



Maths for parents

The aim of this session

- To share how we teach maths in school
- To outline our National Curriculum expectations in maths
- To offer 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?

- Singapore mastery approach to maths teaching
- Concrete-Pictorial–Abstract approach
- Problem solving context
- Textbooks (and workbooks)



tens	ones
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$$21 + 9 = 30$$



WHY?

- 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

■ Americas
 ■ Asia
 ■ Europe



Cr
Singapore

- 1 Create a positive and supportive environment for all pupils, without exception
- 2 Build an ongoing, holistic understanding of your pupils and their needs
- 3 Ensure all pupils have access to high quality teaching
- 4 Complement high quality teaching with carefully selected small-group and one-to-one interventions
- 5 Work effectively with teaching assistants

SPECIAL EDUCATIONAL NEEDS IN MAINSTREAM SCHOOLS

Summary of recommendations



IMPROVING MATHEMATICS IN THE EARLY YEARS AND KEY STAGE 1

Summary of recommendations

- 1 Develop practitioners' understanding of how children learn mathematics
- 2 Dedicate time for children to learn mathematics and integrate mathematics throughout the day
- 3 Use manipulatives and representations to develop understanding
- 4 Ensure that teaching builds on what children already know
- 5 Use high quality targeted support to help all children learn mathematics



Improving Mathematics in Key Stages Two and Three – Recommendations Summary

- 1 Use assessment to build on pupils' existing knowledge and understanding
- 2 Use manipulatives and representations
- 3 Teach pupils strategies for solving problems
- 4 Enable pupils to develop a rich network of mathematical knowledge
- 5 Develop pupils' independence and motivation
- 6 Use tasks and resources to challenge and support pupils' mathematics
- 7 Use structured interventions to provide additional support
- 8 Support pupils to make a successful transition between primary and secondary school

Concrete-pictorial-abstract approach

Concrete – The DOING stage

A child is first introduced to an idea or a skill by acting it out with real objects.

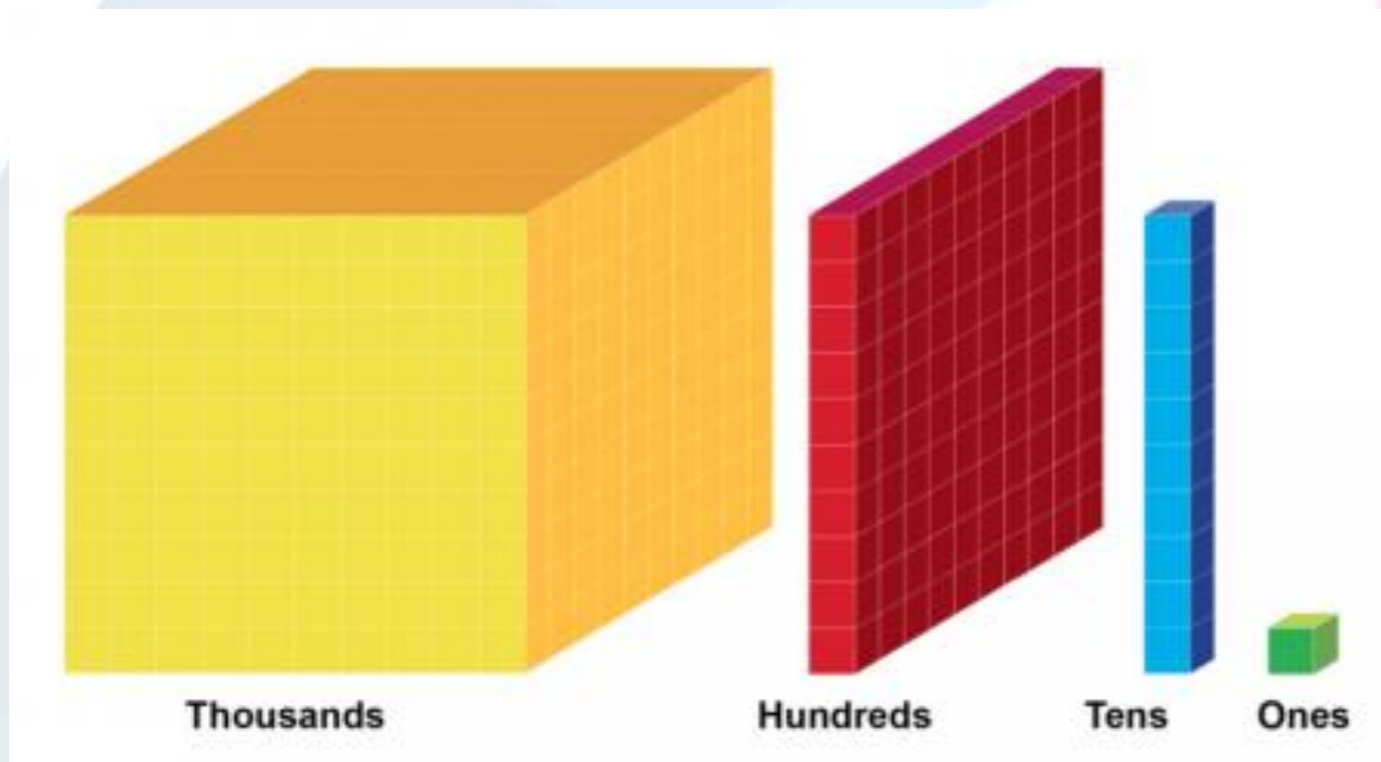
This is a 'hands on' component using real objects and it is the foundation for conceptual understanding.



