



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

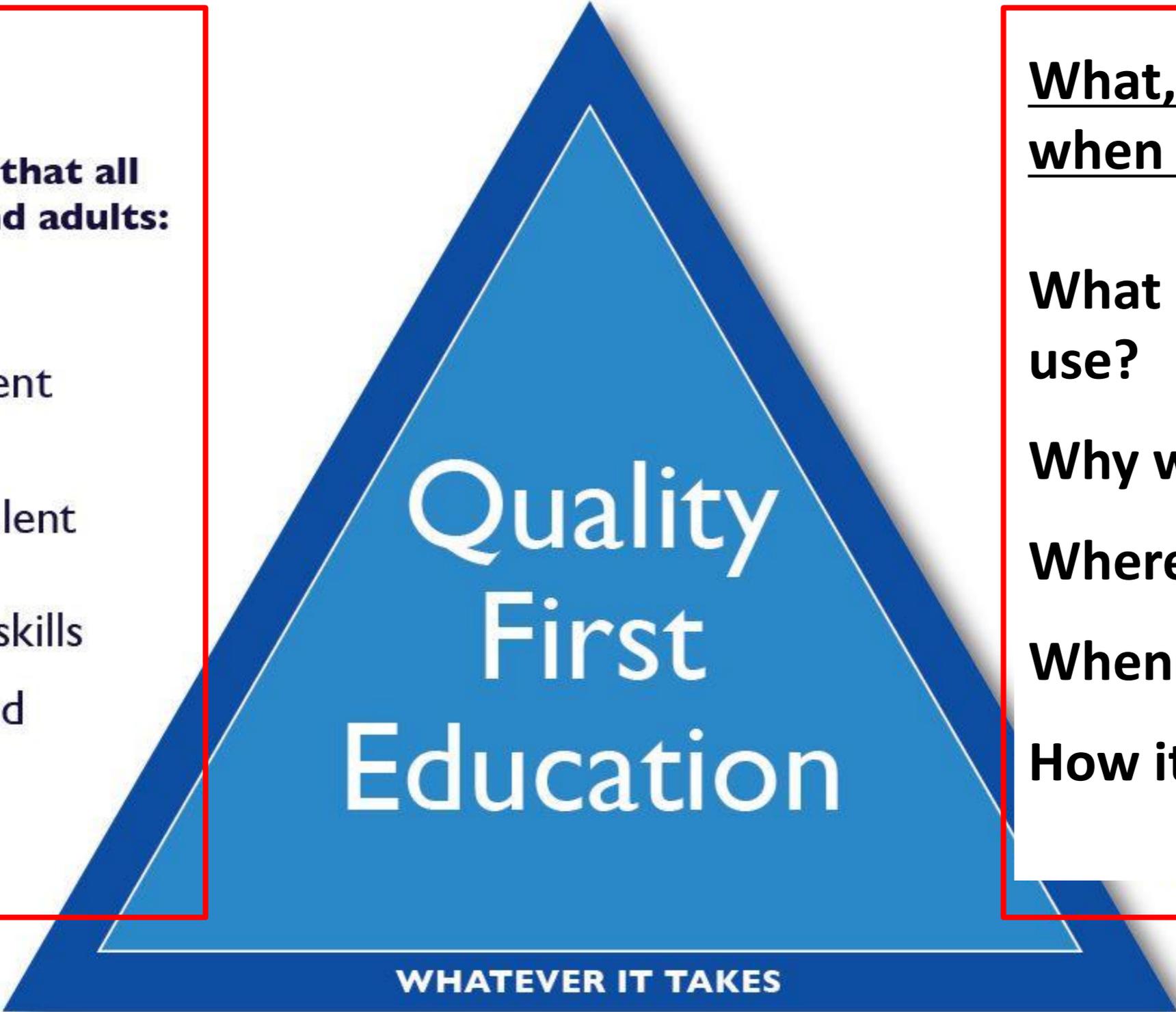
Our aim is that all children and adults:

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:

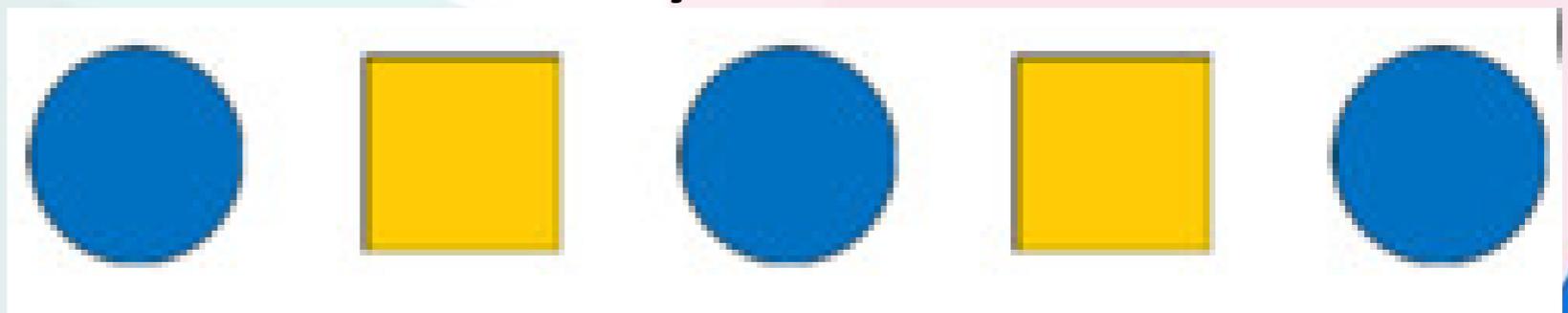
- developing **mathematical vocabulary**
- presenting a **mathematical justification, argument or proof**
- **articulating** their thinking
- building secure foundations by using **discussion** to probe and remedy their misconceptions
- all pupils **mastering the content taught each year** and discourages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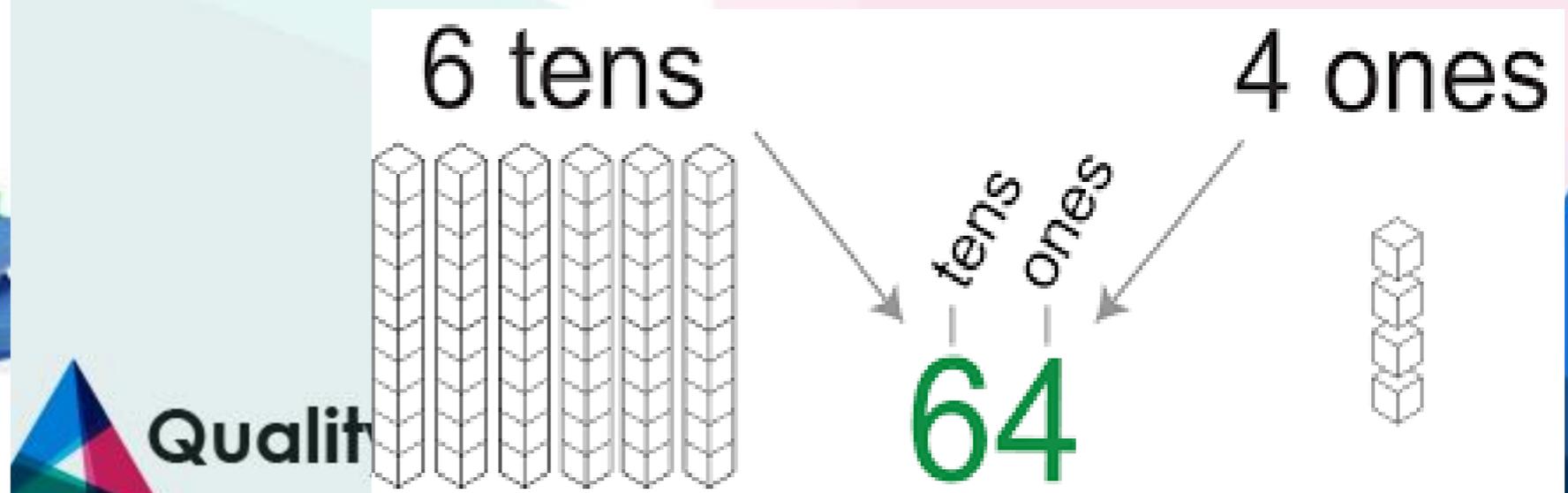
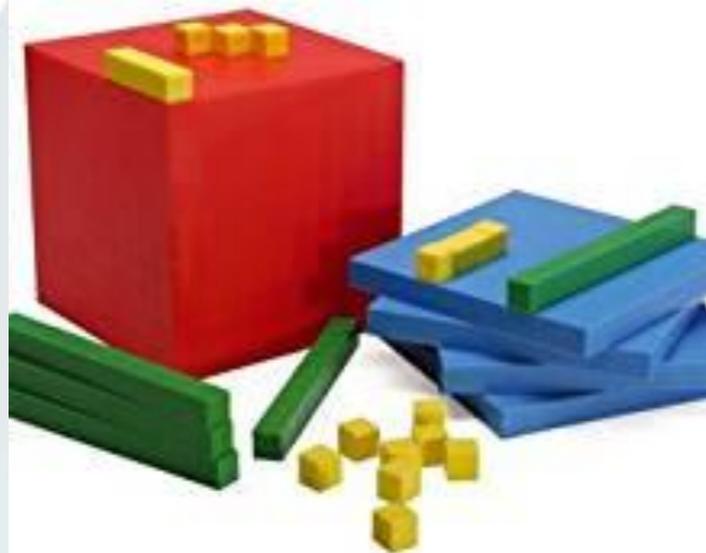


Key stage 1

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.



