

YEAR



Ministry of Education  
Malaysia

Integrated Curriculum for Primary Schools  
CURRICULUM SPECIFICATIONS

# MATHEMATICS



Curriculum Development Centre  
Ministry of Education Malaysia  
2006



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# MATHEMATICS

## YEAR 6



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Ministry of Education Malaysia

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Ministry of Education Malaysia  
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First published 2006

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## RUKUNEGARA DECLARATION

OUR NATION, MALAYSIA, being dedicated

- to achieving a greater unity of all her peoples;
- to maintaining a democratic way of life;
- to creating a just society in which the wealth of the nation shall be equitably shared;
- to ensuring a liberal approach to her rich and diverse cultural traditions;
- to building a progressive society which shall be oriented to modern science and technology;

WE, her peoples, pledge our united efforts to attain these ends guided by these principles:

- BELIEF IN GOD
- LOYALTY TO KING AND COUNTRY
- UPHOLDING THE CONSTITUTION
- RULE OF LAW
- GOOD BEHAVIOUR AND MORALITY

# National Philosophy of Education

Education in Malaysia is an ongoing effort towards further developing the potential of individuals in a holistic and integrated manner so as to produce individuals who are intellectually, spiritually, emotionally and physically balanced and harmonious, based on a firm belief in God. Such an effort is designed to produce Malaysian citizens who are knowledgeable and competent, who possess high moral standards, and who are responsible and capable of achieving a high level of personal well-being as well as being able to contribute to the betterment of the family, the society and the nation at large.

## PREFACE

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Science and technology plays a crucial role in meeting Malaysia's aspiration to achieve developed nation status. Since mathematics is instrumental in developing scientific and technological knowledge, the provision of quality mathematics education from an early age in the education process is critical.

The primary school Mathematics curriculum as outlined in the syllabus has been designed to provide opportunities for pupils to acquire mathematical knowledge and skills and develop the higher order problem solving and decision making skills that they can apply in their everyday lives. But, more importantly, together with the other subjects in the primary school curriculum, the mathematics curriculum seeks to inculcate noble values and love for the nation towards the final aim of developing the holistic person who is capable of contributing to the harmony and prosperity of the nation and its people.

Beginning in 2003, science and mathematics will be taught in English following a phased implementation schedule, which will be completed by 2008. Mathematics education in English makes use of ICT in its delivery. Studying mathematics in the medium of English assisted by ICT will provide greater opportunities for pupils to enhance their knowledge and skills because they are able to source the various repositories of knowledge written in mathematical English whether in electronic or print forms. Pupils will be able to communicate mathematically in English not only in the immediate environment but also with pupils from other countries thus increasing their overall English proficiency and mathematical competence in the process.

The development of a set of Curriculum Specifications as a supporting document to the syllabus is the work of many individuals and experts in the field. To those who have contributed in one way or another to this effort, on behalf of the Ministry of Education, I would like to thank them and express my deepest appreciation.

(DR. HAILI BIN DOLHAN)

Director  
Curriculum Development Centre  
Ministry of Education  
Malaysia

## INTRODUCTION

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Our nation's vision can be achieved through a society that is educated and competent in the application of mathematical knowledge. To realise this vision, society must be inclined towards mathematics. Therefore, problem solving and communicational skills in mathematics have to be nurtured so that decisions can be made effectively.

Mathematics is integral in the development of science and technology. As such, the acquisition of mathematical knowledge must be upgraded periodically to create a skilled workforce in preparing the country to become a developed nation. In order to create a K-based economy, research and development skills in Mathematics must be taught and instilled at school level.

Achieving this requires a sound mathematics curriculum, competent and knowledgeable teachers who can integrate instruction with assessment, classrooms with ready access to technology, and a commitment to both equity and excellence.

The Mathematics Curriculum has been designed to provide knowledge and mathematical skills to pupils from various backgrounds and levels of ability. Acquisition of these skills will help them in their careers later in life and in the process, benefit the society and the nation.

Several factors have been taken into account when designing the curriculum and these are: mathematical concepts and skills, terminology and vocabulary used, and the level of proficiency of English among teachers and pupils.

The Mathematics Curriculum at the primary level (KBSR) emphasises the acquisition of basic concepts and skills. The content is categorised into four interrelated areas, namely, Numbers, Measurement, Shape and Space and Statistics.

The learning of mathematics at all levels involves more than just the basic acquisition of concepts and skills. It involves, more importantly, an understanding of the underlying mathematical thinking, general

strategies of problem solving, communicating mathematically and inculcating positive attitudes towards an appreciation of mathematics as an important and powerful tool in everyday life.

It is hoped that with the knowledge and skills acquired in Mathematics, pupils will discover, adapt, modify and be innovative in facing changes and future challenges.

## AIM

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The Primary School Mathematics Curriculum aims to build pupils' understanding of number concepts and their basic skills in computation that they can apply in their daily routines effectively and responsibly in keeping with the aspirations of a developed society and nation, and at the same time to use this knowledge to further their studies.

## OBJECTIVES

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The Primary School Mathematics Curriculum will enable pupils to:

- 1 know and understand the concepts, definition, rules and principles related to numbers, operations, space, measures and data representation;
- 2 master the basic operations of mathematics:
  - addition,
  - subtraction,
  - multiplication,
  - division;
- 3 master the skills of combined operations;

- 4 master basic mathematical skills, namely:
  - making estimates and approximates,
  - measuring,
  - handling data
  - representing information in the form of graphs and charts;
- 5 use mathematical skills and knowledge to solve problems in everyday life effectively and responsibly;
- 6 use the language of mathematics correctly;
- 7 use suitable technology in concept building, acquiring mathematical skills and solving problems;
- 8 apply the knowledge of mathematics systematically, heuristically, accurately and carefully;
- 9 participate in activities related to mathematics; and
- 10 appreciate the importance and beauty of mathematics.

## CONTENT ORGANISATION

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The Mathematics Curriculum at the primary level encompasses four main areas, namely, Numbers, Measures, Shape and Space, and Statistics. The topics for each area have been arranged from the basic to the abstract. Teachers need to teach the basics before abstract topics are introduced to pupils.

Each main area is divided into topics as follows:

- 1 Numbers
  - Whole Numbers;
  - Fractions;

- Decimals;
  - Money;
- 2 Measures
    - Time;
    - Length;
    - Mass;
    - Volume of Liquid.
  - 3 Shape and Space
    - Two-dimensional Shapes;
    - Three-dimensional Shapes;
    - Perimeter and Area.
  - 4 Statistics
    - Data Handling

The Learning Areas outline the breadth and depth of the scope of knowledge and skills that have to be mastered during the allocated time for learning. These learning areas are, in turn, broken down into more manageable objectives. Details as to teaching-learning strategies, vocabulary to be used and points to note are set out in five columns as follows:

Column 1: Learning Objectives.

Column 2: Suggested Teaching and Learning Activities.

Column 3: Learning Outcomes.

Column 4: Points To Note.

Column 5: Vocabulary.

The purpose of these columns is to illustrate, for a particular teaching objective, a list of what pupils should know, understand and be able to do by the end of each respective topic.

The **Learning Objectives** define clearly what should be taught. They cover all aspects of the Mathematics curriculum and are presented in a developmental sequence to enable pupils to grasp concepts and master skills essential to a basic understanding of mathematics.

The **Suggested Teaching and Learning Activities** list some examples of teaching and learning activities. These include methods, techniques, strategies and resources useful in the teaching of a specific concepts and skills. These are however not the only approaches to be used in classrooms.

The **Learning Outcomes** define specifically what pupils should be able to do. They prescribe the knowledge, skills or mathematical processes and values that should be inculcated and developed at the appropriate levels. These behavioural objectives are measurable in all aspects.

In **Points To Note**, attention is drawn to the more significant aspects of mathematical concepts and skills. These aspects must be taken into accounts so as to ensure that the concepts and skills are taught and learnt effectively as intended.

The **Vocabulary** column consists of standard mathematical terms, instructional words and phrases that are relevant when structuring activities, asking questions and in setting tasks. It is important to pay careful attention to the use of correct terminology. These terms need to be introduced systematically to pupils and in various contexts so that pupils get to know of their meaning and learn how to use them appropriately.

