

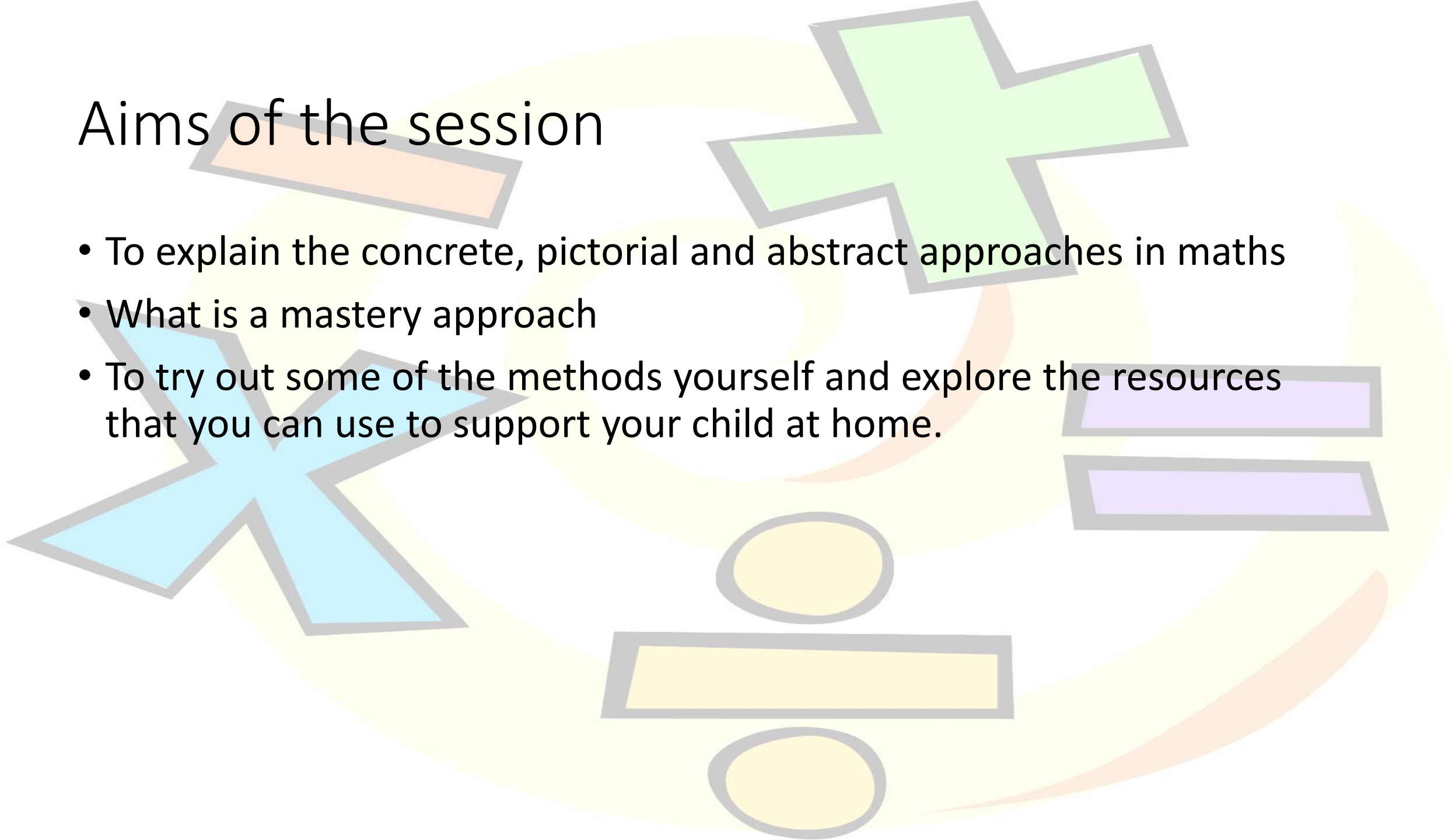
Maths Workshop



Year 6

Aims of the session

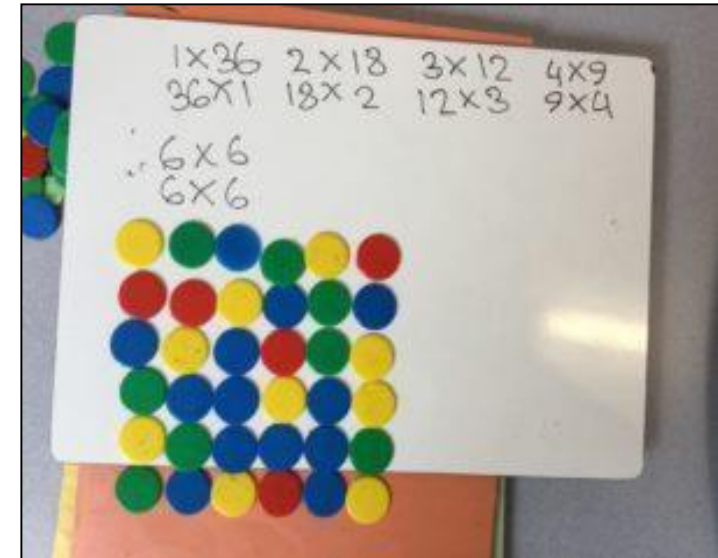
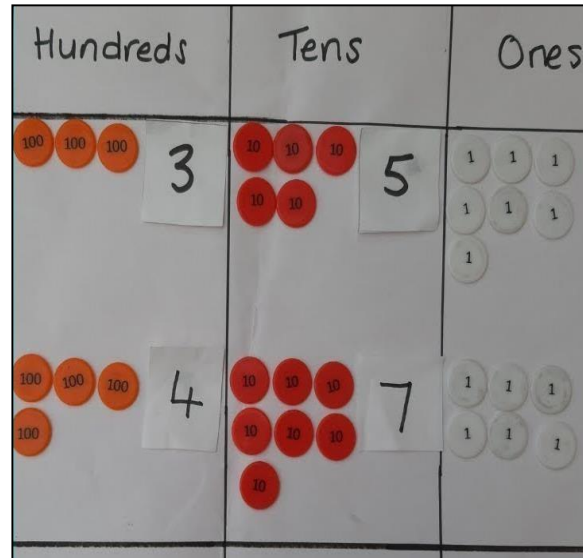
- To explain the concrete, pictorial and abstract approaches in maths
- What is a mastery approach