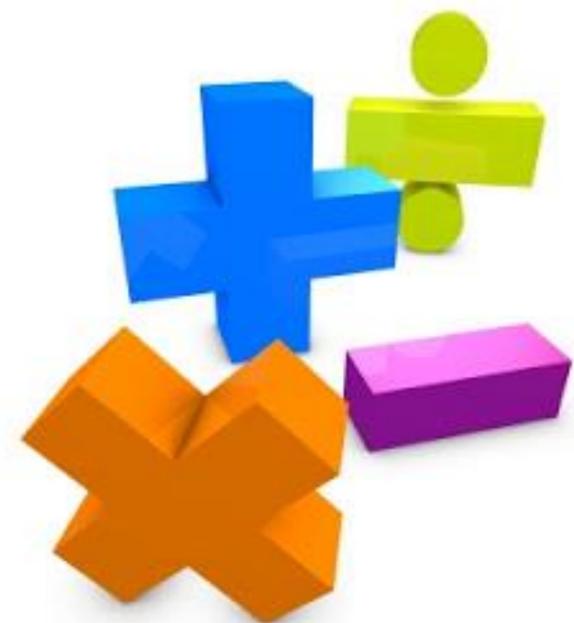
Lower Key Stage 2

- 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?

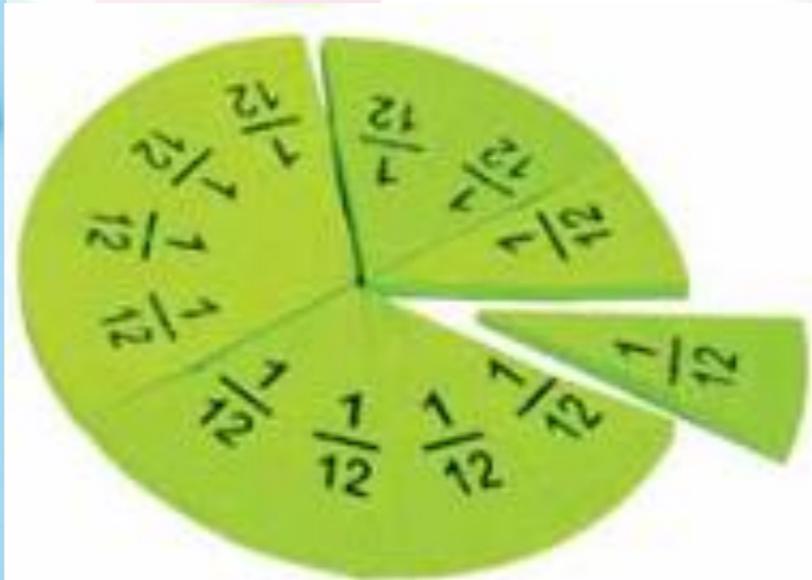


Concrete-pictorial-abstract approach

Concrete – The DOING stage

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

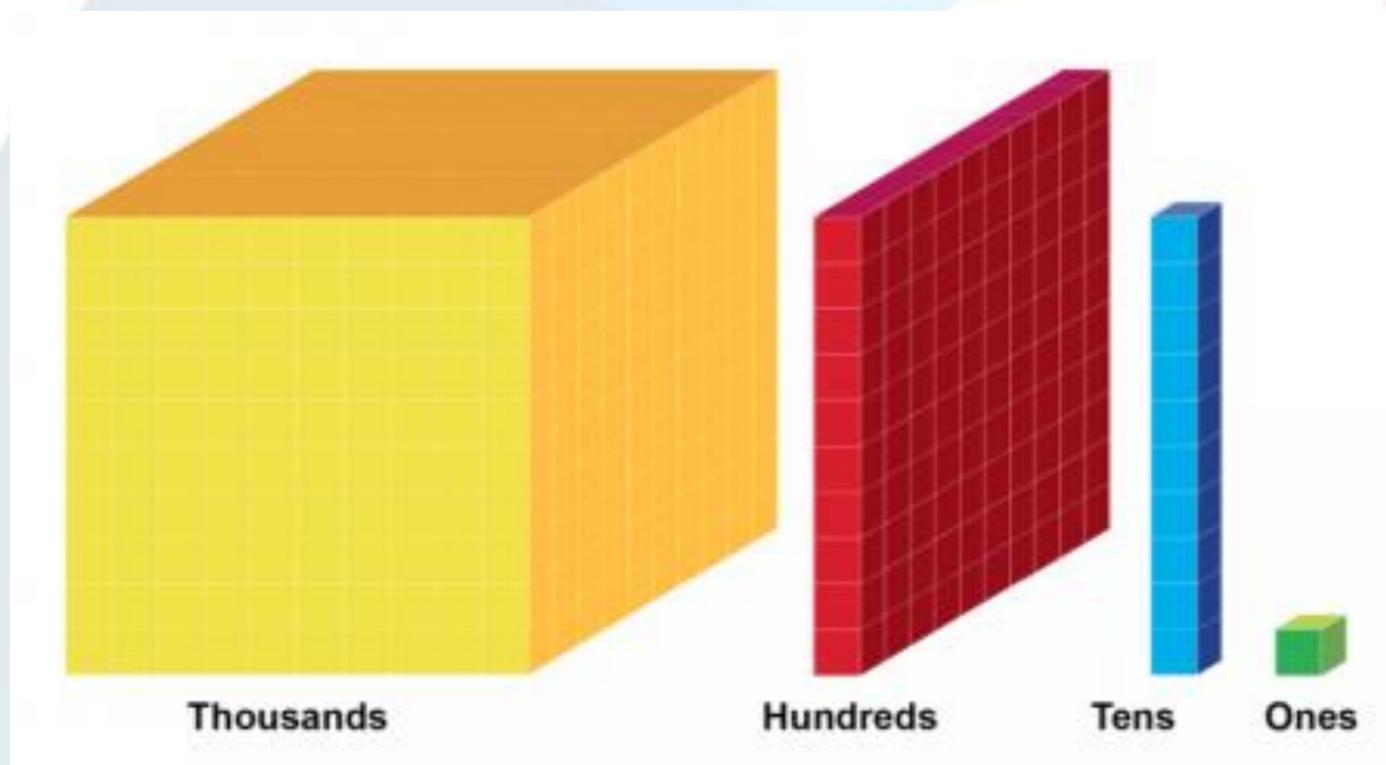
This is a 'hands on' component using real objects and it is the foundation for conceptual understanding.



