



Singapore Maths

Stillness Junior School

In Focus
 A baker made 2750 chocolate cookies and 1638 vanilla cookies.
 He sold 3195 cookies altogether.
 How many cookies did he have left?

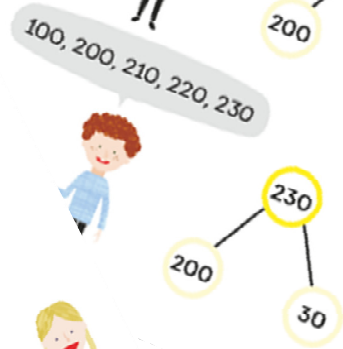
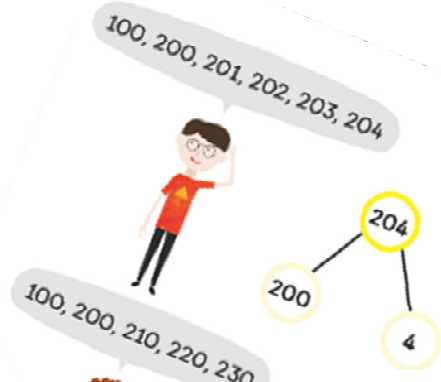
Let's Learn
 1 Understand the problem

Who?	baker
What?	cookies

Make a plan

Find the total number of cookies he made.

Then, subtract the number of cookies sold.



Rationale of Singapore Maths

The Singapore method of teaching mathematics develops pupils' mathematical skills and confidence without having to resort to memorising procedures to pass tests- making mathematics more engaging and interesting.

Borrowing heavily from the Cockcroft report (1982) the emphasis of the programme is all on problem solving. In all the material you will find that the teaching focuses on the use of three core competencies: Visualisation, Finding Patterns, and Mental Strategies. The Singapore method of teaching mathematics is based on research from a variety of sources. The work of educational psychologist Jerome Bruner, Richard Skemp's work on relational and instrumental understanding, and the work of Zoltan Dienes on systematic variation.

What is maths mastery?

The concept of teaching mathematics to mastery is to ensure that topics are well developed. Pupils will spend enough time to fully explore a concept before moving on to a different topic.

As an idea is well formed they are reinforced by plenty of practice. New knowledge is then used on subsequent lessons so that all ideas build on top of each other and pupils have ample opportunity to develop relationships between the topics.

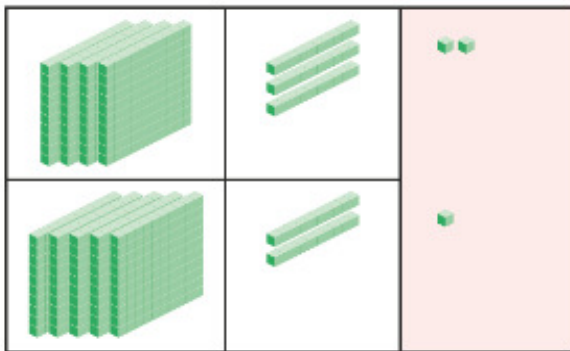


The CPA Approach

One of the key aspects of teaching Singapore maths is the CPA approach- concrete, pictorial and abstract. This approach is based on research by psychologist Jerome Bruner, who suggests that there are three steps necessary for pupils to develop an understanding of a concept. Reinforcement is achieved by repetition of these representations.

Step 1: Concrete representation

Pupils are introduced to an idea or skill by using real objects to represent the problem. In addition for example, this may be done by adding $432+521=$ using 100's, 10's and units blocks. This is a "hands on approach" using real objects, and is a foundation for conceptual understanding.



Step 2: Pictorial representation

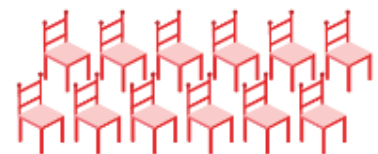
Once pupils have understood the concrete experience they can now relate this to pictorial representations, such as a diagram or picture of the problem. In an example of the addition exercise, this could be the process of counting each object.