- To try out some of the methods yourself and explore the resources that you can use to support your child at home.



CPA Approach: Concrete, Pictorial and Abstract

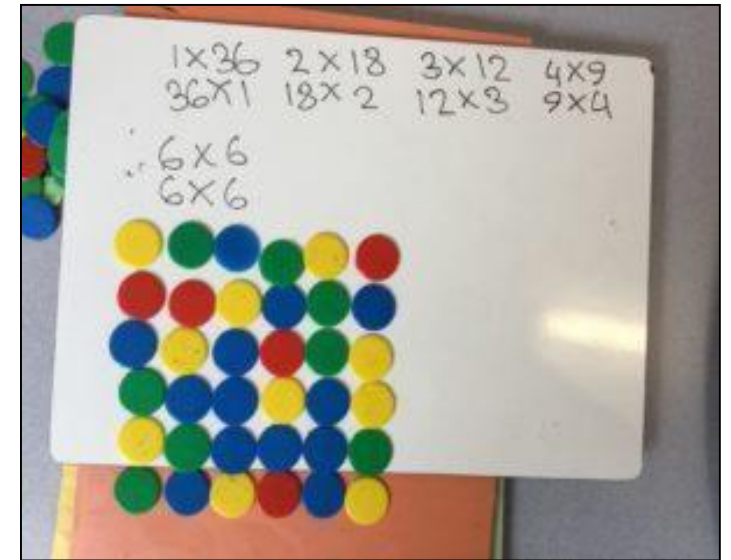
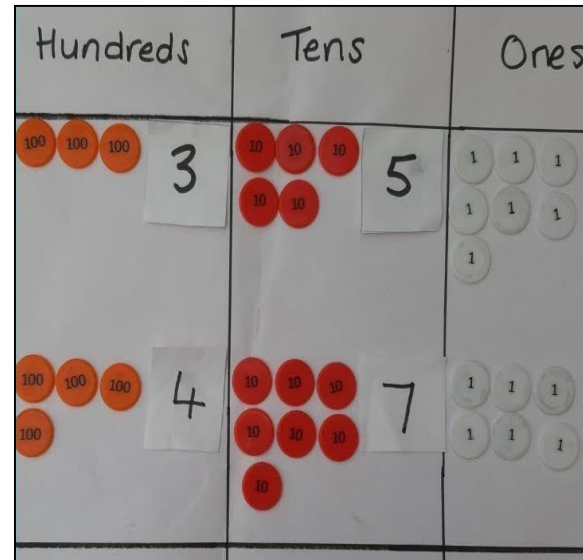
The CPA (Concrete, Pictorial, Abstract) approach to maths involves three stages:

- using **physical objects (concrete)** to explore concepts
- Then using **visual representations (pictorial)** to deepen understanding
- Finally, moving to **abstract symbols (numbers and equations)** to apply the knowledge in solving problems



Concrete (manipulatives)

Concrete/Manipulatives – physical objects that can be used and manipulated to do the maths manually

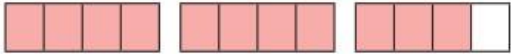


Pictorial: seeing the maths

This is a visual representation of the mathematical concept. This stage allows children to move from the physical manipulation to a visual understanding:

1 What mixed number is shown by each bar model?

a)



b)



1 Complete the calculations.
Use the place value charts to help you.

a) $3,117 + 2,542 =$

Th	H	T	O
			      
			 

+

Abstract: symbols and equations

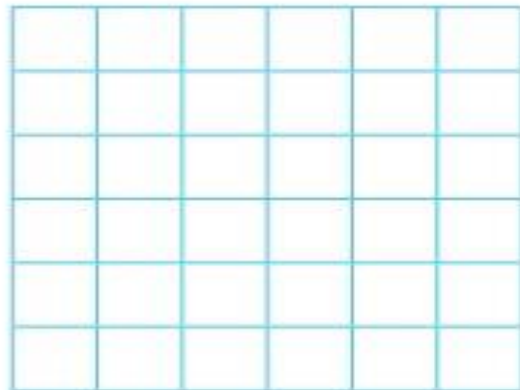
The final stage is for children to understand abstract mathematical concepts, signs and notation.

This is the stage where children understand what the meaning of symbols and notations are, for example: **+** means **adding together**

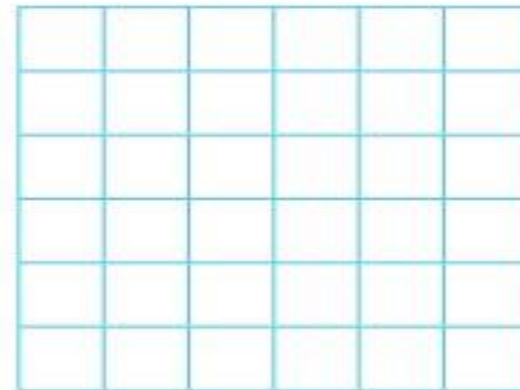
= means **'is equal to'**

At this stage, pupils are expected to have a depth of knowledge, which can now be applied without the need for physical or visual support strategies.

e) 3×240



f) 7×131



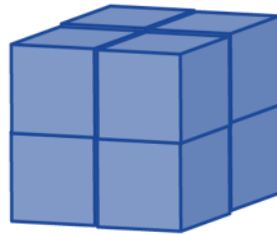
Cube numbers

The result of a number multiplied by itself and then multiplied by itself again.

