



Maths Calculation Policy

Aims

The following calculation policy has been designed to meet requirements of the National Curriculum 2014 for the teaching and learning of mathematics and is also designed to give pupils a consistent and smooth progression of learning in calculations across the school. It also follows the principles of Maths Mastery and should be used in conjunction with the maths lesson structure to ensure that children achieve a depth of understanding in a particular mathematical concept. We use White Rose and NCETM Ready to progress criteria LTP for 2021-2022 to support planning and follow a LTP which is bespoke to the needs of our children at DSH.

Age Stage Expectations:-

- Whilst the calculation policy is organised according to age stage expectations, as set out in the National Curriculum 2014 and new EYFS curriculum, it is vital that pupils are taught strategies that are appropriate for the stage that they are currently working at. We use rigorous formative assessment, to move children onto the next level as soon as they are ready, or working at a lower stage until they are secure enough to move on. Use of concrete and pictorial representations is fundamental to the teaching and learning of number and calculation strategies.

Choosing a calculation method:-

Before pupils opt for a written method they should first think :-

Can I do it in my
head using a
mental strategy?



Could I use some
jottings to
help me?



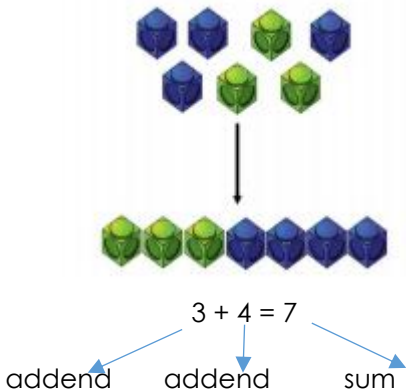
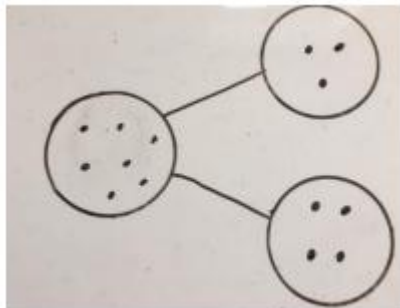
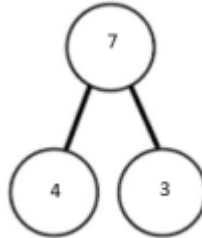
Should I use a formal
written method to
work it out?

**Always model with and ensure
that children can access:**

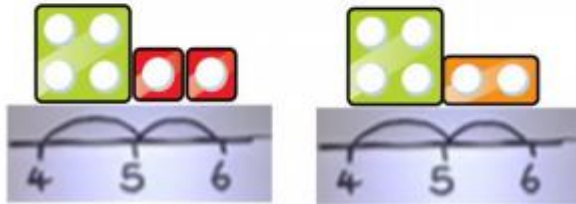
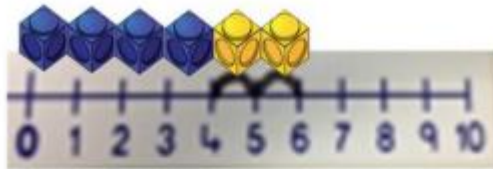
- ✓ Concrete
- ✓ Pictorial
- ✓ Abstract

DO – TALK - RECORD

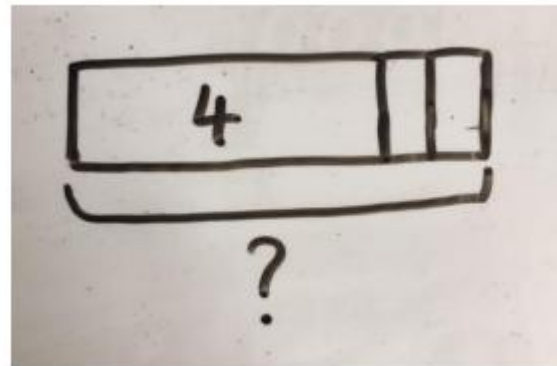
Calculation Policy Guidance - Addition

	<u>EYFS/Yr1</u>	<u>Year 2</u>	<u>Year 3</u>	<u>Year 4</u>	<u>Year 5</u>	<u>Year 6</u>
Addition Key language: Sum, totals, parts and wholes, plus add, addition, altogether, more, is equal to, is the same as, addend , commutative , number bond, number sentence	Combining two parts to make a whole :part whole model Starting at the bigger number and counting on – using cubes or other manipulatives Regrouping to make 10 using the 10 frame	Adding three single digits. Use of base 10 to combine 2 numbers Use of numicon to add 2 or 3 numbers together Introducing the expanded column method	Column method – regrouping Use place value counters (up to 3 digits)	Column method – regrouping Use of place value counters (up to 4 digits)	Column method – regrouping Use of place value counters for adding decimals	Column method – regrouping Abstract methods Place Value counters to be used for adding decimals
<u>Concrete</u>		<u>Pictorial</u>		<u>Abstract</u>		
Combining two parts to make a whole (use other resources too eg eggs, shells, teddy bears etc) 		Children 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, three is a part and the whole is Seven. 		

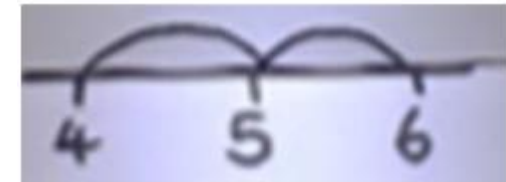
Counting on using number lines using cubes or Numicon



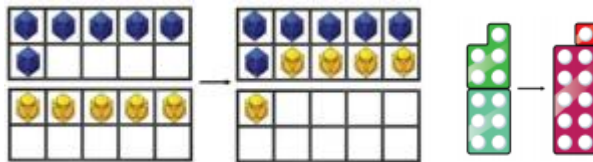
A bar model which encourages children to count on, rather than count all



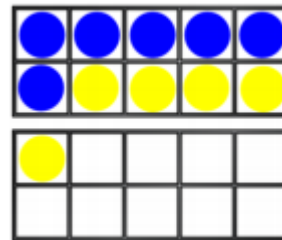
The abstract number line:
What is 2 more than 4?
What is the sum of 2 and 4?
What is the total of 4 and 2?
 $4 + 2 = 6$



Regrouping to make 10; using 10 frames and counters/cubes or Numicon
 $6 + 5$



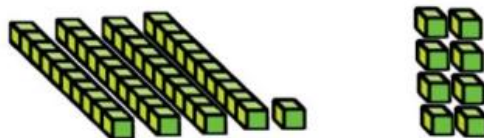
Children to draw the 10 frame and counters (or onto a 10 frame provided)



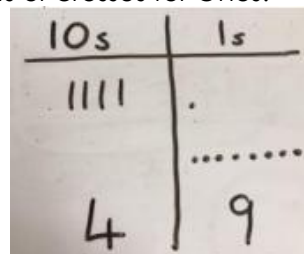
Children to develop an understanding of equality. E.g.

$$\begin{aligned} 6 + \square &= 11 \\ 6 + 5 &= 5 + \square \\ 6 + 5 &= \square + 4 \end{aligned}$$

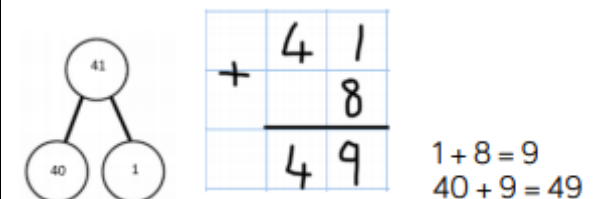
TO + O using base 10. Continue to develop an understanding of place value.
 $41 + 8 =$



Children to represent the base 10 using lines for Tens and dots or crosses for Ones.



