

St Matthew's C of E Primary School



YEAR 6 CALCULATION POLICY



YEAR 6

MAIN PRINCIPLES

Scan QR codes to be directed to the MNP website with further information and videos.

What is maths mastery?

Teaching maths for mastery is a transformational approach to maths teaching which stems from high performing Asian nations such as Singapore. When taught to master maths, children develop their mathematical fluency without resorting to rote learning and are able to solve non-routine maths problems without having to memorise procedures.



Concrete, pictorial, abstract (CPA)

Concrete, pictorial, abstract (CPA) is a highly effective approach to teaching that develops a deep and sustainable understanding of maths. Developed by American psychologist, Jerome Bruner, the CPA approach is essential to maths teaching in Singapore.



Number bonds

Number bonds are a way of showing how numbers can be combined or split up. They are used to reflect the 'part-part-whole' relationship of numbers.



Bar modelling

The bar model method is a strategy used by children to visualise mathematical concepts and solve problems. The method is a way to represent a situation in a word problem, usually using rectangles.



Fractions

In Singapore, the understanding of fractions is rooted in the Concrete, Pictorial, Abstract (CPA) model, where children use paper squares and strips to learn the link between the concrete and the abstract. At the heart of understanding fractions is the ability to understand that we're giving an equal part a name.



YEAR 6

PLACE VALUE

Value of digits - up to 10,000,000

3 Show 10 million using

10 one millions make 10 million.
100 one hundred thousands make 10 million.
1000 ten thousands make 10 million.
Ten million = 10 000 000

Each group shows 1 million.

Place value chart

millions	hundred thousands	ten thousands	thousands	hundreds	tens	ones
●●●●	●●●	●●●●●	●●	●●●●	●●	●●●●
5	4	7	2	7	3	7

Comparing Numbers

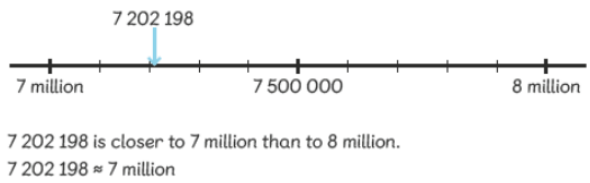
7 8 5 6 3 2 1 7 6 4 5 3 1

0 7 064 531 < 7 856 321 wins.

2 7 264 531 < 7 856 321 wins.

9 7 964 531 > 7 856 321 wins.

Number lines and rounding



Ordering Numbers

1 uses the digits 1, 4 and 9. I made six numbers.

1 4 9 0 0 0 0	1 9 4 0 0 0 0
4 1 9 0 0 0 0	4 9 1 0 0 0 0
9 1 4 0 0 0 0	9 4 1 0 0 0 0

1 490 000, 1 940 000, 4 190 000, 4 910 000, 9 140 000, 9 410 000

smallest → greatest

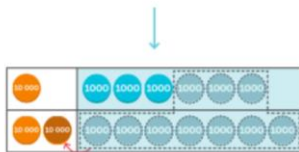
The numbers are arranged in increasing order.

YEAR 6

ADDITION and SUBTRACTION

Using place value counters to support calculations

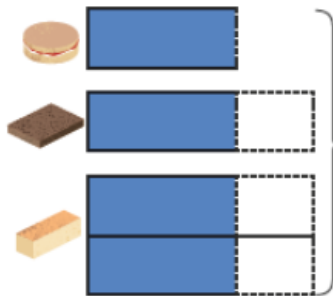
$16\,000 + 17\,000 =$



$$\begin{array}{r} 16\,000 \\ + 17\,000 \\ \hline \end{array}$$

$$\begin{array}{r} 16\,000 \\ + 17\,000 \\ \hline 33\,000 \end{array}$$

$$\begin{array}{r} 16\,000 \\ + 17\,000 \\ \hline 33\,000 \end{array}$$

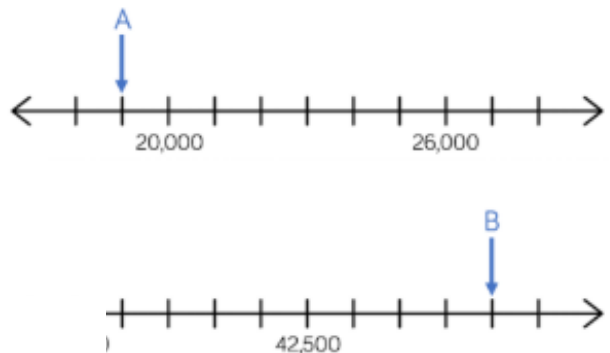


$110\text{ min} - 30\text{ min} = 80\text{ min}$

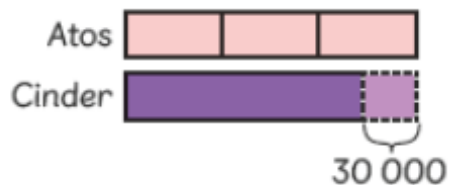
The population of Atos is 30 000 more than that of Cinder.

Number lines

Find the difference between A and B.