Concrete

Use your 8 individual cubes to make one whole cube

Pictorial



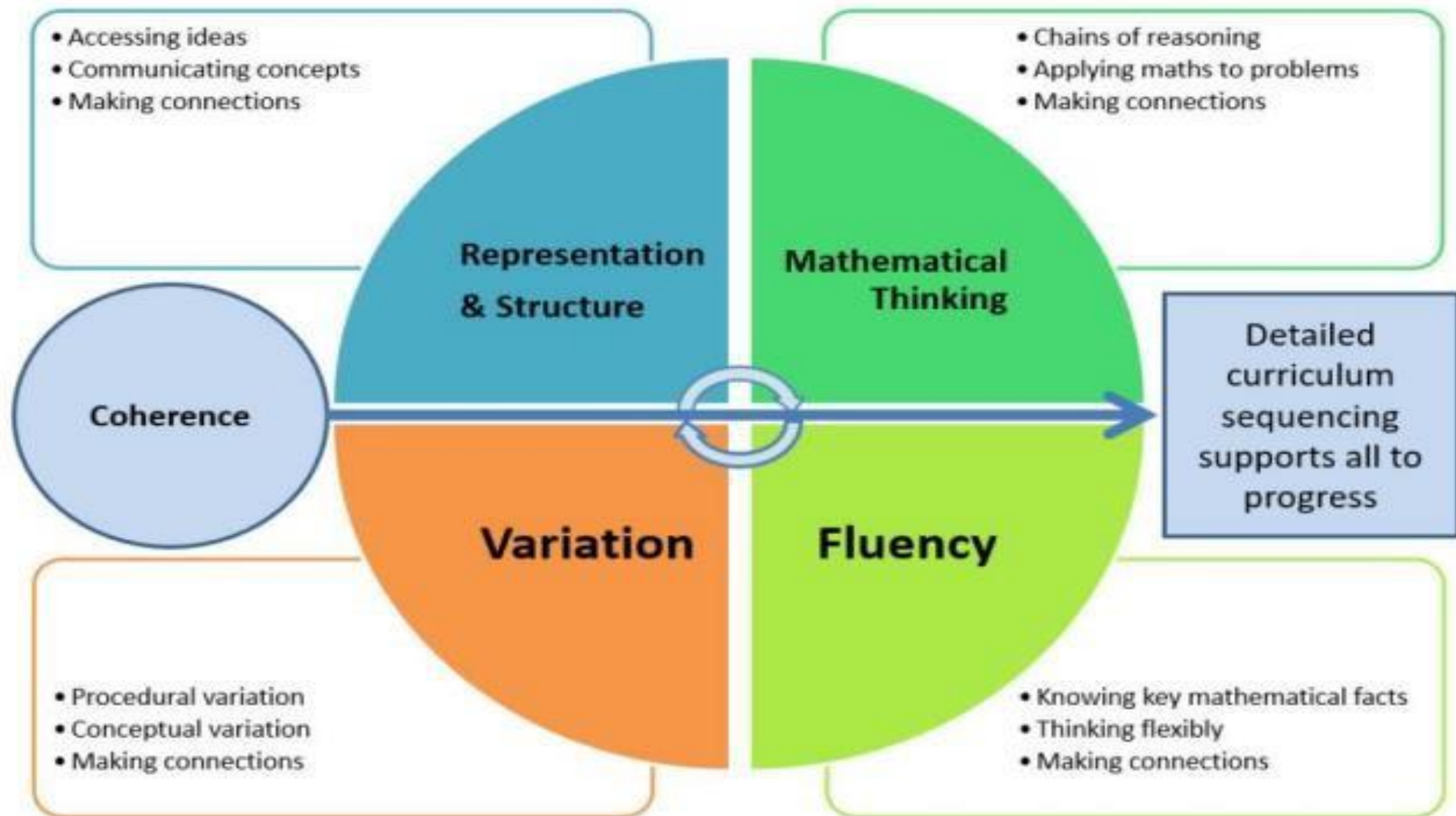
Abstract

“Two cubed”

$$2 \times 2 \times 2$$

$$2^3 = 8$$

Teaching for Mastery



The Mastery Approach

- Mathematic teaching for mastery assumes **everyone can learn and enjoy mathematics.**
- Mathematical learning behaviours are developed in a way that allows learners to reason and to **make connections between concepts.**
- Lesson design links **to prior learning** to ensure all can access the new learning identifies **carefully sequenced steps** in progression to build secure and understanding.
- **Practice and revisiting previous learning** is a vital part of our maths lessons.

