



# Welcome!

## Maths at HIS

Monday 15<sup>th</sup> January 2024

Mrs Georgia Clark



# Overview

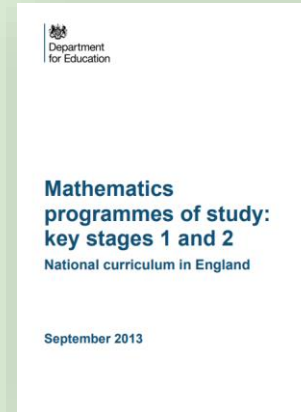
- Maths curriculum
- Maths mastery
- Maths in the classroom
- Assessment
- How you can support your child
- Questions



# The National Curriculum

## Aims: fluency, reasoning and problem solving

- **Fluency** – Pupils will be able to develop their conceptual understanding and be able to recall and apply knowledge rapidly and accurately.
- **Reasoning** – Pupils will be able to follow a line of enquiry, conjecture relationships and generalisations, and develop an argument, justification or proof using mathematical language.
- **Problem solving** – Pupils will be able to apply 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.



Complete the part-whole models.



Here are seven pieces of fruit.

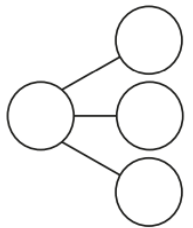


Put the fruit into a part-whole model.

Complete the sentences.

\_\_\_\_\_ is the whole.

\_\_\_\_\_ is a part, \_\_\_\_\_ is a part and \_\_\_\_\_ is a part.



How many different ways can you group the animals?

Draw a part-whole model for each way.

Can you make more than two groups?

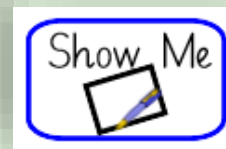
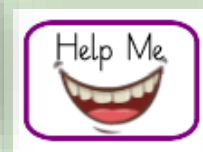
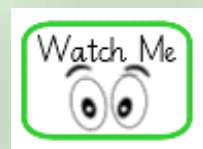
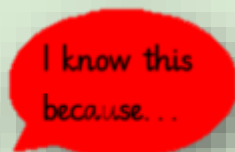
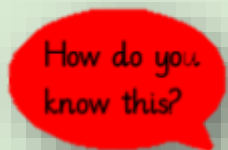
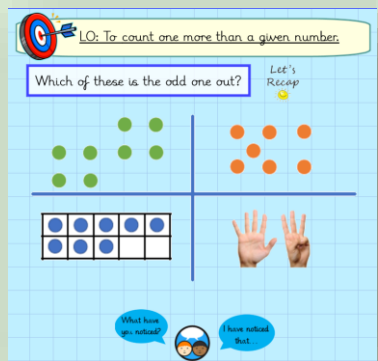


# Maths at HIS

At HPP, we teach mathematics using the mastery approach, in conjunction with the National Curriculum.

Pupils are taught maths daily through whole-class interactive teaching, where the focus is on all pupils working together on the same content at the same time. This ensures that all can master concepts before moving to the next part of the curriculum sequence, allowing no pupil to be left behind.

This approach is taught consistently across the school, which ensures pupils have a clear understanding of what each lessons entails, thus reducing their cognitive load.



“The expectation is that the majority of pupils will move through the programmes of study at broadly the same pace.”



# Planning for mastery – small steps

**Coherence** is about making connections, and it is one of the NCETM’s five ‘Big Ideas’ for how to achieve mastery in mathematics:

*‘Lessons are broken down into smaller, connected steps, helping pupils to access a concept initially and then build upon their understanding. [This] enables them to generalise the concept so that they can apply it to a range of different contexts.’*

## Why plan in small steps?

- Pupils are able to cope more easily with small-step planning and not be overwhelmed.
- Small steps enable pupils to ‘keep up’ rather than ‘catch up’, making the learning accessible to all.
- Concepts can be fully embedded before moving on.
- Teachers can make formative assessments in lessons so that the class can advance.

