



Maths Calculation Policy

Moorlands Primary School Calculation Policy

This policy shows the progression children need to move through in order to become efficient mathematicians. It is split into year groups, showing the expected stage for calculations at each year group, however, teachers will use their discretion to look at earlier methods if a child is finding a concept difficult. As a school, we follow the small steps guidance on White Rose Maths and much of this policy is in line with their calculation policy however, it has been personalised and amended to reflect the methods that we use here at Moorlands Primary.

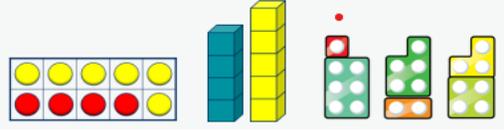
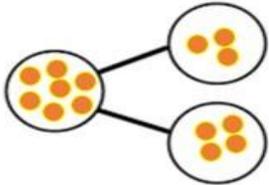
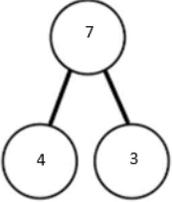
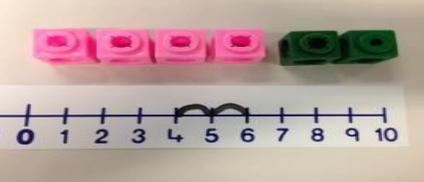
Children should move from concrete to pictorial to abstract. This is cyclical and not a set process. Concrete manipulatives and pictorial representations should still consistently be used to help children understand and access different mathematical questions. All examples of calculations should move children onto finding missing numbers within the calculation. This can start as young as EYFS and is a vital skill to becoming confident with number and calculation.

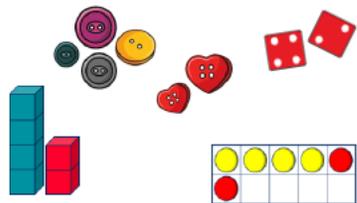
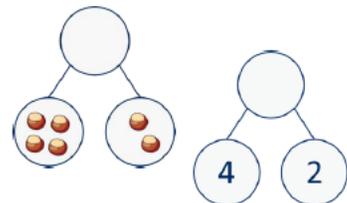
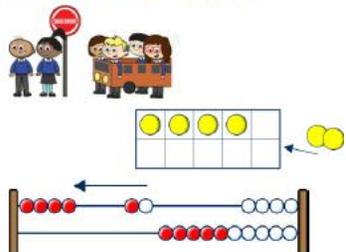
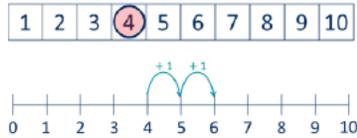
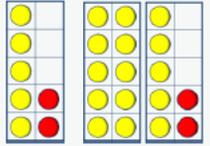
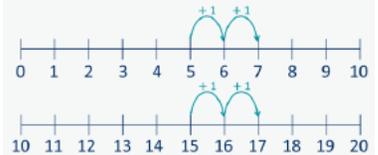
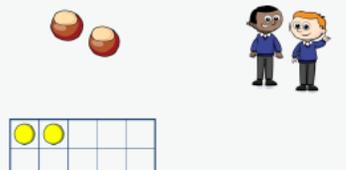
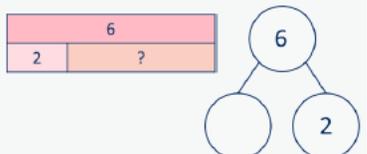
Where skills are divided into more than one section across the page, there is a progression in the level of difficulty from left to right and top to bottom.

ANY NEW CONCEPT SHOULD ALWAYS BE INTRODUCED WITH CONCRETE RESOURCES.

The written steps on the calculation ALWAYS need to go alongside each step made with the concrete otherwise children will never be able to move away from concrete to abstract alone.

Addition

EYFS - Progression of Skills	Key representations progressing in difficulty left to right, top to bottom	
<p>Combine 2 groups 2 groups are combined to find the total.</p>	<p>.... and make</p> 	<p>There are There are There are altogether.</p> 
	<p><i>Progresses on to be pictorially by drawing dots, etc.</i></p>  <p><i>shown children counters</i></p>	<p>Only if able, children may combine 2 abstract numbers.</p> 
<p>Add more A quantity is increased. Children should be counting on from the quantity number to add on.</p>	<p>First... Then.... Now....</p> 	<p>I have I add more. Now I have....</p> 
	 <p><i>Counting on using numberline with manipulatives alongside.</i></p>	<p><i>When confident, children may start with 4 in their head and add on 3 to total 7. OR start on the number line and count on required steps without need for concrete manipulatives.</i></p> <p><i>NOTE - this will be taught in Y1 so children in EYFS may continue to always use manipulatives.</i></p>

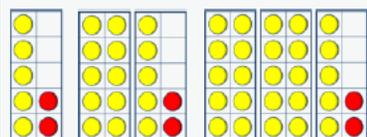
Year 1 - Progression of Skills	Key representations progressing in difficulty left to right, top to bottom		
<p>Add together (aggregation) Two quantities combined to find the total</p>	<p>There are ... There are ... There are ... altogether.</p> 	<p>... is a part. ... is a part. ... is the whole.</p> 	<p>... plus ... is equal to is equal to ... + ...</p> $4 + 2 = 6$ $2 + 4 = 6$ $6 = 4 + 2$ $6 = 2 + 4$
<p>Add more (augmentation) A quantity is increased</p>	<p>First... Then... Now...</p> 	<p>I start at ... I jump on ... I land on ...</p> 	<p>... plus ... is equal to is equal to ... + ...</p> $4 + 2 = 6$ $2 + 4 = 6$ $6 = 4 + 2$ $6 = 2 + 4$ <p><i>Number in head and count on mentally with single digits.</i></p>
<p>Related facts within 20 Make links to known facts</p>	<p>I know that ... and ... = ... so ... and ... = ...</p> 	<p>... more than ... is ... so ... more than ... is ...</p> 	<p>What patterns do you notice?</p> $5 + 2 = 7$ $15 + 2 = 17$ $7 = 5 + 2$ $17 = 15 + 2$
<p>Missing numbers Make links to known facts</p>	<p>How many more do you need to make ...?</p> 	<p>If ... is the whole and ... is a part, the other part must be...</p> 	<p>... plus ... is equal to ...</p> $2 + \square = 6$ $6 = 2 + \square$ 

**Year 2 -
Progression of
Skills**

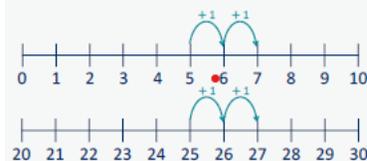
Key representations progressing in difficulty left to right, top to bottom

Add ones to any number
Make links to known facts

I know that ... and ... = ...
so ... and ... = ...



... more than ... is ...
so ... more than ... is ...



What do you notice?
Can you continue the pattern?

$$5 + 2 = 7$$

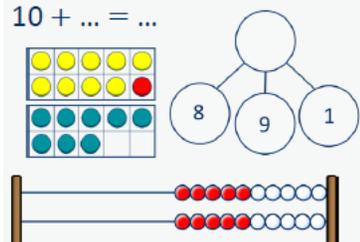
$$15 + 2 = 17$$

$$25 + 2 = 27...$$

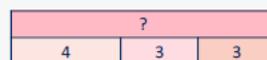
Add three 1 digit numbers

Ensure children recognize, addition can be done in any order - look for known facts

... and ... are a bond to 10
 $10 + \dots = \dots$



Double ... + ... = ...



What do you notice?
Which addition is the easiest to calculate?

$$8 + 9 + 1 =$$

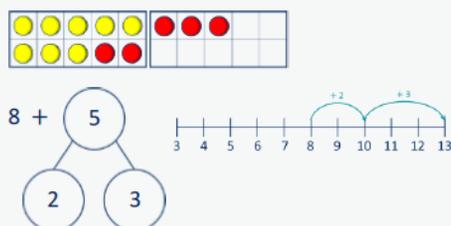
$$8 + 1 + 9 =$$

$$9 + 1 + 8 =$$

Add across a ten (adding a single digit)

Partition the number being added to make a full ten

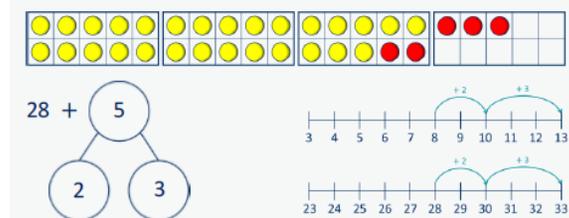
... can be partitioned into ... and ...



By using ten frames and counters or using numicon:
 $6 + 5$ becomes $6 + 4 = 10$ $10 + 1 = 11$



I add ... to get to ... then I add ... $8 + 5 = 13$
 $28 + 5 = 33$

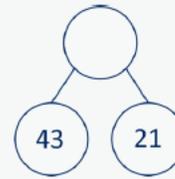


Add 2 digit numbers (not across a ten)

Line up ones and tens in columns to support later written methods

... ones + ... ones = ... ones
... tens + ... tens = ... tens

Tens	Ones



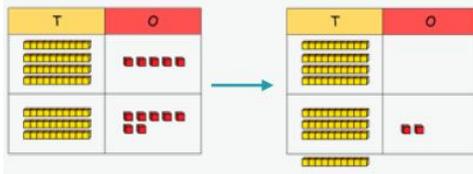
3 ones + 1 one = 4 ones
4 tens + 2 tens = 6 tens
6 tens + 4 ones = 64

?	
43	21

Add 2 digit numbers across a ten

Begin to exchange ten ones for 1 ten.

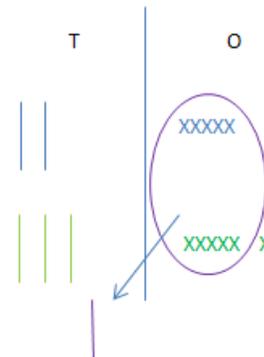
... ones = ... ten and ... ones



	Tens	Ones
+		
=		

Above $36 + 25$. Adding the ones results in 11. Exchange for 1 ten 1 one, recombine to find the answer 61.

Children to represent the concrete using a particular drawn symbol e.g. lines for tens and crosses for ones. When exchanging occurs children can group the ten ones or cross them out and exchange for a ten.



If ready, children may start to use formal written method. Carried over digit shown above answer line.

Note - there is no requirement for Y2 children to move to abstract, they can continue using concrete or pictorial.

$$25 + 17 =$$

T	O
2	5
+ 1	7
<hr/>	
1	
4	2
<hr/>	

Year 3 - Progression of Skills

Key representations progressing in difficulty left to right, top to bottom

Add two 3 digit numbers (no exchange)

Mental strategies and introduction of formal written method.

... ones + ... ones = ... ones
 ... tens + ... tens = ... tens
 ... hundreds + ... hundreds = ... hundreds

?	
345	432

Hundreds	Tens	Ones
100 100 100	10 10 10 10	1 1 1 1
100 100 100 100	10 10 10	1 1

H	T	O	
3	4	5	
+	4	3	2

Add two numbers across a ten or hundred.

Formal written method that includes up to 2 exchanges, including adding a 2 digit to a 3 digit number.

There are ... ones, so I do/do not need to make an exchange.
 There are ... tens, so I do/do not need to make an exchange.
 ... ones = ... ten and ... ones.
 ... tens = ... hundred and ... tens.

H	T	O	
4	6	6	
+	3	5	3

8	1	9	

Use of place value counters to add HTO + TO, HTO + HTO etc. once the children have had practice with this, they should be able to apply it to larger numbers and the abstract

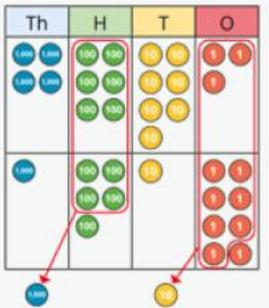
Children to represent the counters by drawing pictorial e.g. like the image below

If the children are completing a word problem, draw a bar model to represent what it's asking them to do

?	
243	368

Children to move to abstract when secure. Carried over digit shown above answer line.

