

St Matthew's C of E Primary School



YEAR 4

CALCULATION POLICY



YEAR 4

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 4

PLACE VALUE

Base ten or dienes blocks:
Thousands/Hundreds/Tens/Ones



2 thousands + 3 hundreds + 4 tens + 5 ones

Partitioning:

$$2345 = 2000 + 300 + 40 + 5$$



2345 is a 4-digit number.



We write 2345 as two thousand, three hundred and forty-five.

Value of digits:

2 thousands + 3 hundreds + 4 tens + 5 ones

thousands	hundreds	tens	ones
2	3	4	5

2345 = 2 thousands + 3 hundreds + 4 tens + 5 ones

2427 = 2000 + 300 + 40 + 5

The digit 2 stands for 2 thousand or 2000.

The digit 3 stands for 3 hundreds or 300.

The digit 4 stands for 4 tens or 40.

The digit 5 stands for 5 ones or 5.

We write 2345 as two thousand, three hundred and forty-five.

Place value cards:

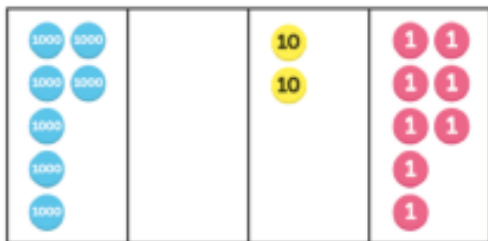
2 thousands + 3 hundreds + 4 tens + 5 ones



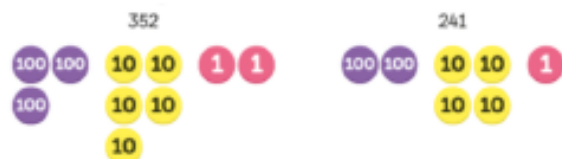
Separating the numbers like this is called **partitioning**.

Place value counters:

7 thousands + 0 hundreds + 2 tens + 8 ones = 7028



Comparing numbers:



352 is more than 241
352 is greater than 241
 $352 > 241$

Number patterns:

What number is 1 more than 1485?

1 4 8 5



This digit changes because we add 1.

$$1485 + 1 = 1486$$

What number is 10 more than 1485?

1 4 8 5



This digit changes because we add 10.

$$1485 + 10 = 1495$$

What number is 100 less than 1485?

1 4 8 5



This digit changes because we subtract 100.

$$1485 - 100 = 1385$$

Comparing numbers:



thousands	hundreds	tens	ones
2	5	0	0



thousands	hundreds	tens	ones
5	8	0	0

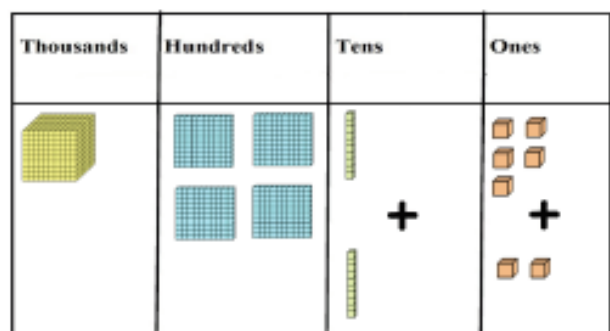
2500 is less than 5800.
 $2500 < 5800$

2500 is less than 5800
 $2500 < 5800$

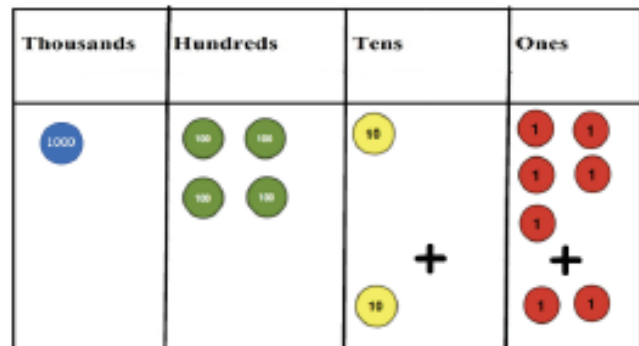
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ADDITION

