m
 - (b) 2km 400m = _____ m
 - (c) 2600 m = ___ km _____ m
 - (d) 3400 m = ___ km _____ m
 - (e) 1 m = _____ cm
 - (f) 1km = _____ m
4. Calculate. (show your working out)
 - (a) $700\text{ m} + 800\text{ m} =$
 - (b) $1\text{ km } 700\text{ m} + 200\text{ m} =$
 - (c) $5\text{ km } 500\text{m} - 800\text{ m} =$
 - (d) $3\text{ km } 400\text{ m} - 2\text{ km } 100\text{m} =$

TEACHING CONTENT - SAMPLE GUIDED LESSONS

GM - Triangles

Content Standards 3.3.1 Investigate the properties of various types of triangles and understand draw beautiful patterns through tessellate.

Key concepts (ASK-MT)

Attitude

- Enjoy making or designing various patterns using Isosceles or Equilateral triangle.

Skills

- Make various triangles by combining same or different lengths of sticks
- Sort out the triangles by two different criteria but the result will be the same
- Draw Isosceles and Equilateral triangles using compass and ruler
- Make an Isosceles triangle and Equilateral triangle using square papers
- Investigate the characteristic of Isosceles angle and Equilateral angle
- Use radius of a circle and draw triangles and
- Draw Isosceles and Equilateral Triangle from given three sides.

Knowledge

- Properties of Isosceles triangles and Equilateral triangles
- Vertex, its size and sides of triangles
- structure of Isosceles Triangle and Equilateral Triangle
- Properties of circles and
- Types of Angles.

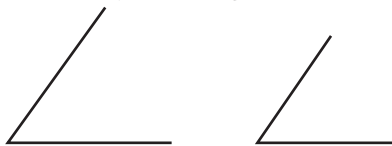
Mathematical thinking

- Think about how to make groups focusing on lengths or sides
- Think about how to draw various triangles
- Think about how to use compass to draw various triangles and
- Think about the structure of Equilateral and Isosceles triangle.

Background

Misconception of angle side and size, Teacher should emphasize to the students that the angle of a triangle is not determine by the length of the sides but the angle size.

For example:



These two angles do not have same length sides but have same angles.

Assessment

What to Assess			How to Assess		
Topic	Assessment Task	Lsn	Ass. Methods	Ass. Criteria	Scoring Key
Triangles	1. Use compass and ruler to draw triangles and describe the triangle.	105	Evaluation - WrittenTest	Q1 - Q 2 • Describe and name Triangles	1 - Show correct answers 0 - Incorrect answer/blank
				Q3 • Draw triangles of given conditions	3 - Complete drawing triangle with conditions met. 2 - Complete drawing triangle with some conditions met 1- Complete drawing triangle with conditions notmet. 0 - Incorrect answer/Blank

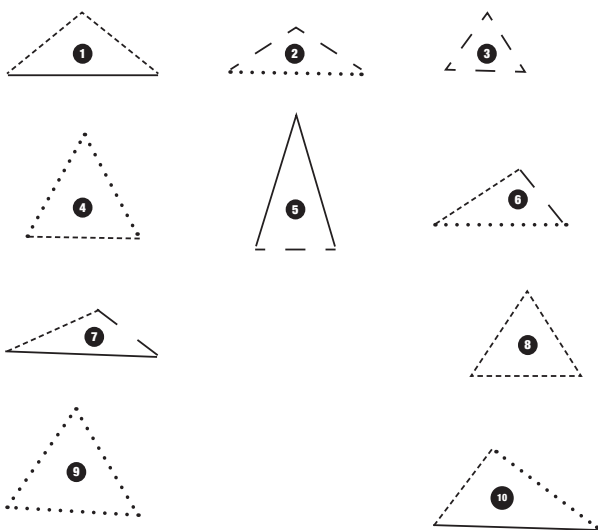
L94. MAKING TRIANGLES

Teaching and learning activities ⌚ (60 min)

- Making triangles using sticks
1. Let's make triangles using sticks of different length.

Four 6 cm sticks	— —
Four 8 cm sticks	-----
Four 10 cm sticks
Four 12 cm sticks	—————

Note: Make triangles by choosing 3 sticks out of 4 sticks. It should be same sticks or combine different size sticks



2. Let's think about how to make different group from the triangles we made.

Let's sort out the triangles into certain groups. "What kind of criteria do we need to categorize the triangles into different groups?"

Expected ideas

- Three sides equal, two sides equal or every sides different
- Using sizes, how big the triangle is or the different lengths

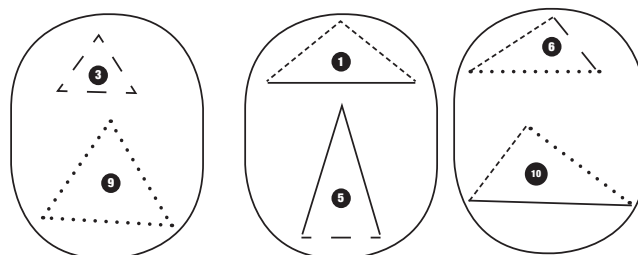
L95. SORTING TRIANGLES(1)

Teaching and learning activities ⌚ (60 min)

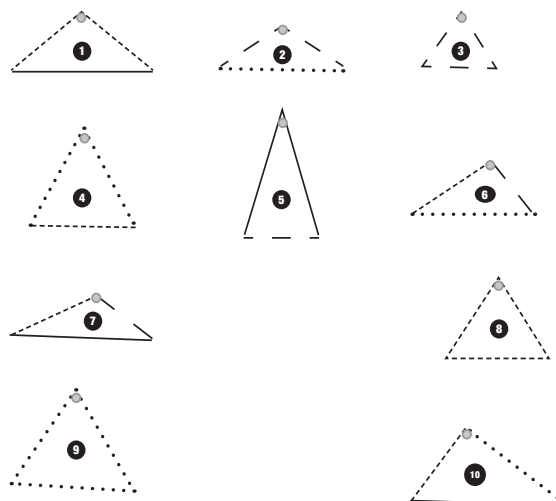
- Thinking about method of grouping of triangles
1. Group the same lengths of triangles or same types of straw triangles.

Expected ideas

- (a) Classify by sticks of different lengths



- (b) Group them by slanted or horizontal base depending on their points.



Note

Review the previous lesson. Depending on the sides, all lengths same, two sides are the same, and all sides are different set a way of sorting out by using the above criteria. Use the 10 triangles made from the previous lesson.

TEACHING CONTENT - SAMPLE GUIDED LESSONS

L96. SORTING TRIANGLES (2)

Teaching and learning activities ⌚ (60 min)

- Sort out the triangles by two different criteria but the result will be the same.

1. Let's classify triangles using methods of the previous lesson.

(a) Let's review the previous lesson and discuss how we can separate the triangles?

Idea.1

Depend on the sides (all lengths same, two sides are the same, and all sides are different).

A	B	C

(b) For classifying triangles in A, B and C, let's think about the lengths of the sides and write their properties in the bottom row.

Expected Ideas

Group A - The length of 2 sides are equal.

Group B - The length of the 3 sides are equal.

Group C - The length of 3 sides are NOT equal.

L96. SORTING TRIANGLES (2)

2. Let's review the previous lesson and discuss How we can separate the triangles?

"Depend on the hanging point in as described in F, G, H

F	G	H
Triangles where a base that can be horizontal	Triangles where a base is always horizontal	Triangles where are always slanted at any points of hanging
The length of 2 sides are equal	The lengths of the 3 sides are equal	All sides are not equal

For classifying triangles in F, G and C, let's think about the lengths of the sides and write their properties in the bottom row.

Group F - The length of 2 sides are equal.

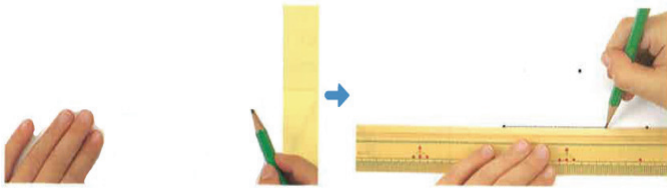
Group G - The length of the 3 sides are equal.

Group H - The length of 3 sides are NOT equal.

L97. IS THIS ISOSCELES TRIANGLES?

Teaching and learning activities ⌚ (60 min)

- Thinking about the properties of an Isosceles triangles.
- Trace triangles in groups A and F from the two tables in the previous lesson (ref page 85).



- Draw a point at vertex
- Draw a straight line connecting the 2 points
- Let's use a ruler to measure the sides of triangle A and triangle F.

What can we say about their sides?

Expected Idea

A triangle with two equal sides is called Isosceles triangle.

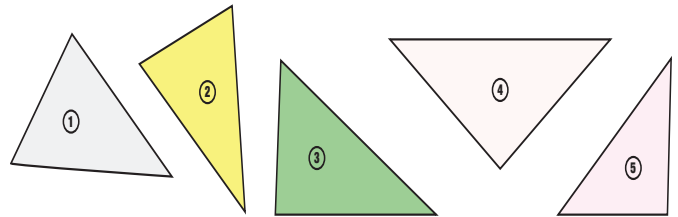


- Explore Isosceles triangles within our surrounding.
- Let's look for isosceles triangles around us.

L97. IS THIS ISOSCELES TRIANGLES?

Exercise

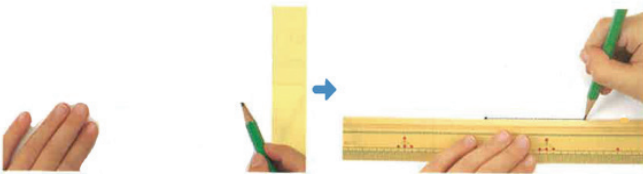
- Which of these is an Isosceles triangle?



L98. IS THIS EQUILATERAL TRIANGLE?

Teaching and learning activities ⌚ (60 min)

- Sort out the triangles by two different criteria but the result will be the same.
- 1. Trace triangles in groups B and H from the two tables in the previous lesson.

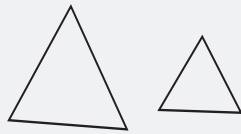


- Draw a point at vertex
- Draw a straight line connecting the 2 points
- Let's use a ruler to measure the sides of triangle A and triangle F.

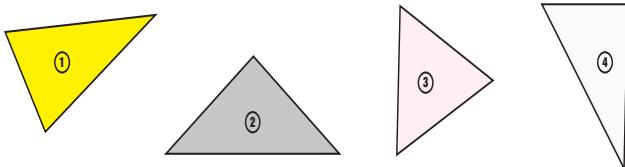
What can we say about their sides?

Expected Idea

A triangle with two equal sides is called Equilateral triangle.

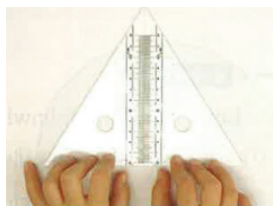


- Explore Equilateral triangles within our surrounding.
- 2. Let's look for equilateral triangles around us. Which of these is an equilateral triangle?



Exercise

- Let's make an isosceles triangle and equilateral triangle by using two same set-square.

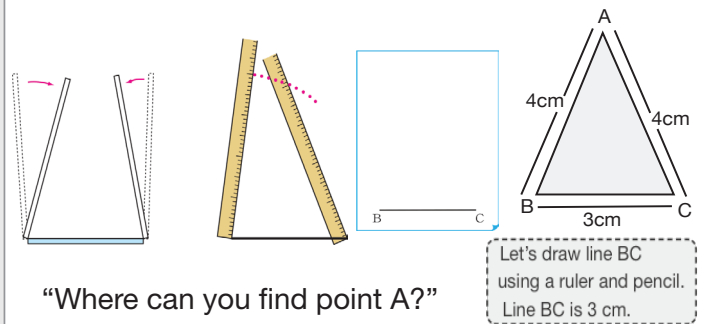


L99. DRAWING ISOSCELES TRIANGLE

Teaching and learning activities ⌚ (60 min)

- How to drawing an Isosceles triangle from point A.
- 1. Let's think about how to draw an Isosceles triangle where the sides are 3 cm, 4 cm and 4 cm.

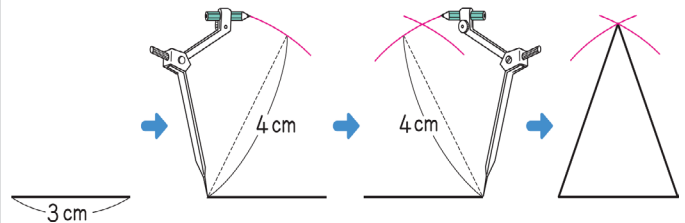
- Draw the side BC 4 cm
Let's think about how to locate the vertex "A" from the drawing below.



Let's draw line BC using a ruler and pencil. Line BC is 3 cm.

"Where can you find point A?"

- Let's use a compass to draw a triangle.



Exercise

- Let's draw the following
 - An isosceles triangle where the 3 sides are, 4 cm, 6 cm and 6 cm.
 - An isosceles triangle where the 3 side are 5 cm, 5 cm and 8 cm.

