

YEAR 5

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.

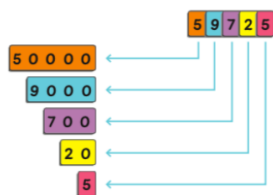


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PLACE VALUE

Value of digits - up to 1,000,000

ten thousands	thousands	hundreds	tens	ones
5	9	7	2	5

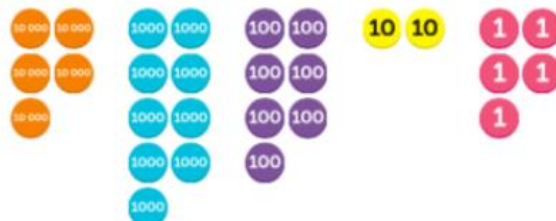


Place value counters



One hundred and twenty thousand, one hundred and ten

Show 59 725 using number discs.



Comparing and ordering



makes the following numbers.

1	8	2	3	0	0	182 300
2	3	6	7	0		23 670
2	3	6	6	5		23 665

182 300 is the greatest.



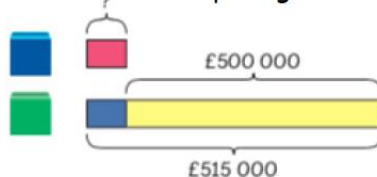
23 665 is less than 23 670.

$$23\ 665 < 23\ 670 < 182\ 300$$



Find the price of each object.

Comparing numbers



Number patterns

Method 1 Make a list.

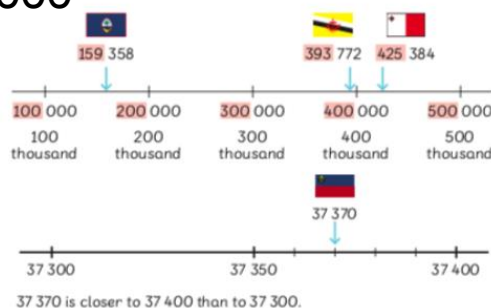
- 515 000
- 415 000
- 315 000
- 215 000
- 115 000
- 15 000

Count back.

Is it possible to use subtraction?



Rounding to the nearest 1000, 10,000, 100,000



Number lines

Method 2 Use a number line.

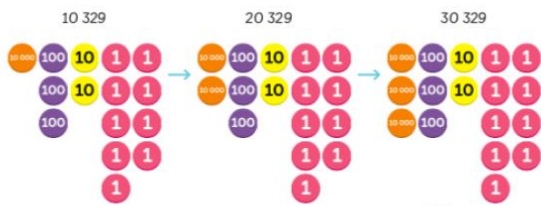
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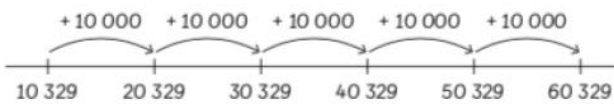
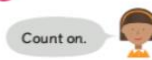
37 370 is closer to 37 400 than to 37 300.

YEAR 5

ADDITION



Adding by counting on

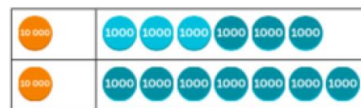


10 329, 20 329, 30 329, 40 329, 50 329, 60 329

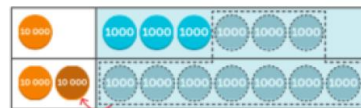


Using place value counters to support column addition

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



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



$$\begin{array}{r} 16\,000 \\ + 17\,000 \\ \hline 3\,000 \end{array}$$

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

	A	B	C
1	Date	Trip	Fare
2	13 September	Airport to Hotel	150 000
3	14 September	Hotel to Office	40 000
4		Office to Hotel	45 000
5	15 September	Hotel to Office	43 000
6		Office to Hotel	42 000
7		Hotel to Restaurant	25 000
8		Restaurant to Hotel	21 000
9	16 September	Hotel to Office	46 000
10		Office to Airport	150 000
11			
12		Total for Taxi Fare	562 000

