



# Welcome

## Maths for parents

*The aim of this session*

- What we have to do - our National Curriculum expectations for maths
- What we do - how we teach maths in school
- What you can do - strategies you may want to use when supporting your children at home



**Quality First** Education Trust



## Relentless drive for improvement, excellence and equality

### Aims

**Our aim is that all children and adults:**

Are safe

Are excellent learners

Have excellent social and emotional skills

Achieve and succeed

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WHATEVER IT TAKES

What, why, where, when and how...

**What approach we use?**

**Why we use it?**

**Where it happens?**

**When it happens?**

**How it happens?**

**What we have to do!**  
**National Curriculum for maths**



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# National Curriculum - Maths

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.



# National Curriculum - Maths

The National Curriculum for Mathematics aims to ensure that all pupils:

- **reason mathematically ... developing an argument, justification or proof using mathematical language.**
- **can solve problems...routine and non-routine problems ... persevering in seeking solutions.**
- The expectation is that the majority of pupils will move through the programmes of study at **broadly the same pace.**
- Pupils who grasp concepts rapidly should be **challenged ...before any acceleration** through new content.
- Those who are not sufficiently fluent ... should **consolidate their understanding, ... through additional practice**, before moving on.



# National Curriculum - maths

The National Curriculum for Mathematics reflects the importance of spoken language and all pupils mastering maths:

- developing **mathematical vocabulary**
- presenting a **mathematical justification, argument or proof**
- **articulating** their thinking
- building secure foundations by using **discussion** to probe and remedy their misconceptions
- all pupils **mastering the content taught each year** and discourages the acceleration of pupils into content from subsequent years.



# Maths in the early years

Children should be able to **count confidently**, develop a **deep understanding of the numbers to 10**, the relationships between them and the patterns within those numbers.

Develop a secure base of **knowledge and vocabulary** from which mastery of mathematics is built.



# Maths in the early years

Develop **spatial reasoning** skills across all areas of mathematics including **shape, space and measures**.

Develop **positive attitudes** and interests in mathematics, look for patterns and relationships, spot connections, 'have a go', talk to adults and peers about what they notice and not be afraid to make mistakes.



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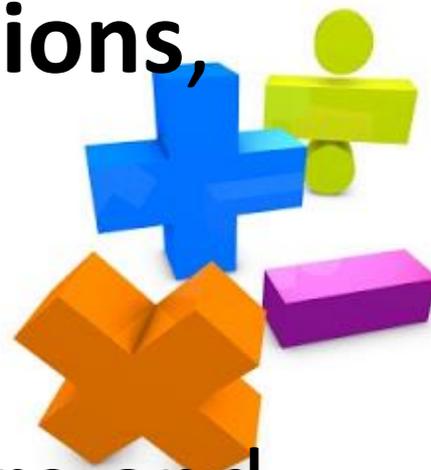
# Key stage 1

Pupils develop **confidence and mental fluency** with whole numbers, counting and place value.

Working with **numerals, words and the four operations**, including practical resources [for example, concrete objects and measuring tools].

Develop ability to recognise, describe, draw, compare and sort different **shapes and use the related vocabulary**.

Describe and compare different quantities such as **length, mass, capacity/volume, time and money**.



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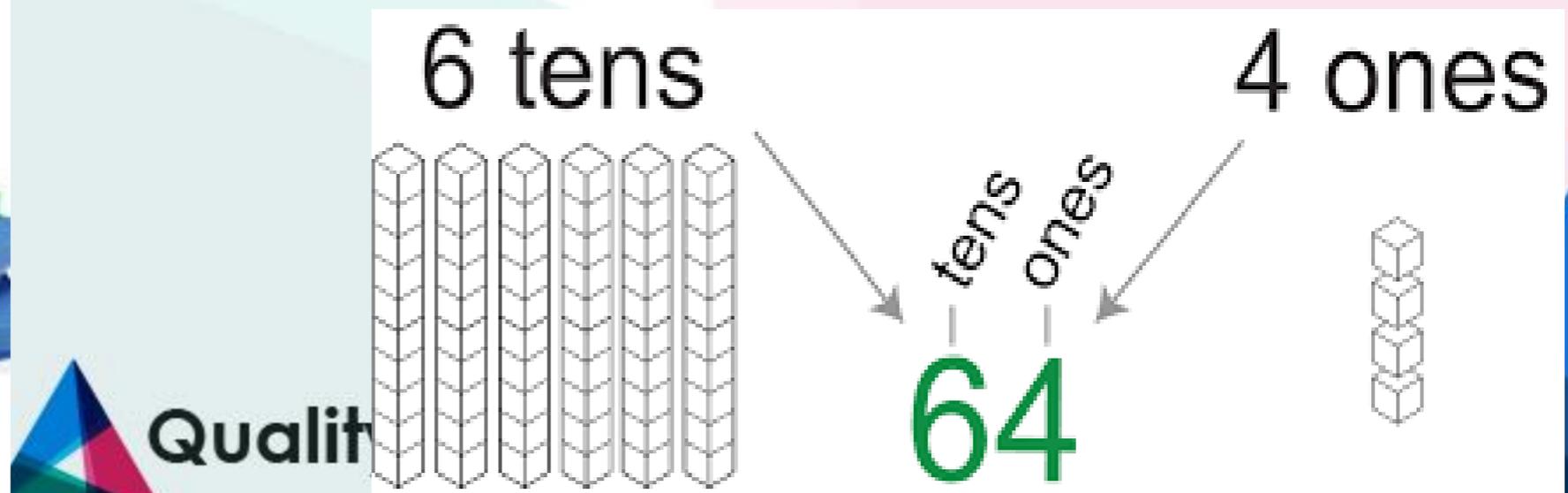
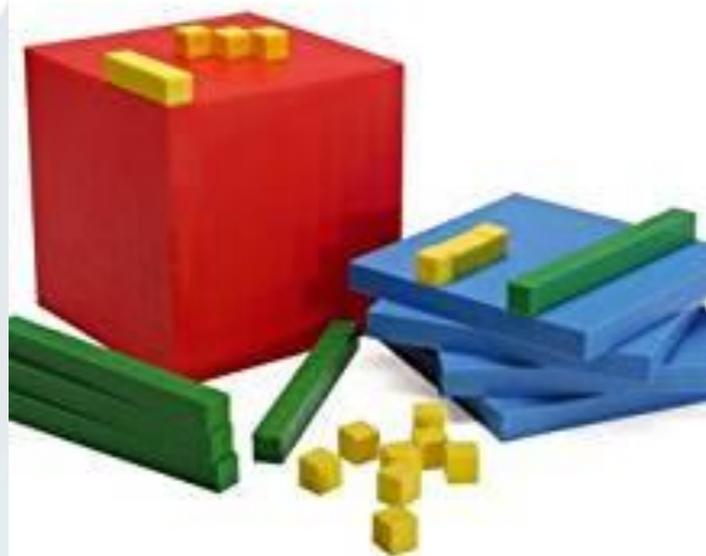


# Key stage 1

By the end of year 2, pupils should know the **number bonds to 20** (the pairs of numbers that make 20)

Be precise in using and understanding **place value**.