L100. DRAWING ISOSCELES TRIANGLE

Teaching and learning activities ⌚ (60 min)

- How to drawing Equilateral triangle

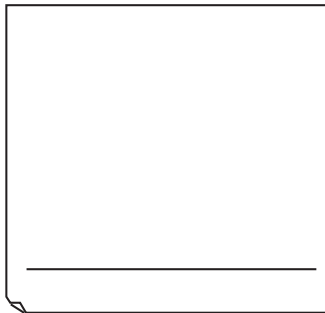
1. Let's draw an equilateral triangle

One side of an equilateral triangle was drawn on the right.

The length is 5 cm.

(a) Let's draw the other sides of the equilateral triangle.

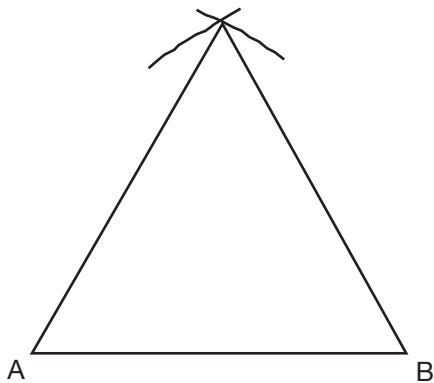
(b) Explain how you drew it.



Expected Idea

First, let the end points of a line be A and B. Next, draw a part of circle with centre A and radius 5cm, using a compass. Moreover, draw a part of circle with centre B and radius of 5cm in the same way. A B

Finally, connect from the intersected point of the two circles to points A and B, respectively.



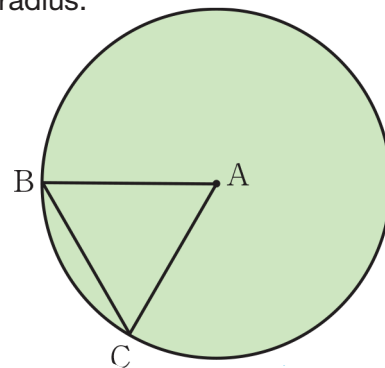
L100. DRAWING ISOSCELES TRIANGLE

- How to drawing Equilateral triangle by using circle.
2. Let's think about using circle to draw an equilateral triangle The figure on the right shows us an equilateral triangle using the radius of circle. B

Explain how to draw it using the three points A, B and C.

Expected Idea

Radii of an circle have same length all around. C First, we measure the radius. Then we connect the points of A,B and C with the same radius.



L101. MAKING TRIANGLES USING PAPER

Teaching and learning activities ⌚ (60 min)

- Making isosceles and equilateral triangles using paper.

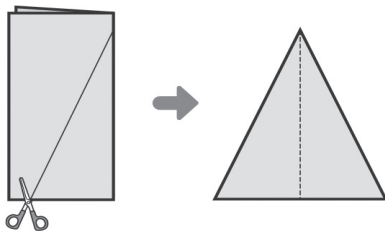
1. Let's make triangles by folding the paper and cutting.

(a) Make an isosceles triangle by folding a sheet of paper as shown on the right.

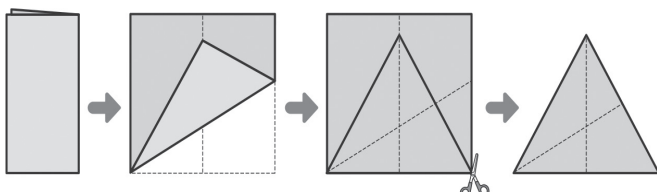
Note: teacher demonstrate prior to students trying

(b) Let's think about how to make an equilateral triangle?

Explain how to draw it by looking at the folding below sides make the same length.



How can we make all the sides make the same length.



Exercise

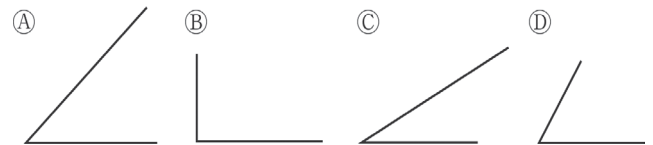
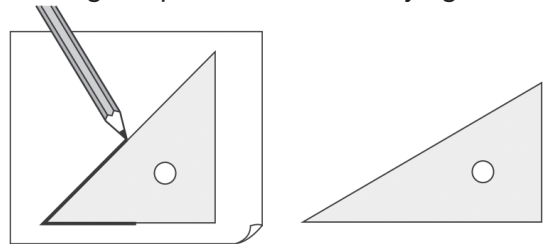
- Let's make the following triangles
 - An equilateral triangle where all sides are 4 cm.
 - An equilateral triangle where all side are 7 cm.
 - An isosceles triangle where 3 sides are 3 side are 8 cm, 8 cm and 6 cm.

L102. EXPLORE TRIANGLES AND ANGLES

Teaching and learning activities ⌚ (60 min)

- Defining angles

1. Trace each corner of the set-square on the paper, Teacher demonstrate and investigate. prior to students trying



(a) Which corner is a right angle?

(b) which corner has very sharp Point?

The shape that is made by 2 straight lines from one point is called angle.
 The point is called vertex of the angle, and the 2 straight lines are called sides of the angle.
 The amount of opening between both sides of an angle is called size of the angle.

- Comparing the size of angle.

2. Compare the size of the angles trace in Activity (1), and say the order of the size of the angle.

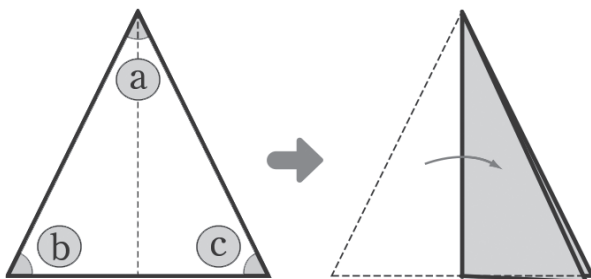
How can we compare?

The size of an angle is determined by the amount of opening between sides and not the length of the sides.

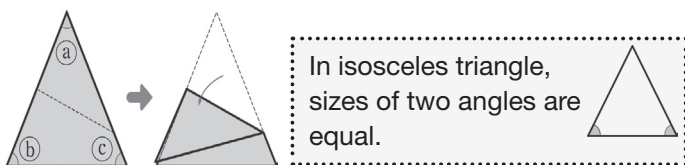
L103. COMPARE THE SIZES OF ANGLES

Teaching and learning activities ⌚ (60 min)

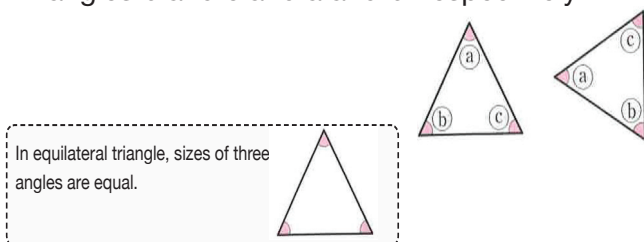
- Size of the angle of Isosceles triangle.
- Let's draw an isosceles triangle on paper, and cut it.



- Compare the size of b and c
- Compare the size of a and b

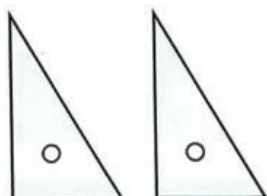


- Size of the angle of Equilateral triangle.
- Let's draw an equilateral triangle on the paper and cut it then compare the sizes of angles b and c and a and b respectively.



Exercise

- Can we make the following figures using the set square as shown on the right. Rectangle, square, right angle, equilateral triangle, isosceles triangle



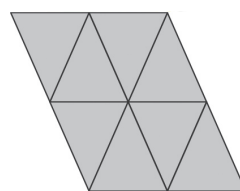
L104. MAKING SHAPES USING TRIANGLES

Teaching and Learning activities ⌚ (60 min)

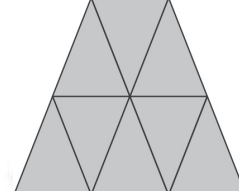
- Designing patterns.
- Make patterns using isosceles triangles
- Let's make various shapes using the same isosceles triangles.

Expected patterns

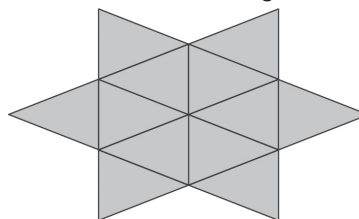
8 isosceles triangle



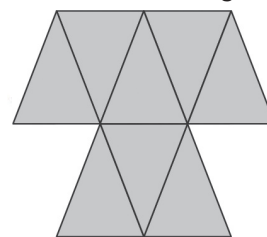
8 isosceles triangle



12 isosceles triangle



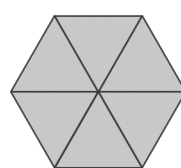
8 isosceles triangle



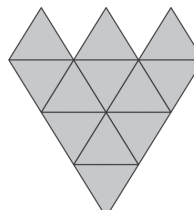
- Make patterns using equilateral triangles

- Let's make various shapes using the same equilateral triangles.

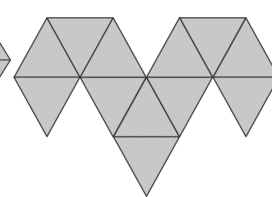
6 equilateral triangle



12 equilateral triangle



12 equilateral triangle



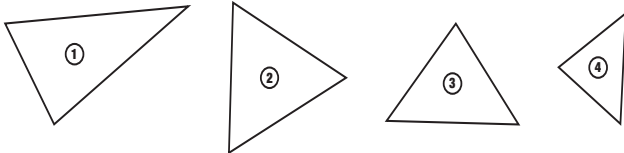
L105 EVALUATION - TRIANGLES

Name: _____

Score ___/___

Complete the following exercises

1. What is the name of the following triangles?



2. Fill the blanks

The shape that is made by 2 straight lines from one point is called _____.

The amount of opening between both sides of an angle is called _____ of the angle.

3. Draw following triangles

(a) An isosceles triangle where 3 sides are 6 cm, 5 cm and 5 cm.

(b) An equilateral triangle where all sides are 4 cm.

TEACHING CONTENT - SAMPLE GUIDED LESSONS

MD - Tables & Graphs

Content Standards

3.4.3 Develop understanding ways to collect, arrange and represent data on tables and bar graphs.

Key concepts(ASK-MT)

Attitude

- Appreciate the usefulness of collecting data in relation to real life situations
- Enjoy manipulating data in tables and graphs

Skills

- read a bar graph
- draw a bar graph considering the scale of 1 unit.
- combine two tables together for comparing the data and
- Arrange the data properly in the table.

Knowledge

- relationship between table and graph
- advantage of table and bar graph
- terminologies and their meaning related to bar graph
- combined table and how to read and
- arrange data using table.

Mathematical thinking

- Think about how to combine some tables together for understanding information effectively
- Think about how to arrange data using table effectively
- Think about advantage of table and bar graph and
- Think about 1 scale to unit represent data.

Background

Children appreciate the usefulness of information collection, displaying them into table format and representing them graphically. They are expected to make sound decisions based on their reasoning from the information to draw conclusions.

Assessment Plan

What to Assess			How to Assess		
Topic	Assessment Task	Lsn	Ass. Methods	Ass. Criteria	Scoring Key
Tables & Graphs	2. Explain how to draw a bar graph.	111	Evaluation - WrittenTest	Q.1 • Draw bar graph from a given data	3 - Complete bar graph. 2 - Complete bar graph but incomplete labelling. 1 - Some bar graph completed with no labelled 0 - Incorrect answer/Blank
	Read 1 dimensional tables			Q.2 • Solve Simple problem involving data in Table	1 - Show correct answer 0 - Incorrect answer/blank

TEACHING CONTENT - SAMPLE GUIDED LESSONS

L106. REPRESENTING DATA IN TABLE

Teaching and learning activities ⌚ (60 min)

- Arrange and represent data in table.
1. Let's investigate what kind of foot wear students where to school.

What kind of foot wear do students were to school. Investigate and show the data in table

- Slippers
- Shoes
- Sandles
- Bare foot

2. Let's think about how to arrange the data and represent it.

The table below are records of what kind of foot wear students wear to school.

Foot wear	Number of student
Slippers	
Shoes	
Sandles	
Barefoot	
Total	42

- Let's change the number of (1) stroke to numbers (by drawing an extra column on your right side.

Foot wear	Number of student	
Slippers		12
Shoes		15
Sandles		5
Barefoot		10
Total		42

- What kind of footwear is worn by many student?
- How many students did not wear any footwear?
- What is the total number of students in class?

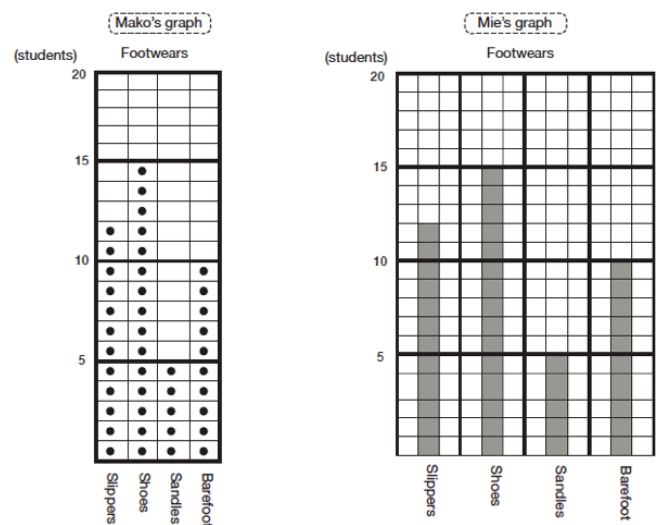
L107. READING BAR GRAPH(1)

Teaching and learning activities ⌚ (60 min)

- Reading bar graph.
1. How to read bar graph.

