Maths

Calculation Policy

2023
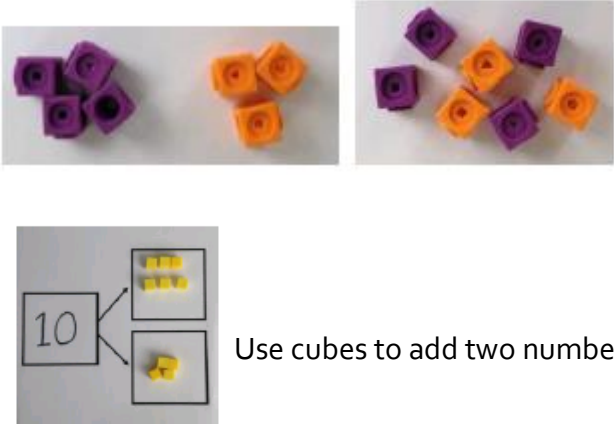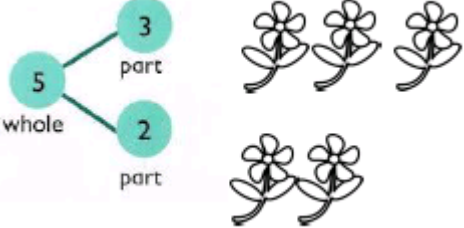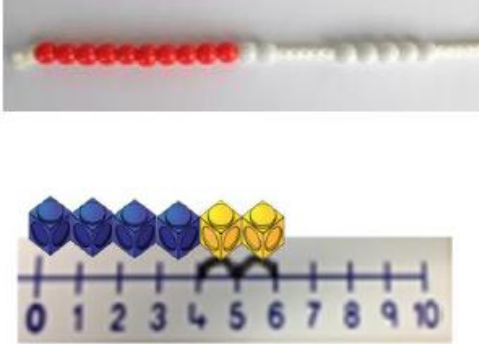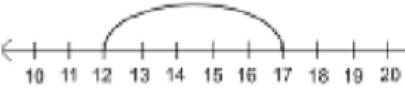

'Enjoy, Explore and Learn'

This document has been largely adapted from White Rose calculation Policy. It is a working document and will be revised and amended as necessary.

EYFS will use concrete resources and pictorial representations to teach the following objectives.		
Addition - EYFS		
Objective and strategy	Concrete	Pictorial
Combining 2 parts to make a whole Use a variety of resources e.g. shells, teddy bears, cars. Part-whole models	 Use cubes to add two numbers together. Use part part whole model	 Use pictures to add two numbers together.
Counting on	 Start with the larger number and count on 1 by 1 to find the answer.	 Start at the larger number and count on in ones to find the answer.

Regrouping to make 10 Using a ten frames and counters/cubes or numicon.	6 + 5	This objective is only taught using concrete manipulatives unless pupils are ready.

In addition to building on strategies from EYFS, children in Year 1 will be taught addition in the following ways.

Addition - Year 1

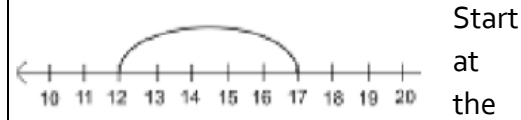| Objective and strategy	Concrete	Pictorial	Abstract
Combining 2 parts to make a whole Use a variety of resources e.g. shells, teddy bears, cars. Part-whole models	 Use part part whole model. Use cubes to add two numbers together as a group or in a bar. 10	 Use pictures to add two numbers together as a group or in a bar. 8	1	4 + 3 = 7 Four is a part, 3 is a part and the whole is seven. 7 4 3 Use the part-part whole diagram to move into the abstract.
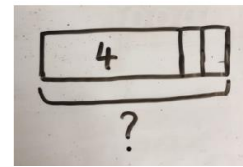
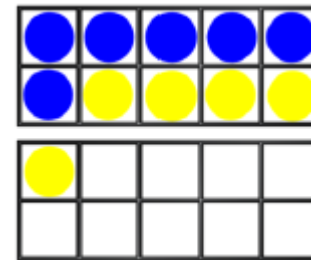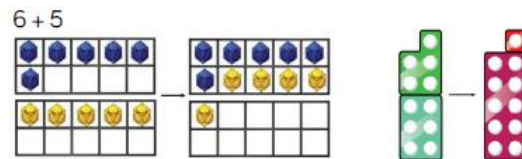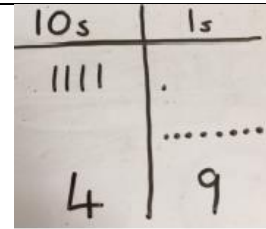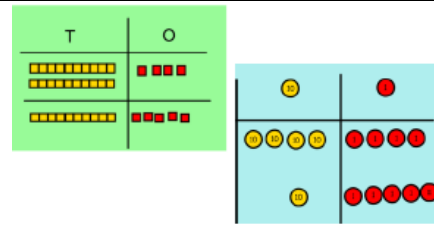| **Counting on**	Start with the larger number and count on 1 by 1 to find the answer	A bar model encouraging pupils to count on, rather than count all. Start at the larger number and count on in ones or in one jump to find the answer.	The abstract number line: What is 2 more than 4? What is the sum of 4 and 2? What is the total of 4 and 2? 4+2=Place the larger number in your head and count on the smaller number
Regrouping to make 10 Using a ten frames and counters/cubes or numicon.	$6+5$	Children to draw the tens frames and counters/cubes	$6 + \square = 11$ $6 + 5 = 5 + \square$ $6 + 5 = \square + 4$ $11 = 6 + \quad \square$

