

Calculations Policy



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Maths- No Problem! EYFS to Year 6

Maths – No Problem! is an evidence – based approach developed in Singapore. It is fully aligned with the 2014 English National Curriculum for Maths.

The Maths – No Problem! Primary Series was assessed by the DfE’s expert panel, which judged that it met the core criteria for a high-quality textbook to support teaching for mastery.

By incorporating established learning research into a highly effective approach, Singapore has become a “laboratory of maths teaching”. The Primary Maths Series is founded on the international research of Piaget, Dienes, Bruner, Skemp and Vygotsky and has been tested and refined over the last 30 years in Singapore.

Teaching Maths for Mastery

The whole class works through the programme of study at the same pace with ample time on each topic before moving on. Ideas are revisited at higher levels as the curriculum spirals through the years.

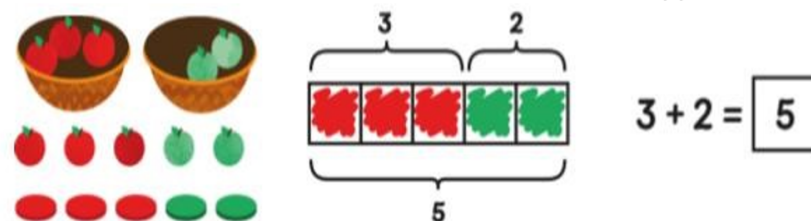
Differentiated activities

Tasks and activities are designed to be easy for children to enter while still containing challenging components. For advanced learners, the textbooks also contain non-routine questions for children to develop their higher-order thinking skills.

Problem Solving

Lessons and activities are designed to be taught using problem-solving approaches to encourage children’s higher-level thinking. The focus is on working with children’s core competencies, building on what they know to develop their relational understanding.

Concrete, Pictorial, Abstract (CPA) approach



Concrete

Concrete is the “doing” stage. This stage brings concepts to life by allowing children to experience and handle physical (concrete) objects. For example, if a problem involves adding pieces of fruit, children can first handle actual fruit.

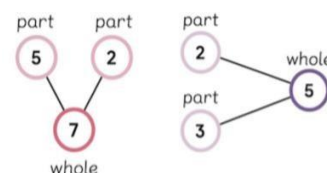
Pictorial

Pictorial is the “seeing” stage. Here, the visual representations of concrete objects are used to model problems. This stage encourages children to make a mental connection between the physical object they just handle and the abstract pictures, diagrams or models that represent the objects from the problem.

Abstract

Abstract is the “symbolic” stage. Children use abstract symbols to model problems and need a solid understanding of the concrete and pictorial stages of the problem. Children are introduced to the concept at a symbolic level, using only numbers, notation, and mathematical symbols.

Number Bonds: Number bonds show how numbers are split or combined. An essential strategy of Singapore maths, number bonds reflect the 'part – part – whole' relationship of numbers. Number bonds are represented by circles connected by lines.



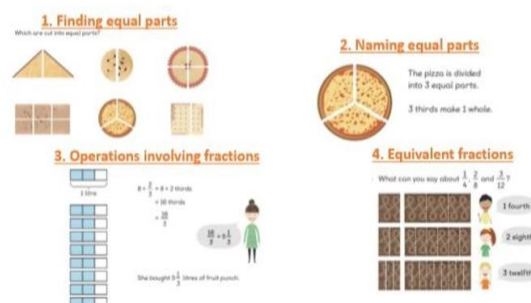
Bar Modelling: Bar modelling is an essential maths mastery strategy.

A Singapore-style of maths model, bar modelling, allows children to draw and visualise mathematical concepts to solve problems.

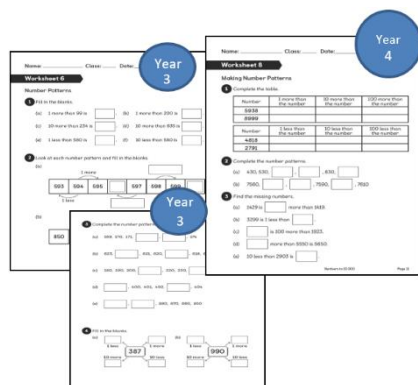


where children use paper squares and strips to learn the link between the concrete and the abstract.

Fractions: In Singapore, the understanding of fractions is rooted in the (CPA) model,



Variations: The questions and examples are carefully varied by expert authors to encourage children to think about the maths. Rather than provide a mechanical repetition, the examples are designed to deepen.



Structure of lessons

In Focus

Includes questions related to various lesson objectives as an introductory activity for pupils.

Let's Learn

Introduces new concepts through CPA approach with the use of engaging pictures and manipulatives. Guided examples are provided for reinforcement.

Guided Practice

Comprises questions for further consolidation and for the immediate evaluation for children's learning.

Mind Workout

Challenging non-routine questions for pupils to apply relevant heuristics and to develop higher-order thinking skills.

Activity Time

Provides pupils with opportunities to work as individuals or in small groups to explore mathematical concepts or to play games.

Maths Journal

Provides children with opportunities to show their understanding of the mathematical concepts learnt.

Self-Check

Allows children to assess their own learning after each chapter.

EYFS Mathematics Policy

One to One Correspondence: Children first learn to count using one to one correspondence. Children will be encouraged to say a number each time they touch an object.



Using Physical Resources: Children begin by practically taking away one or adding one more. They will also be able to use drawings to support them.

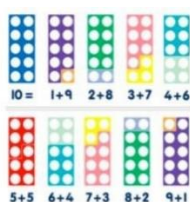
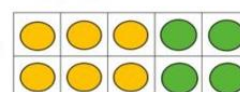
Numicon: Children will be able to use Numicon to count, as well as ordering them from smallest to biggest to create their own number line. Children should be able to see which Numicon shape is one more or one less.



Recognising Numerals: Children learn to recognise numerals to 20. They are beginning to match the numeral with the correct corresponding quantity.

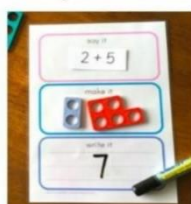
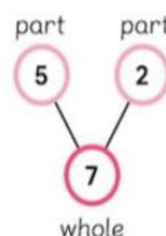
Number Bonds using Tens Frame: Children will be able to use a tens frame to find number bonds to 10.

Tens frame:



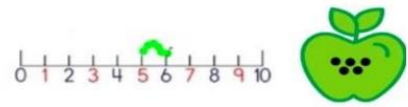
Number Bonds using Numicon: Children will be able to use Numicon to find number bonds to 10.

Part-Part- Whole Model: Children will use the part-part-whole diagram to add and subtract numbers.



Alongside the part-part-whole diagram, children will use Numicon and practical resources to add and subtract numbers. Children will be confident to say and write calculations using the + and – signs.

Number Lines: Children will be able to use a number line to count as well as using it to take away or add one. This will be for numbers up to 20.



What does the National Curriculum say?

Key stage 1 - Years 1 and 2

- The principal focus of mathematics teaching in key stage 1 is to ensure that pupils develop confidence and mental fluency with whole numbers, counting and place value. This should involve working with numerals, words and the 4 operations, including with practical resources.
- At this stage, pupils should develop their ability to recognise, describe, draw, compare and sort different shapes and use the related vocabulary. Teaching should also involve using a range of measures to describe and compare different quantities.
- By the end of year 2, pupils should know the number bonds to 20 and be precise in using and understanding place value.
- Pupils should read and spell mathematical vocabulary, at a level consistent with their increasing word reading and spelling knowledge at key stage 1.

Lower KS2

- The principal focus of mathematics teaching in lower key stage 2 is to ensure that pupils become increasingly fluent with whole numbers and the 4 operations, including number facts and the concept of place value. This should ensure that pupils develop efficient written and mental methods and perform calculations accurately with increasingly large whole numbers.
- Pupils should develop their ability to solve a range of problems, including with simple fractions and decimal place value.
- Pupils are encouraged to draw with increasing accuracy and develop mathematical reasoning so they can analyse shapes and their properties. It should ensure that they can use measuring instruments with accuracy and make connections between measure and number.
- By the end of year 4, pupils should have memorised their multiplication tables up to and including the 12-multiplication table and show precision and fluency in their work.
- Pupils should read and spell mathematical vocabulary correctly and confidently, using their growing word reading knowledge and their knowledge of spelling

Upper KS2

- The principal focus of mathematics teaching in upper key stage 2 is to ensure that pupils extend their understanding of the number system and place value to include larger integers. This should develop the connections that pupils make between multiplication and division with fractions, decimals, percentages and ratio.
- Pupils should develop their ability to solve a wider range of problems, including increasingly complex properties of numbers and arithmetic, and problems demanding efficient written and mental methods of calculation. With this foundation in arithmetic, pupils are introduced to the language of algebra as a means for solving a variety of problems.
- Teaching in geometry and measures should consolidate and extend knowledge developed in number. Teaching should also ensure that pupils classify shapes with increasingly complex geometric properties and that they learn the vocabulary they need to describe them.

- By the end of year 6, pupils should be fluent in written methods for all 4 operations, including long multiplication and division, and in working with fractions, decimals and percentages.
- Pupils should read, spell and pronounce mathematical vocabulary correctly.

Year 1 Mathematics Policy

Place Value – Counting

Counting to 10:



We can count on:



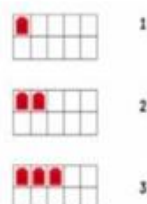
We can count back:



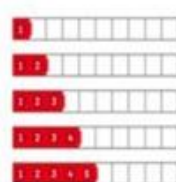
We count with objects:



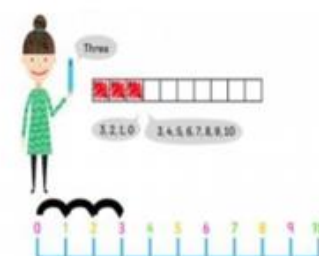
Physical objects



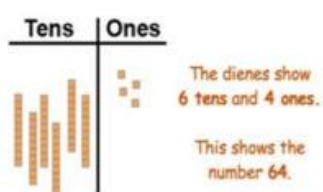
Tens square



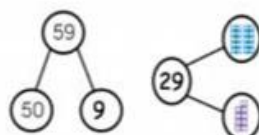
Multilink cubes



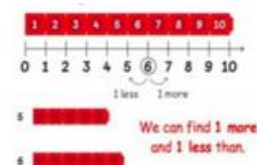
Number lines



Dienes to represent numbers



Number bond method



Ordering numbers

There are 3 cupcakes.

There are 5 cookies.

There are 7 doughnuts.

Which number is more than the others?
Which number is less than the others?

7 is more than 5.
7 is more than 3.
7 is the greatest.

3 is less than 7.
3 is less than 5.
3 is the smallest.

Comparing numbers

1
one

2
two

3
three

Writing numbers to 10

Addition

How many eggs are there in total?