Concrete-pictorial-abstract approach

Pictorial – The SEEING stage

A child has sufficiently understood the hands on experiences, has performed and can now relate them to representations, such as a diagram or picture of the problem.



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Concrete-pictorial-abstract approach

Abstract – The **SYMBOLIC** Stage

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

$$21 + 9 = 30$$



What? Textbook & workbook

Anchor task

A problem that promotes discussion.

Working as a class, it gives the opportunity to address misconceptions and to challenge and support through questioning.

Guided practice

A series of problems for children to work through in pairs, giving opportunity for evaluating children's learning.

Independent work

To assess children's understanding of the learnt concept.



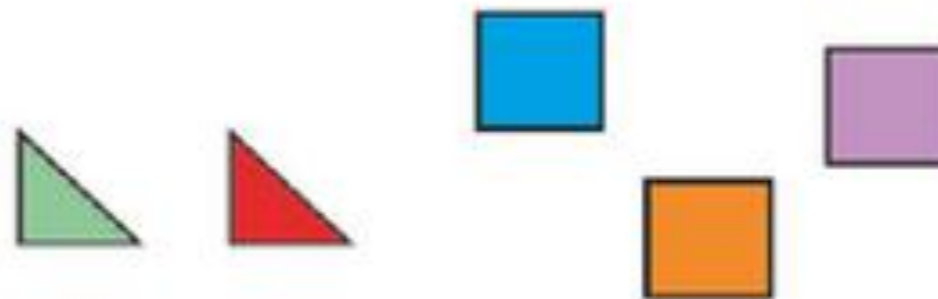
Anchor task – In Focus

A problem that promotes discussion

Lesson
4

Measuring Area

In Focus



Make different figures using all 5 pieces.



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What the lesson looks like

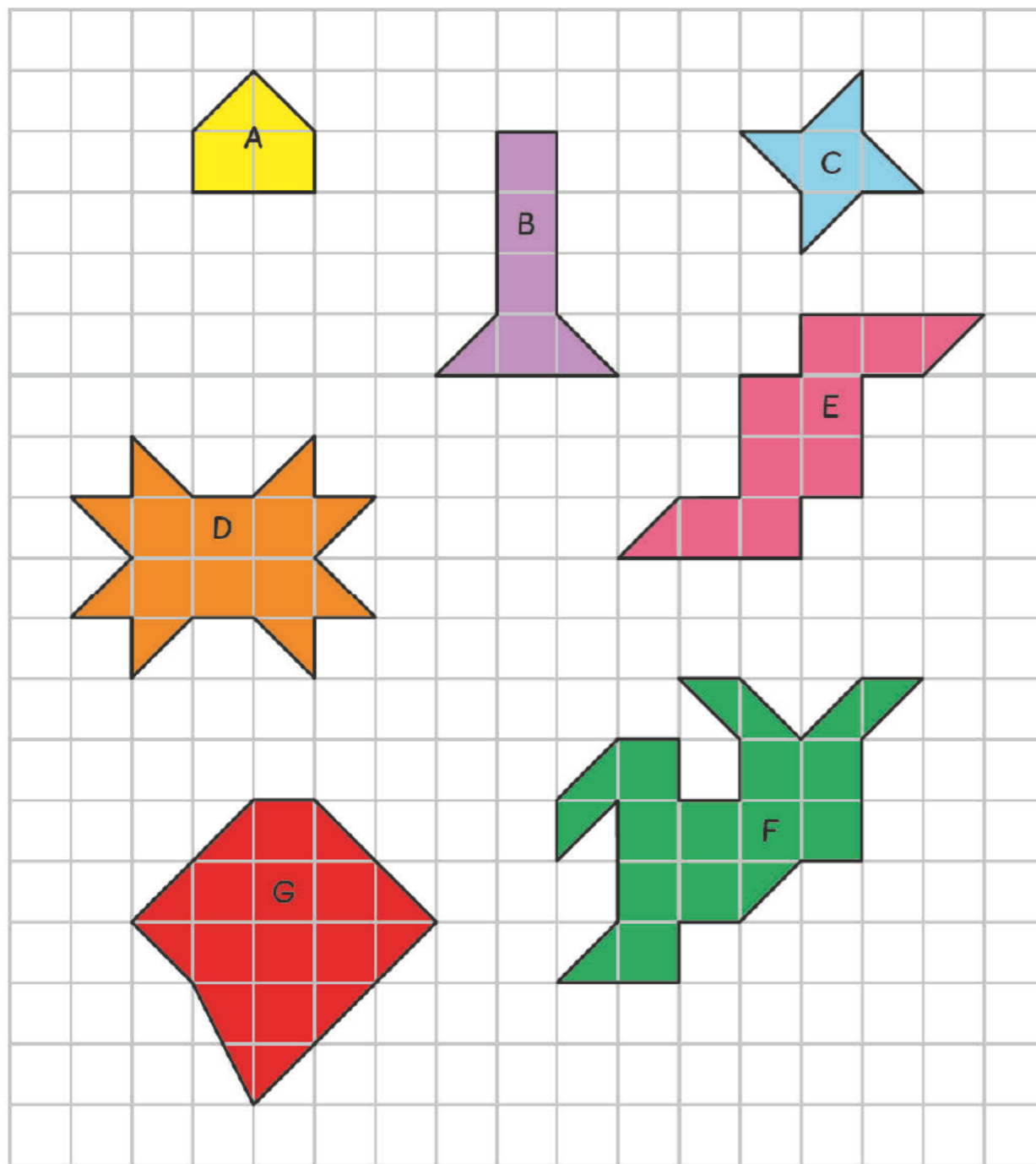
In Focus – an anchor problem that promotes discussion:

- A whole class ‘real life’ problem
- Tackled in a **group** or with **partners**
- Using C-P-A approach – lots of manipulatives
- Takes up to 20 minutes
- Lots of paired or group discussion
- Different strategies may be used
- Tackles misconceptions



Guided Practice

Find the area of each figure.  has an area of 1 square unit.



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

Progression between questions.

What the lesson looks like

Guided practice: a series of problems for children to work through in pairs with teacher guidance.

- Usually tackled with **partners**
- Takes up to 20 minutes
- **Use of manipulatives** to support and challenge
- Use of **pictorial** representations
- Use of the **abstract**
- **Progression of questions**
- Time to further demonstrate and practice the use of procedure, method or strategy



Independent work

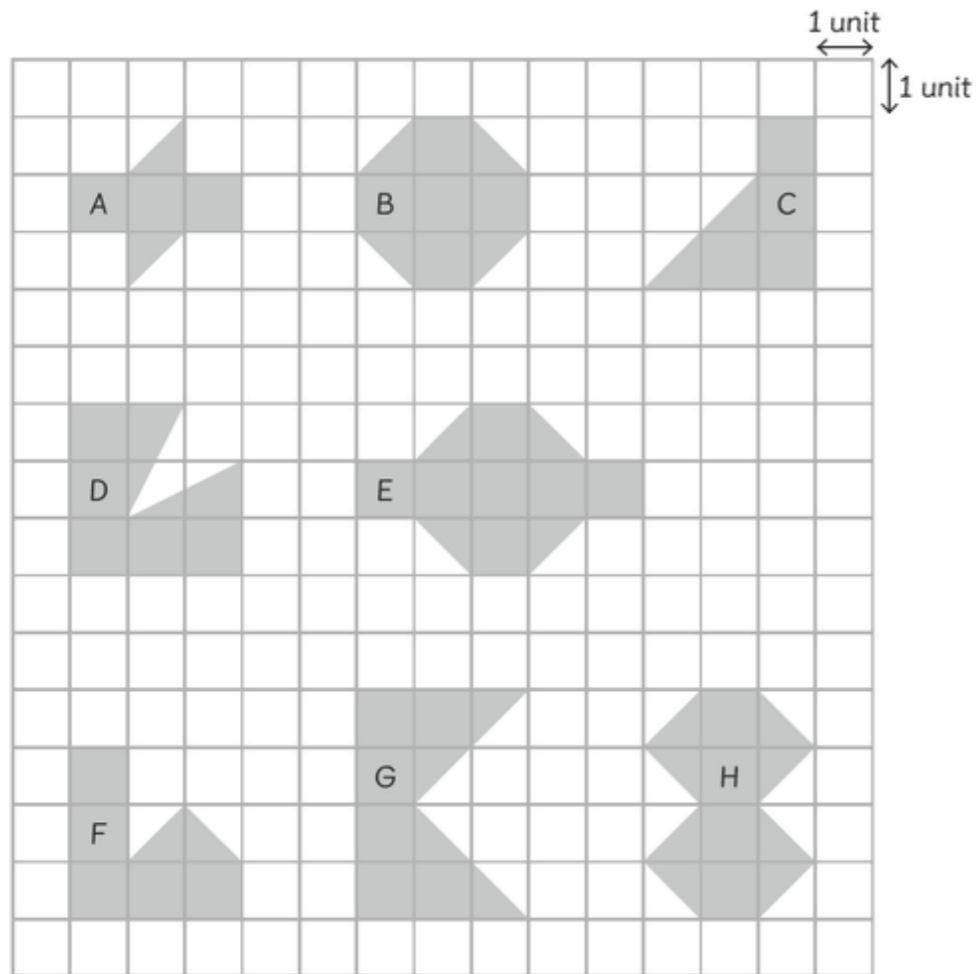
To assess children's understanding of the learnt concept.