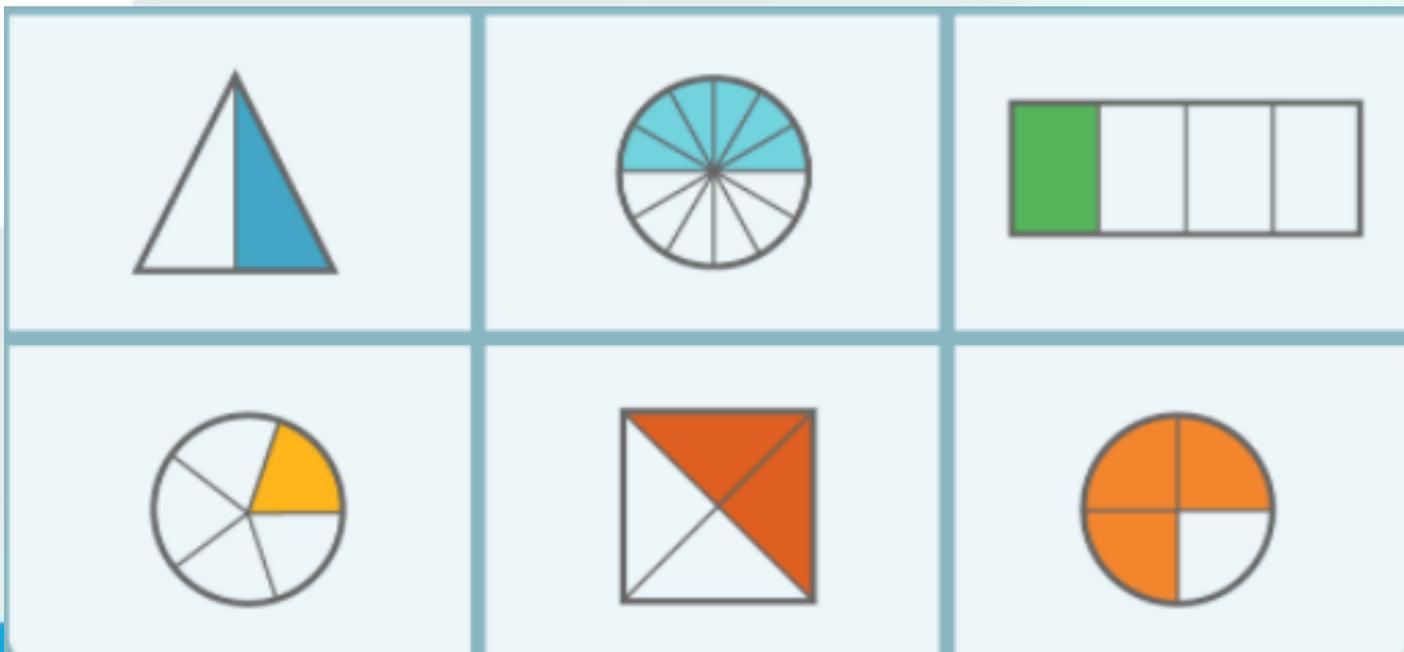
Read and spell **mathematical vocabulary**, at a level consistent with their increasing word reading and spelling knowledge at Key stage 1.



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# Lower Key Stage 2

- Develop ability to **solve a range of problems**, including with **simple fractions** and **decimal place value**.
- Increasing accurate and develop mathematical reasoning to **analyse shapes and their properties**, and confidently describe the relationships between them.
- **Use measuring instruments with accuracy** and make connections between measure and number.



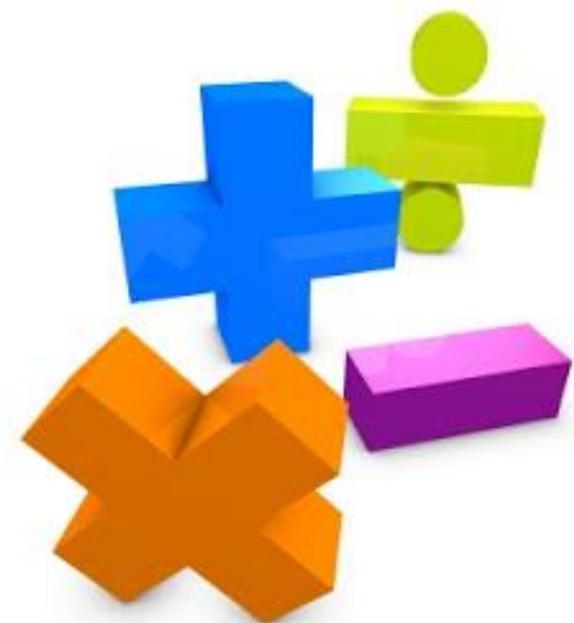
# Lower Key Stage 2

- Pupils become increasingly fluent with whole numbers and **the four operations**, including number facts and the **concept of place value**.
- Pupils **develop efficient written and mental methods** and perform calculations accurately with increasingly large whole numbers.

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$$\begin{array}{r} 48\overset{5}{\cancel{6}}5 \\ -3956 \\ \hline 9 \end{array}$$

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# Lower Key Stage 2

- By the end of year 4, pupils should have memorised their **multiplication tables**, and associated division facts, up to and including the 12 x tables (They are tested! MTC, national tables test in June)
- Show precision and fluency in work
- Read and spell **mathematical vocabulary** correctly and confidently, using their growing word reading knowledge and their knowledge of spelling.



# Upper Key Stage 2

- Pupils extend their understanding of the number system and **place value** to include larger integers (*whole numbers*)
- Develop the connections that pupils make between **multiplication and division with fractions, decimals, percentages and ratio.**

Ratio	Decimal	Percent
$\frac{3}{10} = \frac{30}{100}$	0.30	30%
$\frac{1}{2} = \frac{50}{100}$	0.50	50%
$\frac{3}{4} = \frac{75}{100}$	0.75	75%

# Upper Key Stage 2

- Develop ability to solve a wider range of problems, including **complex problems**.
- Pupils are introduced to the **language of algebra** as a means for solving a variety of problems.
- Pupils **classify shapes with increasingly complex geometric properties** and that they learn the vocabulary they need to describe them.