Step 3: Abstract representation

Pupils are now able to represent problems by using mathematical notation, for example:



6 blue chairs



12 red chairs

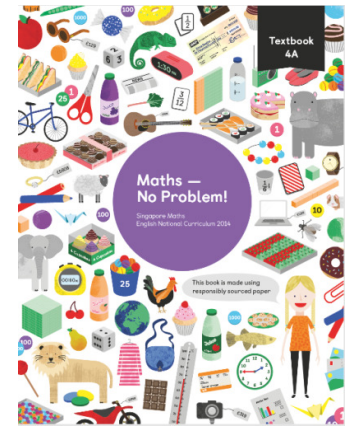
$$10 + 24 = 34$$

The CPA approach is used to introduce every new concept from years 3 to 6.

Textbooks and Workbooks

The textbooks are used daily to inform teaching and allow teachers and pupils to explore topics in depth.

The textbooks include “Let’s learn” methods, guided practice questions and group activities which form each lesson. The varied examples in each book have been chosen to stretch pupils into harder concepts and create dialogue between teachers and pupils.



All children have an individual Singapore workbook. They are extremely learner friendly and include very simple visual representations for children to understand.




Worksheet 12

Dividing with Remainder

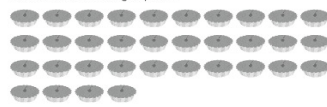
1 Circle the objects and fill in the blanks.

(a) Circle the watermelons to make groups of 5.



+ = remainder

(b) Circle the tarts to make groups of 6.




+ = remainder

Multiplication and Division Page 80

Dividing with Remainder Lesson 12


In Focus



Holly divided the balloons equally between her 2 friends.
How many balloons did each friend get?

Let's Learn

1 There were 11 balloons.



$11 \div 2 = 5 \text{ remainder } 1$
The quotient is 5 and the remainder is 1.
Each friend got 5 balloons.
There was 1 balloon left over.

Multiplication and Division Page 130

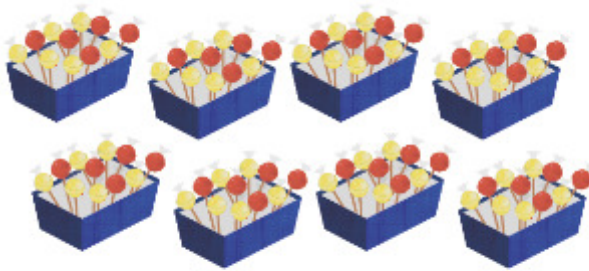
The workbooks allow children to work independently, demonstrating their understanding of the concepts and methods to assess their learning.




Lesson Structure

Part 1- “Let’s learn”

All children are introduced to the problem for example:



How many  are there in 8 boxes?

Discussion:

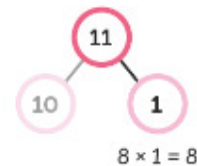
The children discuss with a partner, then with the class teacher many ways in which the problem can be worked out, highlighting important vocabulary.

Methods:

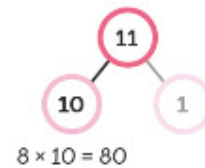
After the problem has been discussed, pupils are introduced to the different methods of solving the problem. Exposing children to this helps them actively try things out, and construct mathematical concepts to enrich their learning. At this stage children often use concrete apparatus to explore the methods. This may be base 10 equipment, counters, place value counters, unifix cubes, coloured card and other resources.

Method 3

$$8 \times 11 = \square$$



$$\begin{array}{r} 11 \\ \times 8 \\ \hline 88 \end{array}$$



$$\begin{array}{r} 11 \\ \times 8 \\ \hline 80 \\ + 8 \\ \hline 88 \end{array}$$

Part 2- Guided practice

Children are now able to put the methods into practice with various questions.