I round each amount to the nearest 10 000.



$$\begin{array}{r} 40\,000 \\ 40\,000 \\ + 40\,000 \\ \hline 120\,000 \end{array}$$



$$37 + 12 = \square$$

$$\begin{array}{r} 37\,000 \\ + 12\,000 \\ \hline \end{array}$$

Rounding to add by estimate

Adding key facts to simplify

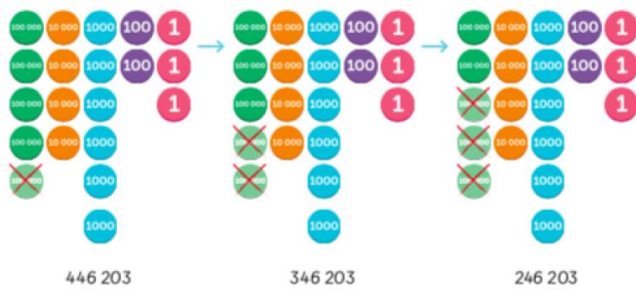


$$120 + 120 = \square$$

$$\begin{array}{r} 120\,000 \\ + 120\,000 \\ \hline \end{array}$$

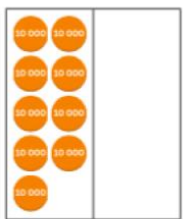
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SUBTRACTION



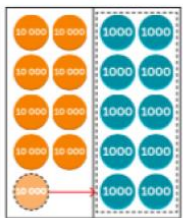
546 203, 446 203, 346 203, 246 203

Subtracting by counting back



There are not enough 1000 to subtract 4000.

$$\begin{array}{r} 90\ 000 \\ - 54\ 000 \\ \hline \end{array}$$



Rename 90 000.

$$\begin{array}{r} 90\ 000 \\ \swarrow \quad \searrow \\ 80\ 000 \quad 10\ 000 \end{array}$$

$$\begin{array}{r} 8\ 10\ 000 \\ - 9\ 000 \\ - 54\ 000 \\ \hline \end{array}$$

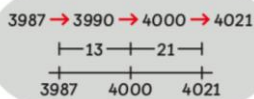
$$\begin{array}{r} 8\ 10\ 000 \\ - 9\ 000 \\ - 54\ 000 \\ \hline 36\ 000 \end{array}$$

Place value counters to visually support column subtraction

Learning mental strategies

4021 - 3987 =

5



80 123 - 79 654 =

$$\begin{array}{r} 80\ 123 \\ - 79\ 654 \\ \hline \end{array}$$

$$\begin{array}{r} 79\ 11\ 23 \\ - 79\ 654 \\ \hline \end{array}$$

$$\begin{array}{r} 79\ 11\ 12\ 3 \\ - 79\ 654 \\ \hline \end{array}$$

$$\begin{array}{r} 79\ 10\ 11\ 13 \\ - 79\ 654 \\ \hline 469 \end{array}$$

Regrouping in each place value column



Take 1 thousand from 80 thousands to make 11 hundreds.



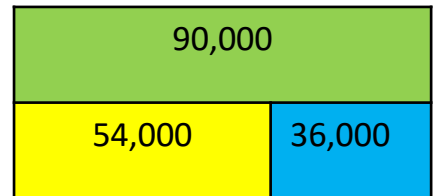
Take 1 hundred from 11 hundreds to make 12 tens.

Take 1 ten from 12 tens to make 13 ones.

Check by estimating.