$41 + 8$ (when using expanded column method children write down their addition steps)



TO + TO using base 10. Continue to develop understanding of partitioning and place value
 $36 + 25$

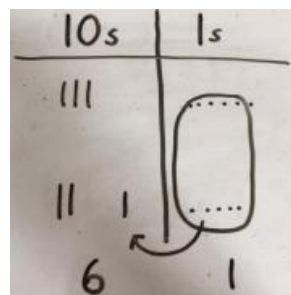
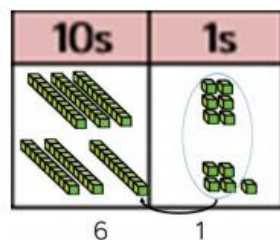
Children to represent the base 10 in a place value chart and circle when they have made an exchange

Looking for ways to make 10

$$5 + 5 = 10$$

$$20 + 20 = 40$$

$$50 + 10 + 1 = 61$$



$$36 + 25 =$$

1 5

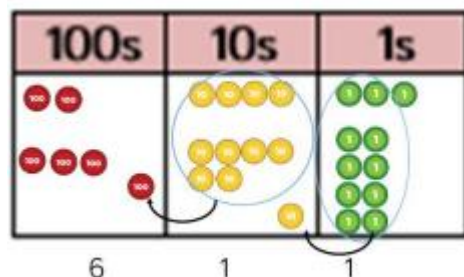
Formal method:

$$\begin{array}{r} 36 \\ +25 \\ \hline 61 \\ \hline 1 \end{array}$$

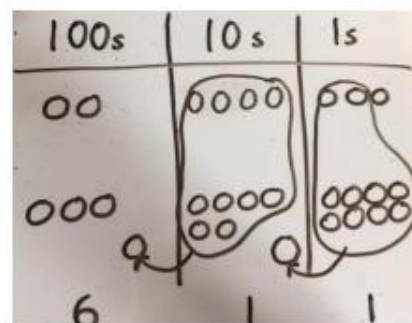
30 + 20 = 50
5 + 5 = 10
50 + 10 + 1 = 61

Use of place Value counters to add HTO + TO or HTO + HTO or ThHTO + HTO etc

When there are 10 ones in the 1s column – we exchange for 1 ten, when there are 10 tens in the 10s column – we exchange for 1 hundred, when there are 10 hundreds in the 100's column we exchange for 1 Thousand.



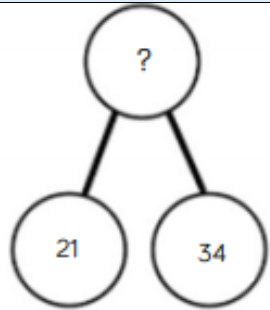
Children to represent the numbers in a place value chart and circle when they have made an exchange



Use the formal column method to solve the problem. Children may still need manipulatives to support.

$$\begin{array}{r} 243 \\ +368 \\ \hline 611 \end{array}$$

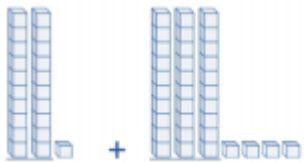
243 → addend
+368 → addend
611 → sum
1 1



?	
21	34

Use the **part-whole or bar model** to find the whole

Solve the picture representation



Word problems :-

In year 3 there are 21 children and in year 4 there are 34 children. How many are altogether?

Prove it-

I think $21 + 34 = 55$. Am I correct?

Express addition problems using different words that mean 'addition'. E.g

Calculate the sum of twenty-one and thirty-four

21

+34

—

$21 + 34 =$

 $= 21 + 34$

10s	1s
	?
?	5

Missing number problems and re-organising the question so the answer comes first. These types of problems can be represented using manipulatives as well.

Mapping of Facts and Strategies

Addition Grid Facts

+	0	1	2	3	4	5	6	7	8	9	10
0	0+0	0+1	0+2	0+3	0+4	0+5	0+6	0+7	0+8	0+9	0+10
1	1+0	1+1	1+2	1+3	1+4	1+5	1+6	1+7	1+8	1+9	1+10
2	2+0	2+1	2+2	2+3	2+4	2+5	2+6	2+7	2+8	2+9	2+10
3	3+0	3+1	3+2	3+3	3+4	3+5	3+6	3+7	3+8	3+9	3+10
4	4+0	4+1	4+2	4+3	4+4	4+5	4+6	4+7	4+8	4+9	4+10
5	5+0	5+1	5+2	5+3	5+4	5+5	5+6	5+7	5+8	5+9	5+10
6	6+0	6+1	6+2	6+3	6+4	6+5	6+6	6+7	6+8	6+9	6+10
7	7+0	7+1	7+2	7+3	7+4	7+5	7+6	7+7	7+8	7+9	7+10
8	8+0	8+1	8+2	8+3	8+4	8+5	8+6	8+7	8+8	8+9	8+10
9	9+0	9+1	9+2	9+3	9+4	9+5	9+6	9+7	9+8	9+9	9+10
10	10+0	10+1	10+2	10+3	10+4	10+5	10+6	10+7	10+8	10+9	10+10

Subtraction Grid Facts

+	0	1	2	3	4	5	6	7	8	9	10
0	0-0										
1	1-0	1-1									
2	2-0	2-1	2-2								
3	3-0	3-1	3-2	3-3							
4	4-0	4-1	4-2	4-3	4-4						
5	5-0	5-1	5-2	5-3	5-4	5-5					
6	6-0	6-1	6-2	6-3	6-4	6-5	6-6				
7	7-0	7-1	7-2	7-3	7-4	7-5	7-6	7-7			
8	8-0	8-1	8-2	8-3	8-4	8-5	8-6	8-7	8-8		
9	9-0	9-1	9-2	9-3	9-4	9-5	9-6	9-7	9-8	9-9	
10	10-0	10-1	10-2	10-3	10-4	10-5	10-6	10-7	10-8	10-9	10-10
11		11-1	11-2	11-3	11-4	11-5	11-6	11-7	11-8	11-9	11-10
12			12-2	12-3	12-4	12-5	12-6	12-7	12-8	12-9	12-10
13				13-3	13-4	13-5	13-6	13-7	13-8	13-9	13-10
14					14-4	14-5	14-6	14-7	14-8	14-9	14-10
15						15-5	15-6	15-7	15-8	15-9	15-10
16							16-6	16-7	16-8	16-9	16-10
17								17-7	17-8	17-9	17-10
18									18-8	18-9	18-10
19										19-9	19-10
20											20-10

