The Meadows Primary School

KS1 Calculation Policy

Version Control

Version	Date	Purpose	Author
2	27/04/2022	Update of previous policy	L.Heath

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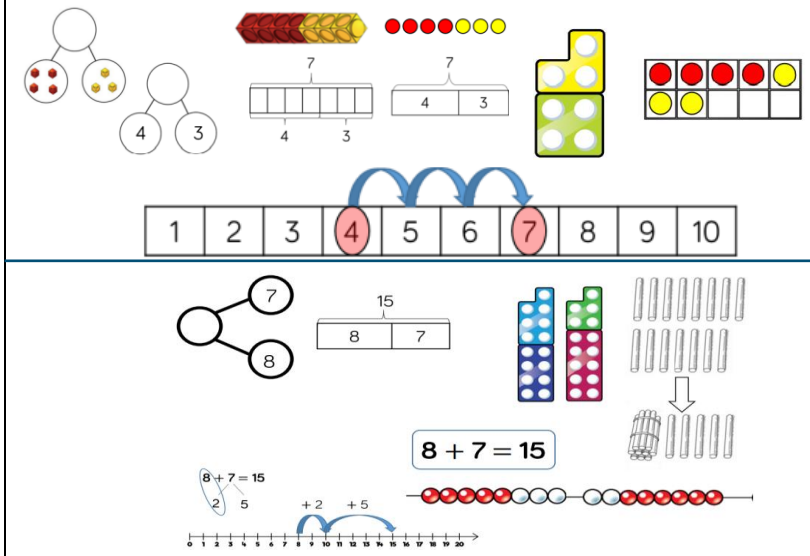
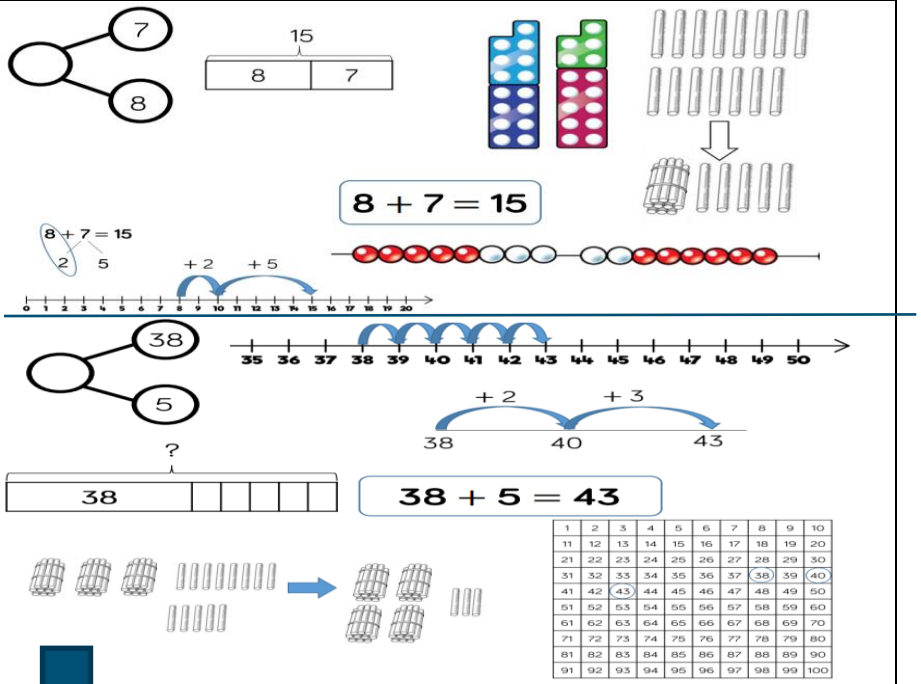
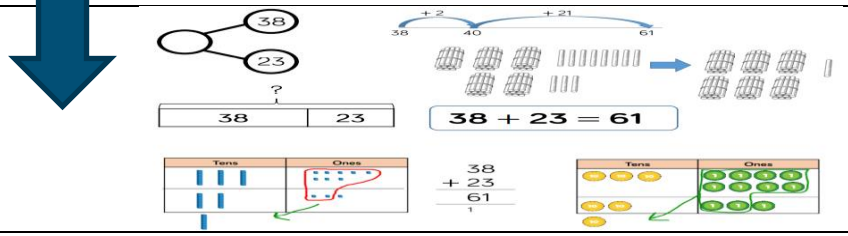
Rationale

At The Meadows we believe in implementing a Calculation Policy which reflects the teaching across school. Our policy shows how we use a specific range of representations consistently to support the conceptual understanding of maths. Mathematical understanding is developed through the use of representations with a Concrete – Pictorial -Abstract approach (CPA).

