



MATHEMATICS PRIMARY ONE

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:

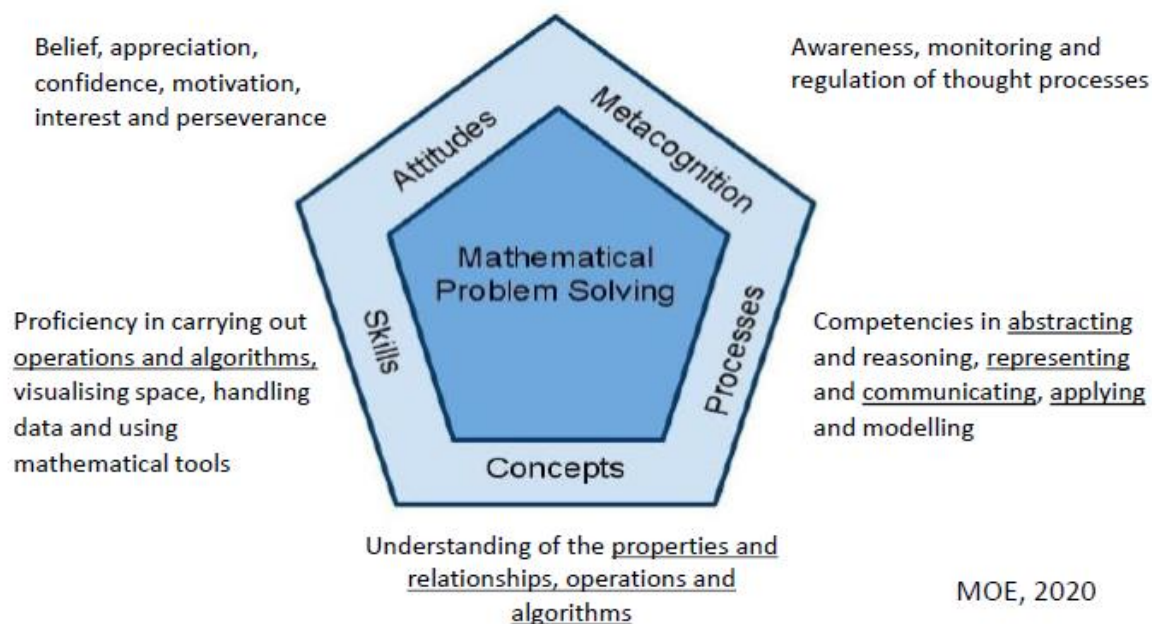
- acquire mathematical concepts and skills for everyday use
- develop thinking, reasoning, communication, application and metacognitive skills through a mathematical approach to problem solving
- build confidence and foster interest in mathematics.

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

Number and Algebra

Number and Algebra are the basic building blocks of mathematics. A good understanding of numbers – their meanings, properties and operations – provides the foundation for the learning of mathematics. At Primary 1, students learn about whole numbers (including addition, subtraction, multiplication and division) and money.

SUB-STRAND: WHOLE NUMBERS	SUB-STRAND: MONEY
<p>1. Numbers up to 100</p> <p>1.1 counting to tell the number of objects in a given set. 1.2 number notation, representations and place values (tens, ones) 1.3 reading and writing numbers in numerals and in words 1.4 comparing the number of objects in two or more sets 1.5 comparing and ordering numbers 1.6 patterns in number sequences 1.7 ordinal numbers (first, second, up to tenth) and symbols (1st, 2nd, 3rd, etc)</p> <p>2. Addition and subtraction</p> <p>2.1 concepts of addition and subtraction 2.2 use of +, – and = 2.3 relationship between addition and subtraction 2.4 adding more than two 1-digit numbers 2.5 adding and subtracting within 100 2.6 adding and subtracting using algorithms 2.7 mental calculation involving addition and subtraction</p> <ul style="list-style-type: none">• within 20• of a 2-digit number and ones without renaming• of a 2-digit number and tens	<p>1. Money</p> <p>1.1 counting amount of money</p> <ul style="list-style-type: none">• in cents up to \$1• in dollars up to \$100

