CHACEWATER SCHOOL

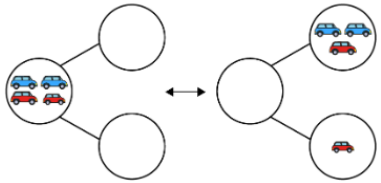
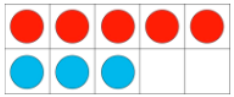
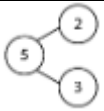
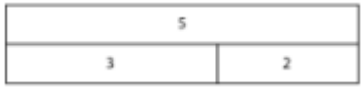
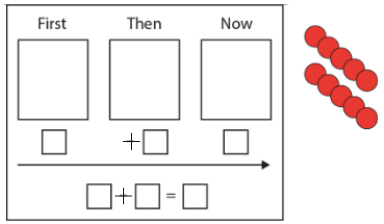
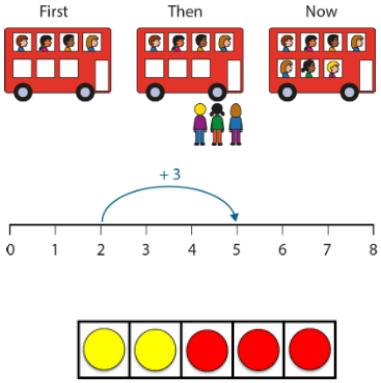
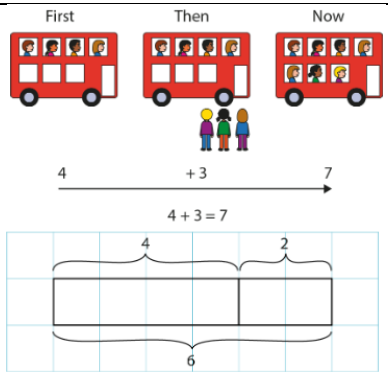
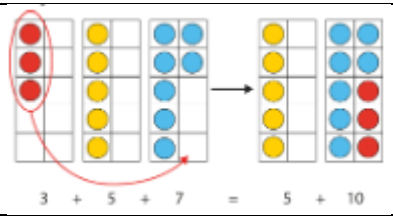
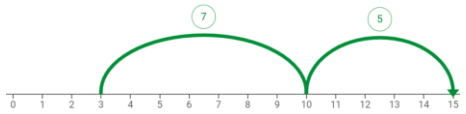
Calculation Guidance

Addition – National Curriculum

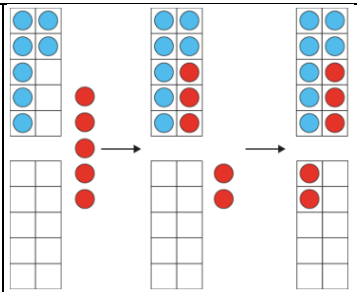
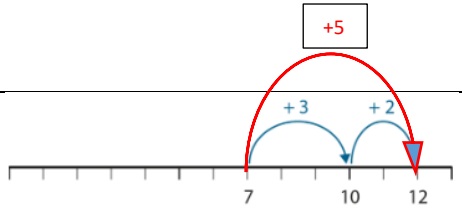
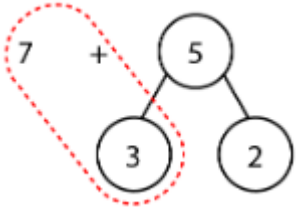
EYFS	Number • Have a deep understanding of number to 10, including the composition of each number. • Subitise (recognise quantities without counting) up to 5. • Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts. Numerical Patterns • Verbally count beyond 20, recognising the pattern of the counting system. • Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity. • Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.
Year 1	• read, write and interpret mathematical statements involving addition (+) and equals (=) signs – THIS MEANS THE SAME AS – relate this to balance number sentences and scales • represent and use number bonds and related subtraction facts within 20 • add one-digit and two-digit numbers to 20, including zero • solve one-step problems that involve addition, using concrete objects and pictorial representations, and missing number problems such as 9 = □ + 7.
Year 2	• solve problems with addition: • using concrete objects and pictorial representations, including those involving numbers, quantities and measures • applying their increasing knowledge of mental and written methods • recall and use addition facts to 20 fluently, and derive and use related facts up to 100 • add numbers using concrete objects, pictorial representations, and mentally, including: • a two-digit number and ones • a two-digit number and tens • two two-digit numbers • adding three one-digit numbers • show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot • recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems
Year 3	• add numbers mentally, including: • a three-digit number and ones • a three-digit number and tens • a three-digit number and hundreds • add numbers with up to three digits, using formal written methods of columnar addition • estimate the answer to a calculation and use inverse operations to check answers • solve problems, including missing number problems, using number facts, place value, and more complex addition.
Year 4	• add with up to 4 digits using the formal written methods of columnar addition where appropriate

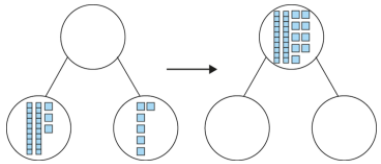
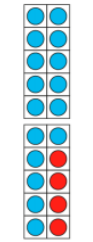
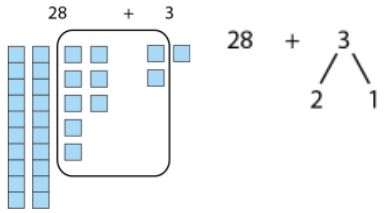
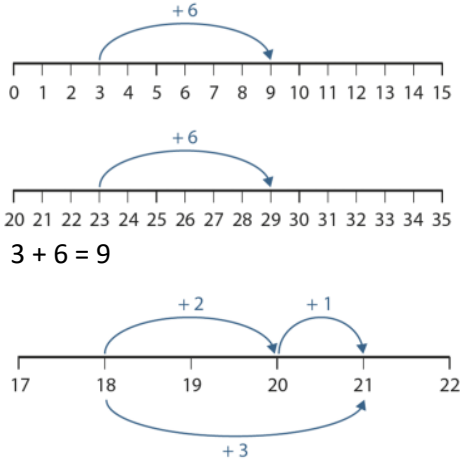
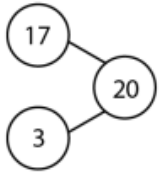
	• estimate and use inverse operations to check answers to a calculation • solve addition two-step problems in contexts, deciding which operations and methods to use and **why.**
Year 5	• add whole numbers with more than 4 digits, including using formal written methods (columnar addition) • add numbers mentally with increasingly large numbers • use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy • solve addition multi-step problems in contexts, deciding which operations and methods to use and why.
Year 6	• solve addition multi-step problems in contexts, deciding which operations and methods to use and why

Addition

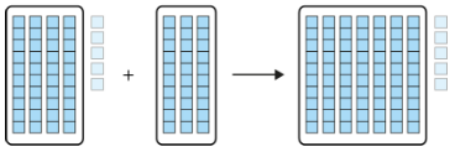
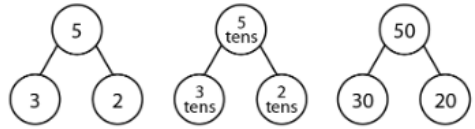
Stem sentences	Concrete (Can we make it?)	Pictorial (Can we draw it?)	Abstract (Can we write the equation?)
__ is the whole, __ is a part, __ is a part. __ = __ plus __ and __ plus __ = __ There are __ in total. **Year R/1**	  3 + 4 = 7 7 = 3 + 4 4 + 3 = 7 7 = 4 + 3  5 + 3 = 8 8 = 5 + 3 3 + 5 = 8 8 = 3 + 5	 3 + 2 = 5 2 + 3 = 5 5 = 3 + 2 5 = 2 + 3	 2 + 3 = 5 3 + 2 = 5 5 = 2 + 3 5 = 3 + 2 Bar model 
First… Then… Now… e.g. **First** there were 4 children on the bus, **then** 3 children got on. **Now** there are 7 children on the bus. **Year R/1**	Role play getting 'on the bus' or use a toy bus. 	 4 + 3 = 7 2 + 3 = 5	 4 + 2 = 6
We can look for pairs of addends which sum to 10. __ plus __ is equal to 10, then 10 plus __ is equal to __. **Year 2**			3 + 5 + 7 = 3 + 7 + 5 = 10 + 5 = 15

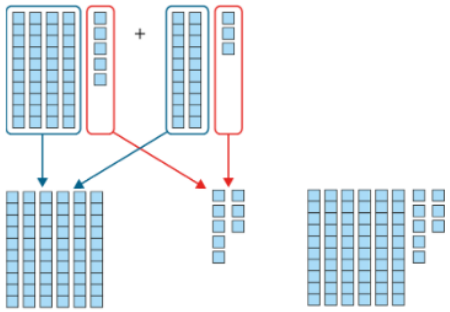
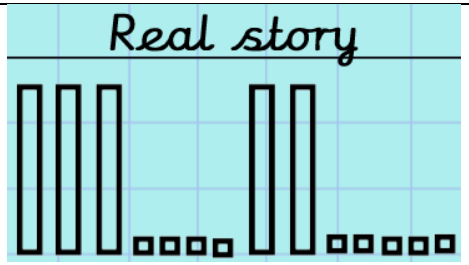
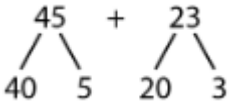
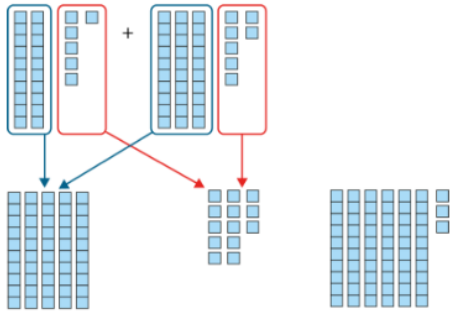
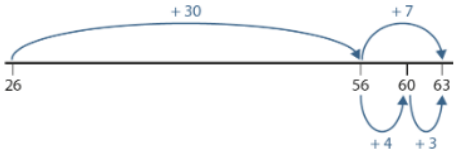
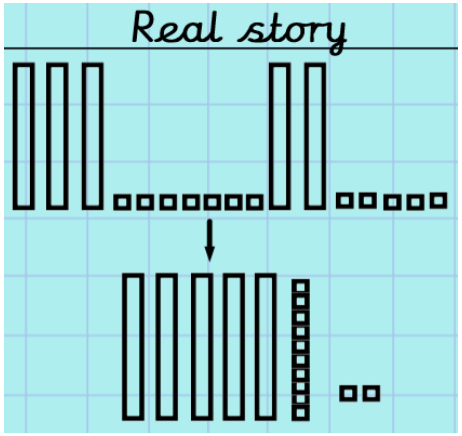
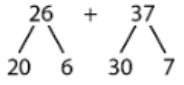
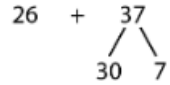
<table>
<tr>
<td>First I partition the __: __ plus __ is equal to __.
Then __ plus __ is equal to ten …
and ten plus __ is equal to __.

Year 2</td>
<td> 
7 + 5 =
7 + 3 = 10
10 + 2 = 12</td>
<td> 
7 + 5 =
7 + 3 = 10
10 + 2 = 12</td>
<td> 
7 + 3 = 10
10 + 2 = 12</td>
</tr>
<tr>
<td>I know that __ plus __ is equal to __. (single-digit fact)
So __ plus __ is equal to __. (related two-digit plus single digit fact)
I know that __ plus __ is equal to ten so __ plus __ is equal to __.

Year 2</td>
<td> 
3 + 6 = 9
23 + 6 = 29
 
16 + 4 = 20
  </td>
<td> 
3 + 6 = 9
23 + 6 = 29</td>
<td> 
17 + 3 = 20</td>
</tr>
<tr>
<td>I know that __ plus __ is equal to __.
So __ tens plus __ tens is equal to __ tens.