## EMPHASES IN TEACHING AND LEARNING

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The Mathematics Curriculum is ordered in such a way so as to give flexibility to the teachers to create an environment that is enjoyable, meaningful, useful and challenging for teaching and learning. At the same time it is important to ensure that pupils show progression in acquiring the mathematical concepts and skills.

On completion of a certain topic and in deciding to progress to another learning area or topic, the following need to be taken into accounts:

- The skills or concepts acquired in the new learning area or topics;
- Ensuring that the hierarchy or relationship between learning areas or topics have been followed through accordingly; and
- Ensuring the basic learning areas have or skills have been acquired or mastered before progressing to the more abstract areas.

The teaching and learning processes emphasise concept building, skill acquisition as well as the inculcation of positive values. Besides these, there are other elements that need to be taken into account and learnt through the teaching and learning processes in the classroom. The main emphasis are as follows:

### 1. Problem Solving in Mathematics

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Problem solving is a dominant element in the mathematics curriculum for it exists in three different modes, namely as content, ability, and learning approach.

Over the years of intellectual discourse, problem solving has developed into a simple algorithmic procedure. Thus, problem solving is taught in the mathematics curriculum even at the primary school level. The commonly accepted model for problem solving is the four-step algorithm, expressed as follows:-

- Understanding the problem;
- Devising a plan;
- Carrying out the plan; and
- Looking back at the solution.

In the course of solving a problem, one or more strategies can be employed to lead up to a solution. Some of the common strategies of problem solving are:-

- Try a simpler case;
- Trial and improvement;
- Draw a diagram;
- Identifying patterns and sequences;
- Make a table, chart or a systematic list;
- Simulation;
- Make analogy; and
- Working backwards.

Problem solving is the ultimate of mathematical abilities to be developed amongst learners of mathematics. Being the ultimate of abilities, problem solving is built upon previous knowledge and experiences or other mathematical abilities which are less complex in nature. It is therefore imperative to ensure that abilities such as calculation, measuring, computation and communication are well developed amongst students because these abilities are the fundamentals of problem solving ability.

People learn best through experience. Hence, mathematics is best learnt through the experience of solving problems. Problem-based learning is an approach where a problem is posed at the beginning of a lesson. The problem posed is carefully designed to have the desired mathematical concept and ability to be acquired by students during the particular lesson. As students go through the process of solving the problem being posed, they pick up the concept and ability that are built into the problem. A reflective activity has to be conducted towards the end of the lesson to assess the learning that has taken place.

## 2. Communication in Mathematics

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Communication is one way to share ideas and clarify the understanding of Mathematics. Through talking and questioning, mathematical ideas can be reflected upon, discussed and modified. The process of reasoning analytically and systematically can help reinforce and strengthen pupils' knowledge and understanding of mathematics to a deeper level. Through effective communications pupils will become efficient in problem solving and be able to explain concepts and mathematical skills to their peers and teachers.

Pupils who have developed the above skills will become more inquisitive gaining confidence in the process. Communicational skills in mathematics include reading and understanding problems, interpreting diagrams and graphs, and using correct and concise mathematical terms during oral presentation and written work. This is also expanded to the listening skills involved.

Communication in mathematics through the listening process occurs when individuals respond to what they hear and this encourages them to think using their mathematical knowledge in making decisions.

Communication in mathematics through the reading process takes place when an individual collects information or data and rearranges the relationship between ideas and concepts.

Communication in mathematics through the visualization process takes place when an individual makes observation, analyses it, interprets and synthesises the data into graphic forms, such as pictures, diagrams, tables and graphs.

The following methods can create an effective communication environment:

- Identifying relevant contexts associated with environment and everyday life experiences of pupils;
- Identifying interests of pupils;
- Identifying teaching materials;
- Ensuring active learning;
- Stimulating meta-cognitive skills;
- Inculcating positive attitudes; and
- Creating a conducive learning environment.

Oral communication is an interactive process that involves activities like listening, speaking, reading and observing. It is a two-way interaction that takes place between teacher-pupil, pupil-pupil, and pupil-object. When pupils are challenged to think and reason about mathematics and to tell others the results of their thinking, they learn to be clear and convincing. Listening to others' explanations gives pupils the opportunities to develop their own understanding. Conversations in which mathematical ideas are explored from multiple perspectives help sharpen pupils thinking and help make connections between ideas. Such activity helps pupils develop a language for expressing mathematical ideas and appreciation of the need for precision in the language. Some effective and meaningful oral communication techniques in mathematics are as follows:

- Story-telling, question and answer sessions using own words;
- Asking and answering questions;

- Structured and unstructured interviews;
- Discussions during forums, seminars, debates and brainstorming sessions; and
- Presentation of findings of assignments.

Written communication is the process whereby mathematical ideas and information are shared with others through writing. The written work is usually the result of discussions, contributions and brainstorming activities when working on assignments. Through writing, the pupils will be encouraged to think more deeply about the mathematics content and observe the relationships between concepts.

Examples of written communication activities are:

- Doing exercises;
- Keeping scrap books;
- Keeping folios;
- Undertaking projects; and
- Doing written tests.

Representation is a process of analysing a mathematical problem and interpreting it from one mode to another. Mathematical representation enables pupils to find relationship between mathematical ideas that are informal, intuitive and abstract using their everyday language. Pupils will realise that some methods of representation are more effective and useful if they know how to use the elements of mathematical representation.

### 3. Mathematical Reasoning

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Logical reasoning or thinking is the basis for understanding and solving mathematical problems. The development of mathematical reasoning is closely related to the intellectual and communicative development of the pupils. Emphasis on logical thinking during

mathematical activities opens up pupils' minds to accept mathematics as a powerful tool in the world today.

Pupils are encouraged to predict and do guess work in the process of seeking solutions. Pupils at all levels have to be trained to investigate their predictions or guesses by using concrete materials, calculators, computers, mathematical representation and others. Logical reasoning has to be infused in the teaching of mathematics so that pupils can recognise, construct and evaluate predictions and mathematical arguments.

#### 4. Mathematical Connections

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In the mathematics curriculum, opportunities for making connections must be created so that pupils can link conceptual to procedural knowledge and relate topics in mathematics with other learning areas in general.

The mathematics curriculum consists of several areas such as arithmetic, geometry, measures and problem solving. Without connections between these areas, pupils will have to learn and memorise too many concepts and skills separately. By making connections pupils are able to see mathematics as an integrated whole rather than a jumble of unconnected ideas. Teachers can foster connections in a problem oriented classrooms by having pupils to communicate, reason and present their thinking. When these mathematical ideas are connected with real life situations and the curriculum, pupils will become more conscious in the application of mathematics. They will also be able to use mathematics contextually in different learning areas in real life.

#### 5. Application of Technology

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The application of technology helps pupils to understand mathematical concepts in depth, meaningfully and precisely enabling them to explore mathematical concepts. The use of calculators, computers,

educational software, websites in the internet and available learning packages can help to upgrade the pedagogical skills in the teaching and learning of mathematics.

The use of teaching resources is very important in mathematics. This will ensure that pupils absorb abstract ideas, be creative, feel confident and be able to work independently or in groups. Most of these resources are designed for self-access learning. Through self-access learning, pupils will be able to access knowledge or skills and information independently according to their pace. This will serve to stimulate pupils' interests and responsibility in learning mathematics.

#### APPROACHES IN TEACHING AND LEARNING

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Various changes occur that influence the content and pedagogy in the teaching of mathematics in primary schools. These changes require variety in the way of teaching mathematics in schools. The use of teaching resources is vital in forming mathematical concepts. Teachers can use real or concrete objects in teaching and learning to help pupils gain experience, construct abstract ideas, make inventions, build self confidence, encourage independence and inculcate cooperation.

The teaching and learning materials that are used should contain self-diagnostic elements so that pupils can know how far they have understood the concepts and skills. To assist the pupils in having positive

attitudes and personalities, the intrinsic mathematical values of exactness, confidence and thinking systematically have to be absorbed through the learning areas.