SUB-STRAND: WHOLE NUMBERS	SUB-STRAND: MONEY
3. Multiplication and division 3.1 concepts of multiplication and division 3.2 use of x 3.3 multiplying within 40 3.4 dividing within 20	

Measurement and Geometry

Measurement involves finding length, mass, area, volume and time with units (e.g. cm, km, kg, and minutes). Geometry is the study of points, lines, angles, figures and their properties and relationships. In geometry, students learn about 2-dimensional and 3-dimensional geometric shapes and figures, identifying, naming and classifying them.

SUB-STRAND 1: MEASUREMENT	SUB-STRAND 2: GEOMETRY
<p>1. Length</p> <p>1.1 measuring length in centimetres 1.2 use of abbreviation cm 1.3 comparing and ordering lengths in cm 1.4 measuring and drawing a line segment to the nearest cm</p> <p>2. Time</p> <p>2.1 telling time to 5 minutes 2.2 use of 'a.m.' and 'p.m.' 2.3 use of abbreviations h and min 2.4 duration of one hour/half hour</p>	<p>1. 2D Shapes</p> <p>1.1 identifying, naming, describing and classifying 2D shapes</p> <ul style="list-style-type: none"> • rectangle • square • triangle • circle • half circle • quarter circle <p>1.2 forming different 2D figures with</p> <ul style="list-style-type: none"> • rectangle • square • triangle • half circle • quarter circle <p>1.3 identifying the basic shapes that make up a given figure</p> <p>1.4 copying figures on dot grid or square grid</p>

Strand: Statistics

Statistics provides the method and tools to summarise, represent, analyse and interpret data so that useful information can be derived for making decision and understanding a situation. At Primary 1, students learn to represent data using picture graph.