$2 + 5 = 7$

Number line method

$7 = 5 + \square$

Abstract calculations

(a)

$\square + \square = \square$

(b)

$\square + \square = \square$

(c)

$\square + \square = \square$

Pictorial method

Put 5 cupcakes on two plates.

whole 5

part 2

part 3

2 and 3 make 5.

This is a number bond.

Number bond method

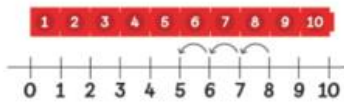
Subtraction



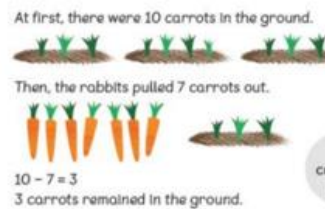
Subtract by crossing out



Subtract by number bonds

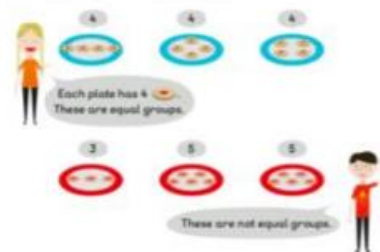


Subtract by counting back

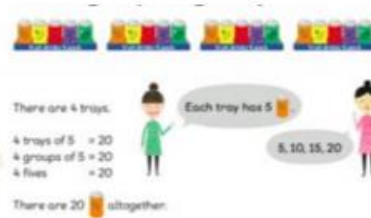


Subtract by writing stories

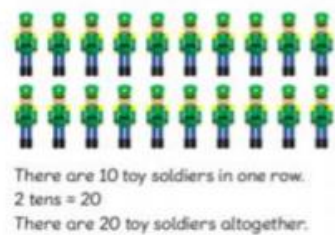
Multiplication



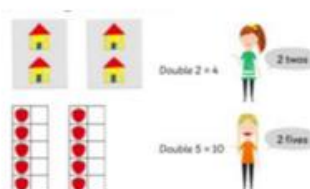
Making equal groups



Adding equal groups



Making equal rows



Making Double

Division

There are 8 cans.



There are 4 boxes of 2 cans.

Grouping equally

There are 6 cookies and 3 children.
Each child takes one cookie.



Each child takes one more cookie.



Each child gets 2 cookies.

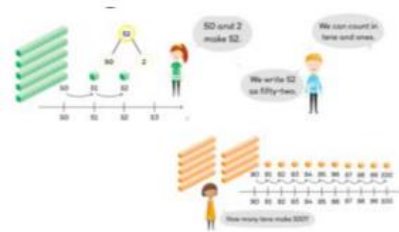
Sharing equally

Year 2 Mathematics Policy

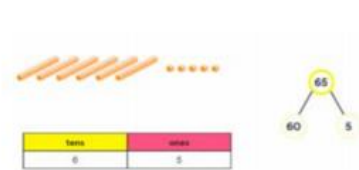
Place Value



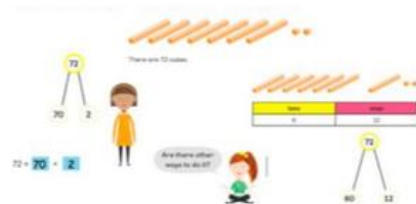
Counting in tens to 100



Counting in tens and ones



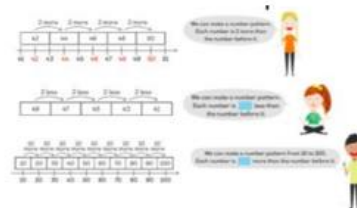
Represent two-digit numbers



Make numbers using different number bonds



Comparing numbers



Extend number patterns

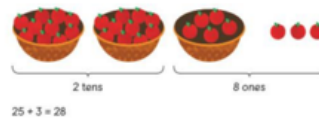


Find the missing numbers in patterns

Addition



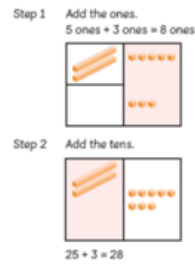
Number line method



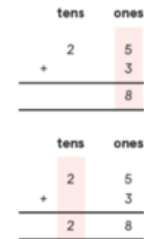
Pictorial method



Partitioning method



Deines method

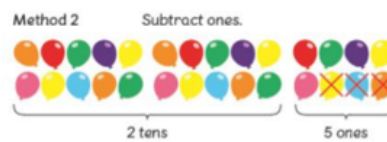


Column method

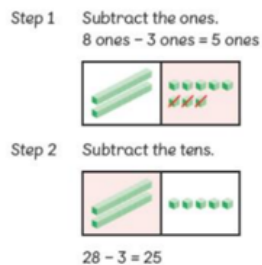
Subtraction



Number line method



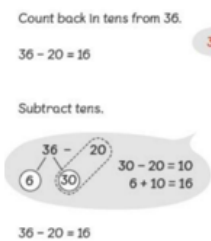
Pictorial method



Deines method



Column method



Partitioning method

Multiplication

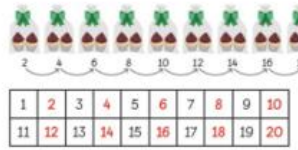
$$3 + 3 + 3 + 3 = 12$$

$$4 \text{ threes} = 12$$

$$4 \text{ groups of } 3 = 12$$

$$4 \times 3 = 12$$

Repeated addition



Pictorial to abstract



How many cupcakes are there altogether?

Grouping method

Multiply.

(a) $2 \times 5 =$

$3 \times 5 =$

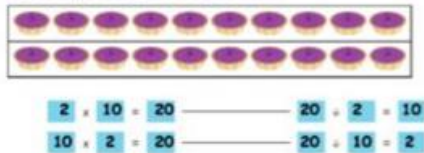
(b) $4 \times 5 =$

$5 \times 5 =$

Abstract method

Division

Look at the picture.
Make a family of multiplication and division facts.



Make a family of multiplication and division facts

Ruby has 15 marshmallows.
She packs 5 marshmallows into each bag.
How many bags does Ruby need?

Method 1 Use to stand for .
Use for each bag.

Ruby has 15 marshmallows.
She packs 5 marshmallows into each bag.
How many bags does Ruby need?

Method 2 Draw a picture.

Ruby has 15 marshmallows.
She packs 5 marshmallows into each bag.
How many bags does Ruby need?

Method 3 Use a division equation.

$$15 \div 5 = 3$$

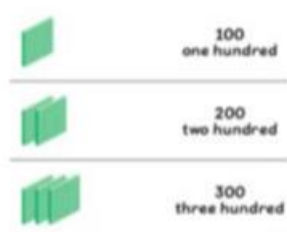
Ruby needs **3** bags.

Solving problems

Year 3 Mathematics Policy

Place Value

Re-capping methods taught in Year 1 and Year 2.



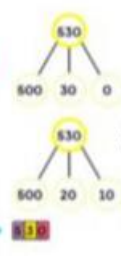
What is the value of each digit in 530?

hundreds	tens	ones
5	3	0

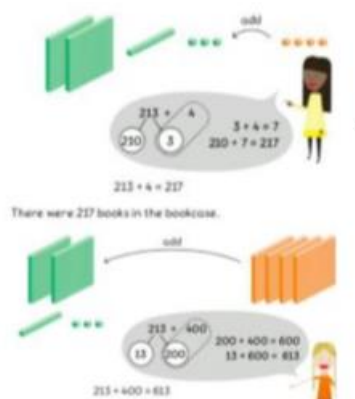
530 = hundreds + tens + ones

530 = + +

The value of the digit 5 is 500.
The value of the digit 3 is 30.
The value of the digit 0 is 0.



Numbers to 1000



Adding ones, tens and hundreds

Addition- No renaming



Beginning practically with dienes before moving onto column addition. Number bond method is taught alongside both methods.

Addition- With renaming

1 (a) $153 + 2 =$
 (b) $153 + 20 =$
 (c) $153 + 200 =$

2 (a) $214 + 3 =$
 (b) $214 + 30 =$
 (c) $214 + 300 =$

3 (a) $325 + 14 =$

	h	t	o
	3	2	5
+		1	4
<hr/>			
	<input type="text"/>	<input type="text"/>	<input type="text"/>

(b) $236 + 543 =$

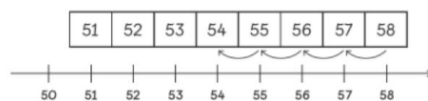
	h	t	o
	2	3	6
+	5	4	3
<hr/>			
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Expected to solve a larger number of abstract calculations. Secure understanding of place value to 1000.

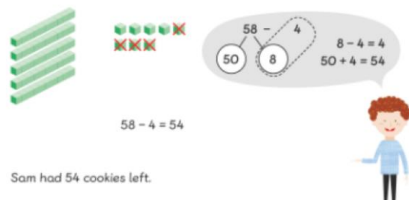
Secure understanding of place value to 1000.

Subtraction

Method 1 Count back from 58.



Method 2 Subtract ones.

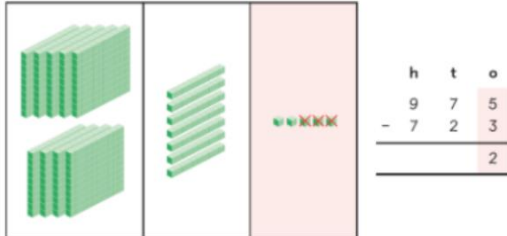


Subtraction numbers within 1000

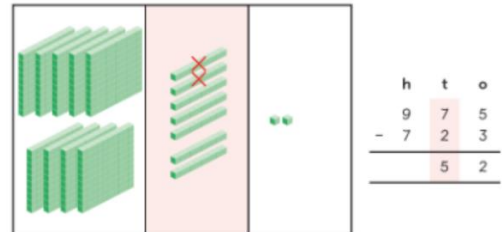
Subtraction- no regrouping- Beginning practically with dienes before moving onto column subtraction. Number bond method is taught alongside both methods.

Subtract 723 from 975.

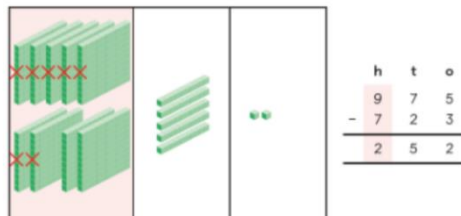
Step 1 Subtract the ones.
5 ones - 3 ones = 2 ones



Step 2 Subtract the tens.
7 tens - 2 tens = 5 tens



Step 3 Subtract the hundreds.
9 hundreds - 7 hundreds = 2 hundreds



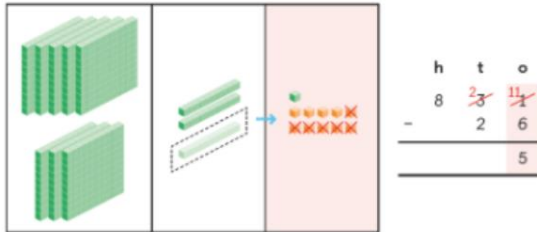
$$975 - 723 = 252$$

There were 252 beads left in the jar.