Good moral values can be cultivated through suitable context. For example, learning in groups can help pupils develop social skills and encourage cooperation and self-confidence in the subject. The element of patriotism can also be inculcated through the teaching-

learning process in the classroom using planned topics. These values should be imbibed throughout the process of teaching and learning mathematics.

Among the approaches that can be given consideration are:

- Pupil centered learning that is interesting;
- The learning ability and styles of learning;
- The use of relevant, suitable and effective teaching materials; and
- Formative evaluation to determine the effectiveness of teaching and learning.

The choice of an approach that is suitable will stimulate the teaching and learning environment in the classroom or outside it. The approaches that are suitable include the following:

- Cooperative learning;
- Contextual learning;
- Mastery learning;
- Constructivism;
- Enquiry-discovery; and
- Futures Study.

assessment techniques, including written and oral work as well as demonstration. These may be in the form of interviews, open-ended questions, observations and assignments. Based on the results, the teachers can rectify the pupils' misconceptions and weaknesses and at the same time improve their teaching skills. As such, teachers can take subsequent effective measures in conducting remedial and enrichment activities to upgrade pupils' performance.

## ASSESSMENT

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Assessment is an integral part of the teaching and learning process. It has to be well-structured and carried out continuously as part of the classroom activities. By focusing on a broad range of mathematical tasks, the strengths and weaknesses of pupils can be assessed. Different methods of assessment can be conducted using multiple

# Topic 1: WHOLE NUMBERS

## Learning Area: NUMBERS UP TO SEVEN DIGITS

# Year 6

LEARNING OBJECTIVES <i>Pupils will be taught to...</i>	SUGGESTED TEACHING AND LEARNING ACTIVITIES	LEARNING OUTCOMES <i>Pupils will be able to...</i>	POINTS TO NOTE	VOCABULARY
<p>1 develop number sense up to seven digits.</p>	<ul style="list-style-type: none"> <li>Teacher pose numbers in numerals, pupils name the respective numbers and write the number words.</li> <li>Teacher says the number names and pupils show the numbers using the calculator or the abacus, then, pupils write the numerals.</li> <li>Provide suitable number line scales and ask pupils to mark the positions that represent a set of given numbers.</li> <li>Given a set of numbers, pupils represent each number using the number base blocks or the abacus. Pupils then state the place value of every digit of the given number.</li> </ul>	<p>(i) Name and write numbers up to seven digits.</p> <p>(ii) Determine the place value of the digits in any whole number of up to seven digits.</p>	<p>Write numbers in words and numerals.</p> <p>Seven-digit numbers are numbers from 1 000 000 up to 9 999 999.</p> <p>Emphasise reading and writing numbers in extended notation for example</p> $5\ 801\ 249 = 5\ 000\ 000 + 800\ 000 + 1\ 000 + 200 + 40 + 9$ <p>or</p> $5\ 801\ 249 = 5\ \text{millions} + 8\ \text{hundred thousands} + 1\ \text{thousands} + 2\ \text{hundreds} + 4\ \text{tens} + 9\ \text{ones.}$ <p>To avoid confusion, initials for place value names may be written in upper cases.</p>	<p>million</p> <p>digits</p> <p>conversion</p> <p>place value</p> <p>explore</p> <p>number patterns</p> <p>multiple of 10</p> <p>simplest form</p> <p>extended notation</p> <p>round off</p>

# Topic 1: WHOLE NUMBERS

## Learning Area: NUMBERS UP TO SEVEN DIGITS

# Year 6

LEARNING OBJECTIVES <i>Pupils will be taught to...</i>	SUGGESTED TEACHING AND LEARNING ACTIVITIES	LEARNING OUTCOMES <i>Pupils will be able to...</i>	POINTS TO NOTE	VOCABULARY
	<ul style="list-style-type: none"> <li>Given a set of numerals, pupils compare and arrange the numbers in ascending then descending order.</li> </ul>	<p>(iii) Express whole numbers in</p> <ul style="list-style-type: none"> <li>a) decimals</li> <li>b) fractions</li> </ul> <p>of a million and vice versa.</p> <p>(iv) Compare number values up to seven digits.</p> <p>(v) Round off numbers to the nearest tens, hundreds, thousands, ten thousands, hundred thousands and millions.</p>	<p>Write numbers in partial words and numerals, for example</p> <ul style="list-style-type: none"> <li>a) 800 000 is 0.8 million</li> <li>b) 6 320 000 is 6.32 million</li> <li>c) 1.4 million is 1 400 000</li> <li>d) 5.602 million is 5 602 000</li> <li>e) 3 500 000 is <math>3\frac{1}{2}</math> million</li> <li>f) <math>8\frac{3}{4}</math> million is 8 750 000</li> </ul> <p>For fractional number words, denominators are in multiples of 10 (10 to 90, 100 and 1000) and reduce fractional terms to its simplest form.</p> <p>Limit decimal terms up to 3 decimal places.</p> <p>Explain to pupils that numbers are rounded off to get an approximate.</p>	

# Topic 1: WHOLE NUMBERS

# Year 6

## Learning Area: BASIC OPERATIONS WITH NUMBERS UP TO SEVEN DIGITS

LEARNING OBJECTIVES <i>Pupils will be taught to...</i>	SUGGESTED TEACHING AND LEARNING ACTIVITIES	LEARNING OUTCOMES <i>Pupils will be able to...</i>	POINTS TO NOTE	VOCABULARY
<p>2 Add, subtract, multiply and divide numbers involving numbers up to seven digits.</p>	<ul style="list-style-type: none"> <li>• Pupils practice addition, subtraction, multiplication and division using the four-step algorithm of               <ol style="list-style-type: none"> <li>1) Estimate the solution.</li> <li>2) Arrange the numbers involved according to place values.</li> <li>3) Perform the operation.</li> <li>4) Check the reasonableness of the answer.</li> </ol> </li> </ul>	<p>(i) Add any two to five numbers to 9 999 999.</p> <p>(ii) Subtract</p> <ol style="list-style-type: none"> <li>a) one number from a bigger number less than 10 000 000</li> <li>b) successively from a bigger number less than 10 000 000.</li> </ol>	<p>Addition exercises include addition of two numbers to four numbers with and without regrouping.</p> <p>Provide mental addition practice either using the abacus-based technique or using quick addition strategies such as estimating total by rounding, simplifying addition by pairs of tens, doubles, etc.</p> <p>Limit subtraction problems to subtracting from a bigger number.</p> <p>Provide mental subtraction practice either using the abacus-based technique or using quick subtraction strategies.</p> <p>Quick subtraction strategies to be implemented are</p> <ol style="list-style-type: none"> <li>a) estimating the sum by rounding numbers</li> <li>b) counting up and counting down (counting on and counting back).</li> </ol>	<p>simpler</p> <p>simulating</p> <p>analogy</p> <p>sequences</p>

# Topic 1: WHOLE NUMBERS

# Year 6

## Learning Area: BASIC OPERATIONS WITH NUMBERS UP TO SEVEN DIGITS

LEARNING OBJECTIVES <i>Pupils will be taught to...</i>	SUGGESTED TEACHING AND LEARNING ACTIVITIES	LEARNING OUTCOMES <i>Pupils will be able to...</i>	POINTS TO NOTE	VOCABULARY
		<p>(iii) Multiply up to six-digit numbers with</p> <ul style="list-style-type: none"> <li>a) a one-digit number</li> <li>b) a two-digit number</li> <li>c) 10, 100 and 1000.</li> </ul> <p>(iv) Divide numbers of up to seven digits by</p> <ul style="list-style-type: none"> <li>a) a one-digit number</li> <li>b) 10, 100 and 1000</li> <li>c) two-digit number.</li> </ul>	<p>Limit products to less than 10 000 000.</p> <p>Provide mental multiplication practice either using the abacus-based technique or other multiplication strategies.</p> <p>Multiplication strategies to be implemented include factorising, completing 100, lattice multiplication, etc.</p> <p>Division exercises include quotients with and without remainder. Note that “r” is used to signify “remainder”.</p> <p>Emphasise the long division technique.</p> <p>Provide mental division practice either using the abacus-based technique or other division strategies.</p> <p>Exposed pupils to various division strategies, such as</p> <ul style="list-style-type: none"> <li>a) divisibility of a number</li> <li>b) divide by 10, 100 and 1 000.</li> </ul>	

