



# MATHEMATICS PRIMARY THREE

### **Overview of Mathematics Curriculum**

Mathematics provides the foundation for many aspects of our everyday activities. In primary school, the students need mathematical concepts to make sense of information around them, such as counting objects and money, reading time, seeing shapes and patterns around them.

At this stage, the students also acquire important basic numeracy as well as develop logical reasoning and problem-solving skills that are required in many disciplines. For these reasons, the Primary Mathematics Syllabus aims to enable all students to:

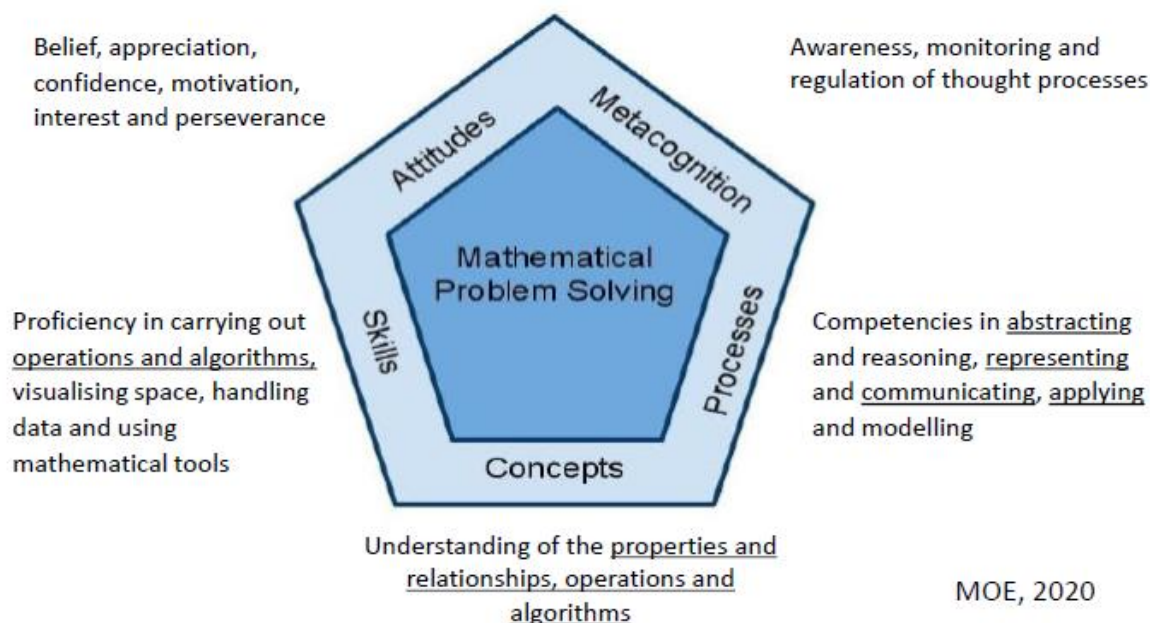
- acquire mathematical concepts and skills for everyday use
- develop thinking, reasoning, communication, application and metacognitive skills through a mathematical approach to problem solving
- build confidence and foster interest in mathematics.

The central focus of the mathematics curriculum is the development of mathematical problem-solving competency. Problems may come from everyday context. They include straightforward and routine task that require selection of the appropriate concepts and skills, as well as complex and non-routine tasks that requires logical reasoning and creative thinking.

## Mathematics Curriculum Framework

The Mathematics curriculum framework shows the underlying principles of an effective mathematics programme. It sets the direction for the teaching, learning, and assessment of mathematics.

The development of mathematical problem-solving ability is dependent on five interrelated components, namely, Concepts, Skills, Processes, Attitudes and Metacognition.



The understanding of mathematical concepts is essential for solving problems. In the primary mathematics curriculum, concept in numbers, algebra, measurement, geometry and statistics are explored.

Mathematical processes refer to the practices of mathematicians that are important to solve problems and build new knowledge. This includes abstracting, reasoning, representing and communicating. Justifying a result, deriving new results and generalising patterns involve reasoning. Expressing one's ideas, solutions and arguments involves representing and communicating.

Metacognition, or thinking about thinking, refers to the awareness of, and the ability to control one's thinking processes, in particular the selection and use of problem-solving strategies. It includes monitoring and awareness of one's affective responses towards a problem.

### **Primary Mathematics Syllabus**

The teaching of Mathematics in Singapore primary school uses the spiral curriculum. This means that many of the topics that have been taught in the lower primary, such as whole numbers, fractions and measurement will be introduced again in both middle and upper primary at a higher level of complexity. This progression allows the students to grasp Mathematical concepts that are appropriate to their age. It is therefore important for the students to be grounded in such foundation concepts.