Calculation Strategies

One More, One Less

Two More, Two Less: Think Odds and Evens

Five and A Bit

Doubles and Near Doubles

7 Tree 9 Square

Make 10 and Then

Snap It

Number 10 Fact Families

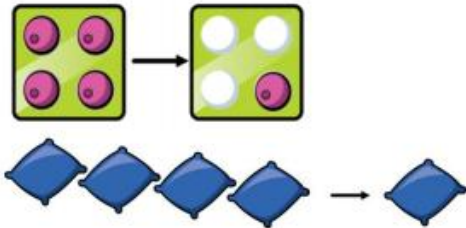
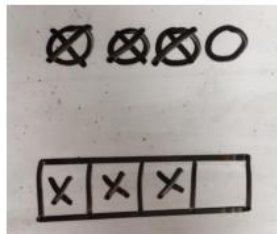
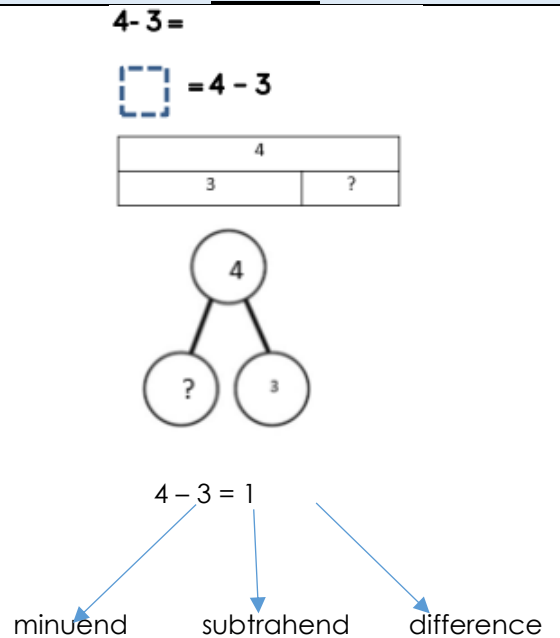
Know About Zero

Ten and A Bit

Adjusting

Number Neighbours: Spot the Difference

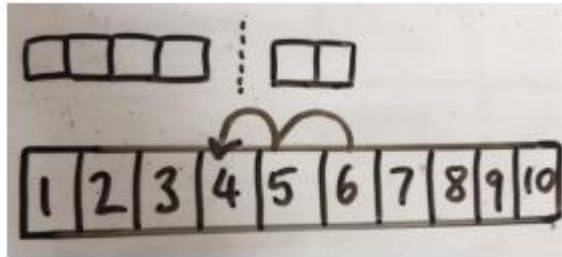
Subtraction

	<u>EYFS/Yr1</u>	<u>Year 2</u>	<u>Year 3</u>	<u>Year 4</u>	<u>Year 5</u>	<u>Year 6</u>
<u>Subtraction</u> Key Language: Take away, less than, the difference, subtract, subtraction, minus, fewer, decrease, minuend, subtrahend	Taking away ones Counting back Find the difference Part whole model Make 10 using the ten frame	Counting back Find the difference Part whole model Make 10 Use of base 10	Column method with regrouping. (up to 3 digits using place value counters)	Column method with regrouping. (up to 4 digits)	Column method with regrouping. Abstract for whole numbers. Start with place value counters for decimals- with the same amount of decimal places.	Column method with regrouping. Abstract methods. Place value counters for decimals- with different amounts of decimal places.
<u>Concrete</u>	<u>Pictorial</u>			<u>Abstract</u>		
Physically taking away and removing objects from a whole. (ten frames, Numicon and other manipulatives can be used) $4 - 3 = 1$ 	Children to draw the concrete resources that they are using and cross out the correct amount. The bar model can also be used. 			$4 - 3 =$ 		

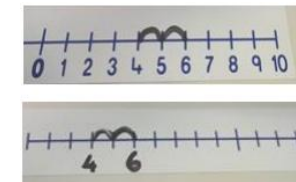
Counting back (using number lines or number tracks. Children start with 6 and count back 2
 $6 - 2 = 4$



Children to represent what they see pictorially

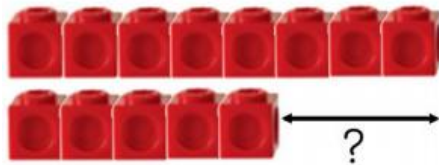


Children to represent the calculation on a number line or number track and show their jumps. Encourage children to use an empty number line as they gain in confidence.

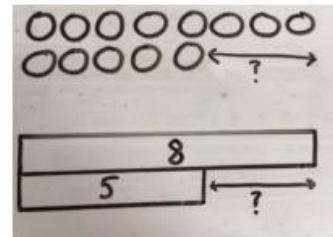


Finding the difference (using cubes, Numicon or Cuisenaire rods, other objects can also be used).

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.



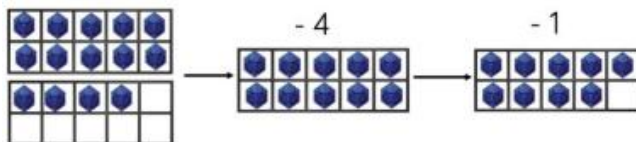
Find the difference between 8 and 5.

$8 - 5$, the difference is _____

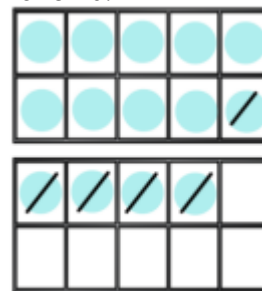
Children to explore why $9 - 6 = 8 - 5 = 7 - 4$ have the same difference.

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**.

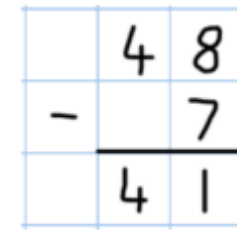
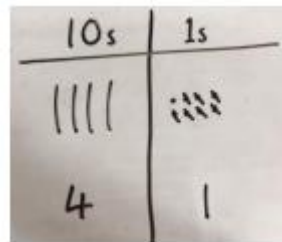
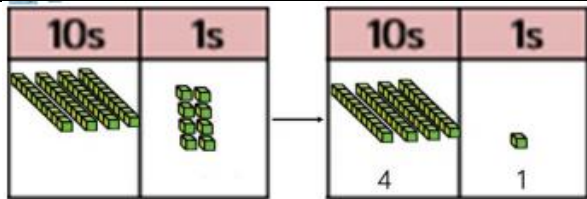
$$\begin{array}{r} 14 - 5 = 9 \\ \swarrow \quad \searrow \\ 4 \quad \quad 1 \end{array}$$

$$\begin{array}{l} 14 - 4 = 10 \\ 10 - 1 = 9 \end{array}$$

Column method using base 10.
 $48 - 7$

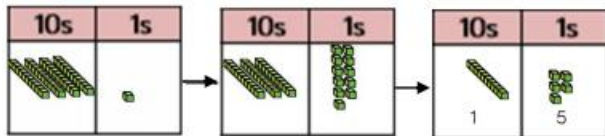
Children to represent the base 10 pictorially.