Name: _____ Class: _____ Date: _____

Worksheet 4

Measuring Area


1 Find the area of each figure. Each  has an area of 1 square unit.

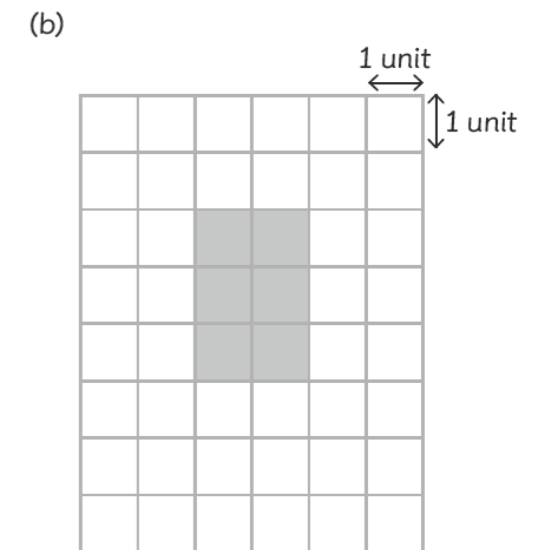
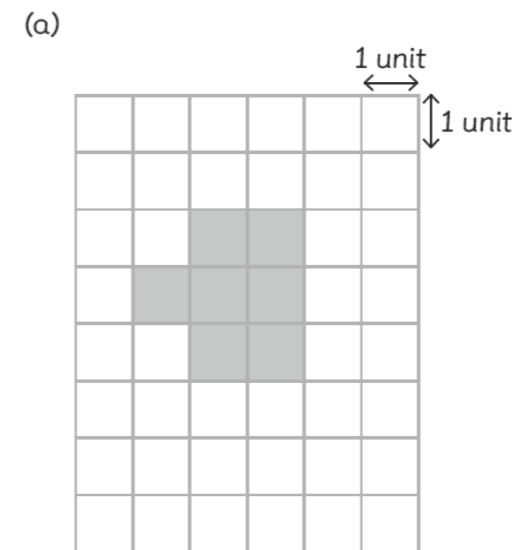


(a)

	Area
Figure A	square units
Figure B	square units
Figure C	square units
Figure D	square units
Figure E	square units
Figure F	square units
Figure G	square units
Figure H	square units

(b) Which figure has the largest area?

2 Shade more  or  so that each figure has an area of 12 square units.



What the lesson looks like

Independent work: To assess children's understanding of the learnt concept.

- Using workbooks
- Takes up to 20 minutes
- **Manipulatives** available to support
- Use of **pictorial** representations encouraged
- Use of the **abstract** expected
- Tackled independently
- Time to further demonstrate and model the use of procedures (if needed)
- Additional activities to deepening (challenge) or consolidate (reinforce)



How?

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)



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 lessons plus an additional hour each week to revisit home learning

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 19 - Mass
Unit 6 - Numbers to 20	Unit 13 - Division	Unit 20 - Space
Unit 7 - Addition and subtraction within 20	Unit 14 - Fractions	

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?

