Calculations Policy

The Beeches Primary School

Author:	Emma McFarland
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Maths No Problem

Aims of the National Curriculum 2014

The national curriculum for mathematics aims to ensure that all pupils:

Become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.

Reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language.

Can solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

Curriculum Coverage

FLUENCY – Being able to recall facts and solve calculations with speed. This also relates to solving simple word problems.

REASONING – Being able to explain the steps in a process, how an answer was found, or explaining mistakes or misconceptions in a process.

PROBLEM SOLVING – Children are able to solve complex problems that require recall of facts, reasoning, and logical thinking. Children are also required to think about representing questions in different ways to help solve a problem.

Why Maths - No Problem?

Children will have a greater conceptual understanding of number and calculation. They will be able to visualise and generalise more readily due to a more in-depth understanding

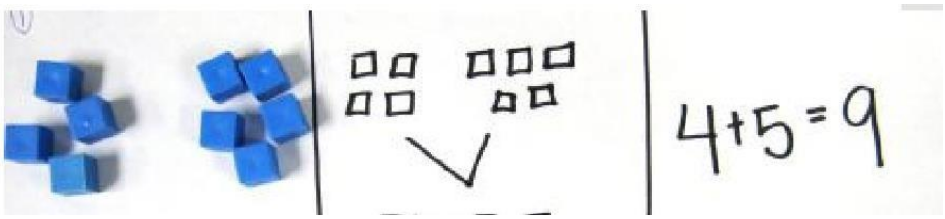
All children will be fully supported through accessing concrete equipment and use of visual models to support understanding.

Rapid graspers will be challenged through exposure to unfamiliar problems, development of reasoning skills and by exploring multiple ways to manipulate numbers and solve problems.

All learners will access teaching of content which matches the expectations of the curriculum in England and be supported further, if needed. The resources match the expectations for formal written methods set out by the government, alongside greater understanding in order to reach 'mastery'.

CPA Approach

Concrete, pictorial, abstract (CPA) is a highly effective approach to teaching that develops a deep and sustainable understanding of maths. The CPA approach is the mainstay of maths teaching in Singapore.



Types of Understanding

Instrumental Understanding

"Instrumental understanding" can be thought of as knowing the rules and procedures without understanding why those rules or procedures work. Students who have been taught instrumentally can perform calculations, apply procedures… but do not necessarily understand the mathematics behind the rules or procedures.

Relational Understanding

"Relational understanding", on the other hand, can be thought of as understanding how and why the rules and procedures work. Students who are taught relationally are more likely to remember the procedures because they have truly understood why they work, they are more likely to retain their understanding longer, more likely to connect new learning with previous learning, and they are less likely to make careless mistakes.

(Richard Skemp)

What is Maths – No Problem?

Maths — No Problem! is a series of textbooks and workbooks written to meet the requirements of the 2014 English national curriculum.

The MNP 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.

As a result, the MNP Primary Series are recommended textbooks for schools on the mastery programme.

Singapore Approach to Mathematics

Singapore established a new way of teaching maths following their poor performance in international league tables in the early 1980's.

Based on recommendations from notable experts, Singapore maths is a combination of global ideas delivered as a highly-effective programme of teaching maths.

The effectiveness of this approach is demonstrated by Singapore's position at the top of the international benchmarking studies and explains why their programme is now used in over 40 countries including the United Kingdom and the United States.

Singapore has become a "laboratory of maths teaching" by incorporating established international research into a highly effective teaching approach. With its emphasis on teaching pupils to solve problems, Singapore Maths teaching is the envy of the world.

Based on recommendations from notable experts such as Jerome Bruner, Richard Skemp, Jean Piaget, Lev Vygotsky, and Zoltan Deines, Singapore maths is an amalgamation of global ideas delivered as a highly-effective programme of teaching methods and resources.

One of highest performing countries in terms of maths.

Teach the concepts of mathematics.

Problem solving is at the heart of mathematics and should be the focus of what is taught in schools.

The focus is not on rote procedures, rote memorisation or tedious calculation but on relational understanding.

Pupils learn to think mathematically as opposed to reciting formulas they don't understand.

Is a way of teaching that allows students to develop a greater sense of number and how to use and manipulate numbers to solve a variety of problems.

A highly effective approach to teaching maths based on research and evidence.

Pupils are encouraged to solve problems working with their core competencies, in particular:

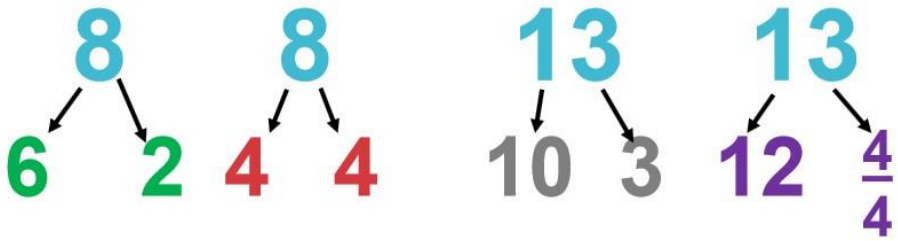
Visualisation

Generalisation

Make decisions

Number Sense

Number sense is knowing what numbers mean by themselves and in relation to one another, the ability to partition (break apart numbers) into a variety of ways, and being able to manipulate numbers for different purposes.



What is Mastery?

Mastery of Mathematics

Achievable for all.

Deep and sustainable learning.

The ability to build on something that has already been sufficiently mastered.

The ability to reason about a concept and make connections.

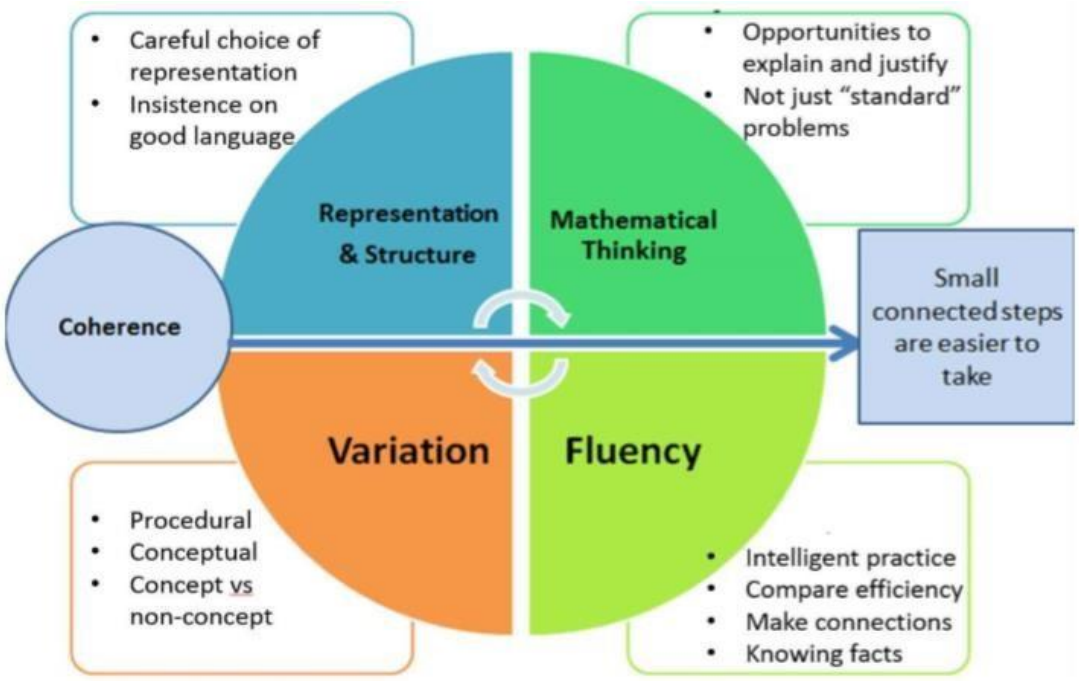
Conceptual and procedural fluency.

Involves a longer time spent on key topics, providing time to go deeper and embed learning.

Procedure has to be backed up by understanding

Five Big Ideas

Lesson Design for Teaching for Mastery



Mastery

Involves a development or three forms of knowledge:

Factual – I know that.

Procedural – I know how.

Conceptual – I know why.

We are aiming to provide children with opportunities to develop:

Deep and sustainable understanding of mathematical concepts.

Ability to reason about mathematics and make connections.

Facts and efficient procedures – the mathematical 'tool kit'.

Confidence and competence in using mathematics to solve problems.

Structure of Maths – No Problem!

Concepts merge from one chapter to the next e.g.

Chapter 1 – Place Value

Chapter 2 – Addition and Subtraction

Each chapter has a series of lessons to follow.

Children master topics before moving on.

How lessons are taught

The parts to the lesson are:

There are five main stages of a Maths — No Problem! Lesson. These components are exploration, structured discussion, practice, journalling and reading. There is no right or wrong order to these components and the lesson structure can vary from teacher to teacher. Before we move on to the individual parts of a lesson, it is important to note that we do not necessarily have to include all five components in every lesson for the learning to be well-rounded and complete.

Exploration The teacher will present the whole class with a problem to explore. We call this the anchor task, it will be the central focus of the whole lesson, and it can be found in the Explore section of the textbooks. The anchor tasks have been designed to motivate learning for the whole class. During this part of the lesson, learners will be working in groups exploring the task themselves, however they see fit, whether this is with concrete resources, modelling or different strategies etc. After teachers have presented the problem and set a time for exploration, their role is observation and assessment. They are giving their class independence to experiment.

Structured discussion If you are following Zoltan Dienes' theory, then structured discussion would come after exploration in the lesson order. This part of the lesson is a teacher-led whole class discussion. The aim is to use targeted questions to draw out from the group, different methods to discuss, and any misconceptions to rectify. The Master section of the book can provide some anticipated methods for solving the problem and teachers can use this to guide the discussion.

The questioning will be based on: 'What are you doing in this strategy to solve the problem and why are you doing it?' Practice In the Maths — No Problem! programme there are two types of practice: guided and independent.

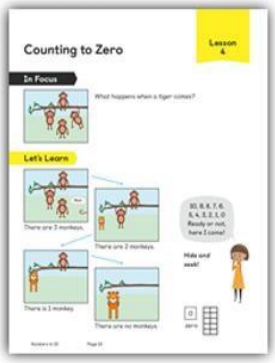
Guided Practice can be found in the textbook, where learners can work through the questions in pairs, whereas Independent Practice can be found in the workbook and as the name suggests pupils work through these by themselves. Both sets of questions have been designed with variation in mind, so learners can develop a deeper understanding of the topic as they work through the exercises. During both types of practice, the teacher will be observing. If they notice a common misconception throughout the class, they could choose to close this section of the lesson with a plenary to immediately address it. Additionally, in each chapter you will find various Activity Times which have been included to help learners explore mathematical concepts further. And there is a Mind Challenge at the end of each chapter to encourage pupils to work on their greater depth thinking.

Journalling The aim of journalling is to give learners a question or task based on the lesson's problem, so it could be creating a story for an equation, taking a Guided Practice question and explaining the calculation, picking one method for solving a problem and justifying why it is the most effective, etc. It allows learners to explore new ideas and to create a completely personal journal entry, making it easier for teachers to assess which individuals have truly grasped the concept and who in the class is working at a greater depth. It also gives learners an opportunity to develop their communication skills by learning to articulate their ideas and explicate their mathematical thinking that surfaced during exploration.

There are five types of journalling — descriptive, evaluative, creative, investigative and formative — and it is important to try and utilise all of them throughout the school year. For some inspiration you can find a Maths Journal idea at the end of each chapter. Reading At some point in the lesson, the learners should be given an opportunity to read through the corresponding content in the textbook. The Maths — No Problem! textbook can be thought of as our friend's journal, with the aim being that pupils can validate their exploration and the class discussion by comparing methods. It is a time for learners to reflect upon which methods they think are the most effective and why. Additionally, it is a good opportunity to learn clear and concise ways to articulate their ideas when writing their own journals.

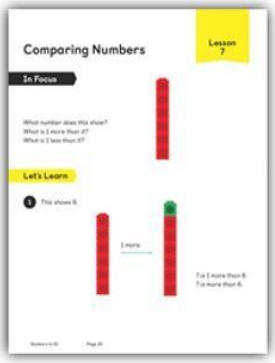
1. *Each lesson leads onto a new level of understanding of a concept. The entire system allows pupils to master ideas before moving. Children then revisit concepts as they progress through the spiral curriculum*

2. *Questions and example are varied both systematically and mathematically to bring pupils to a new level of understanding each time.*



Introduce zero

Ordering numbers



Comparing numbers

Exploratory Task

Add three numbers

Add three numbers

In focus

Can you add to find out how many flowers there are in total?

Guided practice

1. Make 10 and add.

(a) 2 + 8 + 4 = ☐ + ☐
= ☐

(b) 3 + 9 + 1 = ☐ + ☐
= ☐

2. Add.

(a) 6 + 7 + 4 = ☐

(b) 9 + 0 + 4 = ☐

(c) 8 + 5 + 9 = ☐

(d) 7 + 9 + 6 = ☐

Textbooks

Ideas are developed systematically using learning theories and research as a basis, in particular, the work of Jerome Bruner (representations and spiral curriculum) and Zoltan Dienes (Informal-structured-practice progression as well as systematic and mathematical variation of examples)

Workbooks

Allow children to show their understanding of a concept by solving problems displayed in different ways.

The questions are set up to ensure children understand the concept forwards, backwards and inside out.

For rapid graspers this consolidates any previous learning before they move onto greater depth challenges.

Children can work at their own pace through the questions.

Maths journals

Exploratory task

Guided practice

Challenges

5 types of journalling

How will children be challenged?

Make links between previous learning.

Think about problems in different ways.

Have opportunities to explain their reasoning.

Find and explain generalisations.

Use rich mathematical language when explaining ideas.

Solve complex problems which expand on their mathematical knowledge.

Work with a range of manipulatives to consolidate their understanding.

Work with a mix of children in groups, pairs and independently.

Challenge

Problem solving/ reasoning challenges

Explain using drawing/ equipment

Explain orally/ through writing

Write their own problem

Invent a method/ game

Create their own question

Make connections

Identify rules/ generalisations

Correct a mistake

Odd one out

Find something new

How are children supported?

Make links between previous learning.

Think about the way they know to solve problems.

Have opportunities to listen to mathematical vocabulary from peers and use themselves.

Be given more time to work on tricky concepts.

Work with a range of manipulatives to solve problems practically.

Work with a range of children in groups, pairs and independently.

Scaffold learning- extra clues and support.

Scripts to support pupils that may struggle to understand a concept due to cognitive overload.

How teachers support all learners

Move individual children on at their own pace throughout the lesson.

Set rich and sophisticated problem solving activities for rapid graspers.

Give time for all children to fully grasp and master concepts.

Provide visual stimuli for children to access a problem using CPA approach.

Give children ownership in their learning.

Model making mistakes- maths is challenging.

“Negative ideas that prevail about maths… come from one idea, which is very strong, permeates many societies and is at the root of maths failure and underachievement: that only some people can be good at maths. The single belief – that maths is a ‘gift’ that some people have and others don’t – is responsible for much of the widespread maths failure in the world.”

Jo Boaler

Mathematical Mindset (2016)

Maths is challenging. Children need to expect to struggle - this is part of learning

EYFS Mathematics Policy

EYFS are using White Rose Maths as they found this to align better with the Early Learning Goals.

Reception age children learn best when learning is fun, hands-on and practical.

The Reception maths scheme covers the DFE statutory framework for the EYFS and Educational Programme for Mathematics and introduces counting, number patterns and simple number problems in a natural, supportive way.

The scheme uses games and songs and other learning methods to help children explore numbers and discover how fascinating they can be.

By doing so, we give Reception age children the confidence to develop crucial skills and knowledge.