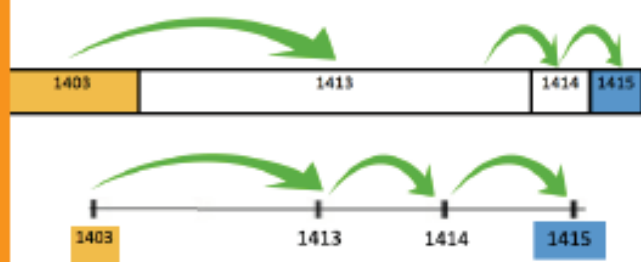
Base 10 method:



Counters method:



Number line method:



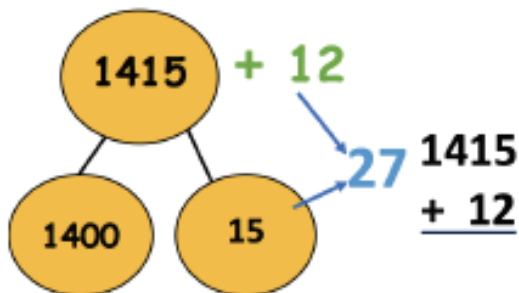
Abstract calculations:

Commutative	Inverse
$1415 + 12 = 1427$	$1427 - 12 = 1415$
$12 + 1415 = 1427$	$1427 - 1415 = 12$

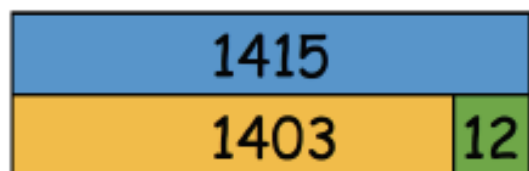
Number bond method:



Number bond method:



Bar model:



Column addition:

Without renaming:

$$\begin{array}{r} 1415 \\ + \quad 12 \\ \hline 1427 \end{array}$$

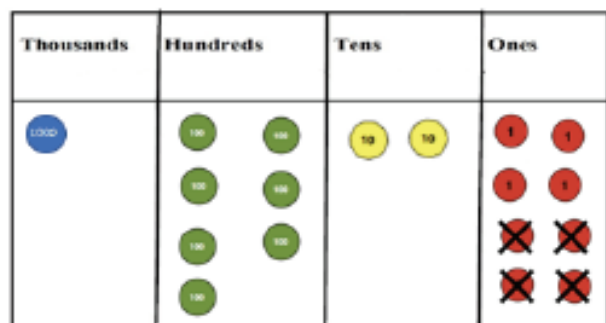
With renaming:

$$\begin{array}{r} 1 \quad 1 \\ 1415 \\ + \quad 96 \\ \hline 1511 \end{array}$$

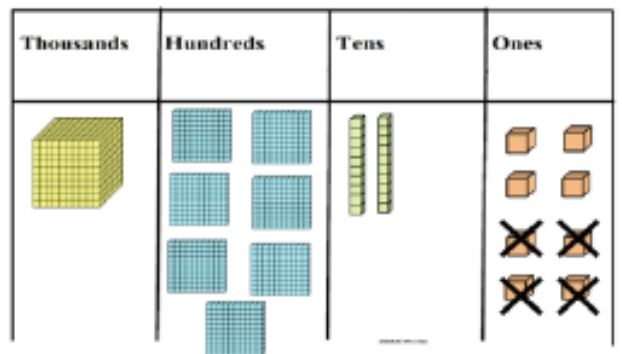
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SUBTRACTION