Year 5 Autumn overview 2021-22

1 Chapter 1: Numbers to 1 000 000						
Recap year 4 Book 4 A, Ch.1, Lesson 7: Comparing & Ordering Numbers To compare and order 4-digit numbers.	Lesson 1: Reading & Writing Numbers to 100 000 To read and represent numbers to 100 000.	Lesson 2: Reading & Writing Numbers to 1 000 000 To read and represent numbers to 1 000 000.	Lesson 3: Reading & Writing Numbers to 1 000 000 To read and represent numbers to 1 000 000 using number discs.	Lesson 4: Comparing Numbers to 1 000 000 To compare numbers to 1 000 000 using place value.	Lesson 5: Comparing Numbers to 1 000 000 To compare numbers to 1 000 000 using place value.	
2 Chapter 1: Numbers to 1 000 000						
Lesson 6: Comparing Numbers to 1 000 000 To compare numbers to 1 000 000 using pictorial representations and proportionality.	Lesson 7: Comparing Numbers to 1 000 000 To compare numbers to 1 000 000 from pictorial representations, using lists and numberlines.	ADDITIONAL LESSON: (if needed) Embed numbers to 1,000,000 (including position on a numberline)	Lesson 8: Making Number Patterns To make and identify patterns in numbers using knowledge of	Lesson 9: Making Number Patterns To make number patterns that decrease in multiples of 10 000	ADDITIONAL LESSON: Recap year 4: Book 4 A, Ch. 1: Lesson 14: Rounding Numbers	
			key methods.	use to remainders.		
12 Chapter 5: Graphs (Year 3 & Year 4: HL 2019-21: Graphs)						
REVIEW: Chapter 3		ADDITIONAL LESSON: Recap Year 3 Graphs: Textbook 3B: Chapter 10, Lesson 5: Reading Bar Graphs	ADDITIONAL LESSON: Recap Year 4 Graphs: Textbook 4 A: Chapter 5, Lesson 4: Drawing & Reading Line Graphs	Lesson 1: Reading Tables To read the information presented in a table and interpret its meaning.	Lesson 2: Reading Tables To read and respond to information presented in a table.	Lesson 3: Reading Tables To read and respond to tables with a variety of data sets.
3 Chapter 1: Numbers to 1 000 000						
Lesson 10 over 2 days: Rounding Numbers To round numbers to the nearest 10 000 using number lines and bar graphs.	Lesson 10 over 2 days: Rounding Numbers	Lesson 11 over 2 days: Rounding Numbers To round to the nearest 1000 using lines and graphs.				
13 Chapter 5: Graphs (Year 3 & Year 4: HL 2019-21: Graphs)						
Lesson 4: Reading Line Graphs To read & interpret information provided in a line graph where a single line represents data.		Lesson 5: Reading Line Graphs To read & interpret the information presented in a line graph where the data is represented by more than 1 line.	Lesson 7: Reading Line Graphs To read & interpret info. presented in table & turn it into a line graph; determine relationships between data sets.	Review Chapter 5	ADDITIONAL LESSON: Recap year 3 fractions: Ch.11, Lesson 1: Counting in Tenths To count in tenths; to recognise tenths & determine how many shade tenth	ADDITIONAL LESSON: Recap year 3 fractions: Ch.11, Lesson 2: Making Number Pairs To make no. pairs to create 1; to combine fractions to make 1.
Chapter 2: Whole Numbers: Addition and Subtraction						
REVIEW: Chapter 1	Recap year 4 Book 4 A, Ch.2, Ch.1, Lesson 5: Adding with Renaming To add with renaming (in 100s, 10s & 1s).	Recap year 4 Book 4 A, Lesson 1: Subtracting with Renaming To subtract with renaming				
14 Chapter 6: Fractions (Yr 3 & 4: HL 2019-21) (Year 3 & Year 4: HL 2019-21: Fractions)						
ADDITIONAL LESSON: Recap year 3 fractions: Ch.11, Lesson 3: Adding Fractions To add fractions with the same denominator.	ADDITIONAL LESSON: Recap year 3 fractions: Ch.11, Lesson 5: Subtracting Fractions To subtract fractions with the same name.	ADDITIONAL LESSON: Recap year 3 fractions: Ch.11, Lesson 8: Finding Equivalent Fractions To find equivalent fractions; to place fractions on a numberline.	Catch up	Catch up	Catch up	Catch up
Christmas holiday break						

How?

- Training for ECTs and new experienced before they start
- INSETs and SMs – differentiated questioning, maths' mindset, use of C-P-A, planning, supporting SEND children and struggling learners
- Maths team – maths leaders, advocates and champions who can offer support and advice
- Virtual planning in year groups across the Trust - Trust overview
- Director of Maths 1:1 support – observe, model, coach, coverage planning, guided lessons,
- Guidance and support - overview of yearly and termly topics, coverage mapping to ensure home learning is revisited before new learning, lesson structure, lesson timings, support for children with special needs, home learning video library
- Money – textbooks, workbooks, manipulatives, online resources



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** 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.



National Curriculum - Maths

The National Curriculum for Mathematics

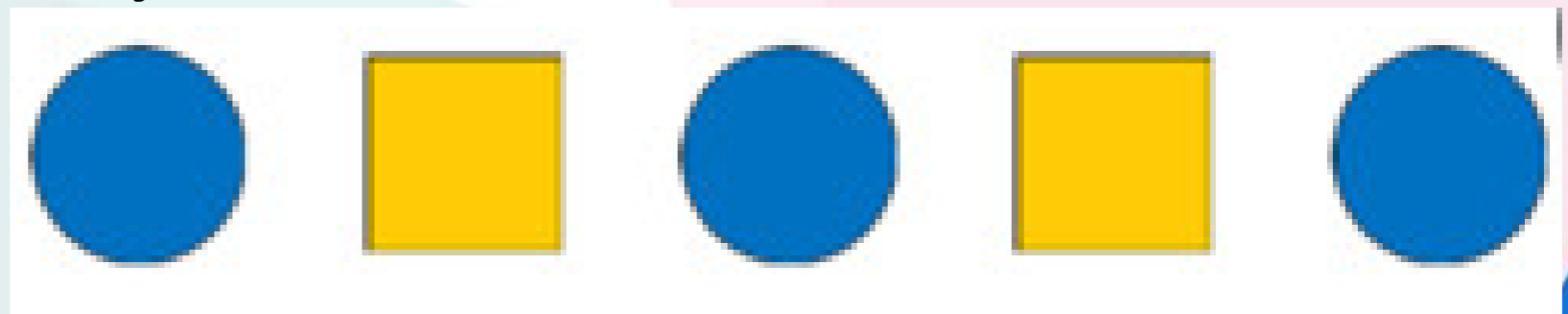
- The expectation is that the majority of pupils will move through the programmes of study at broadly the same pace.
- Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration through new content.
- Those who are not sufficiently fluent with earlier material should consolidate their understanding, including through additional practice, before moving on.



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.