Bar Method



Partitioning

Method 1

$$\begin{array}{r} 600 \\ \swarrow \quad \searrow \\ 400 \quad 200 \\ - 345 \\ \hline 55 \end{array}$$

600 - 345 = 200 + 55



Method 2

$$\begin{array}{r} 600 \\ \swarrow \quad \downarrow \quad \searrow \\ 500 \quad 90 \quad 10 \\ - 300 \quad - 40 \quad - 5 \\ \hline 200 \quad 50 \quad 5 \end{array}$$

600 - 345 = 200 + 50 + 5



YEAR 5

MULTIPLICATION

Finding multiples

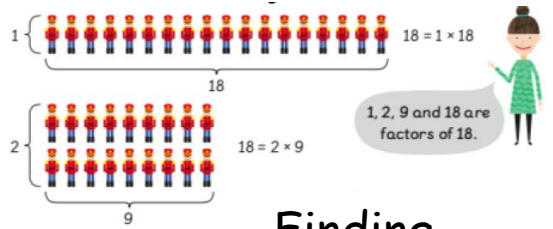


$1 \times 6 = 6$

$2 \times 6 = 12$

$3 \times 6 = 18$

1	2	3	4	5	6
7	8	9	10	11	12
13	14	15	16	17	18
19	20	21	22	23	24



Finding factors

Prime Numbers

number	factors
5	1 and 5
7	1 and 7
4	1, 2 and 4
9	1, 3 and 9
6	1, 2, 3 and 6
8	1, 2, 4 and 8

5 and 7 are prime numbers.

4, 9, 6 and 8 are not prime numbers.

Common Factors

Find the common factors of 48 and 64.

$48 = 1 \times 48$

$64 = 1 \times 64$

$48 = 2 \times 24$

$64 = 2 \times 32$

$48 = 3 \times 16$

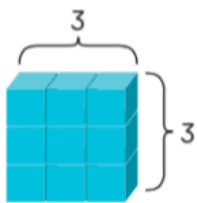
$64 = 4 \times 16$

$48 = 4 \times 12$

$64 = 8 \times 8$

$48 = 6 \times 8$

The common factors of 48 and 64 are 1, 2, 4, 8 and 16.



$9 = 3 \times 3 = 3^2$

Square and cube numbers



$27 = 3 \times 3 \times 3 = 3^3$

27 is a cube.

Multiplying by 10, 100, 1000

12×10	12×100	12×1000
10 10 10 10 10 10 10 10 10 10 10 10	100 100 100 100 100 100 100 100 100 100	1000 1000 1000 1000 1000 1000 1000 1000 1000 1000
$12 \times 10 = 12 \times 1$ ten = 12 tens	$12 \times 100 = 12 \times 1$ hundred = 12 hundreds	$12 \times 1000 = 12 \times 1$ thousand = 12 thousands

120

1200

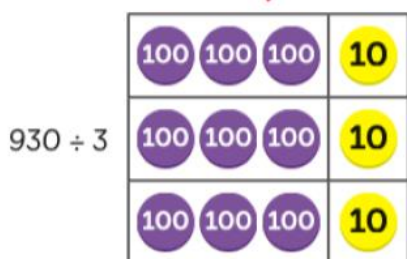
12 000



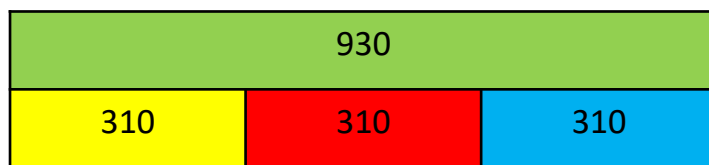
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DIVISION

Using place value Counters

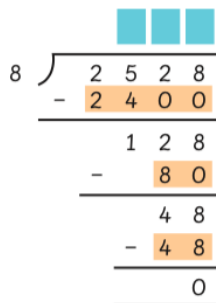
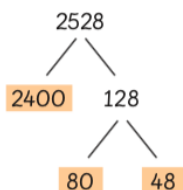


Bar Method

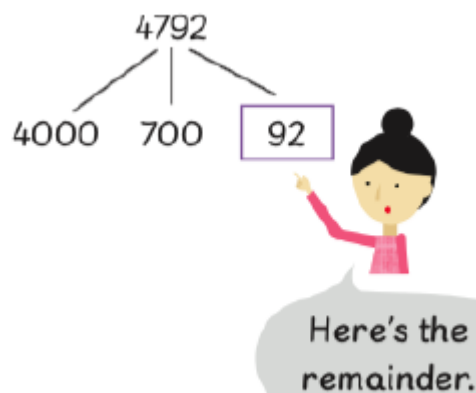


Dividing using long division

$2528 \text{ ml} \div 8 =$



Partitioning



Using known facts

3 What is the largest weight of tomatoes that can be bought with ?

mass	price
1 lb	75p
2 lbs	$2 \times 75\text{p} = 150\text{p}$
4 lbs	$4 \times 75\text{p} = 300\text{p}$
6 lbs	$6 \times 75\text{p} = 450\text{p}$



Can we get 7 lbs with ?