# Topic 1: WHOLE NUMBERS

# Year 6

## Learning Area: BASIC OPERATIONS WITH NUMBERS UP TO SEVEN DIGITS

LEARNING OBJECTIVES <i>Pupils will be taught to...</i>	SUGGESTED TEACHING AND LEARNING ACTIVITIES	LEARNING OUTCOMES <i>Pupils will be able to...</i>	POINTS TO NOTE	VOCABULARY
	<ul style="list-style-type: none"> <li>• Pose to pupils problems in numerical form, simple sentences, tables and pictures.</li> <li>• Pupils create stories from given number sentences.</li> <li>• Teacher guides pupils to solve problems following Polya's four-step model of               <ol style="list-style-type: none"> <li>1) Understanding the problem</li> <li>2) Devising a plan</li> <li>3) Implementing the plan</li> <li>4) Looking back.</li> </ol> </li> </ul>	(v) Solve <ol style="list-style-type: none"> <li>a) addition,</li> <li>b) subtraction,</li> <li>c) multiplication,</li> <li>d) division</li> </ol> problems involving numbers up to seven digits.	Use any of the common strategies of problem solving, such as <ol style="list-style-type: none"> <li>a) Try a simpler case</li> <li>b) Trial and improvement</li> <li>c) Draw a diagram</li> <li>d) Identifying patterns and sequences</li> <li>e) Make a table, chart or a systematic list</li> <li>f) Simulation</li> <li>g) Make analogy</li> <li>h) Working backwards.</li> </ol>	

# Topic 1: WHOLE NUMBERS

# Year 6

## Learning Area: MIXED OPERATIONS WITH NUMBERS UP TO SEVEN DIGITS

LEARNING OBJECTIVES <i>Pupils will be taught to...</i>	SUGGESTED TEACHING AND LEARNING ACTIVITIES	LEARNING OUTCOMES <i>Pupils will be able to...</i>	POINTS TO NOTE	VOCABULARY
<p>3 Perform mixed operations with whole numbers.</p>	<ul style="list-style-type: none"> <li>• Explain to pupils the conceptual model of mixed operations then connect the concept with the procedures of performing operations according to the order of operations.</li> <li>• Teacher pose problems verbally, i.e., in the numerical form or simple sentences.</li> <li>• Teacher guides pupils to solve problems following Polya’s four-step model of               <ol style="list-style-type: none"> <li>1) Understanding the problem</li> <li>2) Devising a plan</li> <li>3) Implementing the plan</li> <li>4) Looking back.</li> </ol> </li> </ul>	<p>(i) Compute mixed operations problems involving addition and multiplication.</p> <p>(ii) Compute mixed operations problems involving subtraction and division.</p> <p>(iii) Compute mixed operations problems involving brackets.</p> <p>(iv) Solve problems involving mixed operations on numbers of up to seven digits.</p>	<p>Mixed operations are limited to not more than two operators, for example</p> <p>a) <math>427\ 890 - 15\ 600 \div 25 =</math></p> <p>b) <math>12\ 745 + 20\ 742 \times 56 =</math></p> <p>Order of operations</p> <p>B – brackets O – of D – division M – multiplication A – addition S – subtraction</p> <p>Examples of mixed operations with brackets</p> <p>a) <math>(1050 + 20\ 650) \times 12 =</math></p> <p>b) <math>872 \div (8 - 4) =</math></p> <p>c) <math>(24 + 26) \times (64 - 14) =</math></p>	<p>compute</p> <p>mixed operations</p> <p>bracket</p> <p>horizontal form</p> <p>vertical form</p>

# Topic 2: FRACTIONS

# Year 6

## Learning Area: ADDITION OF FRACTIONS

LEARNING OBJECTIVES <i>Pupils will be taught to...</i>	SUGGESTED TEACHING AND LEARNING ACTIVITIES	LEARNING OUTCOMES <i>Pupils will be able to...</i>	POINTS TO NOTE	VOCABULARY
<p>1 Add three mixed numbers with denominators of up to 10.</p>	<ul style="list-style-type: none"> <li>• Demonstrate addition of mixed numbers through               <ol style="list-style-type: none"> <li>1) paper folding activities</li> <li>2) fraction charts</li> <li>3) diagrams</li> <li>4) number lines</li> <li>5) multiplication tables</li> </ol> </li>   <li>• Pupils create stories from given number sentences involving mixed numbers.</li>   <li>• Teacher guides pupils to solve problems following Polya's four-step model of               <ol style="list-style-type: none"> <li>1) Understanding the problem</li> <li>2) Devising a plan</li> <li>3) Implementing the plan</li> <li>4) Looking back.</li> </ol> </li> </ul>	<p>(i) Add three mixed numbers with the same denominator of up to 10.</p> <p>(ii) Add three mixed numbers with different denominators of up to 10.</p> <p>(iii) Solve problems involving addition of mixed numbers.</p>	<p>An example of addition of three mixed numbers with the same denominator of up to 10.</p> $3\frac{1}{7} + 1\frac{2}{7} + 2\frac{3}{7} =$ <p>An example of addition of three mixed numbers with different denominators of up to 10.</p> $2\frac{1}{3} + 1\frac{1}{6} + 2\frac{1}{4} =$ <p>Write answers in its simplest form.</p>	<p>mixed numbers</p> <p>equivalent fractions</p> <p>simplest form</p> <p>multiplication tables</p>

## Topic 2: FRACTIONS

### Learning Area: SUBTRACTION OF FRACTIONS

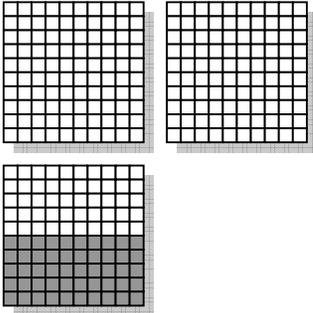
# Year 6

LEARNING OBJECTIVES <i>Pupils will be taught to...</i>	SUGGESTED TEACHING AND LEARNING ACTIVITIES	LEARNING OUTCOMES <i>Pupils will be able to...</i>	POINTS TO NOTE	VOCABULARY
<p>2 Subtract mixed numbers with denominators of up to 10.</p>	<ul style="list-style-type: none"> <li>• Demonstrate subtraction of mixed numbers through               <ol style="list-style-type: none"> <li>1) paper holding activities</li> <li>2) fractions charts</li> <li>3) diagrams</li> <li>4) number lines</li> <li>5) multiplication tables</li> </ol> </li> <li>• Pupils create stories from given number sentences involving mixed numbers.</li> <li>• Pose to pupils, problems in the real context in the form of               <ol style="list-style-type: none"> <li>1) words,</li> <li>2) tables,</li> <li>3) pictorials.</li> </ol> </li> </ul>	<p>(i) Subtract involving three mixed numbers with the same denominator of up to 10.</p> <p>(ii) Subtract involving three mixed numbers with different denominators of up to 10.</p> <p>(iii) Solve problems involving subtraction of mixed numbers.</p>	<p>An example of subtraction involving three mixed numbers with the same denominator of up to 10.</p> $5\frac{4}{5} - 1\frac{2}{5} - 1\frac{1}{5} =$ <p>An example of subtraction involving three mixed numbers with different denominators of up to 10.</p> $7\frac{7}{8} - 3\frac{1}{4} - 1\frac{1}{2} =$ <p>Write answers in its simplest form.</p>	<p>mixed numbers</p> <p>equivalent fractions</p> <p>simplest form</p> <p>multiplication tables</p>

## Topic 2: FRACTIONS

### Learning Area: MULTIPLICATION OF FRACTIONS

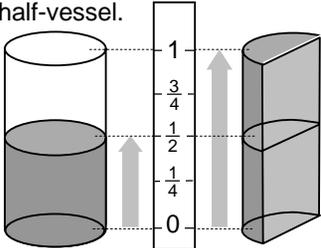
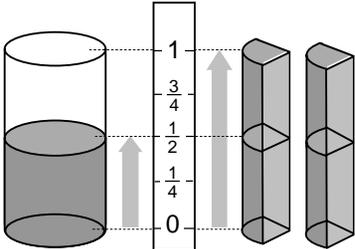
# Year 6