# Upper Key Stage 2

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



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**What we do!**  
**How we teach 'our' maths**



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# WHAT?

- Singapore style mastery approach to maths teaching
- Problem solving in a real-life context
- Concrete-Pictorial–Abstract approach
- Textbooks (and workbooks)



tens	ones
●●	●

$$21 + 9 = 30$$



# Why 'Singapore' style maths?

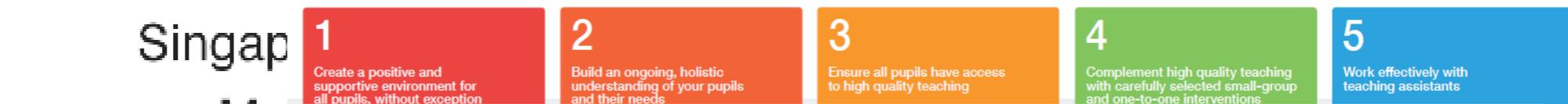
- PISA results (OECD) and TIMSS scores
- EEF recommendations (Sutton Trust)

## Maths

2015 (2012)

Rank	Country
1 (2)	Singapore
2 (3)	Hong Kong
3 (6)	Macao (China)
4 (4)	Taiwan
5 (7)	Japan
6 (1 – as Shanghai)	Beijing-Shanghai
7 (5)	South Korea

## Top 20 in mathematics on 2018 Pisa tests



## Improving Mathematics in Key Stages Two and Three – Recommendations Summary



Explore

# Problem solving in a real-life context.



How can Elliott put the flowers equally into 2 vases?

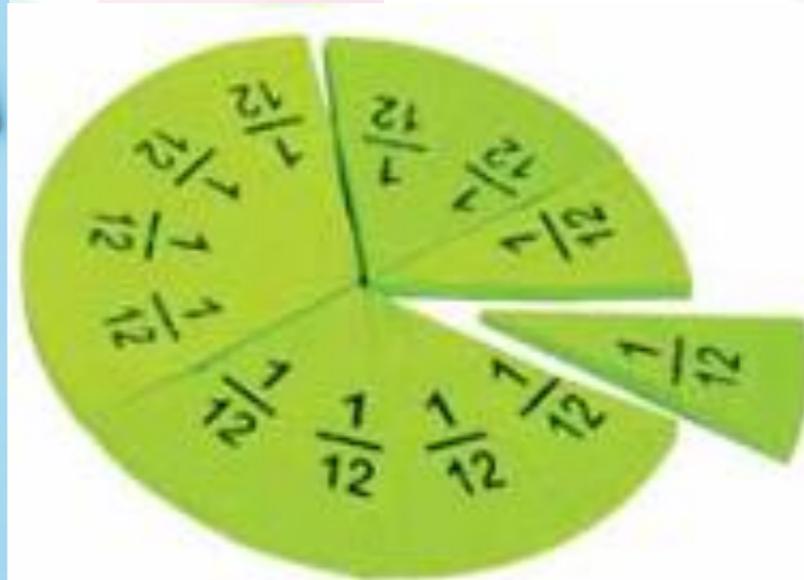
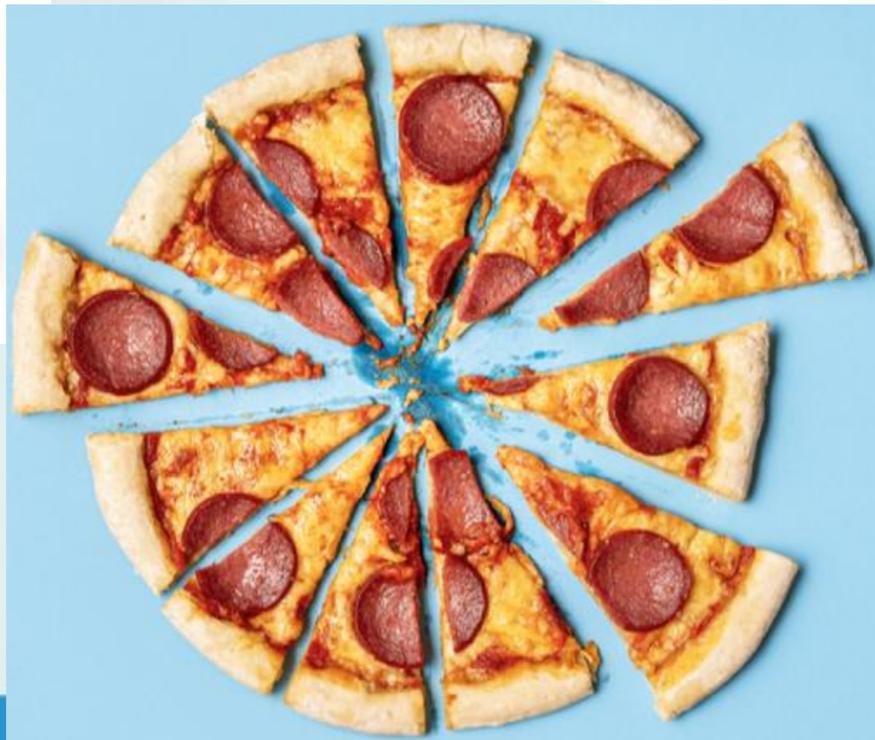


# Concrete-pictorial-abstract approach

## Concrete – The DOING stage

The first introduction to an idea or a skill is by acting it out with real objects.