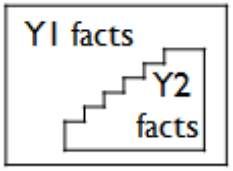
__ tens and __ ones, plus __ tens is equal to __ tens and __ ones.

Year 2</td>
<td> 
40 + 30 = 70 so 45 + 30 = 75</td>
<td> 
45 + 30 = 75</td>
<td> 
2 + 3 = 5
2 tens + 3 tens = 5 tens
20 + 30 = 50</td>
</tr>
</table>

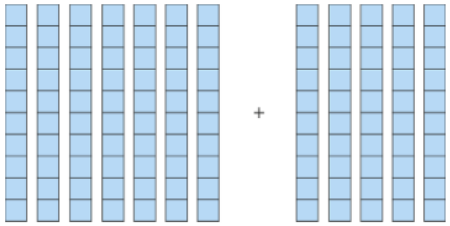
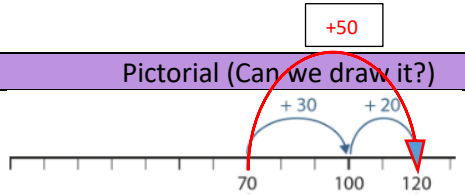
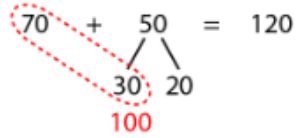
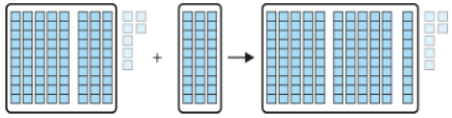
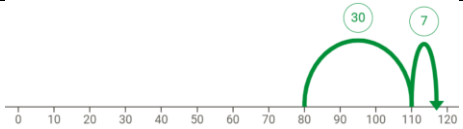
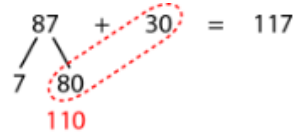
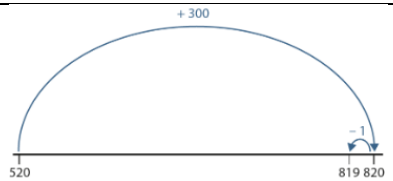
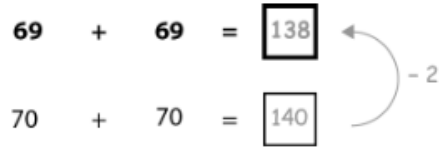
First I partition the __ into __ and __, and the __ into __ and __. __ plus __ is equal to __... (addition of the tens) __ plus __ is equal to __... (addition of the ones) and __ plus __ is equal to __. (addition of the tens and ones) So __ plus __ is equal to __. (summary of the overall calculation) **Year 2**	 45 + 23 = 60 + 8 = 68	 34 + 25 =	 40 + 20 = 60 5 + 3 = 8 60 + 8 = 68 Link to Y3 method if ready 45 +23 8 (5 +3) 60 (40 + 20) 68
First I partition the __ into __ and __, and the __ into __ and __. __ plus __ is equal to __... (addition of the tens) __ plus __ is equal to __... (addition of the ones) and __ plus __ is equal to __. (addition of the tens and ones) So __ plus __ is equal to __. (summary of the overall calculation) **Year 2**	 26 + 37 = 50 + 13 = 63	 26 + 30 = 56 56 + 7 = 63  37 + 25 = 62	 20 + 30 = 50 6 + 7 = 13 50 + 13 = 63 **or**  26 + 30 = 56 56 + 7 = 63

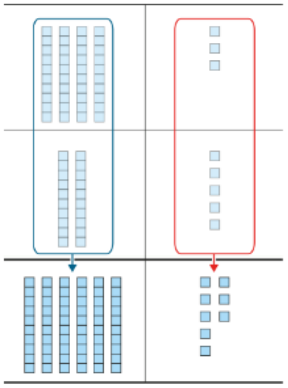
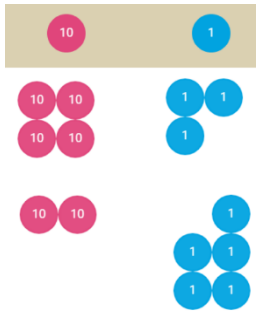
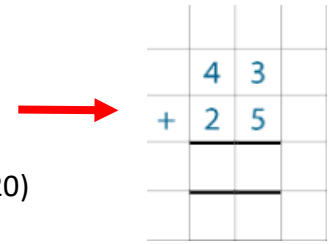
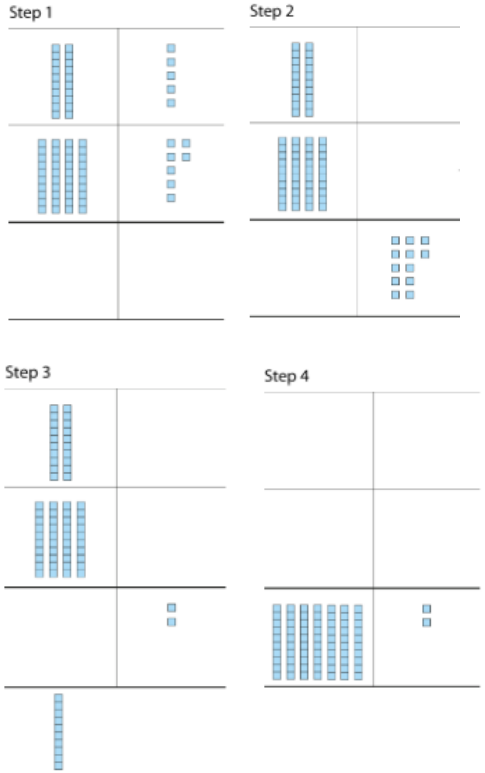
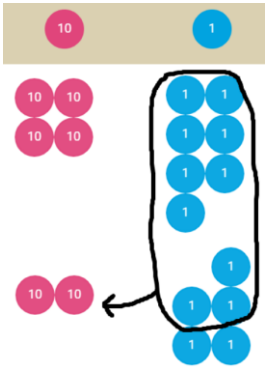
KS1 Addition Facts – These should be regularly practiced by the children in order to achieve automatic recall.

Adding 1	Bonds to 10	Adding 10	Bridging/compensating
Adding 2	Adding 0	Doubles	Near doubles



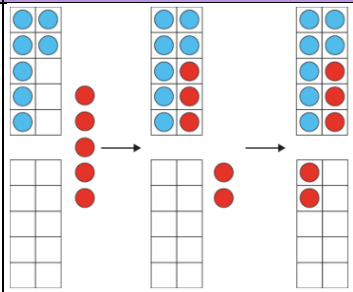
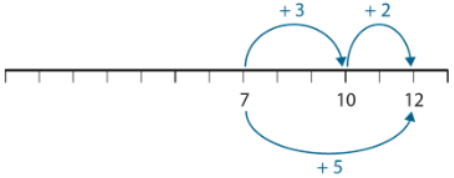
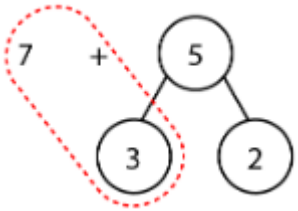
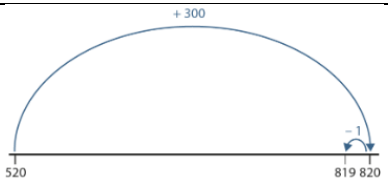
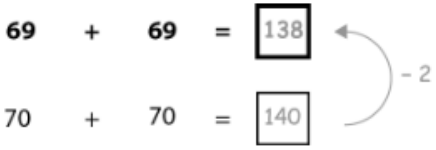
+	0	1	2	3	4	5	6	7	8	9	10
0	0 + 0	0 + 1	0 + 2	0 + 3	0 + 4	0 + 5	0 + 6	0 + 7	0 + 8	0 + 9	0 + 10
1	1 + 0	1 + 1	1 + 2	1 + 3	1 + 4	1 + 5	1 + 6	1 + 7	1 + 8	1 + 9	1 + 10
2	2 + 0	2 + 1	2 + 2	2 + 3	2 + 4	2 + 5	2 + 6	2 + 7	2 + 8	2 + 9	2 + 10
3	3 + 0	3 + 1	3 + 2	3 + 3	3 + 4	3 + 5	3 + 6	3 + 7	3 + 8	3 + 9	3 + 10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

Stem sentences	Concrete (Can we make it?)	Pictorial (Can we draw it?)	Abstract (Can we write the equation?)
I know that __ plus __ is equal to __. (single-digit addends) So __ tens plus __ tens is equal to __ tens. (multiple-of-ten addends) __ plus __ is equal to one hundred and __. **Year 3**	 7 + 5 = 12 7 tens + 5 tens = 12 tens 70 + 50 = 120	 70 + 50 = 70 + 30 = 100 100 + 20 = 120	 70 + 50 = 70 + 30 + 20 = 100 + 20 = 120
I know that __ plus __ is equal to __. (single-digit addends) So __ tens plus __ tens is equal to __ tens. (multiple-of-ten addends) __ plus __ is equal to one hundred and __. **Year 3**	 87 + 30 = 110 + 7 = 117	 87 + 30 = 80 + 30 + 7 = 110 + 7 = 117	 87 + 30 = 80 + 7 + 30 = 110 + 7 = 117
First we add: __ plus __ is equal to __ … … then we adjust: __ minus __ is equal to __. **Year 3**	 35 + 49 = 34 + 50 = 84	 520 + 299 = 520 + 300 = 820 820 – 1 = 819	

We line up the ones; __ ones plus __ ones. We line up the tens: __ tens plus __ tens. The __ is in the ones column – it represents __ ones. The __ is in the ones column – it represents __ ones. __ ones plus __ ones is equal to __ ones. The __ is in the tens column – it represents __ tens. The __ is in the tens column – it represents __ tens. __ tens plus __ tens is equal to __ tens. In column addition we start at the right-hand side. **Year 3/4**	Start with two-digit numbers to exemplify lining up the columns. 	Children could draw place value counters. 	Start with two-digit numbers to exemplify lining up the columns. 43 +25 8 (3 +5) 60 (40 + 20) 68  Extend the same method to look at three-digit numbers.
If the column sum is equal to ten or more, we must exchange. **Year 3/4**	Start with two-digit numbers to exemplify the regrouping. 	Children could draw place value counters. 	Start with two-digit numbers to exemplify the regrouping. 2 5 + 4 7 2 1 2 5 + 4 7 7 2 1 567 +233 800 1 1

If the column sum is equal to ten or more, we must exchange. **Year 4**	See Year 3/4 examples	See Year 3/4 examples	6,584 + 2,739 9,323 1 1 1 £24.55 + £17.82 £42.37 1 1
If the column sum is equal to ten or more, we must exchange. **Years 5 and 6**	See Year 3 examples	See Year 3/4 examples	As in Year 4 but using numbers with more than 4 digits, adding more than two numbers and adding decimal numbers. 43432 +25648 31234 100314 111111