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

Year 4 - Progression of Skills	Key representations progressing in difficulty left to right, top to bottom	
<p>Add two 4 digit numbers</p> <p>Formal written method with up to 3 exchanges. Encourage children to estimate and use inverse operations to check answers.</p>	<p>There are ... ones/tens/hundreds so I do/do not need to make an exchange. I can exchange 10 ... for 1...</p> 	<p>Children to move to abstract when secure. Carried over digit shown above answer line.</p> $ \begin{array}{r} \text{Th H T O} \\ \hline 4673 \\ + 1518 \\ \hline 6191 \end{array} $
<p>Add decimal numbers in the context of money</p> <p>Emphasis on partitioning and use of number lines rather than formal written method</p>	<p>... pence + ... pence = ... pence ... pounds + ... pounds = ... pounds</p>  <p>45p + 25p = 70p £2 + £3 = £5 £5 + 70p = £5.70</p>	<p>£3.25 can be partitioned into £3 + 20p + 5p</p> 

Year 5 - Progression of Skills

Key representations progressing in difficulty left to right, top to bottom

Add whole numbers with more than 4 digits.
Encourage children to estimate and use inverse operations to check answers.

Some children may still benefit from visuals and use of manipulatives as below.

TTh	Th	H	T	O
				5
			0	1
		8	0	5
	2	8	0	5
4	2	8	0	5

Most children will now be secure working abstractly with addition using a formal written method. Carried over digit shown above answer line. Deepen through use of missing number questions.

$$\begin{array}{r}
 \text{Tth Th H T O} \\
 \hline
 26574 \\
 + 16231 \\
 \hline
 42805
 \end{array}$$

Add decimals with up to 2 decimal places.
Progress from same number of decimal places to a different number of decimal places and from no exchange to exchange.

I do/do not need to make an exchange because ...
I can exchange 10 ... for 1 ...

Ones	Tenths	Hundredths
3	2	1
4	4	5

O	Tth	Hth	Thth
1	2	8	1
2	5	4	

Complements to 1
Pairs of numbers with up to 3 decimal places which total 1.
Encourage children to make links with bonds to 10 and complements to 100 and 1000.

$0.3 + \square = 1$ $0.35 + \square = 1$

$4 + 6 = 10$	$0.4 + 0.6 = 1$
$44 + 56 = 100$	$0.44 + 0.56 = 1$
$444 + 556 = 1,000$	$0.444 + 0.556 = 1$

Year 6 - Progression of Skills

Key representations progressing in difficulty left to right, top to bottom

Add integers up to 10 million
Encourage children to estimate and use inverse operations to check answers.

Children should be confident working abstractly with formal written methods. Carried over digits to be shown above answer line. Deepen understanding with missing number questions.

	3	4	6	2	2	1
+	1	8	4	3	2	1
1 1						
	5	3	0	5	4	2

?		
2,354	750	1,500

	8	1		8	5
+			0	6	
9 9 5 8					

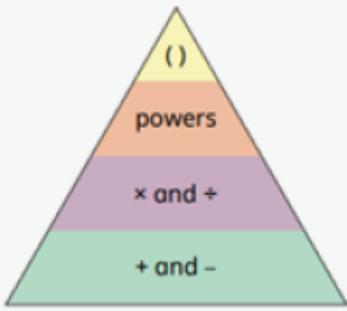
Add decimals with up to 3 decimal places.
Progress to numbers with digits in different value columns.
Encourage to check that columns are lined up correctly.

	3	·	1	0	8
+	2	·	1	5	4
5 2 6 2					
1					

	1	5	·	0	2	7
+		9	·	5	8	
2 4 6 0 7						
1 1						

Order of operations (BODMAS / BIDMAS)
Calculations in brackets done first. Multiplication and division should be performed before addition and subtraction.

... has greater priority than ..., so the first part of the calculation I need to do is ...





$(3 + 4) \times 2 = 14$

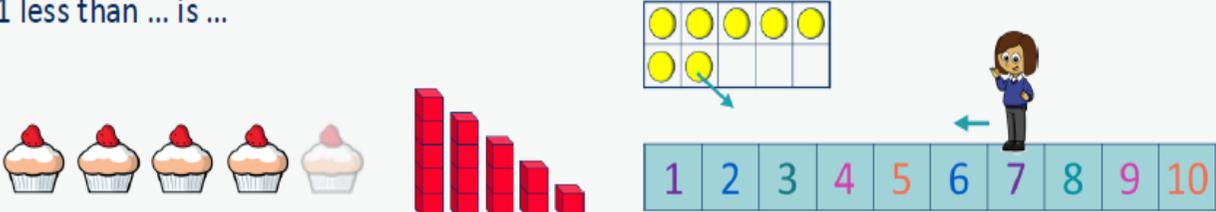
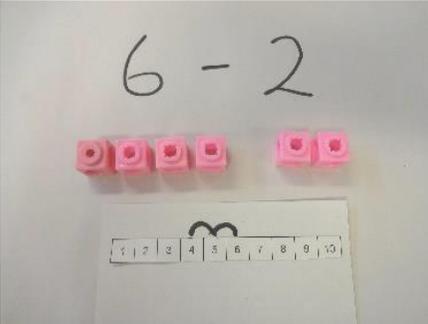
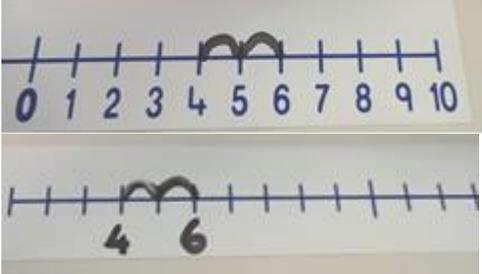


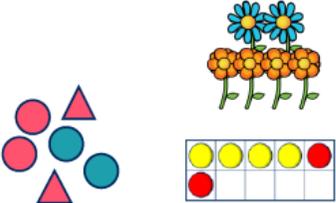
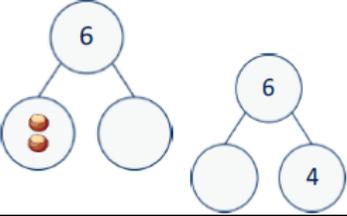
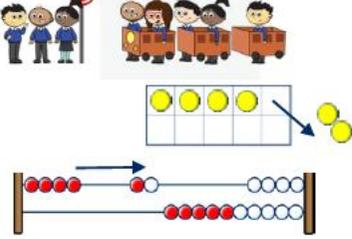
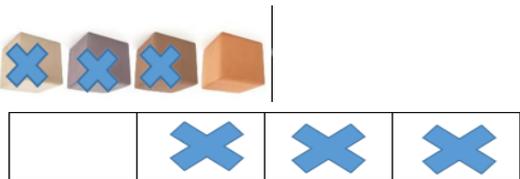
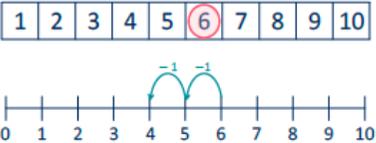
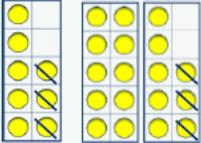
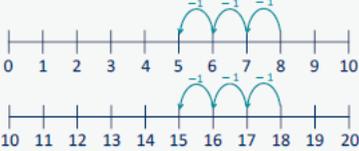
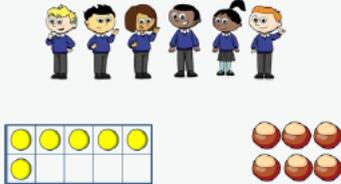
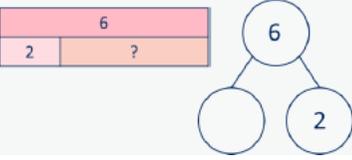
$3 \times 4 + 2 = 14$

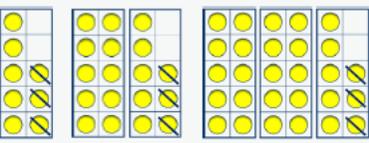
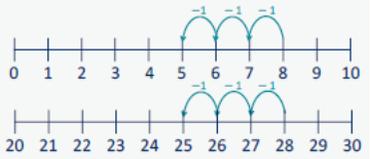
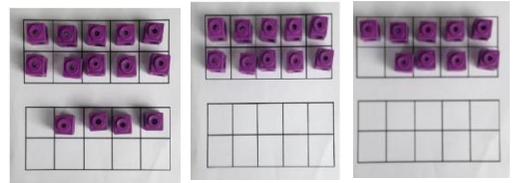
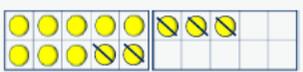
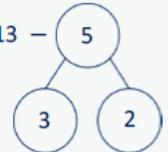
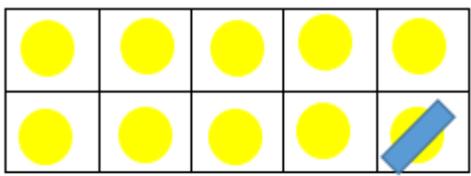
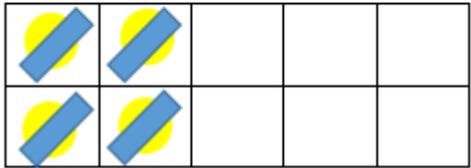
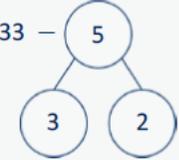
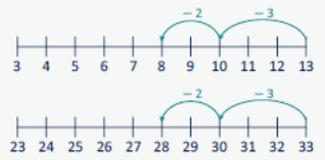
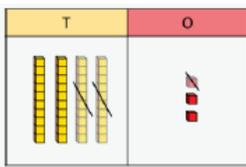
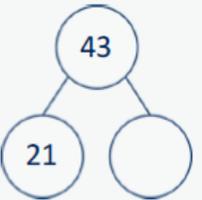
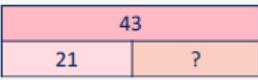


$3 + 4 \times 2 = 11$

Subtraction

EYFS - Progression of Skills	Key representations progressing in difficulty left to right, top to bottom	
<p>1 less</p> <p>Link to stories songs and rhymes</p>	<p>1 less than ... is ...</p>  <p>Use real life objects and concrete manipulatives</p>	
<p>Take away</p> <p>A quantity is reduced, physically take away and remove objects from the whole.</p>	<p>First... Then... Now...</p>  <p>I have ... I take ... away Now I have ...</p> <p>Always use real life objects and concrete manipulatives</p>	
<p>Counting back using a number line</p> <p>Use concrete manipulatives alongside</p>		<p>Use of manipulatives alongside the numberline will support children to visualise and put into context.</p> <p>When confident, children may start with 6 their head and count back 2 to total 4. OR start on the number line and count back required steps without need for concrete manipulatives. NOTE – this will be taught in Y1 so children in EYFS may continue to always use manipulatives</p> 

Year 1 - Progression of Skills	Key representations progressing in difficulty left to right, top to bottom		
<p>Find a part Link to number bonds and known facts. E.g. $2 + 4 = 6$ so if 6 is the whole and 4 is a part, the other part must be 2</p>	<p>There are ... in total. ... are ... How many are not ...?</p> 	<p>... is the whole. ... is a part. ... is a part.</p> 	<p>... subtract ... is equal to is equal to ... - ...</p> $6 - 2 = 4$ $6 - 4 = 2$ $4 = 6 - 2$ $2 = 6 - 4$
<p>Take away A quantity is decreased</p>	<p>First... Then... Now...</p> 	<p>Children can draw pictorially the concrete resources they are using and cross out those that are taken away, can also show on bar model.</p> 	<p>I start at ... I jump back ... I land on ...</p> 
<p>Related facts within 20 Make links to known facts</p>	<p>I know that ... minus ... = ... so ... minus ... = ...</p> 	<p>... less than ... is ... so ... less than ... is ...</p> 	<p>What patterns do you notice?</p> $8 - 3 = 5$ $18 - 3 = 15$ $5 = 8 - 3$ $15 = 18 - 3$
<p>Missing numbers Make links to known facts</p>	<p>How many do you need to subtract to make ...?</p> 	<p>If ... is the whole and ... is a part, the other part must be...</p> 	<p>... minus ... is equal to ...</p> $6 - \square = 2$ $2 = 6 - \square$ 

Year 2 - Progression of Skills	Key representations progressing in difficulty left to right, top to bottom		
<p>Subtract ones from any number (related facts) Make links to known facts</p>	<p>I know that ... minus ... = ... so ... minus ... = ...</p> 	<p>... less than ... is ... so ... less than ... is ...</p> 	<p>What do you notice? Can you continue the pattern?</p> $8 - 3 = 5$ $18 - 3 = 15$ $28 - 3 = 25...$
<p>Subtract across a ten Partition the number being subtracted to bridge through a ten</p>	<p>(Using numicon or ten frames) $14 - 5$ becomes $14 - 4 = 10$ then take one more away to gain answer of 9.</p>  <p>... can be partitioned into ... and ...</p>   	<p>Children to present the ten frame pictorially</p>  	<p>Children to represent how they have solved it e.g.</p> $14 - 5 = 9$ <p>5 is made up of 4 and 1 so I can subtract 4 to make 10 and then 1 to get to 9</p> <p>Make links with related facts.</p>   
<p>Subtract 2 digit numbers (not across a ten)</p>	<p>Use of base ten alongside any representations</p>  <p>3 ones - 1 one = 2 ones 4 tens - 2 tens = 2 tens 2 tens and 2 ones = 22</p> <p>... ones - ... ones = ... ones ... tens - ... tens = ... tens</p>  		

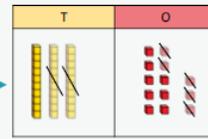
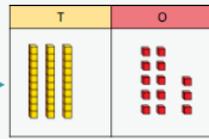
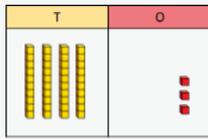
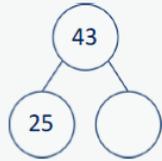
Subtract 2 digit numbers across a ten

Begin to exchange one ten for ten ones.