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:

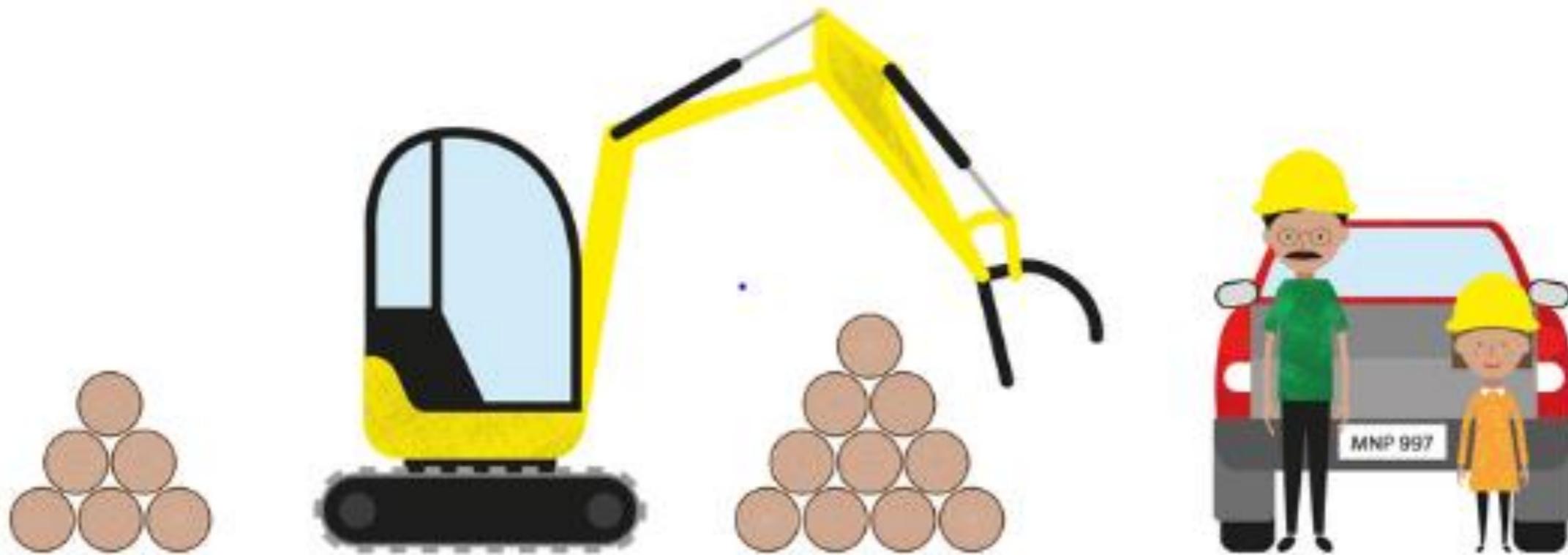
- **Trigger prior learning** – recap/linking previous knowledge
- **Factual fluency** - recall of existing knowledge, aiming for rapid recall of known facts
- **Anchor task** – class problem with a ‘live’ context
- **Guided practice** – paired practice using progressively harder questions
- **Independent**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



Anchor task – ‘Explore’

A problem that promotes discussion

Explore

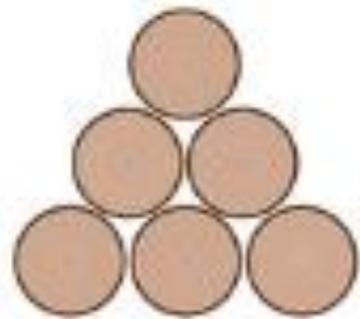


There are 16 logs altogether.
9 logs are taken away.
How many logs are left?