Mako and Mie made the following graphs of the number of students from the tables of the previous lessons.

Expected Idea



- How did they represent the number of children?
(Mako uses circles, Mie uses bars)
- Which bar is the highest?
(Mako's graph it is difficult when the number become large. Mie's graph it is easy to see because the bar and scale are on same line)
- Compare the table from the previous lesson with the graph above.
 - Which one makes it easiest to see the number of children? (Graph)
 - Which one makes it the easiest to see the number of children? (Table)

A graph, which represents the various amounts by the length of bars, is called bar graph.

L107. READING BAR GRAPH(1)

2. How to read bar graph.

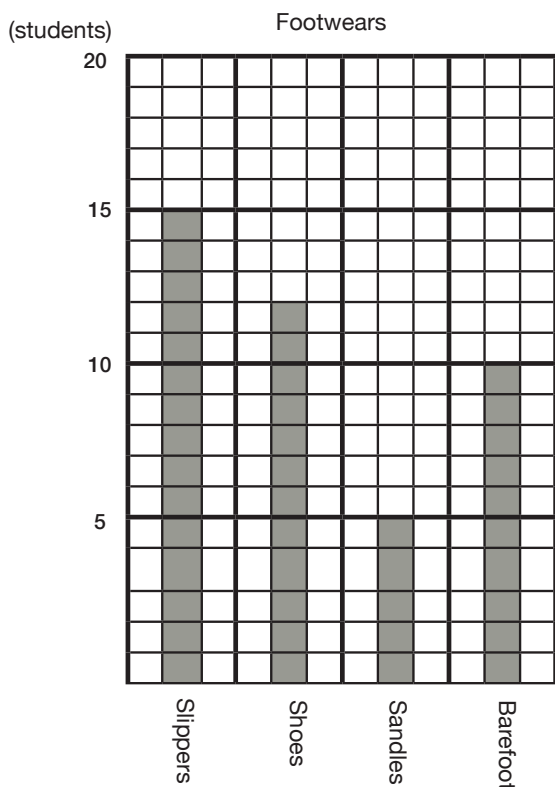
Kenta changed Mie's graph into this one on the right.

(a) How many students wore shoes, slippers(students) sandals and barefoot respectively?

(slippers -15, shoes-12,sandles - 5, and barefoot-10)

(b) What is the biggest number of foot wear worn by students?15 (Slippers)

(c) Let's discuss about Kenta's graph and how it is different from Mie's graph.
(In Kenta's graph, elements are ordered from larger, except barefoot)



In the bar graph, the bars are usually drawn in order from longest to shortest. The "other" bar is usually drawn last.

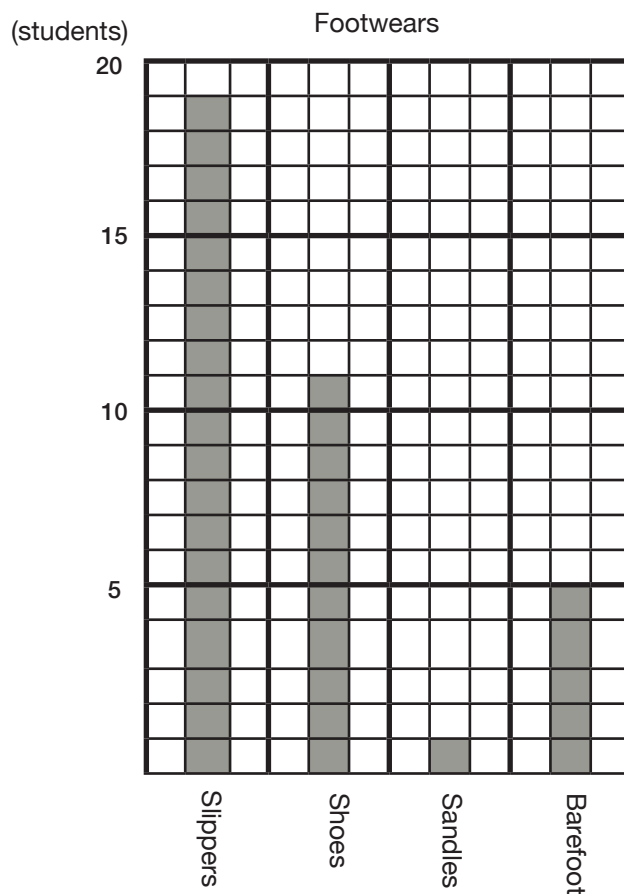
L107. READING BAR GRAPH(1)

3. How to read bar graph.

This bar graph shows the number of children 20 and the kinds footwear students wear.

How is this different from the graph for footwear?

(Only the number of slippers is increased and the rest is decreased)



L108. READING BAR GRAPH(2)

Teaching and learning activities ⌚ (60 min)

- Bar graph and its characteristics

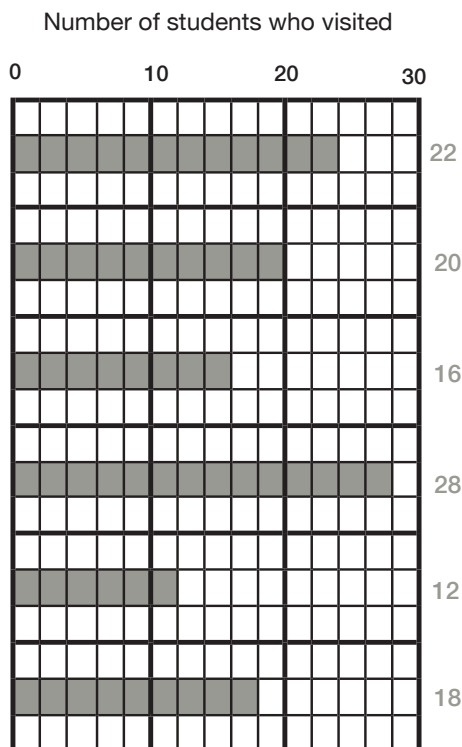
1. How to read bar graphs and its characteristics

The health and hygiene prefect recorded the number of children who visited the school nurse. He recorded the number of children in each grade and made a bar graph.

- (a) How many students are represented in scale 1 of the bar graph? (2 students)
- (b) Let's read the number of students who visited school in each grade.
- (c) What can we conclude from this bar graph? 5th grade 16.

(Grade 6 has the largest number, Grade 7 has the smallest number Grades are ordered from lower to higher) 28.

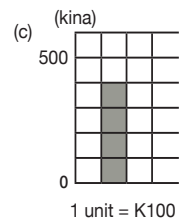
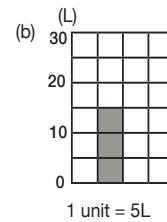
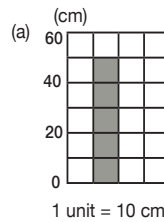
When a bar graph shows amounts with given order like grades, the bars are drawn in order.



L108. READING BAR GRAPH(2)

2. Reading scales in a graph

In the graph below, let's read how much is each unit.



L109. HOW TO DRAW A BAR GRAPH

Teaching and learning activities

(60 min)

- Making a bar graph

1. Let's think about how to draw a bar graph.

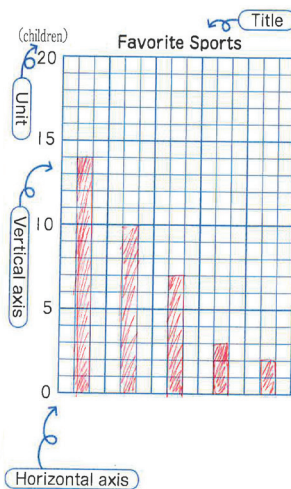
The table on the right show the favorite sports of grade 3A class.

Let's draw a bar graph .

Favorite Sports

Foot wear	Number of student
Soccer	14
Baseball	10
Volleyball	7
Touch rugby	3
Others	2
Total	36

How to Draw a Bar Graph



- Write each sport on the horizontal axis.
- Write the number of the children on the vertical axis.
- Write the title and unit of the vertical axis.
- Draw bars according to the number of students

2. Draw a bar graph confirming each step.

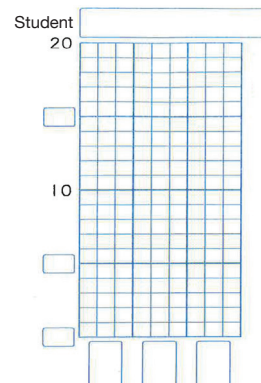
We investigate number of the 3rd graders in each class who said their favorite sport is soccer.

Let's draw a bar graph.

L109. HOW TO DRAW A BAR GRAPH

Number of student who like Soccer

Class	Number of student
1	14
2	15
3	11
Total	40



- Drawing bar graph indicating clearly the scale

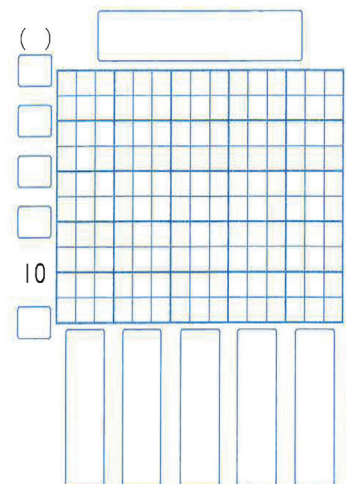
3. Let's draw a bar graph showing clearly the scale as 1 unit

We investigate favorite sports of all the 3rd graders.

Let's draw a bar graph.

Favorite Sports

Foot wear	Number of student
Soccer	40
Baseball	35
Volleyball	15
Touch rugby	10
Others	5
Total	105



L110. COMBINING TABLES

Teaching and learning activities ⌚ (60 min)

- Reading combined table.

1. How to read the combined graph

The following tables show the kinds and number of books that the 3rd graders borrowed in April, May and June.

Books Borrowed (April)

Kind	Number of Books
Story	15
Biography	6
Picture	8
Others	5
Total	

Books Borrowed (May)

Kind	Number of Books
Story	21
Biography	19
Picture	24
Others	8
Total	

Books Borrowed (June)

Kind	Number of Books
Story	16
Biography	14
Picture	19
Others	9
Total	

- What is the total number of books that were borrowed in each month?
- What kind of books was borrowed the most in April to June?
- Integrate the tables for each month together to make 1 table.

Number of Books Borrowed

Kind	April	May	June	Total
Story	15	21	16	52
Biography	6	19		(D)
Picture	8			(E)
Others	5			(F)
Total	(A)	(B)	(C)	(G)

- How many story books were borrowed from April to June?
- How many books are in boxes (A), (B), (C), (D), (E) and in (G)?
- What is the meaning of number in G?
- which kind of books was borrowed the most from April to June?

L110. COMBINING TABLES

Exercise

1. The following table shows number of students who hurt themselves in April, May and June and the types of injuries.

- How many students were hurt in each month?
- What type of injuries happened the most from April to June?

Type \ Month	April	May	June	Total
Scratch	29	27	13	
Bruise	21	46	30	
Cut	13	7	4	
Sprain	7	4	2	
Other	10	14	6	
Total				

L111. EVALUATION - TABLES AND GRAPHS

Name:	Score ___/___
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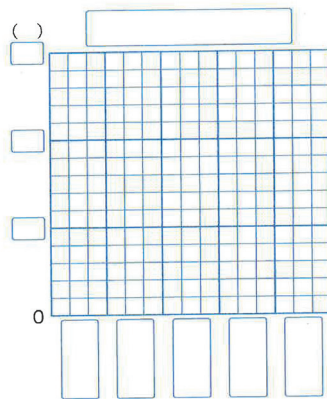
Complete the following exercises

- The following table shows favorite colours of students in Mikes class.

Drawing a bar graph

Favourite Colours

Colour	Number of Students
Blue	12
Red	9
Green	6
Pink	3
Others	6
Total	36



- The following table shows the number of students who hurt themselves in June at Bavaroko Primary School and the type of injuries.

Write the correct numbers in the boxes from "A" to "H".

Injuries (June)

Grade Type	1	2	3	4	5	6	Total
Scratch	3	B	2	5	3	4	21
Cut	A	2	2	3	E	3	G
Bruise	1	1	C	2	2	F	13
Other	2	3	1	1	0	2	9
Total	7	10	8	D	9	13	H

TEACHING CONTENT - SAMPLE GUIDED LESSONS

NO - Multiplication of 2-digit number

Content Standards

3.1.4 Extend learned multiplication to multiple numbers up to 3-digit numbers times 2-digit numbers in vertical form.

Key concepts(ASK-MT)

Attitude

- Appreciate the application of multiplication of 2-digit numbers in money, shops, etc.