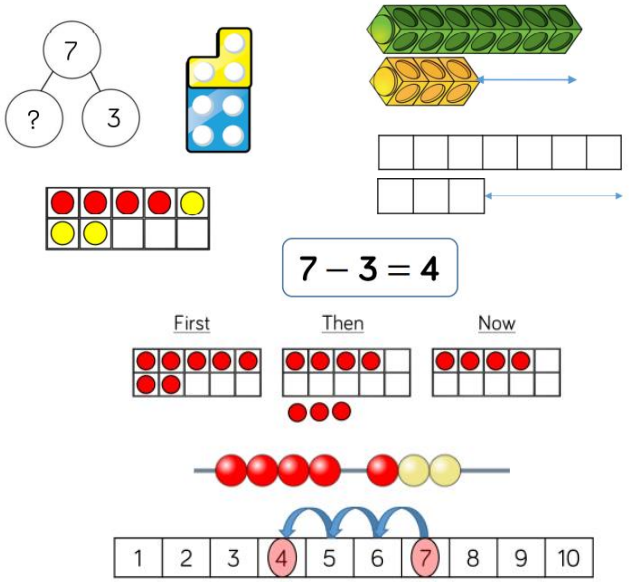
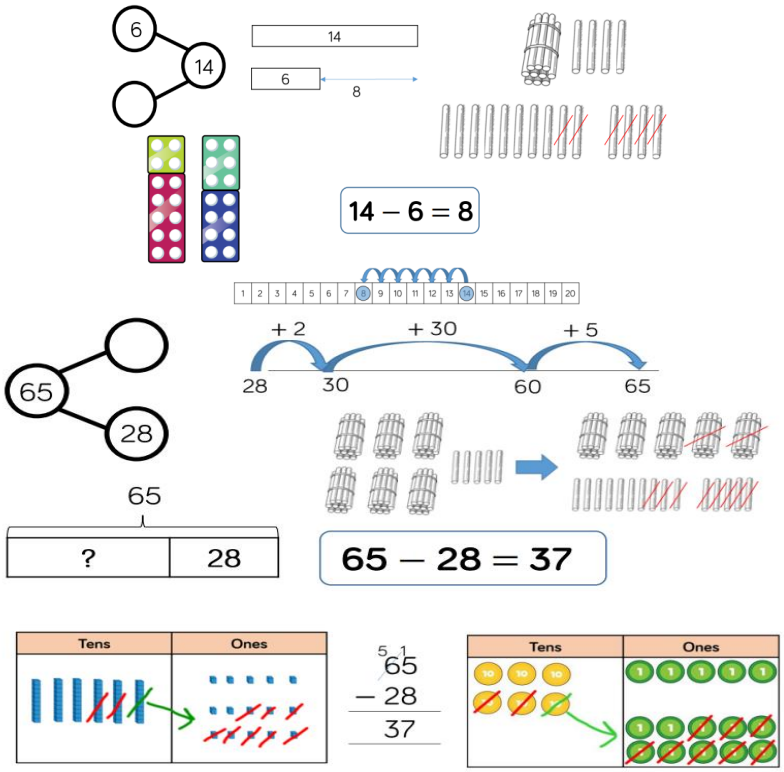
e.g. Concrete (Base 10, Place Value Counters)
Pictorial (Bar Model, Part-Whole diagram)
Abstract (Columnar methods)

We plan our units of work using the White Rose Materials as a firm foundation. This Calculation Policy is in line with their suggested approach of teaching the four operations and we have carefully selected the path our learning journey takes. Each operation is broken down to show models and images which underpin the teaching of calculation in each year group. The representations are consistent and build progressively and can be applied to both written and mental methods.