Bar Model



Formal calculation

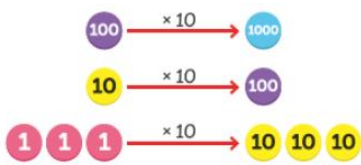
$£3.30 + £8.50 = £11.80$

$$\begin{array}{r} 3.30 \\ + £ 8.50 \\ \hline £ 11.80 \end{array}$$

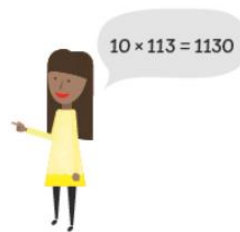
YEAR 6

MULTIPLICATION and DIVISION

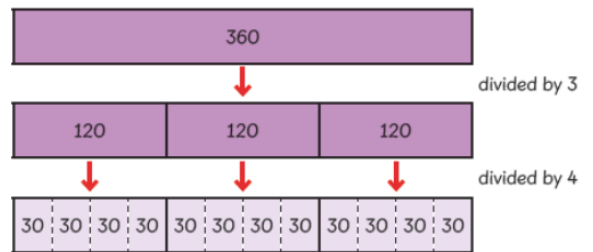
Using place value counters to support calculations



$10 \times 113 = 1130$
 $20 \times 113 = 2260$



Bar Method



Estimating



Estimate 320×31 by calculating 300×30 .

Partitioning

$600 \div 11 = 54 \text{ remainder } 6$



Prime Numbers

Find the factors of 5.



$5 = 1 \times 5$



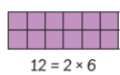
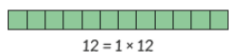
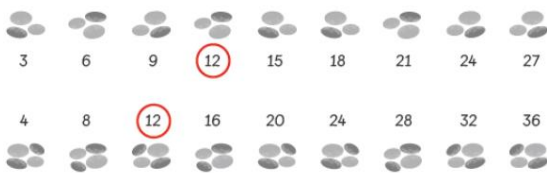
The only way to arrange 5 in a rectangular arrangement is .



5 has only two factors, 1 and itself.
 5 is a prime number.

Common Multiples

2 How many pebbles are there if they can be grouped in 4s as well as 3s?

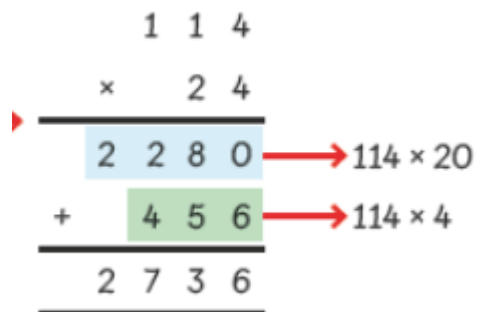


Finding common factors

1, 2, 3, 4, 6 and 12 are factors of 12.



Formal methods



YEAR 6

FRACTIONS

Simplifying Fractions

1 $\frac{2}{8}$

$\frac{2}{8} = \frac{1}{4}$

$2 = 1 \times 2$ $8 = 1 \times 8$
 $2 = 2 \times 1$ $8 = 2 \times 4$

2 is a common factor of 2 and 8.

$\frac{2}{8} = \frac{1}{4}$

$\frac{2}{8} = \frac{1}{4}$

Comparing Fractions

1 Compare $\frac{1}{3}$, $\frac{1}{2}$ and $\frac{3}{4}$.

Using models

I use diagrams.

Making denominators the same

Adding and Subtracting Fractions

1 How much pizza did and eat altogether?

$\frac{1}{2} + \frac{1}{3} = \frac{3}{6} + \frac{2}{6} = \frac{5}{6}$

Using models

They ate $\frac{5}{6}$ of a pizza altogether.

2 Compare $\frac{3}{4}$ and $\frac{5}{6}$.

$\frac{3}{4} = \frac{6}{8} = \frac{9}{12}$
 $\frac{5}{6} = \frac{10}{12}$

$\frac{9}{12} < \frac{10}{12}$

I compare by making the denominator of $\frac{3}{4}$ and $\frac{5}{6}$ the same.

So, $\frac{3}{4} < \frac{5}{6}$

Multiplying Fractions

Using models

$\frac{1}{2} \times \frac{2}{3} = \frac{1}{2} \times \frac{4}{6}$
 $= \frac{2}{6}$
 $= \frac{1}{3}$

Dividing Fractions by a whole number

Hannah's method

$\frac{1}{2} \div 3$
 $= \frac{3}{6} \div 3$
 $= \frac{1}{6}$

Holly's method

$\frac{1}{2} \div 3$
 $= \frac{1}{3} \times \frac{1}{2}$
 $= \frac{1}{6}$

Same denominators

Method 1

$$\frac{1}{2} + \frac{1}{3} = \frac{3}{6} + \frac{2}{6} = \frac{5}{6}$$

$$2 - \frac{5}{6} = 1\frac{6}{6} - \frac{5}{6} = 1\frac{1}{6}$$

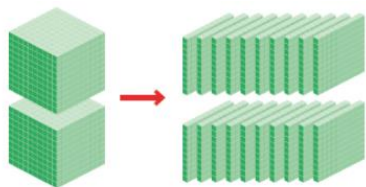
$1\frac{1}{6}$ of the pizza was left.