Skills

- investigate the properties of multiplication
- calculate easy operation by mental calculation
- calculate (2-digit) \times (2-digit) by separating in place value
- calculate (2-3-digit) \times (2-digit) in vertical form
- do mental calculation of (2-digit) \times (1-digit)
- calculate (3-digit) \times (2-digit) with 0 and
- solve a situation problem of quotative division by using 'times'.

Knowledge

- Meaning of (1 digit) \times (10,20,...90) and make mathematical expression.
- deepen understanding of multiplication and division
- multiplication and division concerning 'times'.

Mathematical thinking

- Think about how to calculate (2-digit) \times (2-digit) and understand the those calculation can be solved by using multiplication table
- Think about how to calculate (1-digit) \times (10,20,...90) and find the product
- think about how to calculate (2-3 digit) \times (2-digit) in vertical form
- Think about how to do mental calculation of (2-digit) \times (1-digit).
- Think about how to solve a situation problem of quotative division by using times.

Background

Children deepen their understanding of multiplication by relating to real life problem solving by mental multiplication base on estimation for mastery. For proficiency in multiplication of any form children use vertical form for order and clarity.

Assessment Plan

What to Assess			How to Assess		
Topic	Assessment Task	Lsn	Ass. Methods	Ass. Criteria	Scoring Key
Multipli- cation of 2-digit numbers	1. Complete a written exercise on multiplication.	120	Evaluation - WrittenTest	Q.1 • Multiply 1-2 digit by 2 digit number	2 - Show correct answer 1 - Evidence of multiplication and regrouping is shown 0 - Incorrect answer/blank
				Q.2 • Simple problem involving Multiplication of 2-digit numbers	2 - Show correct math expression with correct answer. 1 - Shown correct math expression with incorrect answer 0 - Incorrect answer/blank

L112. MULTIPLYING BY A LARGER NUMBER

Teaching and learning activities

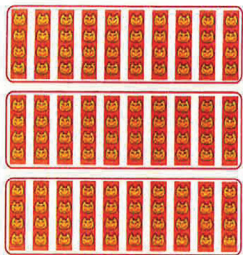
(60 min)

- Multiply by larger number.
1. Let's think about how to multiply by a larger multiplier. There are 30 sets of stickers, with 4 stickers each .
How many stickers are there altogether?

(a) Write an expression



Idea.1



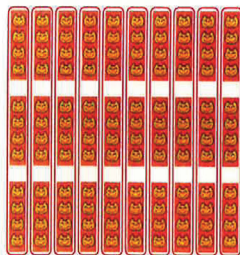
$$4 \times 10 \times 3 = \square$$



$$40 \times 3 = \square$$

Since 4×30 is 10 times of 4×3 , the answer is the of 4×3 with 0 place at the end.

Idea.2



$$4 \times 3 \times 10 = \square$$

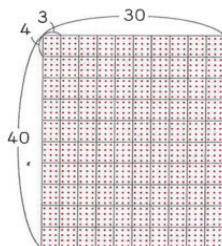


$$12 \times 10 = \square$$

$$4 \times 30 = 4 \times 3 \times 10 = 12 \times 10 = 120$$

2. Let's think about how to calculate for 40×30 .

$$\begin{aligned}
 40 \times 30 &= 4 \times 10 \times 3 \times 10 \\
 &= 4 \times 3 \times 10 \times 10 \\
 &= \square \times \square \\
 &= \square
 \end{aligned}$$



Exercise

1. Do these exercises
 - (a) 3×40 (b) 4×60
 - (c) 70×30 (d) 80×50

L113. MULTIPLYING 2 DIGIT NUMBER BY 2-DIGIT NUMBER (1)

Teaching and Learning activities

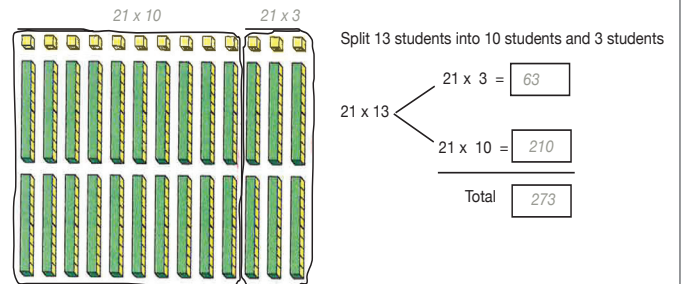
(60 min)

- How to calculate 2-digit number \times 2-digit number.
1. Let's think about how to multiply (2-digit number) \times (2-digit number).

There are 13 students who bought 21 mangoes each in a market. How many do they have altogether?

- (a) Write an expression 21×13 .
- (b) Let's think about how to calculate.

Expected Ideas



- (c) Where can you see 21×3 and 21×10 in the diagram? Circle them.

L114. MULTIPLYING 2 DIGIT NUMBER BY 2-DIGIT NUMBER (1)

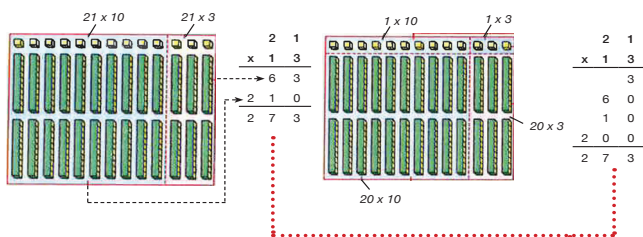
Teaching and learning activities ⌚ (60 min)

- Calculate 2-digit number \times 2-digit number in vertical form.

1. Let's think about how to calculate 21×13 in vertical form.

Expected Ideas

Vavi's idea



How to Multiply 21×13 in Vertical Form

$$\begin{array}{r} 21 \\ \times 13 \\ \hline 63 \\ 210 \\ \hline \end{array}$$

Multiply 21 by 3.
 21×3

$$\begin{array}{r} 21 \\ \times 13 \\ \hline 63 \\ 210 \\ \hline \end{array}$$

Multiply 21 by 10.
 21×10

$$\begin{array}{r} 21 \\ \times 13 \\ \hline 63 \\ 210 \\ \hline 273 \end{array}$$

Add 63 and 210.

There are 21 sets of 10s blocks.

Exercises

1. Let's multiply in vertical form.

- (a) 16×24 (b) 27×32 (c) 15×12
 (d) 21×14 (e) 36×23 (f) 17×57
 (g) 27×24 (h) 15×38

L115. MULTIPLYING 2 DIGIT NUMBER BY 2-DIGIT NUMBER (3)

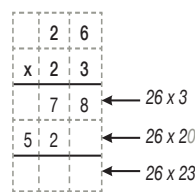
Teaching and learning activities ⌚ (60 min)

- Multiplying in vertical form

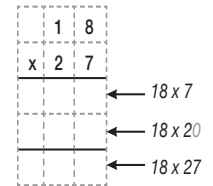
1. Let's think about how to multiply in vertical form

Expected Idea

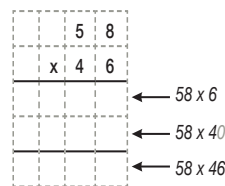
(a) 26×23



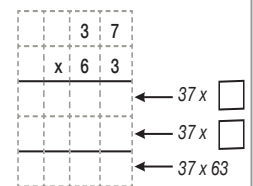
(b) 18×27



(c) 58×46



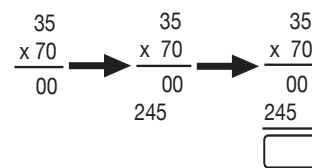
(d) 37×63



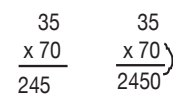
2. Let's think about how to multiply 35×70 in vertical form.

(a) Explain how the following two children multiply in vertical form.

Miku's Idea



Yote's Idea



(b) Compare the answer of 70×35 with the answer of 35×70 .

Exercise

1. Let's multiply in vertical form.

- (a) 38×57 (b) 23×68 (c) 57×87
 (d) 38×57 (e) 74×86 (f) 29×44
 (g) 28×49 (h) 46×97 (i) 78×84
 (j) 38×40 (k) 75×80 (l) 25×70
 (m) 60×65

L116. MULTIPLYING 3-DIGIT NUMBER BY 2-DIGIT NUMBER (1)

Teaching and learning activities ⌚ (60 min)

- Split Calculation of 3 digit number by 2-digit number.

1. Let's think about how to multiply 123×32 .

$$\begin{array}{r}
 123 \times 32 \\
 \hline
 \end{array}
 \begin{array}{l}
 123 \times 2 = \boxed{} \\
 123 \times \boxed{} = \boxed{} \\
 \hline
 \text{Total} \quad \boxed{}
 \end{array}$$

Let's consider using the same method we had used for the multiplication of (2-digit number) x (2-digit number)

- Multiplying 3-digit number by 2-digit number in vertical form.
2. Let's write how to multiply 123×32 in vertical form.
- Solve word problem of 3-digit number x 2-digit number.

How to multiply 123×32

$$\begin{array}{r}
 123 \\
 \times 32 \\
 \hline
 246 \\
 3690 \\
 \hline
 3956
 \end{array}$$

Multiply 123 by 2.
 123×2

3. Let's think of how to solve the word problem of 3-digit number by 2-digit number.

K385 for each student as a school fee in Waigani Primary school was collected in Nick's class. There are 35 students in Nick's class.

L116. MULTIPLYING 3-DIGIT NUMBER BY 2-DIGIT NUMBER (1)

- (a) Write the mathematical Expression?
 (b) Is the total cost larger than ten thousand?
 (c) Let's calculate in vertical form.

Exercise

Let's multiply in vertical form.

- (a) 423×21 (b) 222×43 (c) 279×64
 (d) 418×68 (e) 587×57 (f) 898×41
 (g) 337×85 (h) 684×58
 (i) 754×45 (j) 615×28 (k) 680×48
 (l) 940×25

L117. MULTIPLYING 3-DIGIT NUMBER BY 2-DIGIT NUMBER (2)

Teaching and learning activities ⌚ (60 min)

- Finding calculation mistake
- Let's check the mistake in 805×40 and correct it.

Hilda multiplied 508×40 as follows. If there is any mistakes in the following multiplication, correct it.

How do we estimate	$\begin{array}{r} 508 \\ \times 40 \\ \hline 500 \times 40 \end{array}$	Note the places when we multiply by 10,20,....,90
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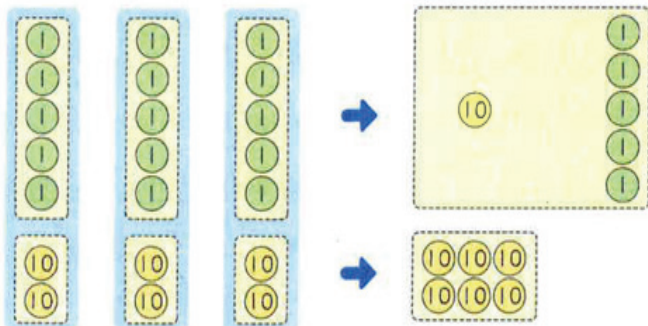
How many digits will be the answer? What is the answer? 20320 (Different students may have their own answers. Accept and go through together). Discuss together

- Mental Calculations
- Let us think of how to do mental calculations for (2-digit) x (1-digit) number
Takeshi buys 4 pencils that cost 62 yen each in a submarket. Let's think about how to find the cost without using the vertical form.

Note: We can find the answer by splitting the multiplicand into two numbers for the ones and tens places.

by $60 \times 4 = 240$ and $2 \times 4 = 8$, $240 + 8 = 248$

- Let's think about how to to calculate 25×3 mentally.



L117. MULTIPLYING 3-DIGIT NUMBER BY 2-DIGIT NUMBER(2)

Exercises

- Let's calculate in vertical form.
 - (a) 608×50 (b) 503×60 (c) 409×40
 - (d) 703×80 (e) 205×74 (f) 802×26
 - (g) 400×37 (h) 900×70
- Let's calculate mentally
 - (a) 52×3 (b) 71×5 (c) 46×2
 - (d) 33×4

L118. TAPE DIAGRAM IN MULTIPLICATION

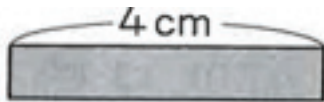
Teaching and learning activities ⌚ (60 min)

- Find the length by multiplying some times to base length.

1. Let's make a tape.

(a) Make a tape which length is 2 sets of

Where should we cut and what is its length in cm?



$$4 \times 2 = \square$$

(b) Make a tape which length is 3 sets of

Where should we cut and what is its length in cm?

$$4 \times 3 = \square$$

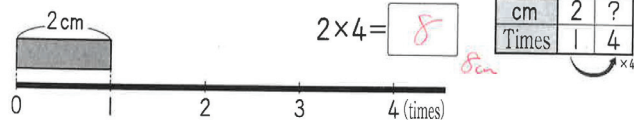
1 set, 2 set and 3 sets are called 1 time, 2 times and 3 times.

cm	4	?
Times	1	3

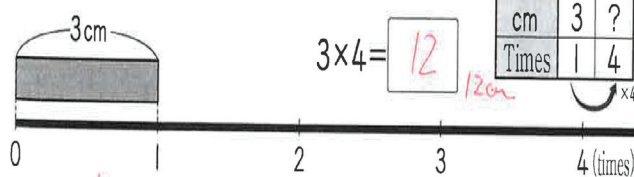
- Find how many times of base length using multiplication.