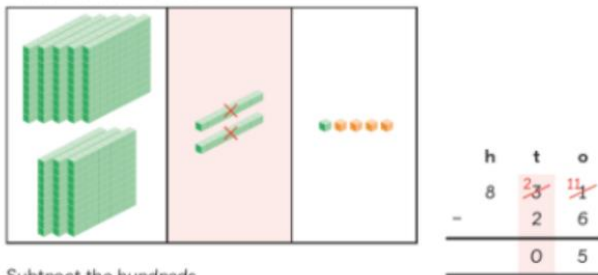
Subtraction- with regrouping

Subtract 26 from 831.

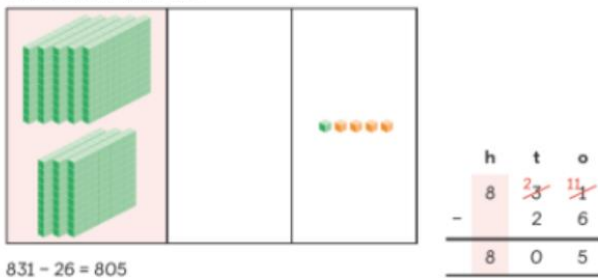
Step 1 Regroup 1 ten into 10 ones.
Subtract the ones.
 $11 \text{ ones} - 6 \text{ ones} = 5 \text{ ones}$



Step 2 Subtract the tens.
 $2 \text{ tens} - 2 \text{ tens} = 0 \text{ tens}$



Step 3 Subtract the hundreds.



$$831 - 26 = 805$$

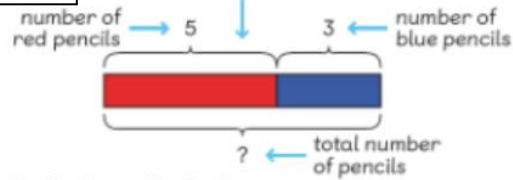
Beginning practically with Dienes before moving onto column subtraction. Number bond method is taught alongside both methods.

Bar Model Method

Use   to show the number of pencils.

Concrete

Pictorial



$$5 + 3 = 8 \text{ or } 3 + 5 = 8$$

There are 8 pencils altogether.

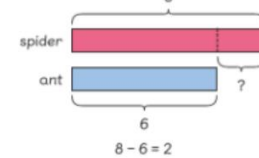
Abstract

Draw bars to show each number.



How many more legs does a spider have than an ant?

A spider has 8 legs.
An ant has 6 legs.



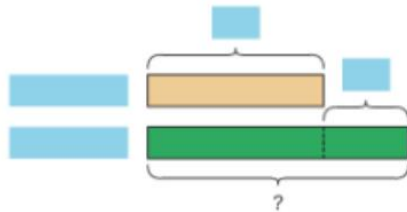
$8 - 6 = 2$
A spider has 2 more legs than an ant.

Draw bars to show each number.



Applying addition and subtraction skills to word problems with bar models to assist.

Lulu has 205 beads.
Holly has 40 more beads than Lulu.
How many beads does Holly have?




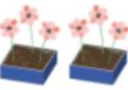

   = 
Holly has  beads.

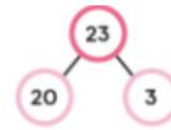
Who has more beads?

Should we add or subtract?



Multiplication

	1 group of 3 $1 \times 3 = 3$
<hr/>	
	2 groups of 3 $2 \times 3 = 6$
<hr/>	
	3 groups of 3 $3 \times 3 = 9$
<hr/>	



Step 1 Multiply the ones by 2.

$$3 \text{ ones} \times 2 = 6 \text{ ones}$$

Step 2 Multiply the tens by 2.

$$2 \text{ tens} \times 2 = 4 \text{ tens}$$

Step 3 Add the products.

$$6 + 40 = 46$$

$$23 \times 2 = 46$$

	t	o
	2	3
\times		4
	1	2
$+$	8	0
	9	2

Step 2

	h	t	o
		2	3
\times		8	
	1	8	4

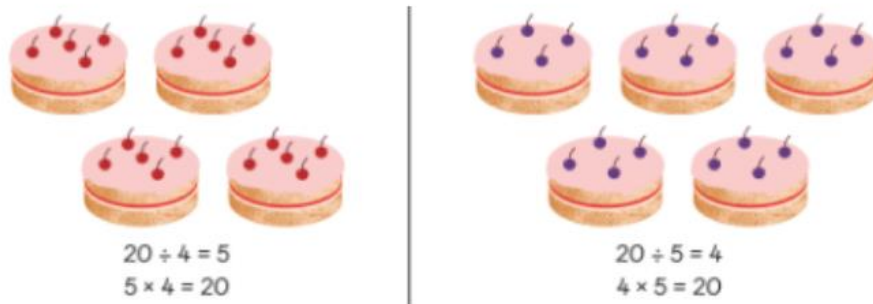
$$23 \times 8 = 184$$

The product of 23 and 8 is 184.

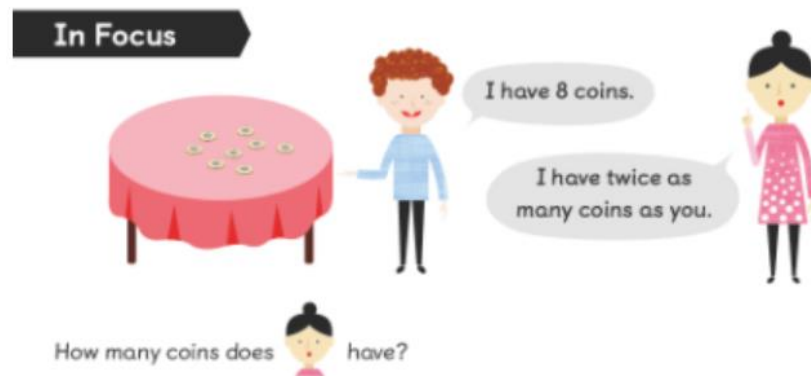
2 tens \times 8 = 16 tens
16 tens + 2 tens = 18 tens



Division



We can make a family of multiplication and division equations.



Let's Learn

1

Method 1 $8 + 8 = 16$

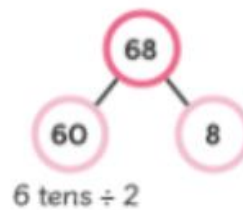
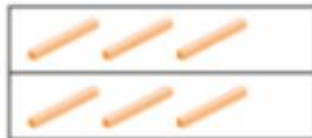
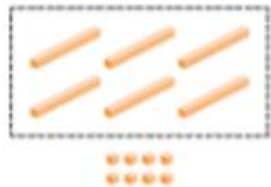
Method 2 $2 \times 8 = 16$

has 16 coins.

To find the number of sweets each person gets, divide 68 by 2.

$$68 \div 2 = \square$$

Step 1 Divide 6 tens by 2.

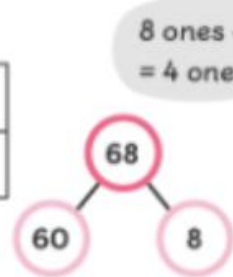
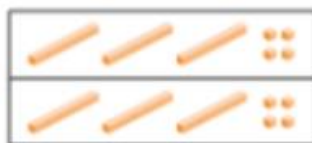


6 tens \div 2
= 3 tens



Number Bond
Method

Step 2 Divide 8 ones by 2.



8 ones \div 2
= 4 ones

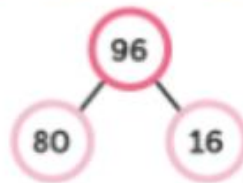


Step 3 Add the results.

$$68 \div 2 = 30 + 4 = 34$$

Each person gets 34 sweets.

6 tens \div 2 8 ones \div 2



First, I take 80 from 96.
Then, I take 16 from
the remaining 16.

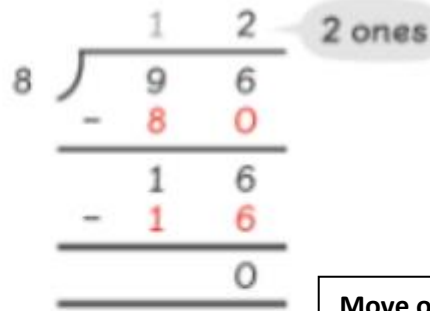
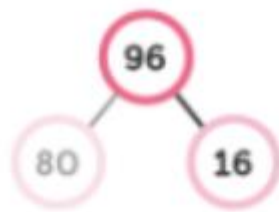
$$\begin{array}{r} 12 \\ 8 \overline{) 96} \\ \underline{- 80} \\ 16 \\ \underline{- 16} \\ 0 \end{array}$$

Long Division
Method



$$\begin{array}{r} 12 \\ 8 \overline{) 96} \\ \underline{- 80} \\ 16 \\ \underline{- 16} \\ 0 \end{array}$$

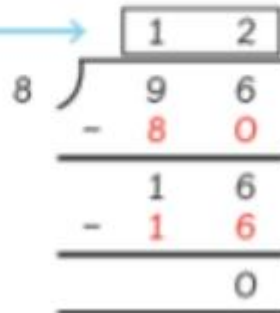
8 tens \div 8 = 1 ten



$$16 \text{ ones} \div 8 = 2 \text{ ones}$$

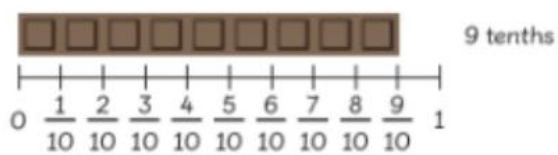
$$1 \text{ ten} + 2 \text{ ones} = \boxed{12}$$

$$96 \div 8 = 12$$



Move onto problem solving involving these methods and bar models

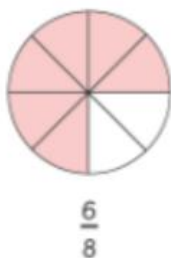
Fractions



9 tenths



Tenths



$\frac{6}{8}$ is equal to $\frac{3}{4}$.

$$\frac{6}{8} = \frac{3}{4}$$

They are equivalent fractions.

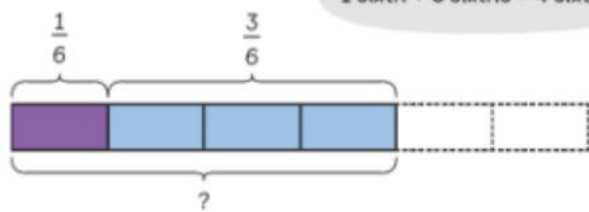
$\frac{3}{4}$ is the simplest form of $\frac{6}{8}$.

Amira is correct.



Finding equivalent and simplifying fractions.

Add $\frac{1}{6}$ and $\frac{3}{6}$.