Column method or children could count back 7.

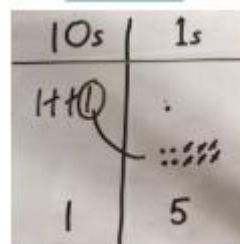


Column method using base 10 and having to exchange.

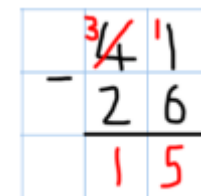
41 - 26



Represent the base 10 pictorially, remembering to show the exchange.

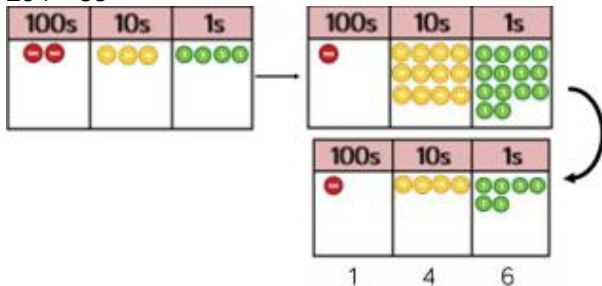


Formal column method. Children must understand that when they have exchanged the 10 they still have 41 because $41 = 30 + 11$.

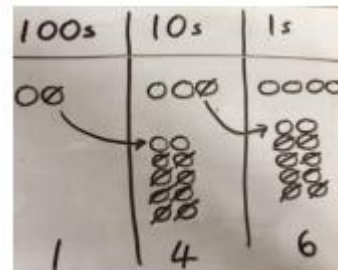


Column method using place value counters.

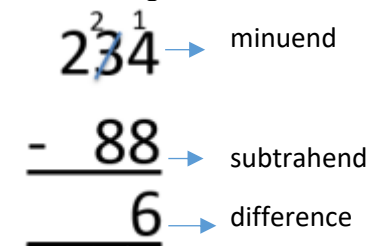
234 - 88



Represent the place value counters pictorially; remembering to show what has been exchanged

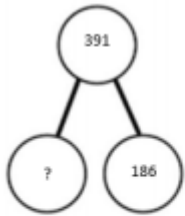


Formal column method. Children must understand what has happened when they have crossed out digits.



Conceptual variation : eg Different ways to ask children to solve $391-186$

Using the **part-whole or bar model** to find a part



391	
186	?

Word problems

Raj spent £391, Timmy spent £186. How much more did Raj spend? Calculate the difference between 391 and 186.

Using other language of subtraction in word problems

What is 186 less than 391?

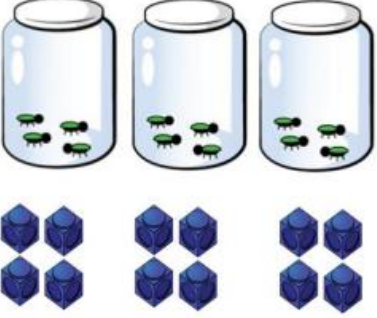
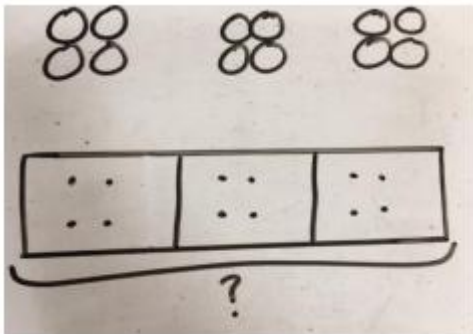
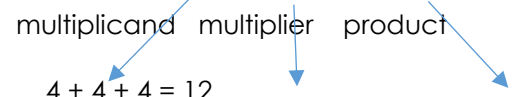
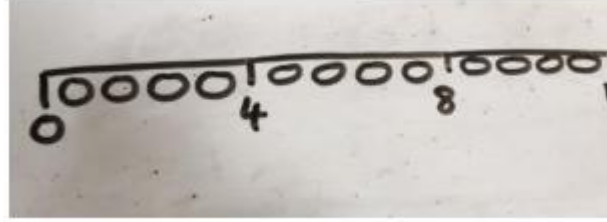
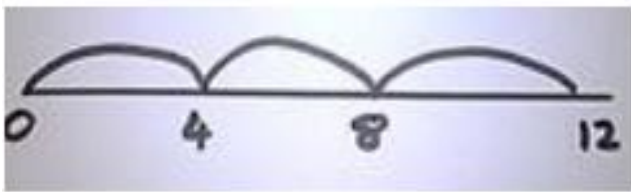
Missing digit calculations

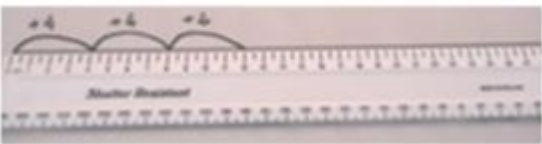
$$\begin{array}{r} 39\Box \\ - \Box\Box6 \\ \hline \Box05 \end{array}$$

Missing answer calculations

$$\begin{array}{r} \boxed{} = 391 - 186 \\ 391 \\ -186 \\ \hline \end{array}$$

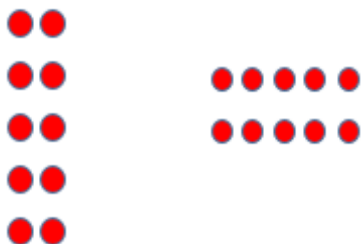
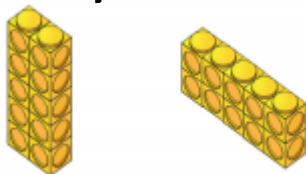
Multiplication

	<u>EYFS/Yr1</u>	<u>Year 2</u>	<u>Year 3</u>	<u>Year 4</u>	<u>Year 5</u>	<u>Year 6</u>
<u>Multiplication</u> Key Language: Double, times, multiplied by, the product of, groups of, lots of, equal groups, multiplicand, multiplier, product, factor	Recognising and making equal groups. Doubling Counting in multiples Use cubes, Numicon and other objects in the classroom	Arrays- showing commutative multiplication	Arrays $2d \times 1d$ using base 10 or Numicon	Column multiplication introduced with place value counters. (2 and 3 digit multiplied by 1 digit)	Column multiplication Abstract only but might need a repeat of year 4 first (up to 4 digit numbers multiplied by 1 or 2 digits)	Column multiplication Abstract methods (multi-digit up to 4 digits by a 2 digit number)
<u>Concrete</u>	<u>Pictorial</u>		<u>Abstract</u>			
Repeated grouping/repeated addition 4×3 $4 + 4 + 4$ There are 3 equal groups with 4 in each group 	Children to represent the practical resources in a picture and use a bar model. 		$4 \times 3 = 12$ multiplicand multiplier product $4 + 4 + 4 = 12$ 			
Children to represent the practical resources in a picture and use a bar model. $4 \times 3 = 12$ $4 + 4 + 4 = 12$ Number lines to show repeated groups	Represent this pictorially alongside a number line e.g.: 		Abstract number line showing three jumps of four. $4 \times 3 = 12$ 			



Cuisenaire rods can be used too.