| | | | Children to develop an understanding of equality. |
| | | | |

In addition to building on strategies from Year1, children in Year 2 will be taught addition in the following ways.

Addition Year 2

| Adding 3 single digits | 4 + 7 + 6= 17
Put 4 and 6 together to make 10. Add on 7.
 |
Add together three groups of objects. Draw a picture to recombine the groups to make 10. | $4 + 7 + 6 = \boxed{10} + \boxed{7}$
10
$= \boxed{17}$
Combine the two numbers that make 10 and then add on the remainder. |
| Use of base 10 to combine two numbers

Two digit + 1 digit | $41 + 8$
 | | $41 + 8$
$1 + 8 = 9$
$40 + 9 = 49$

$\begin{array}{r} 4\,1 \\ +\,8 \\ \hline 4\,9 \end{array}$ |

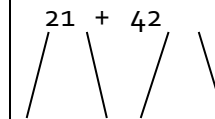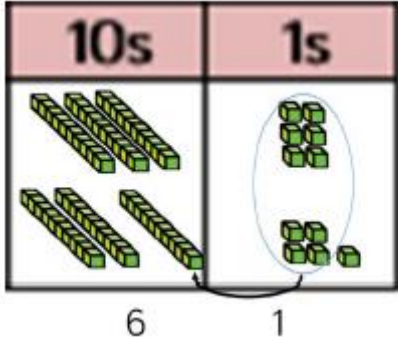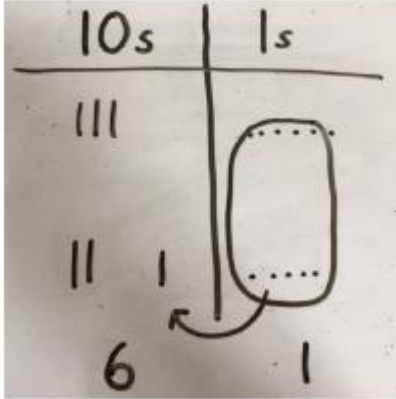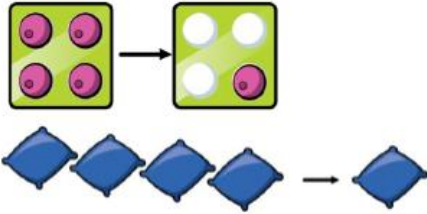|			
		  Children to represent the base 10 with lines for tens and dots for ones.	
Use of base 10 to combine two numbers Two digit + 2 digit	Add together the ones and then add the tens. Use base 10 blocks before moving onto place value counters.	Children represent the base 10 in a place value chart with lines and dots as before.	21 + 42 20 1 40 2 20+40=60 2+1=3 60+3=63 21 + 42 = 21 + 42
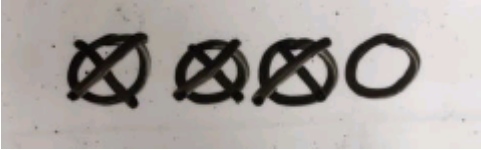
Two digit and 2 digit with regrouping	36 + 25 = 6 1	Children to represent the base 10 in a place value chart.	Looking for ways to make 10. 36 + 25= 30 + 20 = 5 + 5 = 10 50 + 10 + 1 5 Formal method: $$36 \\ +25 \\ \overline{61}$$ 1