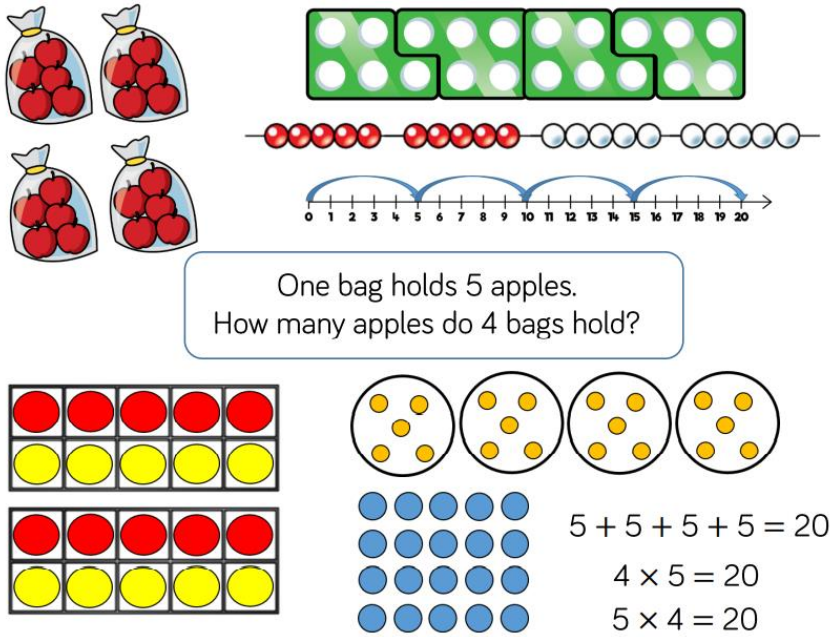
ADDITION

	Year 1	Year 2
NC Objectives	• Given a number, identify one more. • Represent and use number bonds and related subtraction facts within 10 • Read, write and interpret mathematical statements involving addition (+), subtraction (−) and equals (=) signs • Add one digit numbers to10, including zero. • Solve one step problems that involve addition and subtraction, using concrete objects and pictorial representations and missing number problems.	• Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100. • Add and subtract numbers using concrete objects, pictorial representations, and mentally, including: -a two-digit number and ones; -a two-digit number and tens; -two two-digit numbers; -adding three one-digit numbers. • Demonstrate the commutative law of addition • Recognise and use the inverse relationship between +/- and use this to check calculations and solve missing number problems
Supporting Concrete & Pictorial Representations		
New Vocabulary	Number bonds, Number line Add, more, plus, make, sum, total, altogether Inverse Double, Near double, Half, Halve Equals, is the same as (including equals sign) Difference between *How many more to make…? How many more is … than …? How much more is …?*	

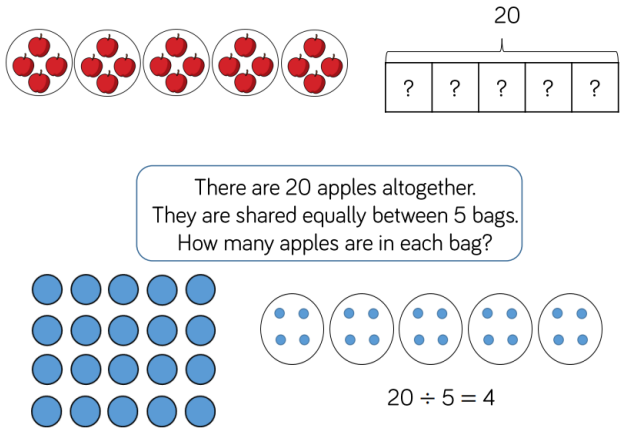
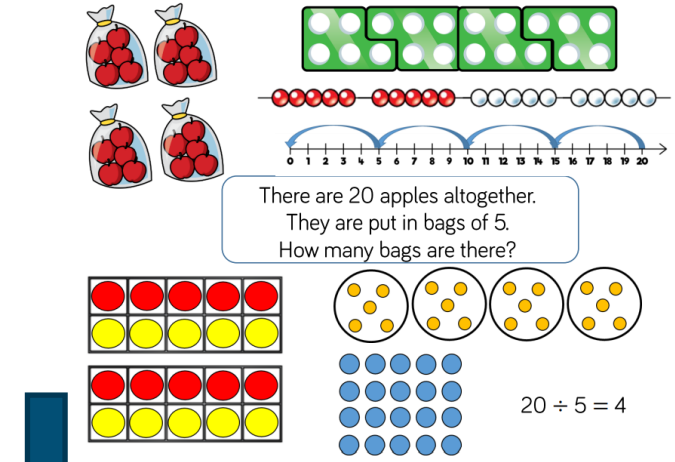
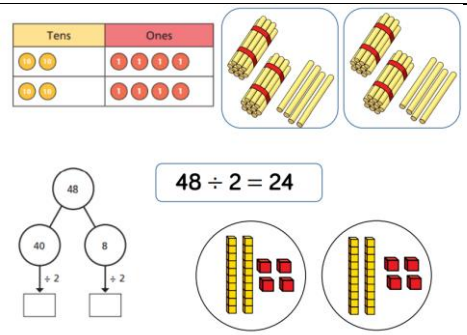
SUBTRACTION

