Inspire Learning, Ignite Curiosity

Marlow C of E Infant School
Calculation Policy
2023

Then God said, "Let us make humankind in our image, in our likeness"
Genesis 1:26

Rationale
At Marlow Church of England Infant School our curriculum aim is to inspire learning and ignite curiosity, within a welcoming Christian and spiritual community.

This bible verse above underpins our Christian vision. It tells us that every individual is created in God's image and so this leads us to conclude that everyone is precious and valuable. As a result of this we focus on treating everybody with respect and dignity because we acknowledge their God given value and unique identity.

To help us achieve our vision we concentrate on:

- Embracing the uniqueness of everybody and being inclusive of all
- Empowering all to be enthusiastic learners
- Ensuring that every child feels nurtured, supported and safe
- Enriching learning through progressive teaching methods and technology
- Being responsible to and for society
- Being good citizens of the planet
- Embodying a Christian and spiritual community
- Being guided by our values of respect, kindness, perseverance, forgiveness, thankfulness and service

As a school we support the rights of children and these rights are encompassed in UN Convention of the Rights of the Child. This policy focuses on helping to realise Article 28 *All children have the right to a quality education.* It does this by enhancing the delivery of curriculum learning through well focused learning outside the classroom that develops children's knowledge and understanding.

Introduction
Our Maths curriculum provides a structured and systematic approach to teaching number. There is a considerable emphasis on teaching mental calculation strategies and speaking and listening activities. We believe that the use of informal written methods is an important part of learning and understanding, so we teach the children to use these methods early on in their maths learning.

Purpose
The policy is a guide for teachers at our school and has been adapted from work by the NCETM. It is purposely set out as a progression of mathematical skills and not in year group phases to encourage a flexible approach to teaching and learning. It is expected that teachers will use their professional judgement as to when consolidation of existing skills is required or if to move onto the next concept. The focus is on breadth and depth rather than accelerating through concepts. We ensure that children are not extended with new learning before they are ready, they deepen their conceptual understanding by tackling challenging and varied problems.

This calculation policy should be used to support children to develop a deep understanding of number and calculation and has been designed to teach children through the use of concrete, pictorial and abstract representations.

In addition to ensuring a consistency in approach to teaching calculations, this policy lays out the progression from informal/practical methods of recording to written methods for each of the four operations. It also provides an aid to parents' understanding in their child's stages of learning.

Implementation

The White Rose maths scheme is used throughout the school to plan learning in maths, alongside Numicon, Nrich and NCTEM. Progression within each area of calculation is in line with the programme of study in the National Curriculum.

All teachers have been given the guidance from the White Rose Maths Hub and they use it as a basis for their planning.

Outcomes by the End of Key Stage 1

Most children will be able to:

- Decide whether a mental method is appropriate
- Understand and use appropriate mathematical language
- Use practical equipment, models and images
- Represent problems pictorially
- Know number and multiplication facts by heart
- Learn to always estimate first
- Always check the answer, preferably using a different method e.g. the inverse operation
- Partition numbers in different ways as appropriate to support particular calculations (e.g. 35 – 18 = 35 – 5 – 3 – 10)

Teaching will enable:

- Children who are making persistent mistakes to return to the method that they can use accurately until ready to move on
- Reference back to expanded methods when revising or extending to larger numbers. This helps to reinforce understanding and reminds children that they have an alternative to fall back on if they are having difficulties.

Monitoring and evaluation of the Calculation Policy

The effectiveness of the policy will be monitored during the year through:

- Monitoring of teaching and learning by the Maths subject leader and the SLT
- Visits from the inspectorate or advisory team
- Consultation with staff
- Sampling of pupils' work
- Visits from the Maths governor to discuss the implementation and effectiveness of the policy with the subject lead.

The following criteria can be used as a measure of success:

- Have the learning targets been achieved?
- Have standards improved?
- Is there whole-school consistency?
- Has any part of the policy been difficult/ impossible to achieve?

This policy should be read in conjunction with the Maths Policy and the monitoring and evaluation of the Calculation Policy will be done in line with the Maths Policy.