When calculating $43 - 25$

I need to make an exchange because I do not have enough ones to subtract ... ones.

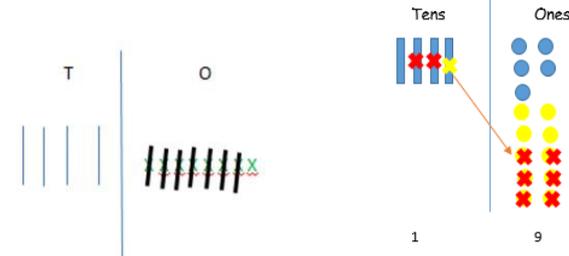
43	
25	?



3 ones - 5 ones
(I need to exchange 1 ten for 10 ones)

13 ones - 5 ones = 8 ones
3 tens - 2 tens = 1 ten
1 ten and 8 ones = 18

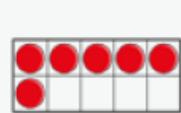
Children begin to represent the base ten pictorially through lines and crosses, circles and sticks etc. Cross out as they exchange.



Missing numbers

Solve missing number problems and use inverse to check

How many do you need to subtract to make ...?



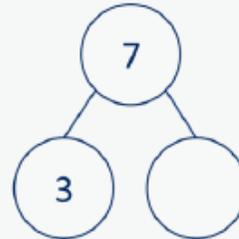
$$10 - \square = 6$$

$$6 + \square = 10$$

If ... is a whole and ... is a part, then ... is the other part.

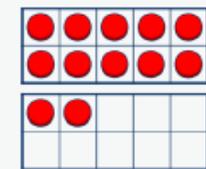
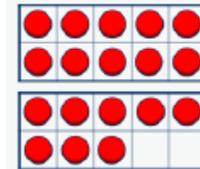
$$7 - 3 = \square$$

$$\square + 3 = 7$$



... can be partitioned into ... and ...

$$18 - \square = 12 + 2$$



Year 3 - Progression of Skills

Key representations *progressing in difficulty left to right, top to bottom*

Subtract two numbers (no exchange)
Introduction of formal written method

... ones – ... ones = ... ones
... tens – ... tens = ... tens
... hundreds – ... hundreds = ... hundreds

769	
147	?

Hundreds	Tens	Ones
7	6	9
1	4	7
—		

H	T	O	
7	6	9	
-	1	4	7
—			

Include written column method alongside concrete resources.

Subtract two numbers across a ten or hundred
Formal written method involving up to 2 exchanges including 3-digit subtract 2-digit numbers.

Include written column method alongside concrete resources

Column method (using place value counters) 234-88

Hundreds	Tens	Ones
2	3	4
-	8	8
—		
1	4	6

Once the children have had practice with the concrete, they should be able to apply it to any subtraction.

Like the other pictorial representations, children to represent the counters.

Children to move to abstract when secure.

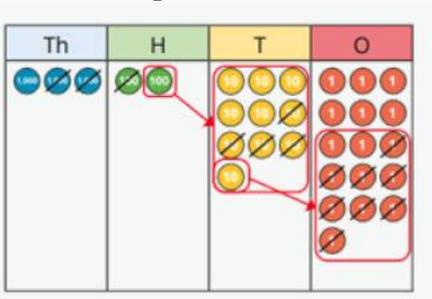
$$\begin{array}{r} 1 \quad 12 \quad 1 \\ 234 \\ - 88 \\ \hline 146 \end{array}$$

Year 4 - Progression of Skills

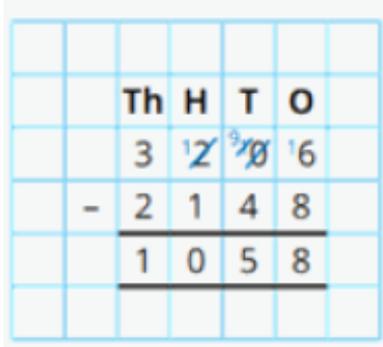
Key representations progressing in difficulty left to right, top to bottom

Subtract up to two 4 digit numbers,
 Formal written method with up to 3 exchanges.
 Encourage children to estimate and use inverse operations to check answers to calculations.

I need to subtract....ones/tens/hundreds. I do/do not need to make an exchange.
 I can exchange 1.... for 10....

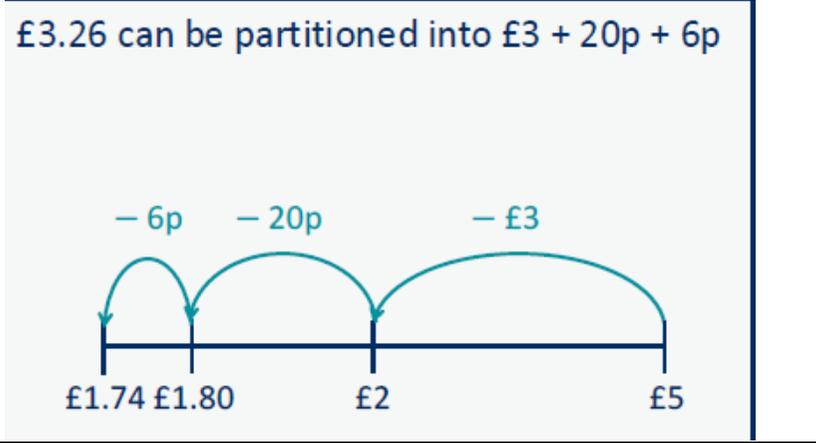


Children to move to abstract when secure. Carried over digit shown above answer line



Subtract decimal numbers in the context of money
 Emphasis here is on partitioning and use of number lines rather than formal written calculations.

When carrying out £5 - £3.26....



Year 5 - Progression of Skills

Key representations progressing in difficulty left to right, top to bottom

Subtract whole numbers with more than 4 digits.
Encourage children to estimate and use inverse operations to check answers.

Some children may still benefit from visuals and use of manipulatives as below.
I can exchange 1 ... for 10 ...

Most children will now be secure working abstractly with addition using a formal written method. Carried over digit shown above answer line. Deepen through use of missing number questions.

Subtract decimals with up to 2 decimal places
Progress from the same number of decimal places to a different number of decimal places and from no exchange to exchange.

Complements to 1
Encourage children to make links with bonds to 10 and complements to 100 and 1,000 when finding a missing part or subtracting from 1

$0.3 + \square = 1$ $0.35 + \square = 1$

10	
3	?

100	
35	?

1	
0.3	?

1	
0.35	?

$10 - 4 = 6$ $1 - 0.4 = 0.6$
 $100 - 44 = 56$ $1 - 0.44 = 0.56$
 $1,000 - 444 = 556$ $1 - 0.444 = 0.556$

Year 6 - Progression of Skills

Key representations progressing in difficulty left to right, top to bottom

Subtract integers up to 10 million
Encourage children to estimate and use inverse operations to check answers.

Children should be confident working abstractly with formal written methods. Deepen understanding with missing number questions.

$$\begin{array}{r} \cancel{2}^2 ^1 \cancel{4}^5 ^2 ^1 \\ - 184321 \\ \hline 161900 \end{array}$$

4,604		
2,354	750	?

$$\begin{array}{r} \\ - 36 \\ \hline 55555 \end{array}$$

Subtract decimals with up to 3 decimal places
Progress from the same number of decimal places to a different number of decimal places and from no exchange to exchange

$$\begin{array}{r} \\ - 1.34 \\ \hline 5.39 \end{array}$$

$$\begin{array}{r} \\ - 0.64 \\ \hline 0.975 \end{array}$$

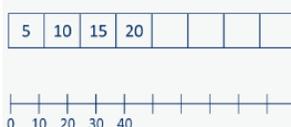
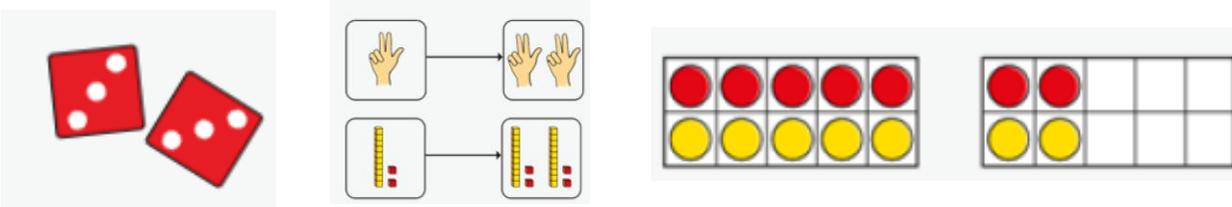
Order of operations (BODMAS / BIDMAS)
Calculations in brackets done first. Multiplication and division should be performed before addition and subtraction.

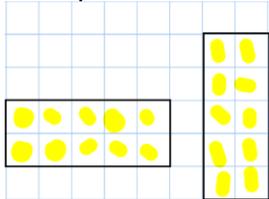
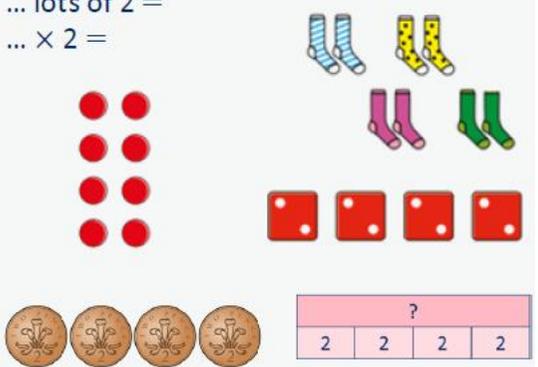
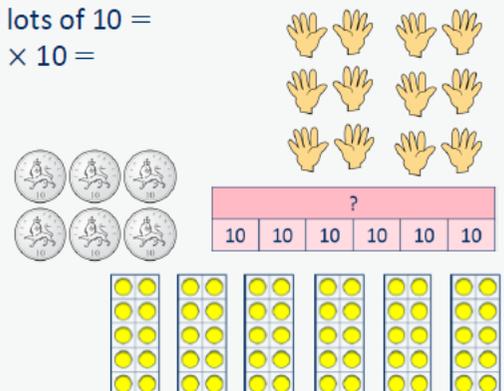
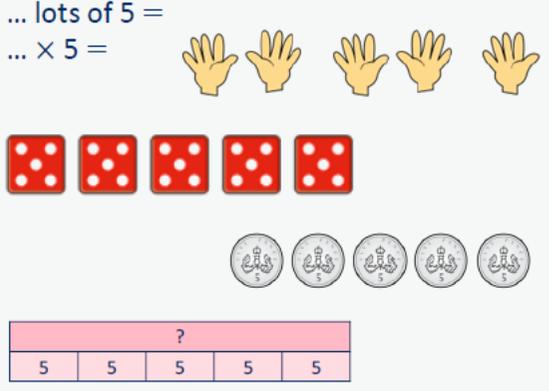
... has greater priority than ..., so the first part of the calculation I need to do is ...

