


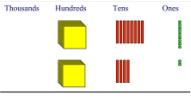
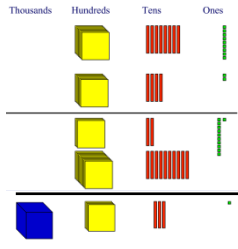
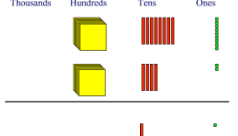
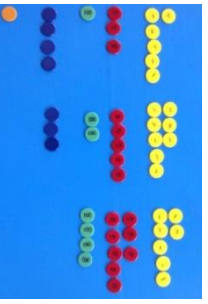
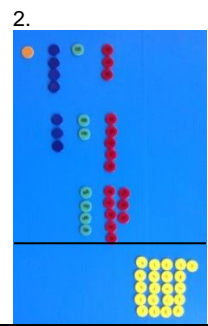
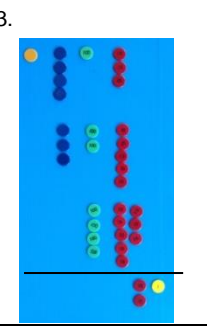
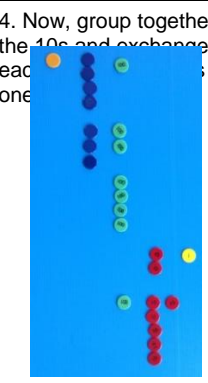


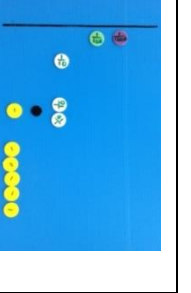
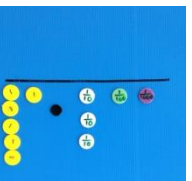
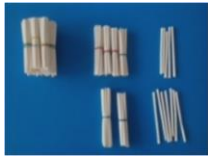




ADDITION


Y3	Y4	Y5	Y6
<p>Mental Strategy and Recording: See Teaching children to calculate mentally</p> <ul style="list-style-type: none"> Reorder numbers when adding; identify pairs totalling 10 or multiples of 10; partition: add hundreds, tens and ones, then recombine; partition: count on in hundreds, tens and ones and find a total; partition: add 10 or 20 and adjust; partition: count on in minutes and hours bridging through 60 (analogue time) <p>The children use empty number lines and informal jottings to record these processes.</p>	<p>Mental Strategy and Recording: See Teaching children to calculate mentally</p> <ul style="list-style-type: none"> Count on in hundreds, tens and ones; partition: add tens and ones separately, then recombine; partition: add a multiple of 10 & adjust, eg $56 + 29 = 56 + 30 - 1$ use knowledge of place value & related calculations, eg work out $140 + 150 = 290$ using $14+15=29$ partition: count on in minutes & hours, bridging through 60 (analogue & digital times) 	<p>Mental strategies and recording: See Teaching children to calculate mentally</p> <ul style="list-style-type: none"> Count on in thousands, hundreds, tens, ones and tenths; partition: add thousands, hundreds, tens or ones separately, then recombine add a multiple of 10 or 100 and adjust partition: double and adjust use knowledge of place value and related calculations, e.g. $6.3 + 4.8$ using $63 + 48$ partition: count on in minutes & hours, bridging through 60 (analogue & digital times) 	<p>Mental Strategy and Recording: See Teaching children to calculate mentally</p> <ul style="list-style-type: none"> count on in thousands, hundreds, tens, ones, tenths and hundredths use knowledge of place value and related calculations, e.g. $680 + 430$, $6.8 + 4.3$, $0.68 + 0.43$ can all be worked out using the related calculation $68 + 43$ use knowledge of place value and of doubles of two-digit whole numbers partition: double and adjust partition: add and adjust, eg. $4.3 + 2.9 = 4.3 + 3 - 0.1$ partition: count on in minutes and hours, bridging through 60 (analogue and digital times, 12-hour and 24-hour clock)
<p>Written Strategy and Recording: Children initially use a mental method of partitioning one number to add. They use empty number lines and informal jottings to record this process. When secure, children are shown and use vertical (columnar) layouts alongside concrete objects (models)– expanded initially and then compact.</p>	<p>Written Strategy and Recording: For addition children initially use a mental method of partitioning one number to add. They use empty number lines and informal jottings to record this process. When secure for addition, children are shown and use vertical (columnar) layouts alongside concrete objects (models) – expanded initially and then compact</p>	<p>Written Strategy and Recording: For addition children initially use a mental method of partitioning one number to add. They use empty number lines and informal jottings to record this process. When secure, for addition children are shown and use vertical (columnar) layouts alongside representations e.g. place value counters – expanded initially and then compact.</p>	<p>Written Strategy and Recording: For addition children initially use a mental method of partitioning one number to add. They use empty number lines and informal jottings to record this process. When secure, for addition children use vertical (columnar) layouts alongside representations e.g. place value counters – expanded initially and then compact</p>
<p>Vocabulary: add, more, sum, total, altogether, plus,</p>	<p>Vocabulary: add, more, sum, total, altogether, plus</p>	<p>Vocabulary: add, more, sum, total, altogether, plus,</p>	<p>Vocabulary: add, more, and, make, sum, total, altogether, plus,</p>
<p>Equipment & Resources: Empty number lines; Base 10 equipment e.g. straws, place value counters</p> <p>ITPs: Number facts;</p>	<p>Equipment & Resources: straws, Base 10 equipment, empty number lines, hundred squares, place value counters http://www.harcourtschool.com/activity/elab2004/gr3/4.html</p> <p>ITPs: Counting on and back; Number facts; Difference</p> <p>NCETM video examples: Market Stall, Australian Curriculum, Assessment and Reporting Authority, Work sample 12.</p>	<p>Equipment & Resources: Base 10 equipment, empty number lines, hundred squares, Base 10 material e.g. straws, Dienes, place value counters</p> <p>ITPs: Counting on and back; Number facts; Difference</p> <p>NCETM video examples: Problem solving language (STEM) Basic column addition explained (STEM);</p>	<p>Equipment & Resources: Equipment: Base 10 equipment, empty number lines, hundred squares, Base 10 material e.g. straws, Dienes, place value counters</p> <p>ITPs: Counting on and back; Number facts; Difference</p> <p>NCETM video examples: Problem solving language (STEM) Basic column addition explained (STEM)</p>
<p>School examples of addition: e.g. $145 + 27$</p> <p>Expanded vertical layout option A and B</p> <p>Teacher demonstration of manipulating the 'model', associated language and recording. Use 'bundles of straws' to set out one hundred and forty and five and underneath set out twenty and seven. Combine to find the total number of 1s, 10s and 100s and record each separately. Then calculate and record the combined total.</p> <p>Initial model for expanded and compact layout</p>  <p>'Five 1s add seven 1s equals twelve (bundle ten) so that's one 10 and two 1s. Four 10s add two 10s equals six 10s which is sixty. Then there is one 100...</p> <p>Model for option A</p> <p>..... so, one hundred and six 10s and one 10 makes seven 10s, or seventy, and two. One hundred and seventy two.</p>  <p>Model for Option B</p> <p>..... so, there are two 1s, seven 10s and one 100. One hundred and seventy two.</p>  <p>Option A: Expanded vertical layout</p> $\begin{array}{r} 100 & 40 & 5 \\ + & 20 & 7 \\ \hline 100 & + 60 & + 12 \\ \hline & & = 172 \end{array}$ <p>and then/or Option B: Expanded vertical layout</p> $\begin{array}{r} 1 & 4 & 5 \\ + & 2 & 7 \\ \hline & 1 & 2 \\ & 6 & 0 \\ \hline 1 & 0 & 0 \\ \hline 1 & 7 & 2 \end{array}$	<p>School examples of addition: e.g. $789 + 642$</p> <p>Expanded vertical layout options A and B</p> <p>Teacher demonstration of manipulating the 'model' associated language and recording. Use Base 10 equipment to set out seven hundred and eighty and nine and underneath set out six hundred and forty and two. Combine to find the total number of 1s, 10s and 100s and record each separately. Then calculate and record the combined total.</p> <p>Initial model for expanded and compact layout</p>  <p>1. 'Nine 1s add two 1s equal eleven. Regroup or exchange for one 10 and one 1. Now add the 10s. Eight 10s add four 10s equal twelve 10s or one hundred and twenty. Regroup or exchange for one 100 and two 10s. Then add the 100s</p> <p>Model for Option A</p> <p>..... so, one thousand three hundred and one hundred and twenty and eleven equals one thousand, four hundred and thirty-one</p>  <p>and then/or Model for Option B</p> <p>..... so, there are one 1, three 10s, three 100s and one 1000. One thousand, four hundred and thirty-one.</p>  <p>Option A: Expanded vertical layout</p> $\begin{array}{r} 700 & 80 & 9 \\ + & 600 & 40 & 2 \\ \hline 1300 & + 120 & + 11 \\ \hline & & = 1431 \end{array}$ <p>and then/or Option B: Expanded vertical layout</p> $\begin{array}{r} 7 & 8 & 9 \\ + & 6 & 4 & 2 \\ \hline & 1 & 1 \\ & 1 & 2 & 0 \\ \hline 1 & 3 & 0 & 0 \\ \hline 1 & 4 & 3 & 1 \end{array}$	<p>School examples of addition: What is the total of 14 136, 3258 and 487?</p> <p>Expanded vertical layout Teacher demonstration of manipulating the equipment (e.g. place value counters offer an appropriate representation), associated language and recording. Represent each number and align vertically. Combine to find the total number of 1s, 10s, 100s etc. Where 'exchange' is required, e.g. with the addition of 6, 8 and 7 'ones', exchange twenty 1s for two 10s. Then calculate and record the combined total</p> <p>1. Represent each number and align vertically eg. using place value counters</p>  <p>2 & 3. Group together the 1s and exchange each group of ten 1s for one 10. (Grouping in fives, as shown, reduces the need for counting in 1s.) Record '21'.</p>   <p>4. Now, group together the 10s and exchange each group of ten 10s for one 100.</p>  <p>5. Continue to group all values.</p> <p>6. So, using recall of addition facts and/or an efficient mental method, three 10s, add five 10s, add eight 10s is sixteen 10s which is one hundred and sixty. Record '160' and so on for all values. ... so, there is one 1, eight 10s, eight 100s, seven 1000s and one 10 000 which is a total of seventeen thousand, eight hundred and eighty one.</p> <p>Recording for expanded vertical layout:</p> $\begin{array}{r} 1 & 4 & 1 & 3 & 6 \\ & 3 & 2 & 5 & 8 \\ + & & 4 & 8 & 7 \\ \hline & & 2 & 1 \\ & & 1 & 6 & 0 \\ & & 7 & 0 & 0 \\ & & 7 & 0 & 0 & 0 \\ \hline 1 & 0 & 0 & 0 & 0 \\ \hline 1 & 7 & 8 & 8 & 1 \end{array}$	<p>School examples of addition: Two numbers have a difference of 1.583. One of the numbers is 4.728. What is the other? Is this the only answer? So, $\square - 4.728 = 1.583$ and $4.728 - \square = 1.583$</p> <p>Expanded or compact vertical recording: $\square - 4.728 = 1.583$ or $4.728 + 1.583 = \square$</p> <p>Expanded vertical layout (option B only) Teacher demonstration of manipulating the equipment (e.g. place value counters offer an appropriate representation), associated language and recording. Represent each number and align vertically. Combine to find the total number of thousandths, hundredths, tenths, ones etc. Where 'exchange' is required, e.g. with the addition of 8 and 3 thousandths, exchange 10 thousandths for one hundredth etc. Then calculate and record the combined total</p> <p>1. Represent each number and align vertically. Begin with the least significant figure.</p>  <p>2. Group together the 'thousandths' and exchange each group of ten for one hundredth. Record 0.011.</p>  <p>3. Now group together the hundredths, tenths and ones.</p>  <p>4. So, using recall of addition facts and/or an efficient mental method, add, and record each stage, the thousands, hundredths, tenths and ones to find the total.</p>  <p>Recording for expanded vertical layout:</p> $\begin{array}{r} 4 & \cdot & 7 & 2 & 8 \\ + & 1 & \cdot & 5 & 8 & 3 \\ \hline 0 & \cdot & 0 & 1 & 1 \\ 0 & \cdot & 1 & 0 & 0 \\ 1 & \cdot & 2 & 0 & 0 \\ \hline 5 & \cdot & 0 & 0 & 0 \\ \hline 6 & \cdot & 3 & 1 & 1 \end{array}$