SUB-STRAND 1: DATA REPRESENTATION and INTERPRETATION

Picture graphs

1.1 reading and interpreting data from picture graphs

Mathematics Curriculum at SQPS

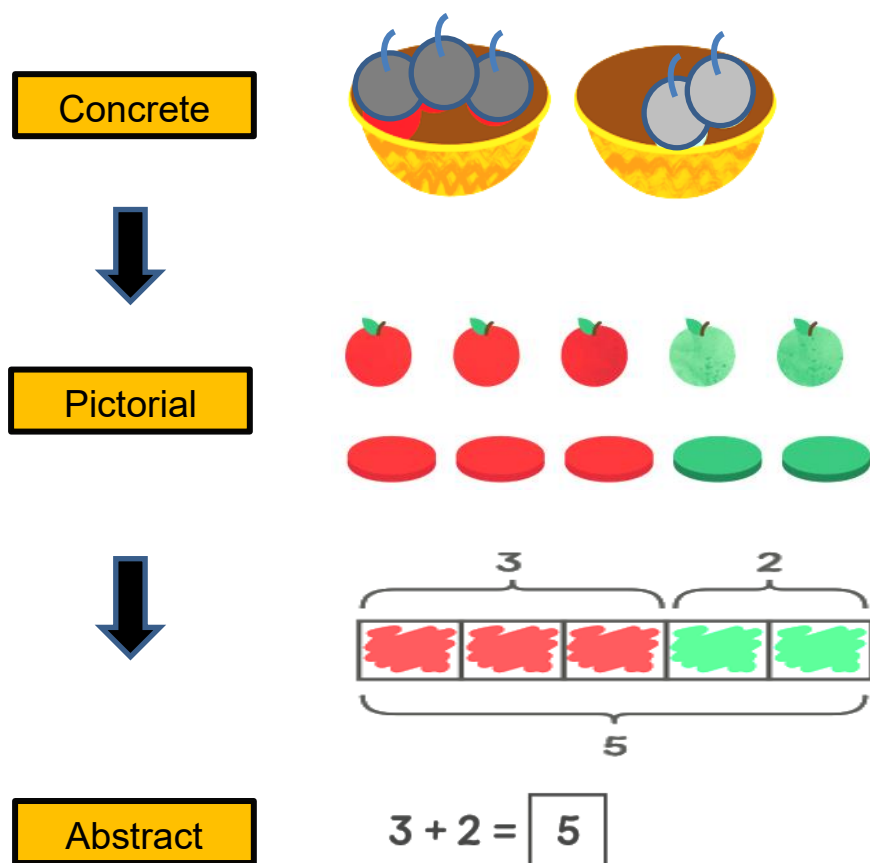
1. Teaching Approach

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 provides 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 Worksheets and Thinking Skills

To supplement workbook practices, the students are given topical worksheets and topical reviews. The topical reviews serve as summary of the concepts and skills learnt as stated in the syllabus. The reviews are done periodically at the end of the topics. The results will provide feedback to both teachers and parents on students' learning progress.

In addition, the topical worksheets provide supplementary practice to expose students to a variety of questions and prepare them for the formal assessment.

3. Learning Support for Mathematics (LSM)

For low-progress learners in the lower primary, the school supports them with early intervention programme where they will be coached in a small-group setting. The lessons are conducted by teachers who have been specially trained in LSM.

In addition, this programme encourages parents to be actively involved in their child's learning. The parents will be briefed by the teachers regarding the different activities that can be used to guide their child at home.

4. 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 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.

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 on 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. Assessment

During classroom teaching, teachers will conduct informal quizzes periodically to evaluate student's progress of learning. The reviews serve as a summary of the basic concepts and skills learnt as stated in the syllabus. The result will then provide useful feedback to both teachers and parents on student's understanding of the various topics.

In line with MOE's holistic assessment approach, P1 students will also have Performance-Based Tasks. This will be done with the guidance of the Maths subject teachers and students will be briefed on the requirement of the tasks.

Throughout the year, the evaluation of student's learning will be consolidated into a few Learning Outcomes (LOs). In each semester, the relevant LOs will be reflected in the report book according to the topics that have been covered. The list of LOs for Primary 1 Mathematics is as follows:

1. Understand numbers up to hundred.
2. Understand addition and subtraction.
3. Add and subtract numbers.
4. Understand multiplication and division.
5. Identify, name, describe and sort shapes.
6. Tell time to the 5 minutes.
7. Measure and compare lengths of objects.
8. Read and interpret picture graphs.

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



Study

What am I given?

- Underline characters and keywords
- Circle numbers
- Show connections (arrow)

What am I asked to find?



Think

What strategy should I use?

Can I draw a model or picture?



Act

I will apply the strategy

I will write out number equations



Reflect

Did I answer the question?

Have I checked for

- Number Transfer?
- Unit?
- Calculation?

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.

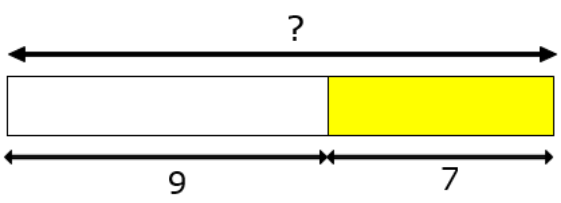
Expectation of Students

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:
 - Annotate mathematical key information
 - Math equation
 - Math working / calculation
 - Final word Statement

Example:

1. Mandy has 9 white cubes.
Cindy has 7 yellow cubes.
How many cubes do they have altogether?
- 
- $$9 + 7 = 16$$
- They have 16 cubes altogether.

2.

Tina saved \$49. Mary saved \$16 less than Tina. How much did Mary save?

Tina

\$49

Mary

?

 $\xrightarrow{\$16}$

$\$49 - \$16 = \$33$
Mary saved \$33.

(Math working)

49
- 16

33

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 and practise mathematics fluency.

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

- <https://member.koobits.com/>
(Login information will be provided by the subject teacher.)
- <https://www.mathplayground.com/>