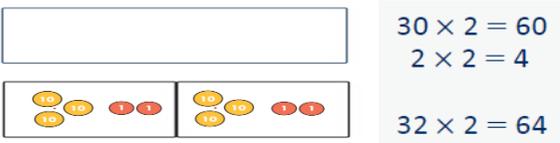
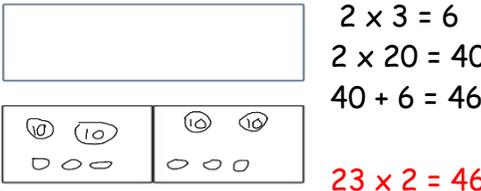
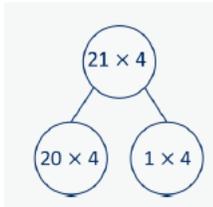
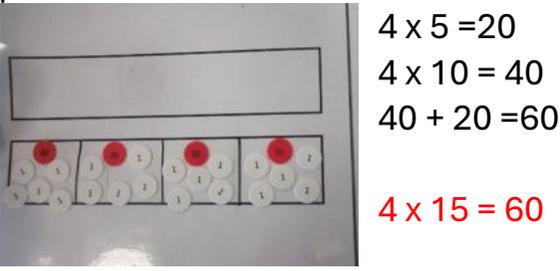
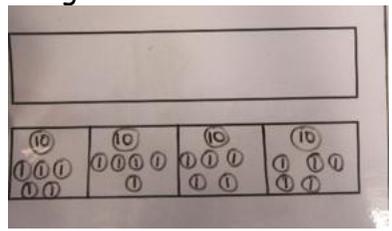
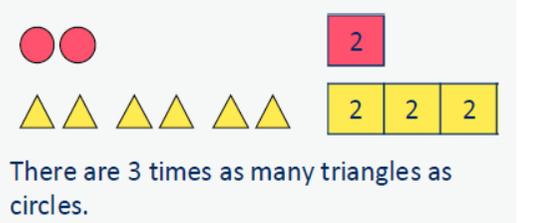
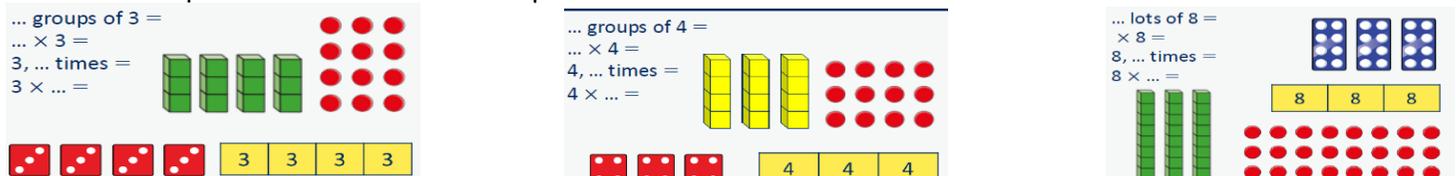
$$8 - 2 \times 3 = 2$$

$$(8 - 2) \times 3 = 18$$

$$8 - 2^2 = 4$$

Year 1 - Progression of Skills	Key representations progressing in difficulty left to right, top to bottom		
<p>Count in 2s, 5s and 10s.</p> <p>Begin by counting objects that naturally come in 2s, 5s and 10s, for example pairs of socks or fingers.</p>	<p>There are ... equal groups of ... There are ... altogether.</p> 	<p>Continue to colour in ...s What do you notice?</p> 	<p>Complete the number track/number line by counting in ...s.</p> 
<p>Add equal groups (repeated addition)</p> <p>Children should be able to write a repeated addition to represent equal groups and to draw pictures or use objects to represent a repeated addition.</p>	<p>There are ... groups of ... There are ... altogether.</p>  <p>$10 + 10 + 10 = 30$</p> <p>$5 + 5 + 5 + 5 = 20$</p>	<p>What is the same? What is different?</p> <p>$2 + 2 + 2 =$</p> <p>$5 + 5 + 5 =$</p> <p>$10 + 10 + 10 =$</p> <p>Use objects or a drawing to represent the equal groups and find how many in total.</p>	
<p>Make arrays</p> <p>Children use their knowledge of adding equal groups to arrange objects in columns and rows.</p>	<p>There are ... rows of ... There are ... altogether. There are ... columns of ... There are ... altogether.</p> 		
<p>Make doubles</p> <p>Children understand that doubles are two equal groups. Children may begin to explore doubles beyond 20 using base 10</p>	<p>Double ... is ...</p> <p>$\dots + \dots = \dots$</p> 		

Year 2 - Progression of Skills	Key representations progressing in difficulty left to right, top to bottom																															
<p>Link repeated addition and multiplication</p> <p>Encourage children to make the link between repeated addition and multiplication.</p>	<p>There are ... equal groups with ... in each group. There are ... altogether.</p>  <p>Use of bar model to show repeated grouping / repeated addition</p>  $3 \times 4 = 12$  <table border="1" data-bbox="1400 391 1657 462"> <tr><td colspan="4">20</td></tr> <tr><td>5</td><td>5</td><td>5</td><td>5</td></tr> </table> $5 + 5 + 5 + 5 = 20$ $4 \times 5 = 20$ <p>Children to have concrete manipulatives to show the groupings. Children can show pictorial images within blank bar models. Move to abstract numbers if secure.</p>			20				5	5	5	5																					
20																																
5	5	5	5																													
<p>Use arrays</p> <p>Encourage children to see that multiplication is commutative.</p>	<p>There are ... rows with ... in each row. There are ... columns with ... in each column</p> <p>Use arrays to illustrate commutativity (counters and other objects to be used)</p> $2 \times 5 = 5 \times 2$ 	<p>Children to draw own arrays</p> 	<p>Children to be able to use an array to write a range of calculations e.g.</p> $2 \times 5 = 10$ $5 \times 2 = 10$ $2 + 2 + 2 + 2 + 2 = 10$ $5 + 5 = 10$																													
<p>NB - Times tables to be taught alongside this. Year 2 to focus on 2, 5 and 10 times table. Ensure when teaching the tables for the first time, that a range of visuals and manipulatives are used see examples below.</p>																																
<p>... lots of 2 = ... \times 2 =</p>  <table border="1" data-bbox="425 1412 660 1476"> <tr><td colspan="4">?</td></tr> <tr><td>2</td><td>2</td><td>2</td><td>2</td></tr> </table>	?				2	2	2	2	<p>... lots of 10 = ... \times 10 =</p>  <table border="1" data-bbox="1064 1276 1344 1348"> <tr><td colspan="6">?</td></tr> <tr><td>10</td><td>10</td><td>10</td><td>10</td><td>10</td><td>10</td></tr> </table>	?						10	10	10	10	10	10	<p>... lots of 5 = ... \times 5 =</p>  <table border="1" data-bbox="1512 1404 1848 1468"> <tr><td colspan="5">?</td></tr> <tr><td>5</td><td>5</td><td>5</td><td>5</td><td>5</td></tr> </table>	?					5	5	5	5	5
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5	5	5	5	5																												

Year 3 - Progression of Skills	Key representations progressing in difficulty left to right, top to bottom		
<p>Multiply a 2 digit number by a 1 digit number (no exchange)</p> <p>Children apply their understanding of partitioning to represent and solve calculations using the expanded method.</p>	<p>Partition to multiply 32×2 using place value counters on a bar model</p>  <p>$30 \times 2 = 60$ $2 \times 2 = 4$ $60 + 4 = 64$</p>	<p>Children to draw counters on blank bar models pictorially. Show partitioned calculation alongside.</p>  <p>$2 \times 3 = 6$ $2 \times 20 = 40$ $40 + 6 = 46$ $23 \times 2 = 46$</p>	<p>Children to be encouraged to show the steps they have taken.</p>  <p>21×4</p> <p>20×4 1×4</p> <p>80 4</p> <p>$80 + 4 = 84$</p>
<p>Multiply a 2 digit number by a 1 digit number (with exchange)</p> <p>Children apply their understanding of partitioning to represent and solve calculations using the expanded method.</p>	<p>Partition to multiply 4×15 using place value counters on a bar model</p>  <p>$4 \times 5 = 20$ $4 \times 10 = 40$ $40 + 20 = 60$ $4 \times 15 = 60$</p>	<p>Children to draw counters on blank bar models pictorially. Show partitioned calculation alongside.</p> 	<p>Children to be encouraged to show the steps they have taken</p> <p>4×15</p> <p>$4 \times 5 = 20$ $4 \times 10 = 40$ $40 + 20 = 60$</p> <p>This is a step before formal written method. Year 3 will continue using expanded method, formal written method to be introduced Y4.</p>
<p>Scaling</p> <p>Children focus on multiplication as scaling (... times the size) as opposed to repeated addition.</p>	<p>There are times as many ... as ...</p>  <p>There are 3 times as many triangles as circles.</p>	<p>... is ... times the size of is ... times the length/height of ...</p>  <p>Miss Smith is twice the height of Jo.</p>	<p>Use bar models as visual for scaling. E.g There are 3 times as many girls as boys in a class.</p>  <p>boys </p> <p>girls </p>
<p>NB - Times tables to be taught alongside this. Year 3 to focus on 3, 6, 4 and 8 times table. Ensure when teaching the tables for the first time, that a range of visuals and manipulatives are used see examples below.</p>  <p>... groups of 3 = $\dots \times 3 =$ 3, ... times = $3 \times \dots =$</p> <p>... groups of 4 = $\dots \times 4 =$ 4, ... times = $4 \times \dots =$</p> <p>... lots of 8 = $\dots \times 8 =$ 8, ... times = $8 \times \dots =$</p>			

Year 4 - Progression of Skills **Key representations progressing in difficulty left to right, top to bottom**

NB - Times tables to be taught alongside this. Year 4 to complete all tables up to 12 x 12 and use Mastering Number KS2 alongside.

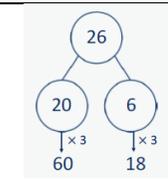
Related Facts
Use knowledge of multiplying by 10 and 100 to scale times-table facts.

... × ... ones is equal to ... ones
so ... × ... tens is equal to ... tens
and ... × ... hundreds is equal to ... hundreds.

$3 \times 7 = 21$ $7 \times 3 = 21$
 $3 \times 70 = 210$ $7 \times 30 = 210$
 $3 \times 700 = 2,100$ $7 \times 300 = 2,100$

Mental strategies
Partition 2 or 3-digit numbers to multiply using informal methods

26 × 3 - partition the 26 into 20 and 6 then multiply both parts by 3 and recombine.
 $3 \times 26 = 60 + 18 = 78$
 Use of visuals alongside to support children.
 Counters on bar models as per Y3.



Multiply a 2 or 3 digit number by a 1 digit.
The short multiplication method is introduced for the first time, initially in an expanded form.

Formal column method with place value counters or base 10. Show calculation as expanded method to begin.

T	O
10 10 10	1 1 1 1
10 10 10	1 1 1 1
10 10 10	1 1 1 1
10 10 10	1 1 1 1
10 10 10	1 1 1 1

(4 × 5)
(30 × 5)

When secure with expanded method, show formal written short division. Using counters alongside.

6 × 23

Step 1: get 6 lots of 23

Step 2: 6 × 3 is 18. Can I make an exchange? Yes! Ten ones for one ten...

Step 3: 6 × 2 tens and my extra ten is 13 tens. Can I make an exchange? Yes! Ten tens for one hundred...

Step 4- what do I have I each column?

Here each step that is taken with the concrete needs showing on the written calculation alongside. E.g. as an exchange is made show how that would look on the calculation. Carried over digit to be shown above answer line.