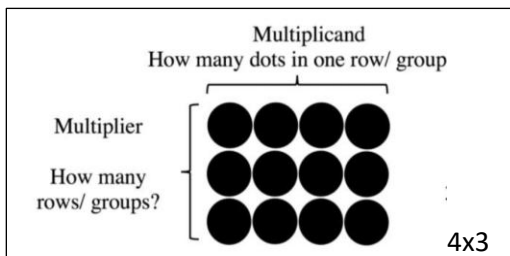
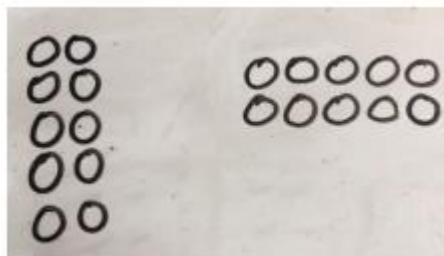
Use arrays to illustrate commutativity, counters and other objects can also be used. $2 \times 5 = 5 \times 2$



2×5
5 lots of 2

5×2
2 lots of 5

Children to represent the arrays pictorially.



Children to be able to use an array to write a range of calculations e.g.

$$10 = 2 \times 5$$

$$5 \times 2 = 10$$

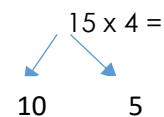
$$2 + 2 + 2 + 2 + 2 = 10$$

$$10 = 5 + 5$$

Partition to multiply using Numicon, base 10 or Cuisenaire rods.
 15×4

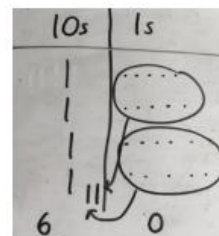
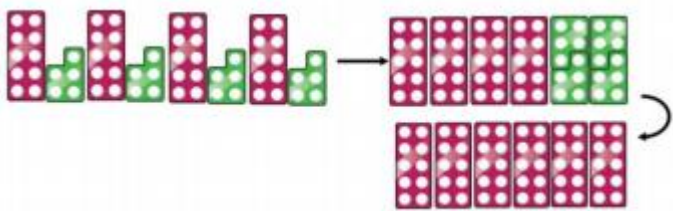
Children to represent the concrete manipulatives pictorially.

Children to be encouraged to show the steps they have taken.



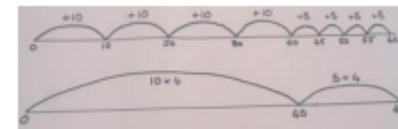
$$10 \times 4 = 40$$

$$5 \times 4 = 20$$



$$40 + 20 = 60$$

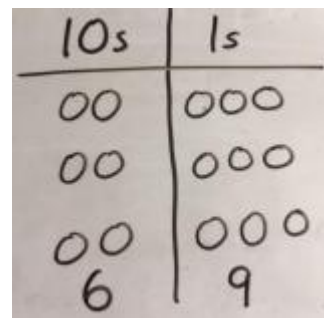
A number line could also be used



Formal column method with place value counters (base 10 can also be used.) 3×23

10s	1s
6	9

Children to represent the counters pictorially.



Children to record what it is they are doing to show understanding.

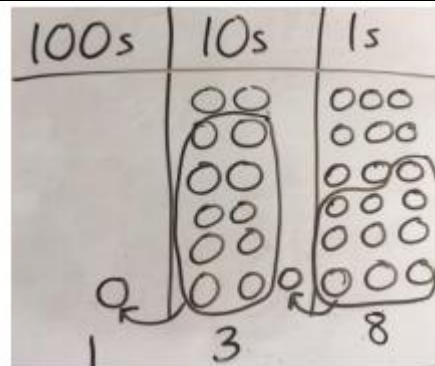
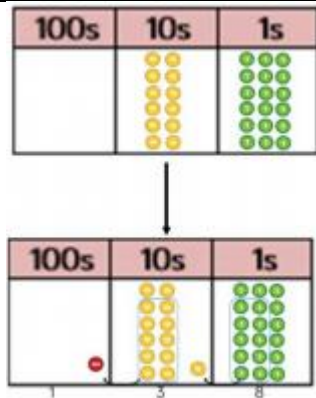
$$\begin{array}{l}
 3 \times 23 \\
 \swarrow \searrow \\
 20 \quad 3
 \end{array}
 \quad
 \begin{array}{l}
 3 \times 20 = 60 \\
 3 \times 3 = 9 \\
 60 + 9 = 69
 \end{array}$$

$$\begin{array}{r}
 23 \\
 \times 3 \\
 \hline
 69
 \end{array}$$

Formal column method with place value counters.
 6×23

Children to represent the counters/base 10, pictorially e.g. the image below.

Formal written method



$$6 \times 23 =$$

$$\begin{array}{r} 23 \\ \times 6 \\ \hline 138 \end{array}$$

multiplicand
multiplier
product

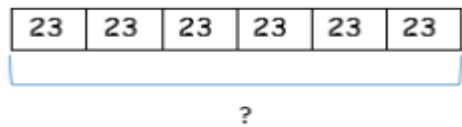
When children start to multiply $3d \times 3d$ and $4d \times 2d$ etc., they should be confident with the abstract:
To get 744 children have solved 6×124 .
To get 2480 they have solved 20×124 .

$$\begin{array}{r} 124 \\ \times 26 \\ \hline 744 \\ 2480 \\ \hline 3224 \end{array}$$

Answer: 3224

Conceptual variation : eg Different ways to ask children to solve 6×23

Bar model – children also need to understand commutativity



Prove It:

With the counters, prove that $6 \times 23 = 138$

Word problems

Mai had to swim 23 lengths, 6 times a week. How many lengths did she swim in one week?

Using other language of multiplication in word problems

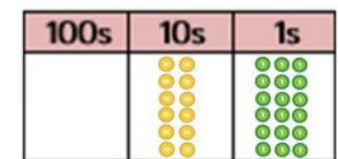
Find the product of 6 and 23

Missing answer or digit problems

$$6 \times 23 =$$

$$\square = 6 \times 23$$

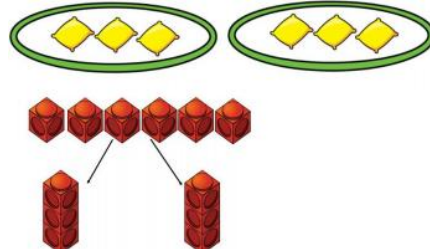
$$\begin{array}{r} 6 \quad 23 \\ \times 23 \quad \times 6 \\ \hline \end{array}$$



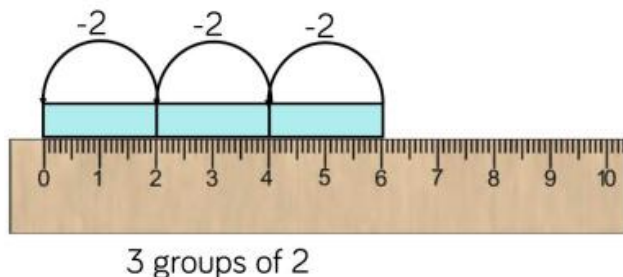
What is the calculation?