Subtraction - EYFS

	Concrete		Pictorial
Taking away ones	Physically taking away and away and removing objects from a whole (ten frames, Numicon, cubes and other items should be used)		Children draw the concrete resources they are using and cross out the correct amount.
Counting back	Using number lines or number tracks children, children start with 6 and count back 2.		Children to represent what they see pictorially e.g.
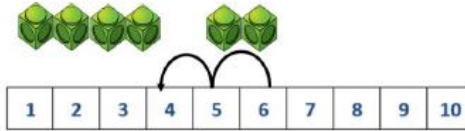
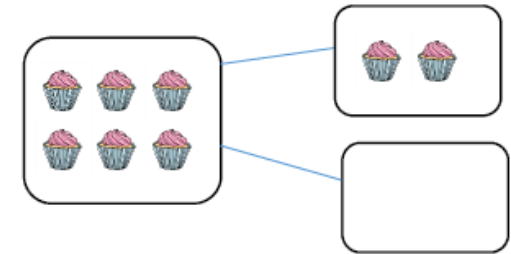|		
	6 – 2 = 4	
Part whole model	Link to addition- use the part whole model to help explain the inverse between addition and subtraction. If 10 is the whole and 6 is one of the parts. What is the other part? 10 - 6 =	Use a pictorial representation of objects to show the part whole model.
Making 10 Using a ten frame	14 – 5	This objective is only taught using concrete manipulatives unless pupils are ready.
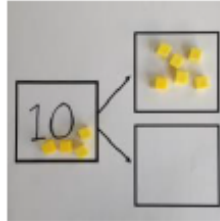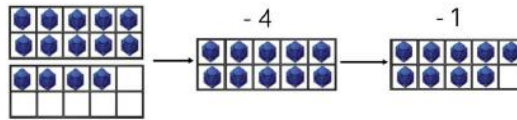
In addition to building on strategies from EYFS, children in Year 1 will be taught subtraction in the following ways.
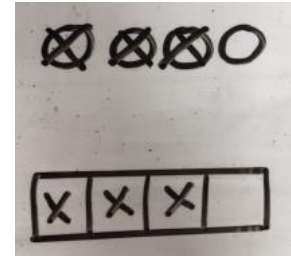
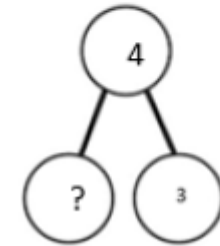## Subtraction - Year 1
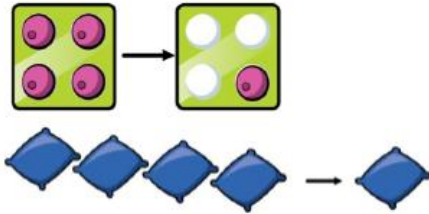
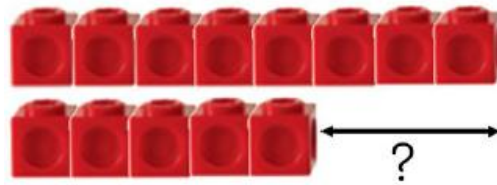| Taking away ones	 Physically taking away and away and removing objects from a whole (ten frames, Numicon, cubes and other items should be used)	Children draw the concrete resources they are using and cross out the correct amount. The bar model can also be used.	$4 - 3 =$ $\boxed{} = 4 - 3$
Counting back	Using number lines or number tracks children, children start with 6 and count back 2. $6 - 2 = 4$ 	Children to represent what they see pictorially e.g. 	Children to represent the calculation on a number line or number track and show the jumps. Encourage children to use an empty number line.
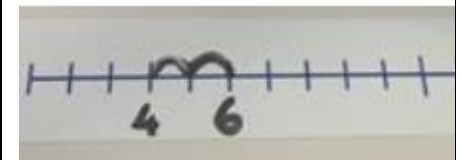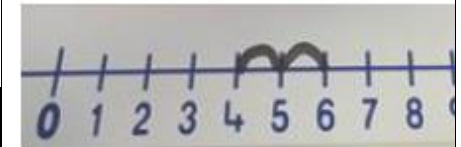
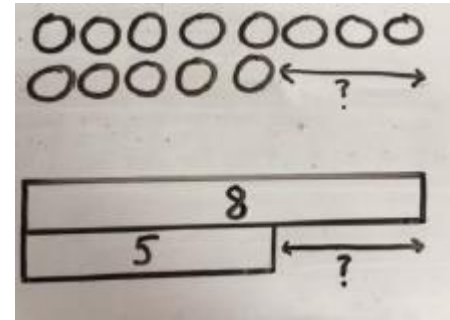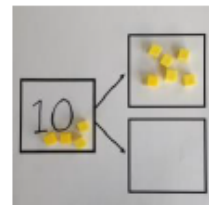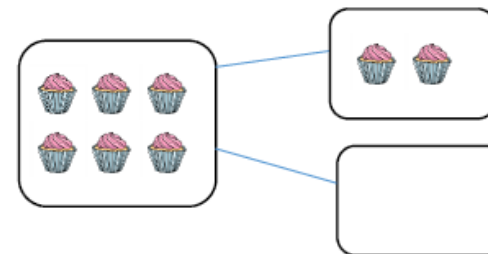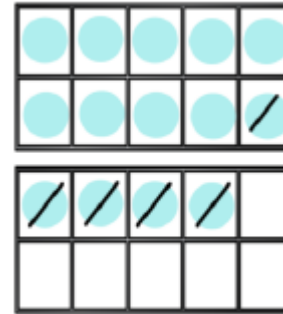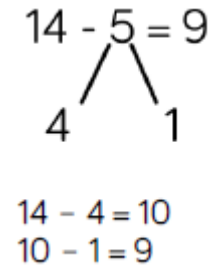| Find the difference			
Find the difference Using cubes, Numicon and other objects	Calculate the difference between 8 and 5. 	Children to draw the cubes/concrete objects that they have used. Use the bar model to illustrate what they need to calculate. 	Find the difference between 8 and 5. 8 – 5, the difference is ? Children to explore why 9-6=8-5=7-4 have the same difference. Hannah has 23 sandwiches. Helen has 15 sandwiches. Find the difference between the number of sandwiches.
Part whole model	 Link to addition- use the part whole model to help explain the inverse between addition and subtraction. If 10 is the whole and 6 is one of the parts. What is the other part? 10 - 6 =	Use a pictorial representation of objects to show the part whole model. 	 Move to using numbers within the part whole model.
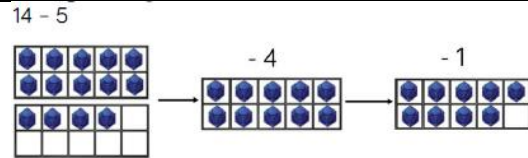
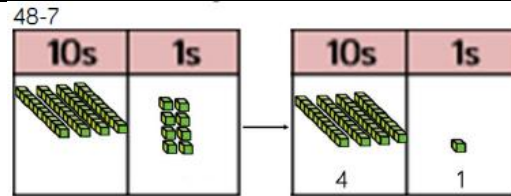|			
Making 10 Using a ten frame	14 – 5 	Children to present the ten frame pictorially and discuss what they did to make 10. 	Children to show how thay can make 10 by partitioning. $14 - 5 = 9$ 4 1 $14 - 4 = 10$ $10 - 1 = 9$