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

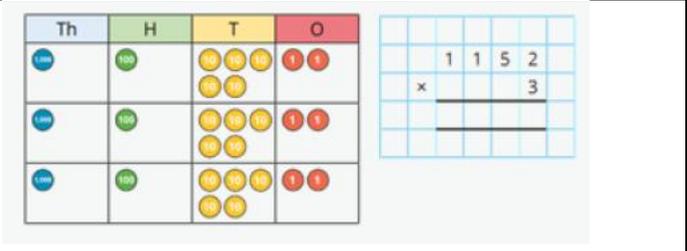
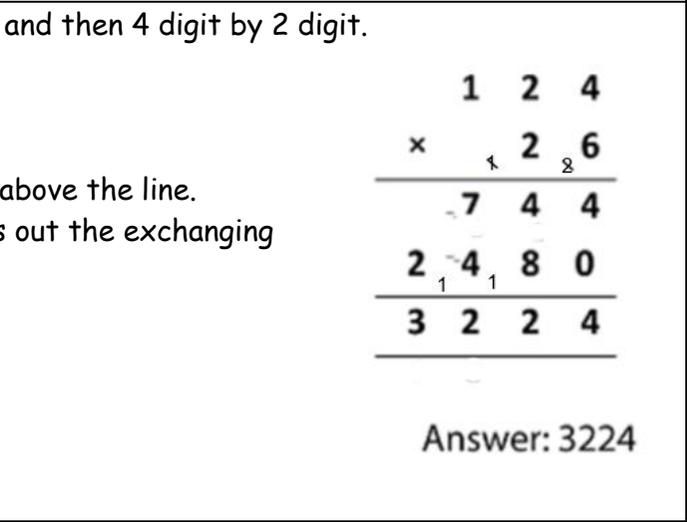
Scaling
Children focus on multiplication as scaling (... times the size).

Always use bar models as visual for scaling.

... is ... times the size of ...

A computer mouse costs £7
A keyboard costs 6 times as much.

A red ribbon is 6 cm.
A yellow ribbon is 7 times as long.

Year 5 - Progression of Skills	Key representations progressing in difficulty left to right, top to bottom	
NB – Times tables to 12 x 12 to continue to be consolidated alongside this. Use Mastering Number KS2 alongside.		
<p>Multiply numbers up to 4 digits by 1 digit This builds on the short multiplication method introduced in Y4</p>	<p>Continue to use concrete manipulatives alongside where children require them. Most children will be able to work abstractly with short multiplication.</p>	
<p>Multiply numbers up to 4 digits by 2 digit This step should only be introduced when children are confident working abstractly for short division. This will be further consolidated in Y6</p>	<p>Begin with solving 2 digit by 2 digit before exploring 3 digit by 2 digit and then 4 digit by 2 digit. To get 744 children have solved 6×124 To get 2480 they have solved 20×124</p> <p>When exchanging in the first calculation, the exchanged number goes above the line. When children start to multiply the tens or hundreds, they must cross out the exchanging from the previous calculation and write in the new exchanging.</p>	 <p style="text-align: right;">Answer: 3224</p>

Year 6 - Progression of Skills

Key representations progressing in difficulty left to right, top to bottom

Multiply numbers up to 4 digits by 2 digit
 This step should only be introduced when children are confident working abstractly for short division.

To get 744 children have solved 6×124
 To get 2480 they have solved 20×124

When exchanging in the first calculation, the exchanged number goes above the line.
 When children start to multiply the tens or hundreds, they must cross out the exchanging from the previous calculation and write in the new exchanging.

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

Answer: 3224

Multiply decimals by integers
 This is the first time children multiply decimals by numbers other than 10, 100 or 1,000
 Encourage them to make links with known facts and whole number multiplication.

I know that $\dots \times \dots = \dots$,
 so I also know that $\dots \times \dots = \dots$

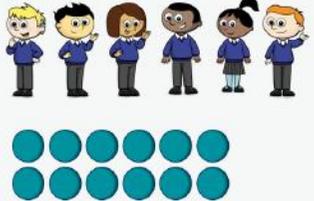
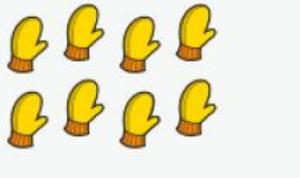
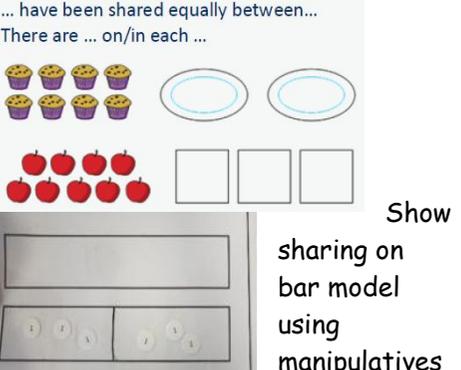
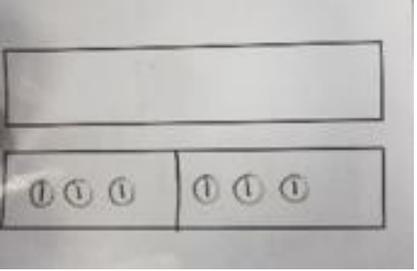
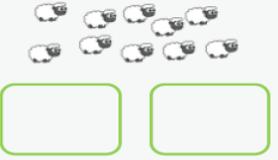
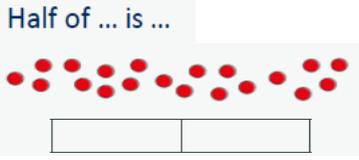
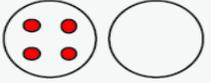
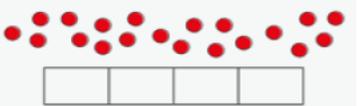
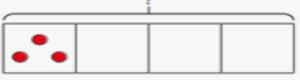
$6 \times 2 = 12$ $6 \times 0.2 = 1.2$

I need to exchange 10 ... for 1 ...

$213 \times 4 = 852$ $2.13 \times 4 = 8.52$

Division

EYFS - Progression of Skills	Key representations progressing in difficulty left to right, top to bottom
<p>Sharing Provide practical activities such as sharing items during snack time. Encourage children to check whether items have been shared fairly (equally).</p>	<p>There are ... altogether. They are shared equally between ... groups.</p> 
<p>Grouping Provide opportunities to make equal groups when tidying up or during snack time. Encourage children to check that each group has the same amount.</p>	<p>There are ... groups of ... There are ... altogether.</p> 

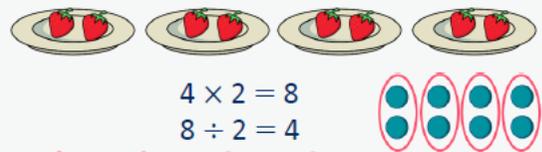
Year 1 - Progression of Skills	Key representations progressing in difficulty left to right, top to bottom		
<p>Make equal groups - grouping Encourage children to physically move objects into equal groups. They can also circle equal groups when using pictures.</p>	<p>Use concrete manipulatives There are ... altogether. How many groups of ... can you make?</p> 	<p>Move to pictorial representations Circle groups of 2 There are ... groups of 2</p> 	<p>Explore, reason and problem solve Take ... cubes. Make equal groups.</p>  <p>There are ... groups of ...</p>
<p>Make equal groups - sharing Encourage children to check that the objects have been shared fairly and each group is the same.</p>	<p>Use concrete manipulatives ... have been shared equally between... There are ... on/in each ...</p>  <p>Show sharing on bar model using manipulatives</p>	<p>Children will begin to draw own circles on bar model</p> 	<p>Explore, reason and problem solve Take ... cubes. Share them between ...</p>  <p>12 shared between ... is ...</p>
<p>Find a half Start with practical opportunities to share into 2 groups. Progress to circling half of the objects in a picture and then to finding the whole from a given half.</p>	<p>To find half, I need to share into 2 equal groups.</p>  <p>There are ... in each group.</p>	<p>Children can draw pictorial representations on blank bar model</p> <p>Half of ... is ...</p> 	<p>Problem solve, find the whole. Use concrete manipulatives If ... is half, what is the whole?</p>  <p>4 is half of ...</p>
<p>Find a quarter Start with practical opportunities to share a quantity into 4 groups. Progress to using pictures or bar models to find a quarter and then to finding the whole from a given quarter.</p>	<p>To find a quarter, I need to share into 4 equal groups.</p>  <p>There are ... in each group.</p>	<p>Children can draw pictorial representations on blank bar model</p> <p>A quarter of ... is ...</p> 	<p>Problem solve, find the whole. Use concrete manipulatives If ... is one quarter, what is the whole?</p>  <p>3 is one quarter of ...</p>

Year 2 - Progression of Skills **Key representations progressing in difficulty left to right, top to bottom**

Divide by 2
Encourage children to compare the grouping and sharing structures of division and to make links with times-table facts and halving.

Make links with 2 times table, introduce the division symbol

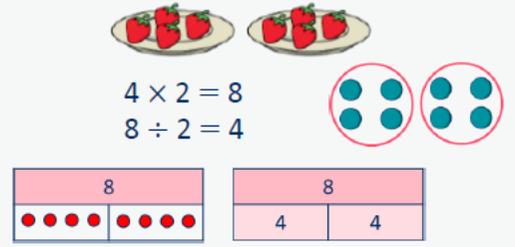
There are ... equal groups of 2
... $\div 2 = \dots$



$4 \times 2 = 8$
 $8 \div 2 = 4$

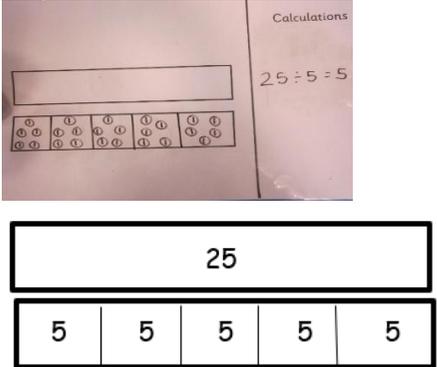
Use bar model to show sharing.

... shared equally between 2 is ...
Half of ... is ...
... $\div 2 = \dots$



$4 \times 2 = 8$
 $8 \div 2 = 4$

Children will show counters pictorially on the bar, when secure they *may* move to pictorial numbers on the bar.

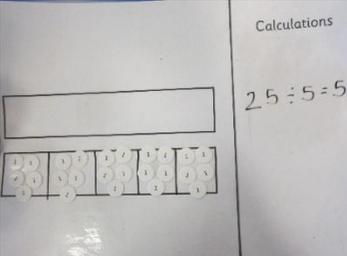


Calculations
 $25 \div 5 = 5$

All of the above to be repeated for divide by 10 and 5. To be taught when 10 and 5 times table are introduced.

Understand division as repeated grouping
Ensure children understand repeated grouping, this will help with problem solving.

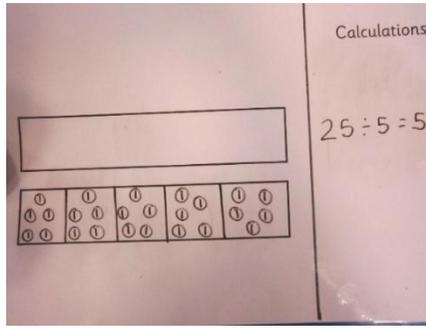
"Sam wants to pack cakes into boxes of 5. How many boxes will he need for 25 cakes?"



Calculations
 $25 \div 5 = 5$

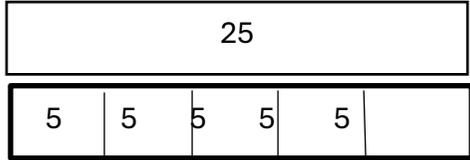
Here we are counting in 5s up to 25 to see how many lots of 5.

Children will draw counters on the bar.



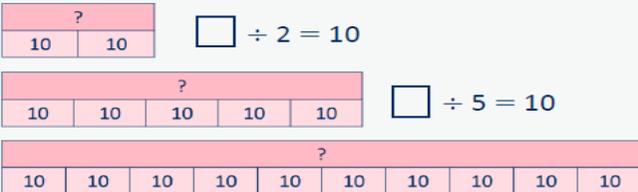
Calculations
 $25 \div 5 = 5$

Children move towards putting numbers on the bar model and using times table knowledge.