What is the product?

Division

	EYFS/Yr1	Year 2	Year 3	Year 4	Year 5	Year 6
Division share, group, divide, divided by, half Key Language: Dividend, divisor, quotient	Sharing objects into groups Division as grouping e.g. I have 12 sweets and put them in groups of 3, how many groups? Use cubes and draw round 3 cubes at a time.	Division as grouping Division within arrays- linking to multiplication Repeated subtraction	Division with a remainder-using lollipop sticks, times tables facts and repeated subtraction. 2d divided by 1d using base 10 or place value counters	Division with a remainder Short division (up to 3 digits by 1 digit concrete and pictorial)	Short division (up to 4 digits by a 1 digit number including remainders)	Short division Long division with place value counters (up to 4 digits by a 2 digit number) Children should exchange into the tenths and hundredths column too.
Concrete Sharing using a range of objects. 6 ÷ 2 	Pictorial Represent the sharing pictorially.	Abstract 6 ÷ 2 = 3 <table><tr><td>3</td><td>3</td></tr></table> Children should also be encouraged to use their 2 times tables facts Divisor (number of columns in the array) Quotient (number in each column)	3	3		
3	3					

Repeated subtraction using Cuisenaire rods above a ruler. Base 10 ones could also be used
 $6 \div 2$



$2d \div 1d$ with remainders using lollipop sticks. Cuisenaire rods, above a ruler can also be used.
 $13 \div 4$

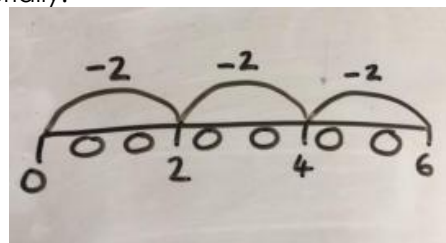
Use of lollipop sticks to form wholes- squares are made because we are dividing by 4.



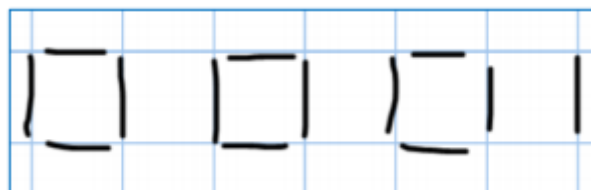
There are 3 whole squares, with 1 left over.

Sharing using place value counters.
 $42 \div 3 = 14$

Children to represent repeated subtraction pictorially.



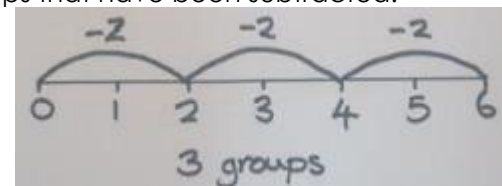
Children to represent the lollipop sticks pictorially.



There are 3 whole squares, with 1 left over.

Children to represent the place value counters pictorially.

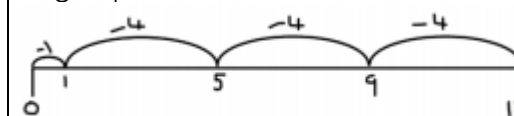
Abstract number line to represent the equal groups that have been subtracted.



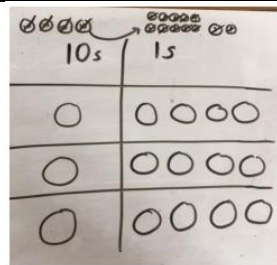
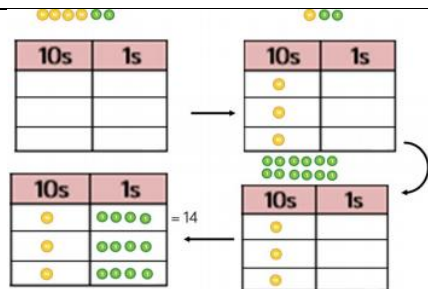
$13 \div 4 = 3$ remainder 1

Children should be encouraged to use their times table facts; they could also represent repeated addition on a number line.

'3 groups of 4, with 1 left over'



Children to be able to make sense of the place value counters and write calculations to show the process.



$$42 \div 3$$

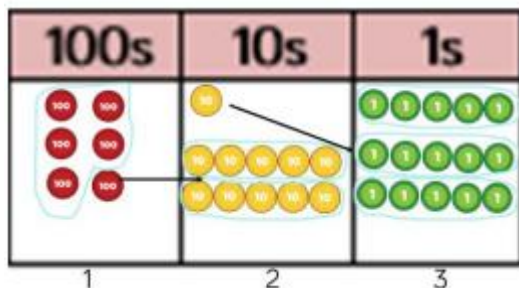
$$42 = 30 + 12$$

$$30 \div 3 = 10$$

$$12 \div 3 = 4$$

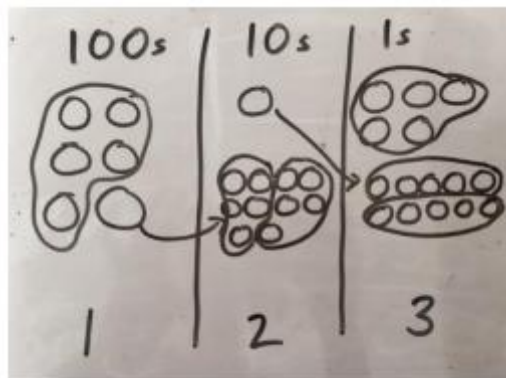
$$10 + 4 = 14$$

Short division using place value counters to group.
 $615 \div 5$



1. Make 615 with place value counters.
2. How many groups of 5 hundreds can you make with 6 hundred counters?
3. Exchange 1 hundred for 10 tens.
4. How many groups of 5 tens can you make with 11 ten counters?
5. Exchange 1 ten for 10 ones.
6. How many groups of 5 ones can you make with 15 ones?

Represent the place value counters pictorially.



Children to the calculation using the short division scaffold.

$$\begin{array}{r} 123 \\ 5 \overline{) 615} \end{array}$$

$$\begin{array}{r} 6 \leftarrow \text{quotient} \\ 4 \overline{) 24} \leftarrow \text{dividend} \\ \uparrow \\ \text{divisor} \end{array}$$

Long division using place value counters

$$2544 \div 12$$

1000s	100s	10s	1s
●●	●●●●●●	●●●●●●	●●●●●●

We can't group 2 thousands into groups of 12 so will exchange them.

1000s	100s	10s	1s
	●●●●●●●●●●●●●●	●●●●●●	●●●●●●

We can group 24 hundreds into groups of 12 which leaves with 1 hundred

1000s	100s	10s	1s
	●●●●●●●●●●●●●●	●●●●●●●●●●●●	●●●●●●

After exchanging the hundred, we have 14 tens. We can group 12 tens into a group of 12, which leaves 2 tens.