Compact vertical (columnar) layout
Teacher demonstration of manipulating the equipment e.g. bundles of straws offer an appropriate model, associated language and recording.

1. 

2. 

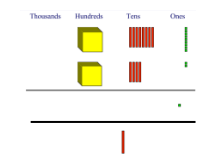
3. 


4. 

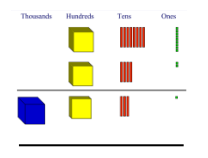
Compact vertical (columnar) recording

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

Compact vertical (columnar) layout
Teacher demonstration of manipulating the equipment e.g. Base 10 equipment offers an appropriate model, associated language and recording.

2. 

3. 

4. 

Compact, vertical (columnar) recording

	7	8	9
+	6	4	2
<hr/>			
1	4	3	1
<hr/>			
	1		

Compact vertical (columnar) layout
Teacher demonstration of manipulating the equipment (e.g. place value counters offer an appropriate representation), associated language and recording. (See initial layout above)

2. Combine to find the total number of 1s and exchange twenty 1s for two 10s. Place the 1s counter in the 'ones' place in the answer and the two 10s counters in the 10s place below the answer line.

3. Continue as shown.

Compact, vertical (columnar) recording:

	1	4	1	3	6
+		3	2	5	8
<hr/>					
1	7	8	8		1
<hr/>					
			1	2	

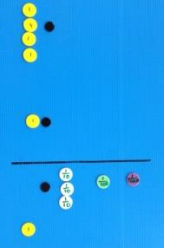
Compact vertical (columnar) layout Teacher demonstration of manipulating the equipment eg use of place value counters as a representation) associated language & recording. (See initial layout above)

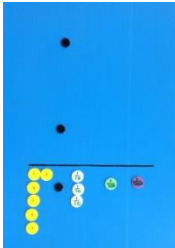
2. Combine to find the total number of thousandths and exchange ten thousandths for one hundredth. Place the thousandth counter in the thousandth place in the answer and the hundredth counter in the hundredth place below the answer line.

3. Combine to find the total number of hundredths and exchange ten hundredths for one tenth. Place the hundredth counter in the hundredth place in the answer and the tenth counter in the tenth place below the answer line.

4. Combine to find the total number of tenths and exchange ten tenths for one 'one'. Place the tenth counters in the tenth place in the answer & the ones counter in the 'ones' place below the answer line.

5&6. Combine to find the total number of ones. Place the ones counter in the ones place in the answer.

5. 

6. 

Compact, vertical (columnar) recording:

	4	7	2	8
+	1	5	8	3
<hr/>				
6	3	1	1	
<hr/>				
	1	1		

Links: Children need to be able to apply the concept of addition to real-life applications, for example the total cost of two items costing 48p and 36p. They may then need to be able to convert their answer into the appropriate units.

- To complement a garden centre/shop role-play area, or similar class theme, ask children to explore the cost of buying combinations of different items on paper or on a spreadsheet. The shop/market stall could link to a historical theme e.g. in Roman times.
- Give children a limited budget to buy items for a party. Often shops have free coloured leaflets with listed items for sale or on special offer, e.g. 'buy one get one free' or 'three for two'.
- Make collections of biscuits/cakes/healthy snacks to sell and raise money for school fund or charity like Comic Relief or Children in Need.
- Visit a local shop or museum shop as part of a class trip. You have £2, £3 or £4, what can you buy with your money? What can't you buy? How much more money might you need? How much change will you get? Have you got the correct change?

Links: When working on addition and subtraction and/or measurement, there are opportunities to make connections between them. Examples include:

- Measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres
- Estimate, compare and calculate different measures, including money in pounds and pence

[Opportunities for cross-curricular and real life connections](#)

Learners will encounter addition and subtraction in many real life contexts:

- When shopping, children will be required to find totals, calculate change and estimate costs in pounds and pence.
- Planning a budget for various projects will involve a great deal of calculation

Practical tasks such as designing models and packaging, and calculating perimeters for fencing and borders will all involve addition and subtraction skills.

The NCETM Primary Magazine provides some useful starting ideas for linking mathematics with [the Romans](#).

Links:

Money – when required to add prices, calculate change, add surcharges or interest, or subtract discounts;

Measurement – when required to add lengths, calculate remaining distance in a journey, find how much more/less liquid is needed, add quantities when cooking, calculate perimeters of regular and irregular shapes, work out time differences e.g. how many days until Christmas, how many minutes until break time etc.;

Statistics – comparing and combining sets of data, interpreting data.

[Opportunities for cross-curricular and real life connections](#)

Learners will encounter addition and subtraction in:

Science – when adding and subtracting test measurements;

History – when comparing historical data from different periods, calculating the duration of monarchs' reign;

Geography – when comparing populations, temperatures and other data for contrasting regions around the world.

Links: Number and place value; measurement; statistics; algebra

Opportunities for cross-curricular and real life connections:

Almost everything! Addition and subtraction are skills used in many problem solving activities in subjects across the curriculum.