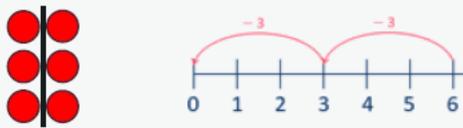
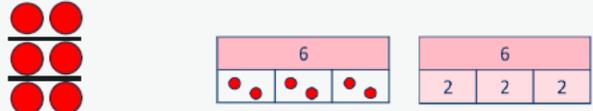
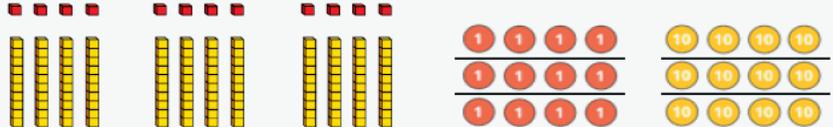
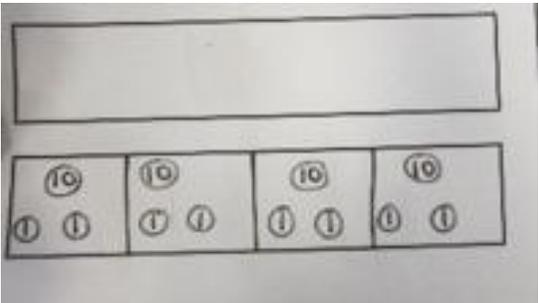


Missing Numbers
Bar models are useful to show the link between multiplication and division.

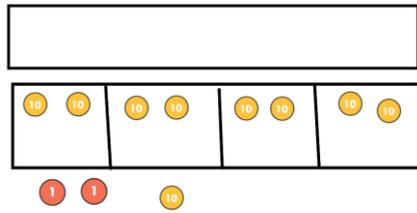
... divided by 2/5/10 is equal to ...



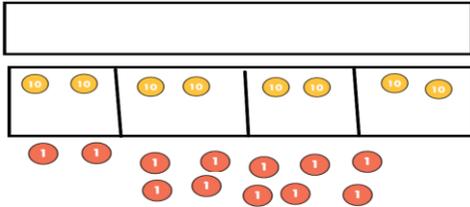
$\square \div 2 = 10$
 $\square \div 5 = 10$
 $\square \div 10 = 10$

Year 3 - Progression of Skills	Key representations progressing in difficulty left to right, top to bottom	
Divide by 3 Encourage children to compare the grouping and sharing structures of division and to make links with times-table facts.	<p>Make links with 3 times table</p> <p>There are ... groups of 3 in ...</p> <p>... \div 3 =</p>  $2 \times 3 = 6$ $6 \div 3 = 2$ 	<p>... has been shared equally into 3 equal groups.</p> <p>... \div 3 =</p>  $2 \times 3 = 6$ $6 \div 3 = 2$ 
All of the above to be repeated for divide by 6, 4 and 8. To be taught when those times table are introduced.		
Related facts Link to known times-table facts.	<p>... \div ... is equal to ..., so ... tens \div ... is equal to ... tens.</p>  $12 \div 3 = 4$ $120 \div 3 = 40$	
Divide a 2 digit by a 1 digit - no exchange Partition into tens and ones to divide and then recombine.	<p>$48 \div 4 = 12$ Partition the 48 into 40 and 8 and share out the tens and ones on bar model. Show partitioned calculation alongside.</p> <p>$40 \div 4 = 10$</p> <p>$8 \div 4 = 2$</p> <p>$10 + 2 = 12$ $48 \div 4 = 12$</p> 	Children will then move to showing pictorially on bar model 
Divide a 2 digit by a 1 digit - with remainders	<p>$92 \div 4 = 23$ Carry out steps as above, first share out the 9 tens, to show there is one left over</p>	Introduce remainders at the end of the calculation using the same steps as previous. Children to record the remainder as r3 etc.

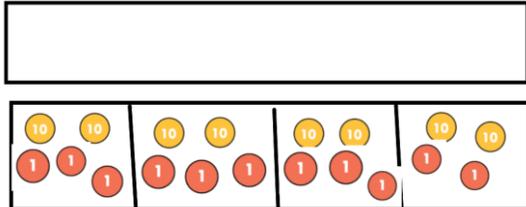
Partition into tens and ones to divide. Exchange tens for ones using base ten or PV counters



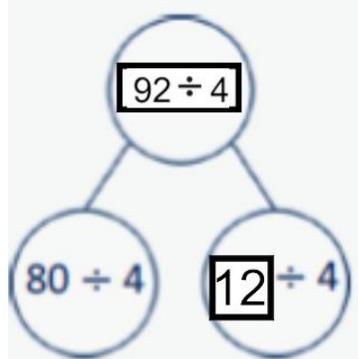
Exchange the one ten for ten ones. Teacher to use the language of exchange but not show as a carried over digit on bus stop



Then divide the remaining 12 ones across the bar model.



Record the flexible partitioning. Children should record this as they go through the steps e.g. recording the 80 after recognising that 8 tens were used rather than the 9.



$$80 \div 4 = 20$$

$$12 \div 4 = 3$$

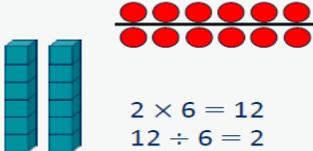
$$92 \div 4 = 23$$

Year 4 - Progression of Skills

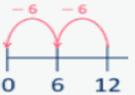
Key representations progressing in difficulty left to right, top to bottom

Division facts to 12 x 12
Encourage children to compare the grouping and sharing structures of division and to make links with times-table facts.

There are ... groups of ... in ...
... ÷ ... =

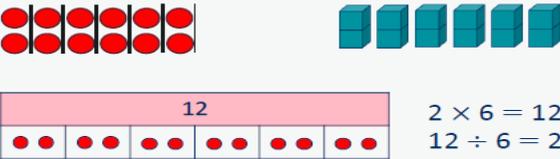


2 × 6 = 12
12 ÷ 6 = 2



0 6 12

... has been shared equally into ... equal groups.
... ÷ ... =



2 × 6 = 12
12 ÷ 6 = 2

Related facts
Link to known times-table facts.

... ÷ ... is equal to ...
so ... tens ÷ ... is equal to ... tens
and ... hundreds ÷ ... is equal to ... hundreds.

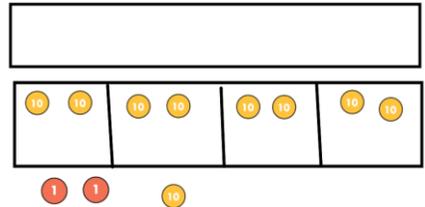


21 ÷ 7 = 3 21 ÷ 3 = 7
210 ÷ 7 = 30 210 ÷ 3 = 70
2,100 ÷ 7 = 300 2,100 ÷ 3 = 700

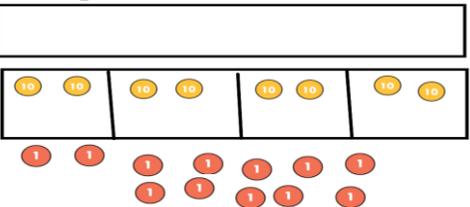
Divide a 2 or 3-digit number by a 1-digit number
Progress from divisions with no exchange, to divisions with exchange and then divisions with remainders.

As a first step, follow same method as Y3 of partitioning the numbers into tens and ones or hundreds, tens and ones. Children should be fairly secure with this method using 2 digit numbers. Show expanded calculations **NOT** bus stop.

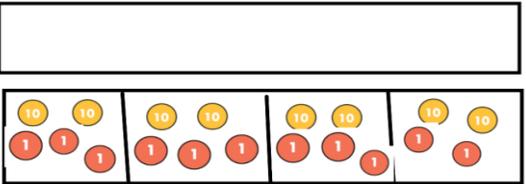
92 ÷ 4 = 23 Carry out steps as above, first share out the 9 tens, to show there is one left over



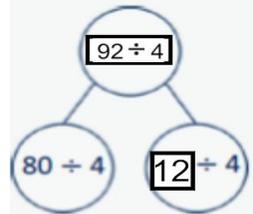
Exchange the one ten for ten ones. Teacher to use the language of exchange but not show as a carried over digit on bus stop



Then divide the remaining 12 ones across the bar model.



Record the flexible partitioning. Children should record this as they go through the steps e.g. recording the 80 after recognising that 8 tens were used rather than the 9.



$$80 \div 4 = 20$$

$$12 \div 4 = 3$$

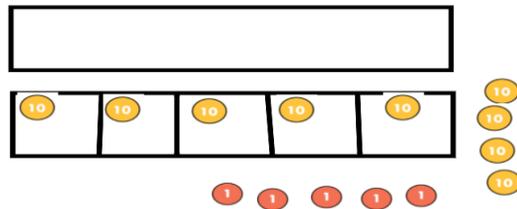
$$92 \div 4 = 23$$

Divide a 2 or 3-digit number by a 1-digit number

Introduce the bus stop method alongside the bar model for the first time.

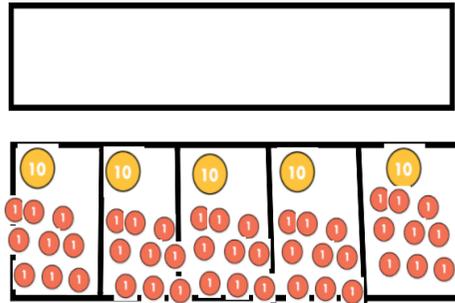
Repeat steps above using bar model and sharing the place value counters, now show the bus stop method alongside, every step that is made on the bar should be shown step by step on the bus stop alongside so that eventually children can work purely abstract.

Step 1 - $95 \div 5$ First partition into 90 and 5, share out the 9 tens across the bar. There are 4 tens left over. Record the 1 ten on top of bus stop, exchange the remaining tens for ones and show as carried over digit on bus stop.



$$\begin{array}{r} 1 \\ 5 \overline{) 95} \end{array}$$

Step 2 - divide the 45 ones across the bar model to show 9 in each box. Record on bus stop. Make links with known times table facts as you teach this to help children be able to move towards a more abstract approach.

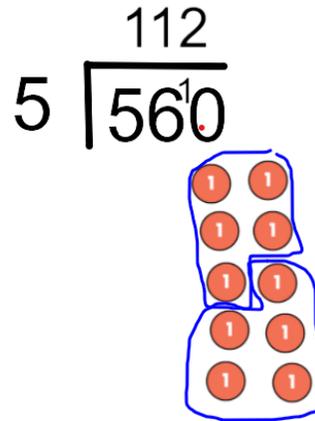
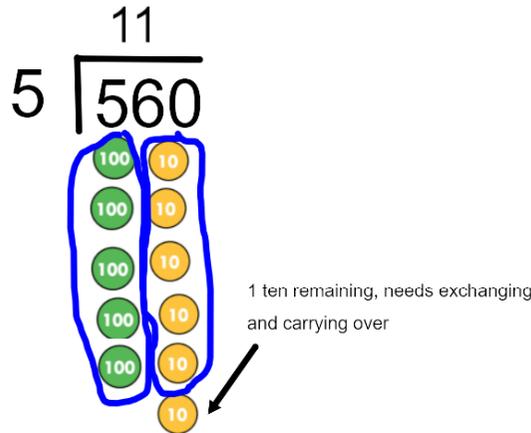


$$\begin{array}{r} 19 \\ 5 \overline{) 95} \end{array}$$

Divide a 2 or 3-digit number by a 1-digit number

This next step to only be used when children are secure with the fact that when dividing the tens we can use times table knowledge but they are actually tens or hundreds etc.

Next stage would be using bus stop but with grouping counters under the bus stop. Use language of how many groups of 5 can I get from 6 tens? Group the tens into 5s and record number of groups above on bus stop. Repeat for ones.



This will then develop into children drawing their own grouping of counters pictorially under the bus stop

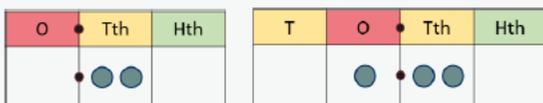
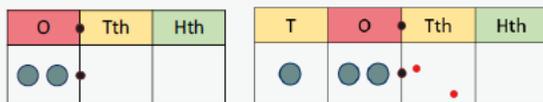
After lots of practical experience, children will naturally move away from the need to draw groupings as they understand the method and will complete the bus stop method abstractly using times table knowledge. Showing carried over digits.