In addition to building on strategies from Year1, children in Year 2 will be taught subtraction in the following ways.
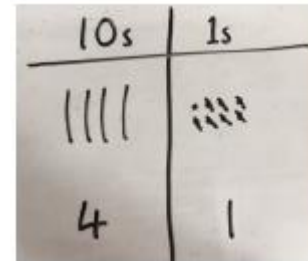
Subtraction – Year 2

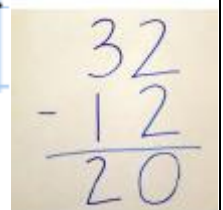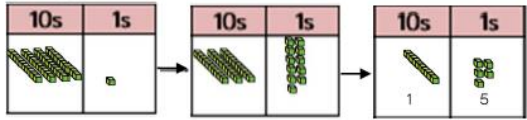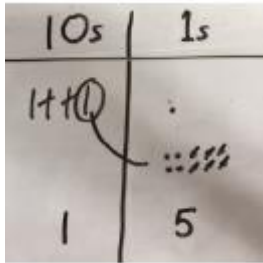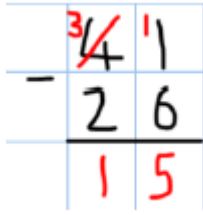|			
Use of base 10 2 digit subtract 1 digit and 2 digit subtract 2 digit without an exchange.	48-7 36 – 14 = 22 Show how you partition numbers to subtract. Make the larger number first.	Children to represent the base 10 pictorially. 	Column method or children could count count back 7. 4 8 - 7 4 1 32 - 1 2 2 0
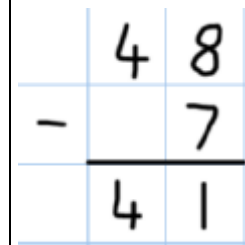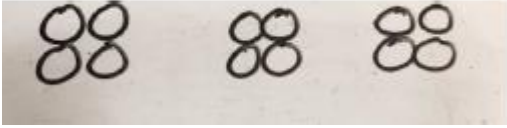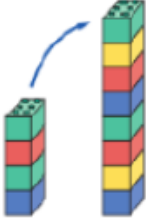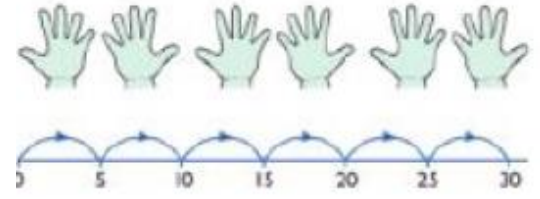
Use of base 10 With an exchange	41 – 26 	Represent the base 10 pictorially, remembering to show the exchange. 	Formal column method. Children must understand what has happened when they have crossed out digits.