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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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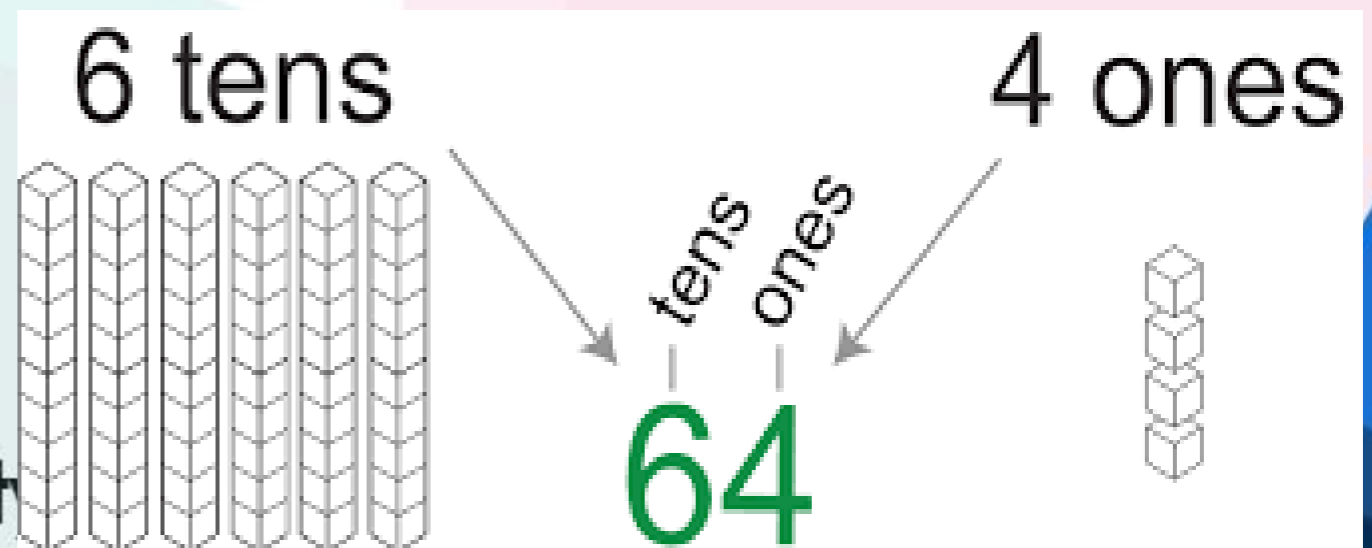
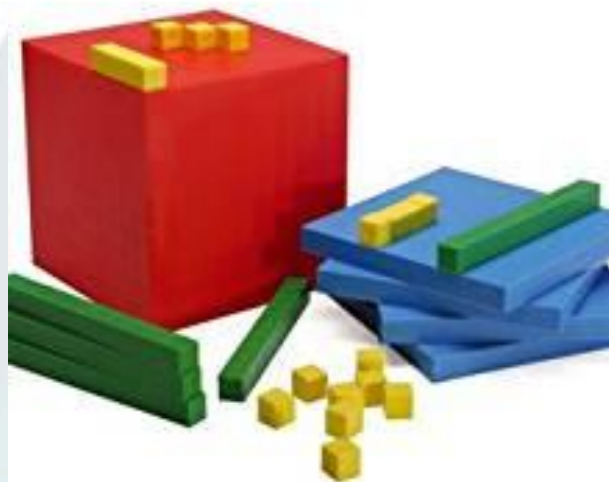


Key stage 1

By the end of year 2, pupils should know the number bonds to 20

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.



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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$$\begin{array}{r} 48\overset{5}{\cancel{6}}\overset{1}{5} \\ -3956 \\ \hline 9 \end{array}$$

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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 will be tested! MTC, June 2022)
- 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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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.



What can you do?



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Mastering Number Ideas

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?