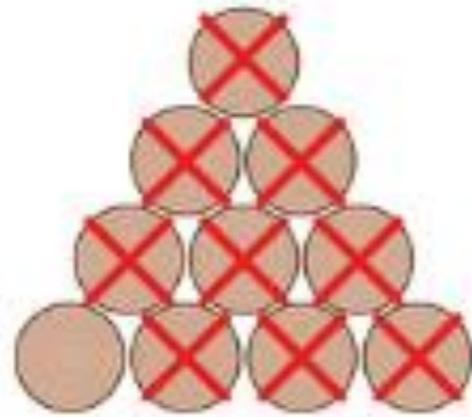


Master

$16 - 9 = \square$



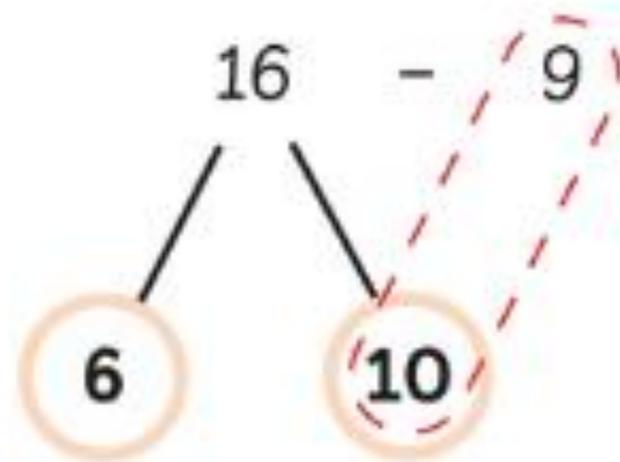
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10

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

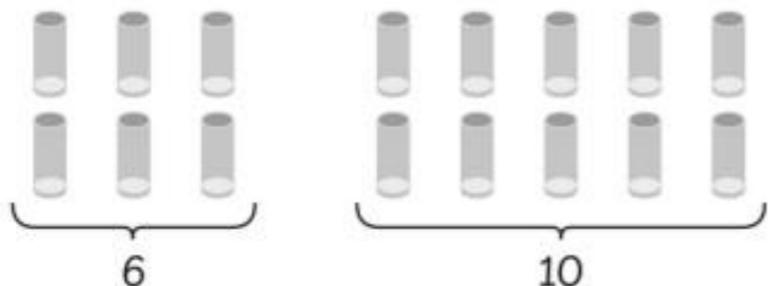
To assess children's understanding of the learnt concept.

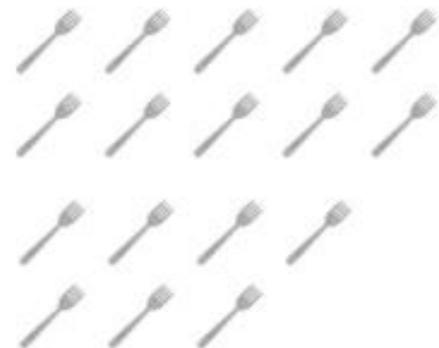
Worksheet 6

Subtract from 10

 is subtracting from 10 first to help him complete subtraction.

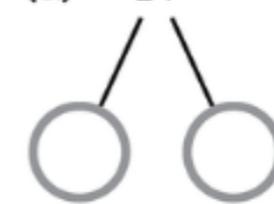
Can you help Charles by filling in the blanks?

1 (a)  **6**

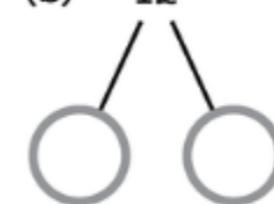
(b) 

(c) 