- The schemes cover the statutory framework for the national curriculum EYFS programme of study and align with non-statutory guidance.
- Reception age children are supported to explore counting, money, shape, patterns, objects, position, sequence and other core foundations of numeracy development.
- Each small step links to relevant rhymes and books to encourage cross-curricular learning.
- All resources are fun, colourful and easy to follow, and encourage mathematics learning through creative play.

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 and object.

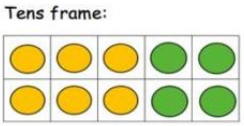
Using Physical
by practically taking more. They will also to support them.

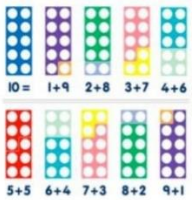
Resources: Children begin away one or adding one be able to use drawings

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.

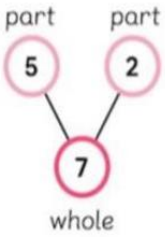
Number Bonds using Tens Frame: Children will be able to use a tens frame to find number bonds to 10.





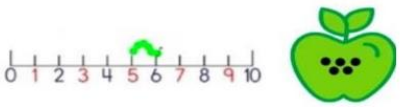
Number Bonds using Numicon: Children will be able to use Numicon to find number bonds to 10.

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

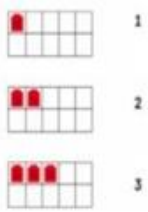
Counting to 10:

We can count on:

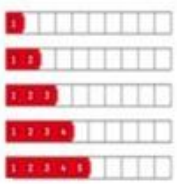
We can count back:

We count with objects:

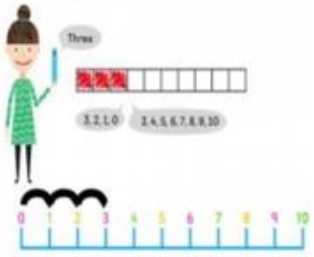
Physical objects



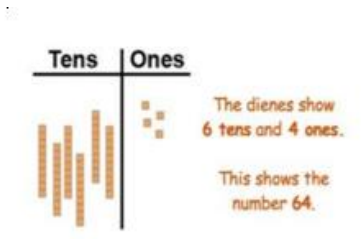
Tens square



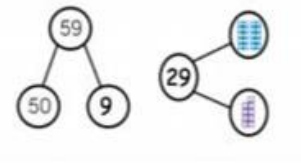
Multilink cubes



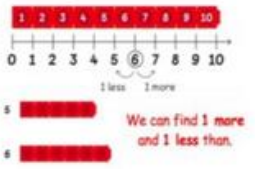
Number lines



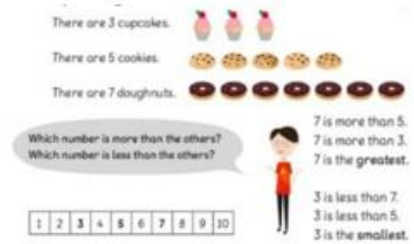
Dienes to represent numbers



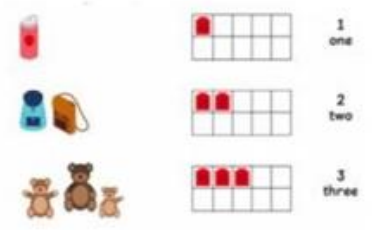
Number bond method



Ordering numbers

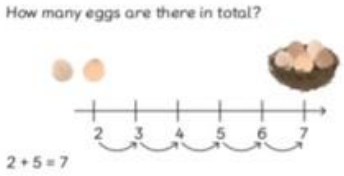


Comparing numbers

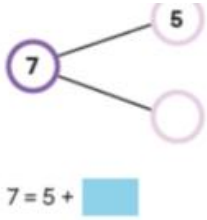


Writing numbers to 10

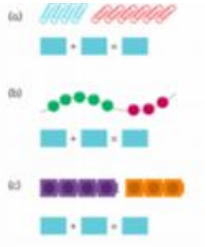
Addition



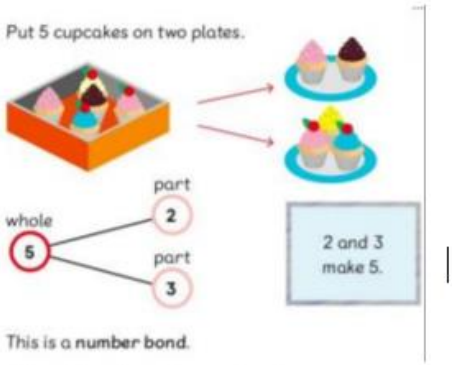
Number line method



Abstract calculations



Pictorial method

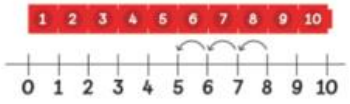


Number bond method

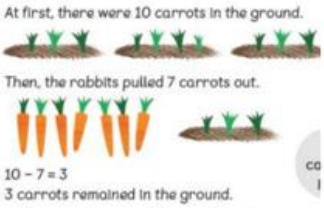
Subtraction

Subtract by crossing out

Subtract by number bonds

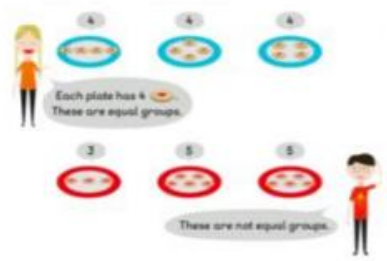


Subtract by counting back

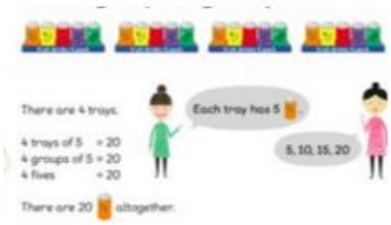


Subtract by writing stories

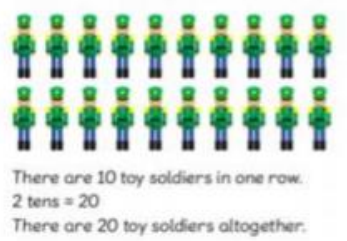
Multiplication



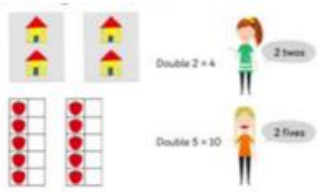
Making equal groups



Adding equal groups

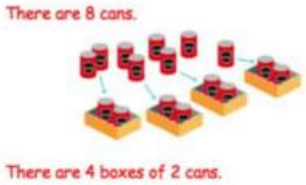


Making equal rows

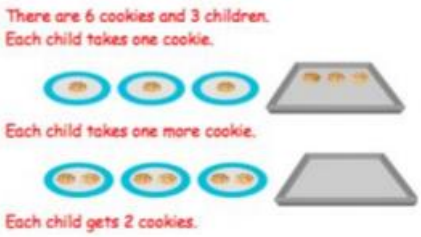


Making Double

Division



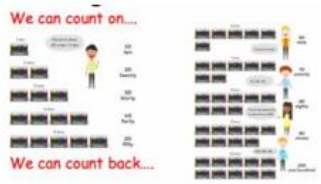
Grouping equally



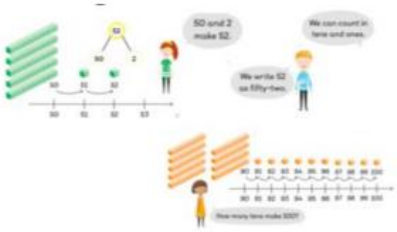
Sharing equally

Year 2 Mathematics Policy

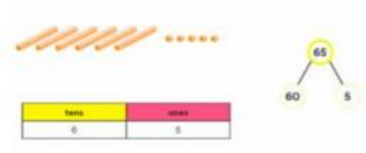
Place Value



Counting in tens to 100



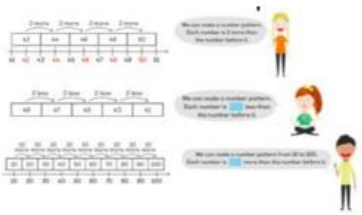
Counting in tens and ones



Represent two-digit numbers

Make numbers using different number bonds

Comparing numbers

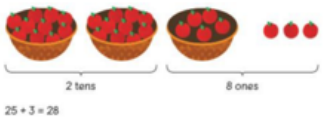


Extend number patterns

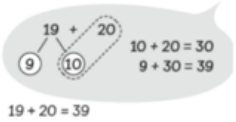
Find the missing numbers in patterns

Addition

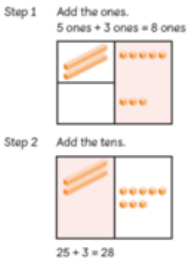
Number line method



Pictorial method



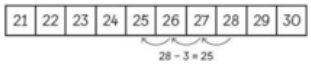
Partitioning method



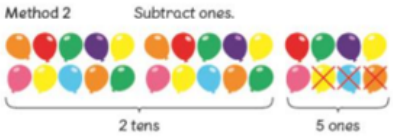
Deines method

Column method

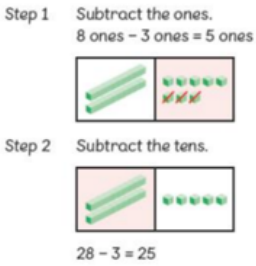
Subtraction



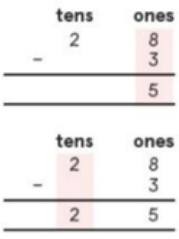
Number line method



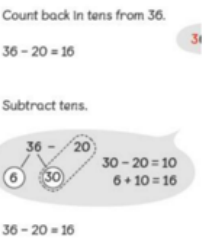
Pictorial method



Deines method



Column method

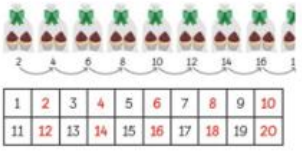


Partioning method

Multiplication

3 + 3 + 3 + 3 = 12
4 threes = 12
4 groups of 3 = 12
4 × 3 = 12

Repeated addition



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

Pictorial to abstract

Grouping method

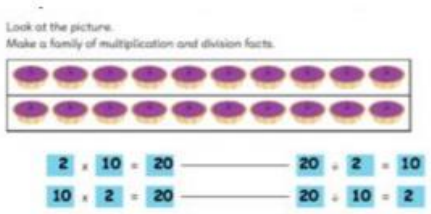
Multiply.

(a) 2 × 5 = ☐
3 × 5 = ☐

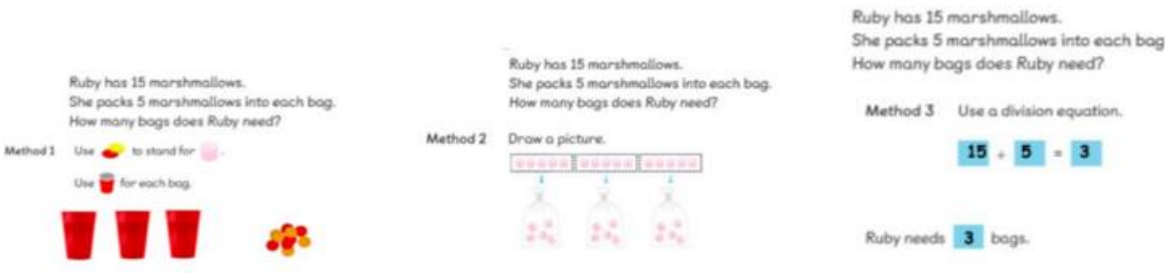
(b) 4 × 5 = ☐
5 × 5 = ☐

Abstract method

Division



Make a family of multiplication and division facts

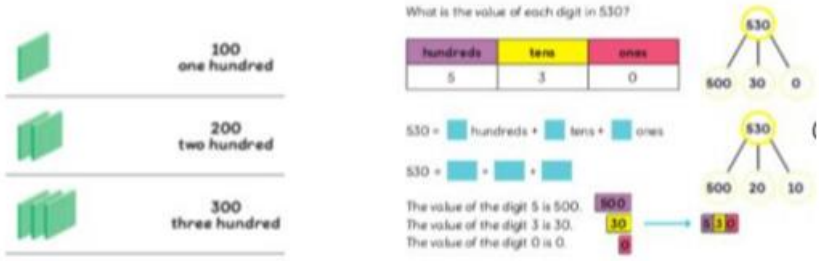


Solving problems

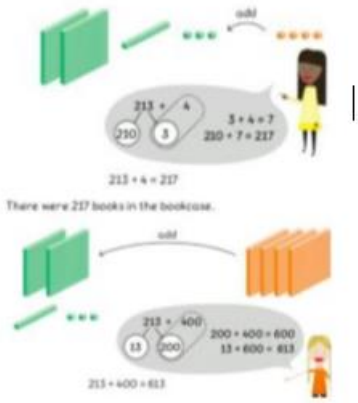
Year 3 Mathematics Policy

Place Value

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



Numbers to 1000

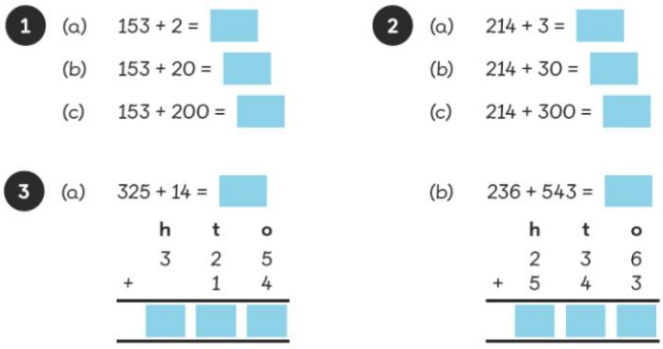


Adding ones, tens and hundreds

Addition- No renaming

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

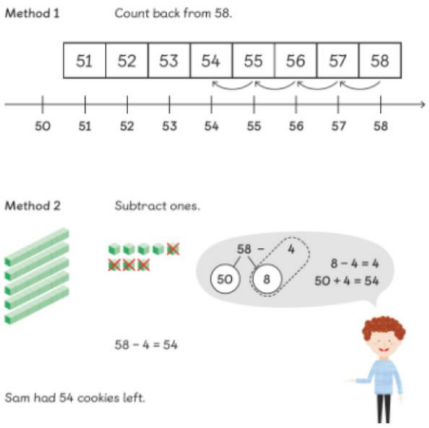
Addition- With renaming



Expected to solve a larger number of abstract calculations. Secure understanding of place value to 1000.

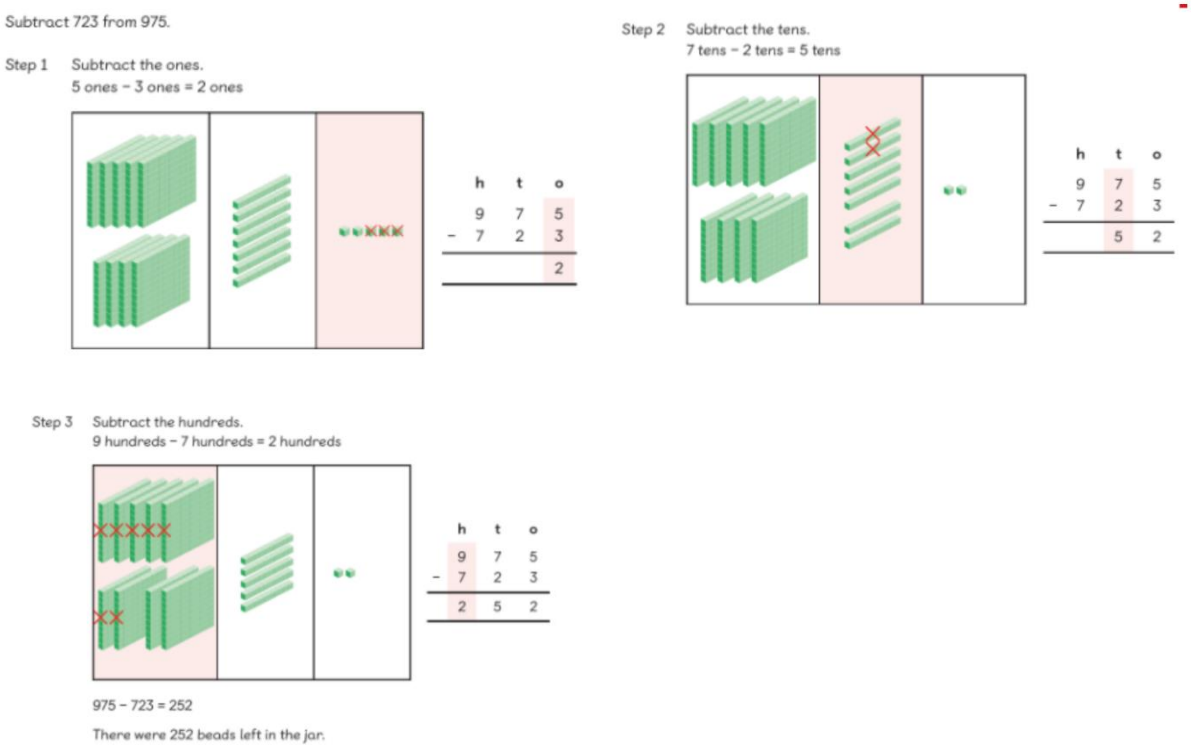
Secure understanding of place value to 1000.