Addition – **Key mental strategies** for Key Stage 2

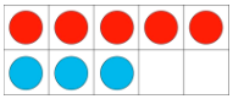
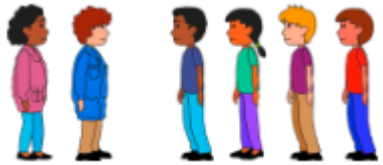
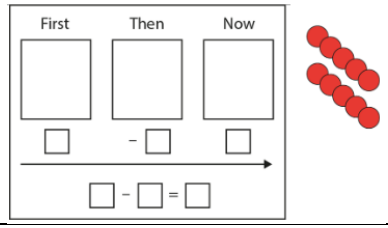
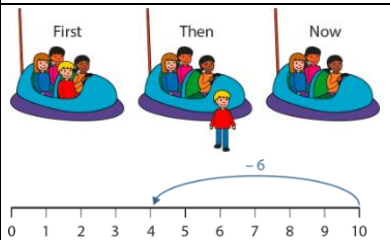
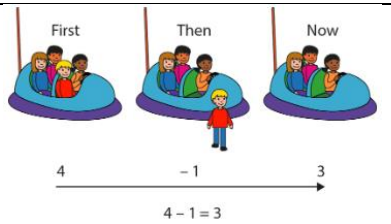
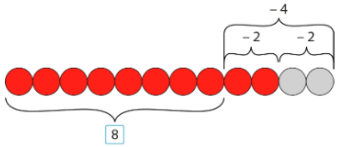
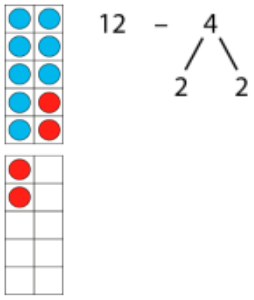
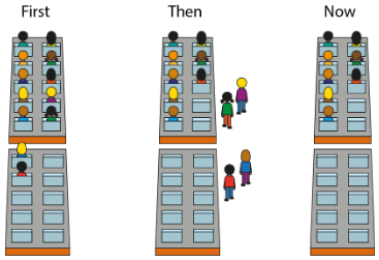
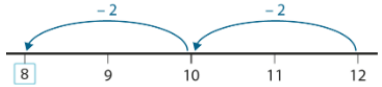
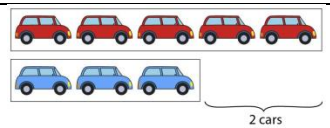
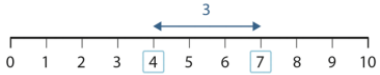
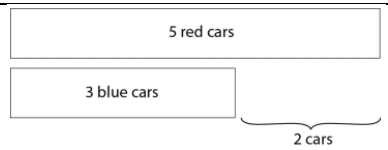
Strategy	Concrete (Can we make it?)	Pictorial (Can we draw it?)	Abstract (Can we write the equation?)
Bridging through a multiple of 10, 100, etc **Years 3, 4, 5 and 6**	 7 + 5 = 7 + 3 = 10 10 + 2 = 12	 7 + 5 = 7 + 3 = 10 10 + 2 = 12	 7 + 3 = 10 10 + 2 = 12
Compensating – rounding to the nearest multiple 10, 100, etc and adjusting **Years 3, 4, 5 and 6**	 35 + 49 = 34 + 50 = 84	 520 + 299 = 520 + 300 = 820 820 – 1 = 819	

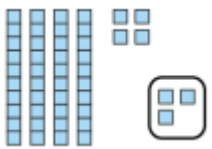
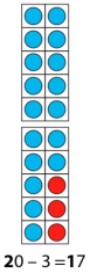
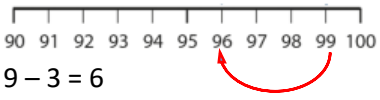
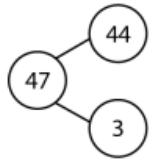
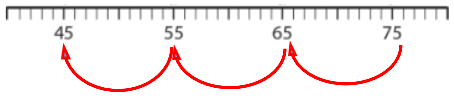
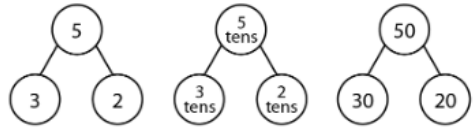
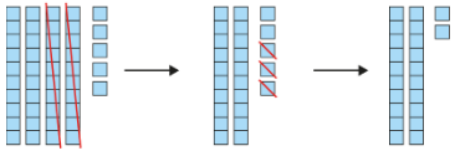
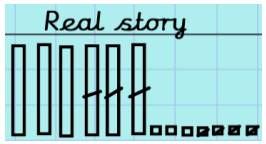
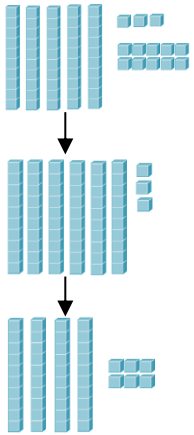
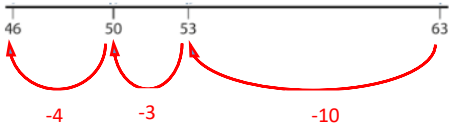
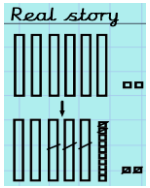
Subtraction – National Curriculum

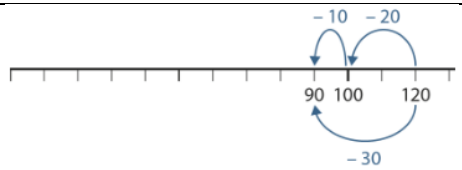
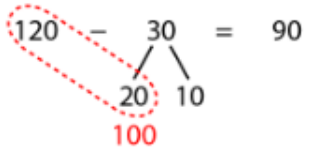
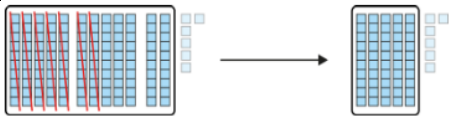
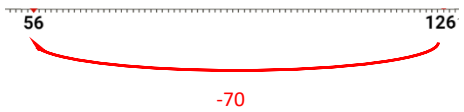
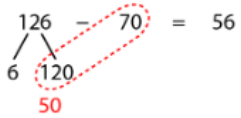
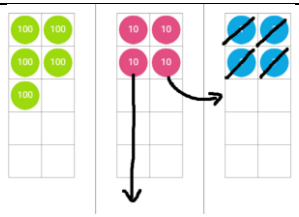
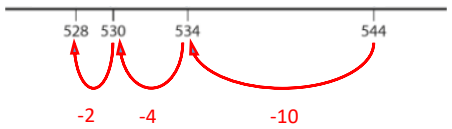
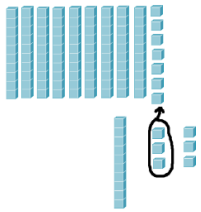
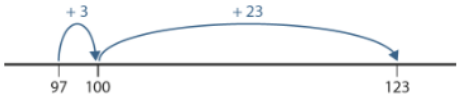
EYFS	Number • Have a deep understanding of number to 10, including the composition of each number. • Subitise (recognise quantities without counting) up to 5. • Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts. Numerical Patterns • Verbally count beyond 20, recognising the pattern of the counting system. • Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity. • Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.
Year 1	• read, write and interpret mathematical statements involving subtraction (-) and equals (=) signs • represent and use number bonds and related subtraction facts within 20 • subtract one-digit and two-digit numbers to 20, including zero • solve one-step problems that involve subtraction, using concrete objects and pictorial representations, and missing number problems such as 9 = □ - 7.
Year 2	• solve problems with subtraction: • using concrete objects and pictorial representations, including those involving numbers, quantities and measures • applying their increasing knowledge of mental and written methods • recall and use subtraction facts to 20 fluently, and derive and use related facts up to 100 • subtract numbers using concrete objects, pictorial representations, and mentally, including: • a two-digit number and ones • a two-digit number and tens • two two-digit numbers • subtracting three one-digit numbers • show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot • recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems
Year 3	• subtract numbers mentally, including: • a three-digit number and ones • a three-digit number and tens • a three-digit number and hundreds • a three-digit number and thousands • subtract numbers with up to three digits, using formal written methods of columnar subtraction • estimate the answer to a calculation and use inverse operations to check answers • solve problems, including missing number problems, using number facts, place value, and more complex subtraction.
Year 4	• subtract with up to 4 digits using the formal written methods of columnar subtraction where appropriate

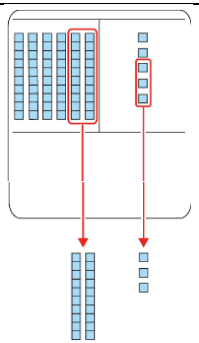
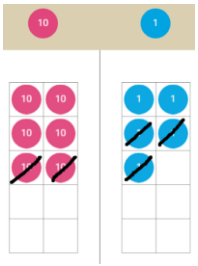
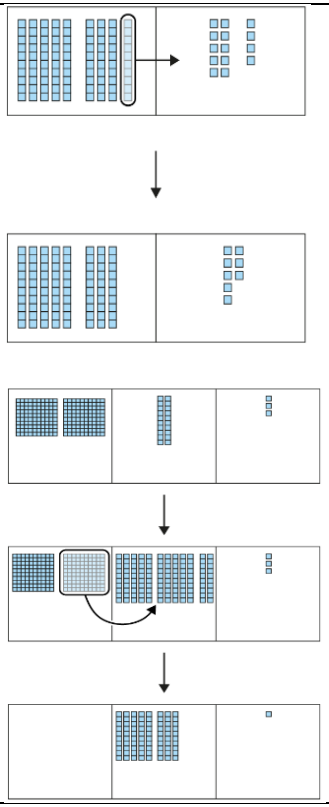
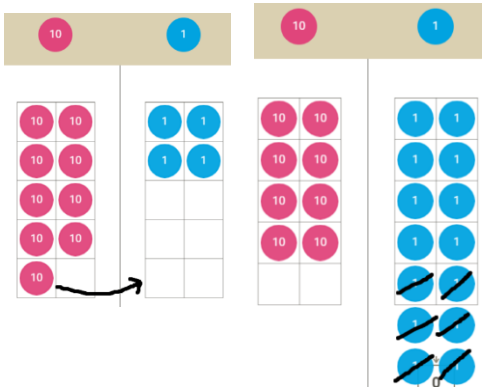
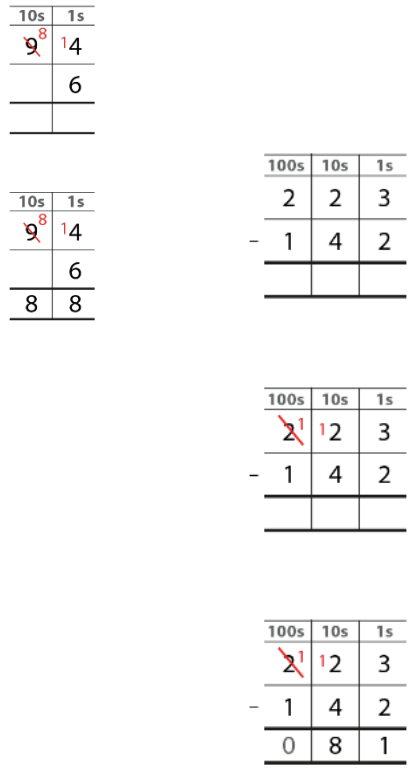
	• estimate and use inverse operations to check answers to a calculation • solve subtraction two-step problems in contexts, deciding which operations and methods to use and why.
Year 5	• subtract whole numbers with more than 4 digits, including using formal written methods (columnar subtraction) • subtract numbers mentally with increasingly large numbers • use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy • solve subtraction multi-step problems in contexts, deciding which operations and methods to use and why.
Year 6	• solve subtraction multi-step problems in contexts, deciding which operations and methods to use and why