LEARNING OBJECTIVES <i>Pupils will be taught to...</i>	SUGGESTED TEACHING AND LEARNING ACTIVITIES	LEARNING OUTCOMES <i>Pupils will be able to...</i>	POINTS TO NOTE	VOCABULARY
<p>3 Multiply any mixed numbers with a whole numbers up to 1000.</p>	<ul style="list-style-type: none"> <li>Use materials such as the hundred squares to model multiplication of mixed numbers. For example, <math>2\frac{1}{2} \times 100 = ?</math></li> </ul>  <ul style="list-style-type: none"> <li>Present calculation in clear and organised steps.</li> </ul> $2\frac{1}{2} \times 100 = \frac{5}{2} \times 100$ $= \frac{5}{1} \times 50$ $= 250$	<p>(i) Multiply mixed numbers with a whole number.</p>	<p>Model multiplication of mixed numbers with whole numbers as grouping sets of objects, for example</p> <p><math>3\frac{1}{3} \times 300</math> means <math>3\frac{1}{3}</math> groups of sets of 300.</p> <p>Suppose we have a set of 100 objects. Two groups or sets will contain 200 objects, i.e. <math>2 \times 100 = 200</math>. Therefore, <math>2\frac{1}{2}</math> groups will contain</p> <p><math>2\frac{1}{2} \times 100 = 250</math> objects.</p> <p>Limit the whole number component of a mixed number, to three digits. The denominator of the fractional part of the mixed number is limited to less than 10.</p>	<p>mixed numbers portions simplest form</p>

# Topic 2: FRACTIONS

## Learning Area: DIVISION OF FRACTIONS

# Year 6

LEARNING OBJECTIVES <i>Pupils will be taught to...</i>	SUGGESTED TEACHING AND LEARNING ACTIVITIES	LEARNING OUTCOMES <i>Pupils will be able to...</i>	POINTS TO NOTE	VOCABULARY
<p>4 Divide fractions with a whole number and a fraction.</p>	<ul style="list-style-type: none"> <li>Teacher models the division of fraction with another fraction as sharing. The following illustrations demonstrate this idea...</li> </ul> <p><math>\frac{1}{2} \div \frac{1}{2} = 1</math></p> <p>Half a vessel of liquid poured into a half-vessel makes one full half-vessel.</p>  <p><math>\frac{1}{2} \div \frac{1}{4} = 2</math></p> <p>Half a vessel of liquid poured into a quarter-vessel makes two full quarter-vessels.</p> 	<p>(ii) Divide fractions with</p> <ol style="list-style-type: none"> <li>a whole number</li> <li>a fraction.</li> </ol> <p>(iii) Divide mixed numbers with</p> <ol style="list-style-type: none"> <li>a whole number</li> <li>a fraction.</li> </ol>	<p>Limit denominators for the dividend to less than 10.</p> <p>Limit divisors to less than 10 for both the whole number and fraction.</p> <p>Some models of division of a fraction with a fraction...</p> $\frac{1}{4} \div \frac{1}{2} = \left(\frac{1}{4} \times 2\right) \div \left(\frac{1}{2} \times 2\right)$ $= \left(\frac{1}{4} \times 2\right) \div 1$ $= \frac{1}{2} \div 1$ $= \frac{1}{2}$ <p>or</p> $\frac{1}{4} \div \frac{1}{2} = \frac{\frac{1}{4} \times 2}{\frac{1}{2} \times 2}$ $= \frac{\frac{1}{2}}{1}$ $= \frac{1}{2}$ <p>or</p> $\frac{1}{2} \overline{) \frac{1}{4}} = \frac{1}{2} \times 2 \overline{) \frac{1}{4} \times 2} = 1 \overline{) \frac{1}{2}} = \frac{1}{2}$	

## Topic 3: DECIMALS

# Year 6

### Learning Area: MIXED OPERATIONS WITH DECIMALS

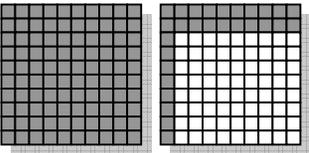
LEARNING OBJECTIVES <i>Pupils will be taught to...</i>	SUGGESTED TEACHING AND LEARNING ACTIVITIES	LEARNING OUTCOMES <i>Pupils will be able to...</i>	POINTS TO NOTE	VOCABULARY
<p>1 Perform mixed operations of addition and subtraction of decimals of up to 3 decimal places.</p>	<ul style="list-style-type: none"> <li>Pupils add and/or subtract three to four decimal numbers in parts, i.e. by performing one operation at a time in the order of left to right. Calculation steps are expressed in the vertical form.</li> <li>The abacus may be used to verify the accuracy of the result of the calculation.</li> </ul>	<p>(i) Add and subtract three to four decimal numbers of up to 3 decimal places, involving</p> <p>a) decimal numbers only</p> <p>b) whole numbers and decimal numbers.</p>	<p>Some examples of mixed operations with decimals.</p> $0.6 + 10.2 - 9.182 =$ $8.03 - 5.12 + 2.8 =$ $126.6 + 84 - 3.29 =$ <p>or</p> $10 - 4.44 + 2.126 - 7 =$ $2.4 + 8.66 - 10.992 + 0.86 =$ $0.6 + 0.006 + 3.446 - 2.189 =$ <p>An example of how calculation for mixed operations with decimals is expressed.</p> $126.6 - 84 + 3.29 = ?$ $\begin{array}{r} 126.6 \\ + 84 \\ \hline 210.6 \\ - 3.29 \\ \hline 207.31 \end{array}$	<p>decimal number decimal places</p>



# Topic 4: PERCENTAGE

# Year 6

## Learning Area: RELATIONSHIP BETWEEN PERCENTAGE, FRACTION AND DECIMAL

LEARNING OBJECTIVES <i>Pupils will be taught to...</i>	SUGGESTED TEACHING AND LEARNING ACTIVITIES	LEARNING OUTCOMES <i>Pupils will be able to...</i>	POINTS TO NOTE	VOCABULARY
	<ul style="list-style-type: none"> <li>Demonstrate the concept of percentage of a quantity using the hundred-squares or multi-based blocks.</li> </ul>  <p>The shaded parts of the two hundred-squares is 128% of 100.</p> <ul style="list-style-type: none"> <li>Guide pupils to find the value for percentage of a quantity through some examples, such as</li> </ul> <p>45% of 10</p> $\frac{45}{100} \times 10 = 45$ <ul style="list-style-type: none"> <li>Pupils create stories from given percentage of a quantity.</li> <li>Pose to pupils, situational problems in the form of words, tables and pictorials.</li> </ul>	<p>(iii) Find the value for a given percentage of a quantity.</p> <p>(iv) Solve problems in real context involving relationships between percentage, fractions and decimals.</p>	<p>Finding values for percentage of a quantity, shall include the following,</p> <p>Quantity value of</p> <ol style="list-style-type: none"> <li>100</li> <li>less than 100</li> <li>more than 100,</li> </ol> <p>Percentage value of</p> <ol style="list-style-type: none"> <li>less than 100%</li> <li>more than 100%.</li> </ol> <p>Sample items for finding values for percentage of a quantity are as follows:</p> <ol style="list-style-type: none"> <li>9.8% of 3500</li> <li>114% of 100</li> <li>150% of 70</li> <li>160% of 120</li> </ol> <p>Solve problems in real life involving percentage calculation of income and expenditure, savings, profit and loss, discount, dividend or interest, tax, commission, etc.</p>	<p>simplest form</p> <p>multiple</p> <p>income</p> <p>expenses</p> <p>savings</p> <p>profit</p> <p>loss</p> <p>discount</p> <p>dividend</p> <p>interest</p> <p>tax</p> <p>commission</p>