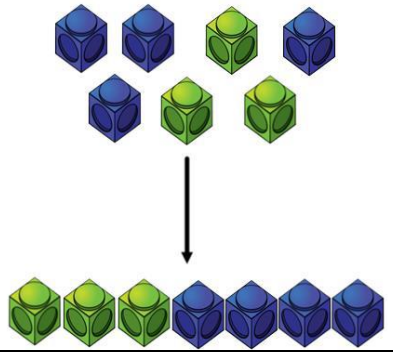
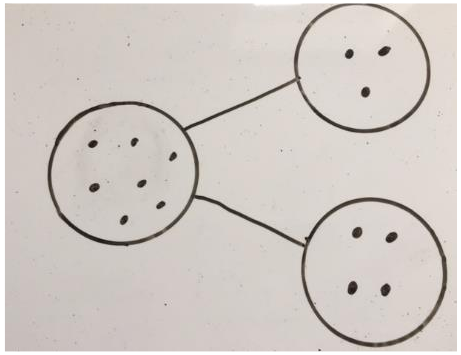
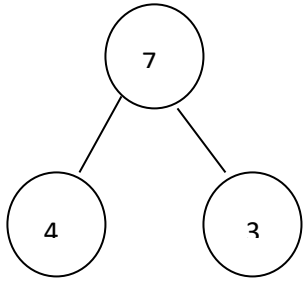
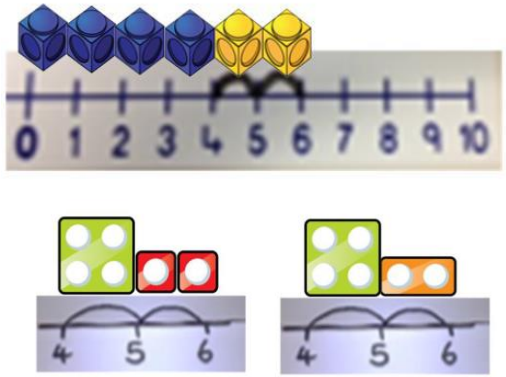
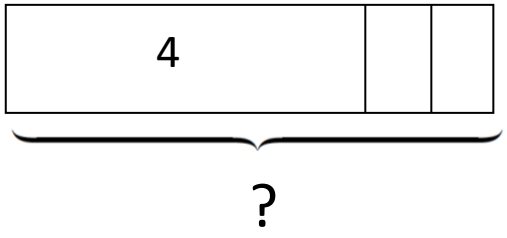
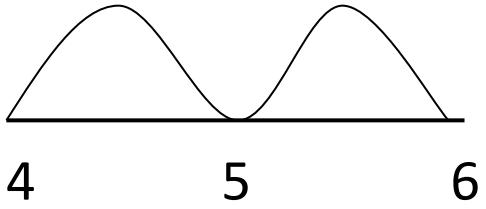
The policy will be reviewed every 3 years.

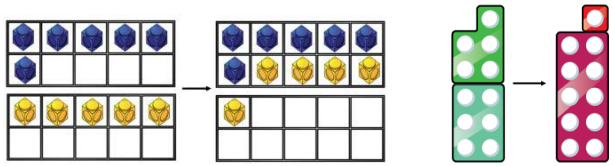
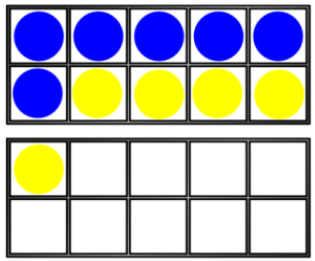
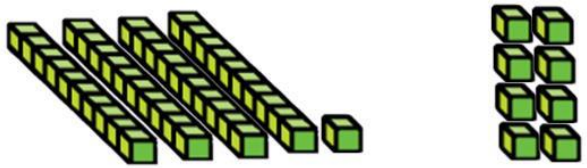
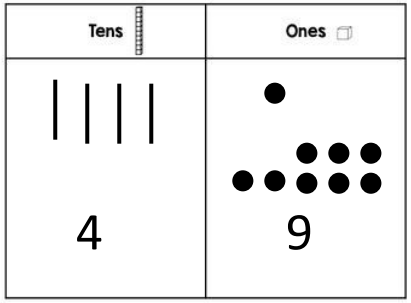
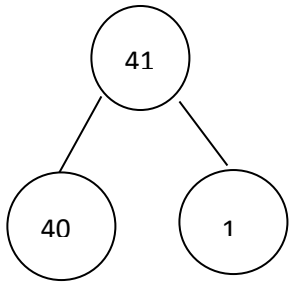
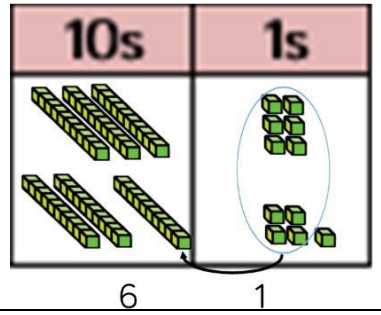
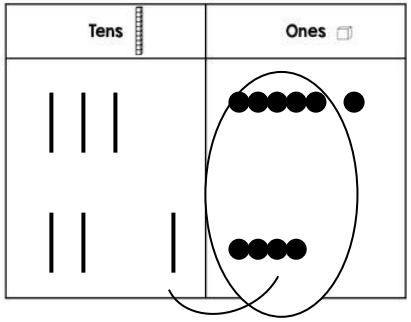
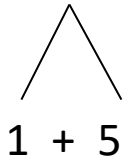
Date of review: September 2023