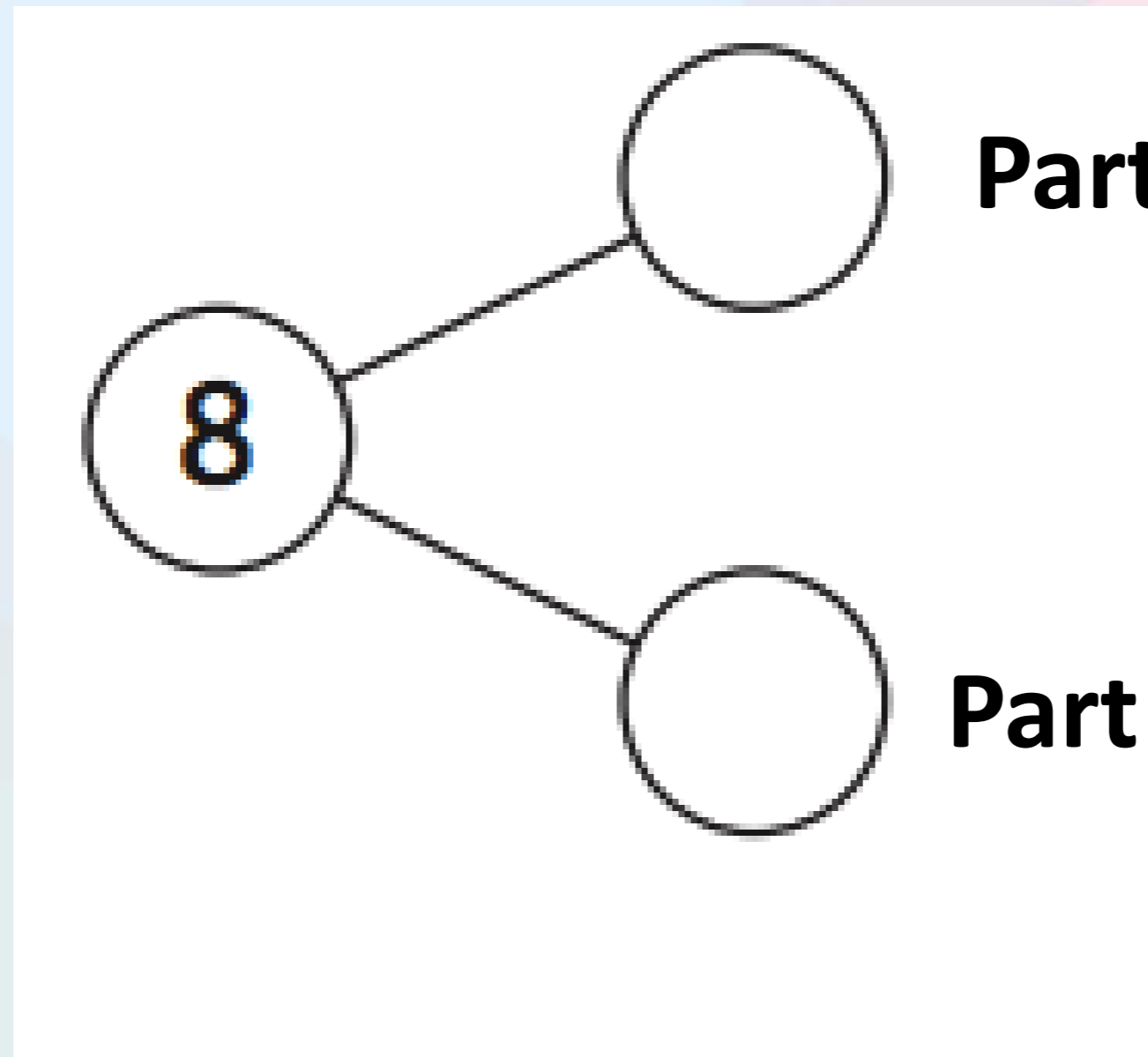
- **704**
- **867**



Mastering Number

Part-whole model – from Reception to Year 6

Whole



Mastering Number Ideas

Three pupils estimate the answer to the sum $4243 + 1734$

Andrew says, 'To the nearest 100, the answer will be 5900.'

Bob says, 'To the nearest 50, the answer will be 6000.'

Chris says, 'To the nearest 10, the answer will be 5970.'

Do you agree with Andrew, Bob or Chris?

Explain your reasoning?

AT HOME: Estimate, approximate, round to the nearest...



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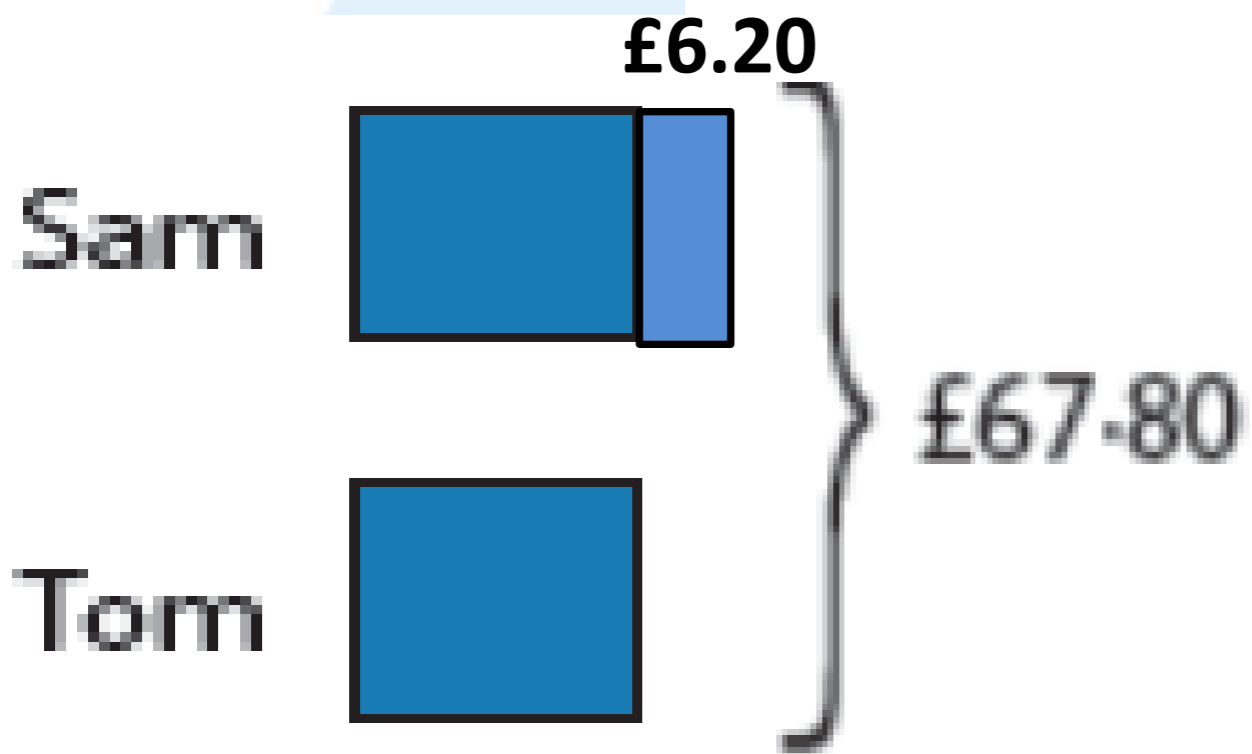
Mastering Number Ideas

