



# YEAR 4

## MAIN PRINCIPLES

### 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.

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## PLACE VALUE

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



2 thousands + 3 hundreds + 4 tens + 5 ones

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

2347 = 2000 + 300 + 40 + 5

The digit 2 stands for 2 thousand or 2000.

The digit 3 stands for 3 hundreds or 300.

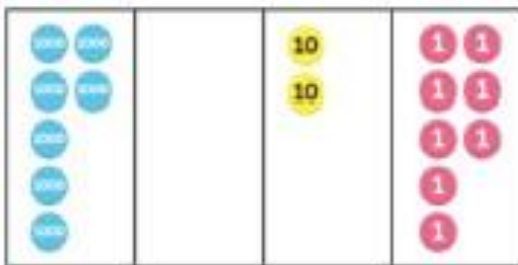
The digit 4 stands for 4 tens or 40.

The digit 5 stands for 5 ones or 5.

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

Place value counters:

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



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

$$1485 - 100 = 1385$$

Partitioning:

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



2345 is a 4-digit number.



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

Place value cards:

2 thousands + 3 hundreds + 4 tens + 5 ones

2 0 0 0

3 0 0

4 0

5



Separating the numbers like this is called partitioning.

Comparing numbers:

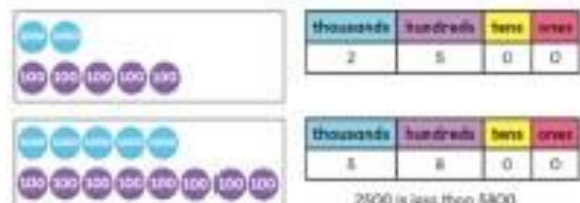


352 is more than 241

352 is greater than 241

$$352 > 241$$

Comparing numbers:



2500 is less than 5800.  
 $2500 < 5800$

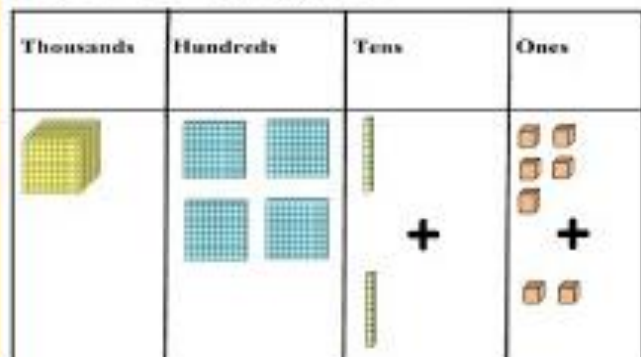
2500 is less than 5800

$$2500 < 5800$$

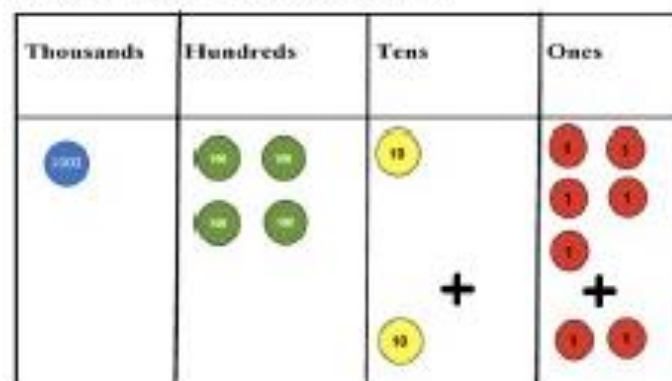
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## ADDITION

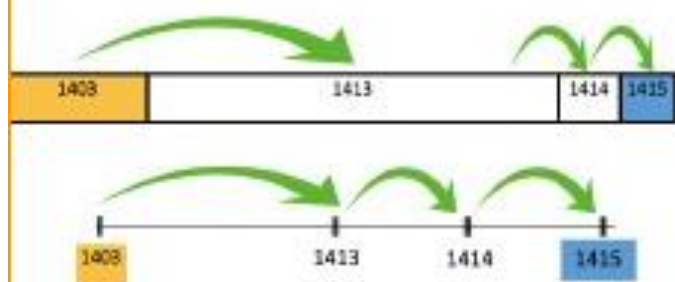
Base 10 method:



Counters method:



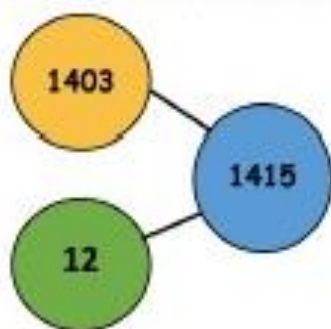
Number line method:



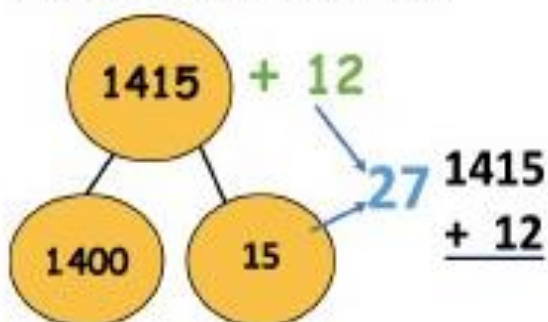
Abstract calculations:

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

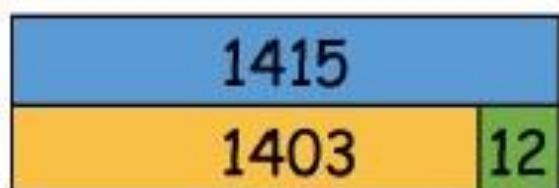
Number bond method:



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

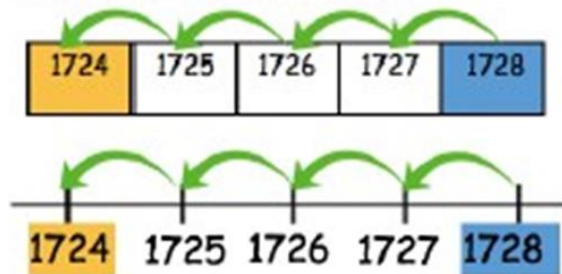
Counters method:

Thousands	Hundreds	Tens	Ones
1000	700 700	20 20	8 8 8 8 X X X X

Base 10 method:

Thousands	Hundreds	Tens	Ones
1000	700 700	20 20	8 8 8 8 X X X X

Number line method:



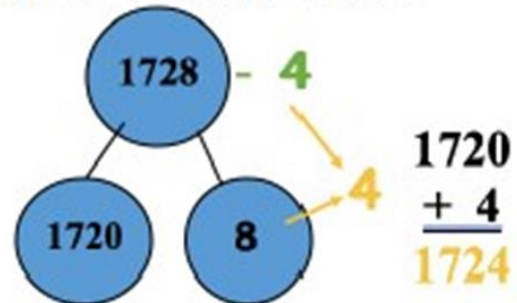
Abstract calculations:

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

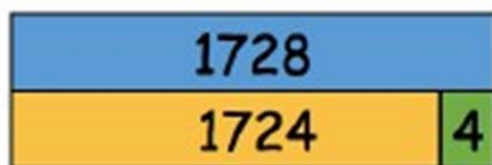
Number bond method:



Number bond method:



Bar model:



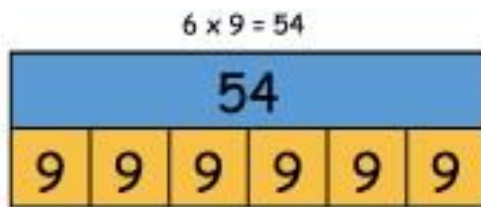
Column subtraction:

Without renaming:	With renaming:
$\begin{array}{r} 1728 \\ - \quad 4 \\ \hline 1724 \end{array}$	$\begin{array}{r} 6 \ 11 \ 18 \\ 1 \ 7 \ 2 \ 8 \\ - \ 3 \ 4 \ 9 \\ \hline 3 \ 7 \ 9 \end{array}$

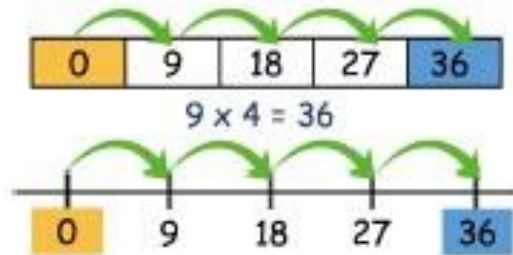
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## MULTIPLICATION

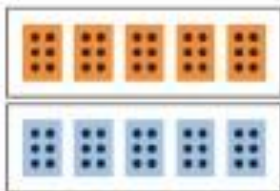
Bar model:



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

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

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

Multiplying by 100:

$7 \times 300 = \square$

Method 1

$$\begin{array}{r} 500 \\ 300 \\ 300 \\ 300 \\ 300 \\ 300 \\ + 300 \\ \hline 2100 \end{array}$$

Method 2

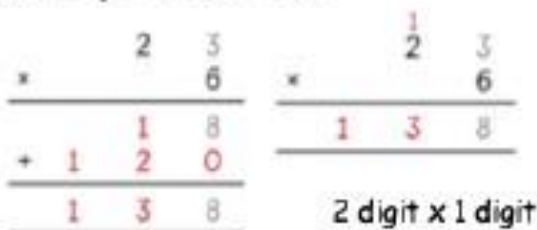
$7 \times 3 = 21$   
 $7 \times 3 \text{ hundreds} = 21 \text{ hundreds}$   
 $7 \times 300 = 2100$

Method 3

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

21 hundreds = 2100

Bridged and short multiplication:



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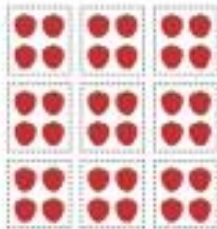


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## DIVISION

### Division by grouping:

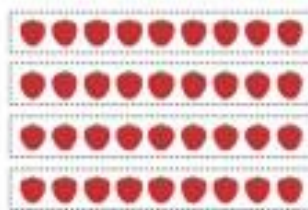
Placing into 9 equal groups



$$36 \div 9 = 4$$

Each group has 4 strawberries.

Placing in groups of 9

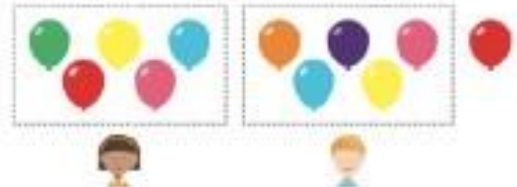


$$36 \div 9 = 4$$

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:

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

### Divide with remainders:

Method 1

Divide 30. Divide 12. What's left? 6

Method 2

Part-part-whole method

Long division

12  $\times$  3 = 36 remainder 0 (quotient)

### Divide without remainders:

Method 1

Divide 400. Divide 8.

Part-part-whole method

Method 2

4 hundreds  $\div$  8

8 ones  $\div$  8

Long division