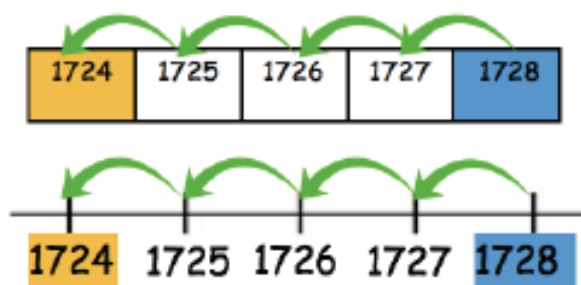
Counters method:



Base 10 method:



Number line method:



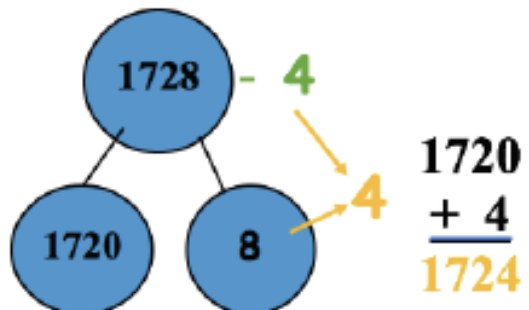
Abstract calculations:

Commutative	Inverse
$1728 - 4 = 1724$	$1724 + 4 = 1728$
$1728 - 1724 = 4$	$4 + 1724 = 1728$

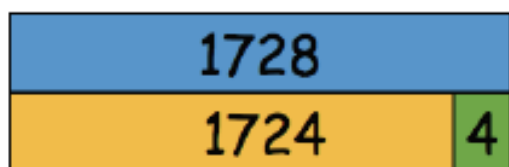
Number bond method:



Number bond method:



Bar model:



Column subtraction:

Without renaming:	With renaming:
$\begin{array}{r} 1728 \\ - \quad 4 \\ \hline 1724 \end{array}$	$\begin{array}{r} 6 \ 11 \ 18 \\ 1728 \\ - \ 349 \\ \hline 379 \end{array}$

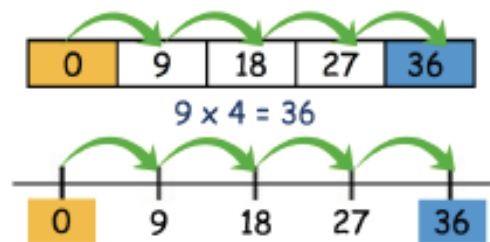
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MULTIPLICATION

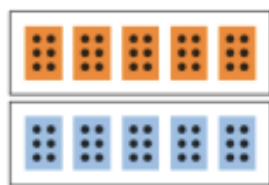
Bar model:



Number line method:



Multiply 3 numbers:



$2 \times 5 \times 6 = 10 \times 6 = 60$

Array method:



$6 \times 3 = 18$ OR $3 \times 6 = 18$

Multiplying by 10:

Method 1

$$\begin{array}{r} 30 \\ 30 \\ 30 \\ 30 \\ 30 \\ 30 \\ 30 \\ 30 \\ + 30 \\ \hline \end{array}$$

Method 2

$9 \times 3 = 27$
 $9 \times 3 \text{ tens} = 27 \text{ tens}$
 $9 \times 30 = 270$

Method 3

$9 \times 30 = 9 \times 3 \times 10$
 $= 27 \times 10$
 $= 27 \text{ tens}$
 $= 270$

What is the product of 9 and 30?
 $9 \times 30 = \square$

Multiplying by 100:

$7 \times 300 = \square$

Method 1

$$\begin{array}{r} 300 \\ 300 \\ 300 \\ 300 \\ 300 \\ 300 \\ + 300 \\ \hline 2100 \end{array}$$

Method 2

$7 \times 3 = 21$
 $7 \times 3 \text{ hundreds} = 21 \text{ hundreds}$
 $7 \times 300 = 2100$

Method 3

$7 \times 300 = 7 \times 3 \times 100$
 $= 21 \times 100$
 $= 21 \text{ hundred}$
 $= 2100$