Subtraction

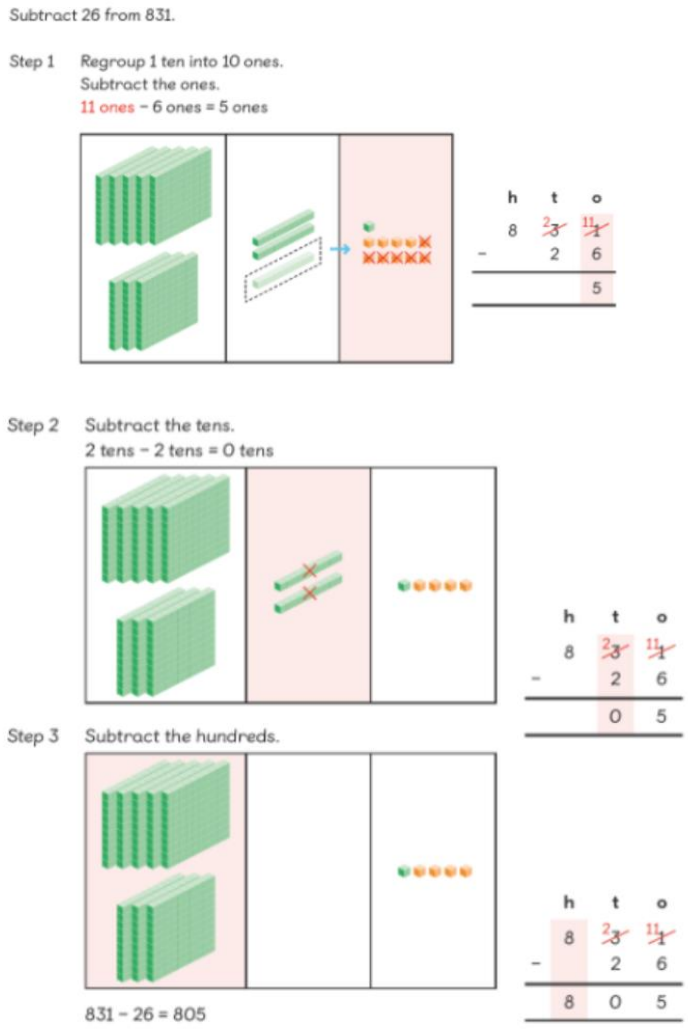


Subtraction numbers within 1000

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

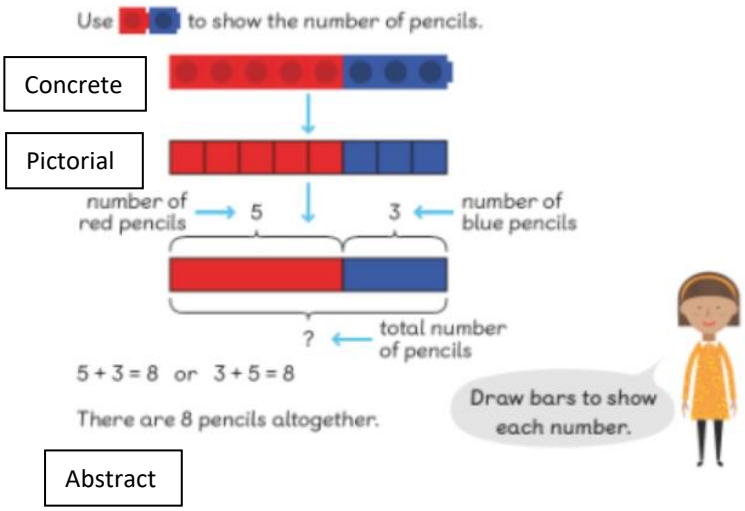


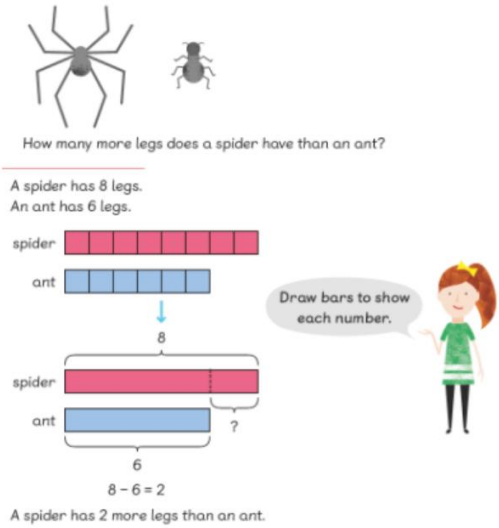
Subtraction- with regrouping



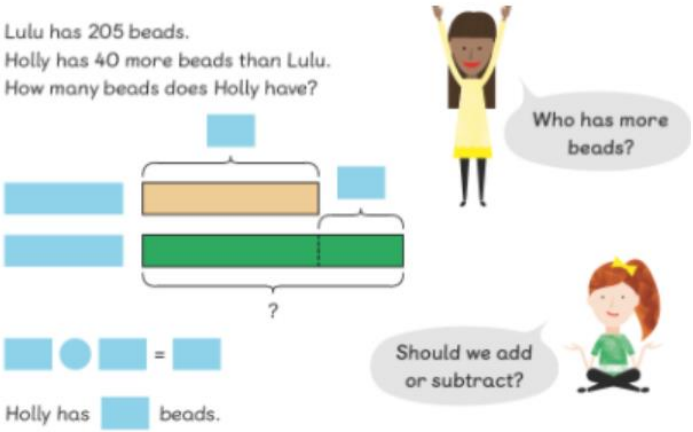
Beginning practically with Dienes before moving onto column subraction. Number bond method is taught alongside both methods.

Bar Model Method

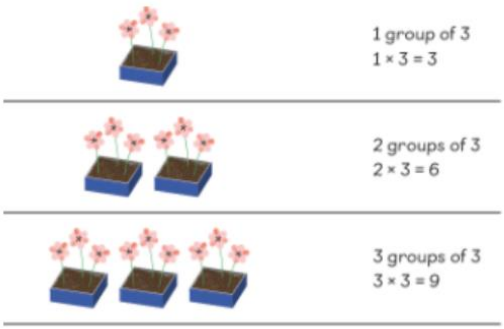


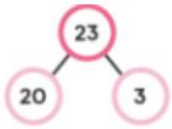


Applying addition and subtraction skills to word problems with bar models to assist.



Multiplication





Step 1 Multiply the ones by 2.

3 ones × 2 = 6 ones

Step 2 Multiply the tens by 2.

2 tens × 2 = 4 tens

Step 3 Add the products.

6 + 40 = 46

23 × 2 = 46

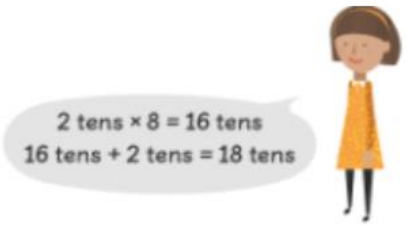
	t	o
	2	3
×		4
	1	2
+	8	0
	9	2

Step 2

	h	t	o
		2 2	3
×			8
	1	8	4

23 × 8 = 184

The product of 23 and 8 is 184.



Division

20 ÷ 4 = 5
5 × 4 = 20

20 ÷ 5 = 4
4 × 5 = 20

We can make a family of multiplication and division equations.

In Focus

How many coins does  have?

Let's Learn

1 

Method 1 8 + 8 = 16

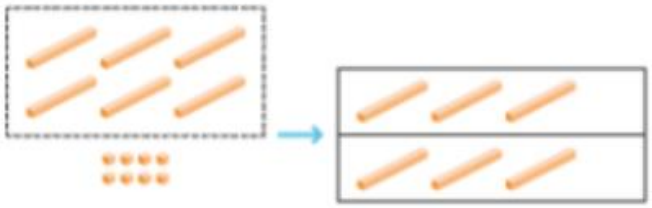
Method 2 2 × 8 = 16

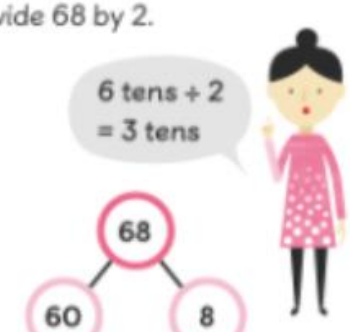
has 16 coins.

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

$68 \div 2 =$ ☐

Step 1 Divide 6 tens by 2.

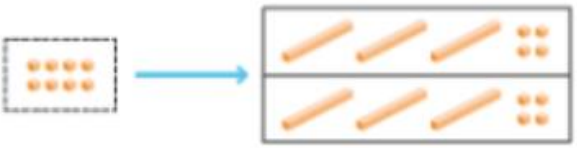


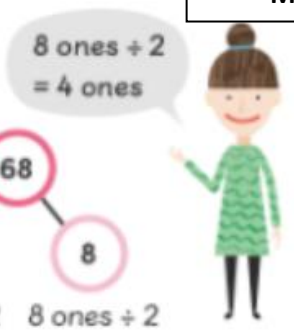


6 tens ÷ 2

Number Bond Method

Step 2 Divide 8 ones by 2.



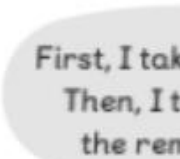


6 tens ÷ 2 8 ones ÷ 2

Step 3 Add the results.

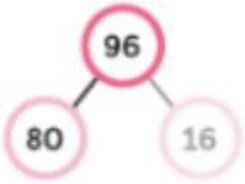
$68 \div 2 = 30 + 4 = 34$

Each person gets 34 sweets.



	1	2
8)	9	6
−	8	0
	1	6
−	1	6
		0

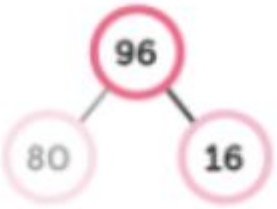
Long Division Method



1 ten

	1	2
8)	9	6
−	8	0
	1	6
−	1	6
		0

8 tens ÷ 8 = 1 ten



16 ones ÷ 8 = 2 ones

1 ten + 2 ones = 12

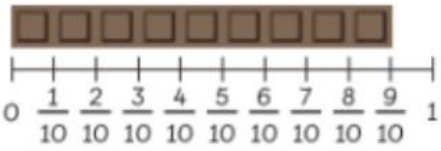
96 ÷ 8 = 12

$$\begin{array}{r} 1\ 2 \\ 8\overline{)\ 9\ 6} \\ -\ 8\ 0 \\ \hline 1\ 6 \\ -\ 1\ 6 \\ \hline 0 \end{array}$$

2 ones

Move onto problem solving involving these methods and bar models

Fractions



9 tenths

Tenths

$\frac{6}{8}$

$\frac{3}{4}$

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

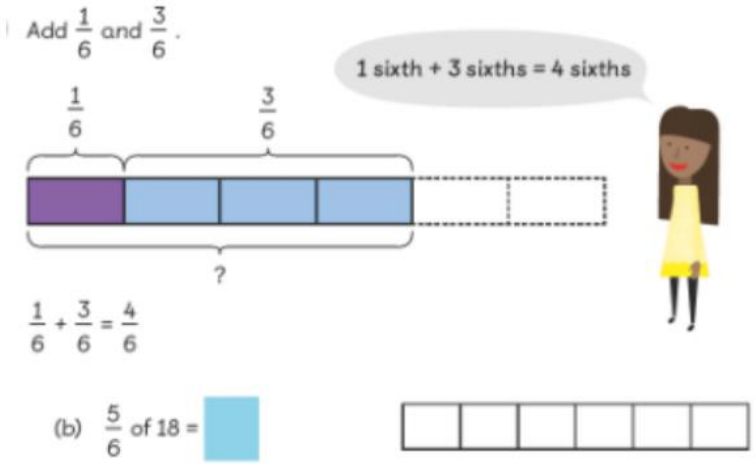
$\frac{6}{8} = \frac{3}{4}$

They are equivalent fractions.

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

Amira is correct.

Finding equivalent and simplifying fractions.



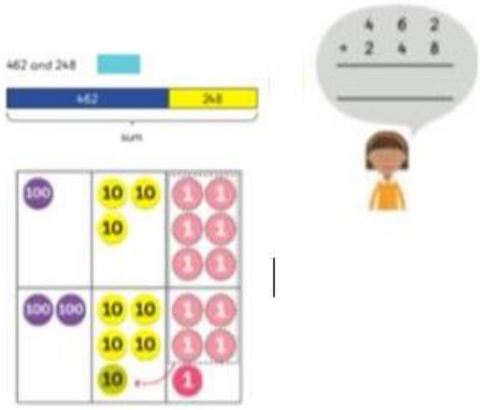
Adding Fractions

Move onto problem solving involving these methods and bar models.

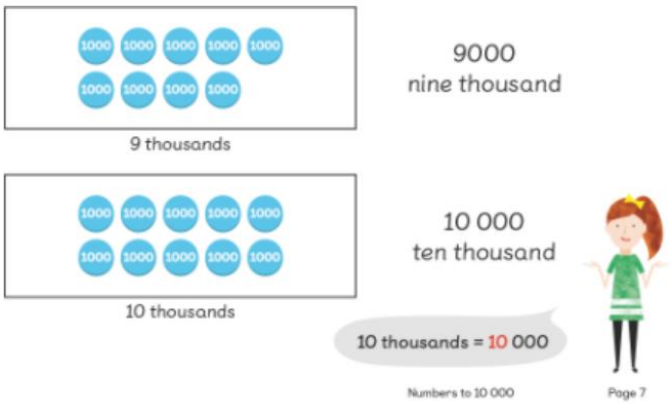
Year 4 Mathematics Policy

Place Value

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



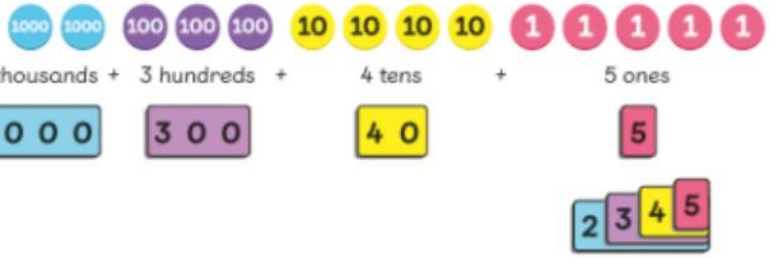
Numbers to 10,000



1

2 thousands + 3 hundreds + 4 tens + 5 ones

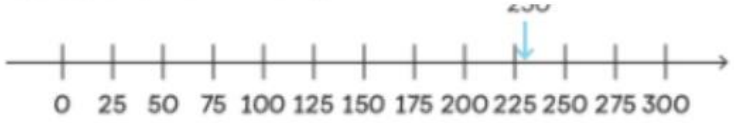
2



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.