The Mastery Approach

- Pupils are taught through whole-class interactive teaching enabling all to master the concepts.
- Typically, a lesson follow the school's **“I Do, We Do, You Do”** approach
- Lesson are underpinned by Rosenshine's teaching principles
- Key number and mathematical facts are learnt to automaticity, avoiding cognitive overload in working memory, enabling pupils to focus on new learning.

Rosenshine's Principles of Instruction

1. **Begin with a review:** Daily review of previous learning.
2. **Present new material in small steps.**
3. **Ask questions frequently.**
4. **Provide models** for solving problems.
5. **Guide student practice.**
6. **Check for understanding.**
7. **Obtain high success rates** (80% mastery).
8. **Provide scaffolding** for difficult tasks.
9. **Independent practice.**
10. **Engage in regular reviews** of learning.

We use White Rose resources across the school as the main resources to deliver lessons

1 Complete the sentences.

a) 

There are equal groups of

+ + + + + =

× =

b) 

There are equal groups of

= + + +

= ×

9 Dora and Amir are trying to convert 1.05 metres into millimetres.

Dora: You can multiply 1.05 by 100 to convert it into centimetres, then multiply the product by 10 to convert it into millimetres.

Amir: You can just multiply 1.05 by 1,000!

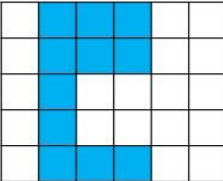
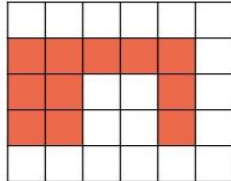


Flashback 4 Year 4 | Week 1 | Day 3

1) $7 \times 12 = 7 \times \square \times 2 = \square \times 2$

2) $12 \times 8 \bigcirc 8 \times 10 + 8 \times 2$

3) Which shape has the smallest area?

↑ 1 cm

4) $\text{LXIII} \xrightarrow{+10} \square$

White Rose Maths

The Mastery Approach

Dexter works out 20 squared

Annie works out 20 cubed

Find the difference between Dexter's and Annie's numbers.

Dexter: $20 \times 20 = 400$

Annie: $20 \times 20 \times 20 = 8,000$

$$8,000 - 400 = 7,600$$

What do children already know?

- *Times tables*
- *x10/x100/x1000*
- *Key mathematical language*

Knowing these concepts allows children to not only learn new mathematical skills, but also rehearse previous learning on a regular basis.

The Mastery Approach

Your turn:

Find the difference between 3^2 and 4^3

Y6 Objectives

Numbers with more than 4 digits

Decimal numbers

Multi-step problems

Addition in Year 6

Vary the number of digits in the number.

$$247 + 14699 =$$

Add more than two numbers together.

$$1242 + 354 + 26489 =$$

Write = in different positions.

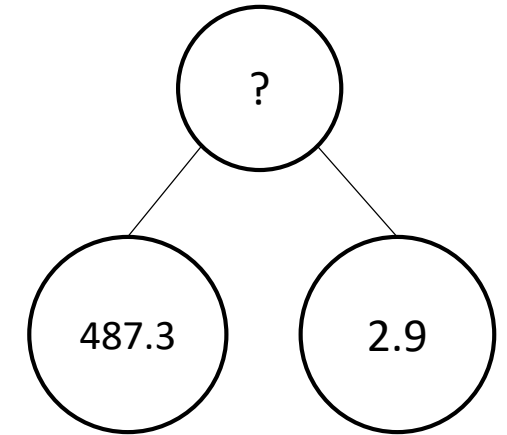
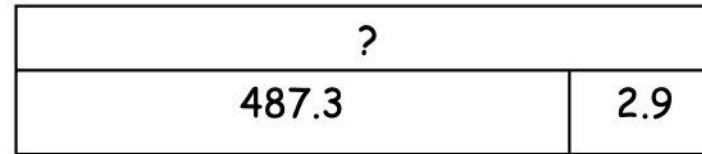
$$? = 6.9 + 14.32$$

Balanced equations

$$648 + ? = 1036 + 58$$

Adding fractions

Children to use part whole and bar model to develop estimation and number sense.