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

Divide by 10 and 100

Encourage children to notice that dividing by 100 is the same as dividing by 10 twice.

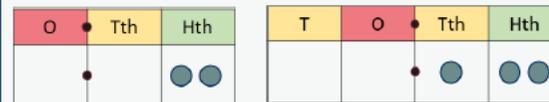
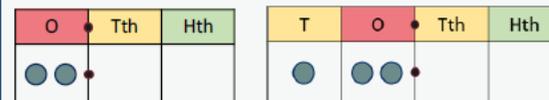
When I divide by 10, the digits move 1 place value column to the right.
... is one-tenth the size of ...



$$2 \div 10 = 0.2$$

$$12 \div 10 = 1.2$$

When I divide by 100, the digits move 2 place value columns to the right.
... is one-hundredth the size of ...



$$2 \div 100 = 0.02$$

$$12 \div 100 = 0.12$$

Year 5 - Progression of Skills

Key representations progressing in difficulty left to right, top to bottom

Divide numbers up to 4 digits by 1 digit
Use short division method

Start by re-capping method developed in Y4 of grouping counters under the bus stop. Some children may be able to work abstractly without the grouping of counters.



Move to abstract method when secure, showing carried over digits.

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

This to be repeated with 4 digits with and without remainders. When recording remainders. Children to write as 15 r3 etc.

Divide by 10, 100, 1000

Encourage children to notice that dividing by 100 is the same as dividing by 10 twice, and that dividing by 1,000 is the same as dividing by 10 three times.

To divide by 10/100/1,000, I move all the digits ... places to the right.
... is one-tenth/one-hundredth/one-thousandth the size of ...

Th	H	T	O	Tth	Hth
	●	●●		●	
		●	●●	●	
			●	●●	●
				●	●●

$$120 \div 10 = 12$$

$$120 \div 100 = 1.2$$

$$120 \div 1,000 = 0.12$$

Short division including with decimal numbers.

Children should be confident working abstractly with short division with whole numbers leaving a remainder. Children to be taught how short division can be used to show remainders as a decimal.

All whole numbers could be written with decimal and zeros e.g. 36 can be written as 36.000. If a remainder is left at the end of a calculation, add the decimal with zero and carry over the remainder to create a decimal answer.

$$5 \overline{) 64} \text{ r } 4 \quad \text{becomes} \quad 5 \overline{) 64.0}$$

Long Division Formal method shown for the first time.

Long Division Step by Step

$8,640 \div 15$

Step one – Write out the multiples of what we are dividing by. In this example, 15. We will refer to this throughout the calculation.

15
30
45
60
75
90
105
120

Step two – Divide

How many 15s go into 8?
Zero, so now look at it as a 2 digit number.
How many 15s go into 86?
By looking at our multiples list, we can see that 15 goes into 86, 5 times. Answer goes on top.

$$15 \overline{) 8640}$$

$$15 \overline{) 8640} \quad 5$$

Step three – What multiple did I get to?

From the list of multiples, we can see that we got to the multiple 75. Write this underneath.

$$15 \overline{) 8640} \quad 5$$

$$75$$

Step four – Subtract

Subtract 75 from 86 (this would be what would be carried over in short division but we now work downwards in long division). $86 - 75 = 11$

$$15 \overline{) 8640} \quad 5$$

$$- 75$$

$$11$$

Step five – Bring down

Bring down the next digit, which in this case is 4.

$$15 \overline{) 8640} \quad 5$$

$$75 \quad \downarrow$$

$$114$$

Step six – Repeat from step two – Divide

How many 15s go into 114?
Using the multiples list we can see that it goes in 7 times. Write on the top.
What multiple did I get to? 105.
Write underneath.
Subtract.

$$15 \overline{) 8640} \quad 57$$

$$75 \quad \downarrow$$

$$114$$

$$- 105$$

$$9$$

Step seven – Bring down the next digit.

Repeat the steps from step two all over again. For this calculation there is no remainder. As 90 is a multiple of 15.
If this final number to divide is not a multiple from the list, you would end up with a remainder after the final subtraction.

$$15 \overline{) 8640} \quad 576$$

$$75 \quad \downarrow$$

$$114$$

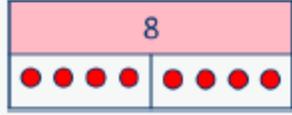
$$- 105$$

$$90$$

$$90$$

$$00$$

Fractions, decimals and percentages

Year 1- Progression of Skills	Key representations progressing in difficulty left to right, top to bottom		
<p>Recognise half of a quantity</p>	<p>Lots of practical experience, outdoor learning etc of splitting groups of objects into half, sharing out equally into 2 groups. Look at options that have been incorrectly split in half. Is this half?</p>	<p>Use concrete manipulatives/counters to find half using bar model.</p> 	<p>Children will move towards, drawing own counters on blank bars, many will be able to mentally half smaller numbers.</p>
<p>Find a quarter Start with practical opportunities to share a quantity into 4 groups. Progress to using pictures or bar models to find a quarter and then to finding the whole from a given quarter.</p>	<p>As above, Lots of practical experience, outdoor learning etc of splitting groups of objects into 4 equal groups (quarters). Look at options that have been incorrectly split in quarters.</p>	<p>Use concrete manipulatives/counters to find quarter using bar model.</p> 	<p>Deepen understanding through reasoning of finding the whole.</p> <p>If ... is one quarter, what is the whole?</p>  <p>3 is one quarter of ...</p>

Year 2 - Progression of Skills

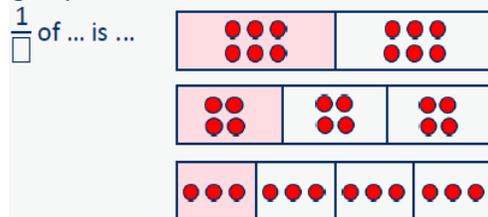
Key representations progressing in difficulty left to right, top to bottom

Unit fractions

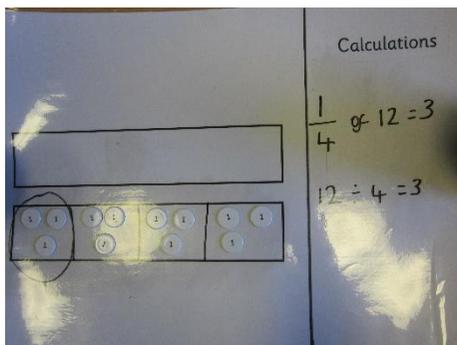
In Y2 the focus is on finding $\frac{1}{2}$, $\frac{1}{4}$ and $\frac{1}{3}$

Bar models are useful to show the link between division and finding a fraction.

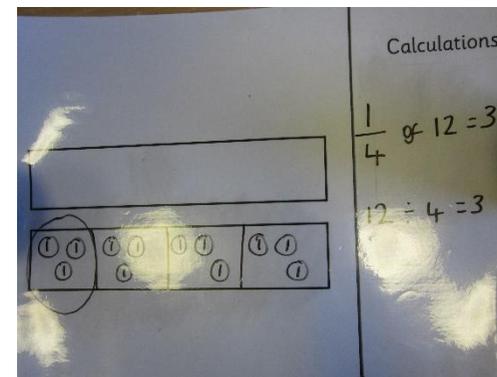
The objects have been shared fairly into ... groups.



Use counters on bar models – write calculation alongside.



Children will draw counters on the bar.

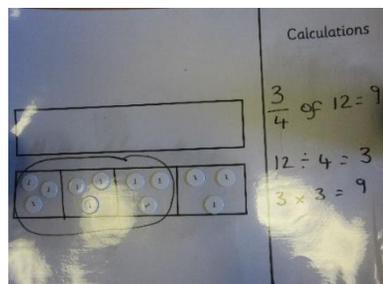


Non-unit fractions

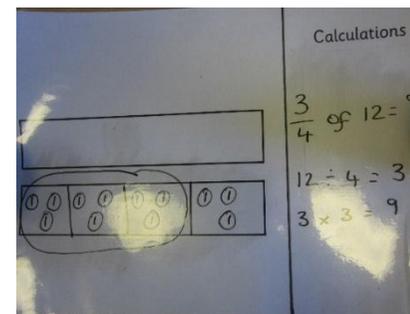
In Y2 the focus is on finding $\frac{2}{4}$ and $\frac{3}{4}$

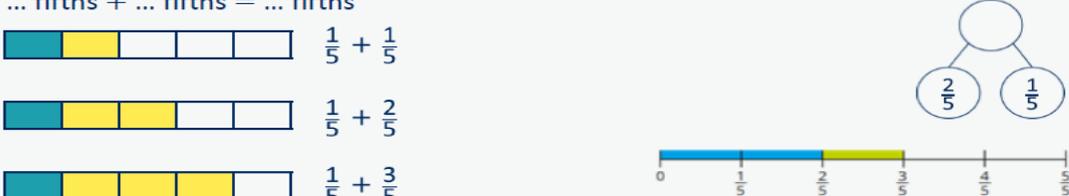
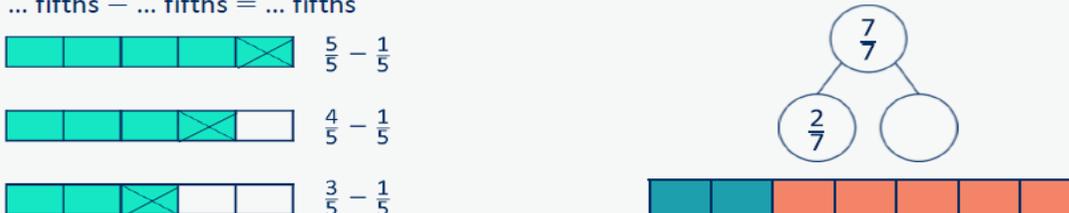
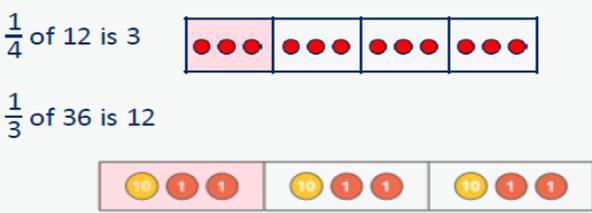
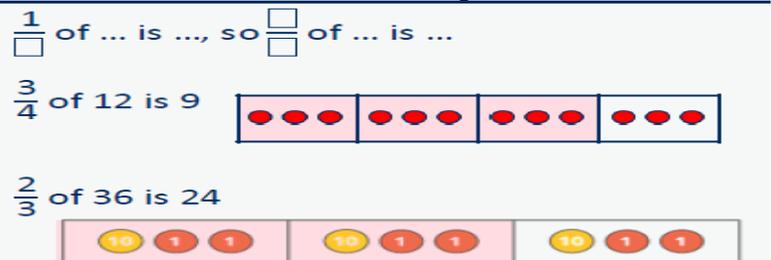
Prompt children to notice that $\frac{2}{4}$ is equivalent to $\frac{1}{2}$

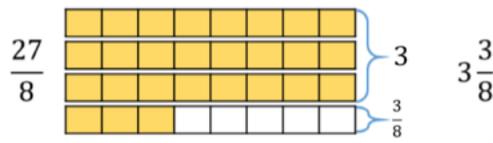
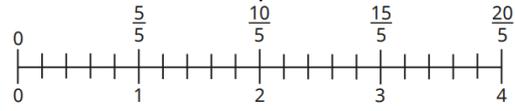
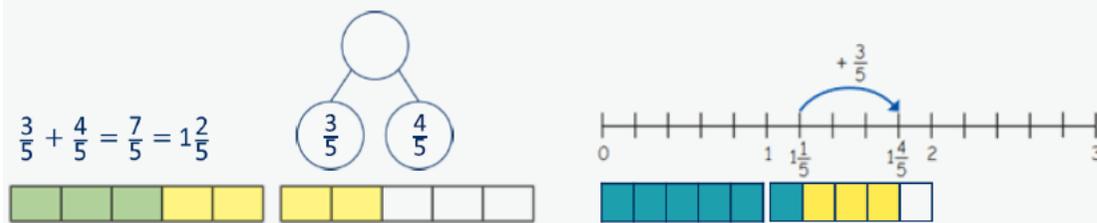
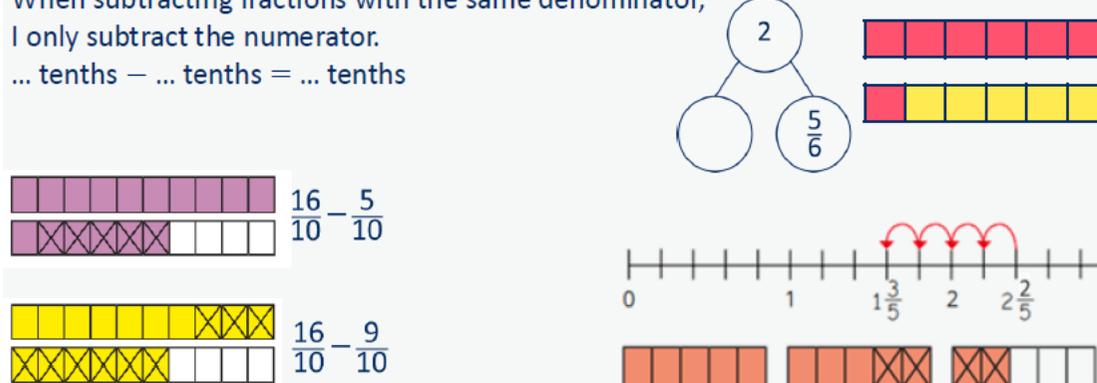
Children will move onto finding more than one part. The bar model will help to focus them on how many parts to look at.