Round 4218 to the nearest 10.

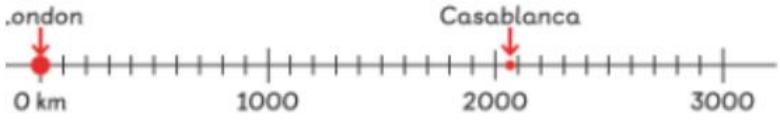
4218 is between 4210 and 4220.

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.

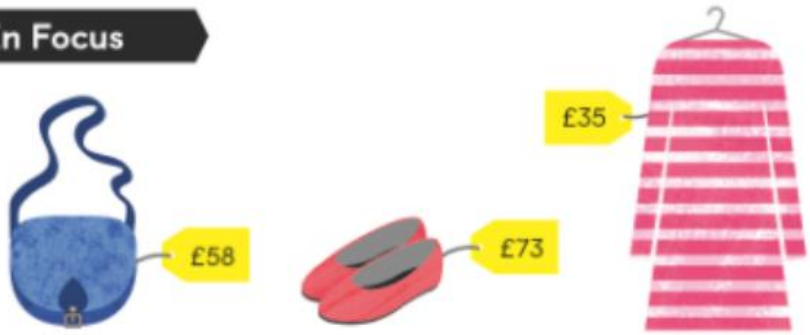
Round 2078 to the nearest 1000.



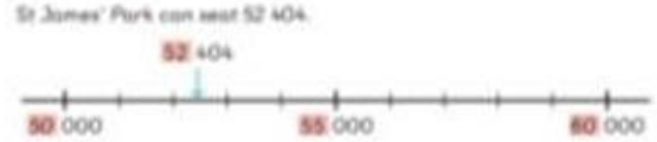
2078 is between 2000 and 3000.
2078 is closer to 2000 than to 3000.

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

In Focus

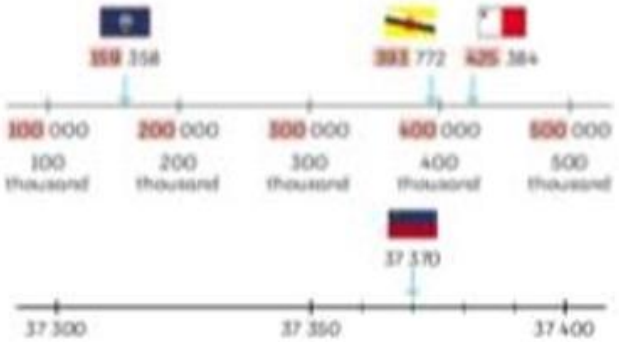


Ravi's mother went shopping.
She bought a handbag for £58, a pair of shoes for £73 and a dress for £35.
Estimate the total cost of these three items.



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

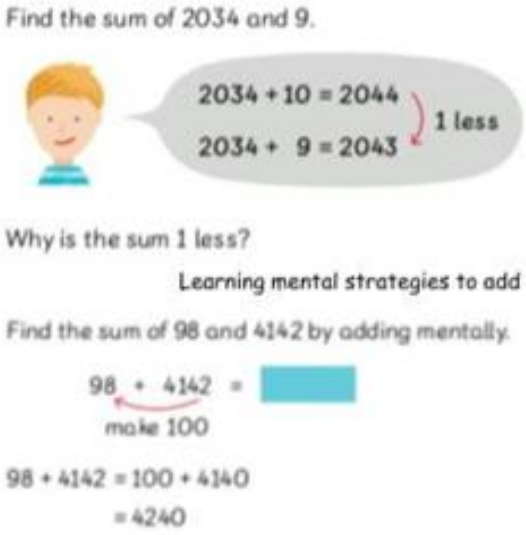
Rounding to the nearest 100, 1000, 10 000 and 100,000



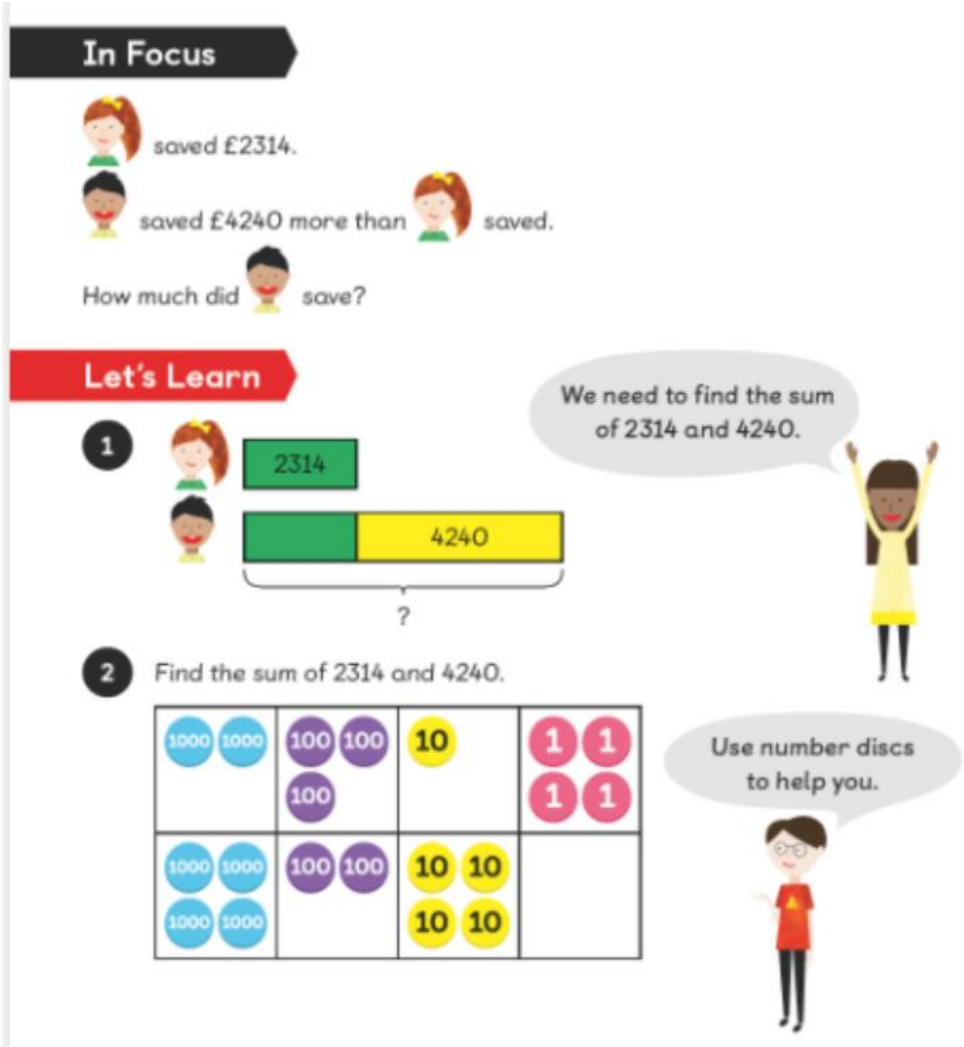
37 370 is closer to 37 400 than to 37 300.

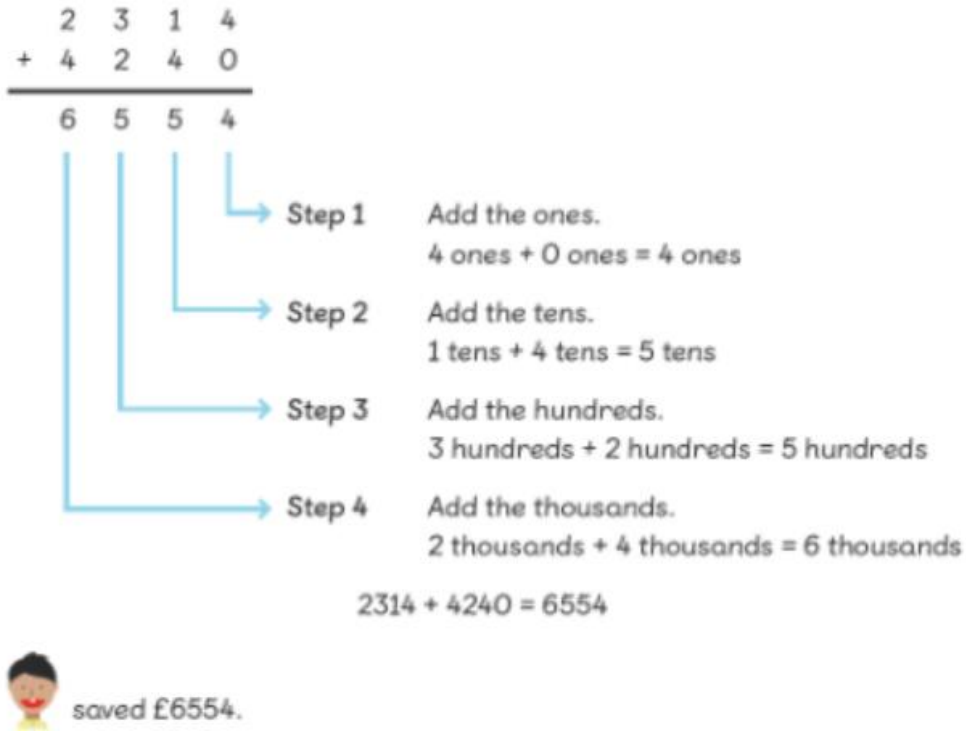
Addition

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

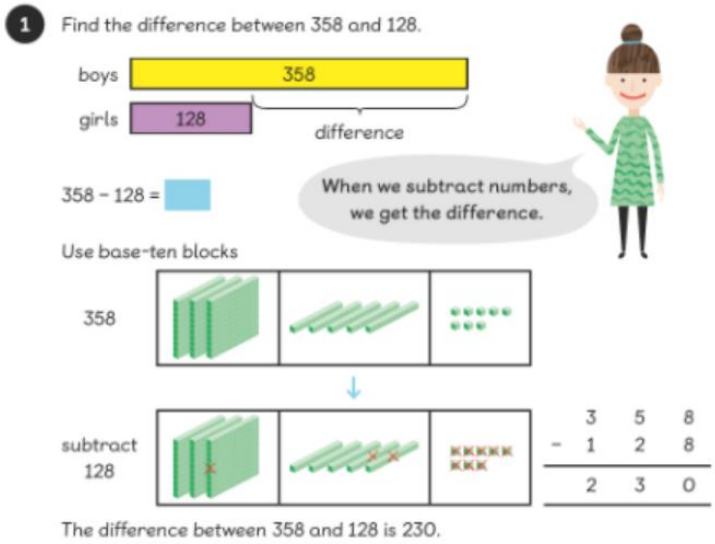


Addition – No renaming

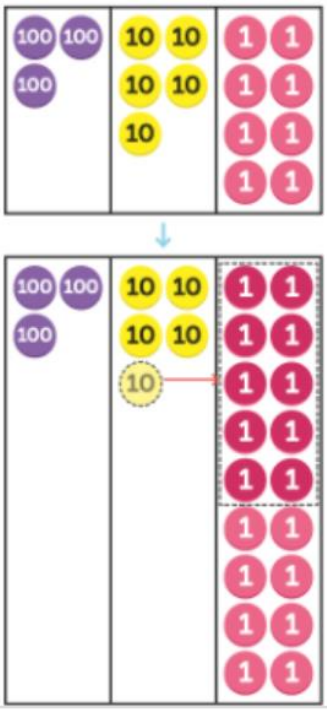




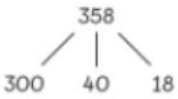
Subtraction- No regrouping



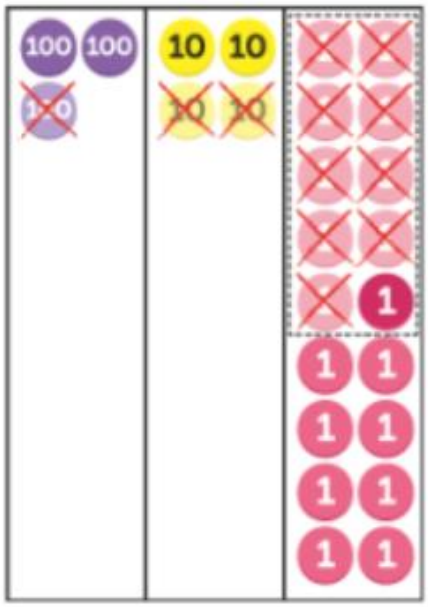
2 Find the difference between 358 and 129.

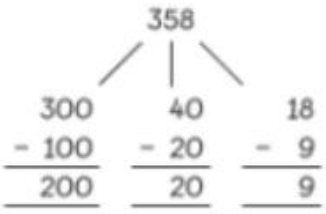


358



subtract 129



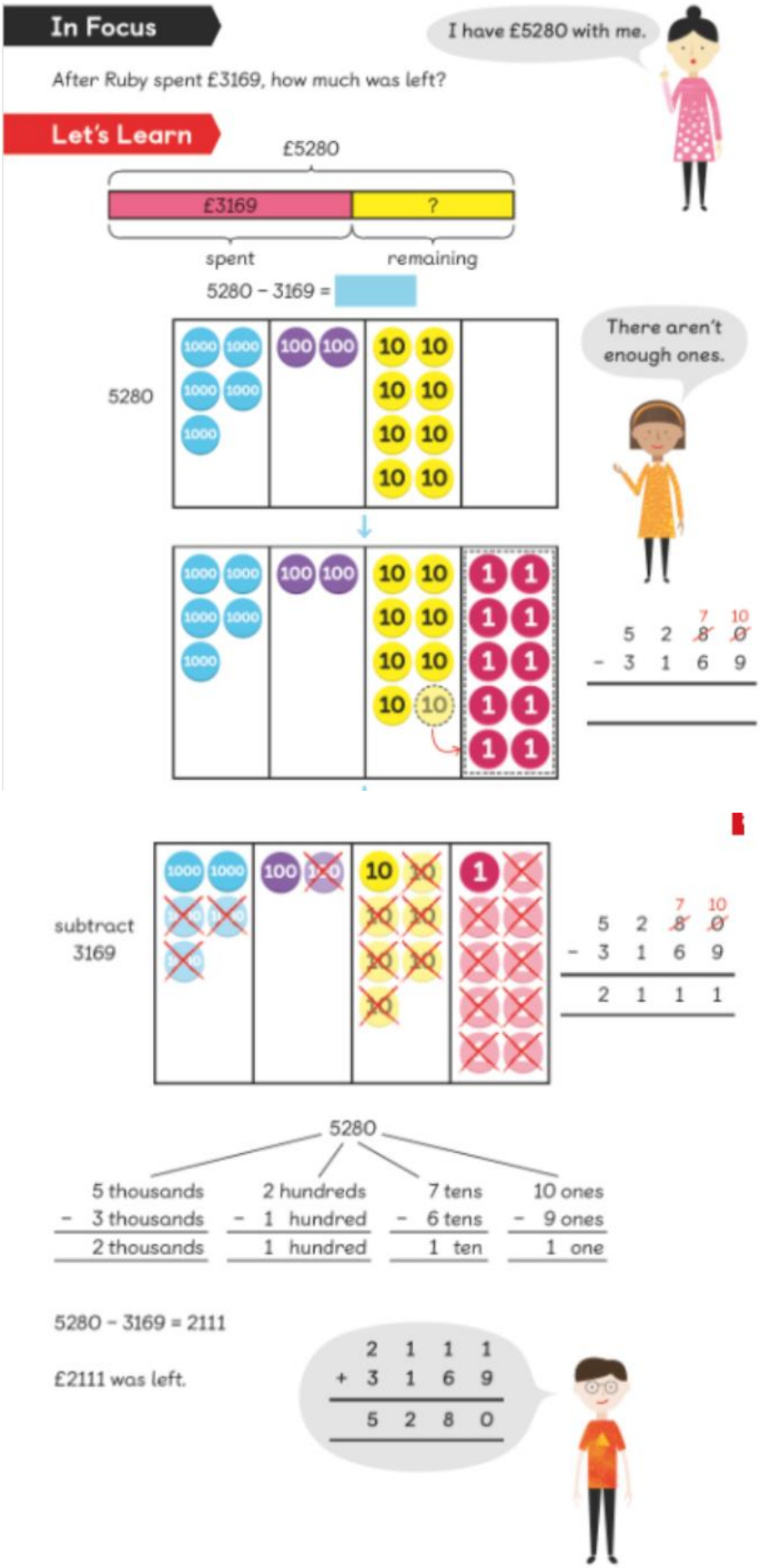


	3	4 ~~5~~	18 ~~8~~
-	1	2	9
	2	2	9

358 − 129 = 229

The difference between 358 and 129 is 229.