2. Lets find 4 times in the following length.

(a)



(b)

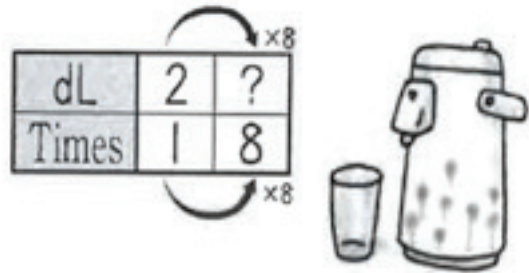


L118. TAPE DIAGRAM IN MULTIPLICATION

3. A thermo bottle holds 8 times the amount of water in a cup. A cup holds 2 dL of water.

How many dL of water can be poured into the thermos bottle?

$$2 \text{ (dL)} \times 8 \text{ (times)} = 16 \text{ (dL)} \quad \text{Ans: 16 dL}$$

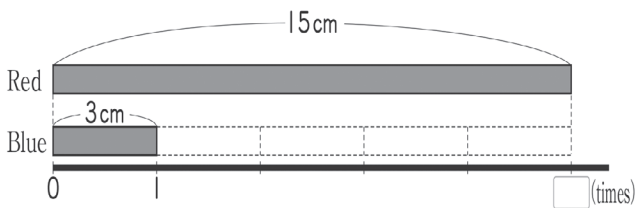


L119. TAPE DIAGRAM IN DIVISION

Teaching and learning activities (60 min)

- Solve a situation problem of quotative division by using 'times'.

- Kila has 15 cm of red tape and 3 cm of blue tape. How many times the length of the blue tape is equal to the length of the red tape?



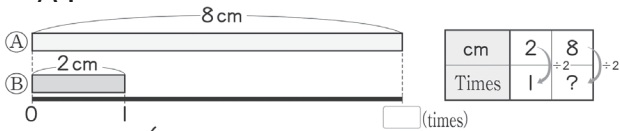
If 3cm is regarded as 1 unit, 15cm is 5 units of 3 cm.

This is called "15cm is 5 times 3 cm".

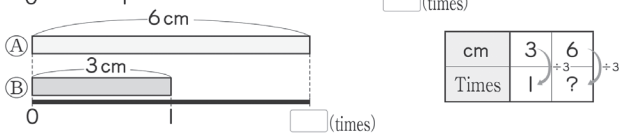
To obtain the number of units 3 cm is equal to 15cm, calculate $15 \div 3$

cm	3	15) +3	+3
Times	1	?		

- How many times of tape 'B' is equal to tape 'A'?



cm	2	8) +2	+2
Times	1	?		

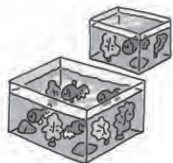


cm	3	6) +3	+3
Times	1	?		

- Solve the word problem of quotative division by using 'times'

The fish tank in the market 'A' holds 24L of water.
The tank in the market 'B' holds 6L of water.
How many times the water in the market 'B' tank can be held in the market 'A'?

L	6	24) +6	+6
Times	1	?		



L120 . EVALUATION - MULTIPLICATION OF 2-DIGIT NUMBERS

Name: _____	Score ____/____
-------------	-----------------

Complete the following exercises

- Calculate in vertical form.

- (a) 2×60 (b) 16×24 (c) 21×14
 (d) 28×49 (e) 423×23 (f) 409×25

- There are 39 children in class A. Each child used 12 papers for writing. How many papers are class A students using?

Mathematical sentence: _____

Answer: _____

- There are 24 groups of 345 people. How many people are there in total?

Mathematical sentence: _____

Answer: _____

TEACHING CONTENT - SAMPLE GUIDED LESSONS

QM - Weights

Content Standards

3.2.2 Develop rational understanding of the quantities in the units of weights (g),(kg) and (t).

Key concepts(ASK-MT)

Attitude

- Appreciate the usefulness of weight in our daily life.
- Enjoy measuring weights of different objects students find within their surroundings.

Skills

- measure the weight appropriately by choosing their scale.
- compare the weight of different things by using balance.
- measure various things using measuring tool.
- measure the weight using kilogram.
- Common relationship compared to other unit of measurements.
- add and subtract weights.

Knowledge

- meaning and concept of unit weight.
- Unit of weights (gram, kilogram and tonne).
- how to write and read the unit (1g) gram.
- structure of scale of kg and read the scale accurately.
- understand that the shape of an object can change but the weight remains the same.
- weight of 1L of water weighs 1kg.

Mathematical thinking

- Think about how to measure weights of different things
- Think of how to represent weights with numbers.
- Think of the weight of 1L of water weighs 1kg.

Background

In teaching and learning of this unit, children develop rational understanding of the units of weight, measure and compare weights of things of different sizes and make sound judgments on the units to use and solve related problems.

Assessment Plan

What to Assess			How to Assess		
Topic	Assessment Task	Lsn	Ass. Methods	Ass. Criteria	Scoring Key
Weight	3. Calculate addition and subtraction of weight. • Reading weight on the scale.	129	Evaluation - WrittenTest	Q.1 •Simple word problem on weight	1 - Show correct answer 0 - Incorrect answer/blank
				Q. 2 & Q.3 • Calculate and convert weights	2 - Show correct answer. 1- Evidence of no conversion 0 - Incorrect answer/blank
				Q.4 • Read weights	1 - Show correct answer. 0 - Incorrect answer/blank

L121. COMPARING WEIGHTS

Teaching and learning activities (60 min)

- Direct comparison.
1. Let's line up objects in decreasing order of their weight Which one is the heaviest?



compare various objects using their hands and compare with other students

“ What can you say about the comparisons of objects?”

- Compare the weights using arbitrary units.
2. Let's think about how to compare the weights of different things accurately.

Discussion Points

T: “How can we compare accurately?”

S: “ We can use the balance to compare accurately” or “By using spring balance” (expected Responses).

3. Let's try comparing weights by using some tools.
 - (a) Teacher provide paper clips and allow students to compare weight of scissors, glue stick and compass with paper clips.
 - (b) Students compare weight of scissors and glue stick, scissors and compass. Then compass with glue stick. Compare each of the three objects with paper clips. Teacher summaries, which is heavier?

L121. COMPARING WEIGHTS

Notes

The metal paper clips as shown below have the weight of 1 gram and can be used in this lesson. Paper clips are used with scissors, compass or glue stick on balance. The number of paper clips that balance the scissors, compass or glue stick gives the weight of the object respectively.

Do not use other objects that do not have weight of 1g to replace paper clips in this lesson.

L122. UNDERSTANDING UNIT GRAM

Teaching and learning activities ⌚ (60 min)

- Expressing weights as units.
1. Express weight as numbers by using paper clip.

Object measured	Gram (g)
Scissor	
Compass	
Glue	



"If we cannot compare two things directly, how can we compare?"
 "We need the same unit to show weight".
 "What kind of unit can we use?"

Notes

Teacher direct students attention to the use of paper clips to measure weights of scissors, compass and glue stick. Teacher demonstrates how to use paper clips to measure the weight of scissors, compass and glue sticks. Students investigate using scissors and paper clips, compass and paper clips then glue stick and paperclips to measure the weight of each objects. They write the number of paper clips into the table. Students understand when using object like paper clip weight of each object can be shown.

- Understanding unit of gram.

Weight is measured by finding how many units of weights something is equal to.

There is a unit called gram that is used to measure weight.

1gram is written as 1g

The weight of a paper clip is 1g



- (a) What is the weight of a pair of scissors, a compass and glue, respectively?
- (b) Measure the weight of different things using paper clip.

L123. MEASURING UNITS OF WEIGHT IN GRAM

Teaching and learning activities ⌚ (60 min)

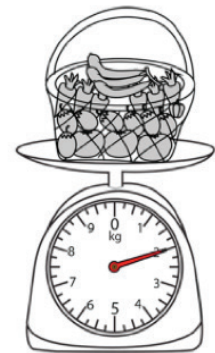
- Use measuring tools to measure weights in grams.

1. Let's use various measuring tools to measure weights.
 - (a) Up to how many 'g' can we measure on the scales below.
 - (b) How many 'g' is the smallest unit shown in scale 1 and 2?
 - (c) How many 'g' is the weight of the flower pot? And how many 'g' is the weight of a vegetables basket?

①

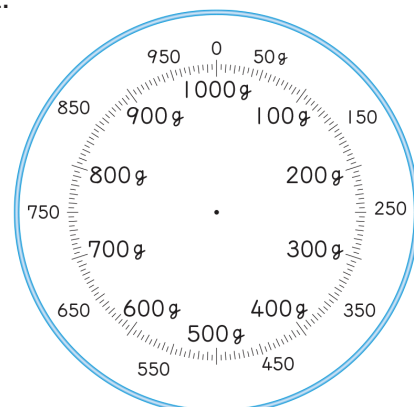


②



2. Let's draw a needle to show the weight of the colour box.

The weight of the colour box is 875g. Draw a needle on the scale shown on the right at this weight.



L124. UNDERSTANDING UNIT KILOGRAM AND TONNE

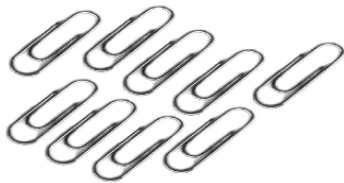
Teaching and learning activities ⌚ (60 min)

- Expressing weights as units of kilogram (Kg).
- How much is the unit if 1000 sets of 1 paper clip?

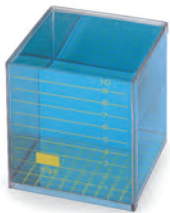
1000g weighs the same as 1kilogram and is written as 1kg.

1kg

1kg = 100g



1L of water weighs 1kg



This is similar to the relationship between km and m, when measuring length.
1km = 1000m

- Measure weights up to 1kg.
- Let's think about how to measure the 1kg using scale.

Make objects that weighs 1kg

Teacher confirm how to use scale with class.

How to Use Scale

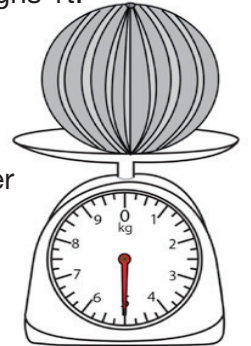
- Put the scale on a flat surface.
- Adjust the needle to 0.
- Read the scale from the front directly.

Note: Students measure material/objects around the classroom and find 1kg materials. Hold the 1 kg material/object by hand and feel the weight of the objects

L124. UNDERSTANDING UNIT KILOGRAM AND TONNE

- Investigate objects that weighs 1t.
- Let's look for objects which weighs in tonne.

Teacher shows students a picture of ship, car or container to know 1000 kg = 1 tonne



There is a unit called tonne to measure weight. 1000kg equal 1tonne and is written as 1t (metric ton)

1t

1t = 1000 kg

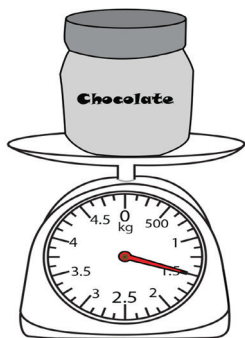
L125. MEASURING UNITS OF WEIGHT IN KILOGRAM

Teaching and learning activities ⌚ (60 min)

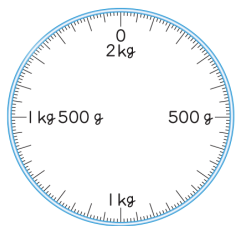
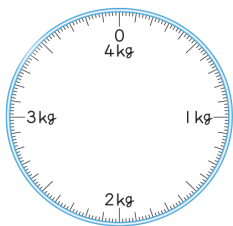
- Investigate measuring tool for measuring weights in kilogram.

1. Let's look at the scale on the right.

(a) Read the weights shown on the scales.
For example, 1kg 500g is read as "one kilo and five hundred grams in short.



How many grams is 1 unit?



(b) Write an \uparrow for the following scales above

- (i) 1kg 800g (ii) 3kg 300g

- Show weighs using decimals.

2. Let's study the scale 31.8 kg.

Vavi weighs 31.8 kg. How many kg and g is her weight?

$$0.1\text{kg} = 100\text{g}$$

$$31.8\text{kg} = \square \text{ kg } \square \text{ g}$$

Teacher ask students to convert the scale to kilogram and gram.



L125. MEASURING UNITS OF WEIGHT IN KILOGRAM

Teaching and Learning activities

- Measuring weights.
3. Let's measure the weights of many different objects using the scale.

Estimate the weights first.



Object measured	Weight expected	Weight measured
Dictionary		
Pencil case		
Exercise books		

TEACHING CONTENT - SAMPLE GUIDED LESSONS

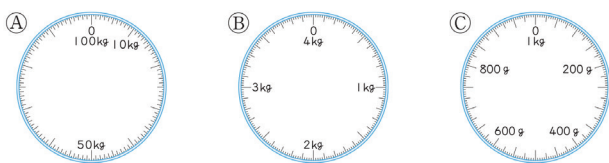
L126. RELATIONSHIP IN UNITS OF MEASUREMENT

Teaching and learning activities ⌚ (60 min)

- Predict the weight of objects.
- Let's choose an appropriate scale to measure.