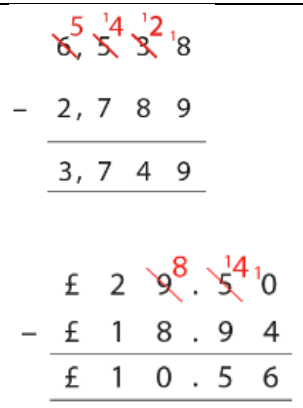
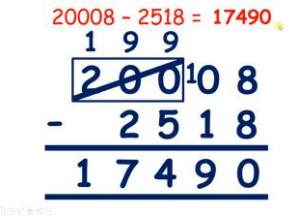
Subtraction

Stem sentences	Concrete (Can we make it?)	Pictorial (Can we draw it?)	Abstract (Can we write the equation?)
__ is the whole, __ is a part, __ is a part. __ = __ minus __ and __ minus __ = __ **Year R/1**	I have 8 counters. 5 counters are red. How many are blue? 	There are 6 children. 2 have their coat on. How many do not have their coat on? 	There are 8 flowers. 2 are red and the rest are yellow. How many are yellow?  8 – 2 = 6
First… Then… Now… e.g. **First** there were 4 children in the car, **then** 1 child got out. **Now** there are 3 children in the car. **Year R/1**	Role play 'getting out of a car'.  	 4 - 1 = 3 3 = 4 – 1 10 – 6 = 4	
We partition the __ into __ and __. First we subtract the __ from __ to get to 10. Then we subtract the remaining __ from 10. We know 10 minus __ is equal to __. **Year 2**	 12 – 4 = 12 – 2 = 10 10 – 2 = 8  	First there were 12 children on the ride. Then 4 got off. Now there are 8 children on the ride.  	 12 – 4 = 12 – 2 = 10 10 – 2 = 4
There are more __ than __. There are fewer __ than __. The difference between __ and __ is __. **Year 2**	 The difference between 2 and 5 is 3. The difference between 5 and 2 is 3.	 The difference between 4 and 7 is 3. The difference between 7 and 4 is 3.	 5 – 3 = 2

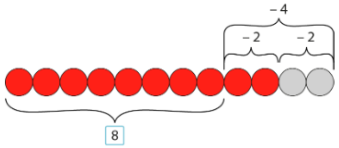
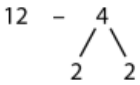
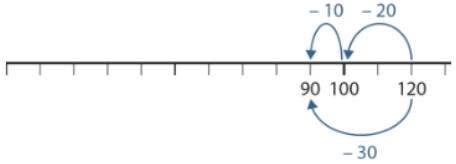
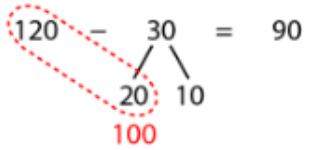
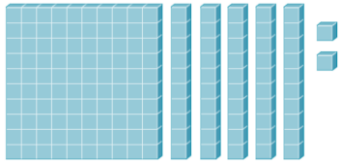
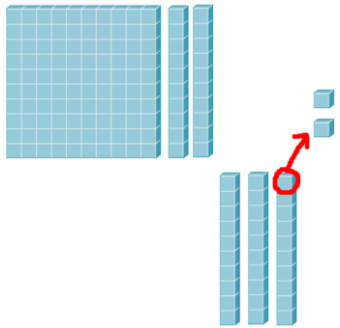
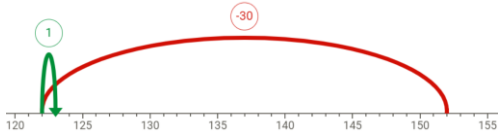
I know that __ minus __ is equal to __. (single-digit fact) So __ minus __ is equal to __. (related two-digit minus single digit fact) I know that ten minus __ is equal to __ so __ minus __ is equal to __. **Year 2**	 7 – 3 = 4 47 – 3 = 44  20 – 3 = 17	 9 – 3 = 6 99 – 3 = 96 -3	 47 – 3 = 44
I know that __ minus __ is equal to __. So __ tens minus __ tens is equal to __ tens. **Year 2**	 70 – 30 = 40 so 75 – 30 = 45	 75 – 30 = 45	 5 – 3 = 2 5 tens – 3 tens = 2 tens 50 – 30 = 20
First I subtract the tens, then I subtract the ones. **Year 2**	 45 – 23 = 45 – 20 = 25 25 – 3 = 22	67 – 34 = 33 	45 – 23 = 22
First I subtract the tens, then I subtract the ones. **Year 2**		 62 – 34 = 28 	63 – 17 = 46

I know that __ minus __ is equal to __. (bridging ten) So __ tens minus __ tens is equal to __ tens. (bridging ten tens) One hundred and __ minus __ is equal to __. **Year 3**	See Year 2 (bridging)	 120 – 30 = 120 – 20 = 100 100 – 10 = 90	 120 – 30 = 120 – 20 = 100 100 – 10 = 90
I know that __ minus __ is equal to __. (bridging ten) So __ tens minus __ tens is equal to __ tens. (bridging ten tens) One hundred and __ minus __ is equal to __. **Year 3**	 126 – 70 = 56		 126 – 70 = 120 – 70 + 6 = 50 + 6 = 56
We partition the __ into __ and __. First we subtract the __ from __ to get to a multiple of 10. Then we subtract the remaining __ from the multiple of 10. We know 10 minus __ is equal to __ so __ minus __ is equal to __. **Year 3**		544 – 16 	Count back to multiples of 10/100
We partition the __ into __ and __. First we add the __ to __ to get to 100. Then we add the remaining __ to 100. We know 100 plus __ is equal to __. **Year 3**		 123 – 97 = 26	Count on to multiples of 10/100

We line up the ones; __ ones plus __ ones. We line up the tens: __ tens plus __ tens. The __ is in the ones column – it represents __ ones. __ ones minus __ ones is equal to __ ones. The __ is in the tens column – it represents __ tens. __ tens minus __ tens is equal to __ tens. In column subtraction we start at the right-hand side. **Year 3**		Children could draw place value counters. 	6 5 − 2 3 4 2 4 6 2 − 2 5 1
If there is an insufficient number to subtract from in a given column, we must exchange from the column to the left. **Year 4**		Children could draw place value counters. 	

If there is an insufficient number to subtract from in a given column, we must exchange from the column to the left. **Year 4**	See Year previous examples	See previous examples	
If there is an insufficient number to subtract from in a given column, we must exchange from the column to the left. **Years 5 and 6**	See Year 3/4 examples	See Year 3/4 examples	As in Year 4 but using numbers with more than 4 digits Using numbers with decimals. Using multiple exchanges across 0. 

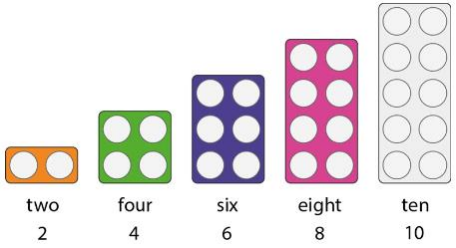
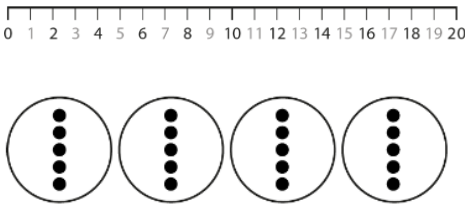
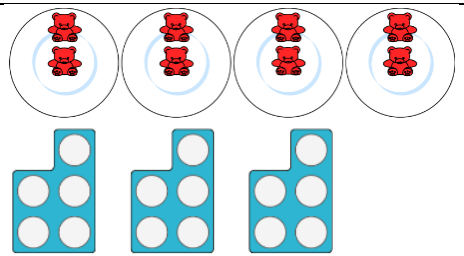
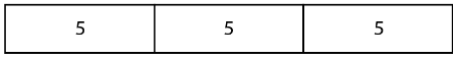
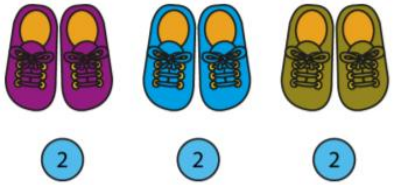
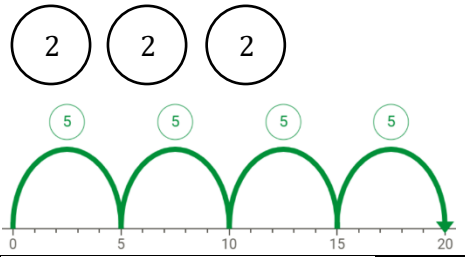
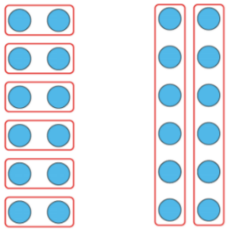
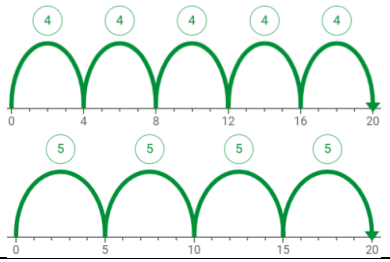
Subtraction – **Key mental strategies** for Key Stage 2

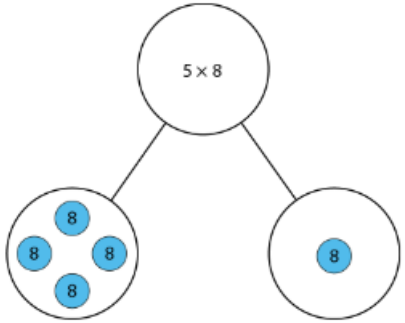
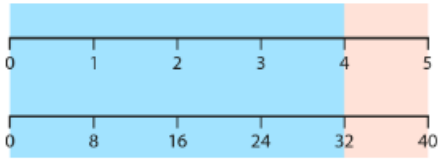
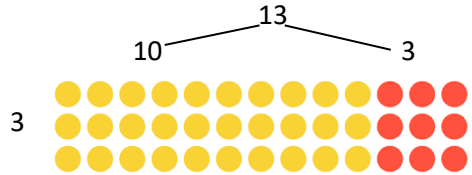
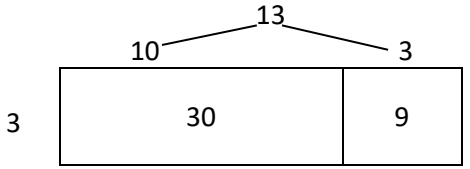
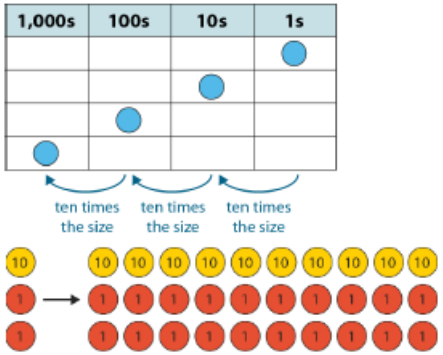
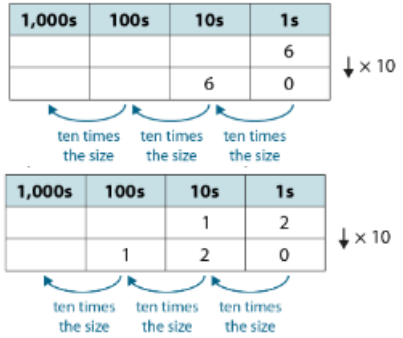
Strategy	Concrete (Can we make it?)	Pictorial (Can we draw it?)	Abstract (Can we write the equation?)
Bridging through a multiple of 10, 100, etc **Years 3, 4, 5 and 6**	 12 – 4 = 12 – 2 = 10 10 – 2 = 8 	 120 – 30 = 120 – 20 = 100 100 – 10 = 90	 120 – 30 = 120 – 20 = 100 100 – 10 = 90
Compensating – rounding to the nearest multiple 10, 100, etc and adjusting **Years 3, 4, 5 and 6**	 152 – 29 		152 – 30 = 122 122 + 1 = 123