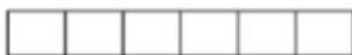
1 sixth + 3 sixths = 4 sixths

$$\frac{1}{6} + \frac{3}{6} = \frac{4}{6}$$



Adding Fractions

(b) $\frac{5}{6}$ of 18 =

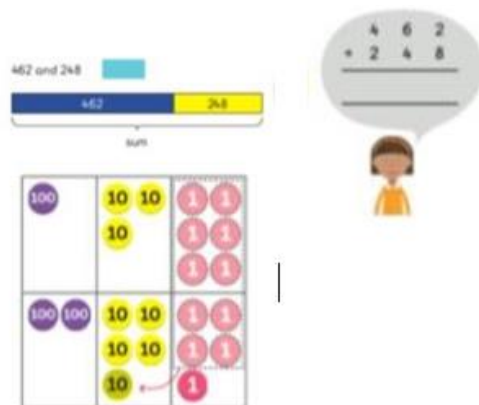


Move onto problem solving involving these methods and bar models.

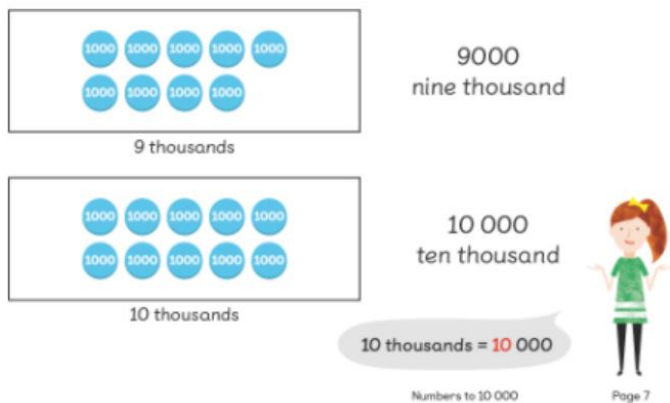
Year 4 Mathematics Policy

Place Value

Re-capping methods taught in Year 3, as well as applying it to measure problems straight away (e.g. money).

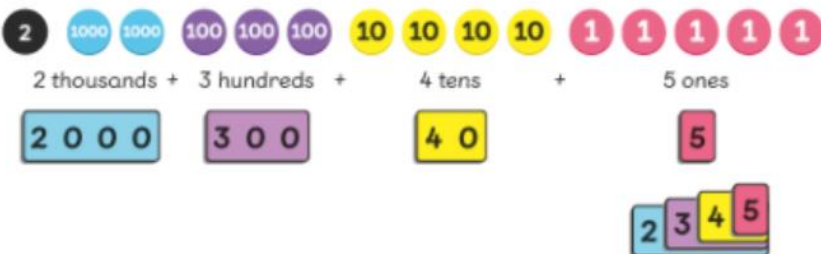


Numbers to 10,000





2 thousands + 3 hundreds + 4 tens + 5 ones



Use a place-value chart.

2 thousands + 3 hundreds + 4 tens + 5 ones

thousands	hundreds	tens	ones
2	3	4	5



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

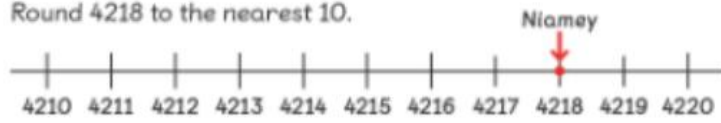


We write 2345 as two thousand, three hundred and forty-five.

2345 is a 4-digit number.

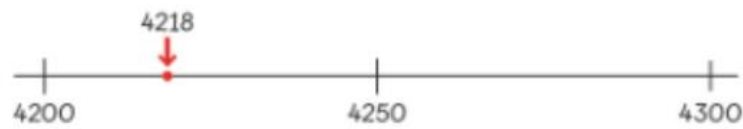


Round 4218 to the nearest 10.



4218 is between 4210 and 4220.

Round 4218 to the nearest 100.

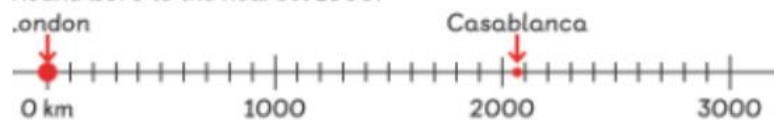


4218 is between 4200 and 4300.

4218 is closer to 4200 than to 4300.
4218 is 4200 when rounded to the nearest 100.



Round 2078 to the nearest 1000.



2078 is between 2000 and 3000.

2078 is closer to 2000 than to 3000.

We say 2078 is 2000 when rounded to the nearest 1000.



In Focus

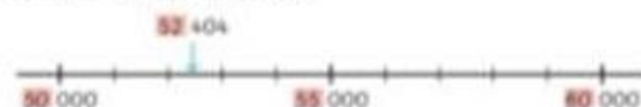


Ravi's mother went shopping.

She bought a handbag for £58, a pair of shoes for £73 and a dress for £35.

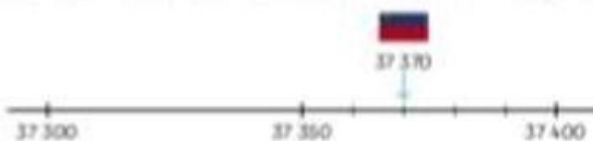
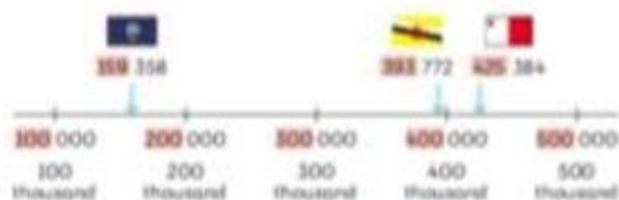
Estimate the total cost of these three items.

St James' Park can seat 52 404.



52 404 is closer to 50 000 than to 60 000.

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



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

Addition

Children are expected to be secure in methods taught in Year 3.

Let's estimate.

5	7	0	0
+	1	2	0
<hr/>			
6	9	0	0

Children are expected to estimate answers to check accuracy

Find the sum of 2034 and 9.



$$2034 + 10 = 2044$$

$$2034 + 9 = 2043 \quad \text{1 less}$$

Why is the sum 1 less?

Learning mental strategies to add

Find the sum of 98 and 4142 by adding mentally.

$$98 + 4142 = \boxed{}$$

make 100

$$98 + 4142 = 100 + 4140$$

$$= 4240$$

Addition – No renaming

In Focus



saved £2314.



saved £4240 more than



saved.

How much did



save?

Let's Learn

1



2314

4240

?

We need to find the sum of 2314 and 4240.



2

Find the sum of 2314 and 4240.

1000 1000	100 100 100	10	1 1 1 1
1000 1000 1000 1000	100 100	10 10 10 10	

Use number discs to help you.



$$\begin{array}{r}
 2 \ 3 \ 1 \ 4 \\
 + \ 4 \ 2 \ 4 \ 0 \\
 \hline
 6 \ 5 \ 5 \ 4
 \end{array}$$



Step 1

Add the ones.
4 ones + 0 ones = 4 ones

Step 2

Add the tens.
1 tens + 4 tens = 5 tens

Step 3

Add the hundreds.
3 hundreds + 2 hundreds = 5 hundreds

Step 4

Add the thousands.
2 thousands + 4 thousands = 6 thousands

$$2314 + 4240 = 6554$$



saved £6554.

Subtraction- No regrouping

- 1 Find the difference between 358 and 128.



$$358 - 128 = \square$$

When we subtract numbers,
we get the difference.



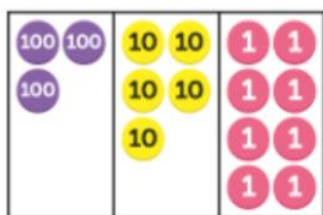
Use base-ten blocks



$$\begin{array}{r}
 3 \ 5 \ 8 \\
 - \ 1 \ 2 \ 8 \\
 \hline
 2 \ 3 \ 0
 \end{array}$$

The difference between 358 and 128 is 230.

- 2 Find the difference between 358 and 129.

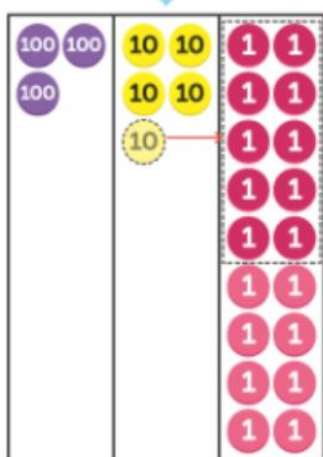


There are not enough ones.

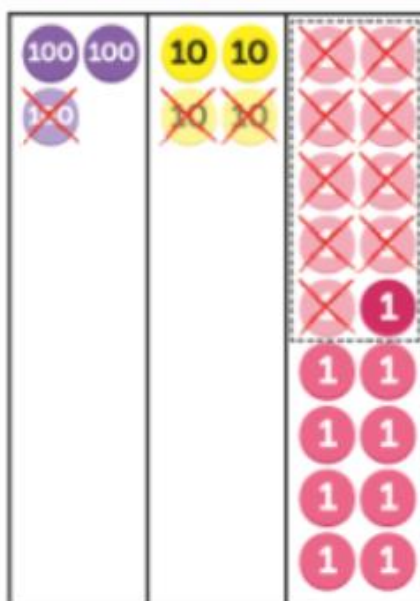


$$\begin{array}{c} 358 \\ \swarrow \quad \downarrow \quad \searrow \\ 300 \quad 40 \quad 18 \end{array}$$

358



subtract
129



$$\begin{array}{r} 358 \\ \begin{array}{r} \swarrow \quad \downarrow \quad \searrow \\ 300 \quad 40 \quad 18 \\ - 100 \quad - 20 \quad - 9 \\ \hline 200 \quad 20 \quad 9 \end{array} \end{array}$$

$$\begin{array}{r} 3 \quad 5 \quad 18 \\ - 1 \quad 2 \quad 9 \\ \hline 2 \quad 2 \quad 9 \end{array}$$

$$358 - 129 = 229$$

The difference between 358 and 129 is 229.

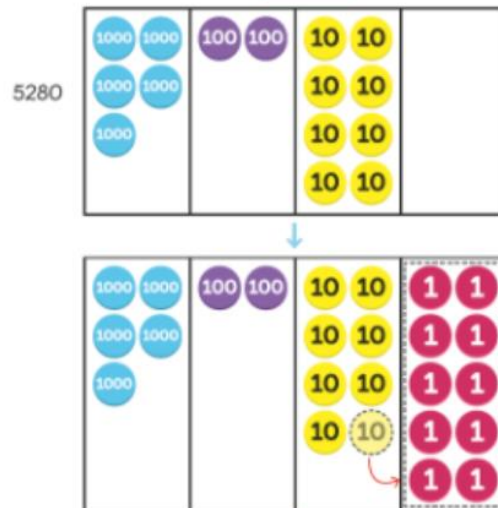
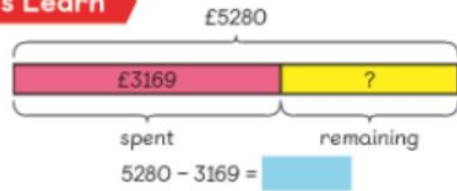
Subtraction- With regrouping

In Focus

After Ruby spent £3169, how much was left?