	Year 1	Year 2
NC Objective	• Given a number, identify one less • Represent and use number bonds and related subtraction facts within 10 • Read, write and interpret mathematical statements involving addition (+), subtraction (−) and equals (=) signs. • Subtract one digit numbers to10, including zero. • Solve one step problems that involve +/-, using concrete objects and pictorial representations and missing number problems.	• Add and subtract numbers using concrete objects, pictorial representations, and mentally, including: - a two-digit number and ones; - a two-digit number and tens; - two two-digit numbers; - adding three one-digit numbers.
Supporting Concrete & Pictorial Representations		
New Vocabulary	Number bonds, Number line, Inverse Take away, Minus, Difference, Difference between *How many fewer is … than …? How much less is …?*	

MULTIPLICATION

	Year 1	Year 2
NC Objective	• Solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with support of the teacher • Count in multiples of twos, fives and tens (with equipment/supportive resources)	• Recall and use multiplication and division facts for the 2,5,10 tables • Recognise odd and even numbers • Show that multiplication of two numbers can be done in any order (commutative) • Calculate mathematical statements for multiplication and division and record with x, ÷ and = signs • Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, multiplication facts including problems in context
Supporting Concrete & Pictorial Representations		
New Vocabulary	Odd, even Count in twos, threes, fives, tens.. (forwards/backwards from) *How many times?* Lots of, groups of, Equal groups of Once, twice, three times, five times Multiple of, times, multiply, multiply by Repeated addition, Double Array, row, column	

DIVISION

	Year 1	Year 2
NC Objective	• Solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with support of the teacher	• Recall and use multiplication and division facts for the 2,5,10 multiplication tables • Recognise odd and even numbers • Show that multiplication of two numbers can be done in any order (commutative) • Calculate mathematical statements for multiplication and division and record with x, ÷ and = signs • Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, multiplication facts including problems in context
Supporting Concrete & Pictorial Representations	**SHARING** 	**GROUPING** 
New Vocabulary	Odd, even, Double, Halve Share, share equally Group in pairs, threes, fives etc Equal groups of Divide, divided by, left, left over	

KEY SKILLS

We have identified the following areas as important key skills which the children need to be fully secure in identifying, retrieving and calculating. These should be regularly visited, built into planning and links made throughout lessons.

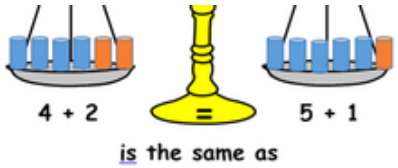
Fact families +/- x/÷ (six facts)

4 + 3 = 7	7 = 4 + 3	7 – 4 = 3
3 + 4 = 7	7 = 3 + 4	7 – 3 = 4

4 x 3 = 12	12 = 4 x 3	12 ÷ 3 = 4
3 x 4 = 12	12 = 3 x 4	12 ÷ 4 = 3

Exploit opportunities to link commutative aspects –
i.e. *if I know that 4+3 = 7, I also know that 3+4 = 7*