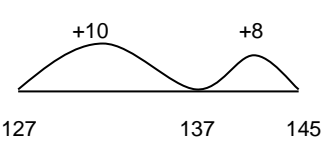
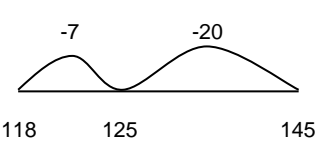

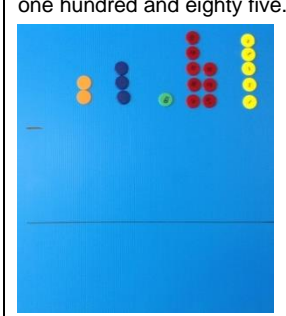
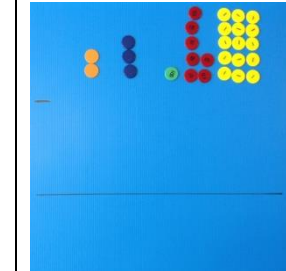
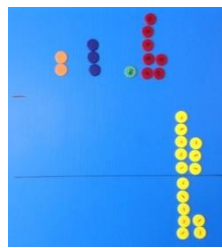
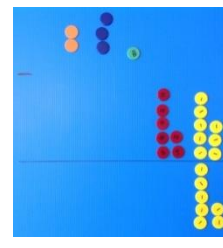
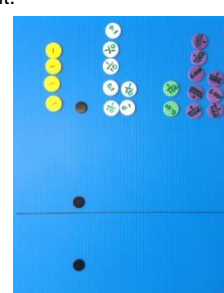
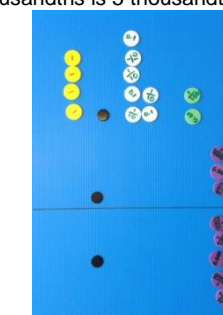




Science: the introduction of the Upper KS 2 Programme of Study states 'pupils should select the most appropriate ways to answer science questions using different types of scientific enquiry, including observing changes over different periods of time, noticing patterns, grouping and classifying things, carrying out comparative and fair tests and finding things out using a wide range of secondary sources of information'. For example, *interpret graphs and charts and find totals and differences in pieces of data, including measurement.*

Geography: the introduction of the Upper KS 2 Programme of Study states pupils should 'extend their knowledge and understanding beyond the local area to include the United Kingdom and Europe, North and South America. This will include the location and characteristics of a range of the world's most significant human and physical features'. For example, *find and compare distances between countries or cities, compare population statistics, temperatures, lengths of rivers, heights of mountains etc.* See, for example:

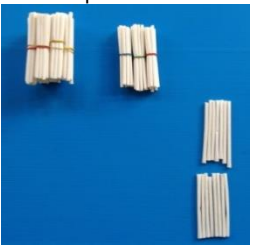
- [Weather](#)
- [Environments around the world](#)
- [Mathematics and geography](#)

History: the introduction of the Upper KS 2 Programme of Study states pupils should 'continue to develop a chronologically secure knowledge and understanding of British, local and world history, establishing clear narratives within and across the periods they study.' For example: *find differences between the duration of the different periods, such as the Stone Age and Iron Age or find the lengths of the reigns of different British monarchs.*

SUBTRACTION


Y3	Y4	Y5	Y6																																																																																																				
<p>Mental Strategy and Recording: See Teaching children to calculate mentally:</p> <ul style="list-style-type: none"> partition: count back in hundreds, tens and ones and find the difference; partition: subtract 10 or 20 and adjust; partition: count back in minutes and hours bridging through 60 (analogue times). <p>The children use empty number lines and informal jottings to record these processes.</p>	<p>Mental Strategy and Recording: See Teaching children to calculate mentally</p> <ul style="list-style-type: none"> Count back in hundreds, tens and ones; partition: subtract tens and then ones, e.g. subtracting 27 by subtracting 20 then 7; subtract by counting up from the smaller to the larger number; partition: subtract a multiple of 10 & adjust, eg $86 - 38 = 86 - 40 + 2$; use knowledge of place value & related calculations, eg work out $140 - 60 = 80$ using $14 + 6 = 8$ partition: count back in minutes & hours, bridging through 60 (analogue & digital times) 	<p>Mental strategies and recording: See Teaching children to calculate mentally</p> <ul style="list-style-type: none"> Count back in thousands, hundreds, tens, ones and tenths; subtract by counting up from the smaller to the larger number subtract a multiple of 10 or 100 and adjust use knowledge of place value and related calculations, e.g. $6.3 - 4.8$ using $63 - 48$ partition: count back in minutes & hours, bridging through 60 (analogue & digital times) 	<p>Mental Strategy and Recording: See Teaching children to calculate mentally</p> <ul style="list-style-type: none"> count back in thousands, hundreds, tens, ones, tenths and hundredths use knowledge of place value and related calculations, e.g. $680 - 430$, $6.8 - 4.3$, $0.68 - 0.43$ can all be worked out using the related calculation $68 - 43$ partition: subtract and adjust, eg $6.5 - 3.8 = 6.5 - 4 + 0.2$ partition: count back in minutes and hours, bridging through 60 (analogue and digital times, 12-hour and 24-hour clock) 																																																																																																				
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<p>Vocabulary: take away, leave, how many are left, how many fewer than, difference between, how much more is...., subtract, minus, subtraction</p>	<p>Vocabulary: leave, how many are left, how many fewer than, difference between, how much more is...., subtract, minus, subtraction</p>	<p>Vocabulary: take away, leave, how many are left, how many fewer than, difference between, how much more is...., subtract, minus, decrease</p>	<p>Vocabulary: take away, leave, how many are left, how many fewer than, difference between, how much more is..., subtract, minus,</p>																																																																																																				
<p>Equipment & Resources: Empty number lines; Base 10 equipment e.g. straws, place value counters ITPs: Number facts;</p>	<p>Equipment & Resources: straws, Base 10 equipment, empty number lines, hundred squares, Base 10 material http://www.harcourtschool.com/activity/elab2004/gr3/4.html ITPs: Counting on and back; Number facts; Difference NCETM video examples: NCETM - Developing column subtraction in key stage 2 Market Stall, Australian Curriculum, Assessment and Reporting Authority, Work sample 12.</p>	<p>Equipment & Resources: Base 10 equipment, empty number lines, hundred squares, Base 10 material e.g. straws, Dienes, place value counters ITPs: Counting on and back; Number facts; Difference NCETM video examples: Problem solving language (STEM) Column subtraction (moving from expanded to 'compact' vertical subtraction) Examples of column subtraction with up to 4 digits (STEM)</p>	<p>Equipment & Resources: Base 10 equipment, empty number lines, hundred squares, Base 10 material e.g. straws, Dienes, place value counters ITPs: Counting on and back; Number facts; Difference NCETM video examples: Problem solving language (STEM) Column subtraction (moving from expanded to 'compact' vertical subtraction) Examples of column subtraction with up to 4 digits (STEM)</p>																																																																																																				
<p>School examples of subtraction: Informal recording What is the difference between/ (how many more than) 127 and 145?</p>  <p>'counting on' in 10s, or multiples of 10s, and 1s using jottings first and then later, when children can visualise the numberline, without an empty numberline i.e. finding 'how many more than' or 'difference'</p> <p>What number is 27 less than 145</p>  <p>Partitioning then 'counting back' in 10s, or multiples of 10, and 1s using jottings first with and then, when children can visualise the numberline, without an empty numberline. Jottings: $145 - 20 = 125$ $125 - 5 - 2 = 118$</p>	<p>School examples of subtraction: Informal recording Counting on' to find 'difference' either using a number line or informal horizontal recording $932 - 457$</p>  <p>The difference between 457 and 932 is 475</p> <p>$932 - 457 = 932 - 400 - 50 - 7$ $932 - 400 = 532$ 'counting back' $532 - 30 - 20 = 482$ either by partitioning $482 - 2 - 5 = 475$ or using a number line</p>	<p>School examples of subtraction: Informal recording Refer back to informal recording on an empty numberline</p> <p>Expanded vertical layout (decomposition) $23\ 185 - 2\ 078$ Teacher demonstration using representation, associated language and recording: use place value counters.</p> <div style="display: flex;"> <div style="flex: 1;"> <p>1. Set out twenty-three thousand, one hundred and eighty five.</p>  </div> <div style="flex: 1;"> <p>2. Begin with the least significant figure, '5 minus 8': there aren't enough to subtract so use one of the tens. Partition 80 into 70 and 10. Cross out 80 and record 70 and 15.</p>  </div> </div> <div style="display: flex;"> <div style="flex: 1;"> <table border="1"> <tr><td>20000</td><td>3000</td><td>100</td><td>80</td><td>5</td></tr> <tr><td>-</td><td>2000</td><td>0</td><td>70</td><td>8</td></tr> <tr><td colspan="5" style="text-align: right;">70</td></tr> </table> </div> <div style="flex: 1;"> <table border="1"> <tr><td>20000</td><td>3000</td><td>100</td><td>80</td><td>15</td></tr> <tr><td>-</td><td>2000</td><td>0</td><td>70</td><td>8</td></tr> <tr><td colspan="5" style="text-align: right;">0 7</td></tr> </table> </div> </div> <p>3. Subtract 8 from 15 and record 7 in the ones place.</p>  <table border="1"> <tr><td>20000</td><td>3000</td><td>100</td><td>80</td><td>15</td></tr> <tr><td>-</td><td>2000</td><td>0</td><td>70</td><td>8</td></tr> <tr><td colspan="5" style="text-align: right;">7</td></tr> </table> <p>4. 70 subtract 70 is zero. Record zero in the tens place.</p>  <table border="1"> <tr><td>20000</td><td>3000</td><td>100</td><td>80</td><td>15</td></tr> <tr><td>-</td><td>2000</td><td>0</td><td>70</td><td>8</td></tr> <tr><td colspan="5" style="text-align: right;">0 7</td></tr> </table>	20000	3000	100	80	5	-	2000	0	70	8	70					20000	3000	100	80	15	-	2000	0	70	8	0 7					20000	3000	100	80	15	-	2000	0	70	8	7					20000	3000	100	80	15	-	2000	0	70	8	0 7					<p>School examples of subtraction: Two numbers have a difference of 1.583. One of the numbers is 4.728. What is the other? Is this the only answer? So, $\square - 4.728 = 1.583$ and $4.728 - \square = 1.583$</p> <p>Expanded or compact vertical (columnar) recording: $4.728 - \square = 1.583$ or $4.728 - 1.583 = \square$</p> <p>Informal recording Refer back to informal recording on an empty numberline for those children for whom it is more appropriate.</p> <p>Expanded vertical layout (decomposition) e.g. $4.728 - 1.583$ Teacher demonstration using representation, associated language and recording: use place value counters.</p> <div style="display: flex;"> <div style="flex: 1;"> <p>1. Set out four point seven, two, eight.</p>  </div> <div style="flex: 1;"> <p>2. Begin with the least significant figure, 8 thousandths minus 3 thousandths is 5 thousandths.</p>  </div> </div> <div style="display: flex;"> <div style="flex: 1;"> <table border="1"> <tr><td>4</td><td>•</td><td>0.7</td><td>0.02</td><td>0.008</td></tr> <tr><td>-</td><td>1</td><td>•</td><td>0.5</td><td>0.08</td><td>0.003</td></tr> <tr><td colspan="6" style="text-align: right;">•</td></tr> </table> </div> <div style="flex: 1;"> <table border="1"> <tr><td>4</td><td>•</td><td>0.7</td><td>0.02</td><td>0.008</td></tr> <tr><td>-</td><td>1</td><td>•</td><td>0.5</td><td>0.08</td><td>0.003</td></tr> <tr><td colspan="6" style="text-align: right;">•</td></tr> <tr><td colspan="6" style="text-align: right;">0.005</td></tr> </table> </div> </div>	4	•	0.7	0.02	0.008	-	1	•	0.5	0.08	0.003	•						4	•	0.7	0.02	0.008	-	1	•	0.5	0.08	0.003	•						0.005					
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<p>Expanded vertical layout Teacher demonstration of manipulating the 'model', associated language and recording: use 'bundles of straws.'</p> <p>$145 - 27 =$</p> <div style="display: flex;"> <div style="flex: 1;"> <p>1. Set out one hundred and forty and five, (NB ONLY set out 145) and record as below.</p>  <table border="1"> <tr><td>100</td><td>40</td><td>5</td></tr> <tr><td>-</td><td>20</td><td>7</td></tr> <tr><td colspan="3" style="text-align: right;">7</td></tr> </table> </div> <div style="flex: 1;"> <p>2. Beginning with the 'ones' '5 minus/subtract/take way 7'. There aren't enough to subtract so we'll use one of the tens. Now we've partitioned 40 into 30 and 10. Cross out 40 and 5 and record 30 and 15. So now we have 100 and 30 and 15.</p>  <table border="1"> <tr><td>100</td><td>30</td><td>15</td></tr> <tr><td>-</td><td>20</td><td>7</td></tr> <tr><td colspan="3" style="text-align: right;">7</td></tr> </table> </div> </div>	100	40	5	-	20	7	7			100	30	15	-	20	7	7			<p>Expanded vertical layout Teacher demonstration of manipulating the 'model', associated language and recording: use Base 10 equipment</p> <div style="display: flex;"> <div style="flex: 1;"> <p>1. Set out nine hundred and thirty and two, (NB ONLY set out 932) and record as below.</p> <p>Hundreds Tens Ones</p>  <table border="1"> <tr><td>900</td><td>30</td><td>2</td></tr> <tr><td>-</td><td>400</td><td>50</td><td>7</td></tr> <tr><td colspan="4" style="text-align: right;">7</td></tr> </table> </div> <div style="flex: 1;"> <p>2. Beginning with the 'ones' '2 minus/subtract/take way 7'. There aren't enough to subtract so we'll use one of the tens. Now we've partitioned 30 into 20 and 10. Cross out 30 and 2 and record 20 and 12. So now we have 900 and 20 and 12.</p> <p>Hundreds Tens Ones</p>  <table border="1"> <tr><td>900</td><td>20</td><td>12</td></tr> <tr><td>-</td><td>400</td><td>50</td><td>7</td></tr> <tr><td colspan="4" style="text-align: right;">7</td></tr> </table> </div> </div>	900	30	2	-	400	50	7	7				900	20	12	-	400	50	7	7																																																																	
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3. So 15 subtract 7 is 8. Record 8 in the ones place.