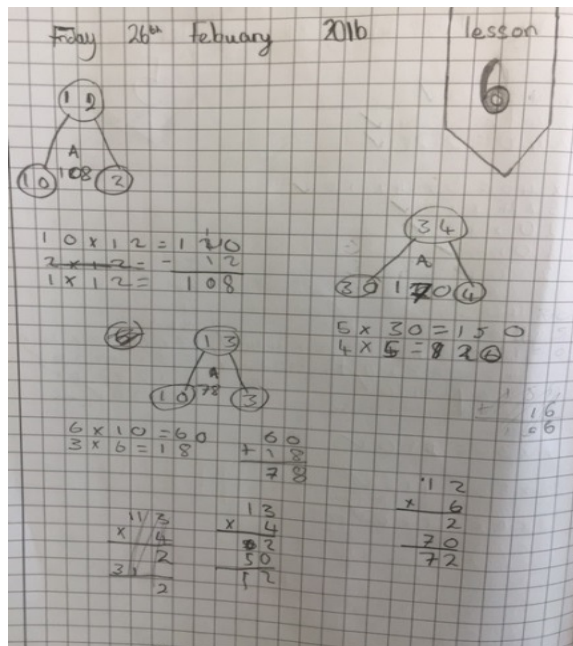
Guided Practice

1 Multiply.

$12 \times 4 =$



The children use their maths journals to record their working out.



During guided practice, the children will continue to use the equipment given in part 1 of the lesson. Journaling is an opportunity for children to use the visual and written methods which work for them.

Part 3- Independent task in workbook


During independent practice, pupils have the opportunity to reinforce concepts by solving a range of problems in their workbooks.

Worksheet 6

Multiplying 2-Digit Numbers

1 Multiply.

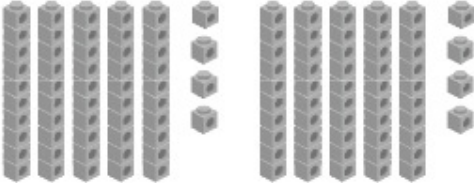
(a) $12 \times 3 =$



		1	2
x			3
<hr/>			

+			
<hr/>			
<hr/>			

(b) $54 \times 2 =$



		5	4
x			2
<hr/>			

+			
<hr/>			
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Planning and Teaching

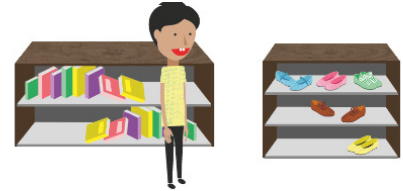
Using the online planning guide, teachers can receive guidance on the methods used in textbooks, questions to help promote deeper thinking, ways in which to differentiate for the less able children and ideas to extend the learning of more able pupils. Each lesson suggests an approach to use for the “let’s learn” task and the guided practice.



The Bar Model

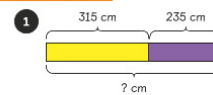
The bar model is a tool used by the children to visualise mathematical concepts and solve problems.

The bar model allows the problem to be represented in proportional and non-proportional diagrams that represent quantities. The children translate the information on the bars and manipulate the models to generate information in order to solve the problems.



Ravi used a wooden board with the length of 315 cm to make a bookshelf. He used another wooden board with the length of 235 cm to make a shoe rack. What was the total length of the wooden boards used?

Let's Learn

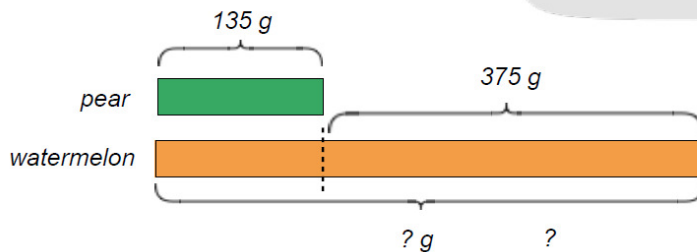


$$315 + 235 = 550$$

The total length of wooden boards used was 550 cm.

Children also use this model for algebra and word problems in order to translate information into algebraic equations to solve for required unknowns.

The mass of a pear is 135 g.
A watermelon is 375 g heavier than the pear.
What is the mass of the watermelon?



Do we add or subtract?



The mass of the watermelon is grams.