21 hundreds = 2100

Bridged and short multiplication:

$$\begin{array}{r} 2 3 \\ \times 6 \\ \hline 1 8 \\ + 1 2 0 \\ \hline 1 3 8 \end{array}$$

$$\begin{array}{r} 2 3 \\ \times 6 \\ \hline 1 3 8 \end{array}$$

2 digit x 1 digit

Bridged and short multiplication:

$$\begin{array}{r} 4 7 3 \\ \times 2 \\ \hline 8 4 0 \\ + 9 4 0 \\ \hline 9 4 6 \end{array}$$

$$\begin{array}{r} 4 7 3 \\ \times 2 \\ \hline 9 4 6 \end{array}$$

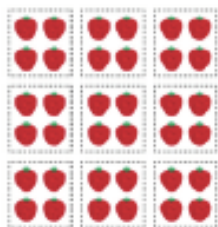
3 digit x 1 digit

YEAR 4

DIVISION

Division by grouping:

Placing into 9 equal groups



$$36 \div 9 = 4$$

Each group has 4 strawberries.

Placing in groups of 9



$$36 \div 9 = 4$$

There are 4 groups.

Grouping with remainders:

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.

Divide using multiplication:

$$24 \div 3 = \underline{8}$$

$$3 \times \underline{8} = 24$$

Dividing by 1, 10 and 100:

$$4 \div 4 = \square \quad 40 \div 4 = \square \quad 400 \div 4 = \square$$
$$4 \div 4 = 1 \quad 40 \div 4 = 10 \quad 400 \div 4 = 100$$

Divide with remainders:

Method 1



Long division

Method 2

$$\begin{array}{r} 6 \text{ tens} \div 6 \\ 6 \overline{) 72} \\ \underline{6} \\ 12 \\ \underline{12} \\ 0 \end{array} \quad \begin{array}{r} 6 \text{ tens} \div 6 \\ 6 \overline{) 75} \\ \underline{6} \\ 15 \\ \underline{12} \\ 3 \end{array} \quad \begin{array}{r} 6 \text{ tens} \div 6 \\ 6 \overline{) 75} \\ \underline{6} \\ 15 \\ \underline{12} \\ 3 \end{array} \quad \begin{array}{r} 12 \text{ ones} \div 6 \\ 12 \overline{) 30} \\ \underline{12} \\ 18 \\ \underline{18} \\ 0 \end{array}$$

$75 \div 6 = 12 \text{ remainder } 3$

Part-part-whole method

Divide without remainders:

Method 1



Long division

Method 2

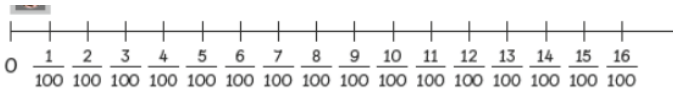
4 hundreds \div 4

$$\begin{array}{r} 100 \\ 4 \overline{) 408} \\ \underline{4} \\ 08 \\ \underline{08} \\ 0 \end{array} \quad \begin{array}{r} 100 \\ 4 \overline{) 408} \\ \underline{4} \\ 08 \\ \underline{08} \\ 0 \end{array} \quad \begin{array}{r} 100 \\ 4 \overline{) 408} \\ \underline{4} \\ 08 \\ \underline{08} \\ 0 \end{array}$$

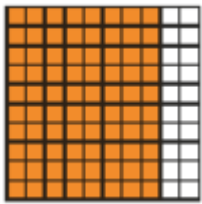
5 ones \div 4

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FRACTIONS

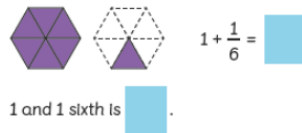


Number lines

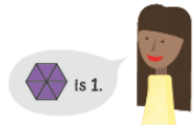


Hundred Squares

Mixed Number Fractions

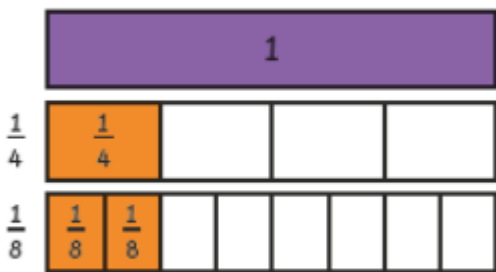


1 and 1 sixth is $1\frac{1}{6}$.