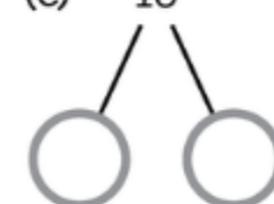
2 (a) $14 - 6 = \square$



(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

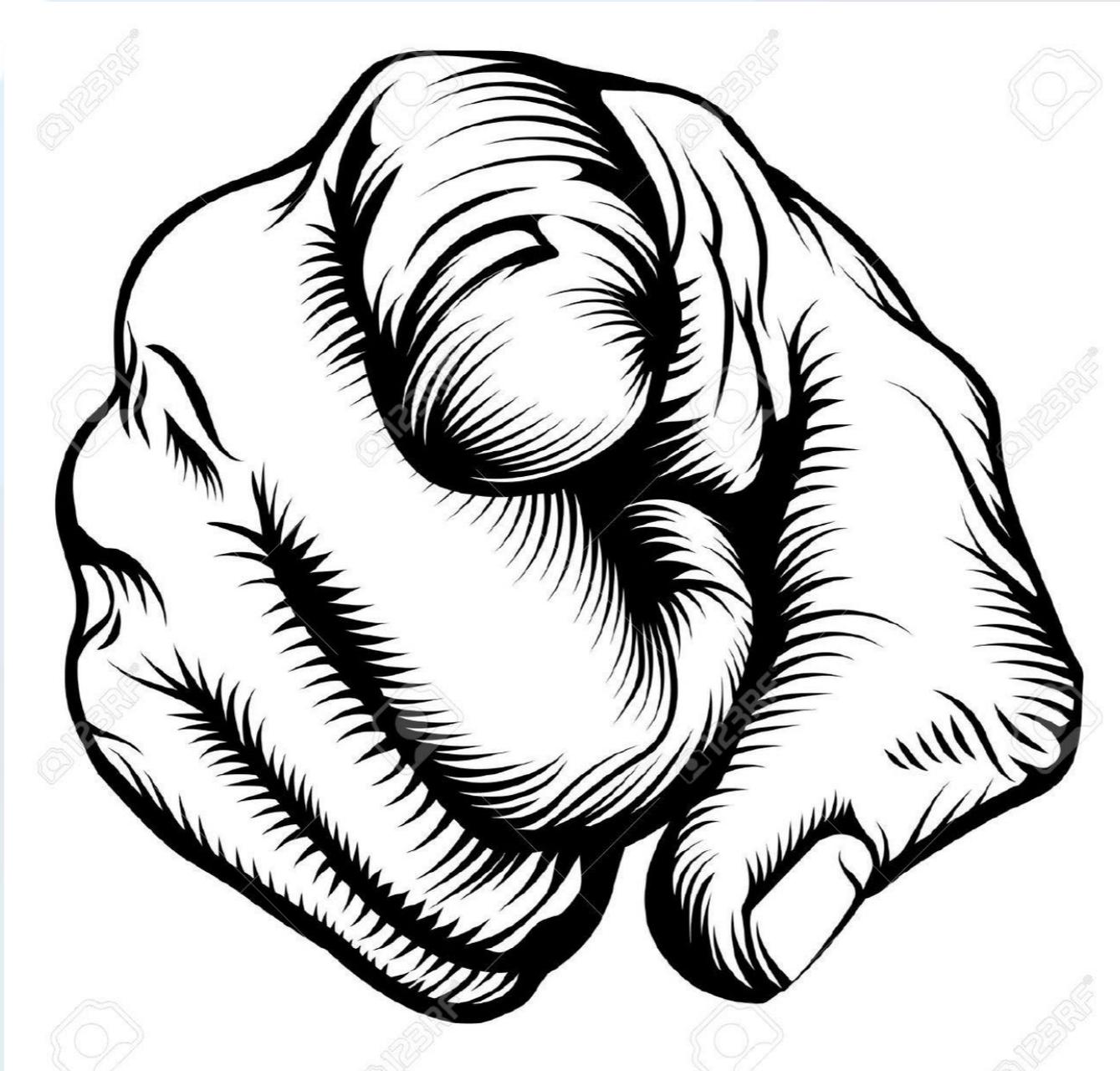
Year 2		
Autumn term	Spring term	Summer term
Book A: Unit 1 - Numbers to 100	Unit 6 - Mass	Unit 13 - Fractions (may start Spring term)
Unit 2 - Addition and subtraction	Unit 7 - Temperature	Unit 14 - Time
Unit 3 - Multiplication 2, 5 & 10	Unit 8 - Picture graphs	Consolidation: Shape, time and money
	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?