Let's Learn

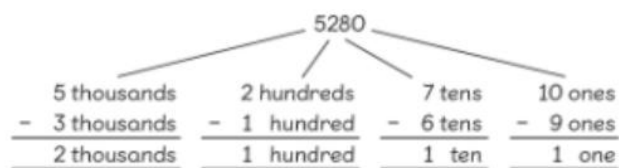
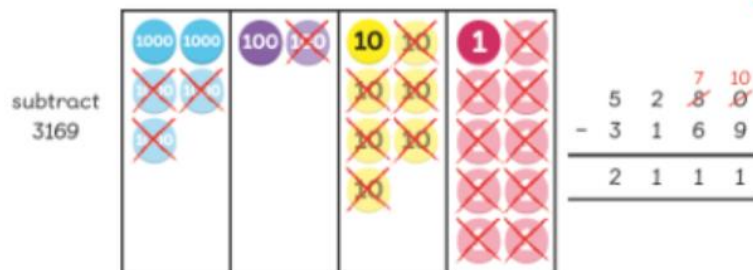
I have £5280 with me.



There aren't enough ones.



$$\begin{array}{r}
 5 \quad 2 \quad \overset{7}{\cancel{8}} \quad \overset{10}{\cancel{0}} \\
 - 3 \quad 1 \quad 6 \quad 9 \\
 \hline
 \end{array}$$



$$5280 - 3169 = 2111$$

£2111 was left.

$$\begin{array}{r}
 2 \quad 1 \quad 1 \quad 1 \\
 + 3 \quad 1 \quad 6 \quad 9 \\
 \hline
 5 \quad 2 \quad 8 \quad 0
 \end{array}$$



Bar Model Method

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

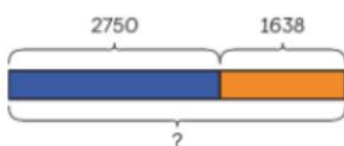


Let's Learn

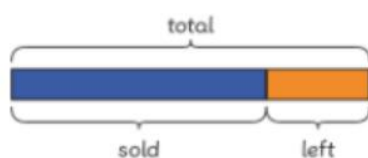
1 Understand the problem

Who?	 baker
What?	 cookies

Make a plan



Find the total number of cookies he made.



Then, subtract the number of cookies sold.



Carry out the plan

$$2750 + 1638 = 4388$$

The baker baked 4388 cookies.

$$4388 - 3195 = 1193$$

He had 1193 cookies left.

Check

Cookies sold	3195
Cookies left	1193
Cookies baked	4388

$$\begin{array}{r} 1 \\ 2750 \\ + 1638 \\ \hline 4388 \end{array}$$

$$\begin{array}{r} 2 \quad 18 \\ 4388 \\ - 3195 \\ \hline 1193 \end{array}$$

$$\begin{array}{r} 3195 \\ + 1193 \\ \hline 4388 \end{array}$$



In Focus

On Saturday, 3018 people attended a funfair. 850 more people attended the funfair on Saturday than attended it on Sunday.

Altogether, how many people attended the funfair over the two days?



Let's Learn

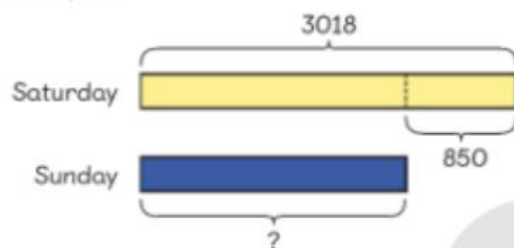
1 Understand the problem

Who?	 people
What?	funfair

Make a plan



Carry out the plan



$$3018 - 850 = 2168$$

2168 people attended the funfair on Sunday.

$$\begin{array}{r} \text{Saturday} \quad 3 \quad 0 \quad 1 \quad 8 \\ \text{Sunday} \quad + \quad 2 \quad 1 \quad 6 \quad 8 \\ \hline 5 \quad 1 \quad 8 \quad 6 \end{array}$$

$$3018 + 2168 = 5186$$

Altogether, 5186 people attended the funfair over the two days.



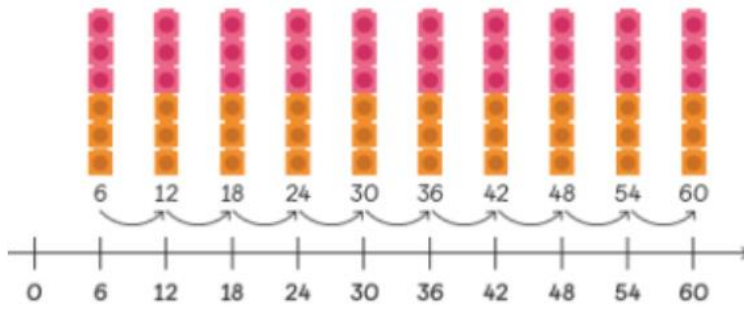
Multiplication



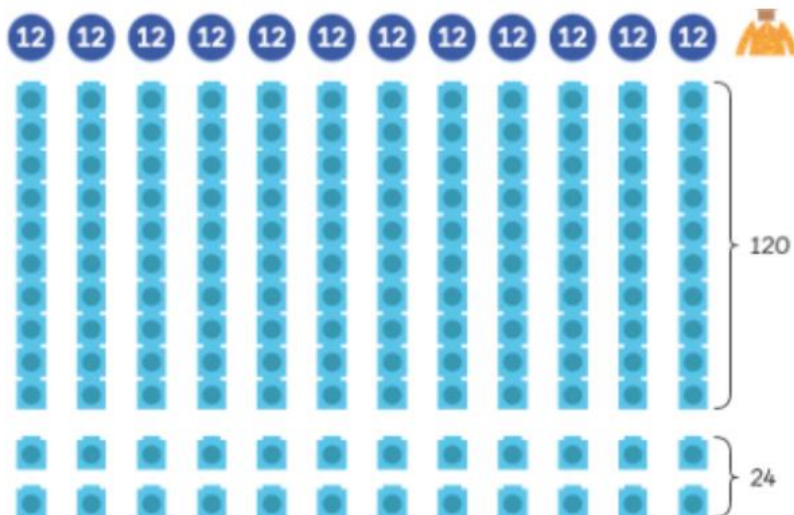
2 groups of 6
 $2 \times 6 = 12$

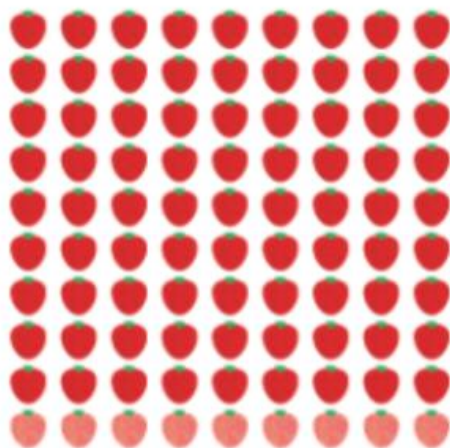


3 groups of 6
 $3 \times 6 = 18$



$2 \times 7 = 14$
 $3 \times 7 = 14 + 7$





10 rows of 9 = 90
 $10 \times 9 = 90$

$10 \times 9 = 90$
 What is 9×9 ?
 How can we tell?



$$3 \times 10 = 30$$

$$3 \times 1 = 3$$

$$3 \times 11 = 30 + 3$$

Recap: bridged and short multiplication

×	2	3	
		6	
		8	
+	1	2	0
	1	3	8

New: multiplying 3 numbers

$$2 \times 5 = 10$$

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



$$2 \times 5 = 10$$



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

×	4	7	3	
			2	
			6	
+	1	4	0	
	8	0	0	
	9	4	6	



Recap:
Bridged and short
multiplication

×	4	7	3	
			2	
			6	
+	1	4	0	
	8	0	0	
	9	4	6	

What is the product of 9 and 30?

$$9 \times 30 = \square$$

Method 1

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

Method 2

$$\begin{array}{l} 9 \times 3 = 27 \\ 9 \times 3 \text{ tens} = 27 \text{ tens} \\ 9 \times 30 = 270 \end{array}$$

Method 3

$$\begin{array}{l} 9 \times 30 = 9 \times 3 \times 10 \\ = 27 \times 10 \\ = 27 \text{ tens} \\ = 270 \end{array}$$



Which method is best?

Recap multiplying by a multiple of 10

New: multiplying by multiples of 100

$$7 \times 300 = \square$$

Method 1

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

Method 2

$$\begin{array}{l} 7 \times 3 = 21 \\ 7 \times 3 \text{ hundreds} = 21 \text{ hundreds} \\ 7 \times 300 = 2100 \end{array}$$

Method 3

$$\begin{array}{l} 7 \times 300 = 7 \times 3 \times 100 \\ = 21 \times 100 \\ = 21 \text{ hundreds} \\ = 2100 \end{array}$$

21 hundreds = 2100



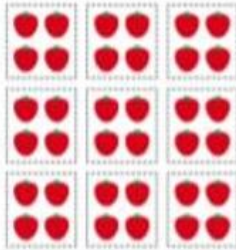
Which method is best?

Division

$$36 \div 9 = ?$$

'equal groups' **VS** 'groups of'

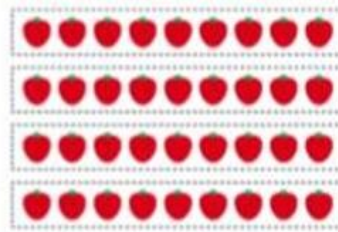
Placing into 9 equal groups



$$36 \div 9 = 4$$

Each group has 4 strawberries.

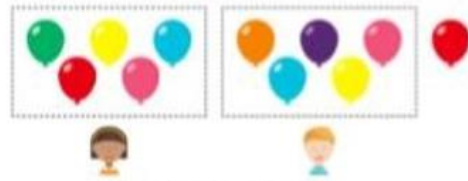
Placing in groups of 9



$$36 \div 9 = 4$$

There are 4 groups.

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.