Multiplication - EYFS

	Concrete	Pictorial
Recognising and making equal groups. Only in 2's, 5's and 10's.	There are 4 equal groups with 2 in each group. 2,4,6,8 There are 8 altogether 	 Children to represent the practical resources in a picture. Counting in 2's, 5's and 10's.

Doubling	Use practical activites to show how to double a number.	Draw pictures to show how to double a number
		Double 4 is 8
Counting in multiples. Use cubes, Numicon and other objects in the classroom. Only in 2's, 5's and 10's.	Count in multiples supported by concrete objects in equal groups 	Use a number line or pictures to continue support when counting in multiples of 2, 5 and 10.

In addition to building on strategies from EYFS, children in Year 1 will be taught multplication in the following ways.

Multiplication -Year 1

Recognising and making equal groups.	There are 3 equal groups, with 4 in each group.	Children to represent the practical resources in a picture.	4+4+4=12
Doubling	Use practical activites to show how to double a number.	Double 4 is 8 Draw pictures to show how to double a number.	Learn double facts and record as a number sentence.
Counting in multiples. Use cubes, Numicon and other objects in the classroom.	Count in multiples supported by concrete objects in equal groups.	Use a number line or pictures to continue support when counting in multiples.	Count multiples of a number aloud. Write sequences with multiples of numbers. 2,4,6,8.10 5,10,15,20,25
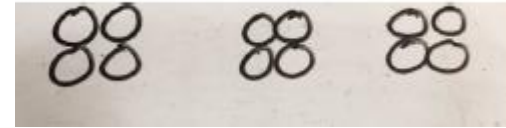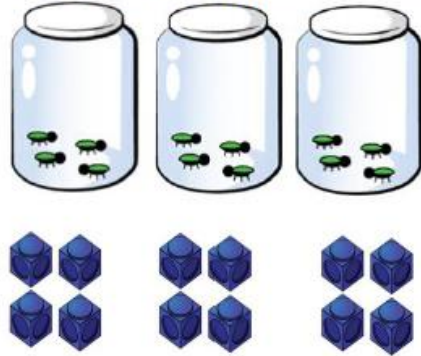
In addition to building on strategies from Year1, children in Year 2 will be taught multiplication in the following ways.			

Multiplication – Year 2

Repeated grouping/ repeated addition	3×4 $4 + 4 + 4$ There are 3 equal groups, with 4 in each group. Number lines to show repeated groups 3×4 	Children represent the practical resources in a picture and use a bar model. Represent this pictorially alongside a numberline.	$3 \times 4 = 12$ $4 + 4 + 4 = 12$ Abstract number line showing 3 groups of 4 $3 \times 4 = 12$
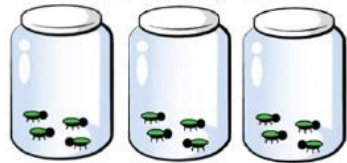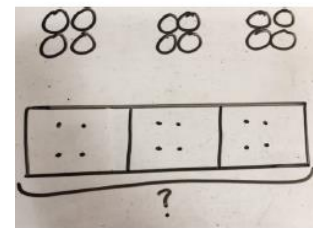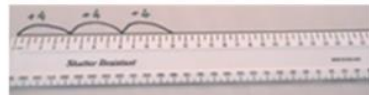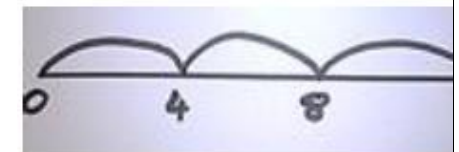
Arrays showing commutative multiplication	$2 \times 5 = 5 \times 2$ 2 lots of 5 5 lots of 2	Children to represent the arrays pictorially.	Children to be able to use an array to write a range of calculations e.g. 10=2X5 5X2=10 2+2+2+2+2=10 10=5+5
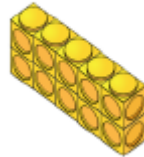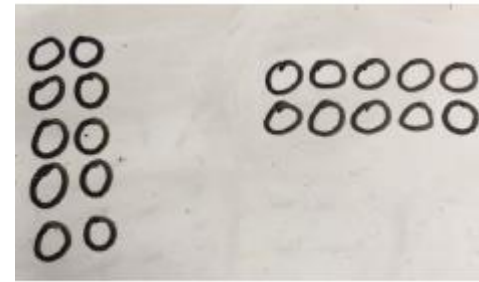
Division- EYFS