Subtraction- With regrouping



Bar Model Method

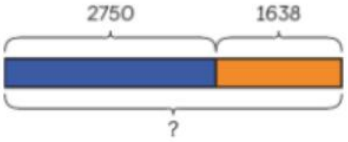
A baker made 2750 chocolate cookies and 1638 vanilla cookies.
He sold 3195 cookies altogether.
How many cookies did he have left?

Let's Learn

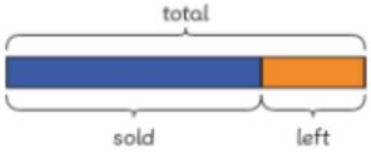
1 Understand the problem

Who?	 baker
What?	 cookies

Make a plan



Find the total number of cookies he made.



Then, subtract the number of cookies sold.

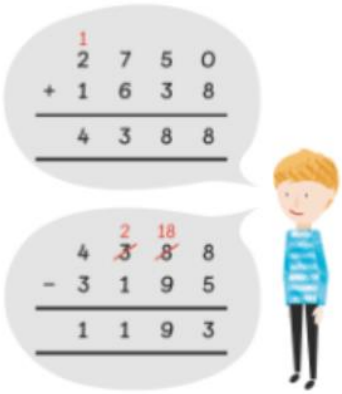
Carry out the plan

$2750 + 1638 = 4388$

The baker baked 4388 cookies.

$4388 - 3195 = 1193$

He had 1193 cookies left.



Check

Cookies sold	3195
Cookies left	1193
Cookies baked	4388

$$\begin{array}{r} 3\ 1\ 9\ 5 \\ +\ 1\ 1\ 9\ 3 \\ \hline 4\ 3\ 8\ 8 \end{array}$$

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?

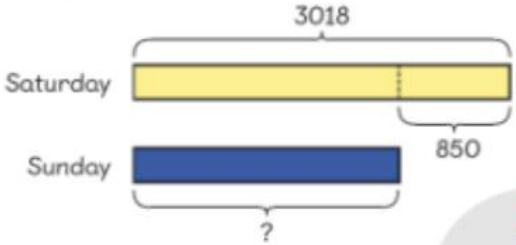
Let's Learn

1 Understand the problem

Who?	 people
What?	funfair

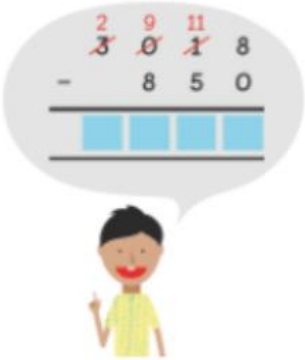
Make a plan

Carry out the plan



3018 − 850 = 2168

2168 people attended the funfair on Sunday.

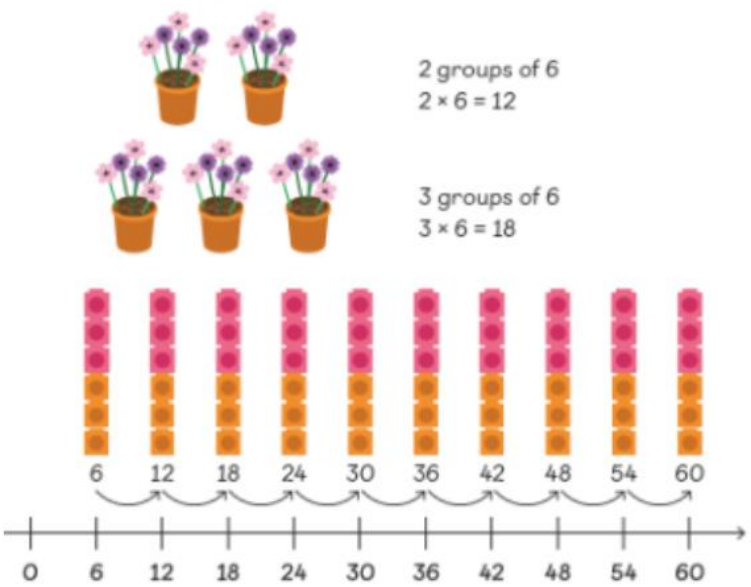


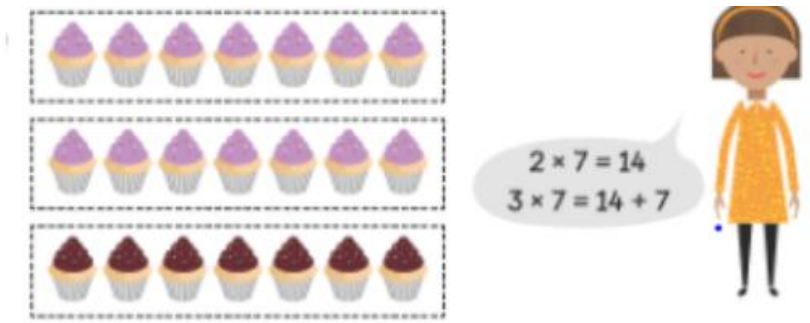
			1	
Saturday	3	0	1	8
Sunday	+ 2	1	6	8
	5	1	8	6

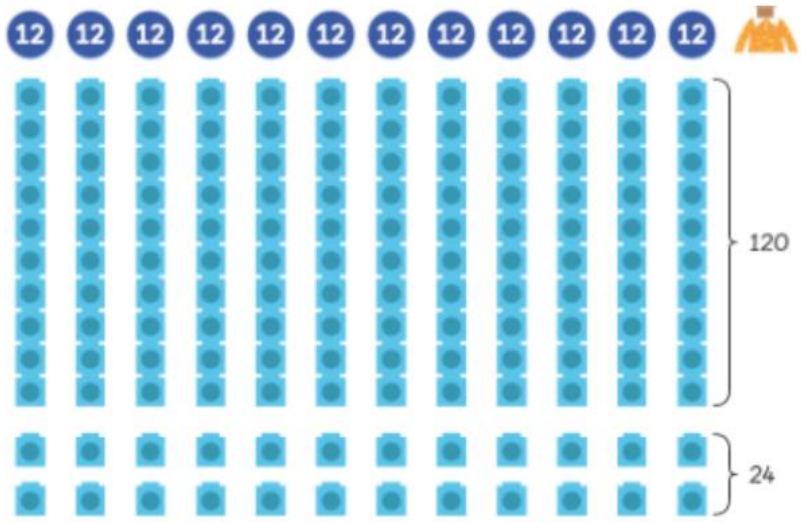
3018 + 2168 = 5186

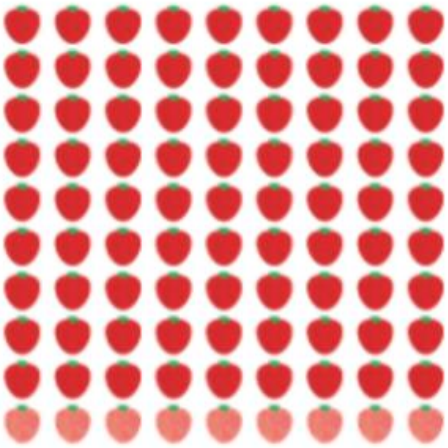
Altogether, 5186 people attended the funfair over the two days.

Multiplication









10 rows of 9 = 90
10 × 9 = 90

3 × 10 = 30

3 × 1 = 3

3 × 11 = 30 + 3

Recap: bridged and short multiplication

		2	3
×			6
		1	8
+	1	2	0
	1	3	8

		1 2	3
×			6
	1	3	8

New: multiplying 3 numbers

2 × 5 × 6 = 10 × 6 = 60

2 × 5 × 6

2 × 5 = 10

2 × 5 × 6 = 10 × 6 = 60

What is the product of 9 and 30?
9 × 30 = ☐

Method 1	Method 2	Method 3
30	9 × 3 = 27	9 × 30 = 9 × 3 × 10
30	9 × 3 tens = 27 tens	= 9 × 3 × 10
30	9 × 30 = 270	= 27 × 10
30		= 27 tens
30		= 270
30		
30		
30		
+ 30		

Which method is best?

10	10	10
10	10	10
10	10	10
10	10	10
10	10	10
10	10	10
10	10	10
10	10	10
10	10	10

Recap multiplying by a multiple of 10

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

Recap:
Bridged and short multiplication

	1 4	7	3
×			2
	9	4	6

New: multiplying by multiples of 100

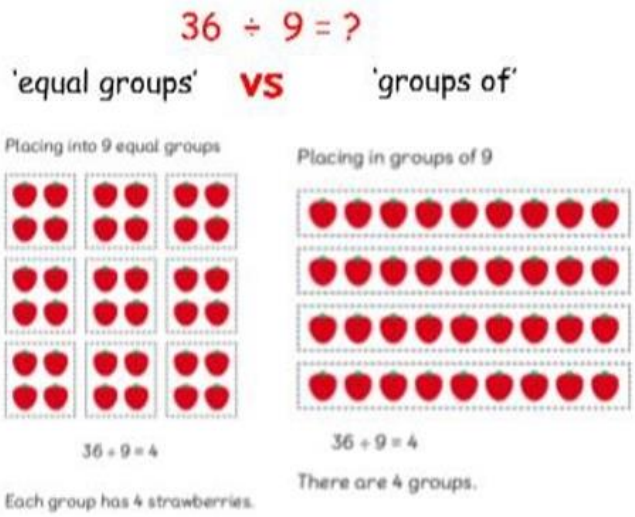
7 × 300 = ☐

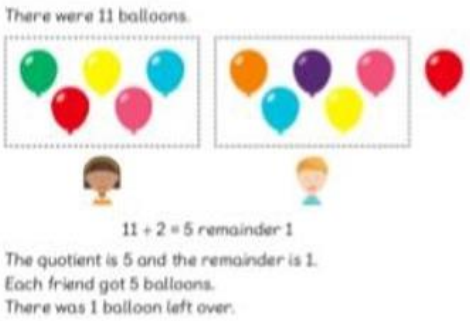
Method 1	Method 2	Method 3
300	7 × 3 = 21	7 × 300 = 7 × 3 × 100
300	7 × 3 hundreds = 21 hundreds	= 7 × 3 × 100
300	7 × 300 = 2100	= 21 × 100
300		= 21 hundreds
300		= 2100
300		
300		
+ 300		
2100		

21 hundreds = 2100

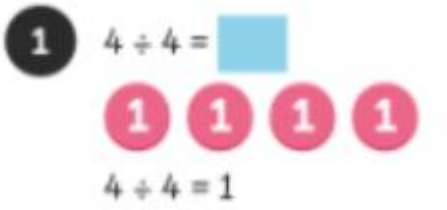
Which method is best?

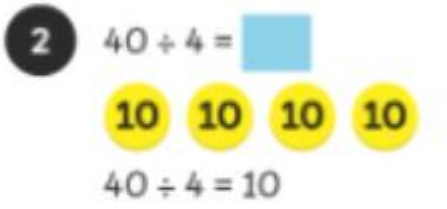
Division

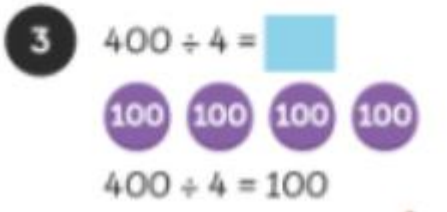


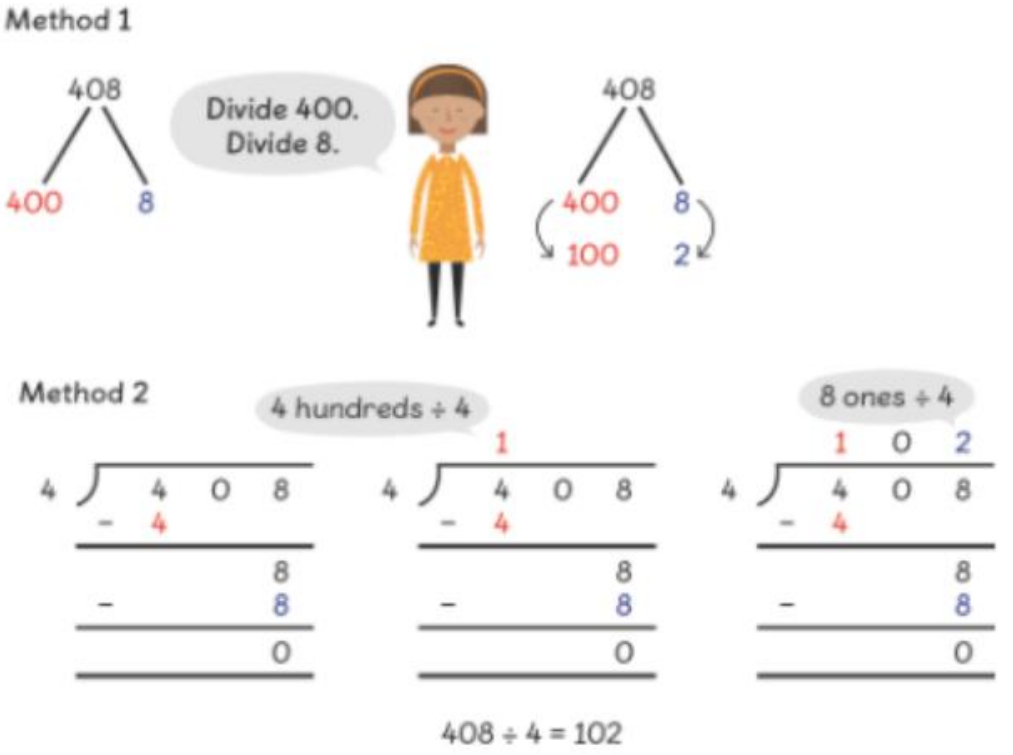


Children are introduced to the concept of remainders

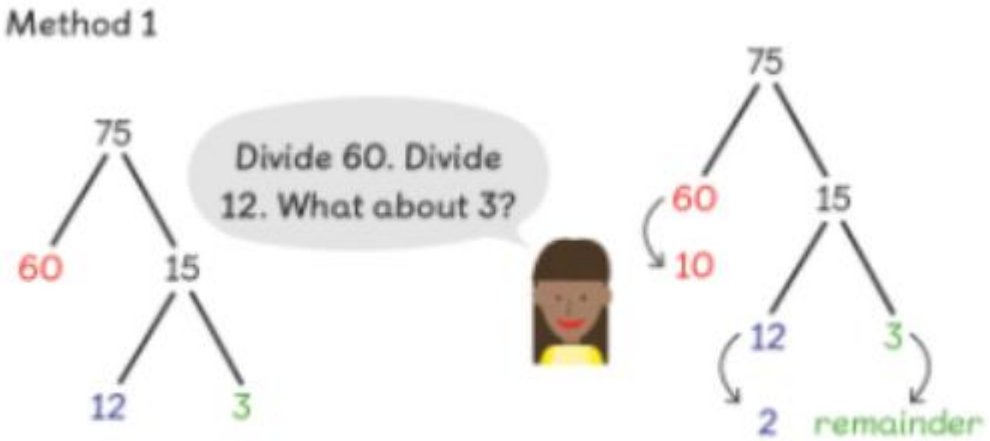




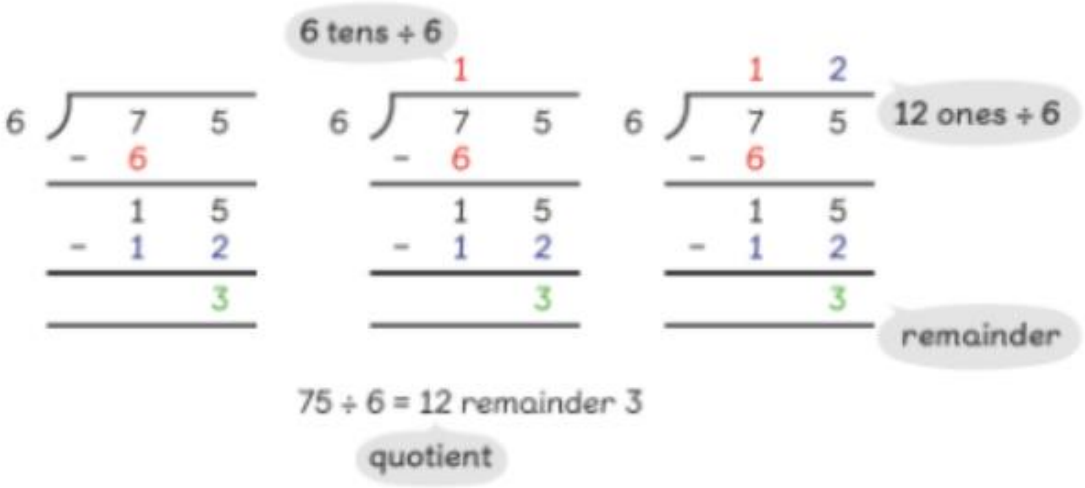




Once confident with the partitioning and long division methods, remainders are introduced using these methods.