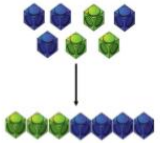
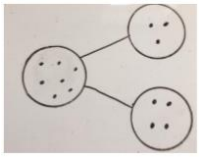
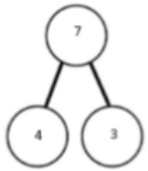
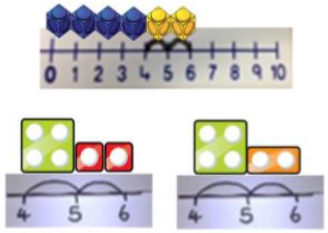
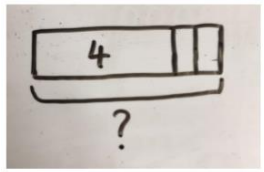
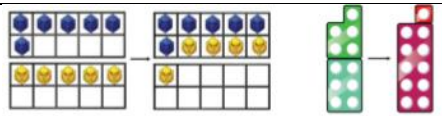
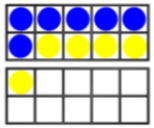
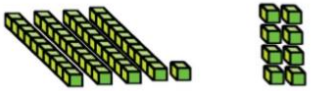
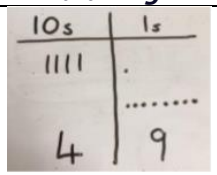
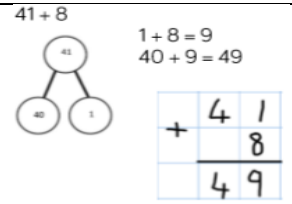
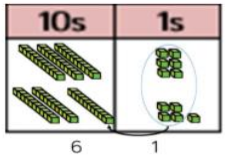
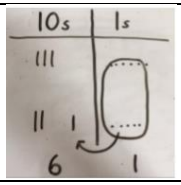
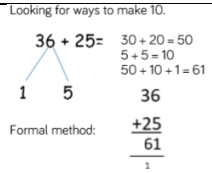
Balance Equations

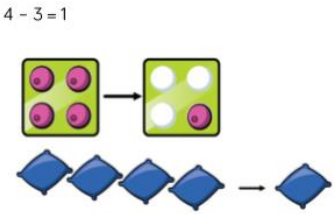
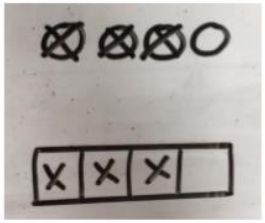
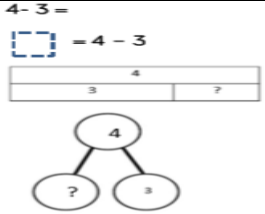
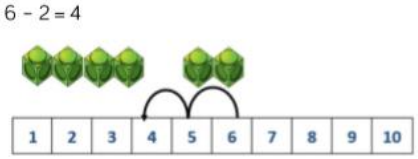
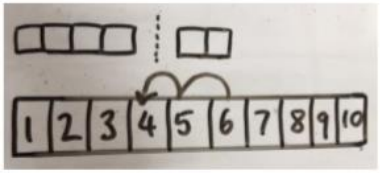
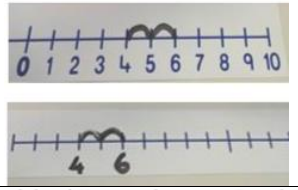
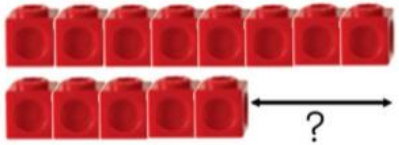
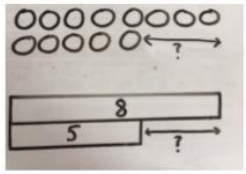


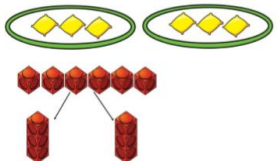
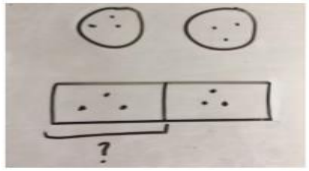
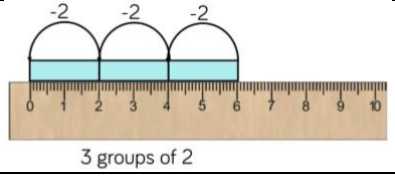
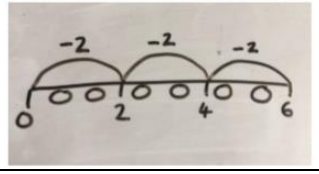
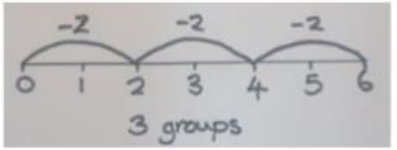
Missing Number Equations