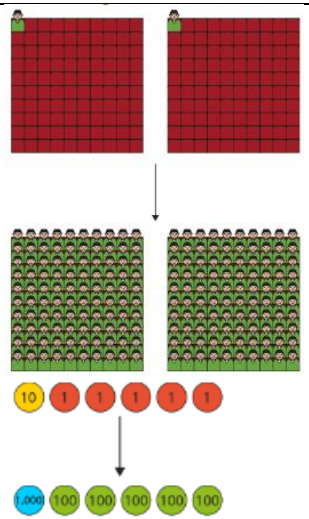
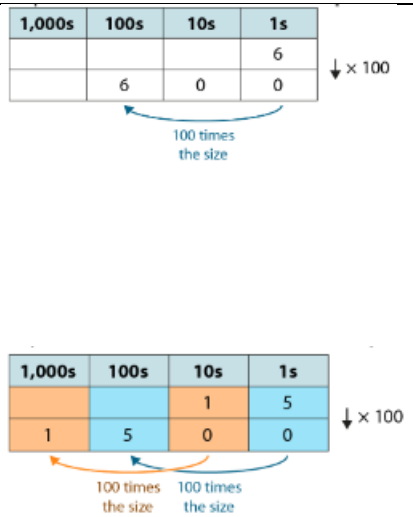
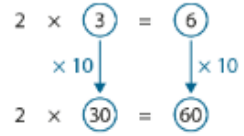
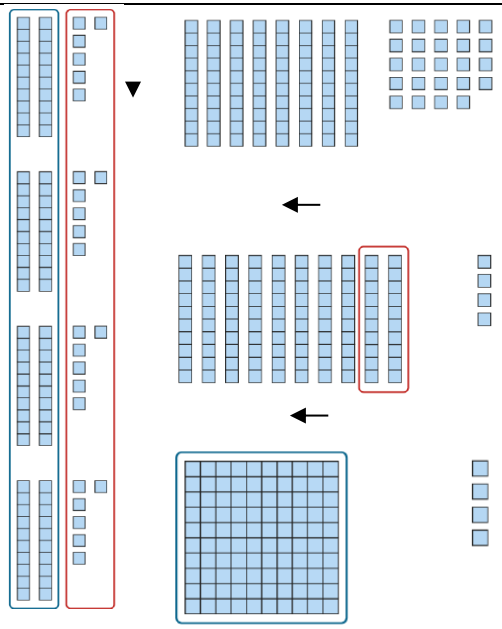
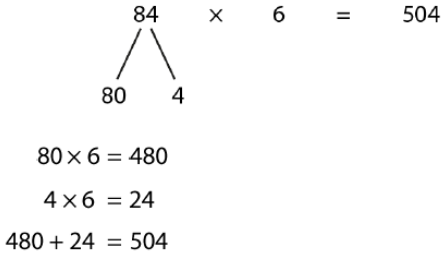
Multiplication – National Curriculum

EYFS	-
Year 1	• solve one-step problems involving multiplication, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.
Year 2	• recall and use multiplication facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers • calculate mathematical statements for multiplication within the multiplication tables and write them using the multiplication (×) and equals (=) signs • show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot • solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.
Year 3	• recall and use multiplication facts for the 3, 4 and 8 multiplication tables • write and calculate mathematical statements for multiplication using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to written methods • solve problems involving missing number problems involving multiplication including positive number scaling problems and correspondence problems where n objects are connected to m objects.
Year 4	• recall and use multiplication facts for multiplication tables up to 12 x 12 • use place value, known and derived facts to multiply mentally, including: x0 x1 and multiplying together three numbers • recognise and use factor pairs and commutativity in mental calculations • multiply two-digit and three-digit numbers by a one-digit number using formal written layout • solve problems involving multiplying, including the distributive law to multiply two-digit numbers by one-digit including positive number scaling problems and correspondence problems where n objects are connected to m objects.
Year 5	• identify multiples and factors: all factor pairs of a number, common factors of two numbers, establish whether a number up to 100 is prime and recall prime numbers up to 19 • multiply numbers up to four digits by a one- or two-digit number using a formal written method • multiply whole numbers and those involving decimals by 10, 100 and 1000.
Year 6	• identify multi-digit numbers up to 4 digits by a two-digit number using formal, long multiplication • identify common factors, common multiples and common prime numbers • use their knowledge of the order of operations to carry out calculations involving the four operations

Multiplication

Stem sentences	Concrete (Can we make it?)	Pictorial (Can we draw it?)	Abstract (Can we write the equation?)
One group of two, two groups of two, three groups of 2, … Ten, twenty, thirty, … One five, two fives, three fives, … **Year R/1**			10, 20, 30, …
There are __ coins. Each coin has a value of __p. This is __p. **Year 1**	 Representing each group by one object		Five 2p coins = 10p
There are __ in each group. There are __ groups. There are __ in a group and __ groups. **Year 2**			2 + 2 + 2 + 2 = 8 2 x 4 = 8 5 + 5 + 5 = 15 5 x 3 = 15
Factor times factor is equal to the product. The product is equal to factor times factor. **Year 2**	 Unitising equal groups – representing each group by one object		2 x 3 = 6 6 = 2 x 3
__ times __ can represent __ in a group and __ groups. It can also represent __ groups of __. Multiplication is commutative. **Year 2**			2 x 5 = 5 x 2

__ is equal to __ plus __, so __ times __ is equal to __ times __ plus __ times __. __ is equal to __ minus __, so __ times __ is equal to __ times __ minus __ times __. Multiplication is distributive. (NCETM Year 4 unit 2.10) **Year 3**			5 = 4 + 1 5 x 8 = 4 x 8 + 1 x 8 = 32 + 8 = 40 4 = 5 – 1 4 x 8 = 5 x 8 – 1 x 8 = 40 – 8 = 32
__ is equal to __ plus __, so __ times __ is equal to __ times __ plus __ times __. __ is equal to __ minus __, so __ times __ is equal to __ times __ minus __ times __. Multiplication is distributive. (NCETM Year 4 unit 2.10) **Year 3**			3 x 13 = 3 x 10 + 3 x 3 = 30 + 9 = 39
To multiply a whole number by 10, place a zero after the final digit of that number. **Year 4**			6 x 10 = 60 12 x 10 = 120

All multiples of 100 have both a tens and ones digit of 0. When a number is multiplied by 100, the product is a multiple of 100. **Year 4**			2 x 100 = 200 There are 100 times as many people as before. 15 x 100 = 1500
If one factor is made ten times the size, the product will be ten times the size. **Year 4**			4 x 3 = 12 so 4 x 30 = 120
If there are ten or more ones, we must regroup the ones into tens and ones. If there are ten or more tens, we must regroup the tens into hundreds and tens. Multiplication is distributive. **Year 4**			84 x 6 = 80 x 6 + 4 x 6 = 480 + 24 = 504

<table>
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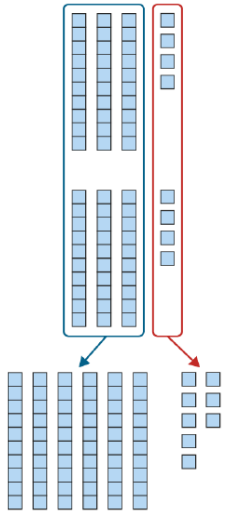
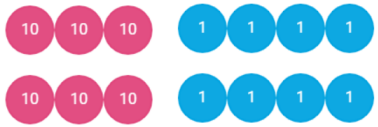
<td>We work from the least significant digit, on the right, to the most significant digit, on the left.

Multiplication is distributive.

Year 4</td>
<td>  </td>
<td> 
34 x 2 = 60 + 8 = 68</td>
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<tr><th></th><th>10s</th><th>1s</th></tr>
<tr><td></td><td>3</td><td>4</td></tr>
<tr><td>×</td><td></td><td>2</td></tr>
<tr><td></td><td></td><td>8</td></tr>
<tr><td></td><td>6</td><td>0</td></tr>
<tr><td></td><td>6</td><td>8</td></tr>
</table>
2 × 4 ones = 8 ones
2 × 3 tens = 6 tens
←
<table>
<tr><td></td><td>2</td><td>1</td></tr>
<tr><td>×</td><td></td><td>4</td></tr>
<tr><td></td><td>8</td><td>4</td></tr>
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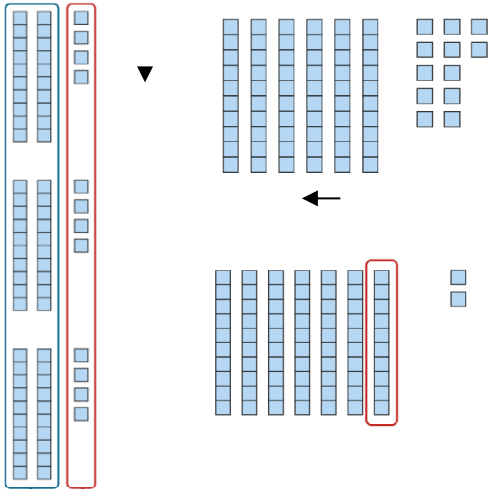
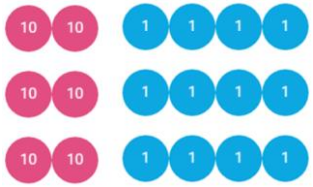
</td>
</tr>
<tr>
<td>If there are ten or more ones, we must regroup the ones into tens and ones.
If there are ten or more tens, we must regroup the tens into hundreds and tens.

Multiplication is distributive.

Year 4</td>
<td>  </td>
<td> 
24 x 3 = 60 + 12 = 72
←</td>
<td>
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<tr><td></td><td>2</td><td>4</td></tr>
<tr><td>×</td><td></td><td>3</td></tr>
<tr><td></td><td>1</td><td>2</td></tr>
<tr><td></td><td>6</td><td>0</td></tr>
<tr><td></td><td>7</td><td>2</td></tr>
</table>
3 × 4 ones = 12 ones = 1 ten + 2 ones
3 × 2 tens = 6 tens
←
<table>
<tr><td></td><td>1</td><td>8</td></tr>
<tr><td>×</td><td></td><td>5</td></tr>
<tr><td></td><td>9</td><td>0</td></tr>
<tr><td></td><td>4</td><td></td></tr>
</table>
<table>
<tr><td></td><td>3</td><td>8</td></tr>
<tr><td>×</td><td></td><td>4</td></tr>
<tr><td></td><td>1</td><td>5</td><td>2</td></tr>
<tr><td></td><td></td><td>3</td><td></td></tr>
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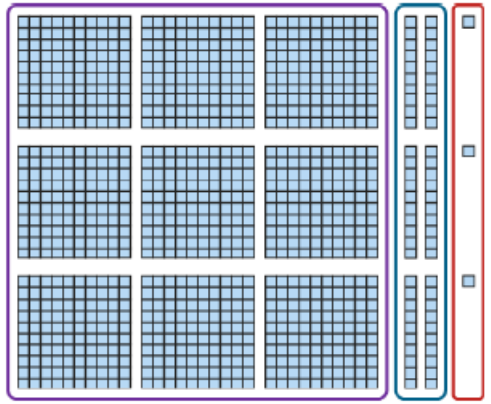
</table>

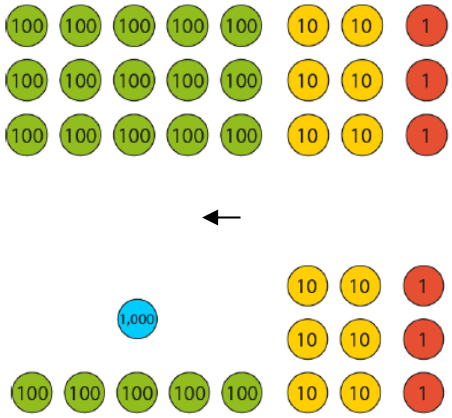
If there are ten or more ones, we must regroup the ones into tens and ones.
If there are ten or more tens, we must regroup the tens into hundreds and tens.
If there are ten or more hundreds, we must regroup the hundreds into thousands and hundred.