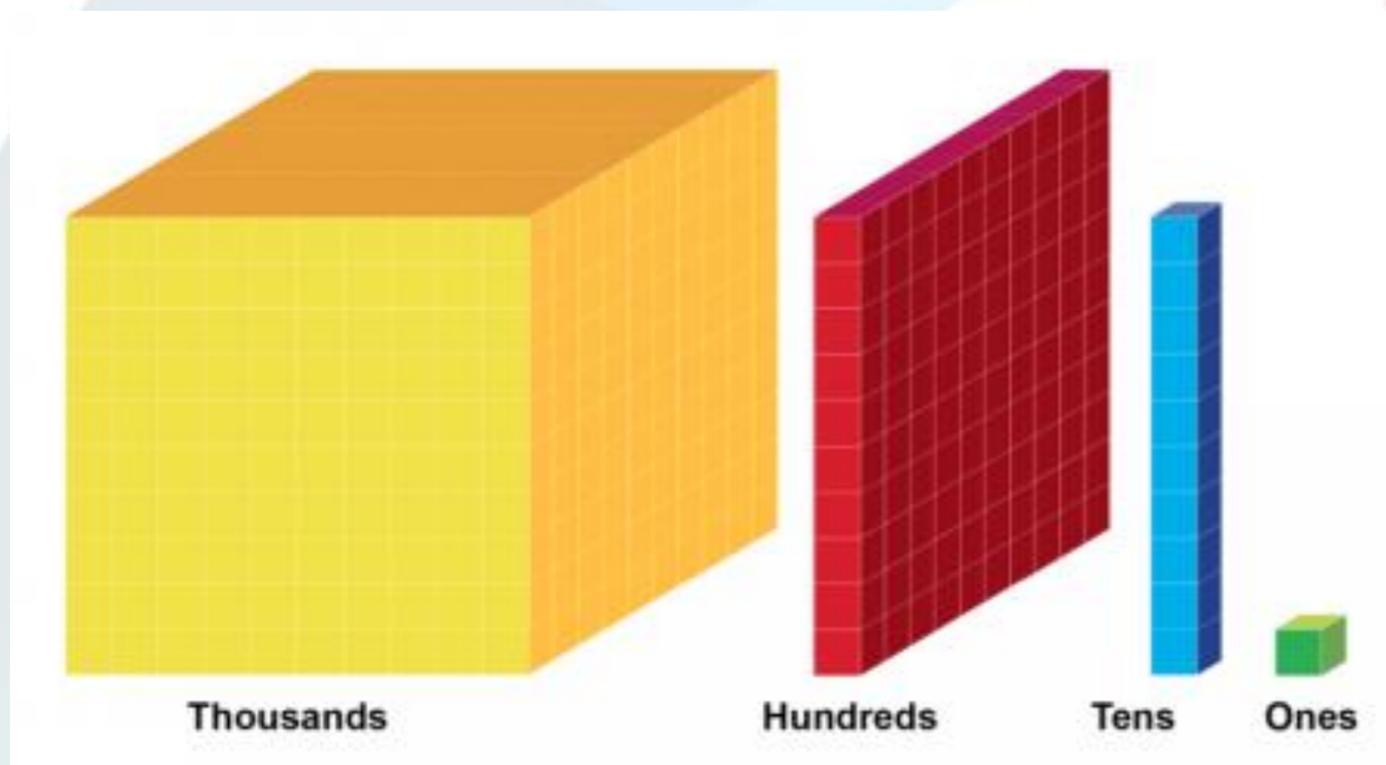
This is a 'hands on' component using real objects and it is the foundation for conceptual understanding.



# Concrete-pictorial-abstract approach

## Pictorial – The SEEING stage

When our children understand their hands-on experiences, have performed them they can now relate them to representations, such as a diagram or picture of the problem.



tens	ones
● ●	●

# Concrete-pictorial-abstract approach

## Abstract – The SYMBOLIC Stage

A child is now capable of representing problems by using mathematical notation, for example:

$$21 + 9 = 30$$

2 tens and 1 one and 9 ones makes 3 tens

2 tens and 1 ten make 3 tens

$$30 = 20 + 10$$



# Our lesson structure – maths and...

## Our maths lessons:

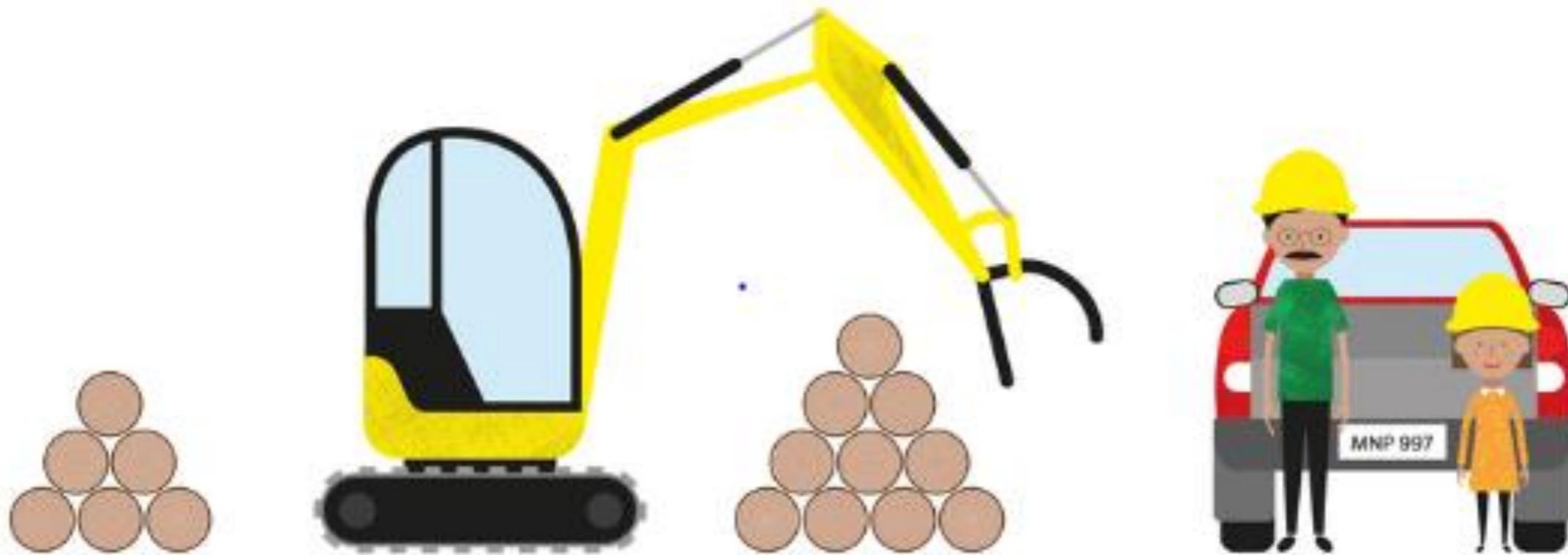
- **Trigger prior learning** – recap/linking previous knowledge
- **Factual fluency** - recall of existing knowledge, aiming for rapid recall of known facts
- **Anchor task** – class problem with a ‘live’ context
- **Guided practice** – paired practice using progressively harder questions
- **Independent** – series of questions moving into unfamiliar (+ consolidation or deepening tasks)



# Anchor task – ‘Explore’

A problem that promotes discussion

## Explore

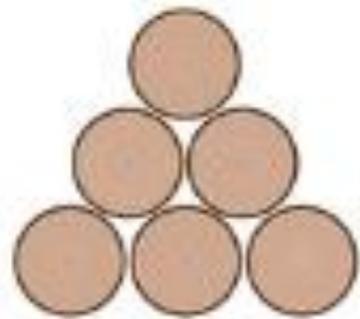


There are 16 logs altogether.  
9 logs are taken away.  
How many logs are left?