$$\begin{array}{r} 30 \\ 100 \ 40 \ 15 \\ - 20 \ 7 \\ \hline 8 \end{array}$$

4. Now, '30 subtract 20 is 10'. Record 10 in the tens place.



$$\begin{array}{r} 30 \\ 100 \ 40 \ 15 \\ - 20 \ 7 \\ \hline 10 \ 8 \end{array}$$

5. There is nothing to subtract from 100, so record 100 in the hundreds place. Add together 100 and 10 and 8 and record the solution of 118.



$$\begin{array}{r} 30 \\ 100 \ 40 \ 15 \\ - 20 \ 7 \\ \hline 100 \ 10 \ 8 \\ = 118 \end{array}$$

Compact, vertical recording To secure children's understanding, compact layouts should initially be demonstrated alongside the model and the expanded layout. Teacher demonstration of manipulating the 'model', associated language and recording: Record the calculation vertically, as above. Use Base 10 equipment to set out 100 and 40 and 5. (NB ONLY set out 145) Beginning with the 'ones' '5 minus/subtract/take way 7'. There aren't enough to subtract so we'll use one of the 10s. Now we've partitioned 40 into 30 and 10. Cross out 4 in the tens place and record 3. Write 1 alongside 5 to represent 15. So now we have 100 and 30 and 15. So 15 subtract 7 is 8. Record 8 in the ones place. Now, 'three 10s subtract two 10s is one 10'. Record 1 in the 10s place. There is nothing to subtract from 100, so record 1 in the 100s place. The solution is 118.

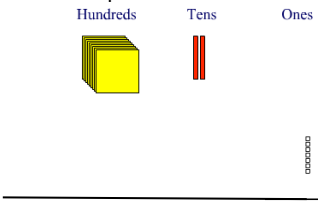
Compact vertical recording			
	3		
1	4	15	
-	2	7	
	1	1	8

Links: Children need to be able to apply the concept of addition to real-life applications, for example the total cost of two items costing 48p and 36p. They may then need to be able to convert their answer into the appropriate units.

- To complement a garden centre/shop role-play area, or similar class theme, ask children to explore the cost of buying combinations of different items on paper or on a spreadsheet. The shop/market stall could link to a historical theme e.g. in Roman times.
- Give children a limited budget to buy items for a party. Often shops have free coloured leaflets with listed items for sale or on special offer, e.g. 'buy one get one free' or 'three for two'.
- Make collections of biscuits/cakes/healthy snacks to sell and raise money for school fund or charity like Comic Relief or Children in Need.

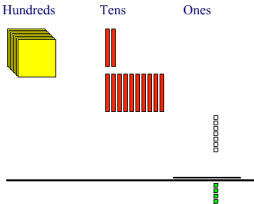
Visit a local shop or museum shop as part of a class trip. You have £2, £3 or £4, what can you buy with your money? What can't you buy? How much more money might you need? How much change will you get? Have you got the correct change?

3. So 12 subtract 7 is 5. Record 5 in the ones place.



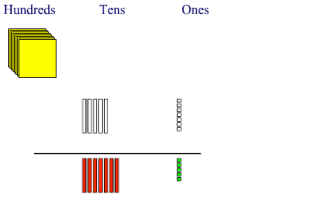
$$\begin{array}{r} 20 \\ 900 \ 30 \ 12 \\ - 400 \ 50 \ 7 \\ \hline 5 \end{array}$$

4. Now, '20 subtract 50, there aren't enough to subtract so we'll use one of the hundreds. Now we've partitioned 900 into 800 and 100. Cross out 900 and record 800 and 120.



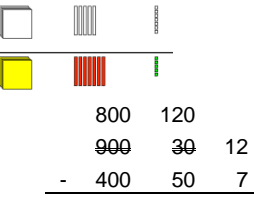
$$\begin{array}{r} 800 \ 120 \\ 900 \ 30 \ 12 \\ - 400 \ 50 \ 7 \\ \hline 5 \end{array}$$

5. So 120 subtract 50 is 70. Record 70 in the tens place.



$$\begin{array}{r} 800 \ 120 \\ 900 \ 30 \ 12 \\ - 400 \ 50 \ 7 \\ \hline 70 \ 5 \end{array}$$

6. So 800 subtract 400 is 400. Record 400 in the hundreds place. Add together 400 and 70 and 5 and record the solution of 475.



$$\begin{array}{r} 400 \ 70 \ 5 \\ 800 \ 120 \\ 900 \ 30 \ 12 \\ - 400 \ 50 \ 7 \\ \hline = 475 \end{array}$$

Compact, vertical (columnar) recording To secure children's understanding, compact layouts should initially be demonstrated alongside the model and the expanded layout.

$$\begin{array}{r} 8 \ 123 \ 12 \\ - 4 \ 5 \ 7 \\ \hline 4 \ 7 \ 5 \end{array}$$

Links: When working on addition and subtraction and/or measurement, there are opportunities to make connections between them. Examples include:

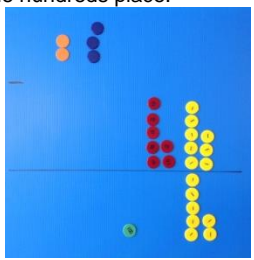
- Measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres
- Estimate, compare and calculate different measures, including money in pounds and pence

[Opportunities for cross-curricular and real life connections](#)

Learners will encounter addition and subtraction in many real life contexts:

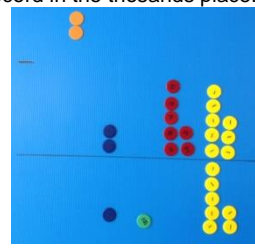
- When shopping, children will be required to find totals, calculate change and estimate costs in pounds and pence.
- Planning a budget for various projects will involve a great deal of calculation
- Practical tasks such as designing models and packaging, and calculating perimeters for fencing and borders will all involve addition and subtraction skills.