Which scale do we use to measure the weight of the following objects?

- (a) Watermelon (b) Textbook (c) Your weight



Length : mm, cm, m, km

Weight : g, kg, t

Amount of water : mL, dL, L

“How many kilograms is 1 tonne?”
 “1000kg”
 “How many milliliters is 1 Liter?”
 “1000ml”

- (a) Fill the with a number.

1m = mm 1L = mL “1000m”

1km = m 1kg = g “1000kg”

- (b) Let's discuss what you found. And write down in “1000ml” your notebook.

Expected ideas

- The base units of measurement are m, L and g.
- There are measurement unit which added k or m.
- 1000 of unit develop a new unit.

L127. AMOUNTS OF BLOCK AND WEIGHT

Teaching and learning activities ⌚ (60 min)

- Relationship between weight of block with different weight and same volume.
- Let find weight at different block with same volume.

- (a) There are pieces of iron, aluminum, vinyl chloride, polyethylene, rubber and timber.

Do they have weigh the same? Guess the answer and compare their real weights. Same volume.

Note for Preparation

- Weighing scales and clay
- Block of timber, rubber, iron or aluminum with same volume. (Two of these materials can do for the investigation purpose)



Iron



Aluminum



Vinyl chloride



Polyethylene



Rubber



Timber

Different materials have different weights even if they are of the same size of block

Different materials have different weights even if they are of the same size of block

- (b) Measure the weight of a lump of clay. Change the shape and measure it again.

How does the weight change?



L128. CALCULATING WEIGHTS

Teaching and learning activities

 (60 min)

- Solving weights problem.

1. Let's solve the word Problem

(a) There are 900g of oranges in a bag that weighs 400g.

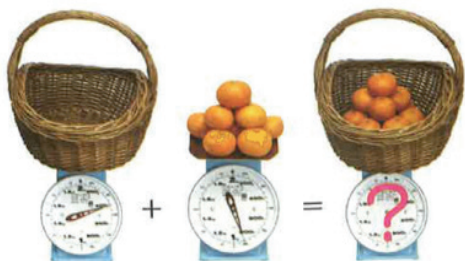
what is the total weight?

(i) What is the total weight in g?

$$400\text{g} + 900\text{g}$$

(ii) What is the value in kg and g?

kg g



(b) The school bag weighs 900g and the total weight of a bag with books and notebooks is 32kg 200g.

What is the value in kg and g of the books and notebooks?



Exercises

Solve the word problems.

- Akira weighs 24kg and Isamu weighs 26kg.
If Isamu stands on a scale while holding Akira on his back, how many kg will the needle of the scale show?
- Saku weighs 3200g at birth and weighs 9100g on her in 1st birthday. By how many g has the weight increased during the 1 year.

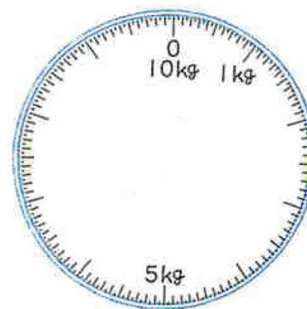
L129. EVALUATION - WEIGHTS

Name: _____

Score ____/____

Complete the following exercises

- The weight of 1L of water is .
- When we add 2L of water and 3L of water, how many L of water are there altogether? And by how many kg? _____
- How many g is one unit on the following scale? _____
- How many kg and g does the following scale shows?



- Keita is measuring the weight of his school bag. He says, "if I add 250g, it will weigh 1kg".
How many g does his school bag weigh?

Ans: _____

TEACHING CONTENT - SAMPLE GUIDED LESSONS

NO - Fractions

Content Standards

3.1.7 Extend learned knowledge on simple fractions to represent the given quantities, sizes and structure of fractions.

Key concepts(ASK-MT)

Attitude

- Be eager to compare and find relationship between fractions with the same denominator.
- Appreciate and participate actively in measuring the sizes less than 1 using unit fractions.

Skills

- Identify how to represent the given quantities in fractions.
- Represent the size of objects less than 1 and the remaining part.
- compare fractions and represent their relationships using the inequality signs.
- compare and explain the relationship between fraction and decimals.
- Calculate simple addition and subtraction of fractions with the same denominator .

Knowledge

- Presenting and expressing quantities in unit fractions.
- Identify and know what fraction looks like.
- Show representation of meaning of unit fraction.
- Define and identify the position of the numerator and the denominator.
- Understand the idea and meaning of unit fraction and fraction which has the same numerator and denominator which is 1 (whole number).
- understand that $\frac{1}{10}$ can be represent in a decimal number as 0.1.
- Explain addition and subtraction of fractions using the fraction unit idea in diagram representations.

Mathematical thinking

- Think about how to express the remaining part and show it using the unit fraction idea.
- Be able to think of ways to express the relationship of fraction and decimal number based on unit idea (fraction/decimal number).
- Be able to think and explain ways of measuring sizes of objects less than 1meter using the unit fraction idea representations.

Background

Though in most PNG context, fraction is referred to as half of a quantity regardless of the size of the portion, children are introduced to sharing whole things amongst friends and estimate the size of each portion and represent them in that proportion as a whole to clear their misconceptions of the half as the only fractional value. In such, children acquire understanding that the values of fractions depended on the size of the portion shared.

What to Assess			How to Assess		
Topic	Assessment Task	Lsn	Ass. Methods	Ass. Criteria	Scoring Key
Fractions	5. Use equality and inequality signs to compare fraction and decimal.	137	Evaluation - WrittenTest	Q.1a-b • shade given fractions	1 - Show correct answer 0 - Incorrect answer/blank
	2. Use tape diagram of 1 meter to explain addition and sub-traction of fraction • Shade fraction • apply unit idea			Q. 2a-d • use unit idea to represent fraction	2 - Show correct answer. 1- Evidence of no conversion 0 - Incorrect answer/blank
				Q.4 • Read weights	1 - Show correct answer. 0 - Incorrect answer/blank

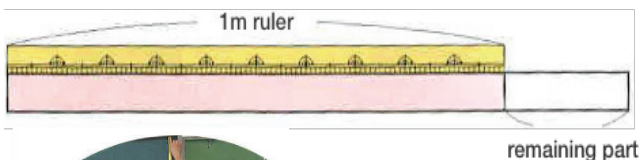
L130. QUANTITIES OF FRACTIONS (1)

Teaching and learning activities ⌚ (60 min)

- Representing the size of objects less than 1 and the remaining part.

1. Let's think about how to represent the remaining part.

There is 1 m tape. Let's measure the lengths of many different objects by the 1 m tape. We take the height of the blackboard by cutting length of the tape and measure it with a 1 m ruler. The length is 1 m and a remaining part. How can we represent the remaining part in meters?



Let's compare the lengths of the divided parts respectively with the length of remaining part.

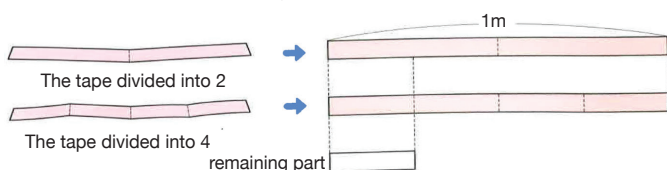
Expected Idea

The length of remaining part is equal to one part that is made by dividing 1m into 4 equal parts.

Discussion

The length of the remaining part is less than 1m, isn't it?

(a) Divide a 1 m tape into 2 and 4 m equal part, respectively.



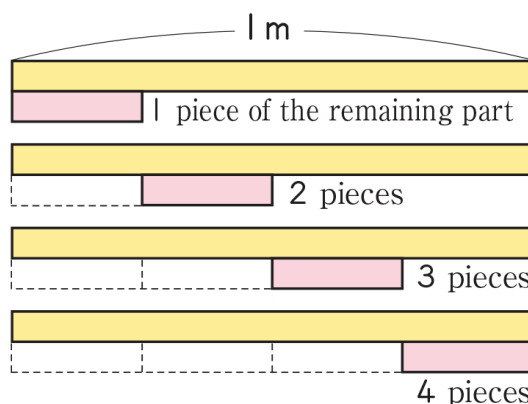
The length of one part that is made by dividing 1m into 4 equal part is called "one fourth meter" or "one quarter" and is written as $\frac{1}{4}$ m,

$$\frac{1}{4}$$

L130. QUANTITIES OF FRACTIONS (1)

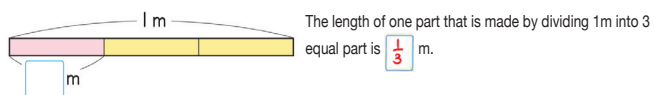
- Meaning of 2 pieces of metre 1 m.
2. How many pieces of the remaining part are equal to 1 m?

The length of the remaining part for which 4 pieces are equal to the length of one part which is obtained by dividing 1m into equal parts. The length of the remaining part is $\frac{1}{4}$ m

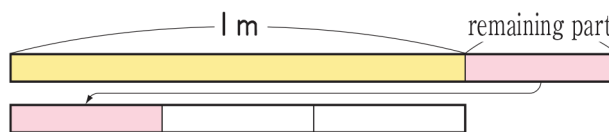


Exercise

1. How many meters are these?



2. The length of the remaining part for which 3 pieces are equal to 1m is $\frac{1}{3}$ m.



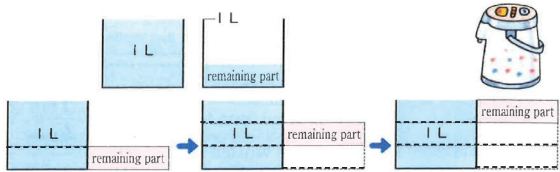
3. The length of one part that is made by dividing 1m into 5 equal parts is $\frac{1}{5}$ m.

TEACHING CONTENT - SAMPLE GUIDED LESSONS

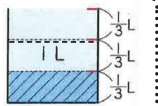
L131. QUANTITIES OF FRACTIONS (2)

Teaching and learning activities ⌚ (60 min)

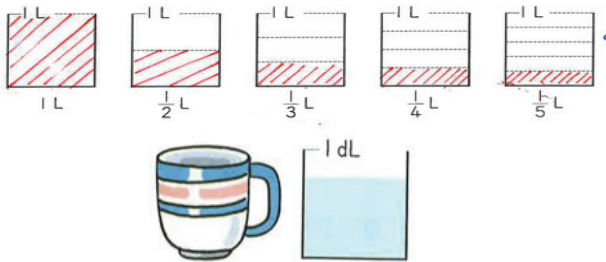
- Expression of the volume by fraction.
1. The amount of water in thermos bottle is 1L and how many L more. Understanding the size of the unit fraction.



The amount of water for which 3 parts are equal to 1L is equal to the amount of one part which is obtained by dividing 1L into 3 equal parts. The amount is $\frac{1}{3}$

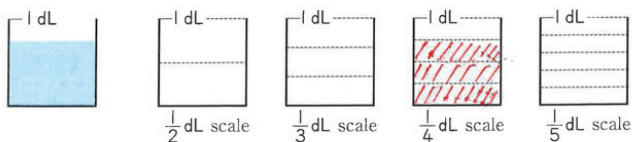


- Understanding the size of the unit fraction.
2. Colour in the portion of the amounts.



- Representing unit fraction.
3. Let's think about how to represent unit fraction.

How many dL is the amount of water in the cup? And which measuring cup should we use to find?



The amount of water for which 3 sets of $\frac{1}{4}$ dL is called "three fourth of a deciliter" and is written as $\frac{3}{4}$ dL



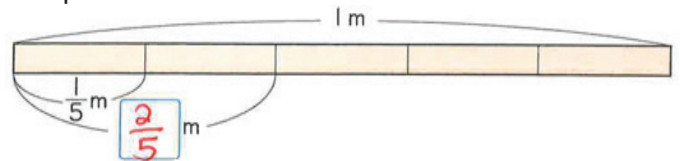
L132. QUANTITIES OF FRACTIONS (3)

Teaching and learning activities ⌚ (60 min)

- Expressing the number of unit fraction in length.

1. How many unit fraction in length?

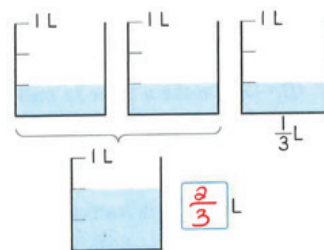
When a 1m is divided into 5 equal parts, how many meters are the length of 2 parts?



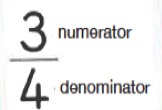
- Expressing how many times of the unit fraction in volume.

2. How many unit fraction in volume?

When a 1L of milk is divided among 3 children equally, how many liters are there for 2 children?