# Topic 5: MONEY

## Learning Area: MONEY UP TO RM10 MILLION

# Year 6

LEARNING OBJECTIVES <i>Pupils will be taught to...</i>	SUGGESTED TEACHING AND LEARNING ACTIVITIES	LEARNING OUTCOMES <i>Pupils will be able to...</i>	POINTS TO NOTE	VOCABULARY
<p>1 Use and apply number sense in real context involving money.</p>	<ul style="list-style-type: none"> <li>Provide to pupils a situation involving money where mixed operations need to be performed. Then, demonstrate how the situation is transformed to a number sentence of mixed operations.</li> <li>Pupils solve mixed operations involving money in the usual proper manner by writing number sentences in the vertical form.</li> <li>Pose problems involving money in numerical form, simple sentences, tables or pictures.</li> <li>Teacher guides pupils to solve problems following Polya's four-step model of               <ol style="list-style-type: none"> <li>Understanding the problem</li> <li>Devising a plan</li> <li>Implementing the plan</li> <li>Looking back.</li> </ol> </li> </ul>	<p>(i) Perform mixed operations with money up to a value of RM10 million.</p> <p>(ii) Solve problems in real context involving computation of money.</p>	<p>Mixed operations exercise may also include brackets, for example</p> $RM8000 + RM1254 - RM5555 =$ $RM125.05 - RM21 - RM105.95 =$ $(RM100 + RM50) \times 5 =$ $(RM125 \times 8) - (RM40 \times 8) =$ $RM1200 - (RM2400 \div 6) =$ <p>Discuss problems involving various situations such as savings, income, expenditure, investments, cost price, selling price, profit, loss and discount.</p>	<p>mixed operation bracket savings income expenditure investments cost price selling price profit loss discount computation</p>

# Topic 6: TIME

## Learning Area: DURATION

# Year 6

LEARNING OBJECTIVES <i>Pupils will be taught to...</i>	SUGGESTED TEACHING AND LEARNING ACTIVITIES	LEARNING OUTCOMES <i>Pupils will be able to...</i>	POINTS TO NOTE	VOCABULARY
<p>1 Use and apply knowledge of time to find the duration.</p>	<ul style="list-style-type: none"> <li>Pupils find the duration from the start to the end of an event from a given situation with the aid of the calendar, schedules and number lines.</li> </ul>	<p>(i) Calculate the duration of an event in between</p> <p>a) months</p> <p>b) years</p> <p>c) dates.</p> <p>(ii) Compute time period from situations expressed in fractions of duration.</p> <p>57</p>	<p>Some basic ideas of points in time so that calculation of duration is possible, are as follows:</p> <p>For duration in months, "... from March until October."</p> <p>For duration in years and months, "... from July 2006 to September 2006."</p> <p>For duration in years, months and days,</p> <p>a) "... from 25th March 2004 up to 25th June 2004", or</p> <p>b) "... from 27th May 2005 till 29th June 2006."</p> <p>An example of a situation expressed in a fraction of time duration</p> <p>... <math>\frac{2}{3}</math> of 2 years.</p>	<p>calculation</p> <p>compute</p> <p>date</p> <p>calendar</p> <p>schedule</p> <p>duration</p> <p>event</p> <p>month</p> <p>year</p>

# Topic 6: TIME

## Learning Area: DURATION

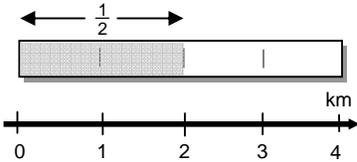
# Year 6

LEARNING OBJECTIVES <i>Pupils will be taught to...</i>	SUGGESTED TEACHING AND LEARNING ACTIVITIES	LEARNING OUTCOMES <i>Pupils will be able to...</i>	POINTS TO NOTE	VOCABULARY
	<ul style="list-style-type: none"><li>• Pose problems involving computation of time in numerical form, simple sentences, tables or pictures.</li><li>• Teacher guides pupils to solve problems following Polya's four-step model of<ol style="list-style-type: none"><li>1) Understanding the problem</li><li>2) Devising a plan</li><li>3) Implementing the plan</li><li>4) Looking back.</li></ol></li></ul>	<p>(iii) Solve problem in real context involving computation of time duration.</p> <p>58</p>	<p>Discuss problem involving various situations such as event, calendar etc.</p>	

# Topic 7: LENGTH

## Learning Area: COMPUTATION OF LENGTH

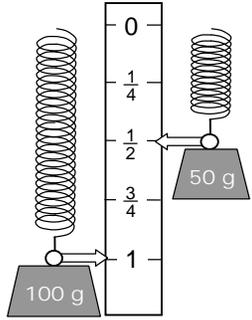
# Year 6

LEARNING OBJECTIVES <i>Pupils will be taught to...</i>	SUGGESTED TEACHING AND LEARNING ACTIVITIES	LEARNING OUTCOMES <i>Pupils will be able to...</i>	POINTS TO NOTE	VOCABULARY
<p>1 Use and apply fractional computation to problems involving length.</p>	<ul style="list-style-type: none"> <li>Use scaled number lines or paper strips to model situations expressed in fractions. <math>\frac{1}{2}</math> of 4 km. </li> <li>Pose problems involving computation of length in numerical form, simple sentences, tables or pictures.</li> <li>Teacher guides pupils to solve problems following Polya's four-step model of             <ol style="list-style-type: none"> <li>Understanding the problem</li> <li>Devising a plan</li> <li>Implementing the plan</li> <li>Looking back.</li> </ol> </li> </ul>	<p>(i) Compute length from a situation expressed in fraction. <b>59, 60</b></p> <p>(ii) Solve problem in real context involving computation of length. <b>61</b></p>	<p>The term fraction includes mixed numbers. An example of computing length from a situation expressed in fraction is as follows: ... <math>\frac{3}{5}</math> of 120 km In this context, "of" is a multiplication operator, so, <math display="block">\frac{3}{5} \times 120 = \frac{360}{5} = 72</math> <math>\frac{3}{5}</math> of 120 km is 72 km. Problems involving computation of length may also include measuring, conversion of units and/or calculation of length. The scope of units of measurement for length involves cm, m and km.</p>	<p>proper fraction length measurement centimetre metre kilometre</p>

# Topic 8: MASS

## Learning Area: COMPUTATION OF MASS

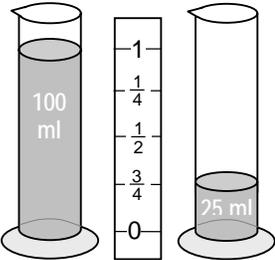
# Year 6

LEARNING OBJECTIVES <i>Pupils will be taught to...</i>	SUGGESTED TEACHING AND LEARNING ACTIVITIES	LEARNING OUTCOMES <i>Pupils will be able to...</i>	POINTS TO NOTE	VOCABULARY
<p>1 Use and apply fractional computation to problems involving mass.</p>	<ul style="list-style-type: none"> <li>Use the spring balance, weights and an improvised fractional scale to verify computations of mass.</li> </ul>  <p>The diagram shows a vertical scale from 0 to 1. The scale is divided into four equal parts between 0 and 1, with labels at 0, 1/4, 1/2, 3/4, and 1. A spring balance is attached to the scale. A weight of 100 g is shown at the 1 mark. A weight of 50 g is shown at the 1/2 mark.</p> <ul style="list-style-type: none"> <li>Pose problems involving computation of mass in numerical form, simple sentences, tables or pictures.</li> <li>Teacher guides pupils to solve problems following Polya's four-step model of             <ol style="list-style-type: none"> <li>Understanding the problem</li> <li>Devising a plan</li> <li>Implementing the plan</li> <li>Looking back.</li> </ol> </li> </ul>	<p>(i) Compute mass from a situation expressed in fraction.</p> <p><b>62- proper fraction</b></p> <p><b>63 – mixed numbers</b></p> <p>(ii) Solve problem in real context involving computation of mass.</p> <p><b>64 – without conversion</b></p> <p><b>65 – with conversion</b></p>	<p>An example of computing mass from a situation expressed in fraction is as follows:</p> <p>... <math>2\frac{1}{2}</math> of 30 kg</p> <p>In this context, “of” is a multiplication operator, so,</p> $2\frac{1}{2} \times 30 = \frac{5}{2} \times 30$ $= \frac{150}{2}$ $= 75$ <p><math>2\frac{1}{2}</math> of 30 kg is 75 kg.</p> <p>Problems involving computation of mass may also include measuring, conversion of units and/or calculation of mass.</p> <p>The scope of units of measurement for mass involves g and kg.</p>	<p>proper fraction</p> <p>mixed number</p> <p>mass</p> <p>conversion</p> <p>weight</p> <p>gram</p> <p>kilogram</p>