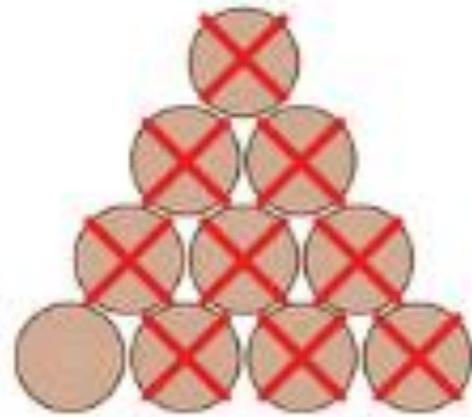


# Master

$16 - 9 = \square$



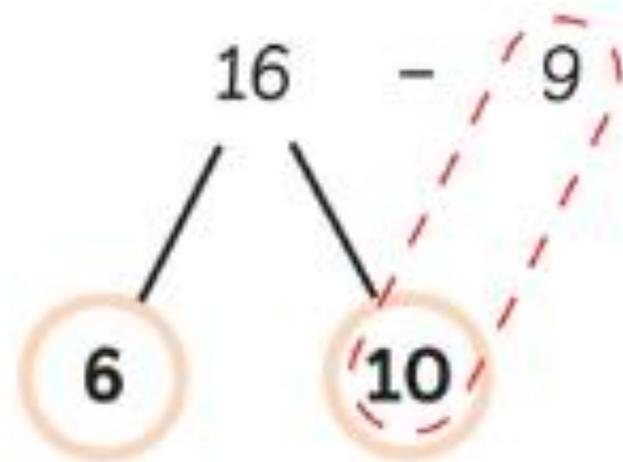
6



10

I can take away 9 logs from the stack of 10.

I then need to add to find how many are left.



$10 - 9 = 1$

$1 + 6 = 7$

$16 - 9 = 7$

There are 7 logs left.



# Guided Practice

Subtract.

1 (a)  $14 - 6 =$



$10 - 6 =$

(b)  $13 - 7 =$



$10 - 7 =$

(c)  $11 - 5 =$



$10 - 5 =$

Subtract from 10.



+ 4 =



+ 3 =



2 (a)  $12 - 4 =$

(b)  $15 - 8 =$

**Guided practice**  
A series of problems for children to work through in pairs.

Progression between questions.

# Independent work

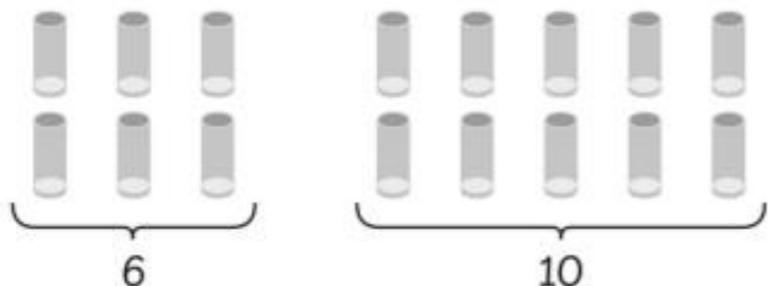
To assess children's understanding of the learnt concept.

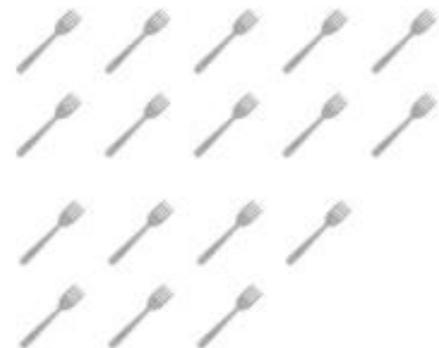
## Worksheet 6

### Subtract from 10

 is subtracting from 10 first to help him complete subtraction.

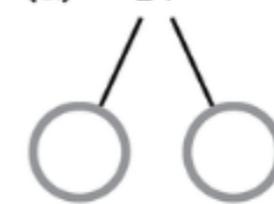
Can you help Charles by filling in the blanks?

1 (a)  6

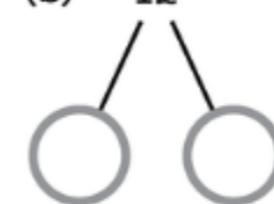
(b) 

(c) 

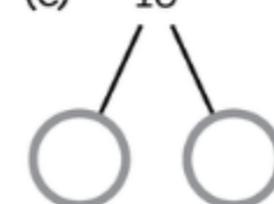
2 (a)  $14 - 6 = \square$



(b)  $12 - 4 = \square$



(c)  $16 - 9 = \square$



3 (a)  $15 - 9 = \square$

(b)  $16 - 8 = \square$

(c)  $14 - 7 = \square$

(d)  $12 - 7 = \square$

# Where? When?

- Reception classes use the same approach in teaching maths in their new curriculum
- Years 1 to 6 use the Singapore structured textbook and workbook
- Daily maths lessons

Year 1		
Autumn term	Spring term	Summer term
Book A: Unit 1 - Numbers to 10	Unit 8 - Shapes and patterns	Unit 15 - Numbers to 100
Unit 2 - Number Bonds	Unit 9 - Length and height	Unit 16 - Time
Unit 3 - Addition within 10	Book B: Unit 10 - Numbers to 40	Unit 17 - Money
Unit 4 - Subtraction within 10		Unit 11 - Addition and subtraction word problems
Unit 5 - Positions	Unit 12 - Multiplication	Unit 18 - Volume and capacity
Unit 6 - Numbers to 20	Unit 13 - Division	Unit 19 - Mass
Unit 7 - Addition and subtraction within 20	Unit 14 - Fractions	Unit 20 - Space

Year 2		
Autumn term	Spring term	Summer term
Book A: Unit 1 - Numbers to 100	Unit 6 - Mass	Unit 13 - Fractions (may start Spring term)
Unit 2 - Addition and subtraction	Unit 7 - Temperature	Unit 14 - Time
Unit 3 - Multiplication 2, 5 & 10	Unit 8 - Picture graphs	Consolidation: Shape, time and money
	Book B: Unit 9 - More word problems	
Unit 4 - Multiplication & division 2, 5 and 10	Unit 10 - Money	
Unit 5 - Length	Unit 11 - Two dimensional shapes	
Unit 6 - Mass (Continued in Autumn term)	Unit 12 - Three dimensional shapes	
	Book B: Unit 15 - Volume	
	Consolidation: Time	