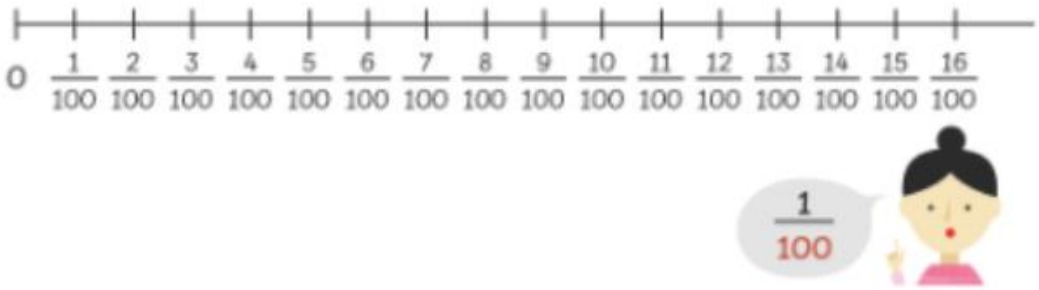
Method 2



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

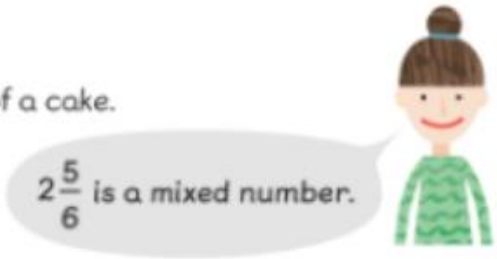
Move onto problem solving involving these methods and bar models

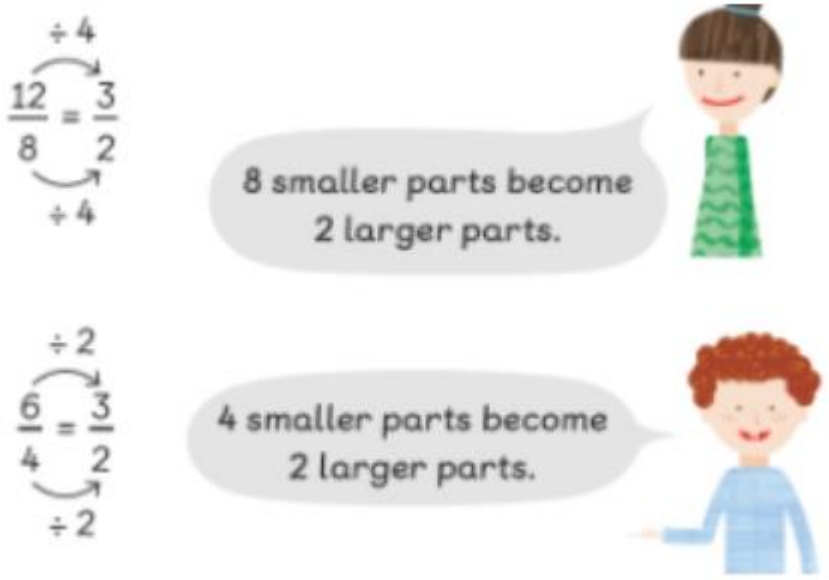
Fractions



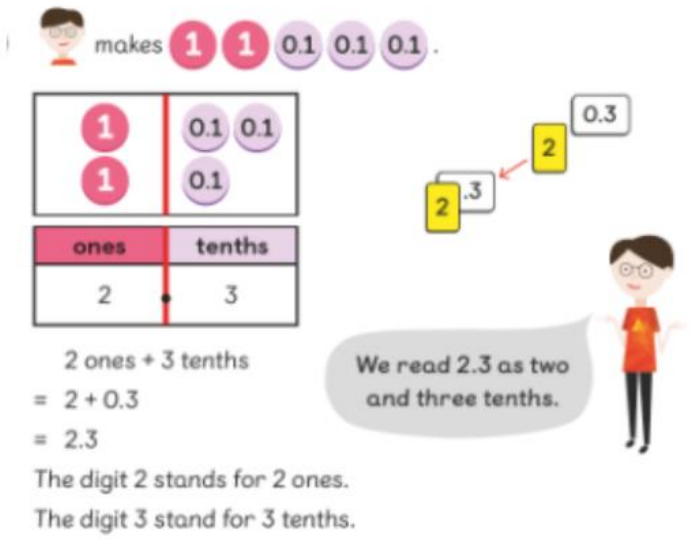
There are 2 whole cakes and 5 sixths of a cake.

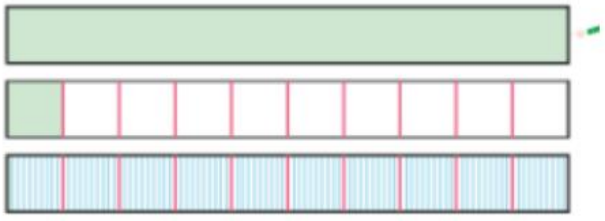
$2 + \frac{5}{6} = 2\frac{5}{6}$

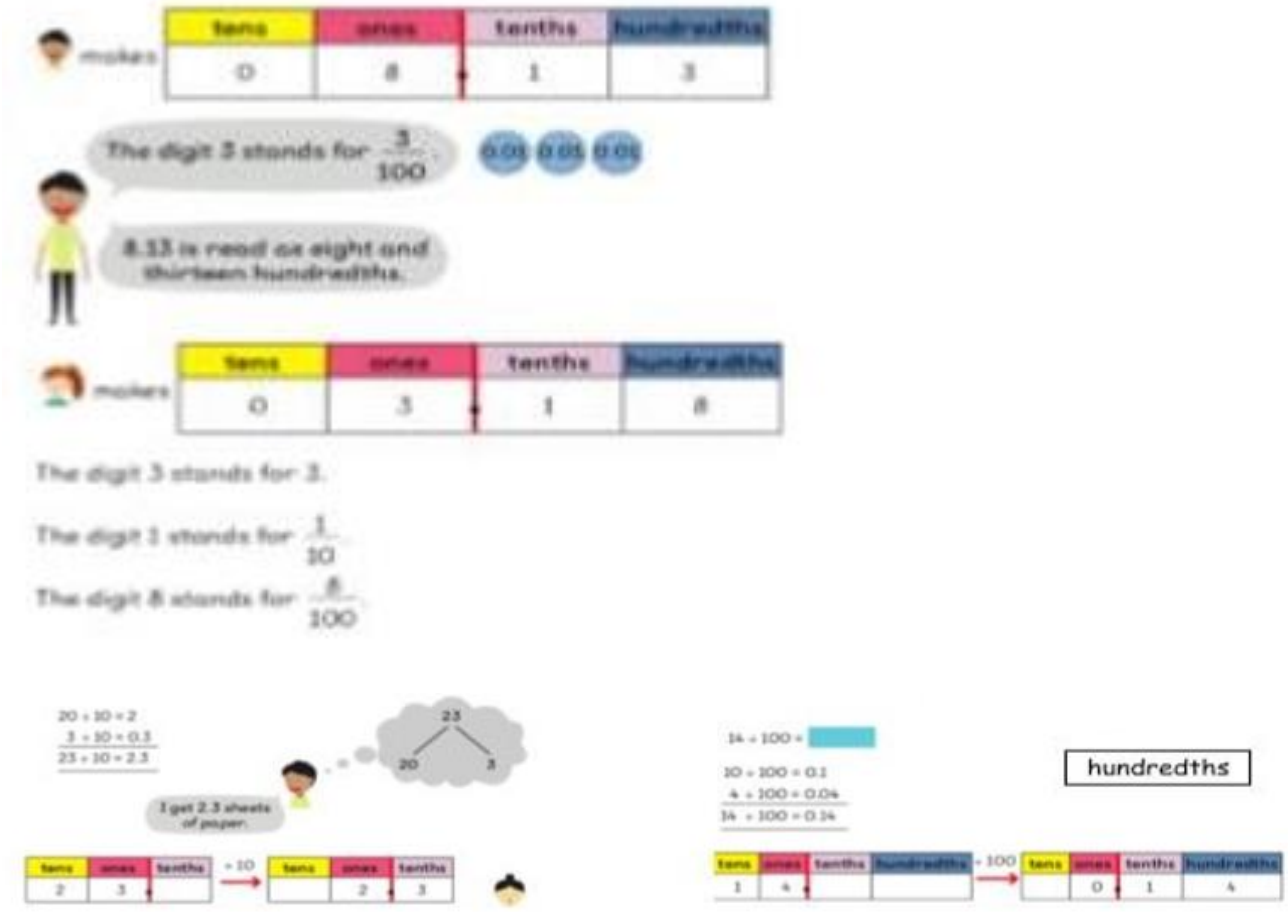



÷ 4
12 = 3
8 2
÷ 4
8 smaller parts become 2 larger parts.
÷ 2
6 = 3
4 2
÷ 2
4 smaller parts become 2 larger parts.

Decimals


makes 1 1 0.1 0.1 0.1 .
1 0.1 0.1
1 0.1
ones tenths
2 3
2 ones + 3 tenths
= 2 + 0.3
= 2.3
The digit 2 stands for 2 ones.
The digit 3 stand for 3 tenths.
0.3
2
2 .3
We read 2.3 as two and three tenths.





YEAR 4 - Multiplication tables check

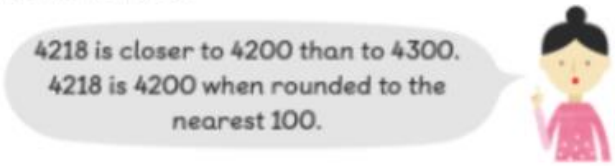
- From the 2019/20 academic year onwards, schools in England will be required to administer an online multiplication tables check (MTC) to year 4 children.
- The national curriculum specifies that children should be taught to recall the multiplication tables up to and including 12 × 12 by the end of 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.

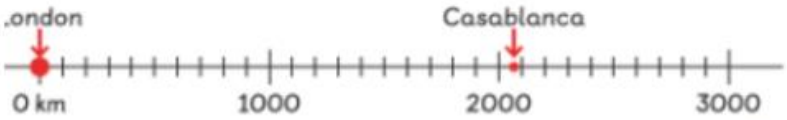
Place Value

Round 4218 to the nearest 100.

4218 is between 4200 and 4300.



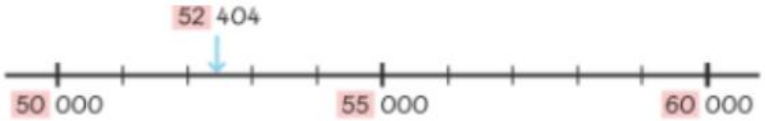
Round 2078 to the nearest 1000.



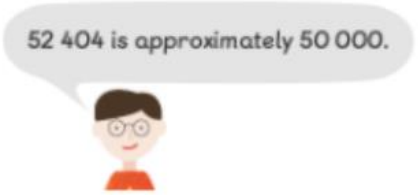
2078 is between 2000 and 3000.
2078 is closer to 2000 than to 3000.

In Focus

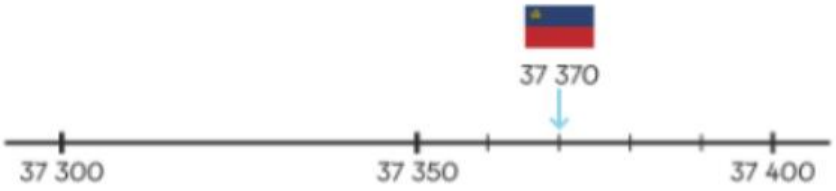
Ravi's mother went shopping.
She bought a handbag for £58, a pair of shoes for £73 and a dress for £35.
Estimate the total cost of these three items.



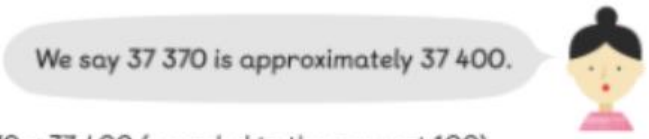
52 404 is closer to 50 000 than to 60 000.



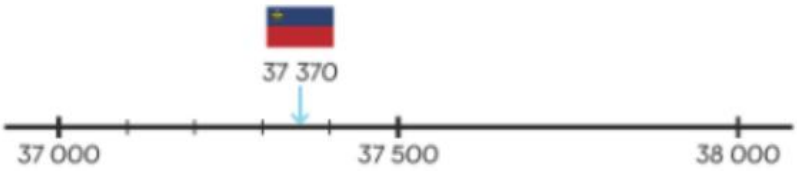
52 404 ≈ 50 000
(rounded to the nearest 10 000)



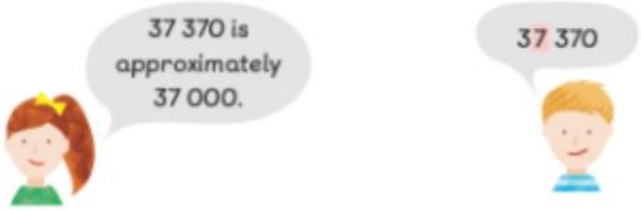
37 370 is closer to 37 400 than to 37 300.