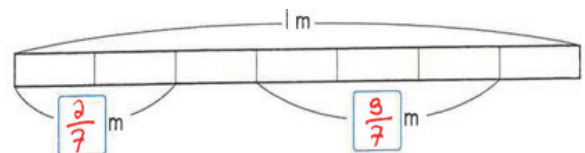


Numbers such as $\frac{1}{3}$, $\frac{3}{4}$ and $\frac{2}{5}$ are called fractions. The number below the bar is called denominator and the number above the bar is called numerator

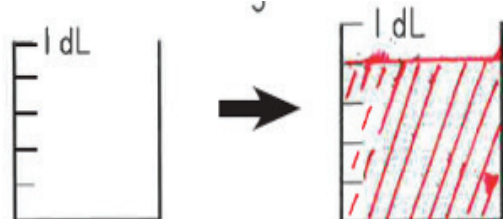


Exercise

1. Let's represent fractions



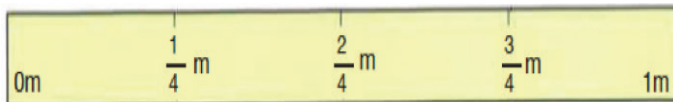
2. Let's colour in the parts of dL.



L133. MEASURING THINGS USING FRACTIONS

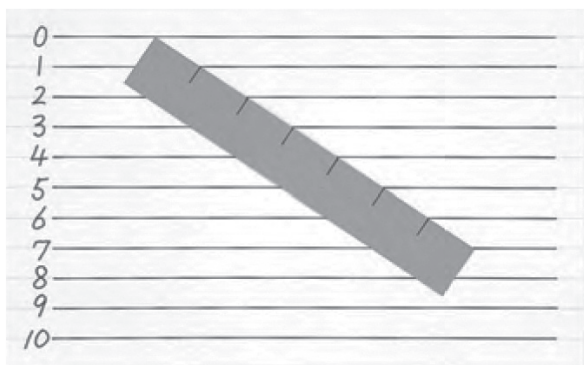
Teaching and learning activities ⌚ (60 min)

- Making a fraction ruler.
1. Let's think about how to make a ruler to measure fractions by dividing a 1m tape into equal sections.



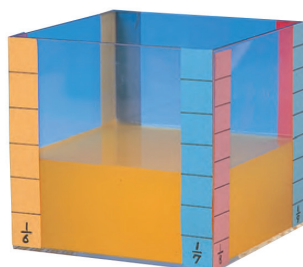
Make a ruler to measure fractions with denominator of 3, 5, 6, 7, 9 and 10 and then let's measure the lengths of different objects.

How to make a ruler with denominator of 9?



- Making a fraction measuring cup.
2. Let's make a 1L measuring cup to measure fractions by constructing a scale of fractions.

How to construct a Fraction Scale of which denominator is 7.



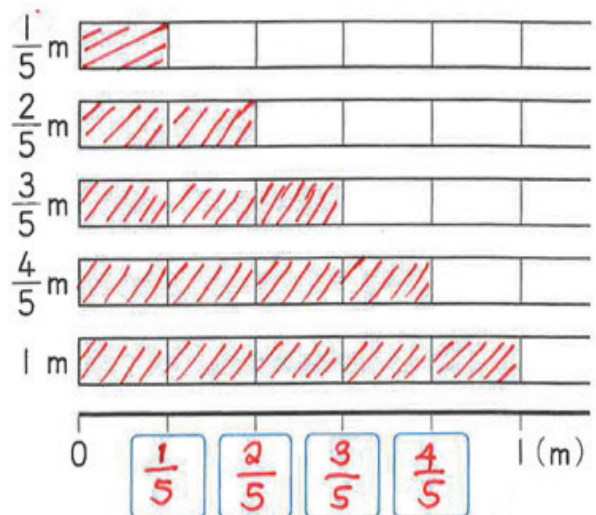
3. Let's measure various things using fraction ruler.

Note: Teacher Identify items to measure for the students before the making of rulers.

L134. THE STRUCTURE OF FRACTION (1)

Teaching and learning activities ⌚ (60 min)

- Understanding the structure of the fraction.
1. Let's color each bar from left to a length that matches each fraction.



- Understanding the fraction, which is the same size of 1.
2. How many L are 6 sets of Denominator and $\frac{1}{6}$.



Fraction with same denominator and numerator are equal to 1

Inequality signs
 > greater than
 < less than
 # not equal to
 = equal

Exercise

1. Let's compare the following fraction and represent the relation in using equality sign.
 - (a) Which is longer, $\frac{3}{4}$ or $\frac{2}{4}$ m? Inequality signs
 - (b) Which is larger $\frac{5}{7}$ L or $\frac{6}{7}$ L?
 - (c) Which is larger $\frac{7}{8}$ dl or 1dL?

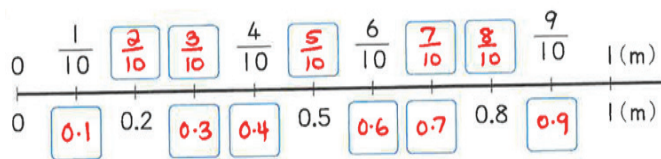
TEACHING CONTENT - SAMPLE GUIDED LESSONS

L135. THE STRUCTURE OF FRACTION (2)

Teaching and learning activities ⌚ (60 min)

- Understanding the relationship between fraction and decimal with fractions and decimal numbers.

1. Let's fill the with fractions and decimals.



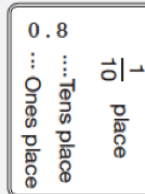
Let's fill the boxes with inequality signs.

(a) $\frac{3}{10}$ 0.2 (b) 0.1 $\frac{1}{10}$ (c) 0.7 $\frac{8}{10}$

When we represent $\frac{1}{10}$ as a decimal numbers, it is 0.1.

$\frac{1}{10} = 0.1$

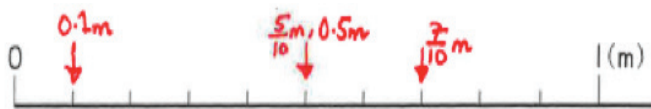
The tenths place is also called $\frac{1}{10}$ place.



- Understanding the relationship between fraction and decimal which the denominator is 10.

2. Let's represent the following numbers on the number line by .

- (a) Represent $\frac{1}{10}$ in decimal number.
 (b) Represent 0.7m in fraction.
 (c) Represent 5 sets of $\frac{1}{10}$ m in fraction and decimal number



Exercise

1. Fill the with equality or inequality signs.

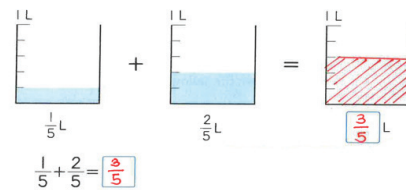
(a) 0.5 $\frac{5}{10}$ (b) $\frac{1}{10}$ 0.2 (c) 0.6 $\frac{4}{10}$

L136. ADDITION AND SUBTRACTION OF FRACTIONS

Teaching and learning activities ⌚ (60 min)

- Addition of fraction with the same denominator.

1. Ove drank $\frac{1}{5}$ L of milk yesterday and $\frac{2}{5}$ L milk today. How many liters did he drink?



Discussion Hints

Consider how many $\frac{1}{5}$ are there in the amount.....

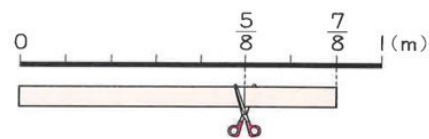
- Subtraction of fraction with the same denominator.

2. From a $\frac{7}{8}$ m tape, $\frac{5}{8}$ m was cut off. How many meters are left?

$\frac{7}{8} - \frac{5}{8} = \frac{2}{8}$

Discussion Hints

How many $\frac{1}{8}$ are there left?



Exercise

1. Let's calculate the following fractions.

(a) Let's represent a calculation $\frac{2}{6} + \frac{3}{6}$ below.



(b) Let's calculate.

(i) $\frac{1}{5} + \frac{4}{7}$ (ii) $\frac{3}{4} - \frac{1}{4}$ (iii) $\frac{4}{5} - \frac{2}{5}$

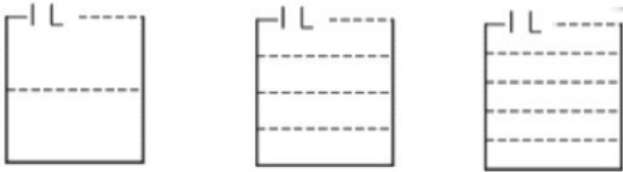
L137 - EVALUATION - FRACTIONS

Name: _____

Score ___/___

Complete the following exercises

1. Color in the portion of the amounts.



2. Fill the blank with a number.

(a) $\frac{3}{5}$ L is _____ sets of $\frac{1}{5}$ L.

(c) _____ sets of $\frac{1}{8}$ L is $\frac{3}{8}$ L.

(b) 4 sets of $\frac{1}{4}$ cm is _____ cm.

3. Which is bigger? Fill the blank with inequality signs.

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

4. Calculate.

(a) $\frac{2}{7} + \frac{3}{7}$ (b) $\frac{2}{6} + \frac{3}{6}$ (c) $\frac{1}{3} + \frac{1}{3}$ (d) $\frac{2}{5} + \frac{1}{5}$

(e) $\frac{3}{4} - \frac{3}{4}$ (f) $\frac{4}{5} - \frac{3}{5}$ (g) $\frac{5}{6} - \frac{3}{6}$ (h) $\frac{7}{9} - \frac{5}{9}$

5. From a $\frac{3}{5}$ m tape, $\frac{2}{5}$ was cut off. How many meters are left?

(a) Mathematical expression: _____

(b) Answer: _____

TEACHING CONTENT - SAMPLE GUIDED LESSONS

DM - Mathematical sentence using the box

Content Standards

3.4.1 Represent a mathematical sentence using words and box to find the missing number using addition and multiplication and their inverse operation.

Key concepts (ASK-MT)

Attitude

- Be able to enjoy representing mathematical sentences using words and the for various situations or pictures.

Skills

- Represent mathematical sentences using words and the box.
- Make math sentence of addition using and find the number which enters in .
- Make math sentence of multiplication using and find the number which enters in .

Knowledge

- understand math sentences which represent mathematical relations.
- understand how to find the number which enters in .

Mathematical thinking

- Think about how to represent mathematical sentence using words and .
- Think about how to find the number which enters in .

Background

This unit introduces the children to basic algebra and to manipulate the worded statement into mathematical sentences by use of numbers, blocks and operands and solve problems. Children are expected to master the knowledge on writing mathematical statements with English words that have mathematical meaning.

Assessment Plan

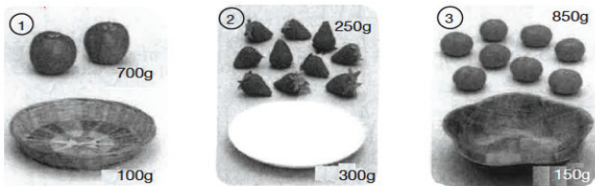
What to Assess			How to Assess		
Topic	Assessment Task	Lsn	Ass. Methods	Ass. Criteria	Scoring Key
Math Sentences using the box <input type="checkbox"/>	1. Find unknown numbers in mathematical sentences of addition and multiplication 2. Represent unknown number in a mathematical sentence by using	141	Evaluation - WrittenTest	Q1a, Q2a • Complete tape diagram	1 - Show correct answer 0 - Incorrect answer/blank
				Q1b, Q2b • Complete mathematical sentences	2 - Show correct answer. 1- Evidence of no conversion 0 - Incorrect answer/blank
				Q1c, Q2c • Represent unknown in mathematical sentences using	2 - Show correct represent of math unknown with correct answer. 1 - Shown correct math expression with incorrect answer 0 - Incorrect answer/blank

TEACHING CONTENT - SAMPLE GUIDED LESSONS

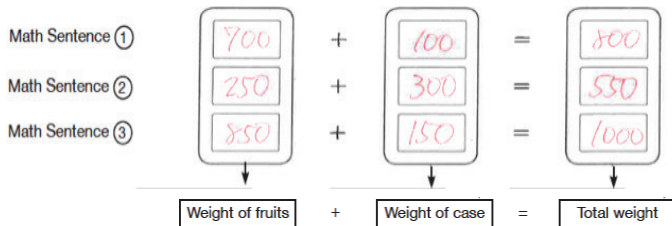
L138. REPRESENT MATHEMATICAL SENTENCE USING \square

Teaching and learning activities ⌚ (60 min)

- Express the relation of two numbers in words (addition).
1. Represent the mathematical sentences for the following situations shown in the photos below.



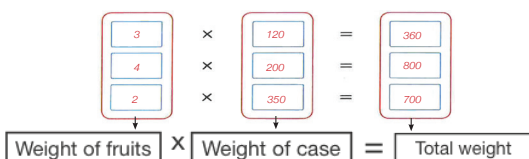
- (a) The total weight of two apples within bamboo case.
- (b) The total weight of ten strawberries on glass dish.
- (c) The total weight of eight oranges on wood dish.



- Express the relations of two numbers in words (multiplication).
2. Represent the mathematical sentences for the following situations pictures.



- (a) The cost of 3 cookers for 120 kina each.
- (b) The cost of 4 hot water han for 200 kina each.
- (c) The cost of 2 Televisions for 350 kina each.