Hampton Infant School & Nursery		
<b>Maths – Medium Term Planning</b>		
<b>Year Group: 1</b>	<b>Term: Autumn – Block 1</b>	
<b>Unit Planning:</b> Number: Place Value (within 10)		
<b>National Curriculum Links:</b>		
<ul style="list-style-type: none"> <li>• Count to ten, forwards and backwards, beginning with 0 or 1, or from any given number.</li> <li>• Count, read and write numbers to 10 in numerals and words.</li> <li>• Given a number, identify one more or one less.</li> <li>• Identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least.</li> </ul>		
<b>Key Vocabulary:</b> sort, count, represent, compare, equal, more, greater, less, fewer, order, groups, ordinal	<b>Resources:</b> Numicon, ten frames, dice, counters, cubes, number cards, number lines	
<b>THE LEARNING JOURNEY</b>		
<b>Key Learning Outcomes and New Knowledge</b>		<b>RTP</b>
1	To sort objects into chosen criteria.	
2	To count groups of objects.	1NPV-1
3	To count objects from 10.	1NPV-1
4	To represent objects in different ways.	
5	To count, read and write forwards from any number within 10.	1NPV-1
6	To count, read and write backwards from any number within 10.	1NPV-1
7	To count one more than a given number within 10.	1NPV-1
8	To count one less than a given number within 10.	1NPV-1
9	To count using one to one correspondence.	
10	To compare groups using mathematical language: equal, more/greater, less/fewer.	1NPV-2
11	To begin to use the symbols <, > and =.	1NPV-2
12	To compare numbers.	1NPV-2
13	To order groups of objects.	1NPV-2
14	To order numbers.	1NPV-2



# Planning for mastery



At HIS, we follow White Rose 'small steps' and the NCETM 'Teaching for Mastery' materials to support our planning.

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Number: Place Value (within 10)				Number: Addition & Subtraction (within 10)				Geometry: Shape	Number: Place Value (within 20)		
	Consolidation	Number: Addition & Subtraction (within 20)			Number: Place Value (within 50)			Measurement: Length & Height	Measurement: Weight & Volume		Consolidation	
	Consolidation	Number: Multiplication & Division			Number: Fractions		Number: Place Value (within 100)	Measurement: Money	Measurement: Time		Geometry: Position & Direction	

Subject matter is broken down into blocks with predetermined objectives and specified outcomes.

Curriculum design ensures a coherent and detailed sequence of essential content to support sustained progression over time.