The syllabus is organised along 3 content strands. The development of processes, metacognition and attitudes are embedded in the learning experiences that are associated with the content.

Concept and Skills		
Number and Algebra	Measurement and Geometry	Statistics
Learning Experiences (Processes, Metacognition and Attitudes)		

Besides developing conceptual understanding, the learning experiences provide opportunities for students to:

- enhance conceptual understanding
- apply concepts and skills learnt to solve problems in real-world contexts
- communicate their mathematical reasoning
- build confidence and foster interest in mathematics

Primary 3 students will learn the following:

STRAND: NUMBER AND ALGEBRA	STRAND : MEASUREMENT AND GEOMETRY	STRAND: STATISTICS
SUB-STRAND 1: WHOLE NUMBERS	SUB-STRAND 1: MEASUREMENT	SUB-STRAND 1: DATA REPRESENTATION AND INTERPRETATION
<p><b>Numbers up to 10 000</b></p> <ul style="list-style-type: none"> <li>- counting in hundreds/thousands</li> <li>- number notation, representations and place values (thousands, hundreds, tens, ones)</li> <li>- reading and writing numbers in numerals and in words</li> <li>- comparing and ordering numbers</li> <li>- patterns in number sequences</li> </ul> <p><b>Addition and subtraction</b></p> <ul style="list-style-type: none"> <li>- addition and subtraction algorithms (up to 4 digits)</li> <li>- mental calculation involving addition and subtraction of two 2-digit numbers</li> </ul>	<p><b>Length, Mass and Volume</b></p> <ul style="list-style-type: none"> <li>- measuring <ul style="list-style-type: none"> <li>• length in kilometres (km)</li> <li>• volume of liquid in millilitres (ml)</li> </ul> </li> <li>- measuring length/mass/volume (of liquid) in compound units</li> <li>- converting a measurement in compound units to the smaller unit, and vice versa <ul style="list-style-type: none"> <li>• kilometres and metres</li> <li>• metres and centimetres</li> <li>• kilograms and grams</li> <li>• litres and millilitres</li> </ul> </li> </ul>	<p><b>Bar graphs</b></p> <ul style="list-style-type: none"> <li>- reading and interpreting data from bar graphs</li> <li>- using different scales on axis</li> </ul>

STRAND: NUMBER AND ALGEBRA	STRAND : MEASUREMENT AND GEOMETRY	STRAND: STATISTICS
<p><b>Multiplication and division</b></p> <ul style="list-style-type: none"> <li>- multiplication tables of 6, 7, 8 and 9</li> <li>- multiplying and dividing within the multiplication tables</li> <li>- division with remainder</li> <li>- multiplication and division algorithms (up to 3 digits by 1 digit)</li> <li>- mental calculation involving multiplication and division within the multiplication tables</li> </ul>	<p><b>Time</b></p> <ul style="list-style-type: none"> <li>- measuring time in seconds</li> <li>- finding the starting time, finishing time or duration given the other two quantities</li> <li>- 24-hour clock</li> </ul>	

STRAND: NUMBER AND ALGEBRA	STRAND : MEASUREMENT AND GEOMETRY	STRAND: STATISTICS
SUB-STRAND 2: FRACTIONS	SUB-STRAND 2: AREA AND VOLUME	
<p><b>Equivalent Fractions</b></p> <ul style="list-style-type: none"> <li>- equivalent fractions</li> <li>- expressing a fraction in its simplest form</li> <li>- comparing and ordering unlike fractions with denominators of given fractions not exceeding 12</li> <li>- writing the equivalent fraction of a fraction given the denominator or the numerator</li> </ul> <p><b>Addition and Subtraction</b></p> <ul style="list-style-type: none"> <li>- adding and subtracting two related fractions within one whole with denominators of given fractions not exceeding 12</li> </ul>	<p><b>Area and Perimeter</b></p> <ul style="list-style-type: none"> <li>- concepts of area and perimeter of a plane figure</li> <li>- measuring area in square units, cm and m, excluding conversion between cm and m</li> <li>- perimeter of: <ul style="list-style-type: none"> <li>• rectilinear figure</li> <li>• rectangle</li> <li>• square</li> </ul> </li> <li>- area of rectangle/square</li> </ul>	