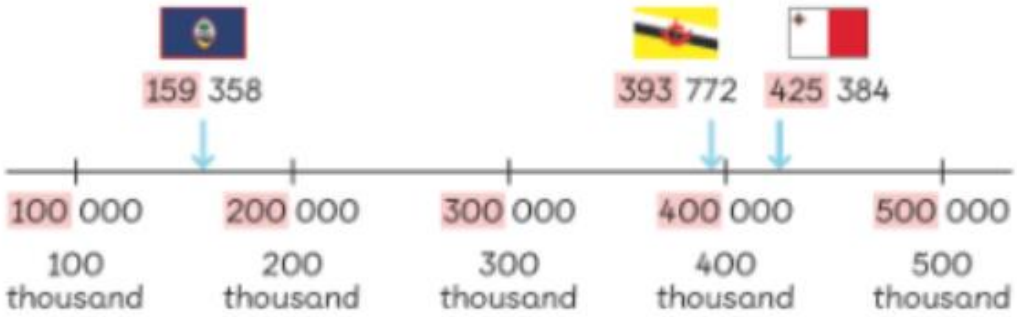
37 370 ≈ 37 400 (rounded to the nearest 100)



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

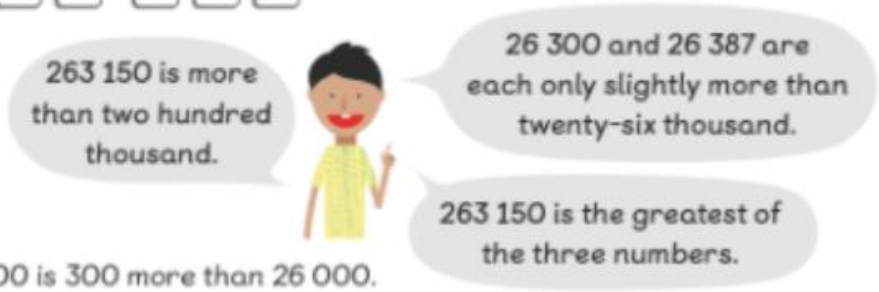


37 370 ≈ 37 000 (rounded to the nearest 1000)



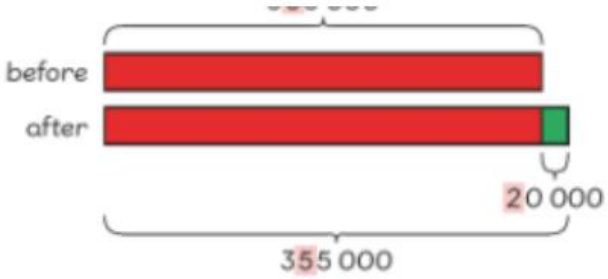
393 772 is closer to 400 000 than to 300 000.
425 384 is closer to 400 000 than to 500 000.

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

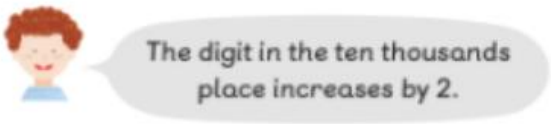


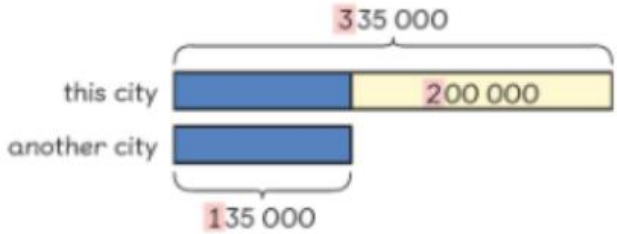
26 300 is 300 more than 26 000.
26 387 is 387 more than 26 000.
26 300 is less than 26 387.

263 150 > 26 387 > 26 300

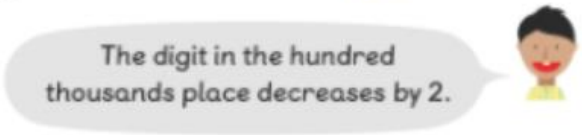

before
after
20 000
355 000


20 000 is
2 ten thousands.


The digit in the ten thousands
place increases by 2.

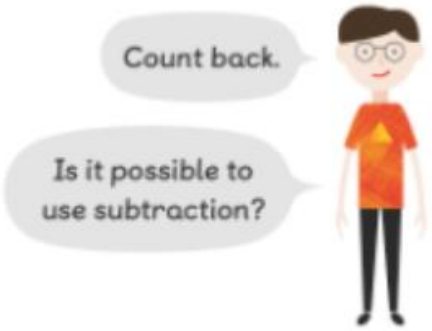

335 000
this city
200 000
another city
135 000


200 000
is 2 hundred
thousands.

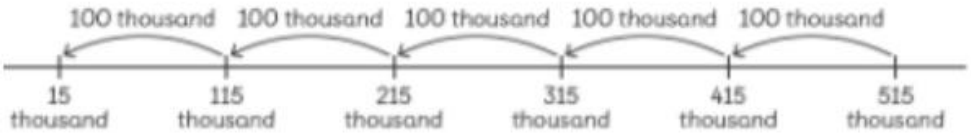

The digit in the hundred
thousands place decreases by 2.

Method 1 Make a list.

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

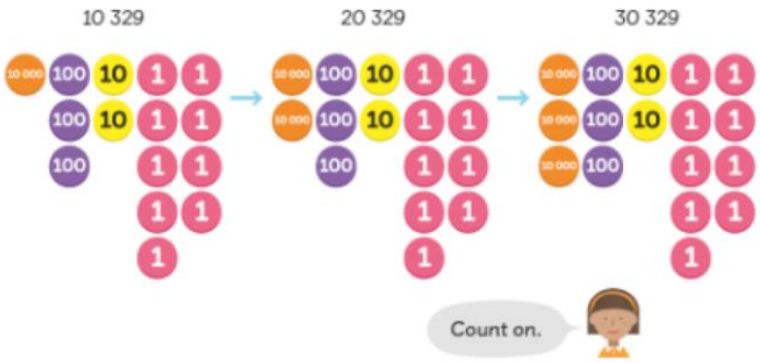


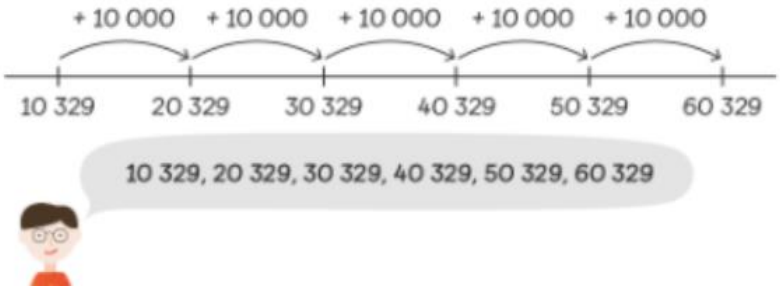
Method 2 Use a number line.



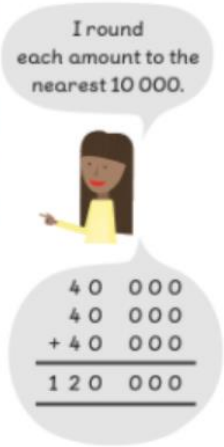
Addition

1 10 329 + 50 000 = ☐



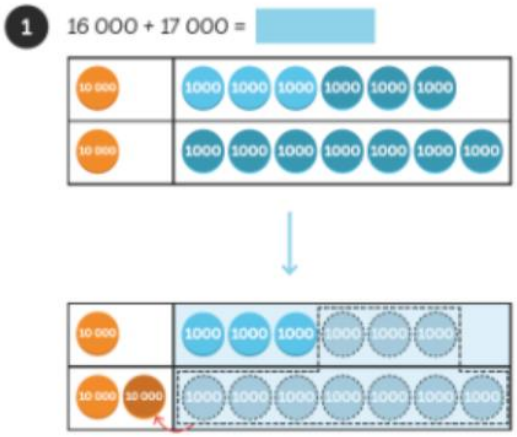


	A	B	C
1	Date	Trip	Fare
2	13 September	Airport to Hotel	150 000
3	14 September	Hotel to Office	40 000
4		Office to Hotel	45 000
5	15 September	Hotel to Office	43 000
6		Office to Hotel	42 000
7		Hotel to Restaurant	25 000
8		Restaurant to Hotel	21 000
9	16 September	Hotel to Office	46 000
10		Office to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



37 000
+ 12 000
_____
_____

```
  1 2 0  0 0 0
+ 1 2 0  0 0 0
---------------
```



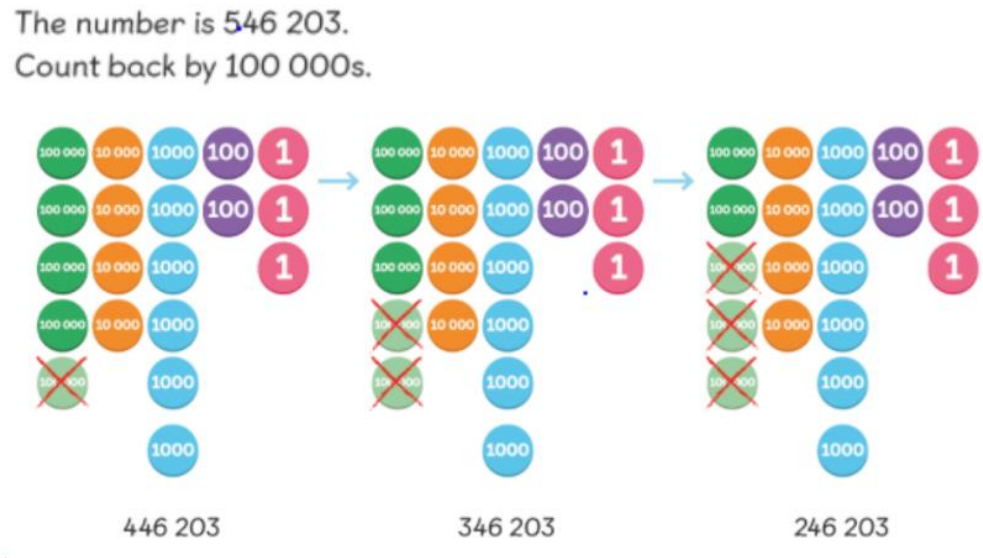

```
    1 6  0 0 0
+   1 7  0 0 0
---------------
```

```
    1
    1 6  0 0 0
+   1 7  0 0 0
---------------
      3  0 0 0
```

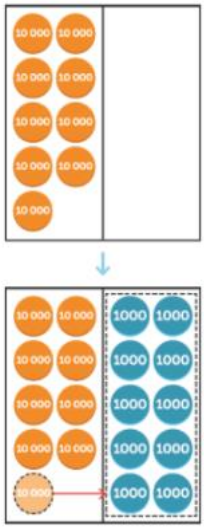
```
    1
    1 6  0 0 0
+   1 7  0 0 0
---------------
    3 3  0 0 0
```

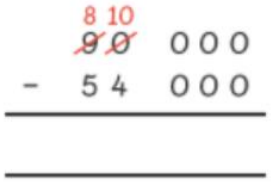
Subtraction

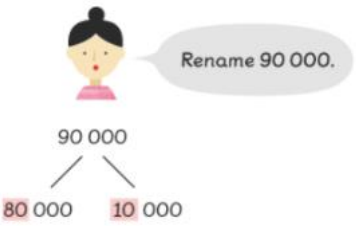
By counting back

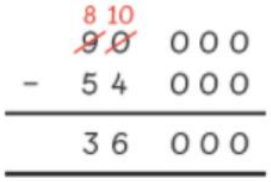


Subtraction with re-grouping

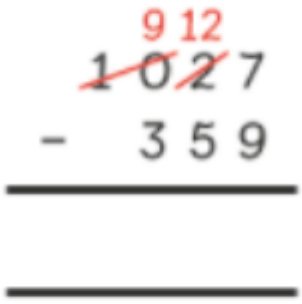


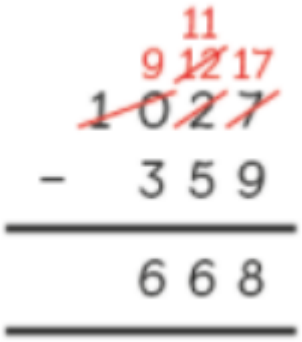




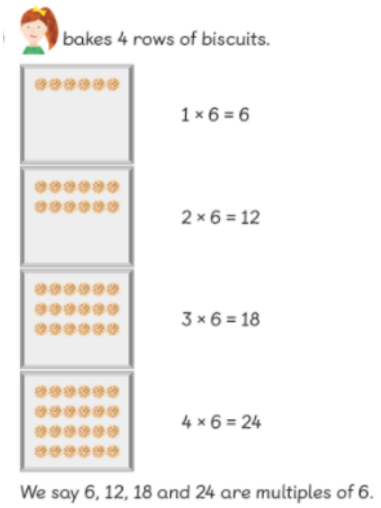


Regrouping in each place value column





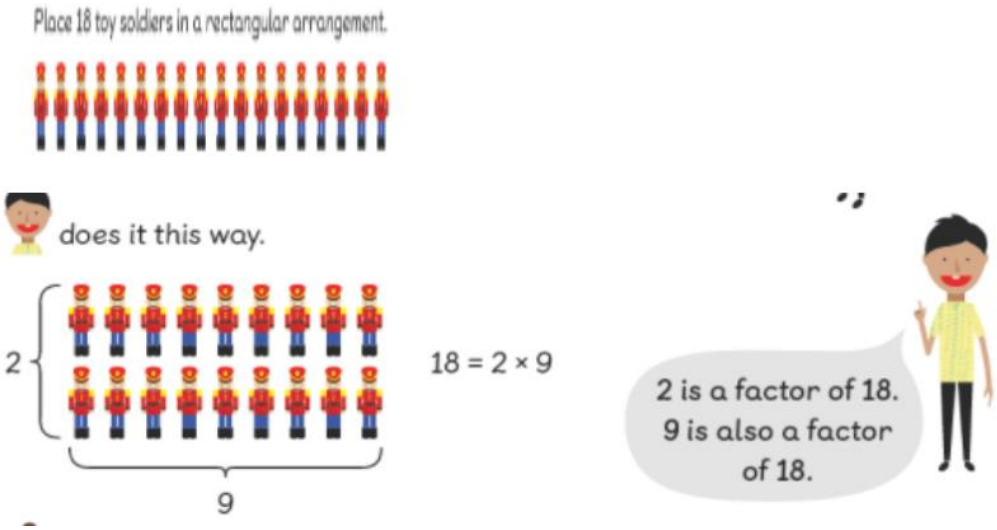
Finding multiples



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



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.

$48 = (1) \times 48$ $\quad$ $64 = (1) \times 64$

$48 = (2) \times 24$ $\quad$ $64 = (2) \times 32$

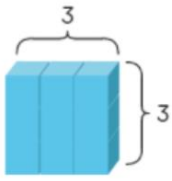
$48 = 3 \times (16)$ $\quad$ $64 = (4) \times (16)$

$48 = (4) \times 12$ $\quad$ $64 = (8) \times 8$

$48 = 6 \times (8)$

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

Square and cube numbers



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

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

27 is a cube.