Children are introduced to the concept of remainders

1

$$4 \div 4 = \square$$



$$4 \div 4 = 1$$

2

$$40 \div 4 = \square$$



$$40 \div 4 = 10$$

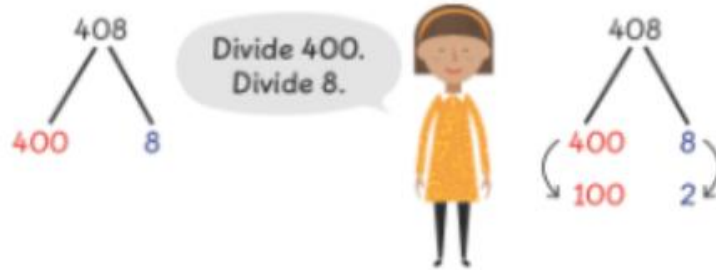
3

$$400 \div 4 = \square$$

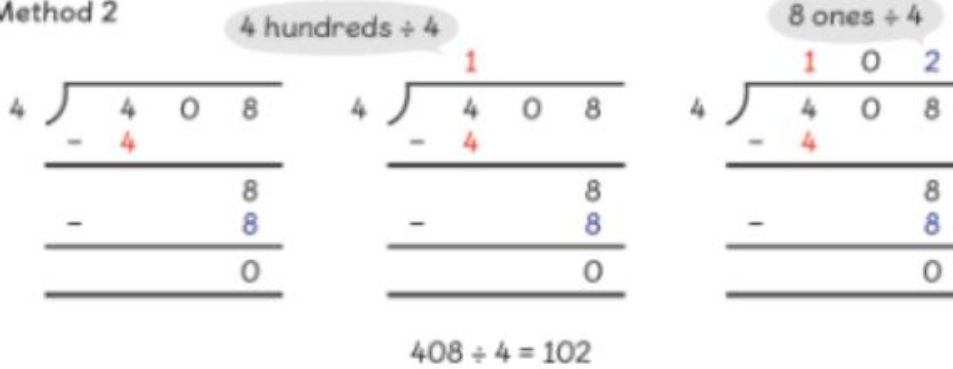


$$400 \div 4 = 100$$

Method 1

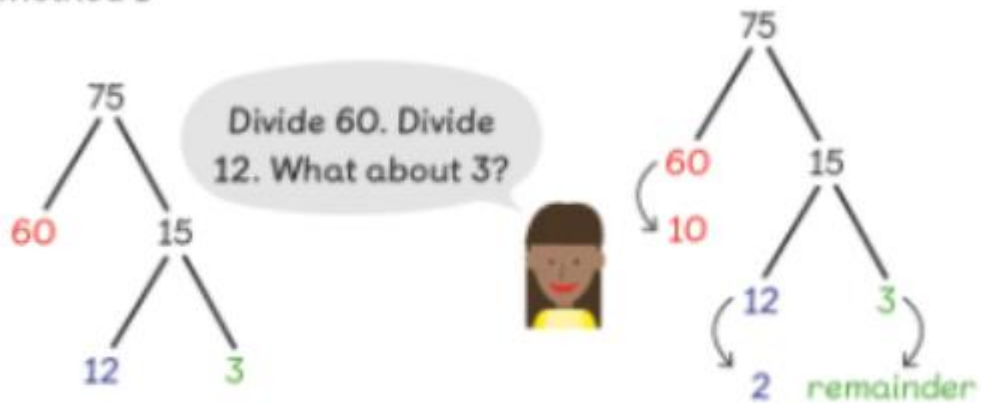


Method 2



Once confident with the partitioning and long division methods, remainders are introduced using these methods.

Method 1



Method 2

6 tens \div 6

$$\begin{array}{r} 6 \overline{) 75} \\ \underline{- 6} \\ 15 \\ \underline{- 12} \\ 3 \end{array}$$

12 ones \div 6

$$\begin{array}{r} 6 \overline{) 75} \\ \underline{- 6} \\ 15 \\ \underline{- 12} \\ 3 \end{array}$$

remainder

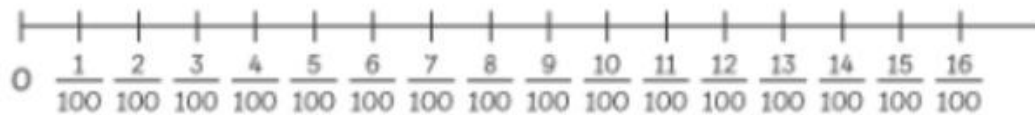
$75 \div 6 = 12 \text{ remainder } 3$

quotient

It is not possible to put 75 children into 6 equal groups.

Move onto problem solving involving these methods and bar models

Fractions



There are 2 whole cakes and 5 sixths of a cake.

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

$2\frac{5}{6}$ is a mixed number.



$$\begin{array}{c} \div 4 \\ \frac{12}{8} = \frac{3}{2} \\ \div 4 \end{array}$$

8 smaller parts become
2 larger parts.



$$\begin{array}{c} \div 2 \\ \frac{6}{4} = \frac{3}{2} \\ \div 2 \end{array}$$

4 smaller parts become
2 larger parts.



Decimals



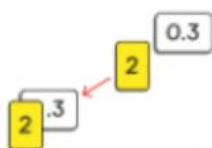
makes 1 1 0.1 0.1 0.1 .

1	0.1	0.1
1	0.1	
ones	tenths	
2	3	

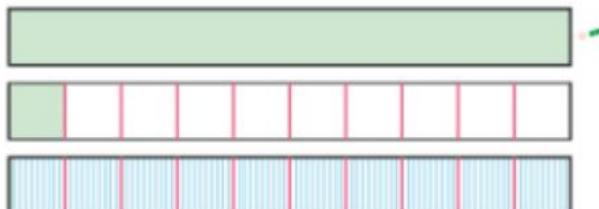
$$\begin{aligned} & 2 \text{ ones} + 3 \text{ tenths} \\ & = 2 + 0.3 \\ & = 2.3 \end{aligned}$$

The digit 2 stands for 2 ones.

The digit 3 stand for 3 tenths.



We read 2.3 as two
and three tenths.



moles

tens	ones	tenths	hundredths
0	8	1	3

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

0.03 0.03 0.03



8.13 is read as eight and thirteen hundredths.

moles

tens	ones	tenths	hundredths
0	3	1	8

The digit 3 stands for 3.

The digit 1 stands for $\frac{1}{10}$

The digit 8 stands for $\frac{8}{100}$

$$\begin{array}{r} 20 + 30 = 2 \\ 3 + 30 = 0.3 \\ 23 + 30 = 2.3 \end{array}$$

I get 2.3 sheets of paper.



tens	ones	tenths		tens	ones	tenths
2	3		$\div 10$		2	3

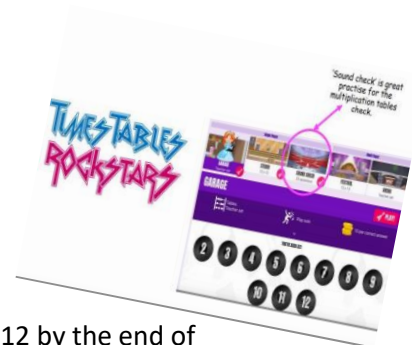
$$\begin{array}{r} 14 \div 100 = \\ 10 \div 100 = 0.1 \\ 4 \div 100 = 0.04 \\ 14 \div 100 = 0.14 \end{array}$$

hundredths

tens	ones	tenths	hundredths		tens	ones	tenths	hundredths
1	4			$\div 100$		0	1	4

YEAR 4 - Multiplication tables check

- From the 2019/20 academic year onwards, schools in England will be required to administer an online multiplication tables check (MTC) to year 4 children.
- The national curriculum specifies that children should be taught to recall the multiplication tables up to and including 12×12 by the end of year 4.
- The purpose of the MTC is to determine whether pupils can recall their times tables fluently, which is essential for future success in mathematics. It will help schools to identify pupils who have not yet mastered their times tables, so that additional support can be provided



Here at The Beeches, we use Times Table Rockstars to best support the children in the lead up to this. The Sound Check area mirrors the layout in which the MTC will have.

Year 5 Mathematics Policy

Place Value

Round 4218 to the nearest 100.

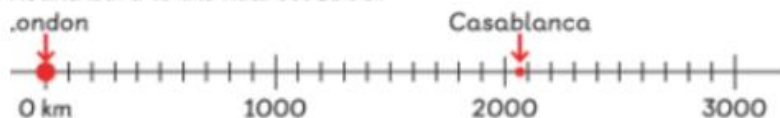


4218 is between 4200 and 4300.

4218 is closer to 4200 than to 4300.
4218 is 4200 when rounded to the nearest 100.



Round 2078 to the nearest 1000.



2078 is between 2000 and 3000.
2078 is closer to 2000 than to 3000.

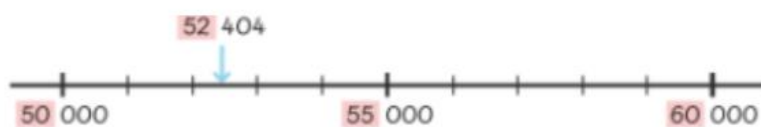
We say 2078 is 2000 when rounded to the nearest 1000.



In Focus



Ravi's mother went shopping.
She bought a handbag for £58, a pair of shoes for £73 and a dress for £35.
Estimate the total cost of these three items.

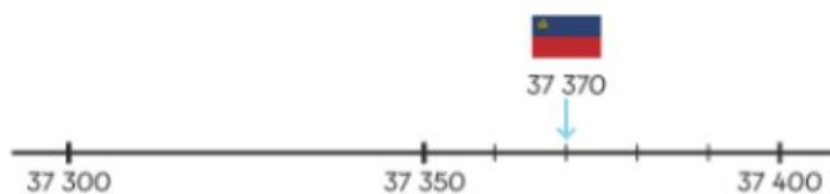


52 404 is closer to 50 000 than to 60 000.

52 404 is approximately 50 000.



$52\,404 \approx 50\,000$
(rounded to the nearest 10 000)

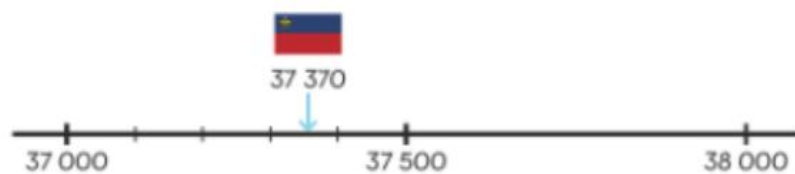


37 370 is closer to 37 400 than to 37 300.

We say 37 370 is approximately 37 400.



$37\,370 \approx 37\,400$ (rounded to the nearest 100)



37 370 is closer to 37 000 than to 38 000.

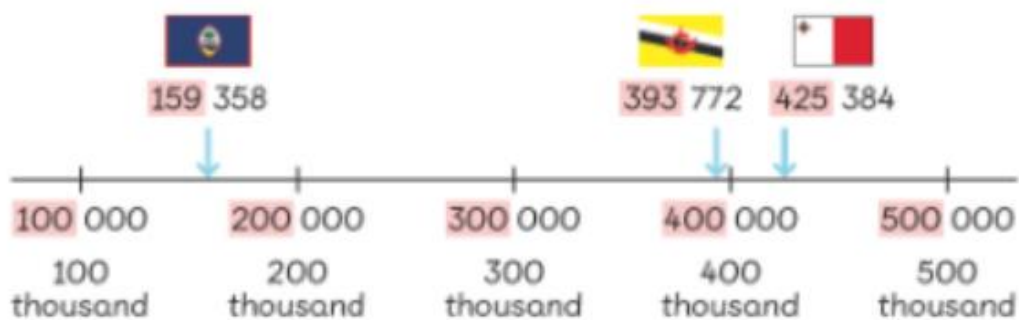
37 370 is
approximately
37 000.