# Topic 9: VOLUME OF LIQUID

## Learning Area: COMPUTATION OF VOLUME OF LIQUID

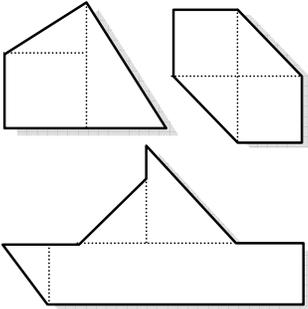
# Year 6

LEARNING OBJECTIVES <i>Pupils will be taught to...</i>	SUGGESTED TEACHING AND LEARNING ACTIVITIES	LEARNING OUTCOMES <i>Pupils will be able to...</i>	POINTS TO NOTE	VOCABULARY
<p>1 Use and apply fractional computation to problems involving volume of liquid.</p>	<ul style="list-style-type: none"> <li>Use the measuring cylinder and an improvised fractional scale to verify computations of volumes of liquid.</li> </ul>  <ul style="list-style-type: none"> <li>Pose problems involving volume of liquid in numerical form, simple sentences, tables or pictures.</li> <li>Teacher guides pupils to solve problems following Polya's four-step model of               <ol style="list-style-type: none"> <li>Understanding the problem</li> <li>Devising a plan</li> <li>Implementing the plan</li> <li>Looking back.</li> </ol> </li> </ul>	<p>(i) Compute volume of liquid from a situation expressed in fraction.</p> <p>(ii) Solve problem in real context involving computation of volume of liquid.</p>	<p>An example of computing volume of liquid from a situation expressed in fraction is as follows:</p> <p>... <math>\frac{3}{8}</math> of <math>400 \lambda</math></p> <p>In this context, "of" is a multiplication operator, so,</p> $\frac{3}{8} \times 400 = \frac{1200}{8}$ $= 150$ <p><math>\frac{3}{8}</math> of <math>400 \lambda</math> is <math>150 \lambda</math>.</p> <p>Problems involving computation of volume of liquid may also include measuring, conversion of units and/or calculation of volume of liquid.</p> <p>The scope of units of measurement for volume of liquid involves <math>m\lambda</math> and <math>\lambda</math>.</p>	<p>proper fraction</p> <p>mixed number</p> <p>volume of liquid</p> <p>conversion</p> <p>litre</p> <p>millilitre</p>

# Topic 10: SHAPE AND SPACE

## Learning Area: TWO-DIMENSIONAL SHAPES

# Year 6

LEARNING OBJECTIVES <i>Pupils will be taught to...</i>	SUGGESTED TEACHING AND LEARNING ACTIVITIES	LEARNING OUTCOMES <i>Pupils will be able to...</i>	POINTS TO NOTE	VOCABULARY
<p>1 Find the perimeter and area of composite two-dimensional shapes.</p>	<ul style="list-style-type: none"> <li>• Pupils construct two-dimensional composite shapes on the geo-board or graph paper. Pupils then measure the perimeter of the shapes.</li> <li>• Teacher provides a two-dimensional composite shape with given dimensions. Pupils calculate the perimeter of the shape.</li> </ul>	<p>(i) Find the perimeter of a two-dimensional composite shape of two or more quadrilaterals and triangles.</p>	<p>A perimeter is the total distance around the outside edges of a shape.</p> <p>Limit quadrilaterals to squares and rectangles, and triangles to right-angled triangles.</p> <p>Given below are examples of 2-D composite shapes of two or more quadrilaterals and triangles.</p> 	<p>perimeter square, rectangle triangle quadrilateral composite two-dimensional geo-board length breadth area</p>

# Topic 10: SHAPE AND SPACE

## Learning Area: TWO-DIMENSIONAL SHAPES

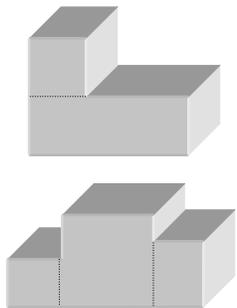
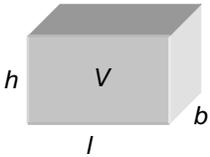
# Year 6

LEARNING OBJECTIVES <i>Pupils will be taught to...</i>	SUGGESTED TEACHING AND LEARNING ACTIVITIES	LEARNING OUTCOMES <i>Pupils will be able to...</i>	POINTS TO NOTE	VOCABULARY
	<ul style="list-style-type: none"> <li>• Pupils construct two-dimensional composite shapes on the geo-board or graph paper. Pupils then find the area of the shapes.</li> <li>• Teacher provides a two-dimensional composite shape with given dimensions. Pupils calculate the area of the shape.</li> <li>• Pose problems of finding perimeters and areas of 2-D shapes in numerical form, simple sentences, tables or pictures.</li> <li>• Teacher guides pupils to solve problems following Polya's four-step model of               <ol style="list-style-type: none"> <li>1) Understanding the problem</li> <li>2) Devising a plan</li> <li>3) Implementing the plan</li> <li>4) Looking back.</li> </ol> </li> </ul>	<p>(ii) Find the area of a two-dimensional composite shape of two or more quadrilaterals and triangles.</p> <p>(iii) Solve problems in real contexts involving calculation of perimeter and area of two-dimensional shapes.</p>	<p>To calculate area of 2-D shapes, use the following formulae...</p> <p>Area <math>A</math>, of a square with sides <math>a</math> in length. <math>A = a \times a</math></p> <p>Area <math>A</math>, of a rectangle with length <math>l</math> and breadth <math>b</math>. <math>A = l \times b</math></p> <p>Area <math>A</math>, of a triangle with base length <math>b</math> and height <math>h</math>. <math>A = \frac{1}{2}(b \times h)</math></p>	<p>quadrilateral triangle grid geo-board</p>

# Topic 10: SHAPE AND SPACE

## Learning Area: THREE-DIMENSIONAL SHAPES

# Year 6

LEARNING OBJECTIVES <i>Pupils will be taught to...</i>	SUGGESTED TEACHING AND LEARNING ACTIVITIES	LEARNING OUTCOMES <i>Pupils will be able to...</i>	POINTS TO NOTE	VOCABULARY
<p>1 Find the surface area and volume of composite three-dimensional shapes.</p>	<ul style="list-style-type: none"> <li>• Pupils draw net according to the given measurements, cut out the shape and fold to make a three-dimensional shape. Next, unfold the shape and use the graph paper to find the area. Verify that the area is the surface area of the 3-D shape.</li> <li>• Teacher provides a three-dimensional composite shape with given dimensions. Pupils calculate the surface area of the shape.</li> <li>• Pupils construct three-dimensional composite shapes using the Dienes's blocks. The volume in units of the block is determined by mere counting the number of blocks.</li> <li>• Teacher provides a three-dimensional composite shape with given dimensions. Pupils calculate the volume of the shape.</li> </ul>	<p>(i) Find the surface area of a three-dimensional composite shape of two or more cubes and cuboids.</p> <p>(ii) Find volume of a three-dimensional composite shape of two or more cubes and cuboids.</p>	<p>Use only cubes and cuboids to form composite 3-D shapes. Examples of these shapes are as below...</p>  <p>For a cuboid with length <math>l</math>, breadth <math>b</math> and height <math>h</math>, the volume <math>V</math> of the cuboid is...</p> $V = l \times b \times h$ 	<p>cube cuboid three-dimensional volume length breadth height</p>