STRAND: NUMBER AND ALGEBRA	STRAND : MEASUREMENT AND GEOMETRY	STRAND: STATISTICS
SUB-STRAND 3: MONEY	SUB-STRAND 3: GEOMETRY	
<p><b>Money</b></p> <ul style="list-style-type: none"> <li>- adding and subtracting money in decimal notation</li> </ul>	<p><b>Angles</b></p> <ul style="list-style-type: none"> <li>- concepts of angle</li> <li>- right angles, angles greater than/smaller than a right angle</li> </ul> <p><b>Perpendicular and Parallel Lines</b></p> <ul style="list-style-type: none"> <li>- perpendicular and parallel lines</li> <li>- draw perpendicular and parallel lines on square grid</li> </ul>	



## Mathematics Curriculum at SQPS

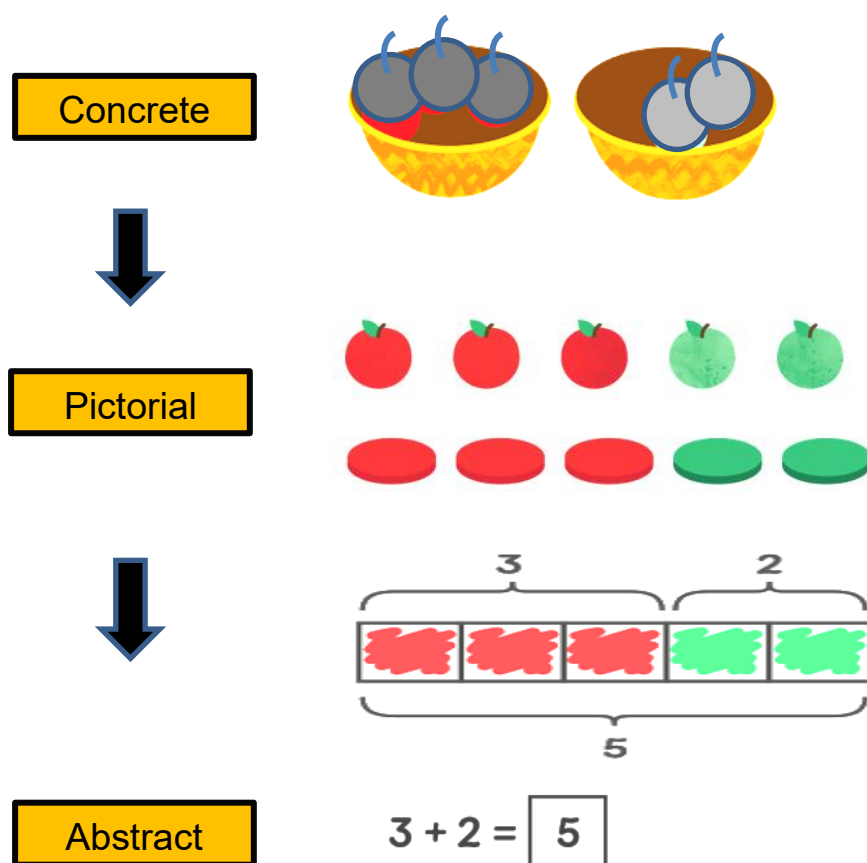
### 1. Teaching Approaches

Math lessons are delivered using the Concrete-Pictorial-Abstract (C-P-A) approach. To introduce a Mathematical concept, teachers use manipulatives to provide hands-on learning experiences. This age-appropriate approach also provide scaffolding for the primary students to help them grasp abstract mathematical concepts.

The concrete manipulatives will be followed by pictorial representations. Finally, the students will move on to the abstract representation in the form of mathematical symbols and equations.

Example:

There are 3 red apples and 2 green apples. How many apples are there altogether?



To help the students visualise abstract mathematical concepts involving the 4 operations (addition, subtraction, multiplication and division), the students in the lower primary will be progressively introduced to model drawing skills. This foundational skill will help the students to comprehend and translate a mathematical problem to a simpler pictorial representation. In addition, the skills will also be very useful when the students learn more complex mathematical problems in the middle and upper primary.

## **2. Topical Worksheet and Heuristic Skills**

To supplement the workbook practices, students are given topical worksheets. This will provide reinforcement of concepts and skills learnt at the end of each topic.

In addition, the students also learn thinking skills (heuristics) to train and equip them with different problem-solving strategies required to solve more challenging Math problems. These strategies include:

- model drawing
- looking for patterns
- guess and check
- making a list
- working backwards

The various skills will be revisited periodically to provide students with enough repetition for subject mastery.

## **3. Remediation Class for Mathematics**

For the students who have not performed very well during formal assessment, the school supports them with remediation class where they will be coached in a small-group setting. The students are grouped according to their Math results. This will enable the teachers who conduct the remediation class to adjust the pace of the lesson according to the profile of the students.