37 370



$37\,370 \approx 37\,000$ (rounded to the nearest 1000)



393 772 is closer to 400 000 than to 300 000.

425 384 is closer to 400 000 than to 500 000.

2	6	3	1	5	0	263 150
2	6	3	0	0		26 300
2	6	3	8	7		26 387

263 150 is more than two hundred thousand.



26 300 and 26 387 are each only slightly more than twenty-six thousand.

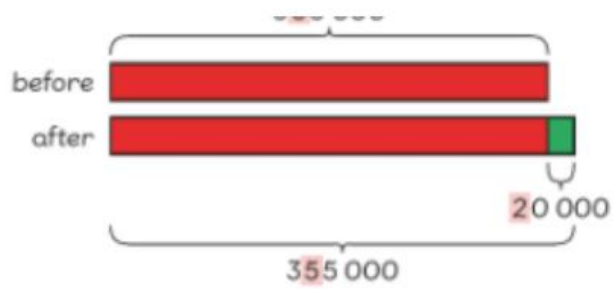
263 150 is the greatest of the three numbers.

26 300 is 300 more than 26 000.

26 387 is 387 more than 26 000.

26 300 is less than 26 387.

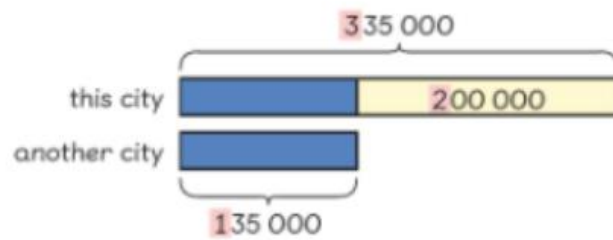
$263\,150 > 26\,387 > 26\,300$



20 000 is
2 ten thousands.



The digit in the ten thousands
place increases by 2.

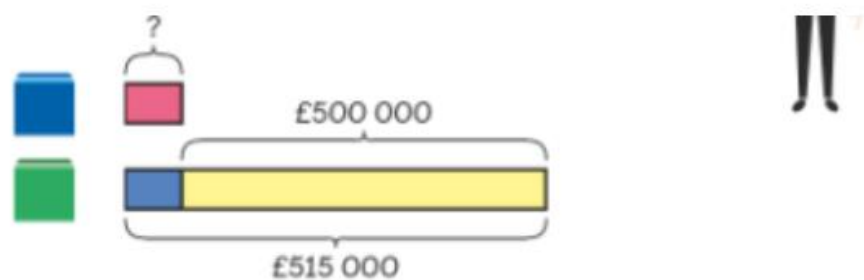


200 000
is 2 hundred
thousands.



The digit in the hundred
thousands place decreases by 2.





Method 1 Make a list.

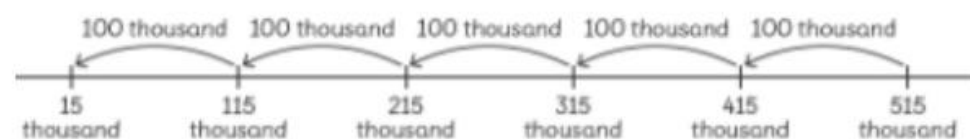
515 000
415 000
315 000
215 000
115 000
15 000

Count back.

Is it possible to use subtraction?

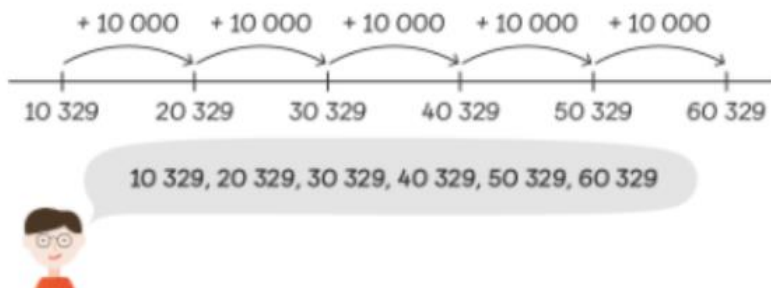


Method 2 Use a number line.



Addition

1 $10\ 329 + 50\ 000 =$



	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.

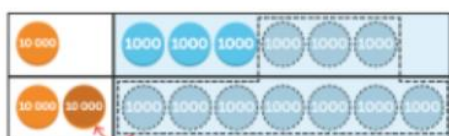
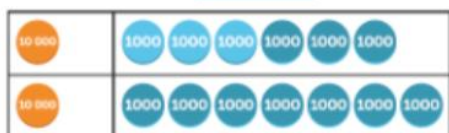


$$\begin{array}{r}
 40\ 000 \\
 40\ 000 \\
 + 40\ 000 \\
 \hline
 120\ 000
 \end{array}$$

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

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

1 $16\ 000 + 17\ 000 =$



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

$$\begin{array}{r} 1\ 16\ 000 \\ + 17\ 000 \\ \hline 3\ 000 \end{array}$$

$$\begin{array}{r} 1\ 16\ 000 \\ + 17\ 000 \\ \hline 33\ 000 \end{array}$$

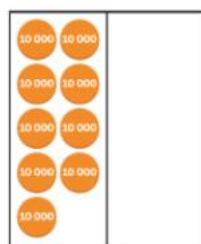
Subtraction

By counting back

The number is 546 203.
Count back by 100 000s.



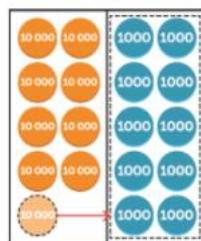
Subtraction with re-grouping



There are not enough  to subtract 4,000.



$$\begin{array}{r} 8 \text{ } 10 \\ \cancel{9} \cancel{0} \text{ } 000 \\ - 54 \text{ } 000 \\ \hline \end{array}$$



Rename 90 000.



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

$$\begin{array}{r} 8 \text{ } 10 \\ \cancel{9} \cancel{0} \text{ } 000 \\ - 54 \text{ } 000 \\ \hline 36 \text{ } 000 \end{array}$$

Regrouping in each place value column

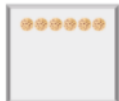
$$\begin{array}{r} 9 \text{ } 12 \\ \cancel{1} \cancel{0} \cancel{2} \text{ } 7 \\ - 359 \\ \hline \end{array}$$

$$\begin{array}{r} 11 \\ 9 \text{ } 12 \text{ } 17 \\ \cancel{1} \cancel{0} \cancel{2} \cancel{7} \\ - 359 \\ \hline 668 \end{array}$$

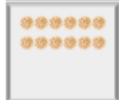
Finding multiples



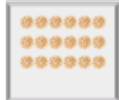
bakes 4 rows of biscuits.



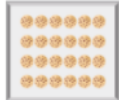
$$1 \times 6 = 6$$



$$2 \times 6 = 12$$



$$3 \times 6 = 18$$



$$4 \times 6 = 24$$

We say 6, 12, 18 and 24 are multiples of 6.

Find the first 12 multiples of 6.

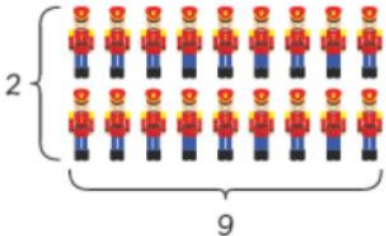
1	2	3	4	5	6
7	8	9	10	11	12
13	14	15	16	17	18
19	20	21	22	23	24
25	26	27	28	29	30

Finding factors

Place 18 toy soldiers in a rectangular arrangement.



does it this way.



$$18 = 2 \times 9$$

“



2 is a factor of 18.
9 is also a factor
of 18.

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.

$$48 = 1 \times 48$$

$$64 = 1 \times 64$$

$$48 = 2 \times 24$$

$$64 = 2 \times 32$$

$$48 = 3 \times 16$$

$$64 = 4 \times 16$$

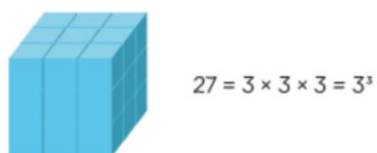
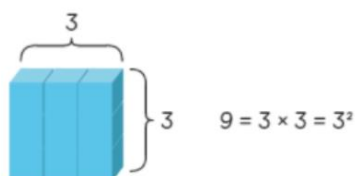
$$48 = 4 \times 12$$

$$64 = 8 \times 8$$




$$48 = 6 \times 8$$

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

Square and cube numbers



27 is a cube.

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



Multiplication

$$\begin{array}{r}
 2718 \\
 \times \quad 4 \\
 \hline
 32 \\
 40 \\
 2800 \\
 + 8000 \\
 \hline
 10872
 \end{array}$$

$$\begin{array}{r}
 \overset{3}{2}718 \\
 \times \quad 4 \\
 \hline
 2
 \end{array}$$

$$\begin{array}{r}
 \overset{3}{2}718 \\
 \times \quad 4 \\
 \hline
 72
 \end{array}$$

$$\begin{array}{r}
 \overset{2}{2}\overset{3}{7}18 \\
 \times \quad 4 \\
 \hline
 872
 \end{array}$$

$$\begin{array}{r}
 \overset{2}{2}\overset{3}{7}18 \\
 \times \quad 4 \\
 \hline
 10872
 \end{array}$$

Recap:

Bridged and short multiplication but with larger numbers

Place value counters are initially used alongside the column method to support pictorially

$$2718 \times 4 = 10872$$







$$\begin{array}{r}
 \overset{1}{\underset{4}{2}}8 \\
 \times 26 \\
 \hline
 168 \\
 + 56 \\
 \hline
 728
 \end{array}$$

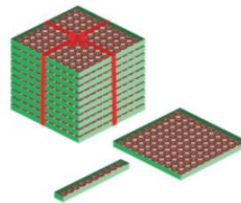
New:
Multiplying 2 and 3 digit numbers by 2-digit numbers

$$\begin{array}{l}
 168 \rightarrow 28 \times 6 \\
 + 56 \rightarrow 28 \times 20
 \end{array}$$

$$\begin{array}{r}
 \overset{4}{2}8 \\
 \times 26 \\
 \hline
 8
 \end{array}
 \rightarrow
 \begin{array}{r}
 \overset{4}{2}8 \\
 \times 26 \\
 \hline
 168
 \end{array}
 \rightarrow
 \begin{array}{r}
 \overset{1}{2}8 \\
 \times 26 \\
 \hline
 168 \\
 6
 \end{array}
 \rightarrow
 \begin{array}{r}
 \overset{1}{2}8 \\
 \times 26 \\
 \hline
 168 \\
 56
 \end{array}$$

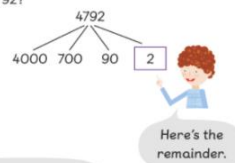
Division

How many  can we get from 4792  ?
 How many  can we get from 4792  ?
 How many  can we get from 4792  ?