Date of next review: September 2026

Addition

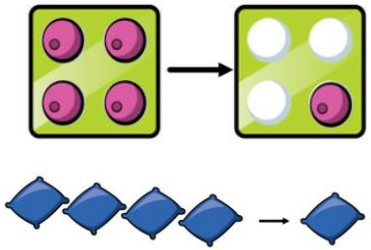
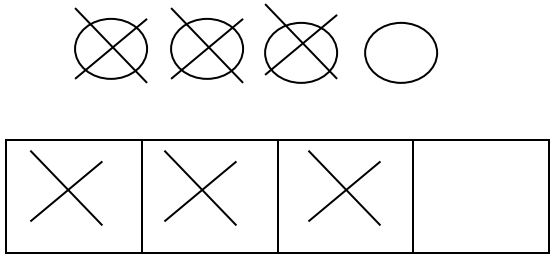
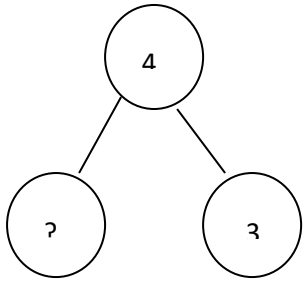
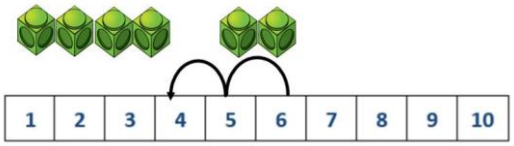
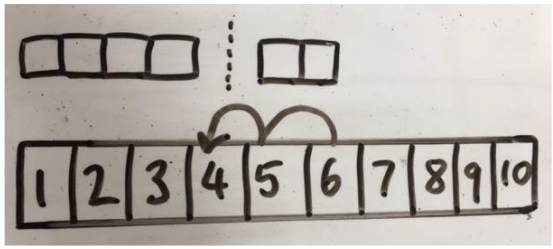
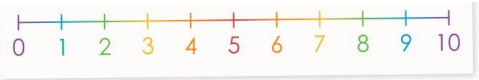
Key language: sum, total, parts and wholes, plus, add, altogether, more, ‘is equal to’ ‘is the same as’.