During remediation class, there will be re-teaching of the concepts that they have learnt in class. Additional written work is also provided to give enough opportunity for the students to practice and learn from their mistakes. In addition, students are expected to have additional revision time at home to ensure retention of important concepts that have been taught in class.

## **4. High Progress Resources**

High progress students will be provided with additional written work to stretch their learning. The questions provided in the resources will give them opportunities to use mathematical thinking and mathematical communication. In addition, these exercises will train them to apply the Mathematical concept that they have learnt in unfamiliar context.

## **5. Use of ICT**

As part of the effort to cultivate self-directed learning, the school make use of Koobits and SLS (Student Learning Space) learning portal to supplement the teaching and learning of Mathematics. Koobits platform allows the students to do daily challenge through bite-size Math quizzes and games. This will help improve the students' basic numeracy skills by providing immediate feedback to the student's response. In addition, the SLS portal is used by the teachers to assign ICT lessons that will reinforce the concepts that have been taught in class.

## **6. Math Activities Outside Classroom**

To increase students' interest in learning Mathematics, the school uses its broadcast system and notice boards to engage students with Math quizzes and puzzles. The puzzles and displays will create awareness of Mathematics application beyond the classroom learning.

The students are also invited to participate in Mathematics projects such as Math trails and poster design. Student's submissions will be evaluated and prizes will be given for the best work. In addition, selected student's work will be put up for display along school common area to increase the vibrancy of learning.

## Mathematical Problem-Solving Approach

To equip students with better problem-solving skills, the school makes a deliberate effort to teach Mathematical process skills through problem solving. The students are taught a systematic problem-solving model called STAR approach.

How do you do solve Mathematics problem sum?

- **Study** the problem carefully
- **Think** of a strategy
- **Act** on the solution
- **Reflect** on the final answer

# STAR approach in Math Problem solving



<b>Study</b>	What am I given? <i>(annotate objects and values, show connections)</i>
	What am I asked to find?
<b>Think</b>	What strategy should I use?
	Can I use model or diagram/table?
<b>Act</b>	I will apply the strategy.
	I write out my steps and equations.
<b>Reflect</b>	Have I answered the question?
	Does my answer make sense (reasonable)?
	Have I checked for Number Transfer, Unit, Calculation?
	Can I solve it differently?

During Math lessons, teachers will 'think aloud' to give attention to these processes and make them visible to students. Through practice, students will develop habits and strategies to help them be better and more independent learners.

Example of problem-solving using STAR approach:

**Sudy: Annotation strategy**

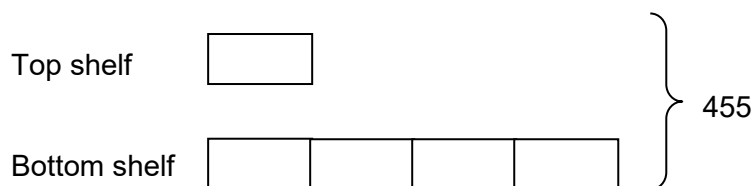
\*note: for clarity of annotation process, students are advised to use a pen or pencil instead of highlighter.

There were 455 books in a bookcase altogether.

The bottom shelf had 4 times as many books as the top shelf.

How many books were there on the bottom shelf?

**Think: Model drawing (or other strategy)**



**Act: Equation and Working**

$$5 \text{ units} = 455$$

$$1 \text{ unit} = 455 \div 5 = 91$$

$$4 \text{ units} = 4 \times 91 = 364$$

$$\begin{array}{r} 91 \\ 5 \overline{) 455} \\ \underline{- 45} \phantom{0} \\ 5 \phantom{0} \\ \underline{- 5} \\ 0 \end{array}$$
  

$$\begin{array}{r} 47 \\ \times 4 \\ \hline 188 \end{array}$$

**Reflect: Check for number transfer, unit and calculation**

There were 364 books on the bottom shelf.

**Other Heuristic example: Guess and Check**

There is a total of 14 cars and motorcycles in a car park.

There are 46 wheels altogether.

How many cars are there in the car park?

Solution:

Number of cars	Number of wheels	Number of motorcycles	Number of wheels	Total number of wheels	check
7	$7 \times 4 = 28$	7	$7 \times 2 = 14$	$28 + 14 = 42$	✗
8	$8 \times 4 = 32$	6	$6 \times 2 = 12$	$32 + 12 = 44$	✗
9	$9 \times 4 = 36$	5	$5 \times 2 = 10$	$36 + 10 = 46$	✓

There are **9** cars in the car park.