A is an odd number which rounds to 100,000 to the nearest thousand.

It has a digit total of 30.

B is an even number which rounds to 500,000 to the nearest hundred thousand.

It has a digit total of 10.

A and B are both multiples of 5 but end in different digits.

A	B
631,255	

Addition

- Vocabulary

Add, addition, more,
plus, increase sum, total,
altogether, how many
more to make...?

addend

The diagram illustrates the components of an addition equation. It shows the equation $5 + 3 = 8$ in orange. Above the number 5 is the word "Addend" in blue, with a black arrow pointing down to the 5. Above the number 3 is the word "Addend" in blue, with a black arrow pointing down to the 3. Above the number 8 is the word "Sum" in blue, with a black arrow pointing down to the 8. The plus sign and equals sign are in black.

Addend		Addend		Sum
↑		↑		↑
5	+	3	=	8

Y6 Objectives

- ❖ Numbers with more than 4 digits.
- ❖ Decimal numbers.
- ❖ Multi-step problems.

Subtraction in Year 6

- Vary the number of digit in the number.

$$15.743 - 214.9 =$$

- Subtract more than two numbers.

$$143,524 - 12,345 - 1698 =$$

- Missing boxes.

$$\underline{\hspace{2cm}} - 200 = 23,837$$

- Balanced equations.

$$231.64 - ? = 254.2 - 0.58$$

- Subtracting fractions.

$$\frac{5}{6} - \frac{1}{4} =$$

Children to use part whole and bar model to develop estimation and number sense.

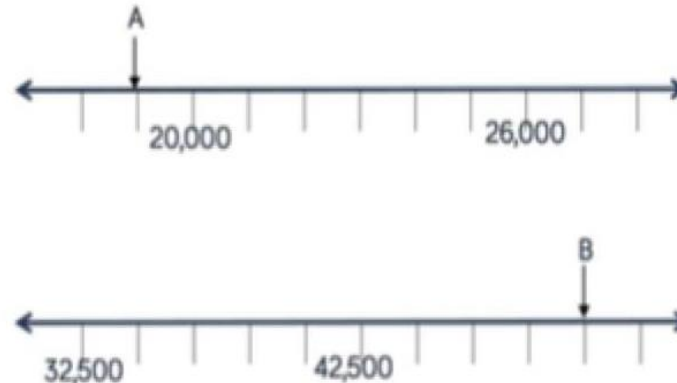
487.3	
?	2.9

Problem Solving

A four bedroom house cost £450,000.
A three bedroom house costs £199,000 less.
How much does the three bedroom house cost?
What method did you use to find the answer?

Multi-step problems

Find the difference between A and B



In Year 6 the children will tackle subtraction calculations relating to fractions, subtracting more than two numbers and by completing increasingly complex multi-step word problems.

Subtraction

- Vocabulary
- Subtract, subtraction, take (away), minus, decrease, how many are left/leftover? Difference, how many more/fewer is... than...? Subtrahend, minuend,

The diagram illustrates the components of the subtraction equation $6 - 2 = 4$. Each part of the equation is labeled with a term and an arrow pointing to it:

- 6**: Minuend (indicated by a teal arrow)
- : Minus Sign (indicated by an orange arrow)
- 2**: Subtrahend (indicated by a teal arrow)
- =**: Equal Sign (indicated by an orange arrow)
- 4**: Difference (indicated by a teal arrow)

Multiplication

Y6 Objectives

- ❖ Multiply multi-digit number up to 4 digit number x 2 digit number.
- ❖ Common factors, common multiples and prime number.
- ❖ Multiplication of decimal umbers by 1 digit number.
- ❖ Order of operations.
- ❖ Solve problems.

$$\begin{array}{r} 24 \\ \times 36 \\ \hline 144 \\ + 720 \\ \hline 864 \end{array}$$