$\square + 8 = 20$ $\quad 98 - \square = 28$ $\quad \square \times \square = 25$

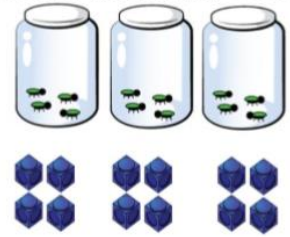
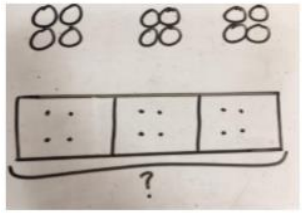
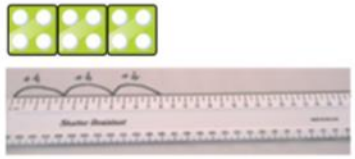
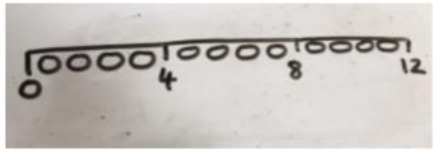
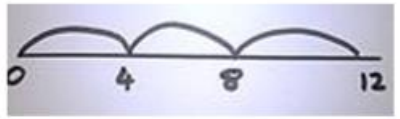
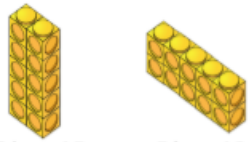
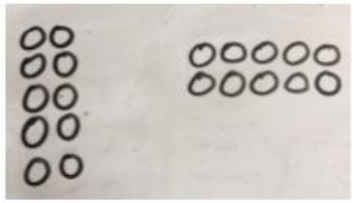
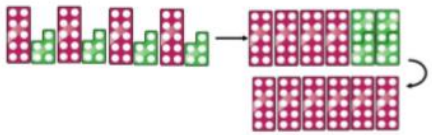
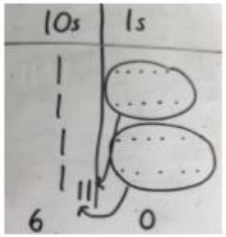
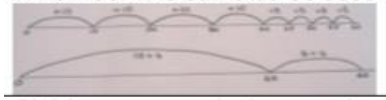
CONCRETE - PICTORIAL - ABSTRACT

ADDITION	CONCRETE	PICTORIAL	ABSTRACT
Combining two parts to make a whole *Use a range of concrete resources – cubes, counters, shells.*		 ***Represent on P-W diagram using different formats such as numbers, dots, numerical images, resources***	
Counting on using Number Line *Use range of concrete resources such as cubes or numicon.* *Use Bar models to count on.* *Abstract number line with questioning such as What is total of 4 and 2?*			 ***What is the total of 4 and 2? What is 2 more than 4? What is the sum of 4 and 2?***
Regrouping to make 10 *Using ten frames/counters/cubes and/or numicon*		 ***Children represent themselves by drawing***	$6 + \square = 11$ $6 + 5 = 5 + \square$ $6 + 5 = \square + 4$ ***Children develop an understanding of equality***
TO + O using base 10 *Continue to develop understanding of partitioning and PV e.g. 41 + 8* *Use of lines/dots/dashes to represent base 10*			
TO + TO using base 10 *Continue to develop understanding of partitioning and PV e.g. 36 + 25*			

SUBTRACTION	CONCRETE	PICTORIAL	ABSTRACT
Physically taking away and removing objects from a whole			
Counting back *using number lines or number tracks* *Eventually move onto an empty number line (abstract)*			
Finding the difference *Use a range of resources e.g. cubes, Cuisenarie Rods*			Find the difference between 8 and 5. 8 – 5, the difference is ☐ Children to explore why 9 - 6 = 8 – 5 = 7 – 4 have the same difference.

DIVISION	CONCRETE	PICTORIAL	ABSTRACT
Sharing			6 ÷ 2 = 3 3 | 3 ***Children should be encouraged to use their x2 table facts***
Repeated subtraction *e.g. using Cuisenaire rods above a ruler*			

CONCRETE - PICTORIAL - ABSTRACT

MULTIPLICATION	CONCRETE	PICTORIAL	ABSTRACT
Repeated grouping/addition	3 × 4 4 + 4 + 4 There are 3 equal groups, with 4 in each group. 		3 × 4 = 12 4 + 4 + 4 = 12
Number lines to show repeated groups	Number lines to show repeated groups- 3 × 4 		3 × 4 = 12 
Use arrays to illustrate commutativity	2 × 5 = 5 × 2 		10 = 2 × 5 5 × 2 = 10 2 + 2 + 2 + 2 + 2 = 10 10 = 5 + 5 ***Children able to use an array to write a range of calculations***
Partition to multiply	4 × 15 		4 × 15 10 5 10 × 4 = 40 5 × 4 = 20 40 + 20 = 60 A number line can also be used