L139. MATHEMATICAL SENTENCE OF ADDITION

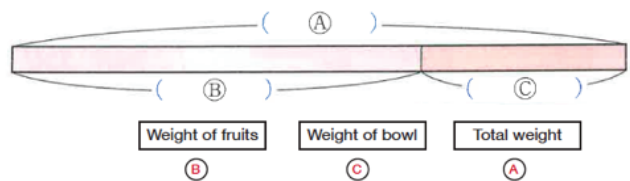
Teaching and learning activities ⌚ (60 min)

- How to write mathematical sentence using \square and how to find \square .

1. Let's think about the following problem.

There are 900g of mandarins in a bowl that weighs 300g. What is the weight of mandarins in gram?

- (a) Let's complete the diagram below by filling the () with words.



- (b) Let's complete the mathematical sentence with words from the diagram (a).



- (c) Let's represent the unknown number in the mathematical sentence by using \square .

Expected Ideas

Kila's Idea

For finding the number which fits $\square + 300 = 900$, put numbers, 100, 200, ... into \square .

100 + 200 < 900
200 + 300 < 900
...

600 + 300 = 900

Answers: 600g

Vavi's Idea

Consider how to use the diagram

$\square + 300 = 900$
 $\square = 900 - 300$
 $\square = 600$

Answers: 600

- How to write mathematical sentence using and how to find .

2. Let's think about the following problem. The weight of 400 g pineapples in the bowl is 850 g.

- (a) What is the weight of the bowl in g?
- (b) Let's draw the diagram or mathematical sentence for the weight of the bowl by using \square . g and find \square .

Exercise

1. The weight of 400 g pawpaw in the bowl is 600 g. what is the weight of the bowl in gram? Let's draw the diagram or mathematical sentence for the weight of the bowl by using \square g and find \square .

TEACHING CONTENT - SAMPLE GUIDED LESSONS

L140 - MATHEMATICAL SENTENCE OF MULTIPLICATION

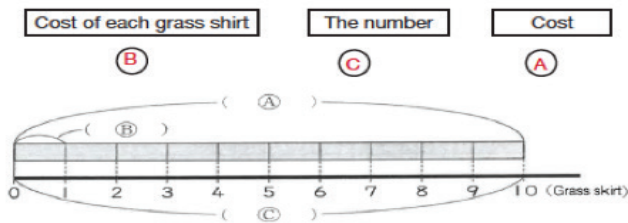
Teaching and learning activities ⌚ (60 min)

- How to write mathematical sentence using \square and how to find \square . ($x a = b$)

1. Let's think about the following problem.

We bought 10 traditional grass skirts, and paid 500 kina. What is the cost of one traditional grass skirt?

- (a) Let's complete the diagram below by filling the () with words.



- (b) Let's complete the mathematical sentence with letter from the diagram (a).

$$\boxed{\text{(C)}} \times \boxed{\text{(B)}} = \boxed{\text{(A)}}$$

- (c) Let's represent the unknown number in the mathematical sentence by using \square .

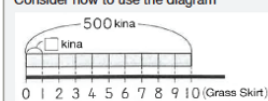
$$\boxed{} \times \boxed{} = \boxed{}$$

Expected Ideas

Kila's Idea

For finding the number which fits
 $\square \times 10 = 500$, put numbers into \square .
 $10 \times 10 < 500$
 $20 \times 10 < 500$
 \vdots
 $50 \times 10 = 500$
Answers: 500g

Vavi's Idea

Consider how to use the diagram

 $\square + 10 = 500$
 $\square = 500 \div 10$
 $\square = 50$
Answers: 50

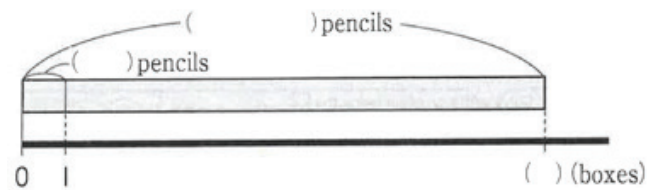
- How to write mathematical sentence using \square and how to find \square . ($a \times \square = b$)

2. You divide 66 pencils into 6 pencils to each box. how many boxes of 6 pencils can you fill?

L140 - MATHEMATICAL SENTENCE OF MULTIPLICATION

Teaching and learning activities ⌚ (60 min)

- (a) Let's draw the diagram by representing the unknown number by using \square .



- (b) Let's make mathematical sentences with words and by using \square .

Number of boxes	+	\square	=	Total Number
6	+	\square	=	66

$$6 \times 10 = 60$$

$$6 \times 11 = 66$$

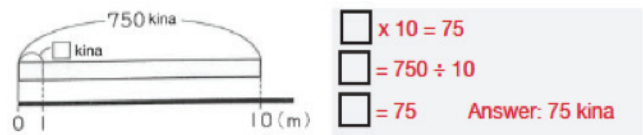
$$\square = 66 \div 6$$

$$= 11$$

Exercise

1. The cost of 10m of special rope is 750 kina.

Write a mathematical sentence by using \square to find the cost of 1m special rope.



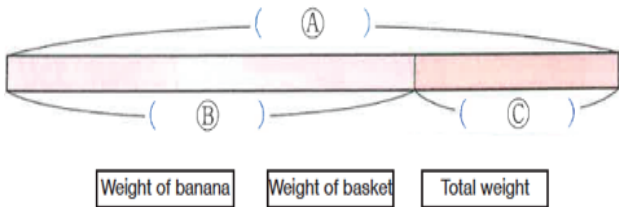
L141. EVALUATION - MATH SENTENCE USING

Name: _____	Score ___/___
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Complete the following exercises

1. The weight of 900g bananas in the basket is 300g. What is the weight of the banana in grams?

(a) Let's complete the diagram below by filling the () with words.



(b) Let's complete the mathematical sentence with words from the diagram (a).

$$\boxed{} + \boxed{} = \boxed{}$$

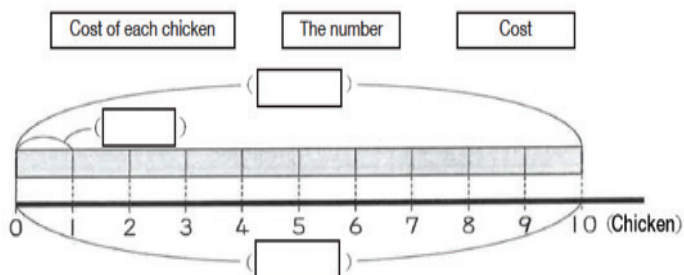
(c) Let's represent the unknown number in the mathematical sentence by using \square .

$$\square + \boxed{} = \boxed{}$$

(d) Let's think about how to find the number in the \square .

2. We bought 10 chickens, and paid 500 kina. What is the cost of one chicken?

(a) Let's complete the diagram below by filling the () with words.



L141. EVALUATION - MATH SENTENCE USING

(b) Let's complete the mathematical sentence with words from the diagram (a).

$$\boxed{} \times \boxed{} = \boxed{}$$

(c) Let's represent the unknown number in the mathematical sentence by using \square .

$$\boxed{} \times \boxed{} = \boxed{}$$

Assessment, Reporting and Recording

Assessment

There are 3 types of assessments that teachers are expected to use when they are teaching the lessons.

1. Assessment *for* Learning
2. Assessment *as/in* Learning
3. Assessment *of* Learning

1. Assessment *for* Learning

‘Assessment *for* learning’ is also known as classroom assessment. It is an ongoing process that arises out of the interaction between teaching and learning. It is not used to evaluate learning but to help learners learn better. It does so by helping both students and teachers to see:

- the lesson objective and the criteria for the lesson,
- the progress of the student as a learner in relation to the lesson objective,
- where they need to link to the next lesson.

Sample of Assessment

Below are two different approaches the teacher can choose and prepare for each lesson.

a. Ask oral questions in reference to the lesson.

For example, teacher posing a revision problem referring to addition with 2-digit numbers and asking the following questions directly to the students to get their responses.

1. How many marbles are there from 13 red marbles and 24 yellow marbles? 38 marbles altogether.
2. How did you get the answer?
3. Can you show the mathematical expression on the blackboard? Student should show hands and teacher selects one male and female to show their work on the blackboard.
4. Teacher and students agree with the process of addition with 2-digit numbers in vertical form.
5. Can we be able to do addition with 3-digit numbers?

b. Peer group discussions.

For example, the activity on “let’s think about addition with 3-digit numbers” Teacher write the problem on paper rings “For the party decoration, we made 215 paper rings yesterday and today we made 143 paper rings”

1. Students represent the problem on the tape diagram correctly.
2. Write the expression and show on blackboard.
3. Add in vertical form to find the solution.
4. Teacher check their work to for addition of 3-digit numbers in vertical form.
5. Teacher evaluate and link addition of 2-digit numbers to 3-digit numbers.

Assessment, Reporting and Recording

Method: Checklist

- Analyse information on a record sheet correctly.
- Transfer the information to a table in numerical form.
- Tally the information correctly.

2. Assessment *as or in* Learning

‘Assessment *as or in* Learning’ is the use of a task or an activity to allow students the opportunity to use assessment to further their own learning and occurs during the lesson period.

Sample Assessment Task

Teacher and student Activity

- Teacher provides place value cards and blocks to each group.
- Teacher allows students to use their ideas to do vertical calculation.
- Student show using the place value blocks and cards.
- Show on the vertical addition.
- Share their ideas and let students learn from these ideas
eg. Kawagoe’s idea and Mono’s ideas - place value chart and vertical calculation
- Teacher assess their understanding of the objective of addition by 3 digit numbers.

Method: Checklist

- Add in vertical form correctly

3. Assessment *of* Learning

‘Assessment *of* learning’ is the use of a task or an activity to measure, record and report on a student’s level of achievement in regards to specific learning expectations. These are often known as summative assessments.

This assessment sample (of learning) can be given at the end of the week. Students will be given oneweek to complete the task. The teacher should guide them from time to time to complete the task and collect them at the end of the week for marking and recording.

Sample Assessment Task

1. Students take homework
2. Teacher collects homework on addition with 3 digit numbers
3. Marks students work

Method: Checklist

- Add in vertical form correctly

Assessment, Reporting and Recording

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: Mr. Jones					MATHEMATICS								Term: ONE									
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		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)

Abbreviations

ASK - Attitude, Skills and Knowledge

cm - centimetres

dL - decilitres

DMR - 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
Addend	A number to be added to another
Algorithms	A procedure or formula for solving a mathematical problem, based on conducting a sequence of specified actions.
Arbitrary Unit	Is a unit which is not part of an internationally accepted absolute system of units.
Augend	A number to which another number is added to form a sum
Bar graphs	a diagram in which the numerical values of variables are represented by the height or length of lines or rectangles of equal width.
Cardinals	Number denoting quantities e.g. 1, 2, 3, etc.
Centre	A point which all points on the circle or sphere are the same distance
Circumference	The enclosing boundary of a circle
Diameter	A straight line passing side to side through the centre of a figure especially circle and sphere
Difference	The result of subtracting one number from the other
Dividend	The number being divided
Divisor	A number that divides an integer evenly or a factor that will divide the dividend exactly
Equilateral triangle	A triangle in which all three sides are equal. It is also equiangular; all three interior angles are equal and measure 60°
Expression	A mathematical phrase that can contain ordinary numbers, variables (like x or y) and operations (like $+$)
Fraction	A numerical quantity that is not a whole number e.g. $\frac{1}{2}$, the top number is the numerator and the bottom number is the denominator
Horizontal axis	The line on a graph that runs horizontally (left-right) through zero. It is used as a reference line so you can measure from it; the x-axis.
Inequality	Two values are not equal and the symbols include (\neq - not equal to, $<$ - less than, $>$ - greater than, \leq - less than or equal to or \geq - greater than or equal to)
Isosceles triangle	A triangle that has two sides of equal length
Length	The measurement or extent of something from end to end
Minuend	The first number in a subtraction, the number from which another number is to be subtracted
Multiplicand	A number that is to be multiplied by another
Multiplier	A number by which another number is multiplied
Ordinals	Number defining the position of something in a series e.g. first, second, third, etc.
Partitive Division	A division problem where you know the total number of groups, and you are trying to find the number of items in each group
Product	The answer when two or more numbers are multiplied
Quotative Division	Involves taking a set of size 'a' and forming groups of size 'b'. The number of groups of this size that can be formed, 'c' is the quotient of 'a' and 'b'
Quotient	The quantity produced by division of two numbers

Glossary

Radius	A straight line from the centre to the circumference of a circle or sphere, of the diameter
Remainder	The amount “left over” after performing some computation. Normally an integer “left over” after dividing one integer by another to produce an integer quotient
Sphere	A round solid figure with every point on its surface equidistant from its centre e.g. soccerball
Subtrahend	The number that is to be subtracted
Sum	The result of adding two or more numbers
Vertex	A corner or a point where lines meet
Vertical axis	The line on a graph that runs vertically (up-down) through zero. It is used as a reference line so you can measure from it, the y-axis.
Weight	A body’s relative mass or the quantity of matter contained by it, giving rise to a down-ward force. The heaviness of a person or thing

References

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NDOE 2004, Mathematics Lower Primary Syllabus, NDOE, Waigani

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