	Concrete	Pictorial
Sharing objects into groups.	Sharing using a range of objects.	Represent the sharing pictorially.
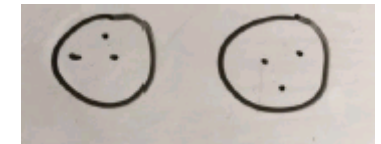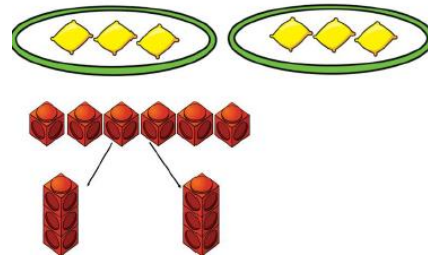
| Division as grouping | Divide quantities into equal groups. Use cubes, counters and other objects. | This objective is only taught using concrete manipulatives unless pupils are ready. |
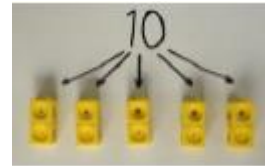
In addition to building on strategies from EYFS, children in Year 1 will be taught division in the following ways.

Division- Year 1
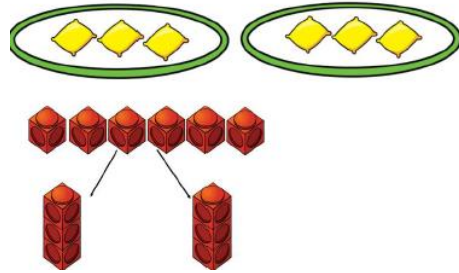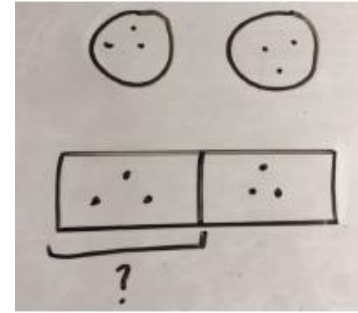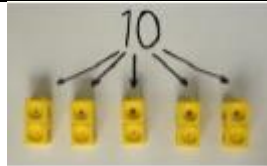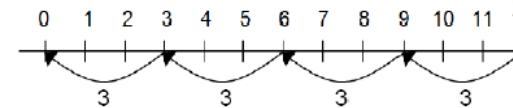
Sharing objects into groups.		Sharing using a range of objects		
			Represent the sharing pictorially.	
Division as grouping	 Divide quantities into equal groups. Use cubes, counters and other objects.		 Use a number line to show jumps in groups.	I have 12 groups and I put them into groups of 3. How many groups?

In addition to building on strategies from Year1, children in Year 2 will be taught division in the following ways.

Division-Year 2

Division as grouping	Divide quantities into equal groups. Use cubes, counters, objects or place value counters to aid understanding. 96 ÷ 3 = 32	Use a number line to show jumps in groups. Think of the bar as a whole. Split it into the number of groups you are dividing by and work out how many would be in each group. 20÷5=? 5x?=20	28÷7=4 Divide 28 into 7 equal groups. How many are in each group?
Division linked to arrays	Link division to multiplication by creating an array and thinking	Draw an array and use it to make multiplication and division nymber sentences.	Find the inverse of multiplication and division sentences by creating 4 linking number sentences.
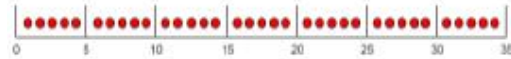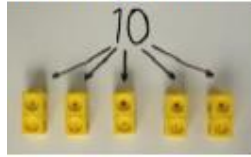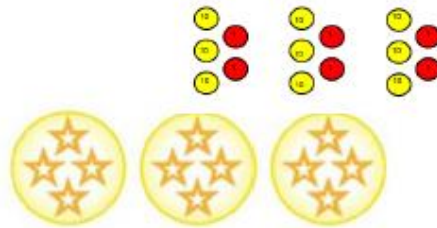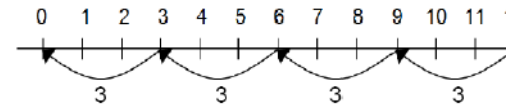
	about the number sentences that can be created.