Children will draw counters on the bar.



Year 3 - Progression of Skills	Key representations <i>progressing in difficulty left to right, top to bottom</i>	
<p>Add fractions with the same denominator within 1 whole Make links with known facts.</p>	<p>When adding fractions with the same denominator, I only add the numerator. ... fifths + ... fifths = ... fifths</p> 	<p>Draw/show bars alongside to show the fifths, thirds etc. Children can visually see the fraction parts that they are adding together.</p>
<p>Subtract fractions with the same denominator within 1 whole Make links with known facts.</p>	<p>When subtracting fractions with the same denominator, I only subtract the numerator. ... fifths - ... fifths = ... fifths</p> 	<p>Show bars alongside, children can cross out the fraction parts being subtracted.</p>
<p>Unit fractions of a set of objects Bar models are useful to show the link between division and fractions, for example, dividing by 3 and finding a third.</p>	<p>Children build on methods used in Y2 on bar model to now find unit fractions of larger numbers. First partition into tens and ones and then split across the bar.</p> 	<p>Eventually children will recognise that $\frac{1}{4}$ is dividing by 4 and use their x table knowledge. $\frac{1}{4}$ of 12 = $12 \div 4 = 3$</p>
<p>Non-unit fractions of a set of objects Bar models are a useful representation and show the links with division and multiplication.</p>	<p>As above, children will now use larger numbers to find non-unit fractions.</p> 	

Year 4 - Progression of Skills	Key representations progressing in difficulty left to right, top to bottom		
<p>Convert mixed numbers to improper fractions and vice versa</p>	<p>Use bar models to show the wholes pictorially.</p> 	<p>Numberlines will develop understanding further, these can be used with the visual of bars added if required.</p> 	<p>Eventually, children will recognise link with times tables and division and work abstractly.</p> $\frac{27}{8} = 27 \div 8 = 3 \text{ r } 3 = 3\frac{3}{8}$ $3\frac{3}{8} = 3 \times 8 + 3 = \frac{27}{8}$
<p>Add fractions and mixed numbers with the same denominator beyond 1 whole</p>	<p>When adding fractions with the same denominator, I only add the numerator. ... fifths + ... fifths = ... fifths</p> 		<p>Draw/show bars alongside to show the fifths, thirds etc. Children can visually see the fraction parts that they are adding together</p>
<p>Subtract fractions and mixed numbers with the same denominator Include subtracting fractions from wholes.</p>	<p>When subtracting fractions with the same denominator, I only subtract the numerator. ... tenths - ... tenths = ... tenths</p> 		<p>Show bars alongside, children can cross out the fraction parts being subtracted.</p>

Year 5 - Progression of Skills

Key representations progressing in difficulty left to right, top to bottom

Year 5 to consolidate adding and subtracting fractions and mixed numbers as per year 4 before moving on to the below.

Add fractions with denominators that are a multiple of one another
Encourage children to convert fractions to the same denominator before adding.
Progress from adding fractions within 1 whole to adding fractions beyond 1 whole.

The denominator has been multiplied by ..., so the numerator needs to be multiplied by... for the fractions to be equivalent.

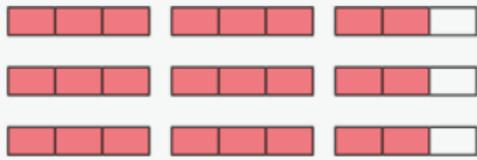
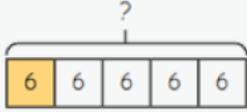
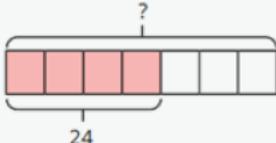
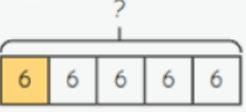
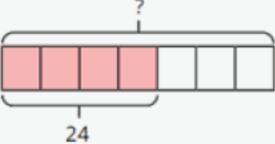
Subtract fractions with denominators that are a multiple of one another
Convert fractions to the same denominator before subtracting. Progress from subtracting fractions within 1 whole to subtracting from a mixed number.

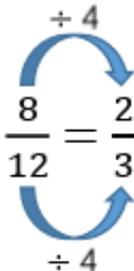
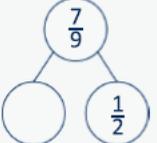
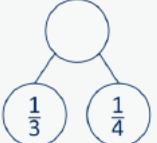
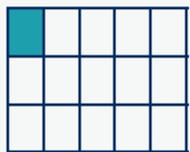
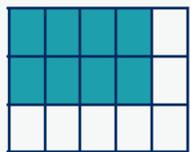
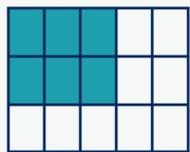
The denominator has been multiplied by ..., so the numerator needs to be multiplied by... for the fractions to be equivalent.

Multiply fractions by a whole number
Make links with repeated addition.
E.g. $\frac{1}{5} \times 4 = \frac{1}{5} + \frac{1}{5} + \frac{1}{5} + \frac{1}{5}$

$\frac{1}{6} \times 4$

Denominator stays the same and you multiply the numerator by the whole number

<p>Multiply mixed number by a whole number</p>	 $2\frac{2}{3} \times 3$ $2 \times 3 = 6 \quad \frac{2}{3} \times 3 = \frac{6}{3} = 2$ $2\frac{2}{3} \times 3 = 6 + 2 = 8$	<p>Partition into whole number and fraction. Multiply the whole numbers, multiply the fraction and recombine.</p>
<p>Find the whole Multiply to find the whole from a given part.</p>	<p>If $\frac{1}{\square}$ is ... , then the whole is ... \times ...</p> <p>$\frac{1}{5}$ of ___ = 6</p>  $5 \times 6 = 30$ $\frac{1}{5} \text{ of } 30 = 6$	<p>If $\frac{\square}{\square}$ is ... , then $\frac{1}{\square}$ is ... and the whole is ... \times ...</p> <p>$\frac{4}{7}$ of ___ = 24</p>  $\frac{1}{7} = 24 \div 4 = 6$ $7 \times 6 = 42$ $\frac{4}{7} \text{ of } 42 = 24$
<p>Fraction of an amount Bar models support children to understand that to find a fraction of an amount, we divide by the denominator and multiply by the numerator.</p>	<p>Drawing own bar models helps to visualise.</p> <p>If $\frac{1}{\square}$ is ... , then the whole is ... \times ...</p>  $\frac{1}{5} \text{ of } _ = 6$  $\frac{4}{7} \text{ of } _ = 24$	<p>Children will divide by the fraction amount then \times by how many parts. (This is quite a complex abstract method so should be used only when full understanding is evident).</p>

<p>Year 6 - Progression of Skills</p>	<p>Key representations progressing in difficulty left to right, top to bottom</p>
<p>Add and subtract fractions Convert fractions to the same denominator before adding. Progress from fractions where one denominator is a multiple of the other, to any fractions and then to mixed numbers.</p>	<p>Find a common denominator using the method below and change the fractions accordingly. Then add or subtract them. If the answer is an improper fraction, convert it into a mixed number.</p> <div style="text-align: center;">  </div> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;">  <p>$\frac{7}{9} - \frac{1}{2} = \frac{14}{18} - \frac{9}{18} = \frac{5}{18}$</p> </div> <div style="text-align: center;">  <p>$\frac{1}{3} + \frac{1}{4} = \frac{4}{12} + \frac{3}{12} = \frac{7}{12}$</p> </div> </div> <div style="text-align: right; margin-top: 10px;"> <p>The lowest common multiple of ... and ... is ...</p>  </div>
<p>Multiply fractions by fractions Encourage children to give answers in their simplest form.</p>	<p>When multiplying a pair of fractions, I need to multiply the numerator and multiply the denominator.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>$\frac{1}{3} \times \frac{1}{5} = \frac{1}{15}$</p> </div> <div style="text-align: center;">  <p>$\frac{2}{3} \times \frac{4}{5} = \frac{8}{15}$</p> </div> <div style="text-align: center;">  <p>$\frac{2}{3} \times \frac{3}{5} = \frac{6}{15} = \frac{2}{5}$</p> </div> </div>

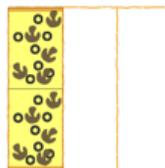
Divide a fraction by an integer

This is the first time children divide fractions by an integer.

Use visuals to help children understand what dividing a fraction

What is $\frac{1}{3} \div 2$?

This is $\frac{1}{3}$ of a pizza.



What does $\frac{1}{3} \div 2$ mean?

It means divide the $\frac{1}{3}$ into 2 equal pieces.

This is $\frac{1}{3} \div 2$

What fraction is this part?



It is $\frac{1}{6}$ of the whole pizza.

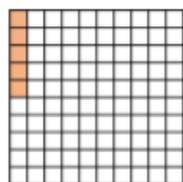
looks like

Once children understand what is happening with the numbers, they will recognise they can work abstractly.

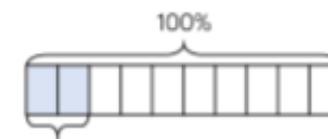
$$\frac{1}{3} \div 2 = \frac{1}{2} \text{ of } \frac{1}{3} = \frac{1}{2} \times \frac{1}{3} = \frac{1 \times 1}{2 \times 3} = \frac{1}{6}$$

Understanding percentages as fractions

Use base ten resources to recognise percent means out of 100.



Pictorial	Parts per hundred	Percentage
	There are 51 parts per hundred.	
		75%



Calculate percentages

Children first learn how to find 1%, 10%, 20%, 25% and 50% before using multiples of these amounts to find any percentage.

There are ... lots of ... % in 100%
To find ... %, I need to divide by ...

100%			
50%		50%	
25%	25%	25%	25%

50% of ... = ... \div 2

25% of ... = ... \div 4

... % is made up of ... %, and ... %

100%									
10%	10%	10%	10%	10%	10%	10%	10%	10%	10%

To find 30%, I can find 10% and then multiply it by 3

To find 23%, I can use $10\% \times 2$ and $1\% \times 3$

To find 99%, I can find 1%, then subtract from 100%

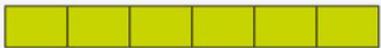
Calculations involving ratio

Encourage children to see the multiplicative relationship between ratios. They will need to multiply or divide each value by the same number to keep the ratio equivalent. Double number lines and ratio tables help children to see both horizontal and vertical multiplicative relationships.

Encourage children to draw comparison bars to help visualise the ratios. Numbers can then be added to the blocks

For every 1 adult on a school trip, there are 6 children.

adults 

children 

The ratio of adults to children is 1 : 6

If there are 5 adults, how many children?

For every 1 adult on a school trip, there are 6 children.

adults 

children  =30

Children will move towards abstractly multiplying or dividing each side of the ratio by same amount.

	Adults	Children
$\times 6$	1	6
$\times 3$	2	12
$\times 3$	3	18
$\times 6$		