1000s	100s	10s	1s
	●●●●●●●●●●●●●●	●●●●●●●●●●●●	●●●●●●●●●●●●●●

After exchanging the 2 tens, we have 24 ones. We can group 24 ones into 2 groups of 12, which leaves no remainder.

$$\begin{array}{r} 02 \\ 12 \overline{) 2544} \\ \underline{24} \\ 1 \end{array}$$

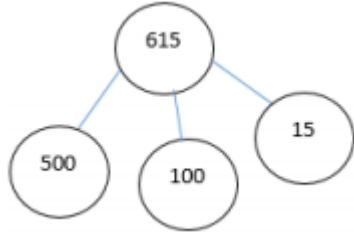
$$\begin{array}{r} 021 \\ 12 \overline{) 2544} \\ \underline{24} \\ 14 \\ \underline{12} \\ 2 \end{array}$$

$$\begin{array}{r} 0212 \\ 12 \overline{) 2544} \\ \underline{24} \\ 14 \\ \underline{12} \\ 24 \\ \underline{24} \\ 0 \end{array}$$

(Quotient)	5
(Divisor) 5	27 (Dividend)
	25
	2 (Reminder)

Conceptual variation : eg Different ways to ask children to solve $615 \div 5$

Using the part whole model below, how can you divide 615 by 5 without using short division?



Word problems including those that use different language of division

I have £615 and share it equally between 5 bank accounts. How much will be in each account?

615 pupils need to be put into 5 groups. How many will be in each group?

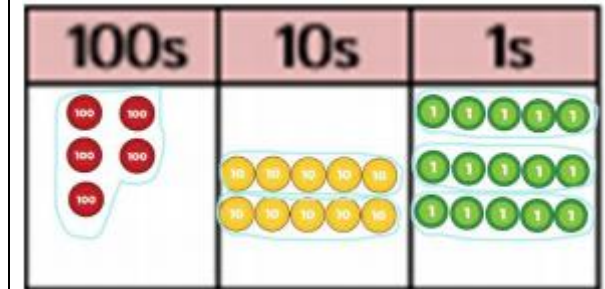
Expressing the calculation in different ways

$$5 \overline{)615}$$

$$615 \div 5 =$$

$$\boxed{} = 615 \div 5$$

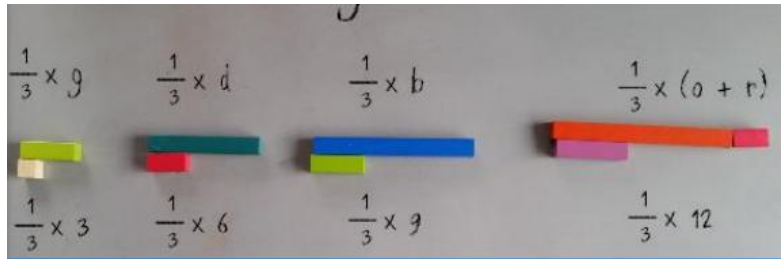
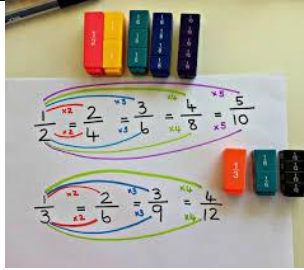
What is the calculation?
What is the answer?



Fractions

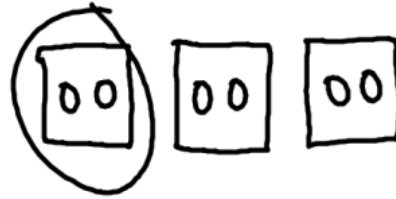
	<u>EYFS/Yr1</u>	<u>Year 2</u>	<u>Year 3</u>	<u>Year 4</u>	<u>Year 5</u>	<u>Year 6</u>
<u>Fractions</u> Numerator, Denominator, improper, proper, mixed, unit, equivalent. Key Language:	Recognise, find and name a half as one of two equal parts of an object, shape or quantity • recognise, find and name a quarter as one of four equal parts of an object, shape or quantity	Recognise, find, name and write $\frac{1}{3}$, $\frac{1}{4}$, $\frac{2}{4}$, $\frac{3}{4}$ of a shape, set of objects or quantity. Recognise the equivalence of $\frac{2}{4}$ and $\frac{1}{2}$. Write simple fractions.	Count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10 Recognise, find and write fractions of a discrete set of objects: unit fractions and non unit fractions with small denominators Recognise and use fractions as numbers: unit fractions and non unit fractions with small denominators Add and subtract fractions with the same denominator.	Count up and down in hundredths; recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten. recognise and show, using diagrams, families of common equivalent fractions add and subtract fractions with the same denominator	Identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths Recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements Compare and order fractions whose denominators are all multiples of the same number. add and subtract fractions with the same denominator and denominators that are multiples of the same number Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams	Add and subtract fractions. Compare and order fractions greater than and less than 1. Add and subtract mixed numbers. Mixed numbers to improper fractions. Subtract 2 mixed fractions. Improper fractions to mixed fractions. Multiplying fractions. Multiply unit fractions by an integer. Multiply non-unit fractions by an integer. Multiply mixed numbers by integers. Fraction of an amount. use common factors to simplify fractions; use common multiples to express fractions in the same denomination • compare and order fractions, including fractions

Concrete

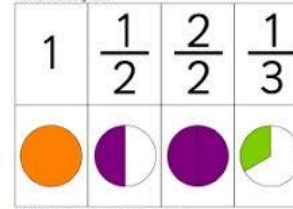


Pictorial

$$\frac{1}{3} \text{ of } 6 = ?$$



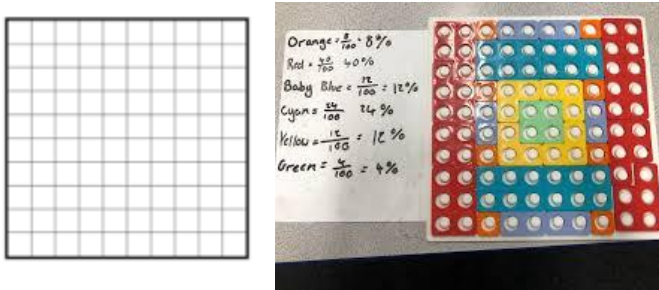
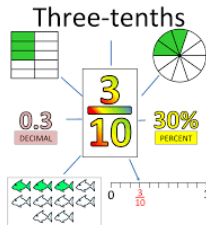
Fraction matching cards