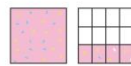
Is $\frac{1}{4} = \frac{2}{8} = \frac{3}{4}$?

Equivalent Fractions



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

Simplifying Fractions



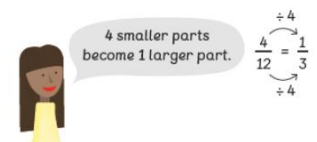
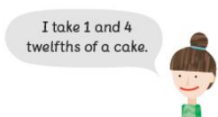
$$1 + \frac{4}{12} = 1\frac{4}{12}$$

$1\frac{4}{12}$ can be simplified.



$$1\frac{4}{12} = 1\frac{1}{3}$$

$1\frac{1}{3}$ is the simplest form.



Subtracting Fractions

$\frac{3}{5}$ and $\frac{4}{5}$ make 1 and $\frac{2}{5}$.

$$1\frac{2}{5}$$

Adding Fractions



$$1 - \frac{3}{4} = \frac{1}{4}$$

$$1\frac{1}{4} - \frac{3}{4} = \frac{1}{4} + \frac{1}{4} = \frac{2}{4}$$

$$1\frac{1}{4} - \frac{3}{4} = \frac{1}{2}$$

There is $\frac{1}{2}$ kg of flour left in the sack.



$$1 - \frac{3}{4} = \frac{1}{4}$$

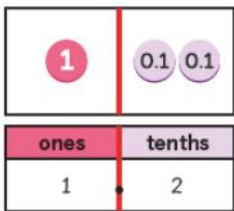


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DECIMALS

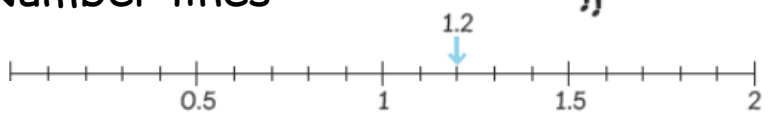
Place Value Counters

uses 1, 0.1, 0.1 to show 1.2.



We read 1.2 as one and two tenths.

Number lines



Compare and Order Decimals

Place Value Charts

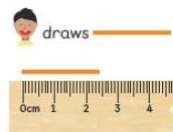
makes

tens	ones	tenths	hundredths
0	8	1	3

The digit 3 stands for $\frac{3}{100}$.

8.13 is read as eight and thirteen hundredths.

Rounding Decimals



It is 2.4 cm long.

It is nearer to 2 cm than to 3 cm. It is about 2 cm long.

2.4 is approximately equal to 2.
 $2.4 \approx 2$

Number Patterns/ Sequences

What rule am I using?

0.3, 0.4, 0.5, 0.6, 0.7, ...

What's my rule?

0.36, 0.35, 0.34, 0.33, ...

$$\begin{aligned} 20 + 10 &= 2 \\ 3 + 10 &= 0.3 \\ 23 + 10 &= 2.3 \end{aligned}$$

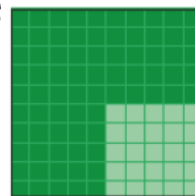
I get 2.3 sheets of paper.

tens	ones	tenths	+10	tens	ones	tenths
2	3			2	3	

What do you notice when a number is divided by 10?

Writing fractions as Decimals

Method 1



$$\frac{3}{4} = 75 \text{ hundredths} \\ = 0.75$$

Method 2

$$\begin{aligned} &\times 25 \\ \frac{3}{4} &= \frac{\quad}{100} \\ &\times 25 \\ \frac{3}{4} &= \frac{75}{100} \\ &= 0.75 \end{aligned}$$

Dividing whole numbers by 10 and 100