- ‘When I count in tens from any number the ones digit stays the same.’ Do you agree? Explain your reasoning.
- **AT HOME: I am going to count backwards in twos from 20. How many steps will it take to reach 0? Convince me.**



Mastering Number Language

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

Bar Models



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Mastering Number Ideas

- 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)

From June, 2022 : National test: multiplication tables check for Year 4 (MTC)



Mastering Number Ideas



AT HOME:

- Baking
- 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?



Mastering Money Ideas

AT HOME:

Can you show how to make ...p?

How many ways can you make....p?

How do you know?

Which would you rather have, 3 × 50p coins or

7 × 20p coins?

Explain why.



Mastering Ratio and Money Ideas

You can buy 3 pots of banana yoghurt for £2.40 .

How much will it cost to buy 12 pots of banana yoghurt?



A child's bus ticket costs £3.70 and an adult bus ticket costs three times as much. How much does an adult bus ticket cost?

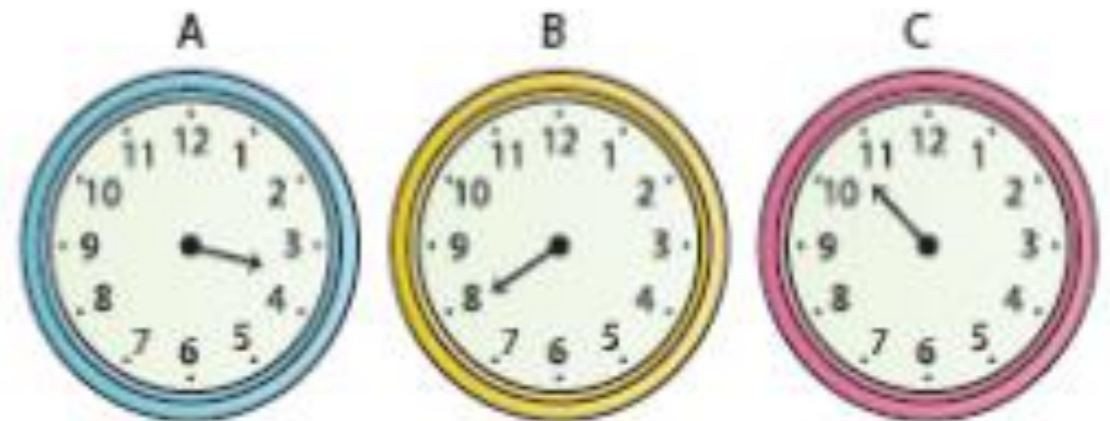
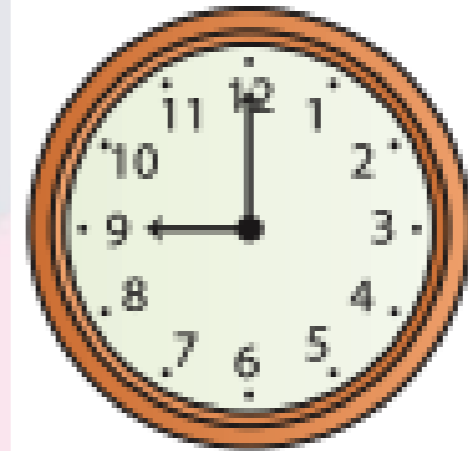
Mastering Time Ideas

Wake up at...

School starts at...

Bedtime at...

These clocks have only one hand, but can you work out a time that each could be showing?



Mastering Fraction & Percentage Ideas

Last month your sister saved a of her £10 pocket money. They 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?



Mastering Measurement Ideas

My cousin , Sarah, is **0.2 m** taller than me.

My sister is **15 cm** taller than Sarah.

I'm **one and a quarter metres**.

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



Supporting your children

- Ask your child to show/teach **you** and explain how they solve the problem.
- If they get stuck, don't rush them.
- Praise effort 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.'



Supporting your children

- Find opportunities to solve maths problems everywhere.
- Take real-life situations and look for patterns, connections and things that can be matched.
- Play games that involve numbers.
- Show them that maths is fun and isn't only reserved for the classroom.