How many  can we get from 4792?

 contains 10 pieces.



How many
10s in 4790?

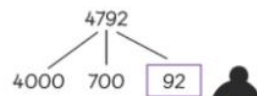
$$\begin{array}{l}
 4790 \div 10 = 479 \\
 479 \text{ tens} \div 1 \text{ ten} = 479
 \end{array}$$

There are 479 groups
of 10 in 4790.



How many  can we get from 4792?

 contains 100 pieces.



How many
100s in 4700?

$$\begin{array}{l}
 4700 \div 100 = 47 \\
 47 \text{ hundreds} \div 1 \text{ hundred} = 47
 \end{array}$$



There are 47 groups
of 100 in 4700.

How many  can we get from 4792?

 contains 1000 pieces.



How many 1000s in 4000?

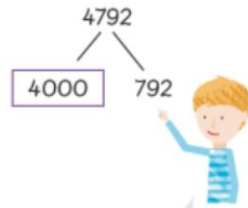
There are 4  in 4000.

$$4000 \div 1000 = 4$$

$$4 \text{ thousands} \div 1 \text{ thousand} = 4$$



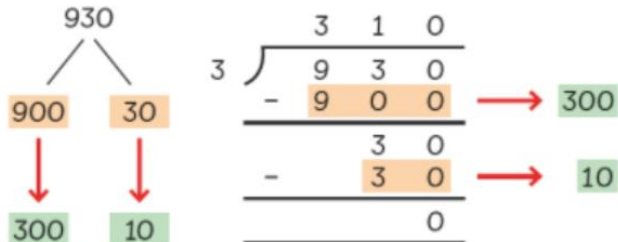
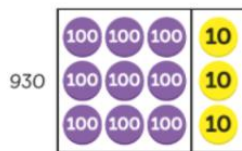
There are 4 groups of 1000 in 4000.



Here is the remainder.

Further Division

$$900 \div 3 = 300$$



Dividing with
place value
counters

$930 \div 3$

100	100	100	10
100	100	100	10
100	100	100	10

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

Dividing a
thousands
number with
long division

930

Dividing a
hundreds
number with
long division

$4 \overline{) 108} \rightarrow 4 \overline{) 108}$

Short division

$3 \overline{) 51} \rightarrow 3 \overline{) 51}$

Fractions

Improper fractions, mixed numbers and simplifying

Sharing objects to write as improper and mixed numbers

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



3 apples shared equally among 3 friends.

$$3 \div 3 = 1$$



The remaining 2 apples are shared equally among 3 friends.

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

Adding fraction pairs before adding fractions with different denominators

1 sixth and 4 sixths

$$\frac{1}{6} \text{ and } \frac{4}{6} \text{ make } \frac{5}{6}$$



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

$$\frac{1}{6} \text{ and } \frac{2}{3} \text{ make } \frac{5}{6}$$

Making denominators the same and simplifying the answers



$$\frac{1}{9}$$

We need to make both the same 'type' of fractions before adding.

1 ninth + 1 third is not 2 ninths or 2 thirds!

$$\frac{1}{3} = \frac{3}{9}$$

$$\frac{1}{9} + \frac{3}{9} = \frac{4}{9}$$

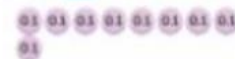
$$1 \text{ ninth} + 3 \text{ ninths} = 4 \text{ ninths}$$

Decimals

Find the sum and the difference.

$$5d: 8 \text{ tenths} + 1 \text{ tenth} =$$

$$8 \text{ tenths} - 1 \text{ tenth} =$$



$$0.8 + 0.1 =$$

$$0.8 -$$



$$0.8 + 0.1 = 0.9$$

$$0.8 - 0.1 = 0.7$$

$$0.8 + 0.1 = 0.9$$

$$0.8 - 0.1 = 0.7$$

$$0.8 + 0.1 = 0.9$$

$$0.8 - 0.1 = 0.7$$

$$0.8 + 0.1 = 0.9$$

$$0.8 - 0.1 = 0.7$$

$$0.8 + 0.1 = 0.9$$

$$0.8 - 0.1 = 0.7$$

$$0.8 + 0.1 = 0.9$$

$$0.8 - 0.1 = 0.7$$

$$0.8 + 0.1 = 0.9$$

$$0.8 - 0.1 = 0.7$$

$$0.8 + 0.1 = 0.9$$

$$0.8 - 0.1 = 0.7$$

$$0.8 + 0.1 = 0.9$$

$$0.8 - 0.1 = 0.7$$

$$0.8 + 0.1 = 0.9$$

$$0.8 - 0.1 = 0.7$$

$$0.8 + 0.1 = 0.9$$

$$0.8 - 0.1 = 0.7$$

$$0.8 + 0.1 = 0.9$$

$$0.8 - 0.1 = 0.7$$

$$0.8 + 0.1 = 0.9$$

$$0.8 - 0.1 = 0.7$$

$$0.8 + 0.1 = 0.9$$

$$0.8 - 0.1 = 0.7$$

$$0.8 + 0.1 = 0.9$$

$$0.8 - 0.1 = 0.7$$

$$0.8 + 0.1 = 0.9$$

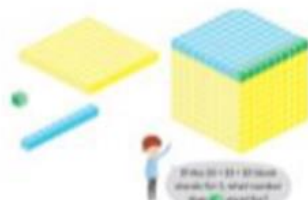
$$0.8 - 0.1 = 0.7$$

$$0.8 + 0.1 = 0.9$$

$$0.8 - 0.1 = 0.7$$

$$0.8 + 0.1 = 0.9$$

$$0.8 - 0.1 = 0.7$$



What is 0.01 + 0.01 + 0.01? How many 0.01s are there in 0.03?

thousandths

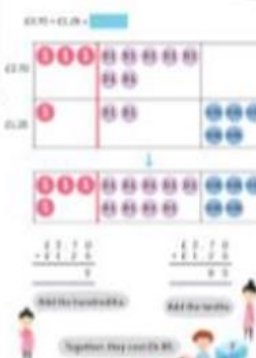
Other areas covered by decimals:

- Comparing and ordering
- Money
- Weight
- Rounding
- Perimeter



Using base blocks	In hundredths	In tenths
	$\frac{1}{10} = 0.1$	1 tenth
	$\frac{1}{100} = 0.01$	10 hundredths
	$\frac{1}{1000} = 0.001$	100 thousandths

Representing in fractions and decimals



Adding and subtracting decimals

Year 6 Mathematics Policy

On the lead up to SATs, the children should be encouraged to use formal written methods for all four of the operations.

Addition and Subtraction

789 + 642 becomes	874 – 523 becomes	932 – 457 becomes	932 – 457 becomes
$\begin{array}{r} 789 \\ + 642 \\ \hline 1431 \\ \hline \end{array}$	$\begin{array}{r} 874 \\ - 523 \\ \hline 351 \\ \hline \end{array}$	$\begin{array}{r} 932 \\ - 457 \\ \hline 475 \\ \hline \end{array}$	$\begin{array}{r} 932 \\ - 457 \\ \hline 475 \\ \hline \end{array}$

Multiplication

24 × 16 becomes	124 × 26 becomes	124 × 26 becomes
$\begin{array}{r} 24 \\ \times 16 \\ \hline 144 \\ 240 \\ \hline 384 \\ \hline \end{array}$	$\begin{array}{r} 124 \\ \times 26 \\ \hline 744 \\ 2480 \\ \hline 3224 \\ \hline \end{array}$	$\begin{array}{r} 124 \\ \times 26 \\ \hline 744 \\ 2480 \\ \hline 3224 \\ \hline \end{array}$

Division

98 ÷ 7 becomes	432 ÷ 5 becomes	496 ÷ 11 becomes
$\begin{array}{r} 14 \\ 7 \overline{) 98} \\ \underline{7} \\ 28 \\ \underline{28} \\ 0 \end{array}$	$\begin{array}{r} 86 \text{ r } 2 \\ 5 \overline{) 432} \\ \underline{40} \\ 32 \\ \underline{30} \\ 2 \end{array}$	$\begin{array}{r} 45 \text{ r } 1 \\ 11 \overline{) 496} \\ \underline{44} \\ 56 \\ \underline{55} \\ 1 \end{array}$

PIXL Policy

The Beeches Primary School uses the Maths No Problem scheme and supplements the arithmetic with PIXL; to ensure pupils are provided opportunities to develop fluency becoming efficient mathematicians.

Arithmetic is a branch of Mathematics that consists the study of numbers and basic calculations we do in everyday life: addition, subtraction, multiplication and division. Arithmetic also includes other skills that are related to the four operations, e.g. fractions and percentage that are related to division.

PIXL is used in a range of ways across different year groups. Largely, after teaching a sequence of lessons, you will have collected a range of evidence to show what pupils can and cannot do.

A PIXL Classroom lesson is an intervention lesson that you will deliver at the end of a sequence of lessons that will focus on a single PLC skill. The PLC skill will have been identified as an area of weakness with the aim of ensuring that all pupils make progress.

PIXL has a range of Mathematical resources that will enable you to create a bespoke and heavily differentiated set of activities that will ensure all students are involved in the learning and are shown to make progress in one lesson.

All pupils from Year 2 and above have arithmetic books to keep their PIXL separate from their journaling and MNP workbooks.

Each year groups uses PIXL in the following ways:

Year 2

PIXL is used as extra intervention with twice a week to support target children to meet the expected standard. It is also used as a revision tool once children have completed test papers. PIXL resources are utilised to revise strands of mathematics that have been identified as areas of weakness to plug the gaps.

Year 3

PIXL Arithmetic 10 in 10 tests are undertaken every other week. . The arithmetic test is undertaken as a 'walking, talking mock.' Follow up work is then planned related to the test once a week using PIXL resources.

Year 4

PIXL Arithmetic 10 in 10 tests and a 3 in 3 are undertaken every week. The arithmetic test is undertaken as a 'walking, talking mock.'

Year 5

PIXL 3 in 3s are used, 2 or 3 days per week, for a 3-minute starter for maths lessons. In addition to this, PIXL resources are used for tuition alongside Century. The PIXL tests informs the priority therapies and we follow the PLCs from Y5 maths. In addition to this, the PIXL resources are utilised in tuition lessons and for pre-teaching lessons.

Year 6

PIXL 3 in 3s are used every day as a 3-minute starter for maths lessons. In addition to this, PIXL resources are used for tuition alongside Century. The PIXL tests in-forms the priority therapies and we follow the PLCs from Y6 maths. In addition to this, the PIXL resources are utilised in tuition lessons and for pre-teaching lessons.