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

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

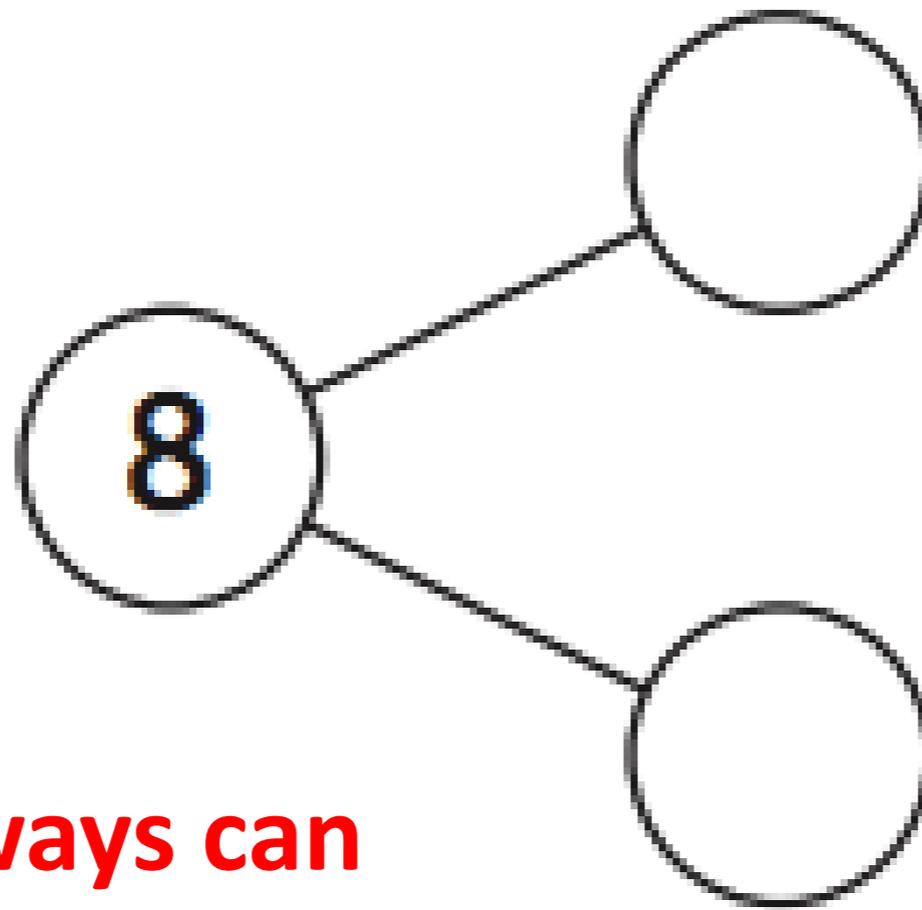
Notebooks £1.75

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.

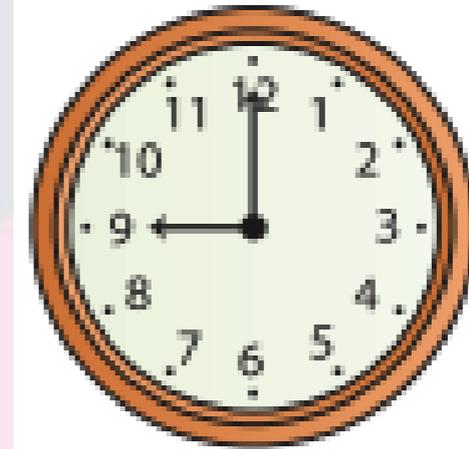


Linking maths at home and school

Wake up at...

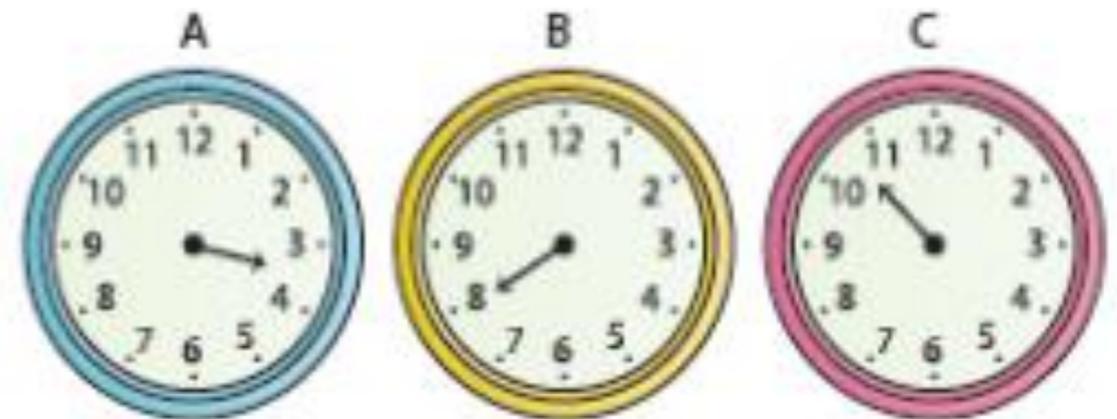
School starts at...

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 7×6 ? 7×6 , 6×7 , $5 \times 6 + 1 \times 7$, double 3×7
- If you know 2×3 , 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 12×12 (0, 6, 7, 9, 11, 12)

In June, statutory testing for all year 4 children:

National test: Year 4 Multiplication Tables Check (MTC)