Hampton Infant School and Nursery Termly Knowledge and Skills for Maths – Year 1

Autumn Term				
Block	Block 1 Number: Place Value (within 10)	Block 2 Number: Addition and Subtraction	Block 3 Geometry: Shape	Block 4 Number: Place Value (within 20)
<b>Knowledge and Skills</b>	<ul style="list-style-type: none"> <li>Sort objects.</li> <li>Count objects from a larger group.</li> <li>Represent objects.</li> <li>Recognise numbers as words.</li> <li>Count on from any number.</li> <li>One more.</li> <li>Count backwards within 10.</li> <li>One less.</li> <li>Compare groups by matching.</li> <li>Compare groups using mathematical language.</li> <li>Introduce <math>=</math> and <math>&lt;</math> symbols.</li> <li>Compare numbers.</li> <li>Order groups of objects.</li> <li>Order numbers.</li> <li>The number line.</li> </ul>	<ul style="list-style-type: none"> <li>Part-whole model.</li> <li>Writing number sentences – Addition symbol.</li> <li>Fact families – Addition facts.</li> <li>Find number bonds for numbers within 10.</li> <li>Number bonds within 10.</li> <li>Systematic methods for number bonds within 10.</li> <li>Number bonds to 10.</li> <li>Addition: Adding together.</li> <li>Addition: Adding more.</li> <li>Addition problems.</li> <li>Finding a part.</li> <li>Subtraction – Introducing the subtraction symbol.</li> <li>Subtraction – Finding a part.</li> <li>Fact families – The eight facts.</li> <li>Subtraction – Taking away/counting out (how many left?).</li> <li>Subtraction – Taking away (how many left?).</li> <li>Subtraction – Counting back (number line).</li> <li>Subtraction – Finding the difference.</li> <li>Subtraction – Addition and subtraction (operation selection).</li> </ul>	<ul style="list-style-type: none"> <li>Recognise and name 2D shapes, including: (e.g. rectangles (including squares), circles and triangles).</li> <li>Recognise and name common 3D shapes, including (e.g. cuboids (including cubes), pyramids and spheres).</li> </ul>	<ul style="list-style-type: none"> <li>Count forwards and backwards within 20.</li> <li>Understanding 10.</li> <li>Understanding numbers 11 to 20 – Tens and ones.</li> <li>One more and one less.</li> <li>The number line to 20.</li> <li>Using a number line to 20.</li> <li>Estimating on a number line.</li> <li>Compare numbers to 20.</li> <li>Order numbers to 20.</li> </ul>
<b>National Curriculum Links</b>	<ul style="list-style-type: none"> <li>Count to ten, forwards and backwards, beginning with 0 or 1, or from any given number.</li> <li>Count, read and write numerals to 10 in numerals and words.</li> <li>Given a number, identify one more or one less.</li> <li>Identify and represent numbers using objects and pictorial representations including the number line, and use the language of 'equal to, more than, less than (fewer), most, least'.</li> </ul>	<ul style="list-style-type: none"> <li>Represent and use number bonds and related subtraction facts within 10.</li> <li>Read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs.</li> <li>Add and subtract one-digit numbers to 10, including zero.</li> <li>Solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations and missing number problems.</li> </ul>	<ul style="list-style-type: none"> <li>Recognise and name common 2D shapes, including (e.g. rectangles (including squares), circles and triangles).</li> <li>Recognise and name common 3D shapes, including (e.g. cuboids (including cubes), pyramids and spheres).</li> </ul>	<ul style="list-style-type: none"> <li>Count to twenty, forwards and backwards, beginning with 0 or 1, from any given number.</li> <li>Count, read and write numerals to 20 in numerals and words.</li> <li>Given a number, identify one more or one less.</li> <li>Identify and represent numbers using objects and pictorial representations including the number line, and use the language of 'equal to, more than, less than (fewer), most, least'.</li> </ul>
<b>TAF Statements</b>	<ul style="list-style-type: none"> <li>WTS - Read and write numbers in numerals (to 10).</li> <li>EXS - Read scales in divisions of (ones).</li> <li>GDS - Read scales where not all numbers on the scale are given and estimate points in between.</li> <li>Solve unfamiliar word problems that involves more than one step.</li> <li>Use reasoning about numbers and relationships to solve more complex problems and explain their thinking.</li> </ul>	<ul style="list-style-type: none"> <li>Add and subtract (one-digit numbers) explaining the method verbally in pictures or using apparatus.</li> <li>Recall at least four of the six number bonds for 10 and reason about associated facts.</li> <li>Recall all the number bonds to and within 10, and use these to reason with.</li> <li>Use reasoning about numbers and relationships to solve more complex problems and explain their thinking.</li> <li>Solve unfamiliar word problems that involves more than one step.</li> </ul>	<ul style="list-style-type: none"> <li>Name some common 2D and 3D shapes from a group of shapes or from pictures of the shapes and describe some of their properties.</li> <li>Name and describe properties of 2D and 3D shapes.</li> <li>Describe the similarities and differences of 2D and 3D shapes, using their properties.</li> </ul>	<ul style="list-style-type: none"> <li>Read and write numbers in numerals (to 20).</li> <li>Partition a two-digit number into tens and ones and demonstrate and understand place value, though they may use structured resources (e.g. base ten blocks).</li> <li>Partition two-digit numbers into different combinations of tens and ones, explaining their thinking verbally in pictures or using apparatus.</li> <li>Use reasoning about numbers and relationships to solve more complex problems and explain their thinking.</li> <li>Solve unfamiliar word problems that involve more than one step.</li> </ul>

Hampton Infant School & Nursery  
Maths – Medium Term Planning

Year Group: 1	Term: Autumn – Block 1
<b>Unit Planning:</b> Number: Place Value (within 10)	
<b>National Curriculum Links:</b>	<ul style="list-style-type: none"> <li>Count, read and write numbers to 20 in numerals and words.</li> <li>Given a number, identify one more or one less.</li> <li>Identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least.</li> </ul>
<b>Key Vocabulary:</b> sort, count, represent, compare, equal, more, greater, less, fewer, order, groups, ordinal	<b>Resources:</b> Numicon, ten frames, dice, counters, cubes, number cards, number lines
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7 To count one more than a given number within 10.	INPV-1
8 To count one less than a given number within 10.	INPV-1
9 To count using one to one correspondence.	
10 To compare groups using mathematical language: equal, more/greater, less/fewer.	INPV-2
11 To begin to use the symbols $<$ , $>$ and $=$ .	INPV-2
12 To compare numbers.	INPV-2
13 To order groups of objects.	INPV-2
14 To order numbers.	INPV-2

Ready to Progress Criteria identifies the most important conceptual knowledge and understanding that pupils need as they progress from Year 1 to Year 6.