Multiplication is distributive.

Year 4



321 x 3 = 963



521 x 3 = 1000 + 500 + 60 + 3 = 1563

100s	10s	1s	
3	2	1	
×		3	
		3	3 × 1 ones = 3 ones
	6	0	3 × 2 tens = 6 tens
9	0	0	3 × 3 hundreds = 9 hundreds
9	6	3	

	3	2	1
×			3
	9	6	3

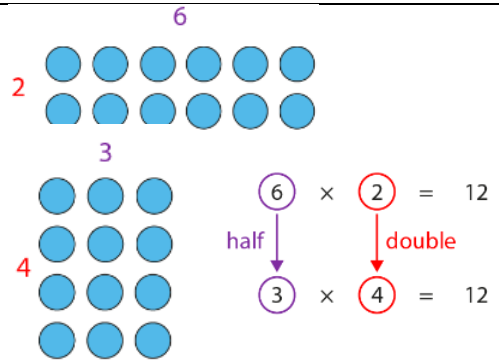
1,000s	100s	10s	1s
	5	2	1
×			3
			3
		6	0
1	5	0	0
1	5	6	3

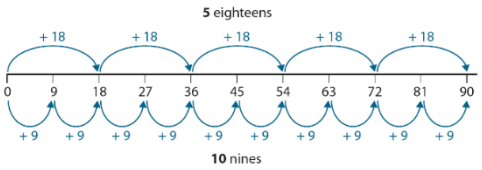
	3	6	7
×			4
	1	4	6	8
		2	2	

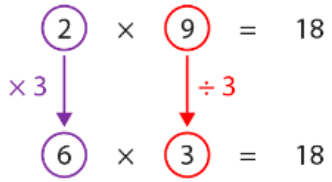
If there is a multiplicative increase in one factor and a multiplicative decrease in the other, the product remains the same.

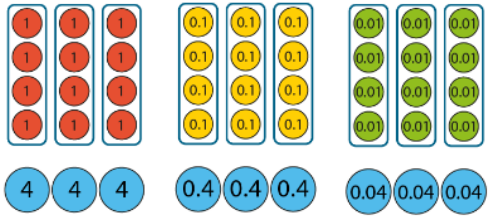
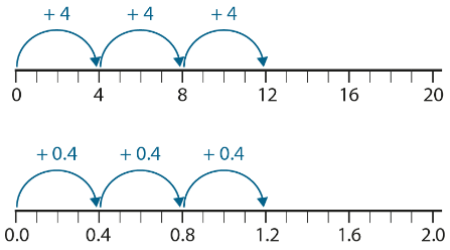
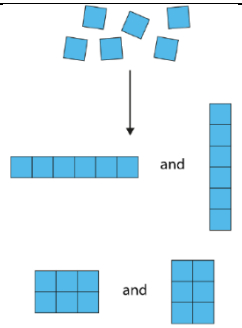
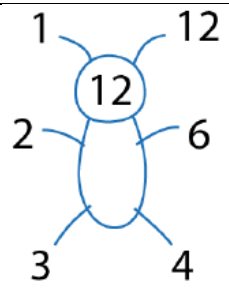
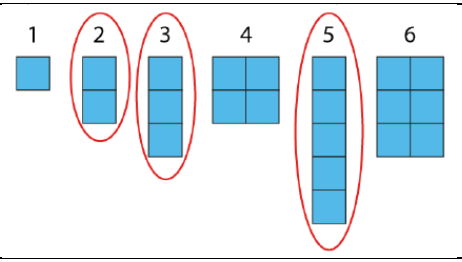
If I multiply one factor by __, I must divide the other factor by __ for the product to remain the same.

Year 5 and 6



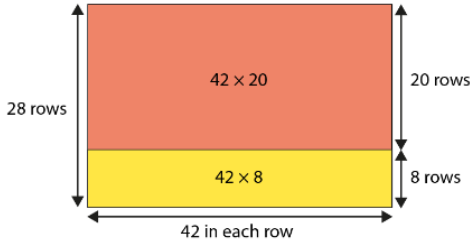


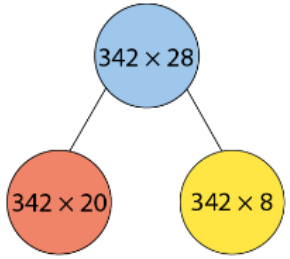


If one factor is made one tenth of the size, the product will be one tenth of the size. If one factor is made one hundredth of the size, the product will be one hundredth of the size. I move the digits of the number I am multiplying __ places to the left until I get a whole number; then I multiply; then I move the digits of the product __ places to the right. **Year 5**	 4 x 3 = 12 0.4 x 3 = 1.2 0.04 x 3 = 0.12		$\begin{array}{r} 456 \\ \times \quad 4 \\ \hline 1824 \\ \hline 22 \end{array}$ $\begin{array}{r} 4.56 \\ \times \quad 4 \\ \hline 18.24 \\ \hline 22 \end{array}$
Numbers that have more than two factors are composite numbers. **Year 5**	 Factors of 6 are 1, 2, 3 and 6.	 Factor bugs	Factors of 6 are 1, 2, 3 and 6.
Numbers that have only two factors are prime numbers. **Year 5**			17 is a prime number because its only factors are 1 and 17.

To multiply two two-digit numbers, first multiply by the ones, then multiply by the tens, then add them together.
To multiply a three-digit number by a two-digit number, first multiply by the ones, then multiply by the tens, then add them together.

Year 6





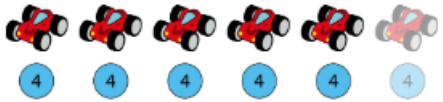
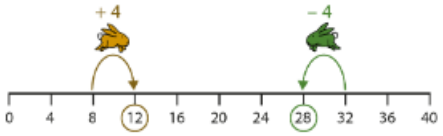
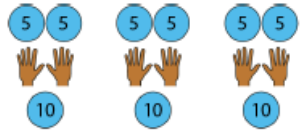
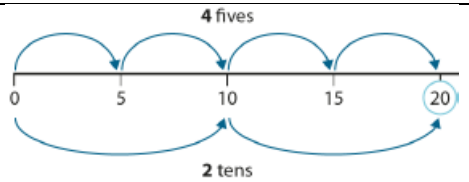
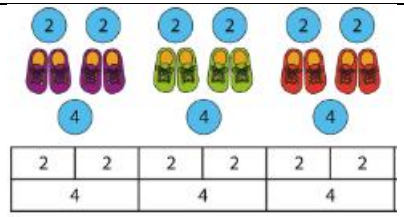
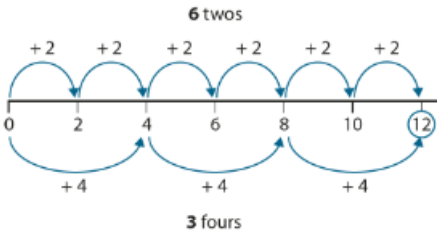
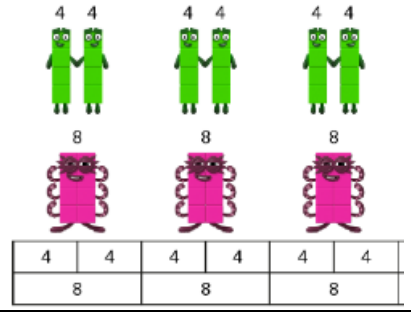
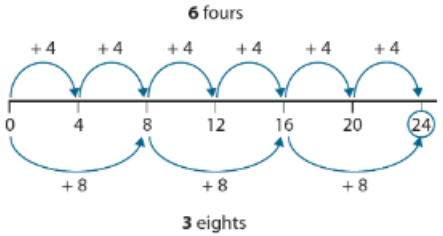
	100s	10s	1s	
		2	7	
×		2	3	
		8	1	27 × 3
	5	4	0	27 × 20
	6	2	1	

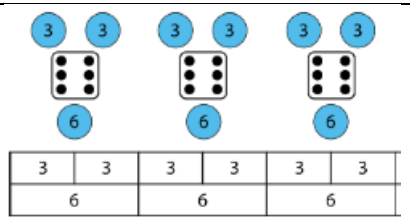
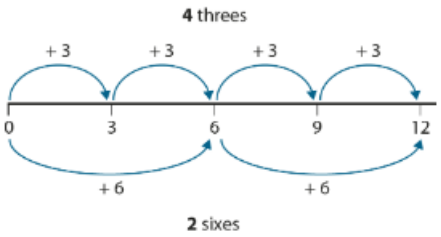
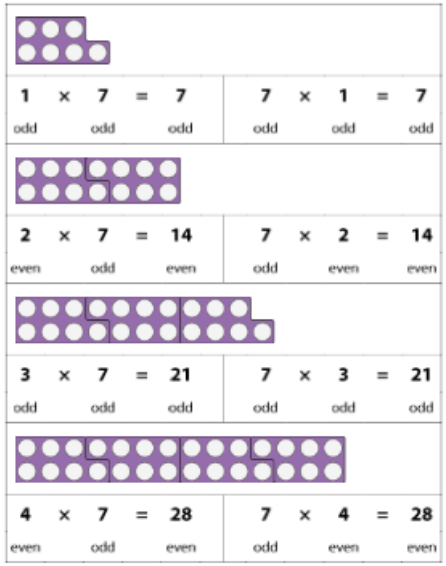
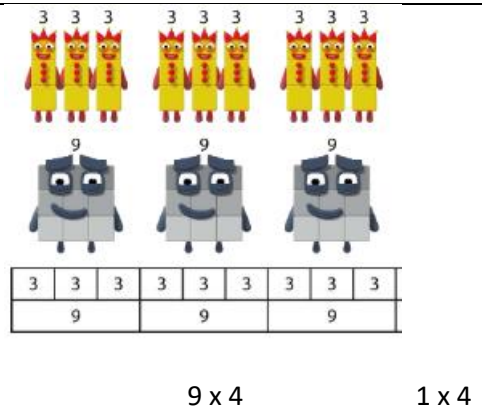
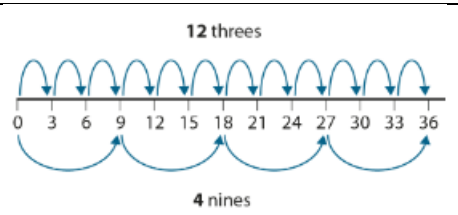
1

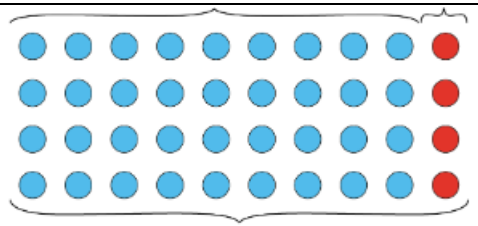
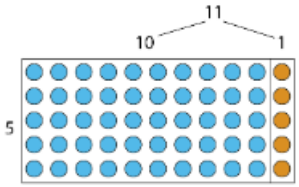
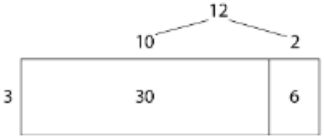
		3	1	2
×			2	8
	2	4	9	6
	6	2	4	0
	8	7	3	6