# How?

<b>Autumn 1: 33 lessons</b>				
<b>1 Chapter 1: Numbers to 10 000</b>				
<b>INSET day Q1E</b>	<b>INSET day school</b>	<b>Lesson 1: Counting in Hundreds and Twenty-Fives</b> To count in hundreds and twenty-fives.	<b>Lesson 2: Counting in Thousands</b> To count in thousands.	<b>Lesson 3: Counting in Thousands, Hundreds, Tens and Ones</b> To count in thousands, hundreds, tens and ones.
<b>2 Chapter 1: Numbers to 10 000 (Factual fluency: including basic rounding to the nearest 10 and 100)</b>				
<b>Lesson 4: Using Place Value</b> To use an understanding of place value to count.	<b>Lesson 5: Using Place Value</b> To understand place value in a 4-digit number.	<b>Lesson 6: Comparing and Ordering Numbers</b> To compare and order numbers.	<b>Lesson 7: Comparing and Ordering Numbers</b> To compare and order 4-digit numbers.	<b>Lesson 8: Making Number Patterns</b> To make number patterns (100, 10, 1 more and less).
<b>3 Chapter 1: Numbers to 10 000</b>				
<b>Lesson 9: Making Number Patterns</b> To make number patterns (4-digit numbers).	<b>Lesson 10: Rounding Numbers</b> To round numbers to the nearest 1000.	<b>Lesson 11: Rounding Numbers</b> To round numbers to the nearest 10, 100 and 1000.	<b>Lesson 12: Rounding Numbers to Estimate</b> To round numbers to estimate.	<b>Lesson 13: Rounding Numbers to Estimate</b> To round numbers to estimate.
<b>4 Chapter 1: Numbers to 10 000 (Factual fluency: including missing number sequences)</b>				
<b>Consolidation of rounding, if needed</b> To be used if lessons take longer than expected or a topic needs to be revisited.	<b>Chapter 1 review and consolidation</b> To practise various concepts covered in the chapter	<b>ADDITIONAL LESSON : Negative Numbers</b> To compare and order numbers.	<b>ADDITIONAL LESSON : Negative Numbers</b> Look at NfER papers to find similar questions.	<b>Lesson 1: Finding Totals and Sums</b> To find totals and sums.
<b>5 Chapter 2: Addition and Subtraction</b>				
<b>Lesson 2: Adding without Renaming</b> To add without renaming.	<b>Lesson 3: Adding with Renaming</b> To add with renaming (in the ones column).	<b>Lesson 4: Adding with Renaming</b> To add with renaming (in tens and ones).	<b>Lesson 5: Adding with Renaming</b> To add with renaming (in hundreds, tens and ones).	<b>Lesson 6: Adding Using Mental Strategies</b> To add using mental strategies (making tens, hundreds and thousands).
<b>6 Chapter 2: Addition and Subtraction (Factual fluency: including basic rounding to the nearest 10, 100 and 1000)</b>				
<b>Lesson 7: Adding Using</b>	<b>Lesson 8: Finding</b>	<b>Lesson 9: Subtracting</b>	<b>Lesson 10: Subtracting</b>	<b>Lesson 11: Subtracting</b>

# What can you do?



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# Supporting your children – keep it real!

- Take real-life situations and look for patterns, connections and things that can be matched.
- Find opportunities to solve maths problems everywhere – shopping, jobs, weighing, estimating costs, looking at height, length, shape.
- Play games that involve numbers/counting.
- Show them that maths is fun and isn't only reserved for the classroom.





Rulers 60p

Pens 85p

Paper £3.50

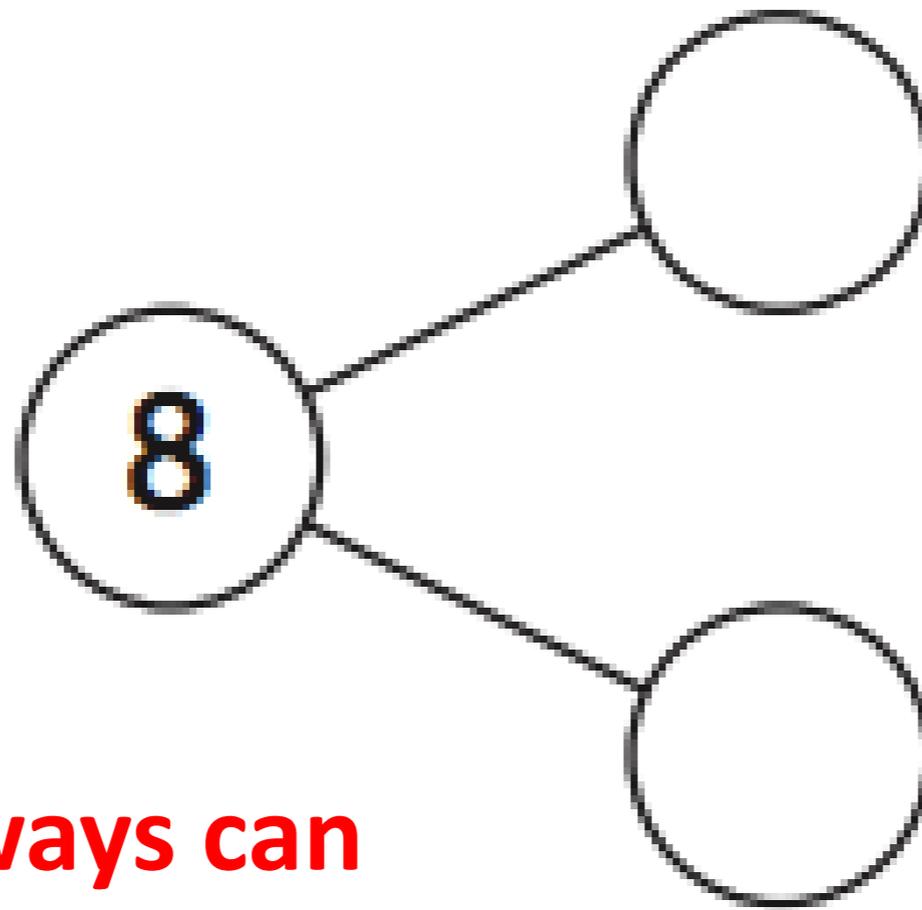
Notebooks £1.75

Emma buys 5 notebooks and 7 pens.  
How much change would Emma get from a £20 note?