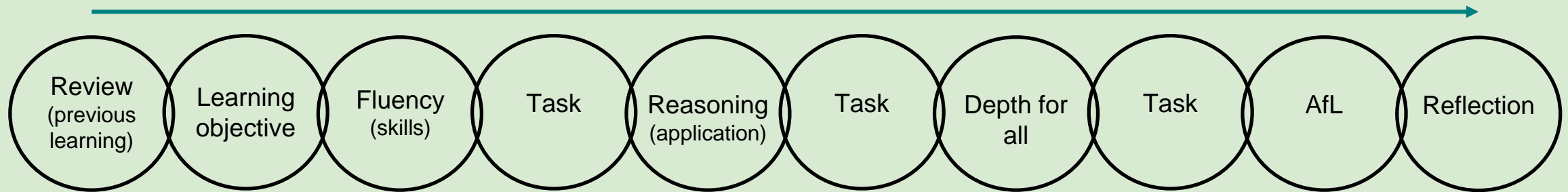


# Lesson design – a maths mastery lesson

Pre-assessment

Progress

Post assessment



- Lesson design links to prior learning to ensure all can access the new learning, identifying carefully sequenced steps in progression to build secure understanding.
- Pupils are taught through whole-class interactive teaching, enabling pupils to master the concepts necessary for the next part of the curriculum sequence.
- In a typical lesson, the teacher leads back and forth interaction, including questioning, short tasks, explanation, demonstration, and discussion, enabling pupils to think, reason and apply their knowledge to solve problems.
- Use of precise mathematical language enables all pupils to communicate their reasoning and thinking effectively.



# Differentiation

Differentiation is achieved through:

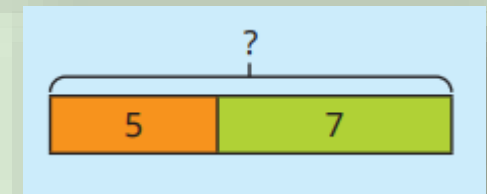
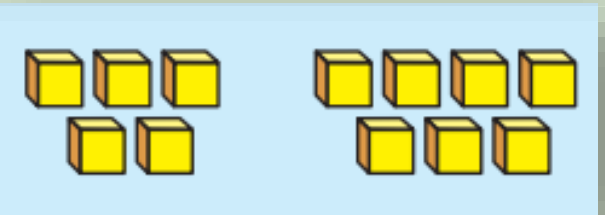
- varying the degree of support;
- using enabling and extending questions;
- providing or asking for alternative representations;
- encouraging pupils to explain their methods and workings to demonstrate understanding.

## Multiple representations for all

Pupils (and adults!) can find maths difficult because it is abstract. The CPA approach builds on pupils' existing knowledge by introducing abstract concepts in a concrete and tangible way. It involves moving from concrete materials to pictorial representations to abstract symbols and problems.

- **Concrete** – Pupils have the opportunity to work with physical objects/concrete resources, in order to bring the maths to life and to build understanding of what they are doing.
- **Pictorial** – Alongside concrete resources, pupils work with pictorial representations, making links to the concrete. Visualising a problem in this way can help pupils to reason and to solve problems.
- **Abstract** – With the support of both the concrete and pictorial representations, children can develop their understanding of abstract methods.

### Concrete – Pictorial – Abstract (CPA)



A light blue rectangular box containing a yellow parallelogram with the number sentence  $5 + 7$  written inside.





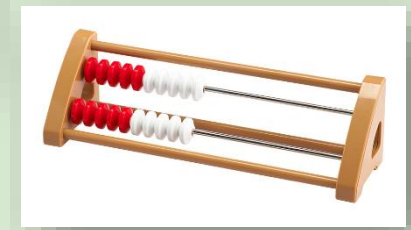
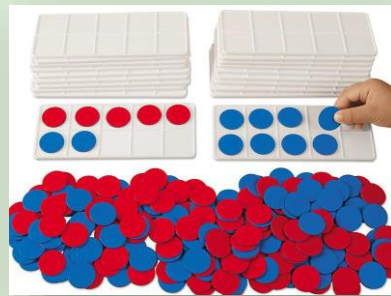
# CPA - Concrete

Concrete is the 'doing' stage.

During this stage, pupils use concrete objects to model problems.