5. 100 subtract zero is 100. Record in the hundreds place.



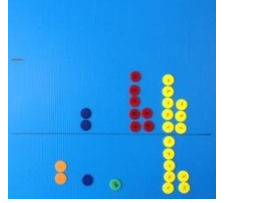
$$\begin{array}{r} 70 \\ 20000 \ 3000 \ 100 \ 80 \ 15 \\ - 2000 \ 0 \ 70 \ 8 \\ \hline 100 \ 0 \ 7 \end{array}$$

6. 3000 subtract 2000 is 1000. Record in the thousands place.



$$\begin{array}{r} 70 \\ 20000 \ 3000 \ 100 \ 80 \ 15 \\ - 2000 \ 0 \ 70 \ 8 \\ \hline 1000 \ 100 \ 0 \ 7 \end{array}$$

7. 20 000 subtract zero is 20 000. Record in the ten thousands place.



$$\begin{array}{r} 70 \\ 20000 \ 3000 \ 100 \ 80 \ 15 \\ - 2000 \ 0 \ 70 \ 8 \\ \hline 1000 \ 100 \ 0 \ 7 \end{array}$$

Compact vertical (columnar) recording

To secure children's understanding, compact layouts should initially be demonstrated alongside the model and the expanded layout.

$$\begin{array}{r} 2 \ 3 \ 1 \ 78 \ 15 \\ - 2 \ 0 \ 7 \ 8 \\ \hline 1 \ 1 \ 0 \ 7 \end{array}$$

Links:

Money – when required to add prices, calculate change, add surcharges or interest, or subtract discounts;

Measurement – when required to add lengths, calculate remaining distance in a journey, find how much more/less liquid is needed, add quantities when cooking, calculate perimeters of regular and irregular shapes, work out time differences e.g. how many days until Christmas, how many minutes until break time etc.;

Statistics – comparing and combining sets of data, interpreting data.

[Opportunities for cross-curricular and real life connections](#)

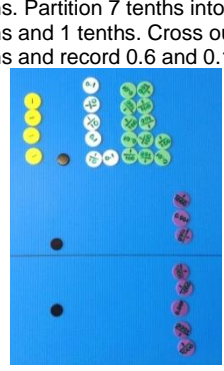
Learners will encounter addition and subtraction in:

Science – when adding and subtracting test measurements;

History – when comparing historical data from different periods, calculating the duration of monarchs' reign;

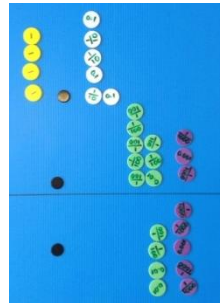
Geography – when comparing populations, temperatures and other data for contrasting regions around the world.

3. '2 hundredths minus 8 hundredths': there aren't enough to subtract so use one of the tenths. Partition 7 tenths into 6 tenths and 1 tenth. Cross out 7 tenths and record 0.6 and 0.12.



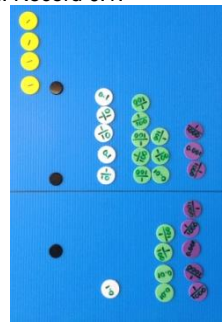
$$\begin{array}{r} 0.6 \ 0.12 \\ 4 \cdot 0.7 \ 0.02 \ 0.008 \\ - 1 \cdot 0.5 \ 0.08 \ 0.003 \\ \hline 0.005 \end{array}$$

4. 12 hundredths minus 8 hundredths is 4 hundredths. Record 0.04.



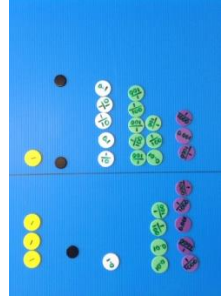
$$\begin{array}{r} 0.6 \ 0.12 \\ 4 \cdot 0.7 \ 0.02 \ 0.008 \\ - 1 \cdot 0.5 \ 0.08 \ 0.003 \\ \hline 0.04 \ 0.005 \end{array}$$

5. '6 tenths minus 5 tenths is 1 tenth. Record 0.1.



$$\begin{array}{r} 0.6 \ 0.12 \\ 4 \cdot 0.7 \ 0.02 \ 0.008 \\ - 1 \cdot 0.5 \ 0.08 \ 0.003 \\ \hline 0.1 \ 0.04 \ 0.005 \end{array}$$

6. '4 minus 1 is 3'. Record 3.



$$\begin{array}{r} 0.6 \ 0.12 \\ 4 \cdot 0.7 \ 0.02 \ 0.008 \\ - 1 \cdot 0.5 \ 0.08 \ 0.003 \\ \hline 3 \cdot 0.1 \ 0.04 \ 0.005 \\ = 3.145 \end{array}$$

Compact vertical (columnar) recording

To secure children's understanding, compact layouts should initially be demonstrated alongside the model and the expanded layout.

$$\begin{array}{r} 4 \cdot 6 \ 1 \ 7 \ 2 \ 8 \\ - 1 \cdot 5 \ 8 \ 3 \\ \hline 3 \cdot 1 \ 4 \ 5 \end{array}$$

Links: Number and place value; measurement; statistics; algebra

Opportunities for cross-curricular and real life connections:

Science: the Upper KS 2 Programme of Study states 'pupils should select the most appropriate ways to answer science questions using different types of scientific enquiry, including observing changes, noticing patterns, grouping and classifying things, carrying out comparative and fair tests and finding things out using a wide range of secondary sources of information'. For example, *interpret graphs and charts and find totals and differences in pieces of data, including measurement.*

Geography: the Upper KS 2 Programme of Study states pupils should 'extend their knowledge and understanding beyond the local area to include the United Kingdom and Europe, North and South America. This will include the location and characteristics of a range of the world's most significant human and physical features'. For example, *find and compare distances between countries or cities, compare population statistics, temperatures, lengths of rivers, heights of mountains etc.* See, for example:

- [Weather](#)
- [Environments around the world](#)
- [Mathematics and geography](#)

History: the Upper KS 2 Programme of Study states pupils should 'continue to develop a chronologically secure knowledge and understanding of British, local and world history, establishing clear narratives within and across the periods they study.' For example: *find differences between the duration of the different periods, such as the Stone Age and Iron Age or find the lengths of the reigns of different British monarchs.*

MULTIPLICATION

Y3

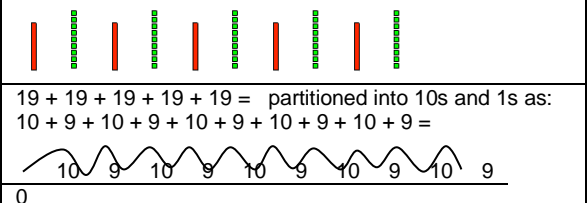
Strategy: to recognise *repeated aggregation* (addition of groups of the same size); and *scaling* (increase/decrease a number of times/by a scale factor of) – both structures should be represented as an array.

Vocabulary: lots of, groups of, times, multiply, multiplication, multiplied by; multiple of, product, repeated addition, array; row, column;;
Language of scaling: once, twice, three times... ten times...; times as (big, long, wide... and so on); double, scaling, scale, factor, doubling, trebling, so many times bigger, than (longer than, heavier than, and so on), so many times as much as (or as many as).

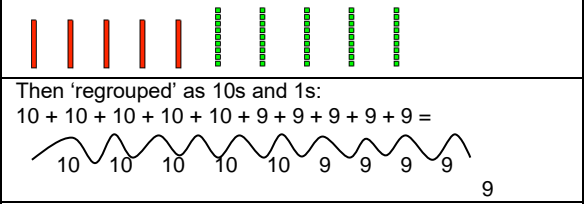
Recording: Following teacher demonstration to link pictorial recording (number line & array), children continue to develop recording especially using pictures and their own number lines. They use standard notation (including the symbols x and =)

Equipment & Resources: number lines, hundred squares, counters, array, pegboards, straws, squared paper, cubes etc. & everyday objects e.g. bars of chocolate, egg boxes,
ITPs: [Multiplication Array](#); [Multiplication facts](#); [Multiplication tables](#); [Number dials](#); [Multiplication Board](#) (tables square); [Multiplication grid](#) (grid multiplication)
NCETM video examples: [Times Tables in Ten Minutes](#); [Grid multiplication as an interim step](#)

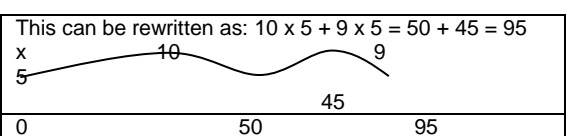
School examples of multiplication:
Mark drives 19 miles to work every day. He does this on Mondays, Tuesdays, Wednesdays, Thursdays and Fridays. How many miles does he travel to work in one week?
Demonstrate using a numberline as 'repeated' addition using straws or Base 10 as a model i.e.