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

Multiplication

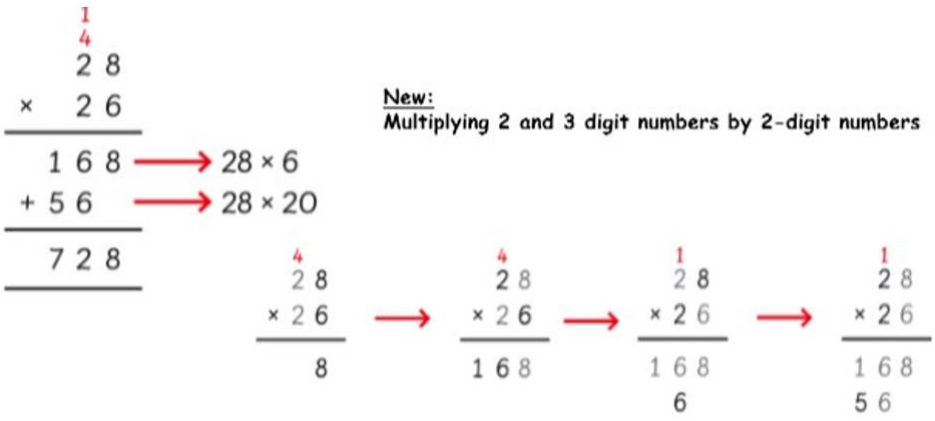
$$\begin{array}{r} 2\,7\,1\,8 \\ \times \quad 4 \\ \hline 3\,2 \\ 4\,0 \\ 2\,8\,0\,0 \\ +\,8\,0\,0\,0 \\ \hline 1\,0\,8\,7\,2 \\ \hline \end{array}$$

$$\begin{array}{r} {\scriptstyle 3} \\ 2\,7\,1\,8 \\ \times \quad 4 \\ \hline 2 \\ \hline \end{array} \qquad \begin{array}{r} {\scriptstyle 3} \\ 2\,7\,1\,8 \\ \times \quad 4 \\ \hline 7\,2 \\ \hline \end{array} \qquad \begin{array}{r} {\scriptstyle 2\ 3} \\ 2\,7\,1\,8 \\ \times \quad 4 \\ \hline 8\,7\,2 \\ \hline \end{array} \qquad \begin{array}{r} {\scriptstyle 2\ 3} \\ 2\,7\,1\,8 \\ \times \quad 4 \\ \hline 1\,0\,8\,7\,2 \\ \hline \end{array}$$

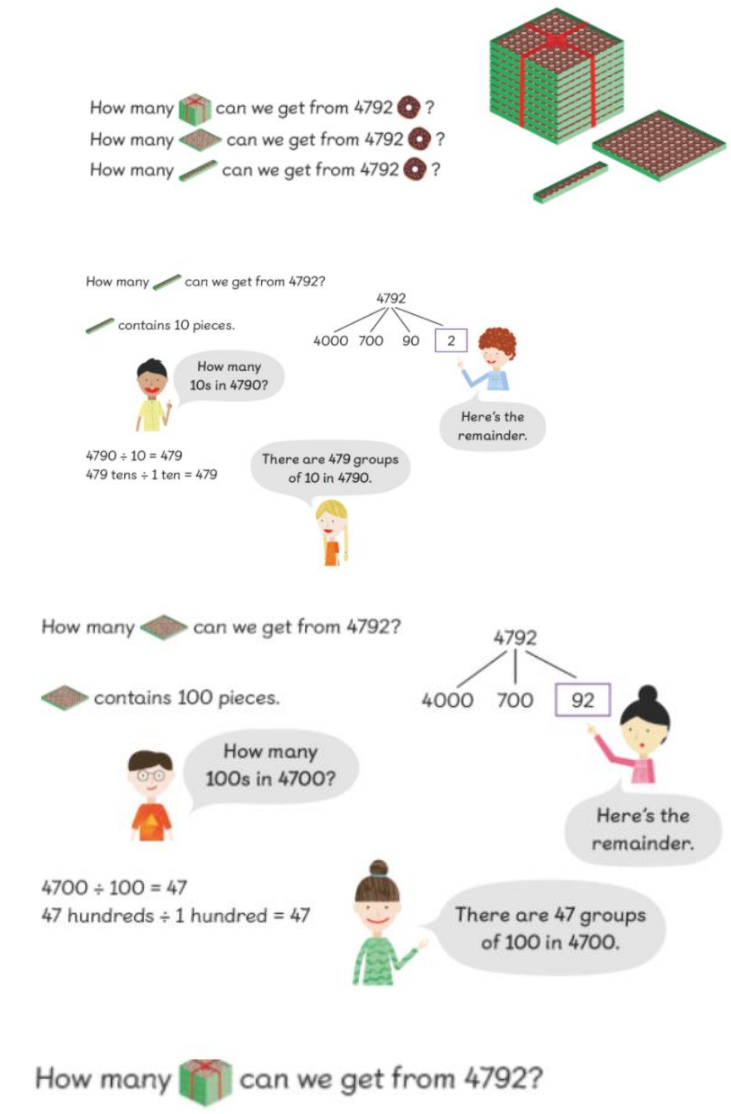
Recap:
Bridged and short multiplication but with larger numbers

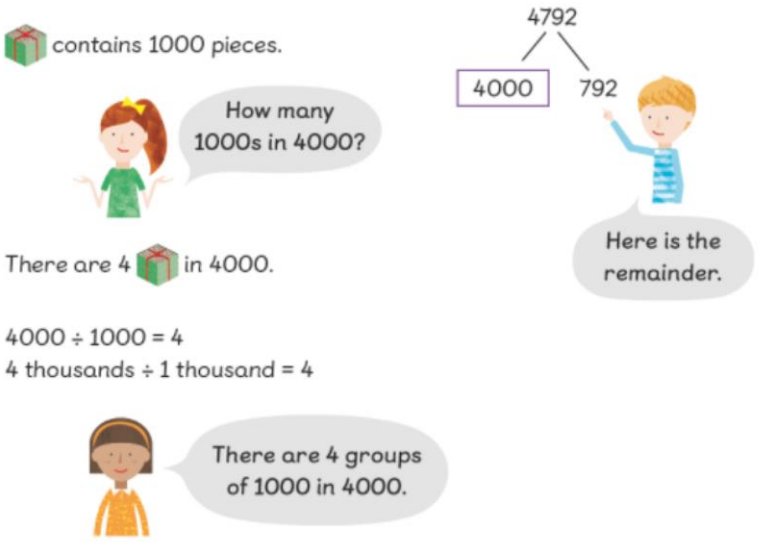
Place value counters are initially used alongside the column method to support pictorially

2718 × 4 = 10 872

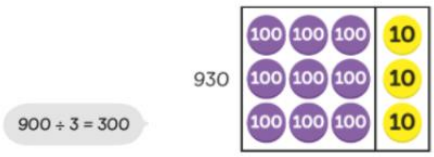

New:
Multiplying 2 and 3 digit numbers by 2-digit numbers
28 × 26
168 → 28 × 6
+ 56 → 28 × 20
728

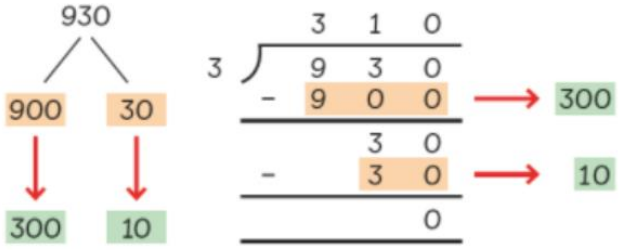
Division

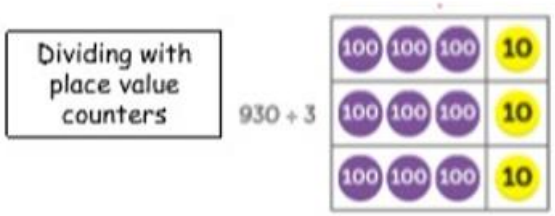

How many can we get from 4792 ?
How many can we get from 4792 ?
How many can we get from 4792 ?
How many can we get from 4792?
contains 10 pieces.
4792
4000 700 90 2
How many 10s in 4790?
Here's the remainder.
4790 ÷ 10 = 479
479 tens ÷ 1 ten = 479
There are 479 groups of 10 in 4790.
How many can we get from 4792?
contains 100 pieces.
4792
4000 700 92
How many 100s in 4700?
Here's the remainder.
4700 ÷ 100 = 47
47 hundreds ÷ 1 hundred = 47
There are 47 groups of 100 in 4700.
How many can we get from 4792?

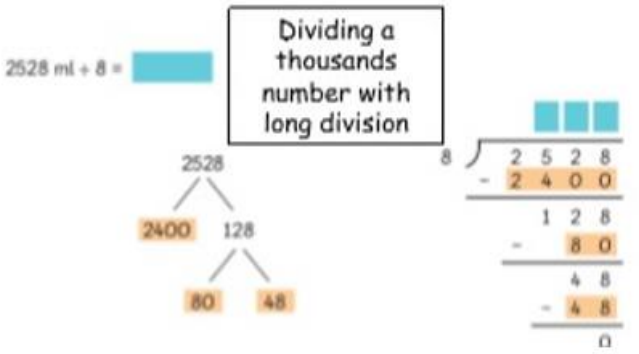


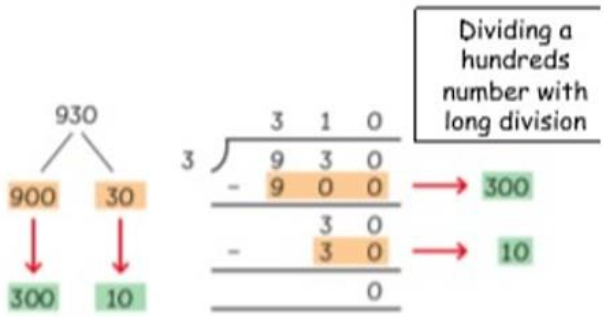
Further Division

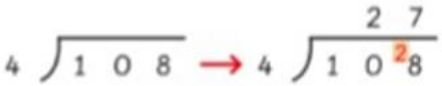






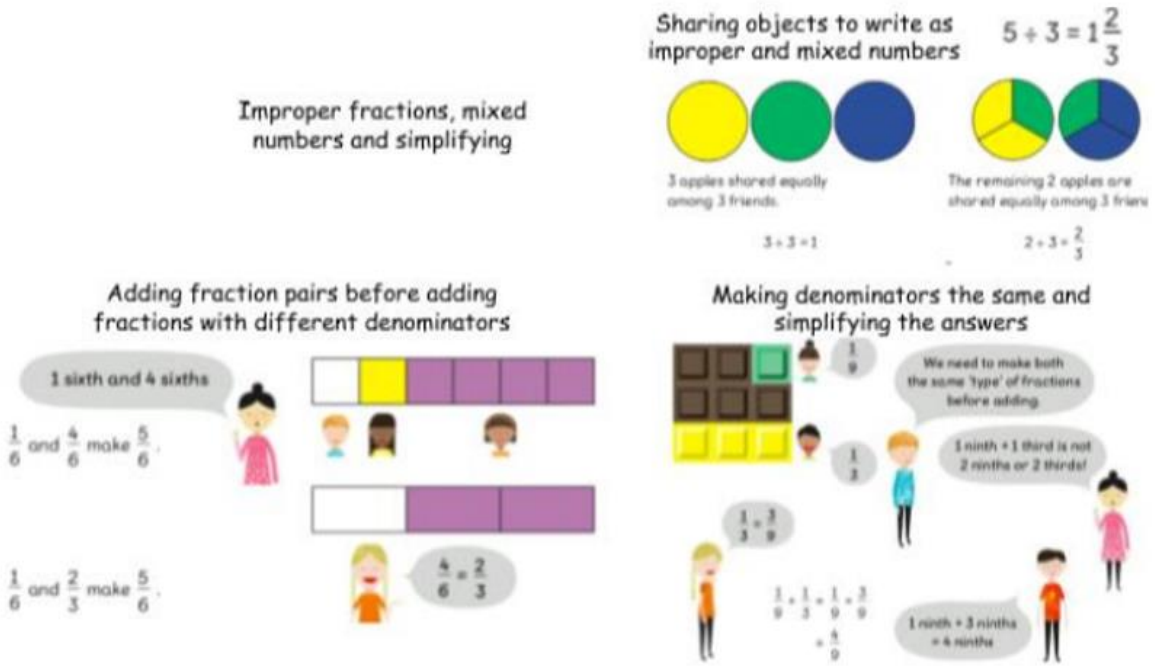




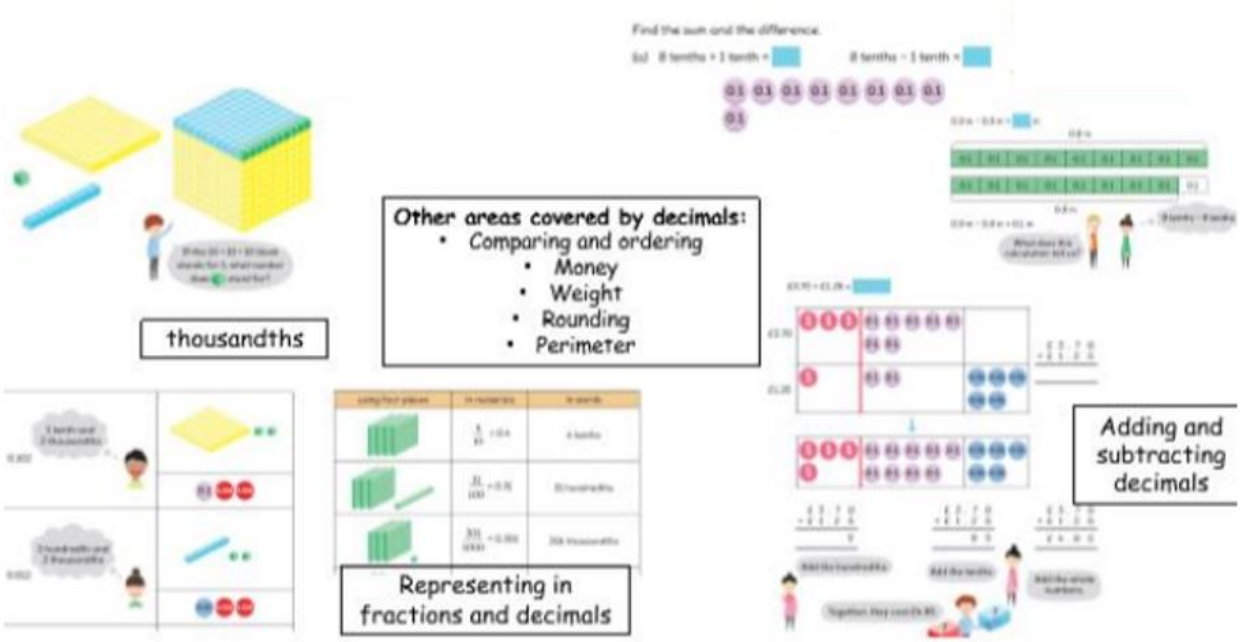


Short division

Fractions



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

$$\begin{array}{r} {\scriptstyle 1\ 1} \\ 789 \\ +\ 642 \\ \hline 1431 \end{array}$$

874 – 523 becomes

$$\begin{array}{r} 874 \\ -\ 523 \\ \hline 351 \end{array}$$

932 – 457 becomes

$$\begin{array}{r} {\scriptstyle 8\ 12\ 1} \\ 9\not{3}\not{2} \\ -\ 457 \\ \hline 475 \end{array}$$

932 – 457 becomes

$$\begin{array}{r} {\scriptstyle 1\ 1} \\ 932 \\ -\ 4\not{5}\not{7} \\ {\scriptstyle 5\ 6} \\ \hline 475 \end{array}$$

Multiplication

24 × 16 becomes

$$\begin{array}{r} {\scriptstyle 2} \\ 24 \\ \times\ 16 \\ \hline 240 \\ 144 \\ \hline 384 \end{array}$$

124 × 26 becomes

$$\begin{array}{r} {\scriptstyle 1\ 2} \\ 124 \\ \times\ 26 \\ \hline 2480 \\ 744 \\ \hline 3224 \\ {\scriptstyle 1\ 1} \end{array}$$

124 × 26 becomes

$$\begin{array}{r} {\scriptstyle 1\ 2} \\ 124 \\ \times\ 26 \\ \hline 744 \\ 2480 \\ \hline 3224 \\ {\scriptstyle 1\ 1} \end{array}$$

Division

98 ÷ 7 becomes

$$\begin{array}{r} 14 \\ 7\overline{)98} \end{array}$$

432 ÷ 5 becomes

$$\begin{array}{r} 86\ r2 \\ 5\overline{)432} \end{array}$$

496 ÷ 11 becomes

$$\begin{array}{r} 45\ r1 \\ 11\overline{)496} \end{array}$$

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 one day per week, for a 3-minute starter for maths lessons. In addition to this, PIXL Arithmetic 10 in 10 tests are undertaken once a week. The PIXL tests informs the priority therapies and we follow the PLCs from Y5 maths.

Year 6

PIXL 3 in 3s are used every day as a 3-minute starter for maths lessons. The PIXL tests informs 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.