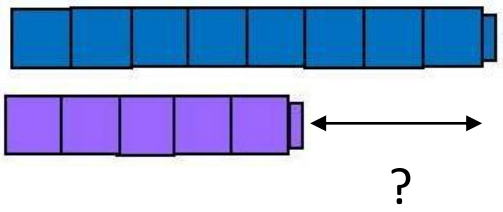
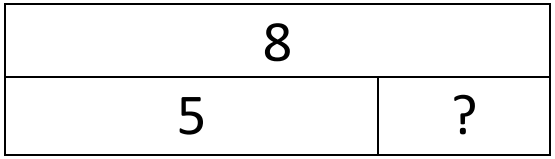
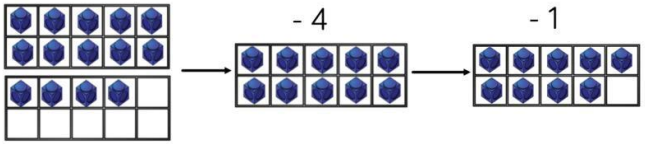
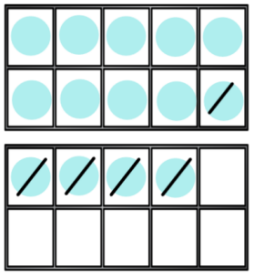
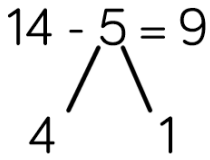
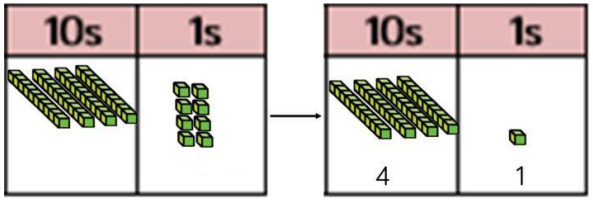
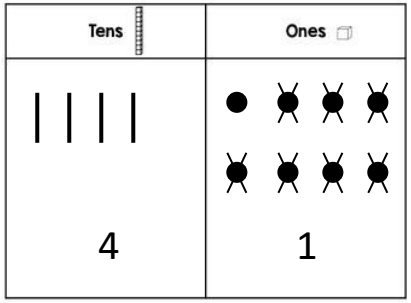
Concrete	Pictorial	Abstract
Combining two parts to make a whole (use other resources too e.g. eggs, shells, teddy bears, cars). 	Children to represent the cubes using dots or crosses. They could put each part on a part whole model too. 	4 + 3 = 7 Four is a part, 3 is a part and the whole is seven. 
Counting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

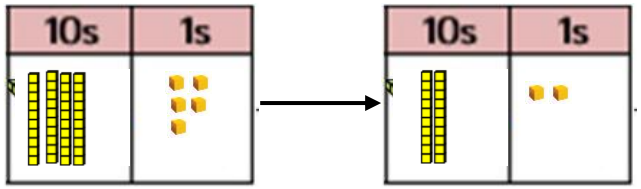
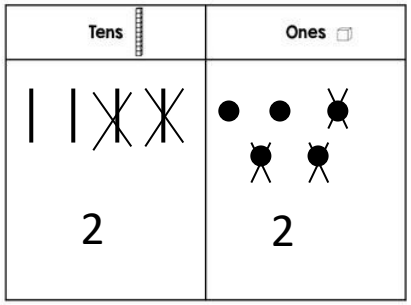
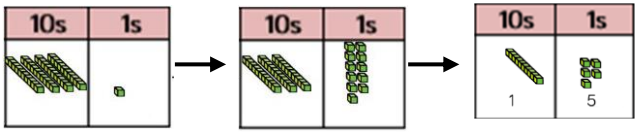
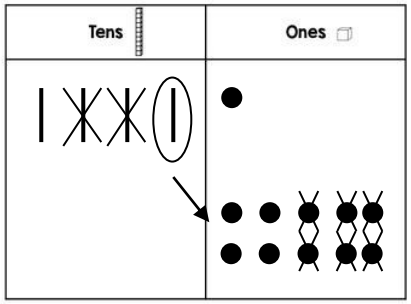
Regrouping to make 10; using ten frames and counters/cubes or using Numicon. 6 + 5 	Children to draw the ten frame and counters/cubes. 	Children to develop an understanding of equality e.g. 6 + □ = 11 6 + 5 = 5 + □ 6 + 5 = □ + 4
Adding a ones number to a two-digit number using base 10. Continue to develop understanding of partitioning and place value. 41 + 8 	Children to represent the base 10 e.g. lines for tens and dot/crosses for ones. 	Partitioning using part, part, whole. 41 + 8  1 + 8 = 9 40 + 9 = 49
Adding a 2-digit number to a 2-digit number using base 10. Continue to develop understanding of partitioning and place value. 36 + 25 	Children to represent the base 10 in a place value chart. 	Looking for ways to make 10. 36 + 25 = 61  30 + 20 = 50 5 + 5 = 10 50 + 10 + 1 = 61 36 + 25 = 61 (t) 30 + 20 = 50 (o) 6 + 5 = 11 (r) 50 + 11 = 61