Unlike traditional maths teaching methods where teachers demonstrate how to solve a problem, the CPA approach brings concepts to life by allowing children to experience and handle physical (concrete) objects.

With the CPA framework, every abstract concept is first introduced using physical, interactive concrete materials. For example, if a problem involves adding pencils, children can first handle pencils. From there, they can progress to handling abstract counters or cubes which represent the pencils.





# CPA - Pictorial

Pictorial is the 'seeing' stage.

Here, visual representations of concrete objects are used to model problems. This stage encourages pupils to make a mental connection between the physical object they just handled and the abstract pictures, diagrams or models that represent the objects from the problem.

Building or drawing a model makes it easier for pupils to grasp difficult abstract concepts(e.g. fractions). Simply put, it helps pupils visualise abstract problems and makes them more accessible.

$7 = 4 + 3$   
 $7 = 3 + 4$

$7 - 3 = 4$   
 $7 - 4 = 3$

$4 + 3 = 7$     4 is a part.  
 $3 + 4 = 7$     3 is a part.  
 $7 - 3 = 4$     7 is the whole.  
 $7 - 4 = 3$

$7 = 4 + 3$

$7 = 3 + 4$



# CPA - Abstract

Abstract is the 'symbolic' stage.

This is where pupils use abstract symbols to model problems. They will not progress to this stage until they have demonstrated that they have a solid understanding of the concrete and pictorial stages of the problem.

The abstract stage involves the teacher introducing abstract concepts (e.g. mathematical symbols).

Children are introduced to the concept at a symbolic level using only numbers, notations and mathematical symbols, e.g. +, -, x, / to indicate addition, subtraction, multiplication or division.

A concrete representation of 3 + 2 = 5 using five blocks (three blue, two green). A pictorial representation of 3 + 2 = 5 using a bar model with three blue units and two green units. The equation  $3 + 2 = 5$  is shown to the right.

Concrete representations of 2 + 2 = 4 using two green and two red apples, and two green and two red blocks. The equation  $2 + 2 = 4$  is shown to the right.

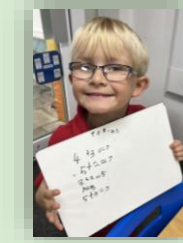
A sequence of three boxes illustrating the transition from concrete to abstract for 2 + 1 = 3. The first box shows two red blocks and one yellow block with a plus sign. An arrow points to the second box, which shows a bar model with two red units and one yellow unit. A second arrow points to the third box, which shows the equation  $2 + 1 = 3$ .



# Assessment




## Formative assessment:

- During lessons, questioning, talk tasks, 'show me' tasks (whiteboards, fingers, actions) are used to assess understanding.
- The structure of the lesson allows for 'live' marking and questioning to address misconceptions and/or help pupils to identify errors and correct these themselves.



## Summative assessment:

- On completion of each block of learning, summative assessments are used to identify any gaps in learning and plan for/address these before moving on to the next block of learning/concept.
- At the end of each half term, more formal 'End of Term' assessments are carried out to support/inform end of term judgements. As a team, data from these are used to identify areas/concepts/gaps that would benefit from recap slides or intervention groups at the beginning of the following half term.

<p>How many children are there?</p>  <p>There are ____ children.</p>	<p>Circle 6 apples.</p>  <p>There are ____ apples.</p>
<p>How many bananas are there?</p>  <p>There are ____ bananas.</p>	<p>Complete.</p> <p>One more than 9 is <input type="text"/></p> <p>One less than <input type="text"/> is 5</p>



# How to support your child

Resources to help practise mathematical skills at home:

- NumBots
- Topmarks
- Maths Zone
- Nrich
- Oxford Owl





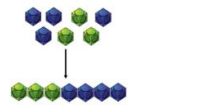
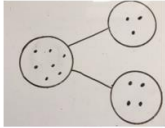
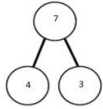

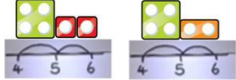
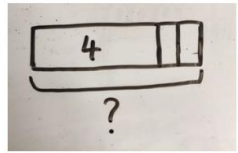



# How to support your child

The school's calculation policy shows how we teach mathematical concepts at HIS using the concrete, pictorial and abstract approach.