E.g. 15÷3=5

15÷5=3

5x3=15

3x5=15 | 2x5=10
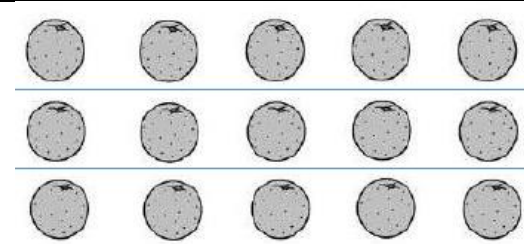
5x2=10

10÷5=2

10÷2=5 |
| **Repeated subtraction** | 3 groups of 2

6÷2=3 | Children to represent repeated subtraction pictorially | Abstract number line to represent the equal groups that have been subtracted.

3 groups |
| **Division with a remainder**

2 digit ÷ 1 digit | 13÷4=

Use of lollipop sticks to form wholes- squares are made because we are dividing by 4.

There are 3 whole squares, with 1 left over. | Children to represent the lollipop sticks pictorially. | 13÷4=3 remainder 1

Children should be encouraged to use their timestable facts and

can also represent this on a numberline. |

Addition and Subtraction Skills by year group:

Skill: Add 1-digit numbers within 10	Year: 1

When adding numbers to 10, children can explore both aggregation and augmentation.

The part-whole model, discrete and continuous bar model, number shapes and ten frame support aggregation.

The combination bar model, ten frame, bead string and number track all support augmentation.

$4 + 3 = 7$

Skill: Add 1 and 2-digit numbers to 20	Year: 1/2

When adding one-digit numbers that cross 10, it is important to highlight the importance of ten ones equalling one ten.

Different manipulatives can be used to represent this exchange. Use concrete resources alongside number lines to support children in understanding how to partition their jumps.

$8 + 7 = 15$

Skill: Add three 1-digit numbers	Year: 2

When adding three 1-digit numbers, children should be encouraged to look for number bonds to 10 or doubles to add the numbers more efficiently.

This supports children in their understanding of commutativity.

Manipulatives that highlight number bonds to 10 are effective when adding three 1-digit numbers.

$7 + 6 + 3 = 16$

Skill: Add 1-digit and 2-digit numbers to 100	Year: 2/3

When adding single digits to a two-digit number, children should be encouraged to count on from the larger number.

They should also apply their knowledge of number bonds to add more efficiently e.g. $8 + 5 = 13$ so $38 + 5 = 43$.

Hundred squares and straws can support children to find the number bond to 10.

$38 + 5 = 43$

Skill: Add two 2-digit numbers to 100	Year: 2/3

$38 + 23 = 61$

$$\begin{array}{r} 38 \\ + 23 \\ \hline 61 \\ {\scriptstyle 1} \end{array}$$

Tens	Ones

At this stage, encourage children to use the formal column method when calculating alongside straws, base 10 or place value counters. As numbers become larger, straws become less efficient.

Children can also use a blank number line to count on to find the total. Encourage them to jump to multiples of 10 to become more efficient.

Skill: Subtract 1-digit numbers within 10	Year: 1

$7 - 3 = 4$

Part-whole models, bar models, ten frames and number shapes support partitioning.

Ten frames, number tracks, single bar models and bead strings support reduction.

Cubes and bar models with two bars can support finding the difference.

Skill: Subtract 1 and 2-digit numbers to 20	Year: 1/2

$14 - 6 = 8$

$14 - 6 = 8$

$14 - 6 = 8$

When subtracting one-digit numbers that cross 10, it is important to highlight the importance of ten ones equalling one ten.

Children should be encouraged to find the number bond to 10 when partitioning the subtracted number. Ten frames, number shapes and number lines are particularly useful for this.

Skill: Subtract 1 and 2-digit numbers to 100	Year: 2

$65 - 28 = 37$

Tens	Ones

$$\begin{array}{r} {\scriptstyle 5}\,{\scriptstyle 1} \\ 65 \\ - 28 \\ \hline 37 \end{array}$$

Tens	Ones

At this stage, encourage children to use the formal column method when calculating alongside straws, base 10 or place value counters. As numbers become larger, straws become less efficient.

Children can also use a blank number line to count on to find the difference. Encourage them to jump to multiples of 10 to become more efficient.

Multiplication and Division Skills by year group:

Skill: Solve 1-step problems using multiplication	Year: 1/2

One bag holds 5 apples.
How many apples do 4 bags hold?

$5 + 5 + 5 + 5 = 20$
$4 \times 5 = 20$
$5 \times 4 = 20$

Children represent multiplication as repeated addition in many different ways.