Subtraction

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

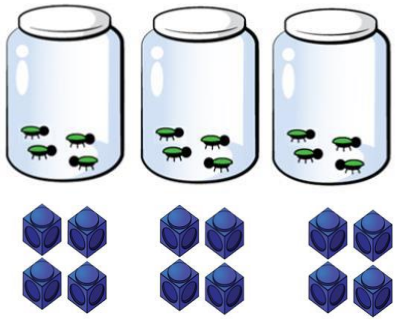
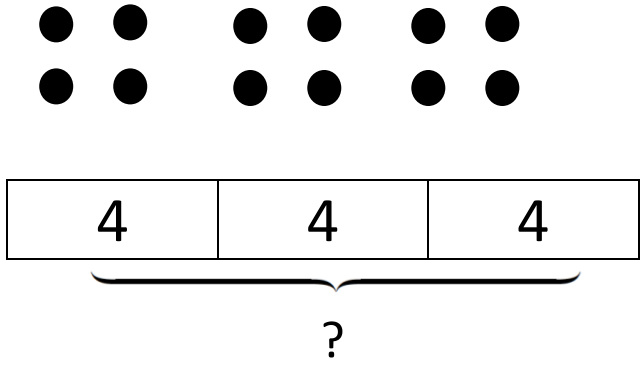
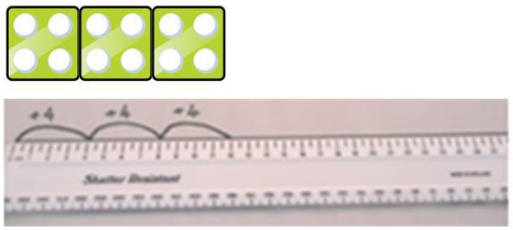
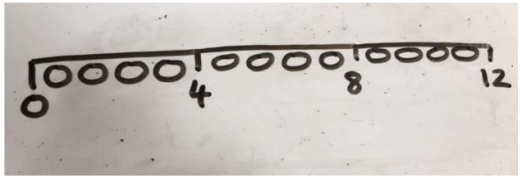
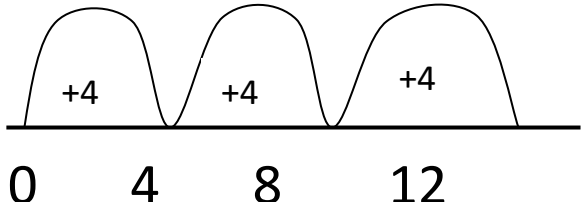
Concrete	Pictorial	Abstract
Physically taking away and removing objects from a whole (ten frames, Numicon, cubes and other items such as beanbags could be used). 4 – 3 = 1 	Children to draw the concrete resources they are using and cross out the correct amount. The bar model can also be used. 	Find the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

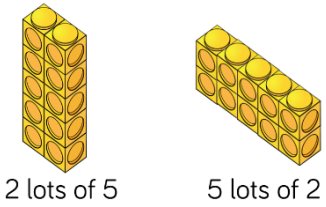
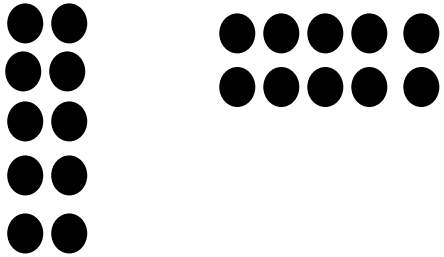
Finding the difference (using cubes, Numicon or Cuisenaire rods, other objects can also be used). Calculate the difference between 8 and 5. 	Children to draw the cubes/other concrete objects which they have used or use the bar model to illustrate what they need to calculate. 	Find the difference between 8 and 5. 8 – 5, the difference is ☐ Children to explore why 9 – 6, 8 – 5 and 7 – 4 have the same difference.
Making 10 using ten frames. 14 – 5 	Children to present the ten frame pictorially and discuss what they did to make 10. 	Children to show how they can make 10 by partitioning the subtrahend.  14 – 4 = 10 10 – 1 = 9
Subtraction a 1-digit number from a 2-digit number using base 10. 48 - 7 	Children to represent the base 10 pictorially. 	Children to count back using a number line or mentally. Encourage the children to use a blank number line. 41, 42, 43, 44, 45, 46, 47, 48