Place holder

$$2 \times 4 = 8$$

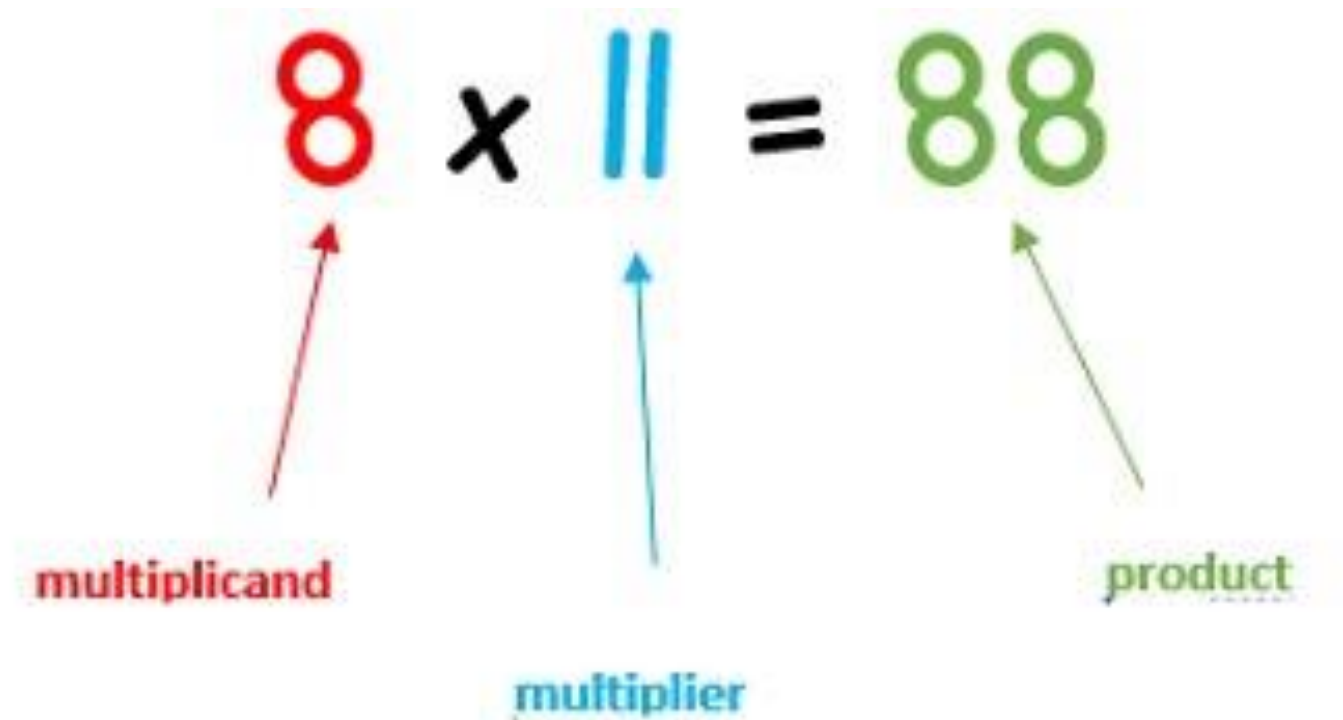
Factors Product

$$\begin{array}{r} 0.23 \\ \times 9 \\ \hline 2.07 \end{array}$$

Multiplication

- Vocabulary
- Lots of, groups of, multiply, multiplication, multiplied by, multiple of, product, factors

Factors



Division

Handwritten long division of 432 by 15 on a grid:

$$\begin{array}{r} 28 \text{ r } 12 \\ 15 \overline{) 432} \\ \underline{- 30} \\ 132 \\ \underline{- 120} \\ 12 \end{array}$$

The remainder 12 is indicated by a purple arrow pointing to the word "Remainder".