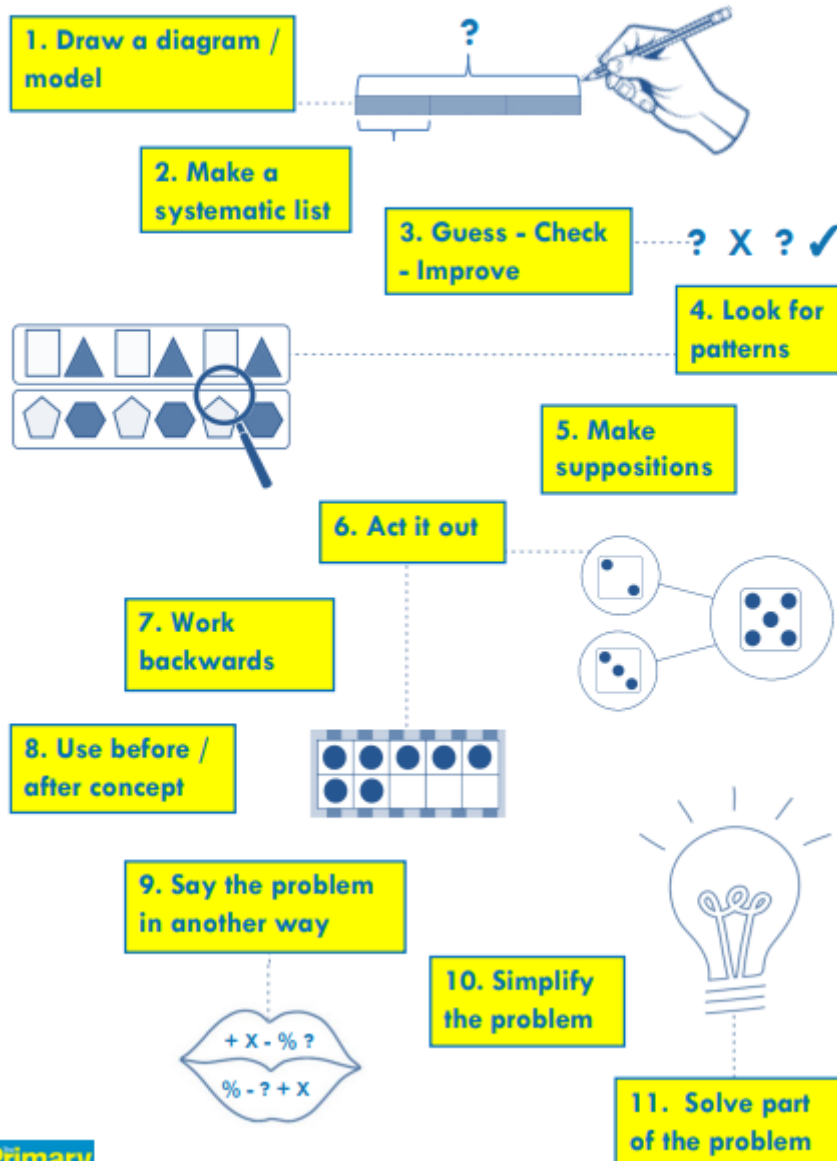
Abstract

$$\frac{2}{4} + \frac{1}{4} = \frac{3}{4}$$

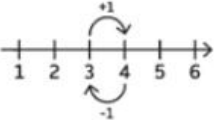
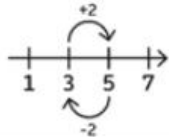
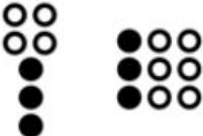
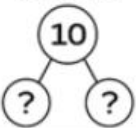
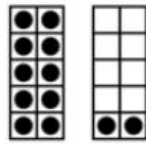
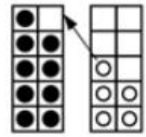
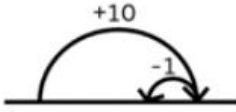
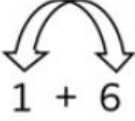
Percentages

	EYFS/Yr1	Year 2	Year 3	Year 4	Year 5	Year 6
Percentages Percentage, whole, Percent, percentage Key Language:					Recognise the per cent symbol (%) and understand that per cent relates to 'number of parts per hundred', and write percentages as a fraction with denominator 100, and as a decimal solve problems which require knowing percentage and decimal equivalents of 1/2, 1/4, 1/5, 2/5, 4/5 and those fractions with a denominator of a multiple of 10 or 25.	pupils build on their understanding of percentages from Year 5 by calculating percentages of amounts and solving more complex, multi-step problems involving percentages. Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts
Concrete	Pictorial			Abstract		
Use 100-bead strings or 100-square grids to count out percentages. For example, shade 45 squares on a grid to represent 45%. 	Represent percentages using bar models, where the whole is split into 100 parts. Draw diagrams with 100 equal sections to show percentages visually. 			Recognise the % symbol and understand that 1% means 1/100. Learn to write percentages as fractions with a denominator of 100, and as decimals. For example, 50%=50/100=0.550 % equals 50 over 100 end-fraction equals 0.5 50%=50/100=0.5 Focus on the decimal and percentage equivalents for common fractions.		

11 Heuristics for Solving Problems



We explicitly teach problem solving, in the context of worked examples. We use these 11 Heuristics for Solving Problems as a successful approach to building children's substantive knowledge in

One More, One Less 	When we add one, we get the next counting number. When we subtract one, we get the previous counting number (e.g. $5 - 1 = 4$).	Number Neighbours: Spot the Difference 	Adjacent numbers have a difference of 1. Adjacent odds and evens have a difference of 2. Spot number neighbours (adjacent, odds or evens) to solve subtractions of adjacent numbers (e.g. $5 - 4 = 1$), of adjacent odds (e.g. $9 - 7 = 2$) or adjacent evens (e.g. $6 - 4 = 2$).
Two More, Two Less: Think Odds and Evens 	If we add two to a number, we go from odd to next odd or even to next even. If we subtract two from a number, we go from odd to previous odd or even to previous even.	7 Tree and 9 Square 	Use these visual images to remember addition and subtractions fact families that children can find tricky. For example, visualising the 7 tree helps remember that $7 - 3 = 4$. Visualising the 9 square helps remember that $3 + 6 = 9$.
Number 10 Fact Families 	Go beyond just recalling the pairs of numbers that add to 10. Make sure that we can also spot additions and subtractions which we can use number bonds to 10 to solve.	Ten and A Bit 	The numbers 11 – 20 are made up of 'Ten and a Bit'. Recognising and understanding the 'Ten and a Bit' structure of these numbers enables addition and subtraction facts involving their constituent parts (e.g. $3 + 10 = 13$, $17 - 7 = 10$, $12 - 10 = 2$).
Five and A Bit 	The numbers 6, 7, 8 and 9 are made up of 'five and a bit'. This can be shown on hands, and supports decomposition of these numbers into their five and a bit parts (e.g. $5 + 3 = 8$, $9 - 5 = 4$).	Make Ten and Then... 	Additions which cross the 10 boundary can be calculated by 'Making Ten' first, and then adding on the remaining amount (e.g. $8 + 6$ can be calculated by thinking '$8 + 2 = 10$ and 4 more makes 14'). The same strategy can be applied to subtractions through 10.
Know about 0 	When we add 0 to or subtract 0 from another number, the total remains the same. If we subtract a number from itself, the difference is 0.	Adjust It 	Any addition and subtraction can be calculated by adjusting from a fact you know already, (e.g. $6 + 9$ is one less than $6 + 10$).
Doubles and Near Doubles 	Memorise doubles of numbers to 10, using a visual approach. Then use these known double facts to calculate near doubles and hidden doubles. Once we know $6 + 6 = 12$ then $6 + 7$ and $5 + 7$ is easy.	Swap It 	When the order of two numbers being added (addends) is exchanged the total remains the same. E.g. $1 + 8 = 8 + 1$. Sometimes reversing the order of the two addends makes addition easier to think about conceptually.