# Language – talk about numbers!

## Part-whole model – from Reception to Year 6

**Whole**



**Part**

**Part**

**How many ways can you make 3, 5, 8, ...?**

**8 is 1 and 7**  
**8 is 2 and 6**  
**8 is 3 and 5**  
**8 is ...**



# Mastering Number Ideas

In school: How many ways can we partition the number 674?

- 674 is made of 6 hundreds, 7 tens and 4 ones
- 674 is also made of 67 tens and 4 ones
- 674 is also made of 6 hundreds and 74 ones
- 674 is also made of 674 ones.

**AT HOME: What amounts can we make 630 from?**

- **867**
- **7104**
- **10003**



# Linking maths at home and school

- At school: Explain your reasoning. 'When I count in tens from any number the ones digit stays the same.' Do you agree?
- **AT HOME: Prove it! If I count backwards in twos from 20. How many steps will it take to reach 0?**
- **If I count back in fives will I take more steps?**



# Linking maths at home and school

## AT HOME:

Can you show how to make ...p?

How many ways can you make 10p, 15p, 13p?

How do you know?

Which would you rather have,  $3 \times 50\text{p}$  coins or  $7 \times 20\text{p}$  coins?

Explain why.

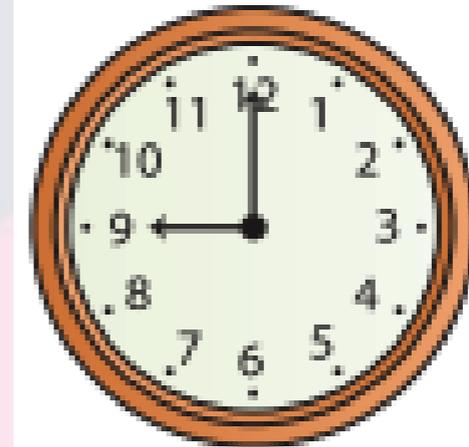


# Linking maths at home and school

Wake up at...

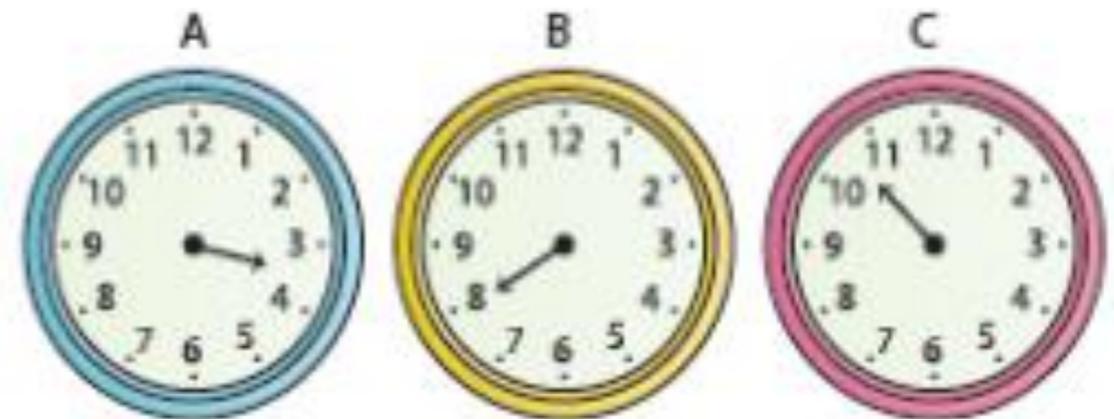
School starts at...

Bedtime at...



Can you tell the time with only the hour hand?

Estimate the time.



# Linking maths at home and school

## Ratio and Money (look at the prices together):

We can buy three pots of banana yoghurt for £2.40 .

How much will it cost to buy six pots of banana yoghurt?



A child's coach ticket costs £4.70 and an adult's costs three times as much. How much does an adult bus ticket cost?

# Linking maths at home and school

## Use a variety of measures:

Sarah is **0.2m** taller than mum.

Mum is **one and a quarter metres**.

Your brother is **15 cm** taller than Sarah.

- Who is the tallest person?
- What is the difference in height between the tallest and the shortest person?

**We use:**

**grams/kilograms; cm/mm; m/km; millilitres/litres**



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# Linking maths at home and school

## Fraction & Percentage (don't be afraid to ask)

Last month your sister saved a quarter of her £10 pocket money. She also saved 15% of her £20 birthday money.

How much did she save altogether?

Dad ate half the pizza and your brother ate half of what was left.

What fraction is left for us?



# Linking maths at home and school

## AT HOME:

- Baking
- Food items
- Laying the table
- Skip counting 4, 8, 12, mm-mm 20, 24
- How many different ways can you calculate  $7 \times 6$ ?  $7 \times 6$ ,  $6 \times 7$ ,  $5 \times 6 + 1 \times 7$ , double  $3 \times 7$
- If you know  $2 \times 3$ , what else can you work out from that fact?



# Linking maths at home and school

- Year 1 = counting in 2s, 5s & 10s from different multiples
- Year 2 = fluent in multiplication tables for 2s, 5s & 10s
- Year 3 = recall & use multiplication & division facts for 3s, 4s & 8s multiplication tables
- Year 4 = recall multiplication & division facts for multiplication tables to  $12 \times 12$  (0, 6, 7, 9, 11, 12 )