In Year 1, children use concrete and pictorial representations to solve problems. They are not expected to record multiplication formally.

In Year 2, children are introduced to the multiplication symbol.

Skill: 2 times table	Year: 2

Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square.

Look for patterns in the two times table, using concrete manipulatives to support. Notice how all the numbers are even and there is a pattern in the ones.

Use different models to develop fluency.

Skill: 5 times table	Year: 2

Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square.

Look for patterns in the five times table, using concrete manipulatives to support. Notice the pattern in the ones as well as highlighting the odd, even, odd, even pattern.

Skill: 10 times table	Year: 2

Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square.
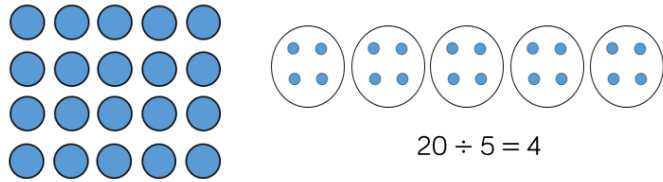
Look for patterns in the ten times table, using concrete manipulatives to support. Notice the pattern in the digits- the ones are always 0, and the tens increase by 1 ten each time.

Skill: Solve 1-step problems using multiplication (sharing)	Year: 1/2

20
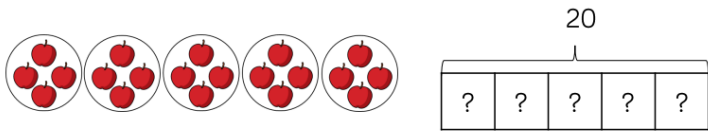
There are 20 apples altogether.
They are shared equally between 5 bags.
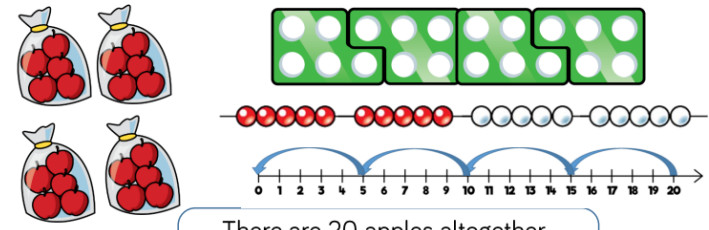How many apples are in each bag?

$20 \div 5 = 4$

Children solve problems by sharing amounts into equal groups.

In Year 1, children use concrete and pictorial representations to solve problems. They are not expected to record division formally.
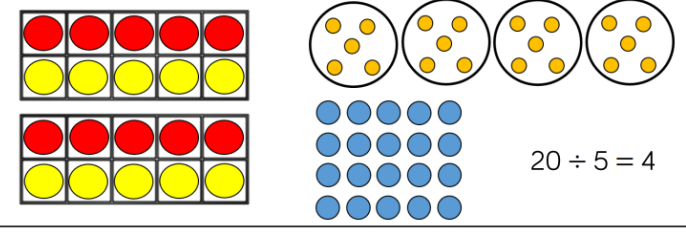
In Year 2, children are introduced to the division symbol.

Skill: Solve 1-step problems using division (grouping)	Year: 1/2

There are 20 apples altogether.
They are put in bags of 5.
How many bags are there?

$20 \div 5 = 4$

Children solve problems by grouping and counting the number of groups. Grouping encourages children to count in multiples and links to repeated subtraction on a number line. They can use concrete representations in fixed groups such as number shapes which helps to show the link between multiplication and division.
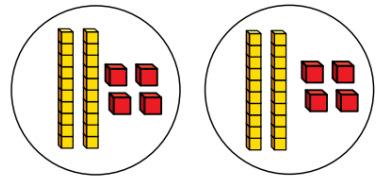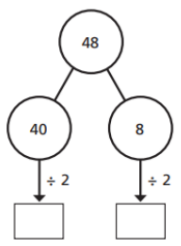
Skill: Divide 2-digits by 1-digit (sharing with no exchange)	Year: 1/2

Tens	Ones
10 10	1 1 1 1
10 10	1 1 1 1

48

40   8

÷ 2   ÷ 2
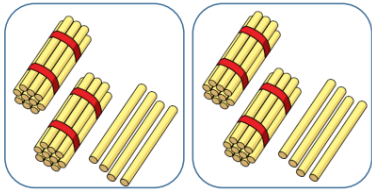
$48 \div 2 = 24$

When dividing larger numbers, children can use manipulatives that allow them to partition into tens and ones.

Straws, Base 10 and place value counters can all be used to share numbers into equal groups.

Part-whole models can provide children with a clear written method that matches the concrete representation.