Subtracting a 2-digit number from a 2-digit number using base 10. 45 – 23  	Represent the base 10 pictorially.  	Formal written method, partitioning both numbers and remembering to add the tens and ones together when recombining. 45 – 23 = 22 (t) 40 – 20 = 20 (o) 5 – 3 = 2 (r) 20 + 2 = 22
Subtracting a 2-digit number from a 2-digit number using base 10 and having to exchange. 41 – 26  	Represent the base 10 pictorially, remembering to show the exchange.  	Formal written method, only partitioning the subtrahend. 41 – 26 = 15 (t) 41 – 20 = 21 (o) 21 – 6 = 15

Multiplication

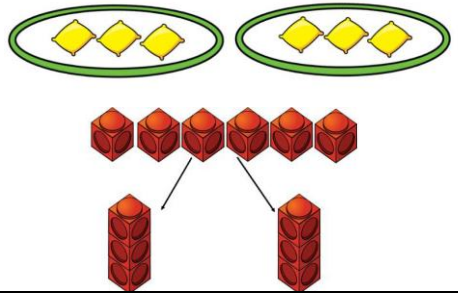
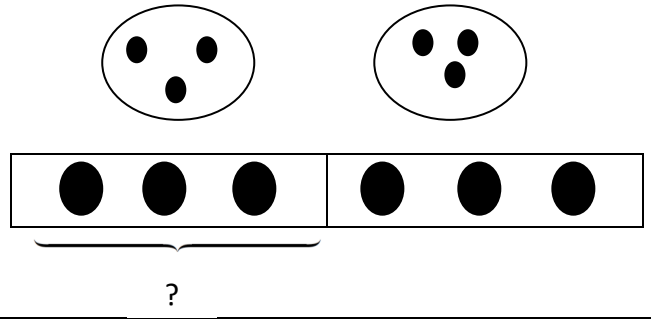
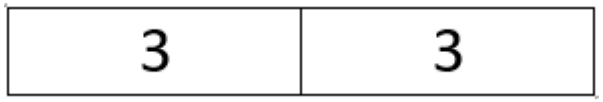
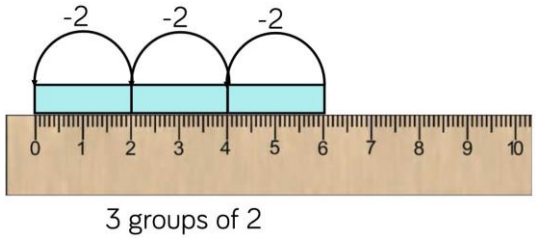
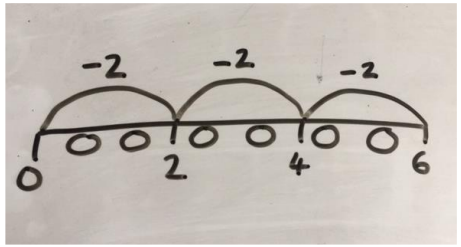
Key language: double, times, multiplied by, the product of, groups of, lots of, equal groups.

Concrete	Pictorial	Abstract
Repeated grouping/repeated addition 3 × 4 4 + 4 + 4 There are 3 equal groups, with 4 in each group. 	Children to represent the practical resources in a picture and use a bar model.  	3 × 4 = 12 4 + 4 + 4 = 12
Number lines to show repeated groups. Numicon and Cuisenaire rods can be used too. 3 × 4 	Represent this pictorially alongside a number line e.g.:  	Abstract number line showing three jumps of four. 3 × 4 = 12 

Use arrays to illustrate commutativity counters and other objects can also be used. 2 × 5 = 5 × 2  	Children to represent the arrays pictorially. 	Children to be able to use an array to write a range of calculations e.g. 10 = 2 × 5 5 × 2 = 10 2 + 2 + 2 + 2 + 2 = 10 10 = 5 + 5

Division

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

Concrete	Pictorial	Abstract
Sharing using a range of objects. 6 ÷ 2 	Represent the sharing pictorially. The bar model could be used here too. 	6 ÷ 2 = 3  Children should also be encouraged to use their 2 times tables facts.
Repeated subtraction using Cuisenaire rods above a ruler. 6 ÷ 2 	Children to represent repeated subtraction pictorially. 	Repeated subtraction on a blank number line to represent the equal groups that have been subtracted.