# Topic 10: SHAPE AND SPACE

## Learning Area: THREE-DIMENSIONAL SHAPES

# Year 6

LEARNING OBJECTIVES <i>Pupils will be taught to...</i>	SUGGESTED TEACHING AND LEARNING ACTIVITIES	LEARNING OUTCOMES <i>Pupils will be able to...</i>	POINTS TO NOTE	VOCABULARY
	<ul style="list-style-type: none"><li>• Pose problems of finding surface area and volume of 3-D shapes in numerical form, simple sentences, tables or pictures.</li><li>• Teacher guides pupils to solve problems following Polya's four-step model of<ol style="list-style-type: none"><li>1) Understanding the problem</li><li>2) Devising a plan</li><li>3) Implementing the plan</li><li>4) Looking back.</li></ol></li></ul>	<p>(iii) Solve problems in real contexts involving calculation of surface area and volume of three-dimensional shapes.</p>		

# Topic 11: DATA HANDLING

## Learning Area: AVERAGE

# Year 6

LEARNING OBJECTIVES <i>Pupils will be taught to...</i>	SUGGESTED TEACHING AND LEARNING ACTIVITIES	LEARNING OUTCOMES <i>Pupils will be able to...</i>	POINTS TO NOTE	VOCABULARY
<p>1 Understand and compute average.</p>	<ul style="list-style-type: none"> <li>Arrange four stacks of coins as in the diagram below. Pupils tabulate the number of coins in each stack. Ask pupils what would be the number of coins in each stack if the coins were evenly distributed. Pupils share among the class on how they arrive at the average number.</li> </ul>  <ul style="list-style-type: none"> <li>Teacher demonstrates how the average is calculated from a given set of data.</li> </ul>	<p>(i) Calculate the average of up to five numbers.</p>	<p>Average is the common central value for a set of items in between the lowest and the highest value of the items. The formula to calculate average is...</p> $\text{average} = \frac{\text{total item values}}{\text{number of items}}$ <p>An example...</p> <p>Find the average value of these numbers...1.2, 3.65, 0.205, 4, 5.8.</p> $\frac{1.2 + 3.65 + 0.205 + 4 + 5.8}{5}$ $= \frac{14.855}{5}$ $= 2.971$ <p>Limit the value of averages to three decimal places.</p>	<p>average decimal place item value</p>

# Topic 11: DATA HANDLING

## Learning Area: AVERAGE

# Year 6

LEARNING OBJECTIVES <i>Pupils will be taught to...</i>	SUGGESTED TEACHING AND LEARNING ACTIVITIES	LEARNING OUTCOMES <i>Pupils will be able to...</i>	POINTS TO NOTE	VOCABULARY										
	<ul style="list-style-type: none"> <li>• Pose problems involving average in numerical form, simple sentences, tables or pictures.</li> <li>• Teacher guides pupils to solve problems following Polya’s four-step model of               <ol style="list-style-type: none"> <li>1) Understanding the problem</li> <li>2) Devising a plan</li> <li>3) Implementing the plan</li> <li>4) Looking back.</li> </ol> </li> </ul>	<p>(ii) Solve problems in real contexts involving average.</p>	<p>Use quantities objects or people, money, time, length, mass, volume of liquid, etc., as context for problems.</p> <p>Include compound units for calculation of average when dealing with money and time.</p> <p>An example problem...</p> <p>The table below is the time clocked by four runners of a team running the mile. What is the average time made by the team to run the mile?</p> <table border="1" data-bbox="1329 919 1625 1190"> <thead> <tr> <th>Runner</th> <th>time</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>2 hr 10 min</td> </tr> <tr> <td>B</td> <td>2 hr 5 min</td> </tr> <tr> <td>C</td> <td>1 hr 50 min</td> </tr> <tr> <td>D</td> <td>1 hr 40 min</td> </tr> </tbody> </table>	Runner	time	A	2 hr 10 min	B	2 hr 5 min	C	1 hr 50 min	D	1 hr 40 min	<p>average</p> <p>decimal place</p> <p>quantity</p>
Runner	time													
A	2 hr 10 min													
B	2 hr 5 min													
C	1 hr 50 min													
D	1 hr 40 min													

# Topic 11: DATA HANDLING

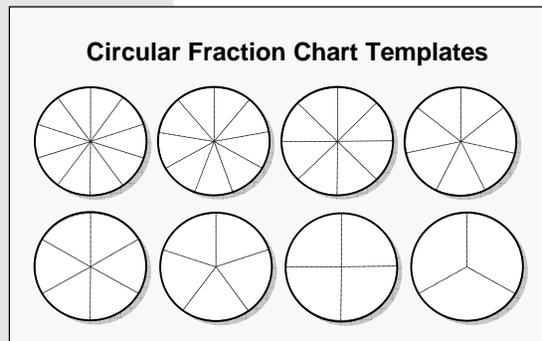
## Learning Area: ORGANISING AND INTERPRETING DATA

# Year 6

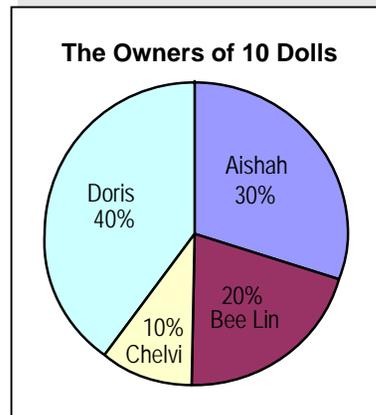
LEARNING OBJECTIVES <i>Pupils will be taught to...</i>	SUGGESTED TEACHING AND LEARNING ACTIVITIES	LEARNING OUTCOMES <i>Pupils will be able to...</i>	POINTS TO NOTE	VOCABULARY
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1 Organise and interpret data from tables and charts.

- Teacher prepares some templates in the form of circular fraction charts and a suitable data set. Teacher then guides pupils to select the right template to begin constructing the pie chart.



(i) Construct a pie chart from a given set of data.



POINTS TO NOTE

Scope data sets for pie chart construction, convertible to proper fractions with denominators up to 10 only. For example...

Name	Dolls Own
Aishah	3
Bee Lin	2
Chelvi	1
Doris	4

Total number of dolls owned by the girls is 10.

Aishah has  $\frac{3}{10}$  of the total number of dolls, Bee Lin has  $\frac{1}{5}$ , Chelvi  $\frac{1}{10}$ , while Doris has  $\frac{2}{5}$  of the total number of dolls.

Percentage may be used in the legend.

VOCABULARY

- pie chart
- frequency
- mode
- range
- maximum
- minimum

# Topic 11: DATA HANDLING

# Year 6

## Learning Area: ORGANISING AND INTERPRETING DATA

LEARNING OBJECTIVES <i>Pupils will be taught to...</i>	SUGGESTED TEACHING AND LEARNING ACTIVITIES	LEARNING OUTCOMES <i>Pupils will be able to...</i>	POINTS TO NOTE	VOCABULARY												
	<ul style="list-style-type: none"> <li>Teacher provides a pie chart and guides pupils to extract information from the chart to construct a data table. Remind the meaning of frequency, mode, range, etc.</li> <li>Pupils discuss and present their findings and understanding of charts and tables.</li> <li>The electronic spreadsheet may be used to aid the understanding of charts and tables.</li> </ul>	<p>(ii) Determine the frequency, mode, range, mean, maximum and minimum value from a pie chart.</p>	<p>Introduce the term <i>mean</i> as an average value.</p> <p>Extract information from a given pie chart to construct a data table.</p> <div data-bbox="1320 626 1719 1049" style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p style="text-align: center;"><b>Mathematics test scores of 100 pupils</b></p> <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <caption>Mathematics Test Scores Data</caption> <thead> <tr> <th>Score</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>30%</td> </tr> <tr> <td>B</td> <td>40%</td> </tr> <tr> <td>C</td> <td>10%</td> </tr> <tr> <td>D</td> <td>10%</td> </tr> <tr> <td>E</td> <td>10%</td> </tr> </tbody> </table> </div> <p>From the data table,                      “What is the most common score? (mode)”</p> <p>The highest mark for students who scored A is 85 and the lowest is 80. For the score of E, the highest mark is 29 while the lowest is 17.</p>	Score	Percentage	A	30%	B	40%	C	10%	D	10%	E	10%	<p>average mean</p>
Score	Percentage															
A	30%															
B	40%															
C	10%															
D	10%															
E	10%															

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