***In June, statutory testing for all year 4 children:***

***National test: Year 4 Multiplication Tables Check (MTC)***

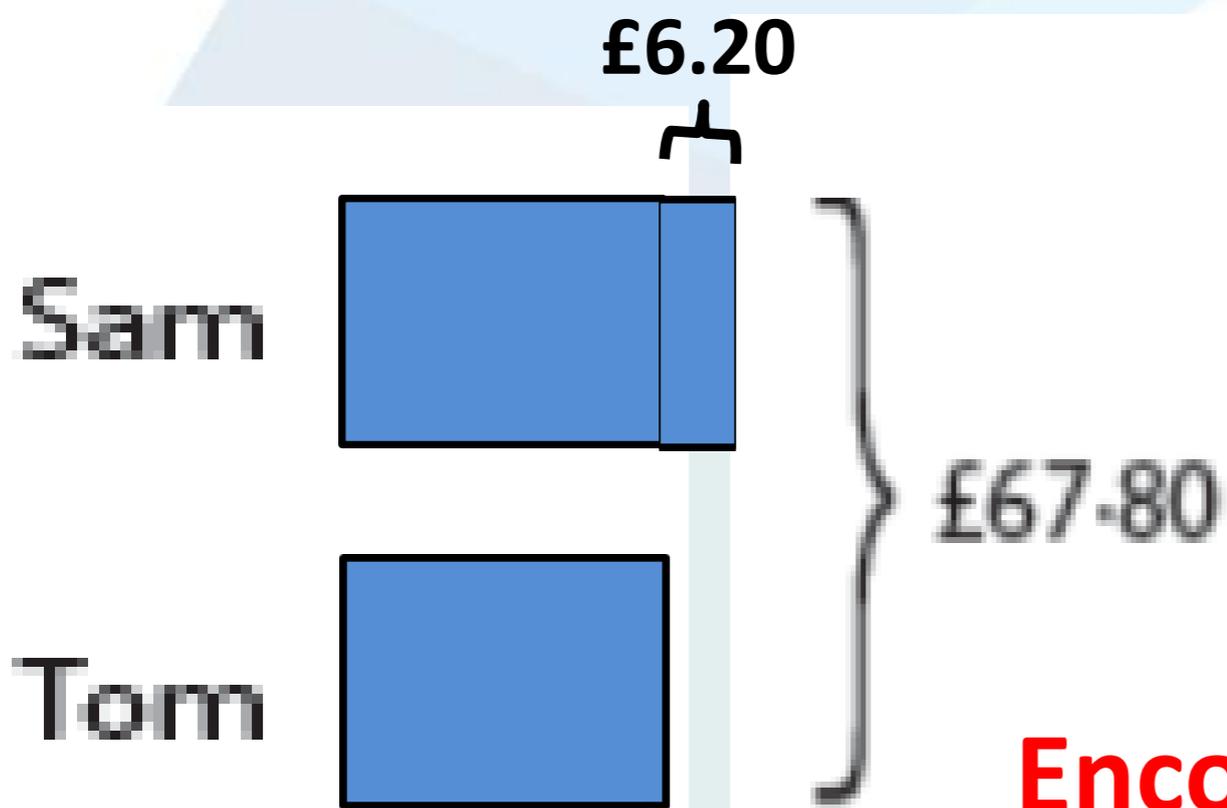


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# Language – problem solving

## Bar Models

Sam and Tom have £67.80 between them.  
If Sam has £6.20 more than Tom, how much does Tom have?



$$£67.80 - £6.20 = £61.60$$

$$£61.60 \div 2 = £30.80$$

Tom has £30.80

**Encourage children to  
'show you with a bar model'.**

# Supporting your children – link classroom learning

- Ask your child to show/teach **you** and explain how they solve the problem.
- If they get stuck, don't rush them.
- Praise effort/hard work and reassure them that they'll get it with practice.
- Ask them if they can think of more ways to solve the problem.
- 'Show your thinking in other ways.'



# Try using bar models

## Solving Word Problems

Lesson  
3

### Explore

Hannah carried out a traffic survey. In one hour, she counted 46 cars and 12 fewer motorbikes than cars. How many vehicles did Hannah count in total?



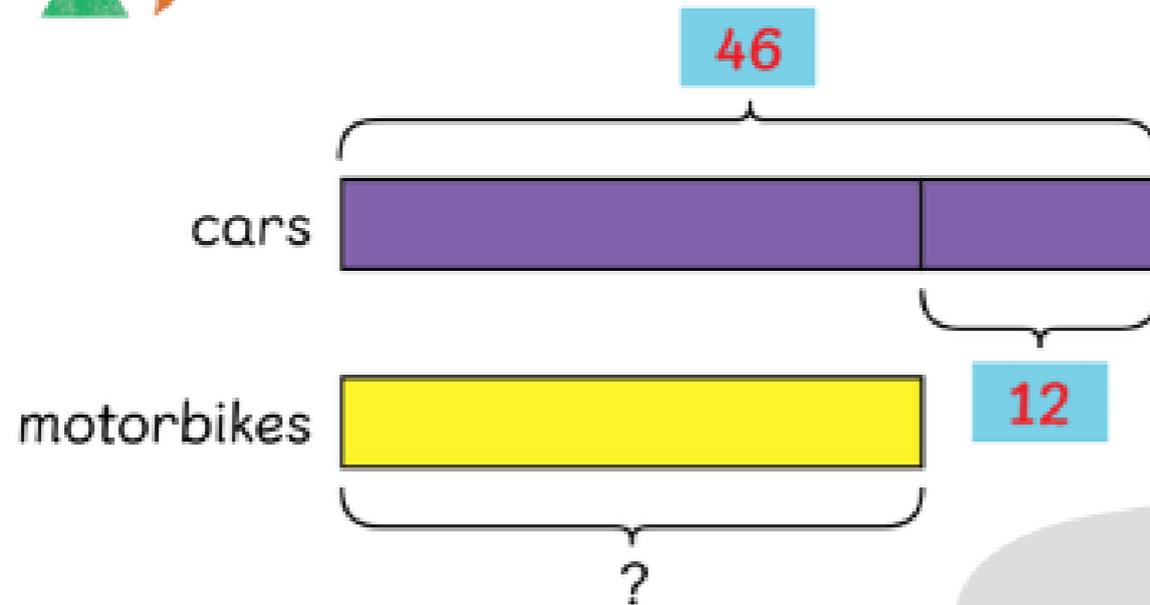
# Did it look like this?

## Master

1



Start by finding the number of motorbikes.



$$46 - 12 = 34$$

Hannah counted 34 motorbikes.



Then, find the total number of vehicles.

Do we add or subtract to find the number of motorbikes?



## Partner work

- ① Fill the  with water.
- ② Use the  to measure the capacity of a container.
- ③ Tell your partner the capacity of the container.
- ④ Take turns.

You will need:



The capacity of  
this container is  
about 4 units.



# Year 5: volume

## Solving Word Problems Involving Volume

Lesson  
5

### Master

- 1 Find the capacity of the tank.  
Capacity =  $15 \times 15 \times 20$   
=  $4500 \text{ cm}^3$   
=  $4500 \text{ ml}$

$$\begin{aligned}\text{Volume of water in tank} &= 3.6 \text{ l} \\ &= 3600 \text{ ml}\end{aligned}$$

$$\begin{aligned}\text{Amount of water needed} &= 4500 \text{ ml} - 3600 \text{ ml} \\ &= 900 \text{ ml}\end{aligned}$$

Holly needs to add 900 ml of water to fill the tank completely.

A square base means the length and breadth of the tank are the same.