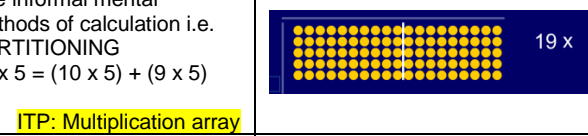
19 + 19 + 19 + 19 + 19 = partitioned into 10s and 1s as:
10 + 9 + 10 + 9 + 10 + 9 + 10 + 9 + 10 + 9 =



Then 'regrouped' as 10s and 1s:
10 + 10 + 10 + 10 + 10 + 9 + 9 + 9 + 9 + 9 =



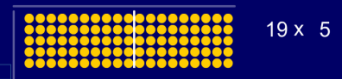

This can be rewritten as: 10 x 5 + 9 x 5 = 50 + 45 = 95



Use informal mental methods of calculation i.e. PARTITIONING
19 x 5 = (10 x 5) + (9 x 5)
ITP: [Multiplication array](#)

Leading to formal recording of 'grid multiplication' as a representation of the rectangular array. (Link with 'area')
50 + 45 = 95 so, 19 x 5 = 95

OR COMPENSATION
i.e. 19 x 5 = 20 x 5 - 5

Y4

Strategy: to recognise *repeated aggregation* (addition of groups of the same size); and *scaling* (increase/decrease a number of times/by a scale factor of) – both structures should be represented as an array.

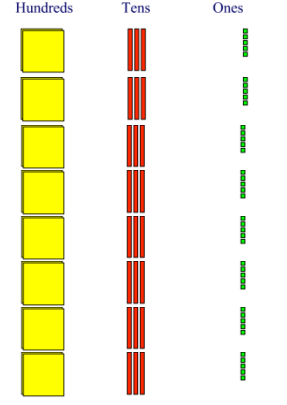
Vocabulary: lots of, groups of, times, multiply, multiplication, multiplied by, multiple of, product, once, twice, three times... ten times...times as (big, long, wide... and so on), repeated addition, array, row, column, double,

Recording: Following teacher demonstration to link pictorial recording (array), children continue to develop recording e.g. grid multiplication to represent arrays, and vertical recording of expanded vertical layouts of multiplication. They use standard notation (including the symbols x and =)

Equipment & Resources: number lines, hundred squares, counters, array, pegboards, straws, squared paper, cubes etc. & everyday objects e.g. bars of chocolate, egg boxes,
ITPs: [Multiplication Array](#); [Multiplication facts](#); [Multiplication tables](#); [Number dials](#); [Multiplication Board](#) (tables square); [Multiplication grid](#) (grid multiplication) [Moving Digits](#)
<http://www.wmnet.org.uk/resources/gordon/Chunking.swf>
NCETM video examples: [Grid multiplication as an interim step](#) [Times Tables in Ten Minutes](#)

School examples of multiplication:
The class wants to make 235 spiders for a display. How many legs do they need to make?
235 x 8 is approximately 235 x 10 = 2350

Model using Base 10 equipment or straws. Use the equipment to demonstrate partitioning i.e. 235 x 8 = 200 x 8 + 30 x 8 + 5 x 8 = (200 + 30 + 5) x 8



Leading to formal recording of 'grid multiplication' as a representation of the rectangular array.

x	200	30	5
8	1600	240	40

1600 + 240 + 40 = 1880 so, 235 x 8 = 1880

As 235 x 8 = 8 x 235 (commutative), the layout for grid multiplication can also be presented 'vertically' as a step towards 'long multiplication'.

x	8
200	1600
30	240
5	40
	1880

Leading to an expanded 'vertical' layout.

x	8			
2	3	5	8 multiplied by 5 is 40	
	4	0	8 multiplied by 30 is 240	
2	4	0	8 multiplied by 200 is 1600	
1	6	0	0	To give a total of 1880
1	8	8	0	

Y5

Strategy: to recognise *repeated aggregation* (addition of groups of the same size); and *scaling* (increase/decrease a number of times/by a scale factor of) – both structures should be represented as an array.

Vocabulary: lots of, groups of, times, multiply, multiplication, multiplied by, multiple of, product, once, twice, three times... ten times... times as (big, long, wide... and so on), repeated addition, array, row, column, double,

Recording: Following teacher demonstration to link pictorial recording (array), children continue to develop recording especially grid multiplication to represent arrays, and vertical recording of expanded vertical layouts of multiplication. They use begin to use standard compact layouts for multiplication.

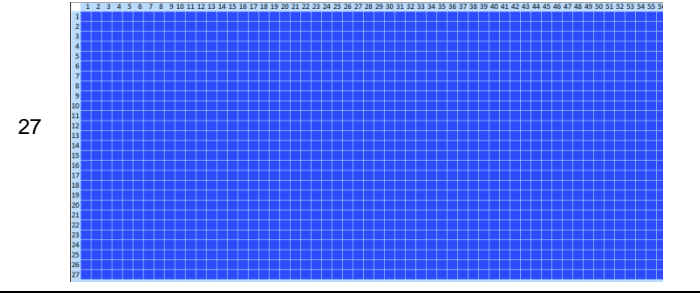
Equipment & Resources: a range of mathematics equipment as well as everyday situations especially those that produce arrays e.g. number of seats in an auditorium
ITPs: [Multiplication Array](#); [Multiplication facts](#); [Multiplication tables](#); [Number dials](#); [Multiplication Board](#) (tables square); [Multiplication grid](#) (grid multiplication) [Moving Digits](#)
NCETM video examples: [Moving from grid to a column method](#) [rapid recall of multiplication facts](#)

School examples of multiplication:
56 x 27 is approximately 60 x 30 = 1800.

Where possible, model using Base 10 equipment. See Y4 example. Use the equipment to show partitioning i.e. 56 x 27 = 50 x 20 + 50 x 7 + 6 x 20 + 6 x 7 = (50 + 6) x 27

Leading to formal recording of 'grid multiplication' as a representation of the rectangular array. Possible to record on a number line – see Y4 example.

Possible use of Excel to generate array to represent 56 x 27



As 56 x 27 = 27 x 56 (commutative), the layout for grid multiplication can also be presented 'vertically' (largest number on the vertical axis) as a step towards 'long multiplication'.

x	20	7
50	1000	350
6	120	42
	1120	392
		1512

Leading to an expanded 'vertical' layout. Either begin with least or most significant figure.

x	2	7
1	5	6
	4	2
1	2	0
3	5	0
1	0	0
1	5	1
	1	

Leading to a compact 'vertical' layout:

x	2	7
1	5	6
	4	2
1	2	0
3	5	0
1	0	0
1	5	1
	1	

Y6

Strategy: to recognise *repeated aggregation* (addition of groups of the same size); and *scaling* (increase/decrease a number of times/by a scale factor of) – both structures should be represented as an array.

Vocabulary: lots of, groups of, times, multiply, multiplication, multiplied by, multiple of, product, once, twice, three times... ten times... times as (big, long, wide... and so on), repeated addition, array, row, column, double,

Recording: Following teacher demonstration to link pictorial recording (array), children continue to develop recording especially grid multiplication to represent arrays, and vertical recording of expanded vertical layouts of multiplication. They use begin to use standard compact layouts for multiplication.

Equipment & Resources: a range of mathematics equipment as well as everyday situations especially those that produce arrays e.g. number of seats in an auditorium
ITPs: [Multiplication Array](#); [Multiplication facts](#); [Multiplication tables](#); [Number dials](#); [Multiplication Board](#) (tables square); [Multiplication grid](#) (grid multiplication) [Moving Digits](#)
NCETM video examples: [Moving from grid to a column method](#) [rapid recall of multiplication facts](#)

School examples of multiplication:
1328 x 43 is approximately 1200 x 40 = 48000

Use equipment to show partitioning i.e. 1328 x 43 = 1000 x 43 + 300 x 43 + 20 x 43 + 8 x 43 = (1000 + 300 + 20 + 8) x 43

Leading to recording using 'grid multiplication' as a representation of a rectangular array. Possible use of Excel to generate array – see Y5 example.

As 1328 x 43 = 43 x 1328 (commutative), the layout for grid multiplication can also be presented 'vertically' as a step towards 'long multiplication'.

x	40	3
1000	40 000	3000
300	12 000	900
20	800	60
8	320	24
	53 120	3984
		57 104

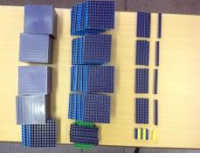

Leading to an expanded 'vertical' layout. Either begin with least or most significant figure.

x	1	3	2	8
	2	4	3	
	6	0		
9	0	0		
3	0	0		
	8	0		
1	2	0		
4	0	0		
5	7	1	0	4
	2	1		

Leading to a compact 'vertical' layout. Either begin with least or most significant figure.

x	1	3	2	8
	3	9	8	4
5	3	1	2	0
	5	7	1	0
	1	1		

Also include examples that involve decimals, money and other measures e.g. 18.6 x 4.4

As 18.6 x 4.4 = 4.4 x 18.6 (commutative), the layout for grid multiplication can also be presented 'vertically' as a step towards 'long multiplication'.

x	4	0.4
10	40.0	4.00
8	32.0	3.20
0.6	2.4	0.24
	74.4	7.44
		81.84

Leading to an expanded 'vertical' layout. Either begin with least or most significant figure and then a compact 'vertical' layout – see above.

Links: Learners will encounter aspects of multiplication when working on area, relating to arrays. Problem solving work involving finding all possibilities and combinations also draws on knowledge of multiplication tables facts. Fractions work within other curriculum areas and in real life links naturally to multiplication work. The notion of equal groups can emerge in many different activities and contexts, e.g. purchasing quantities of items for several people etc.

Links:

- Convert between different units of measure [for example, kilometre to metre; hour to minute]
- solve problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to days.

Fractions

- recognise and show, using diagrams, families of common equivalent fractions

Cross-curricular and real life connections

Counting – Calculating totals by counting small amounts or a proportion and then scaling up e.g. standing against a tree and using your known height to work out ‘How many of me are equal to the height of the tree?’ or counting people on one part of a stadium and multiplying to calculate the total number of spectators.