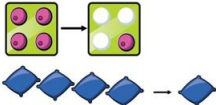
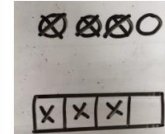
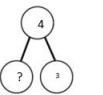

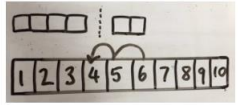
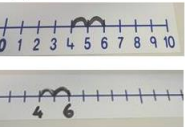
## Addition

**Key language:** sum, total, part, whole, plus, add, altogether, more, equal to, the same as.

Concrete	Pictorial	Abstract
<p><b>Combining two parts to make a whole</b> (use other resources too, e.g. eggs, shells, teddy bears, cars).</p> 	<p>Children to represent the cubes using dots or crosses. They could put each part on a part-whole model too.</p> 	<p><math>4 + 3 = 7</math> Four is a part, 3 is a part and the whole is seven.</p> 
<p><b>Counting on using number lines and cubes/Numicon.</b></p>  	<p>A bar model which encourages children to rather than count all.</p> 	<p>The abstract number line: <i>What is 2 more than 4? What is the sum of 2 and 4? What is the total of 4 and 2?</i></p> <p><math>4 + 2</math></p> 

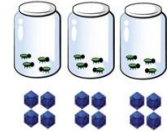
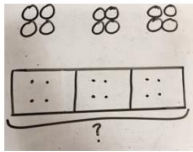
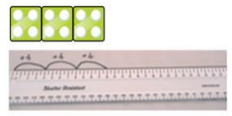
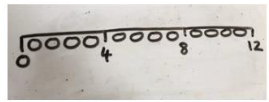
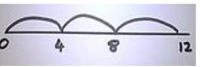
## Subtraction

**Key language:** take away, less than, the difference, subtract, minus, fewer, decrease.

Concrete	Pictorial	Abstract
<p><b>Physically taking away and removing objects from a whole</b> (ten frames, Numicon, cubes and other items, such as beanbags could be used).</p> <p><math>4 - 3 = 1</math></p> 	<p>Children to draw the concrete resources they are using and cross out the correct amount. The bar model can also be used.</p> 	<p><math>4 - 3 = ?</math></p> <p><math>? = 4 - 3</math></p> 
<p><b>Counting back</b> (using number lines or number tracks) children start with 6 and count back 2.</p> <p><math>6 - 2 = 4</math></p> 	<p>Children to represent what they see pictorially, e.g.</p> 	<p>Children to represent the calculation on a number line or number track and show their jumps. Encourage children to use an empty number line.</p> 

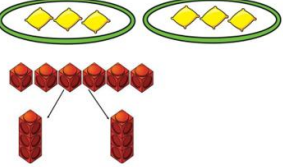
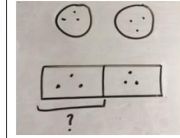

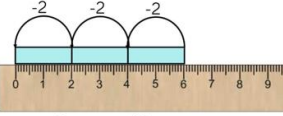
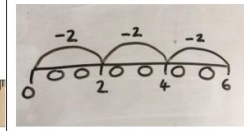
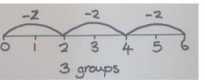
## Multiplication

**Key language:** double, times, multiplied by, the product of, groups of, lots of, equal groups.

Concrete	Pictorial	Abstract
<p><b>Repeated grouping/repeated addition.</b></p> <p><math>3 \times 4</math> <math>4 + 4 + 4</math></p> <p>There are 3 equal groups, with 4 in each group.</p> 	<p>Children to represent the practical resources in a picture and use a bar model.</p> 	<p><math>3 \times 4 = 12</math> <math>4 + 4 + 4 = 12</math></p>
<p><b>Number lines to show repeated groups.</b></p> <p><math>3 \times 4</math></p> 	<p>Represent this pictorially alongside a number line, e.g.</p> 	<p>Abstract number line showing three jumps of four.</p> <p><math>3 \times 4 = 12</math></p> 

## Division

**Key language:** share, group, divide, divided by, half.

Concrete	Pictorial	Abstract
<p><b>Sharing</b> using a range of objects. <math>6 \div 2</math></p> 	<p>Represent the sharing pictorially.</p> 	<p><math>6 \div 2 = 3</math></p>  <p>Children should also be encouraged to use their 2 times table facts.</p>
<p><b>Repeated subtraction</b> using Cuisenaire rods above a ruler.</p> <p><math>6 \div 2</math></p>  <p>3 groups of 2</p>	<p>Children to represent repeated subtraction pictorially.</p> 	<p>Abstract number line to represent the equal groups that have been subtracted.</p>  <p>3 groups</p>



# Questions?