KFC

$$15 \times 1 = 15$$

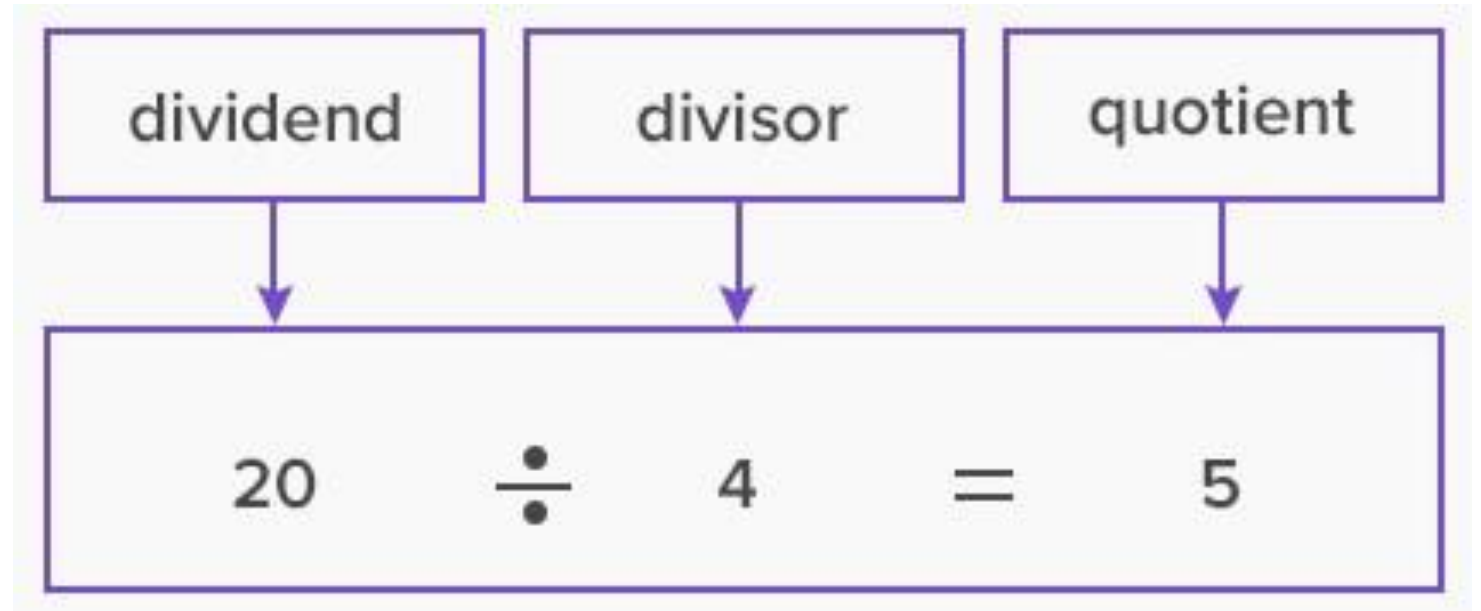
$$15 \times 2 = 30$$

$$15 \times 5 = 75$$

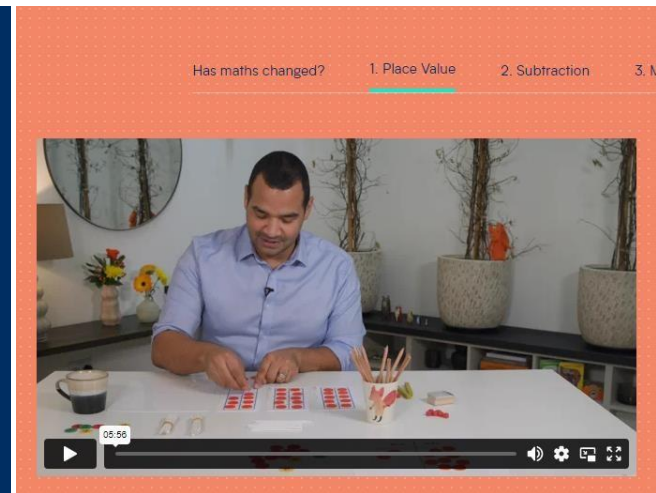
$$15 \times 10 = 150$$

Division

- Vocabulary
- Halve, share, share equally, group in..., groups of, divide, division, dividend, divided by, divisible by, inverse, quotient



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