YEAR 6

DECIMALS

Divide whole numbers

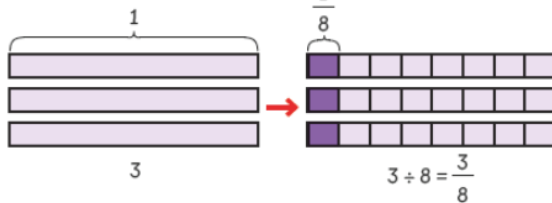
$2 \div 10 = \square$



$$2 \div 10 = 20 \text{ tenths} \div 10 \\ = 2 \text{ tenths} \\ = 0.2$$

Concrete

$3 \div 8 = \square$



Pictorial

$$\begin{array}{r}
 \\
 8 \overline{) 3000} \\
 \underline{- 2400} \\
 6000 \\
 \underline{- 5600} \\
 4000 \\
 \underline{- 4000} \\
 0
 \end{array}$$

Abstract

Multiplying Decimals

$0.2 \times 3 = \square$

Each piece is 0.2 m.



0.23×9

$$0.23 \times 9 = 1.8 + 0.27 = 2.07$$

$$\begin{array}{r}
 \\
 \times 0.23 \\
 \hline
 0.27 \\
 + 1.80 \\
 \hline
 2.07
 \end{array}$$

$$0.2 \times 3 = 2 \text{ tenths} \times 3 \\ = 6 \text{ tenths} \\ = 0.6$$



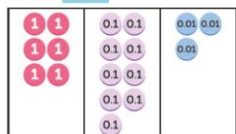
Pictorial

Concrete

Abstract

Dividing Decimals

$6.93 \div 3 = \square$



Concrete

Pictorial

Abstract

$6.42 \div 3 = \square$



$$\begin{array}{r}
 \\
 3 \overline{) 6.42} \\
 \underline{- 6} \\
 0 \\
 \underline{- 0} \\
 0 \\
 \underline{- 0} \\
 0
 \end{array}$$



7

$$\begin{array}{r}
 2.31 \\
 2.31 \\
 2.31 \\
 \hline
 6.93 \div 3 = 2.31
 \end{array}$$

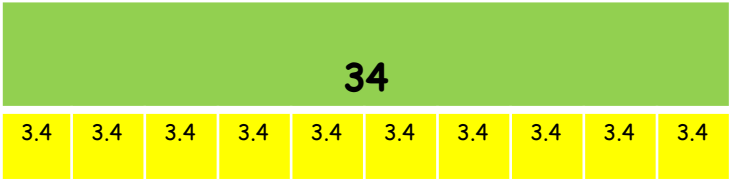
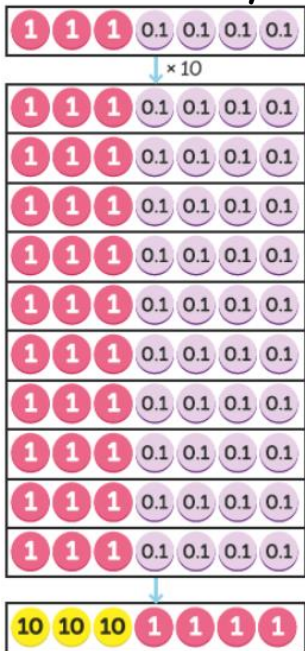
$6.93 \div 3 = 2.31$

YEAR 6

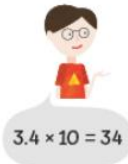
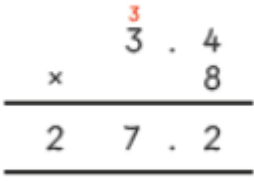
DECIMALS contd

Multiply decimals by a whole number

Pictorial



Abstract

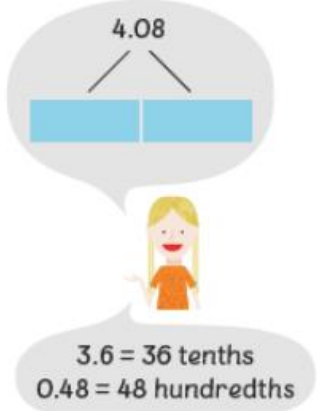
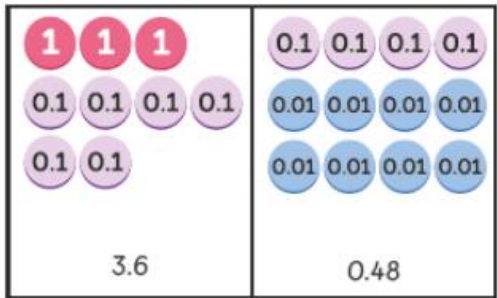


Dividing Decimals by a Whole Number

Pictorial

1 $4.08 \div 12 =$

Concrete



$$36 \text{ tenths} \div 12 = 3 \text{ tenths} = 0.3$$

$$48 \text{ hundredths} \div 12 = 4 \text{ hundredths} = 0.04$$

$$4.08 \div 12 = 0.3 + 0.04 = 0.34$$

Abstract