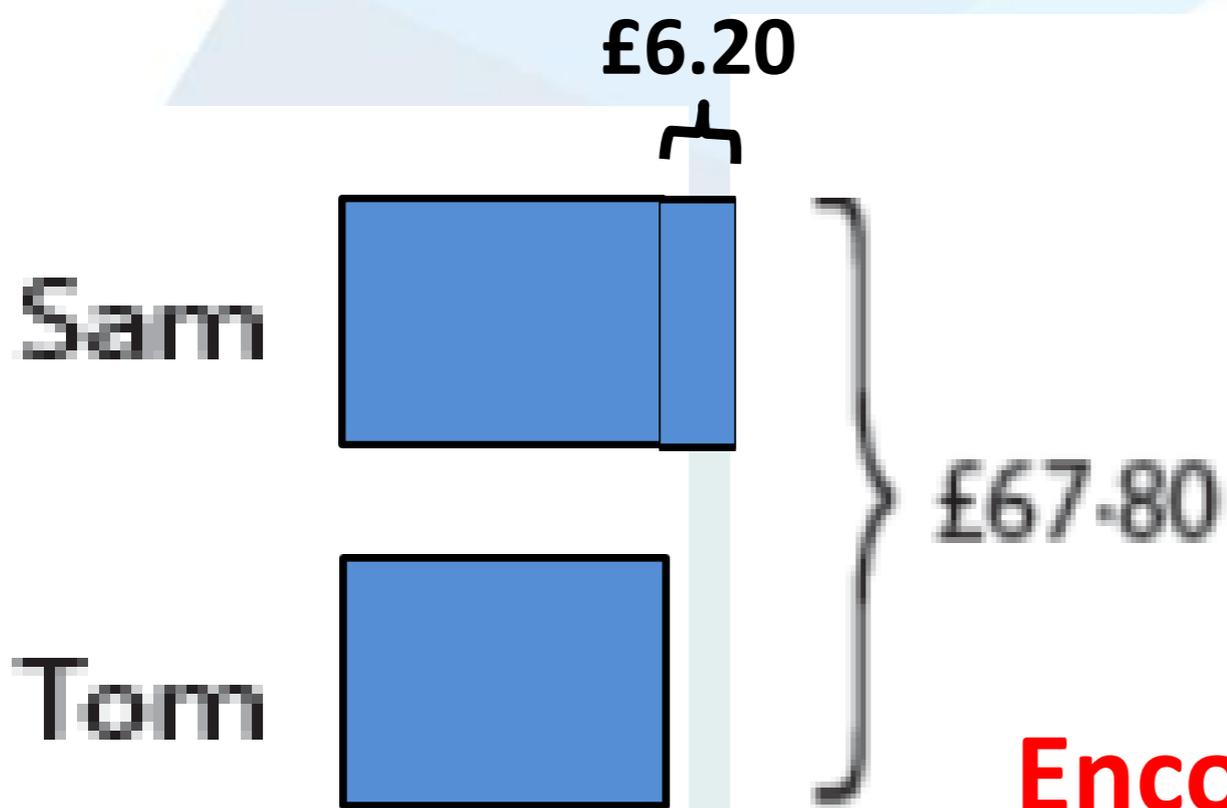


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Language – problem solving

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?



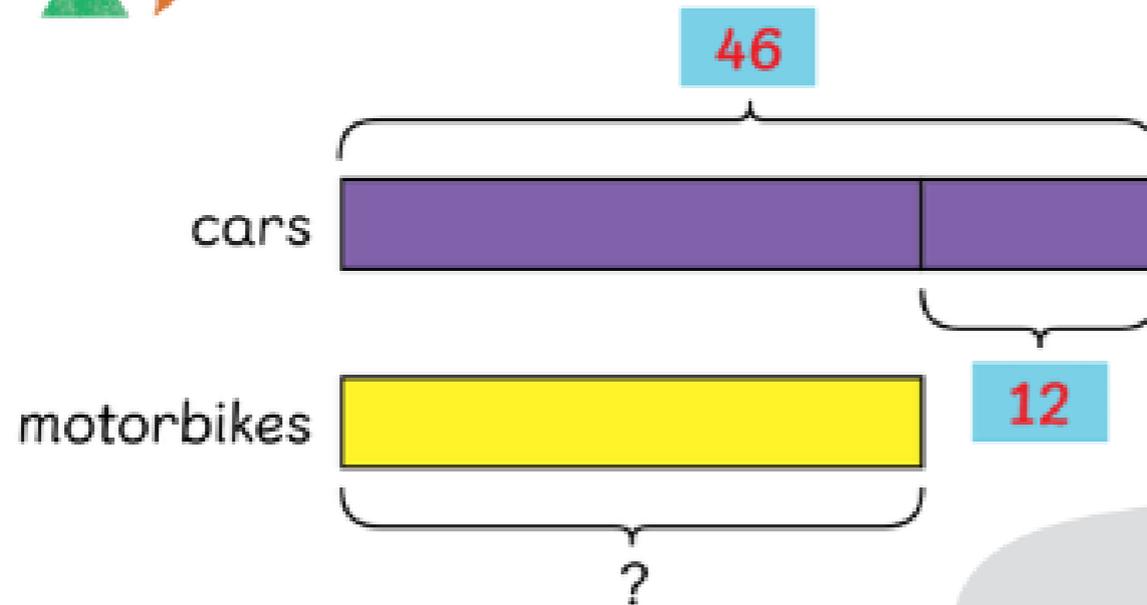
Did it look like this?

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 cm^3
= 4500 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.