1

Multiplication – **Key mental strategies** for Key Stage 2

Strategy	Concrete (Can we make it?)	Pictorial (Can we draw it?)	Abstract (Can we write the equation?)
Adjacent multiples of __ have a difference of __. **Year 3 onwards**			4 x 6 = 4 x 5 + 4 4 x 9 = 4 x 10 - 4
Products in the 10 times table are double the products in the 5 times table. Products in the 5 times table are half of the products in the 10 times table. (NCETM Year 2 unit 2.5) **Year 3 onwards**			5 x 4 = 10 x 2
Products in the 4 times table are double the products in the 2 times table. Products in the 2 times table are half of the products in the 4 times table. **Year 3 onwards**			2 x 6 = 4 x 3
Products in the 8 times table are double the products in the 4 times table. Products in the 4 times table are half of the products in the 8 times table. **Year 3 onwards**			4 x 6 = 8 x 3

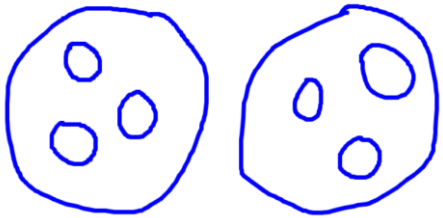
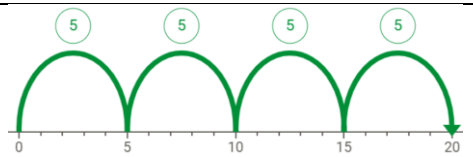
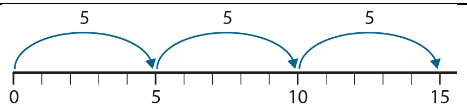
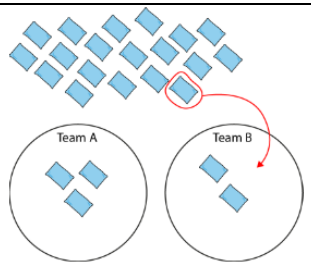
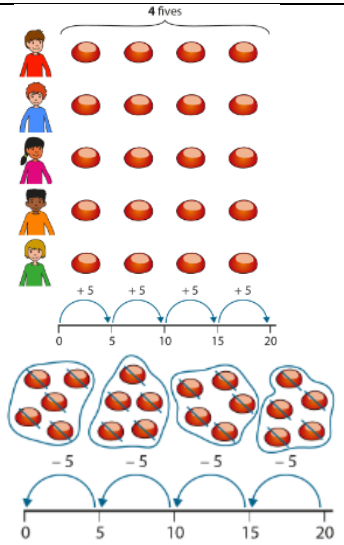
Products in the 6 times table are double the products in the 3 times table. Products in the 3 times table are half of the products in the 6 times table. **Year 3 onwards**			3 x 4 = 6 x 2
When both factors are odd, the product is odd. When one factor is odd and the other factor is even, the product is even. (NCETM Year 3 unit 2.9) **Year 3 onwards**			odd x odd = odd odd x even = even even x odd = even even x even = even
Products in the 9 times table are triple the products in the 3 times table.			3 x 12 = 9 x 4

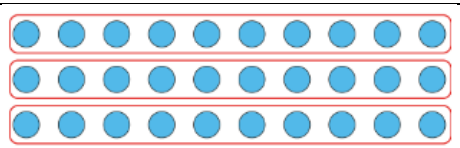
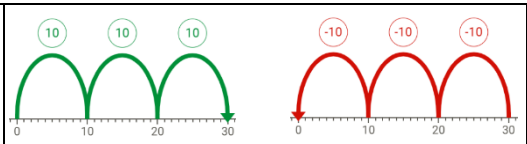
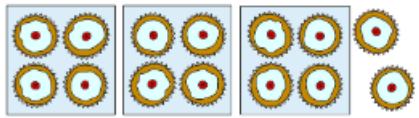
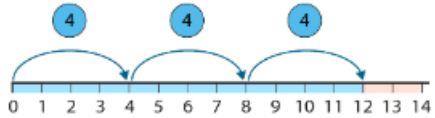
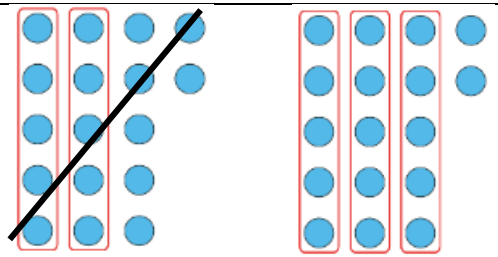
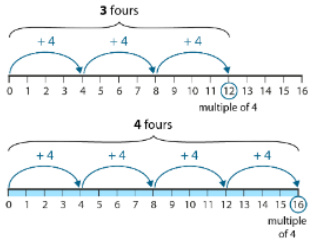
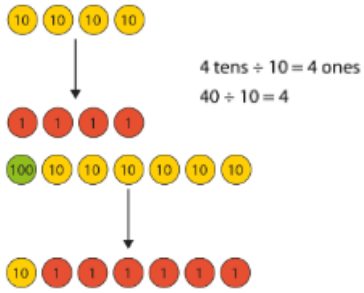
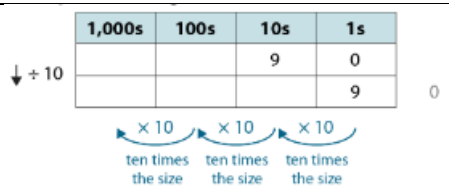
Products in the 10 times table can be used to find products in the 9 times table. (NCETM Year 3 unit 2.8) **Year 4 onwards**	 10 x 4		9 x 4 = 10 x 4 – 1 x 4
Products in the 10 times table can be used to find products in the 11 times table and 12 times table. **Year 4 onwards**			12 x 3 = 10 x 3 + 2 x 3 = 30 + 6 = 36

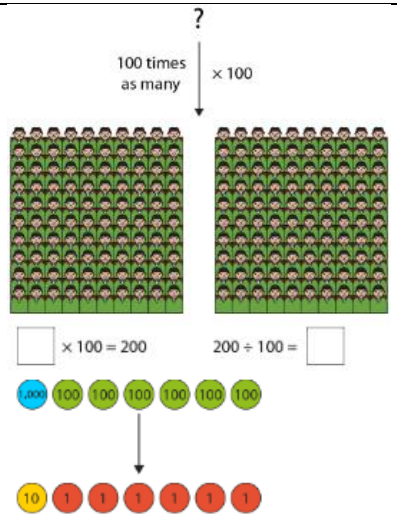
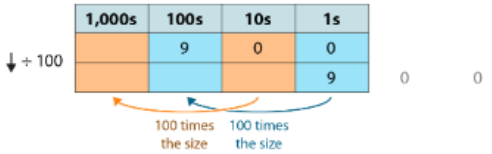
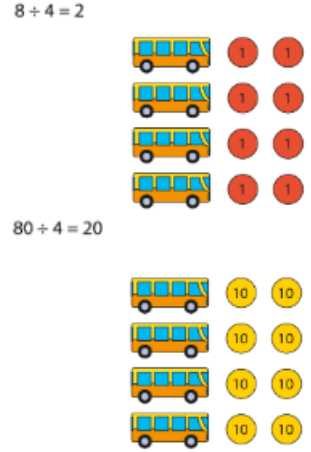
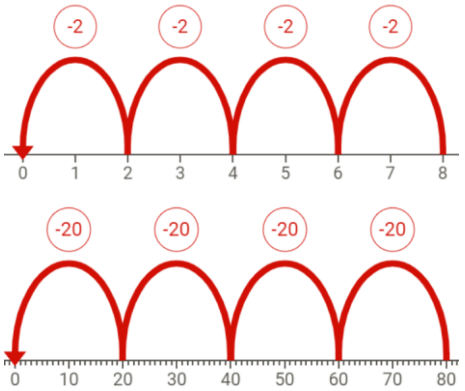
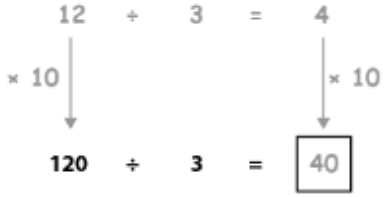
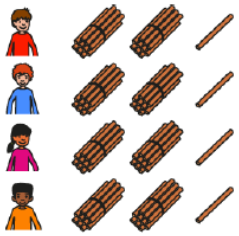
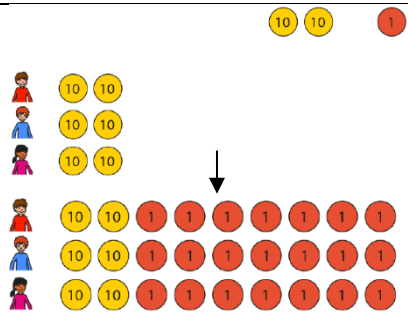
Division – National Curriculum

EYFS	-
Year 1	• solve one-step problems involving division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.
Year 2	• recall and use multiplication and division facts for the 2, 3, 5 and 10 multiplication tables, including recognising odd and even numbers • calculate mathematical statements for division within the multiplication tables and write them using the signs ÷ and = • show that multiplication of two numbers is commutative but division is not • solve problems involving division using materials, arrays, repeated addition, mental methods and division facts, including problems in contexts.
Year 3	• recall and use multiplication and division facts for the 3, 4 and 8 x tables • write and calculate mathematical statements for division using the multiplication tables they know, including 2-digit divided by 1-digit using mental and progressing to formal written methods • solve problems, involving missing number problems, involving division, including positive number scaling problems and correspondence problems where n objects are connected to m objects *Non statutory division 2 digit by 1 digit
Year 4	• recall multiplication and division facts up to 12 x 12 • use place value, known and derived facts to divide mentally, including dividing by 1 • solve problems involving dividing a three-digit number by one-digit and number using a formal layout
Year 5	• identify multiples and factors, including finding all factor pairs of a number, common factors of two numbers, know and use the vocabulary of prime numbers and establish whether a number up to 100 is prime • multiply and divide numbers mentally drawing on known facts • divide numbers up to 4 digits by a one-digit number using a written method and interpret remainders appropriately for the context • divide whole numbers and those involving decimals by 10, 100 and 1000.
Year 6	• divide numbers up to 4 digits by a two-digit number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding as appropriate for the context. • divide numbers up to 4 digits by a two-digit number using the formal written method of short division as appropriate.