**Expectation of Students**

1. Students are expected to complete all the work assigned by the subject teachers neatly. This will provide opportunities for students to revise and evaluate the learning that has taken place during lessons. This will also provide feedback to their teachers on the misconceptions that need to be addressed pertaining to the topic.
2. To enable students to do Math with speed and accuracy, certain Math facts can be committed to memory. E.g. multiplication tables can be memorised. Having math facts fluency allows students to recall the basic facts in all four operations accurately, quickly and effortlessly. When students achieve automaticity with these facts, they have attained a level of mastery that enables them to retrieve them from long-term memory without conscious effort or attention. Through automaticity, students free up their working memory and can devote it to problem solving and learning new concepts and skills.

Fluent math facts also mean less confusion. When a child masters his/her math facts, these concepts will be significantly easier and the student will be better equipped to solve them faster. If the child spends a lot of time doing the basic facts, he/she is more likely to be confused with the processes and get lost in their problem-solving calculations.

3. To do well in Mathematics, students are trained to present their math solutions in a clear and systematic way. In general, students are expected to show the following in their math presentation:

- Annotation of key information
- Model drawing (when relevant)
- Math equation
- Math working / calculation
- Word statement

### **Assessment**

To ascertain students' progress in learning, students will sit for a formal assessment at the end of the year. Prior to the conduct of the examinations, the school will provide practice paper based on previous year's assessment. This will help the students build the rigour required to do well during the examination.

In addition, the teachers will conduct termly weighted assessment periodically to evaluate student's understanding of the concepts and skills taught. This will help both the teachers and students to identify learning gaps and address any misconceptions.

The following table shows the termly assessment plan.

	Term 1	Term 2	Term 3	Term 4
<b>Mode of assessment</b>	-	WA1	WA2	End-of-year examination
<b>Weighting</b>	-	15%	15%	70%

Format of P3 end-of-year examination

	Item type	Number of Question	Duration
<b>Section A</b>	MCQ (Multiple Choice Question)	10	1 h 30 min
<b>Section B</b>	SAQ (Short-Answer Question)	15	
<b>Section C</b>	LAQ (Long-Answer Question)	5	

### **Common mistakes made by students**

- Incorrect unit of measurement during conversion

Example: 1 km = 100 m (*wrong fact*)

- Writing incorrect Math equation

Example:  $20 + 10 = 30 + 5 = 35$

*Not equal*

### **How to do well in Mathematics**

Before exam:

- Revise all the topics in the textbook (from P1-P3).
- Get the basic facts and concepts right.
- Build time management skills, e.g. attempt questions within the exam time limit during practice. Speed and accuracy are important.
- Practice different strategies to solve questions, such as Model Drawing and Making a List.

During exam:

- Highlight important information or data in the questions.
- Use appropriate strategies to solve questions, such as Model Drawing
- Do not dwell too long on a question. Skip questions that you are unsure of and come back to attempt them later.
- Attempt all questions. Show all the Math equations and workings.
- Check all the working and equations.



## **How Parents Can Support the Child's Learning at Home**

Parents are important partners in ensuring a child's mathematical success. A warm, inviting numeracy rich learning environment at home is the first step to fostering a love of mathematics in children. The following are some strategies and opportunities to encourage and sustain math learning in the home:

- ✓ Parents as models of mathematical learning
  - Engage your child in interesting mathematical activities helps stimulate a lifelong enjoyment of mathematics.
  - Build your child's self-confidence and optimism, and help them see math learning as valuable as well as fun.
  - Set a positive mindset for the mathematics learning that takes place at school. Parents cannot replace the school experience but they are a significant influence on their children's developing attitudes towards, and enjoyment of, mathematics.
- ✓ Have a growth mindset
  - Believe that every child can be successful in math. Encouragement and practice will help.
  - Encourage persistence. (Some math problems take time to solve) It is alright if your child does not get it right at the first attempt or takes a longer time to figure out the math problem.
  - Encourage your child to experiment with different approaches to mathematics. There is often more than one way to solve a math problem.
- ✓ Promote mathematical reasoning
  - Encourage your child to talk about and show a math problem in a way that makes sense (i.e., draw a picture, explain using concrete objects, etc)
  - When your child is solving math problems ask questions such as:
    - What operation do you use? Why?
    - Do you see any patterns?
    - Does the answer make sense? How do you know?
- ✓ Connect math to everyday life and help your child understand how math influences them (i.e. shapes of traffic signs, walking distance to school, telling time, weighing and reading mass of objects).

- ✓ Use of Games and Storybooks to practise Mathematical concepts

- ✓ Use of ICT resources effectively  
The following websites can be explored to introduce math concepts through fun activities.

- <https://member.koobits.com/>
- <https://www.mathplayground.com/>