Can we get more than 6 lbs with ?



Short Division

$$4 \overline{) 108} \rightarrow 4 \overline{) 10^2 8}$$

$$3 \overline{) 51} \rightarrow 3 \overline{) 5^1 1}$$

YEAR 5

FRACTIONS

Simplifying Fractions

$\frac{6}{10} = \frac{\square}{5}$

Write $\frac{6}{10}$ in its simplest form.

$\frac{6}{10} = \frac{3}{5}$

$\div 2$

Equivalent Fractions

$\frac{4}{5} = \frac{8}{10}$

$\frac{4}{5} = \frac{80}{100}$

Comparing and ordering fractions

Compare $1\frac{3}{10}$ and $1\frac{2}{5}$.

$1\frac{3}{10} < 1\frac{4}{10}$

$1\frac{2}{5} = 1\frac{4}{10}$

$1\frac{3}{10}$ has the least water.

Adding fractions with different denominators

We need to make the denominators equal before adding.

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

$= \frac{3}{6}$

$= \frac{1}{2}$

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

Elliott ate half a pizza in all.

Subtracting fractions with different denominators

Find the difference between $\frac{7}{8}$ and $\frac{3}{4}$.

$\frac{7}{8} - \frac{3}{4} = \frac{7}{8} - \frac{6}{8} = \frac{1}{8}$

Multiplying Fractions

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

$5 \times 1\frac{2}{3} = 5 \times \frac{5}{3}$

$= \frac{25}{3}$

$= 8\frac{1}{3}$

They had $8\frac{1}{3}$ mini cake rolls.

YEAR 5 DECIMALS

Place value counters up to thousandths

0.102 1 tenth and 2 thousandths	
0.012 1 hundredth and 2 thousandths	
0.021 2 hundredths and 1 thousandth	

Comparing and ordering decimals

1 Write 0.4 as a fraction.

0.4 is 4 tenths. $0.4 = \frac{4}{10}$

0.4 is also 40 hundredths. $0.4 = \frac{40}{100}$

's method

$$2.125 = 2 \frac{125}{1000}$$

$$2.15 = 2 \frac{15}{100} = 2 \frac{150}{1000}$$

$$2.5 = 2 \frac{5}{10} = 2 \frac{500}{1000}$$

125 thousandths < 150 thousandths < 500 thousandths

2.5 kg is the heaviest of the three masses.

Write Fractions as decimals

Write each fraction as a decimal.

$\frac{7}{10} = 7 \text{ tenths} = 0.7$

$\frac{3}{5} = \frac{6}{10} = 6 \text{ tenths} = 0.6$

$\frac{17}{25} = \frac{34}{50} = \frac{\quad}{100} = \quad \text{hundredths} = \quad$

$\frac{13}{20} = \frac{\quad}{100} = \quad \text{hundredths}$

Adding and subtracting decimals

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

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

11 tenths = 1 one and 1 tenth

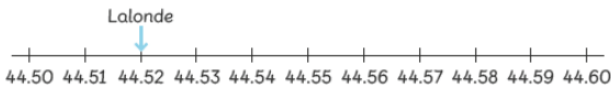
$$\begin{array}{r} \\ \\ \\ \\ \hline \\ \\ \\ \hline \end{array}$$

Now we can subtract. Is this the smallest possible difference?

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

Rounding Decimals

Round these times to the nearest tenth of a second.



44.52 s is closer to 44.5 s than to 44.6 s.