Division

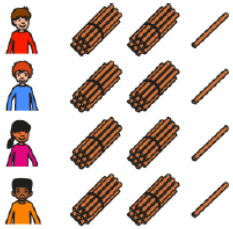
Stem sentences	Concrete (Can we make it?)	Pictorial (Can we draw it?)	Abstract (Can we write the equation?)
One group of two, two groups of two, three groups of 2, … Ten, twenty, thirty, … One five, two fives, three fives, … **Year R/1**			6 biscuits shared between 2 children gives 3 biscuits each.
The _____ costs __p. Each coin has a value of __p. So I need __ coins. **Year 1**			Five 2p coins = 10p
__ is divided into groups of __. There are __ groups. We can skip count using the divisor to find the quotient. **Year 2**			5 + 5 + 5 = 15 15 ÷ 5 = 3
__ divided between __ is equal to __ each. We can skip count using the divisor to find the quotient. **Year 2**			One 5 is 1 each. That's 5. Two 5s is 2 each. That's 10. 10 ÷ 5 = 2

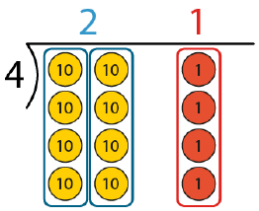
Ten times __ is equal to __ so __ divided into groups of ten is __. If the divisor is __, we can use the __ times table to find the quotient. **Year 2**	 30 represents the total number of counters. 10 represents the number in each group. 3 represents the number of groups.		10 x 3 = 30 3 x 10 = 30 30 ÷ 10 = 3
__ is divided into groups of __. There are __ groups and a remainder of __. (NCETM Year 4 unit 2.12) **Year 3**			14 = 4 x 3 + 2 14 ÷ 4 = 3 r 2
__ is a multiple of __ so when it is divided into groups of __, there is no remainder. The remainder is always less than the divisor. (NCETM Year 4 unit 2.12) **Year 3 or 4?**			17 ÷ 5 = 2 r 7 is incorrect because 7 is greater than 5. 17 ÷ 5 = 3 r 2
To divide a multiple of ten by 10, remove the zero from the ones place. **Year 4**	 4 tens ÷ 10 = 4 ones 40 ÷ 10 = 4		90 ÷ 10 = 9 150 ÷ 10 = 15

To divide a multiple of 100 by 100, remove two zeros (from the tens and ones places). **Year 4**			900 ÷ 100 = 9 1500 ÷ 100 = 15
If the dividend is made ten times the size, the quotient will be ten times the size. **Year 4**			
If dividing the tens gives a remainder of one or more tens, we must exchange the remaining tens for ones. **Year 4**	 84 ÷ 4 = 21		8 tens ÷ 4 = 2 tens 4 ones ÷ 4 = 1 one 84 ÷ 4 = 21 6 tens ÷ 3 = 2 tens 21 ones ÷ 3 = 7 ones 81 ÷ 3 = 27

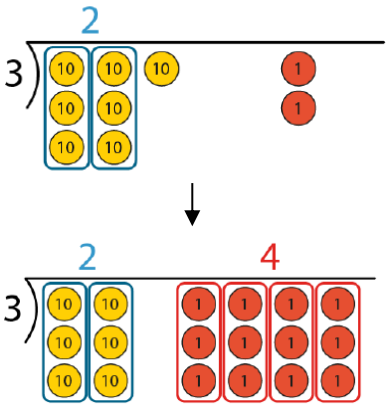
If dividing the tens gives a remainder of one or more tens, we must exchange the remaining tens for ones.

Year 4

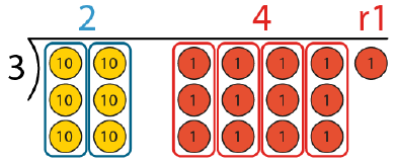




72 ÷ 3 = 24



73 ÷ 3 = 24 r 1



10s 1s

$$\begin{array}{r} 2\ 1 \\ 4\overline{)\,8\ 4} \end{array}$$

8 tens ÷ 4 = 2 tens
4 ones ÷ 4 = 1 one

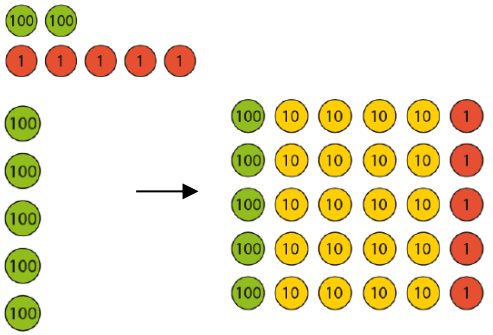
$$\begin{array}{r} 2\ 1 \\ 4\overline{)\,8\ 4} \end{array}$$

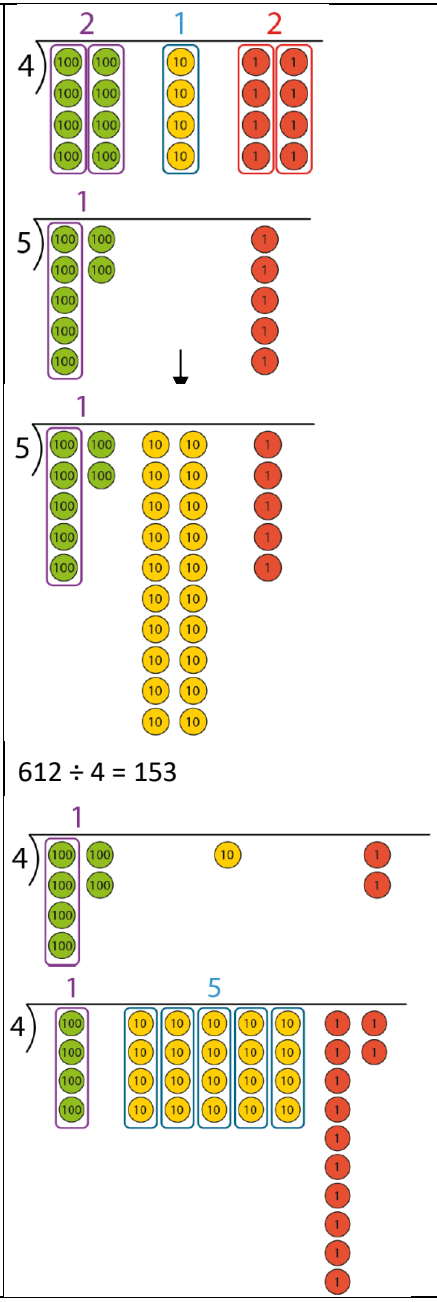
$$\begin{array}{r} 2\ 4 \\ 3\overline{)\,7\ {}^{1}2} \end{array}$$

$$\begin{array}{r} 2\ 4\text{r}1 \\ 3\overline{)\,7\ {}^{1}3} \end{array}$$

If dividing the hundreds gives a remainder of one or more hundreds, we must exchange the remaining hundreds for tens.

Year 4





$$\begin{array}{r} 2\ 1\ 2 \\ 4\overline{)\ 8\ 4\ 8} \end{array}$$

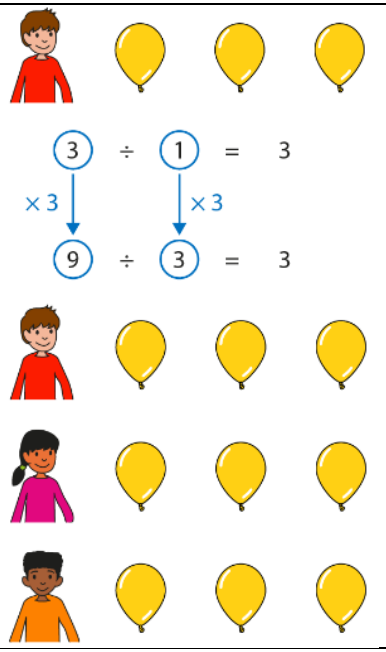
$$\begin{array}{r} 1\ 4\ 1 \\ 5\overline{)\ 7\ {}^{2}0\ 5} \end{array}$$

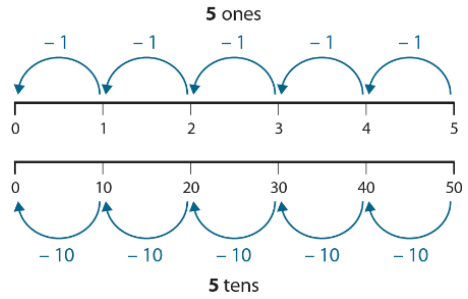
$$\begin{array}{r} 1\ 5\ 3 \\ 4\overline{)\ 6\ {}^{2}1\ {}^{1}2} \end{array}$$

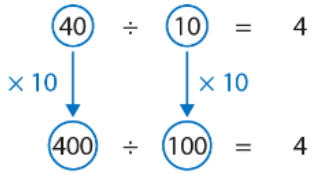
If there is a multiplicative change to the dividend factor and a corresponding change to the divisor, the quotient remains the same.

If I multiply the dividend by __, I must multiply the divisor by __ for the quotient to remain the same.

Year 5 and 6





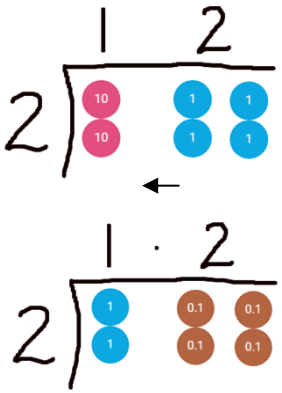


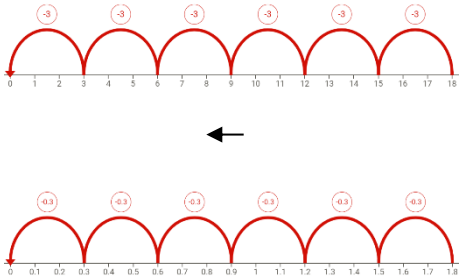
If the dividend is made one tenth of the size, the quotient will be one tenth of the size.

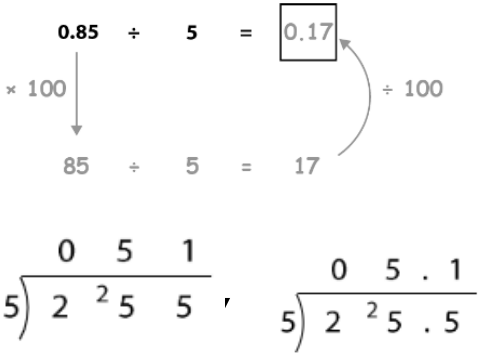
If the dividend is made one hundredth of the size, the quotient will be one hundredth of the size.

I move the digits of the dividend __ places to the left until I get a whole number; then I divide; then I move the digits of the quotient __ places to the right.

Year 5 onwards



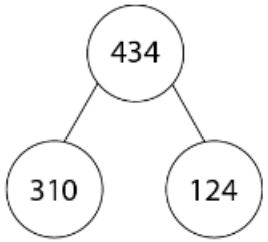




Any two-, three- or four-digit dividend can be divided by a two-digit divisor using skip-counting in multiples of the divisor, or by short division or long division.

Year 6

Partitioning



$310 \div 31 = 10$

$124 \div 31 = 4$

$434 \div 31 = 14$

Short division

$$31\overline{)4\ {}^{4}3\ {}^{12}4}\quad 0\ 1\ 4$$

Long division

$$\begin{array}{r} 0\ 1\ 4 \\ 31\overline{)4\ 3\ 4} \\ 3\ 1 \\ \hline 1\ 2\ 4 \\ 1\ 2\ 4 \\ \hline 0 \end{array}$$

(1 ten × 31 = 31 tens)

(4 ones × 31 = 124 ones)

Where there is a remainder, the result can be expressed as a whole-number quotient with a whole-number remainder, a whole-number quotient with a proper-fraction remainder, or as a decimal-fraction quotient.

Year 6

$354 \div 15 = ?$

$$\begin{array}{r} 2\ 3\ \text{r}\,9 \\ 15\overline{)3\ 5\ 4} \\ 3\ 0 \\ \hline 5\ 4 \\ 4\ 5 \\ \hline 9 \end{array}$$

So, $354 \div 15 = 23$ r 9

$$\begin{array}{r} 2\ 3\ \frac{9}{15} \\ 15\overline{)3\ 5\ 4} \\ 3\ 0 \\ \hline 5\ 4 \\ 4\ 5 \\ \hline 9 \end{array}$$

$\frac{9}{15} = \frac{3}{5}$

So, $354 \div 15 = 23\frac{3}{5}$

$$\begin{array}{r} 2\ 3.6 \\ 15\overline{)3\ 5\ 4.0} \\ 3\ 0 \\ \hline 5\ 4 \\ 4\ 5 \\ \hline 9\ 0 \\ 9\ 0 \\ \hline 0 \end{array}$$

So, $354 \div 15 = 23.6$