Money – shopping: adding multiple products of the same price, adding coins of same value,

Measurement – Scaling quantities (e.g. recipes) to cater for more and less people, reading scales and unlabelled increments on measuring apparatus, calculating area for carpets, decorating etc., scaling shapes to scale geometric artwork e.g. How would you make this triangle three times its size? Comparing river lengths/building heights e.g. the River Nile is x times longer than the River X.

Statistics – Reading scales and determining appropriate scales for different types of graph relating to weather, temperature, sound etc., Working with proportion, fractions and percentages using pie charts, comparing data using ratio, fractions and scaling such as proportion of children missing breakfast or 1 in 7 children under 10 now has a mobile phone etc.

Links:

Learners will encounter multiplication and division in: **Fractions (including decimals and percentages)**

Requirements include:

- multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams
- solve problems involving number up to 3 decimal places

When working on multiplication and division and/or fractions (including decimals and percentages), there are opportunities to make connections between them, for example:

You could give the children strips of paper and ask them to fold them to show you different proper and mixed fractions, for example, $\frac{5}{8}$, $1\frac{3}{4}$. Next ask them to multiply these fractions by single digit numbers. They could use the strips to help them: $1\frac{5}{8} \times 6$



$1 \times 6 = 6$ $\frac{5}{8} \times 6 = \frac{30}{8}$ or $3\frac{3}{8}$ $1\frac{5}{8} \times 6 = 6 + 3\frac{3}{8} = 9\frac{3}{8}$ or $9\frac{3}{4}$

Numbers with decimals are frequently seen in real life, for example when using money, so give the children opportunities to multiply these in context. For example, you could give them take-away menus and ask them to find out how much it would cost to buy four of a meal deal or a particular course. You could give them the total cost of six of the same dish and ask to work out which dish you chose.

You could ask the children problems that involve multiplying numbers up to 3 decimal places and link to measures, such as:

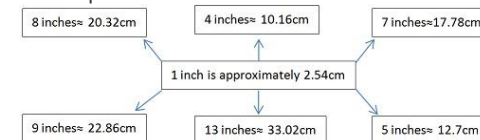
- Jessie had eight lengths of rope. Each was 1m 36cm. If he put them side by side what would the total length be?
- Paddy had 12 cartons of orange juice. Each carton contained 0.750l. How much juice did he have altogether?
- Suzie, the baker, was making 14 loaves of bread for the local supermarket. For each loaf she needed 1.275kg of flour. What is the total amount of flour that she needed?
- India took part in a sponsored bike ride at her school. She cycled 25 times around the perimeter of the school playground. The perimeter is 105.34m. How far did she travel?

Measurement

When working on multiplication and division and/or measurement there are opportunities to make connections between them, for example: You could give the children opportunities to rehearse multiplying by 10, 100 and 1000 by converting, for example, millimetres to centimetres, centimetres to metres, metres to kilometres. They could then multiply lengths, masses and capacities of different sizes, for example, 14.75kg by 8. You could then put these into problem format, eg:

- Benji, a party organiser, was going to make a fruit punch. For each guest he needed 0.250ml of orange juice and 0.250l of mango juice. If there are 25 guests coming to the party, what is the total amount of juice Benji needs?

You could give the children an approximate equivalence between miles and kilometres, for example 1.6km is approximately 1 mile. Then they multiply this amount to find approximate equivalences for other miles, for example 5 miles, 8 miles, 10 miles, 14 miles. The children could make a spider diagram for this and other equivalences.



You could give the children lengths of one side of different regular polygons, for example, pentagon, octagon, decagon, dodecagon and ask them to find their perimeters by multiplying each length by the number of sides the polygon has.

You could also give the children the lengths of different sized rectangles and ask them to find their areas, for example, a rectangle 28cm by 12cm.

Set problems involving time and money for the children to use, for example:

- Samir spent 45 minutes completing his homework. It took Pete three times as long. How long did it take Pete to complete his homework?
- It took Carol $1\frac{1}{2}$ hours to drive from Oxford to London. It took Lorna a third of that time. How long did it take Lorna to travel to London?
- Harry is given £3.75 a week as pocket money. He is saving it to buy a computer game. How much will he have saved over 8 weeks? What about 12 weeks?
- Georgie saved £2.25 of her pocket money each week. How much will she have saved over 9 weeks?
- Penny had saved £75 over a period of 12 weeks. She saved an equal amount every week. How much did she save each week?

Cross-curricular and real life connections

Learners will encounter number and place value in:

Within the geography curriculum there are opportunities to connect with multiplication and division, for example in the introduction of the Key Stage 2 Programme of Study it states that pupils should extend their knowledge and

Links:

Fractions

- identify the value of each digit in numbers given to three decimal places and multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places
- multiply one-digit numbers with up to two decimal places by whole numbers
- use written division methods in cases where the answer has up to two decimal places
- divide proper fractions by whole numbers [e.g. $\frac{1}{3} \div 2 = \frac{1}{6}$]
- multiply simple pairs of proper fractions, writing the answer in its simplest form

When working on multiplication and division and/or fractions there are opportunities to make connections between them, for example:

Multiply numbers such as:

- 245.25 by 10, 100 and 1000
- 1.35 by 8
- $\frac{1}{4} \times \frac{1}{2}$

Divide numbers such as:

- 12 578 by 10, 100 and 1000
- 237 by 5
- $\frac{1}{3} \div 2$

Ratio and proportion

- solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts

When working on multiplication and division and/or ratio and proportion there are opportunities to make connections between them, for example:

Convert the ingredients in this lasagne recipe for 4 people so that it will serve 12:

- 350g minced beef
- 1 onion
- 1 clove garlic
- 600g tin of tomatoes
- 2 tablespoons tomato puree
- 175g lasagne sheets

Algebra

- express missing number problems algebraically
- use simple formulae

When working on multiplication and division and/or algebra there are opportunities to make connections between them, for example:

Solve missing number problems, e.g. $6(a + 12) = 144$

multiply out the equation: $6a + 72 = 144$

balance by -72: $6a + 72 - 72 = 144 - 72$

$6a = 72$

Use known division facts: $a = 72 \div 6$

$a = 12$

Find perimeters and areas of rectangles using the appropriate formulae, e.g. a square field has sides of 24.75m. What is its perimeter? What is its area?

Measurement

- solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate
- convert between miles and kilometres

When working on multiplication and division and/or measurement there are opportunities to make connections between them by solving problems such as;

- 1 pint = 0.57 litres, how many litres in 8 pints? How many pints in 12 litres?
- Dan was driving between two cities in France. The sign said the distance was 185km. He wanted to know what that was in miles. How can he find out? How many miles is it?

Statistics

- calculate and interpret the mean as an average

When working on multiplication and division and/or statistics there are opportunities to make connections between them, for example:

Solve problems, e.g. find the mean monthly temperature for Reykjavik, Iceland

Monthly temperatures for Reykjavik

Jan Feb March April May June July Aug Sept Oct Nov Dec

-2°C -1°C 3°C 6°C 10°C 13°C 14°C 14°C 11°C 7°C 5°C -2°C

Cross-curricular and real life connections

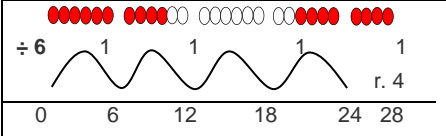
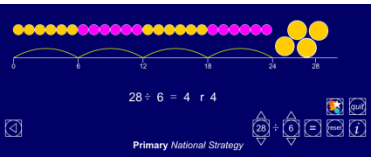
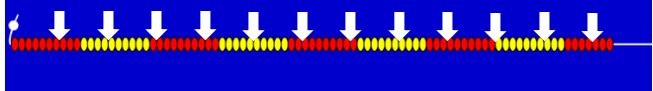
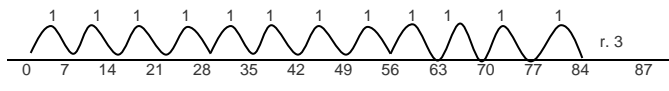
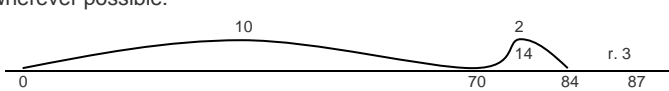
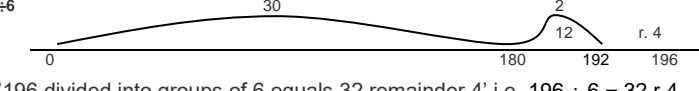
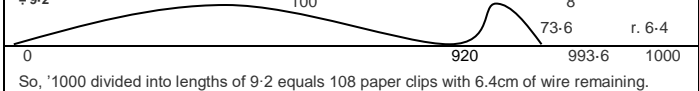
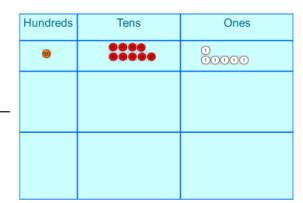
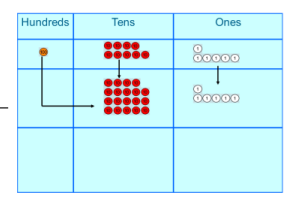

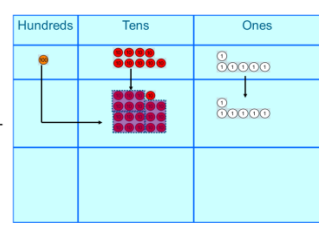
Learners will encounter multiplication and division in:

Art & Design

Within the art and design curriculum there are opportunities to connect with multiplication and division, for example in the introduction of the Key Stage 2 Programme of Study it states that pupils should be taught to develop their techniques, including their control and their use of materials, with creativity, experimentation and an increasing awareness of different kinds of art, craft and design. This could include designing and creating life size models of, for

		<p>understanding beyond the local area to include the United Kingdom and Europe, North and South America. This will include the location and characteristics of a range of the world's most significant human and physical features. Children could, for example, find out about the currencies used in a selection of countries. They could then make up a currency converter using mental calculation strategies and then check using multiplication, for example: £1 = 1.20 Euros £2 = 2.40 Euros £3 = 3.60 Euros £4 = 4.80 Euros £5 = 6 Euros</p>	<p>example a Barbara Hepworth sculpture or a Van Gogh painting where the children need to find realistic measurements and then scale them down using division.</p> <p>Geography Within the geography curriculum there are opportunities to connect with multiplication and division, for example in the introduction of the Key Stage 2 Programme of Study it states that pupils should extend their knowledge and understanding beyond the local area to include the United Kingdom and Europe, North and South America. This will include the location and characteristics of a range of the world's most significant human and physical features. Work on multiplication and division could include converting between miles and kilometres and vice versa when looking at distances between countries or famous locations, making currency converters for pounds sterling and the currency in the country they are investigating. See, for example:</p> <ul style="list-style-type: none">• Mathematics and geography <p>History Within the history curriculum, there are opportunities to connect with multiplication and division, for example in the introduction of the Key Stage 2 Programme of Study it states that 'in planning to ensure the progression described above through teaching the British, local and world history outlined below, teachers should combine overview and depth studies to help pupils understand both the long arc of development and the complexity of specific aspects of the content'. The history curriculum requires that pupils should 'compare aspects of life in different periods', suggesting comparisons between Tudor and Victorian periods, for example. Scale models could be one way of learning about life in different periods. See, for example:</p> <ul style="list-style-type: none">• The Tudors• The Victorians• The Ancient Egyptians• The Ancient Greeks
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DIVISION

Y3	Y4	Y5	Y6					
<p>Strategy: recognise division as <i>equal sharing</i>; the <i>inverse of repeated aggregation</i> (divided into groups of...) i.e. grouping</p>	<p>Strategy: recognise division as <i>equal sharing</i>; the <i>inverse of repeated aggregation</i> (divided into groups of...) i.e. grouping</p>	<p>Strategy: recognise division as <i>equal sharing</i>; the <i>inverse of repeated aggregation</i> (divided into groups of...) i.e. grouping; and, <i>ratio structure</i> for division i.e. comparison of two quantities – how many times less than or more than ...</p>	<p>Strategy: recognise division as <i>equal sharing</i>; the <i>inverse of repeated aggregation</i> (divided into groups of...) i.e. grouping; and, <i>ratio structure</i> for division i.e. comparison of two quantities – how many times less than or more than ...</p>					
<p>Vocabulary: halve; share, share equally; one each, two each, three each... group in pairs, threes... tens; equal groups of, divide, division, divided by, divided into, left, left over, remainder</p>	<p>Vocabulary: halve, share, share equally, one each, two each, three each..., group in pairs, threes... tens, equal groups of, divide, division, divided by, divided into, remainder, factor, quotient, divisible by inverse</p>	<p>Vocabulary: halve, share, share equally one each, two each, three each..., group in pairs, threes... tens equal groups of, divide, division, divided by, divided into, remainder, factor, quotient, divisible by, inverse</p>	<p>Vocabulary: halve, share, share equally one each, two each, three each..., group in pairs, threes... tens, equal groups of, divide, division, divided by, divided into, remainder, factor, quotient, divisible by, inverse</p>					
<p>Recording: Following teacher demonstration to link pictorial recording (number line & array), children continue to develop recording especially using pictures and their own number lines. They use standard notation (including the symbols \div and $=$)</p>	<p>Recording: Following teacher demonstration to link pictorial recording (number line), children continue to develop recording especially their own number lines, and vertical recording of expanded vertical layouts of division - chunking using repeated addition. They use standard notation (including the symbols \div and $=$)</p>	<p>Recording: Following teacher demonstration to link pictorial recording (number line), children continue to develop recording leading to vertical recording of expanded vertical layouts of division. They use begin to use standard compact layouts for division.</p>	<p>Recording: Following teacher demonstration to link pictorial recording (number line), children continue to develop recording leading to vertical recording of expanded vertical layouts of division. They begin to use standard compact layouts for division.</p>					
<p>Equipment & Resources: Equipment and resources : number lines, hundred squares, counters, array, pegboards, straws, squared paper, cubes etc. & everyday objects e.g. bars of chocolate, egg boxes, ITPs: Multiplication Array; Multiplication facts; Multiplication tables; Number dials; Grouping; Multiplication Board (tables square); NCETM video examples: Times Tables in Ten Minutes</p>	<p>Equipment & Resources: Equipment and resources : number lines, hundred squares, counters, array, pegboards, straws, squared paper, cubes etc. & everyday objects e.g. bars of chocolate, egg boxes, ITPs: Multiplication Array; Multiplication facts; Multiplication tables; Number dials; Multiplication Board (tables square) Moving Digits http://www.wmnet.org.uk/resources/gordon/Chunking.swf NCETM video examples: Times Tables in Ten Minutes</p>	<p>Equipment & Resources: a range of mathematics equipment as well as everyday situations especially those that produce arrays e.g. number of seats in an auditorium ITPs: Multiplication Array; Multiplication facts; Multiplication tables; Number dials; Multiplication Board (tables square); Moving Digits http://www.wmnet.org.uk/resources/gordon/Chunking.swf NCETM video examples: Representing division with place value counters rapid recall of multiplication facts</p>	<p>Equipment & Resources: a range of mathematics equipment as well as everyday situations ITPs: Multiplication Array; Multiplication facts; Multiplication tables; Number dials; Multiplication Board (tables square); Moving Digits http://www.wmnet.org.uk/resources/gordon/Chunking.swf NCETM video examples: Representing division with place value counters rapid recall of multiplication facts</p>					
<p>School examples of division: Miss West needs 28 paper cups. She has to buy them in packs of 6 How many packs does she have to buy?</p>  <p>GROUPING i.e. $28 \div 6$ in this context: '28 cups divided into groups of 6'. Modelled using cups then a bead string or bar and recorded on a number line as above. So, $28 \div 6 = 4$ remainder 4</p> <p>Also use Grouping ITP: </p> <p>EQUAL SHARING e.g. There are 28 paper cups to share equally between 6 people. So if everyone has one paper cup, that's one group of 6 paper cups. Demonstrate recording of one group of 6 paper cups on a number line..... Another one for each person etc. So, $6 + 6 + 6 + 6 + 4 = 6 \times 4 + 1 = 28$ OR so $28 \div 6 = 4$ r.4 i.e. 28 shared equally between 6 equals 4 remainder 4.</p>	<p>School examples of division: There are 87 shopping days to Christmas. How many weeks is that? $87 \div 7$ So, '87 divided into groups of 7' is approximately $70 \div 7 = 10$.</p> <p>GROUPING: Model using bead bar or string. Demonstrate partitioning into groups of 7 using the interpretation of $87 \div 7$ as '87 divided into groups of 7'</p>  <p>Record on a number line alongside bead bar or string.</p>  <p>So, '87 divided into groups of 7 equals 12 remainder 3' i.e. $87 \div 7 = 12$ r.3 or $12 \frac{3}{7}$</p> <p>Then begin to divide into 'groups of the divisor' using groups of 10, 5 and 2 wherever possible:</p>  <p>If children's understanding is secure, introduce vertical recording e.g. during summer term. Demonstrate vertical recording alongside number line recording. Begin to record information vertically introducing or 'repeated addition/additive chunking'.</p> $\begin{array}{r} \div 7 \\ 7 \ 0 \\ + 1 \ 4 \\ \hline 8 \ 4 \\ + \quad 3 \\ \hline 8 \ 7 \end{array}$ <p>so, $87 \div 7 = 12$ r.3 or $12 \frac{3}{7}$</p>	<p>School examples of division: $196 \div 6$ i.e. '196 divided into groups of 6' is approximately $180 \div 6 = 30$</p> <p>Leading on from Year 4, divide into 'groups of the divisor' using multiples of groups of 10, 5 and 2 wherever possible and record on a number line.</p>  <p>'196 divided into groups of 6 equals 32 remainder 4' i.e. $196 \div 6 = 32$ r.4 or $32 \frac{4}{6}$ or $32 \frac{2}{3}$</p> <p>When children's understanding is secure, use vertical recording. Demonstrate vertical recording alongside number line recording. Begin to record information vertically introducing 'repeated addition/additive chunking'</p> <table border="1" data-bbox="1513 1144 2181 1459"> <tr> <td> $196 \div 6 =$ 60 (x10) $+ 60$ (x10) 120 $+ 60$ (x10) 180 $+ 12$ (x2) 192 $+ 4$ 196 </td> <td> <p>Where necessary dividing by 'groups of the divisor' using groups of 10, 5 and 2 (see left) and then using 'multiple groups of 10, 5 and 2 (see right)</p> </td> <td> $\div 6$ $1 \ 8 \ 0$ (x30) $+ \quad 1 \ 2$ (x2) $\hline 1 \ 9 \ 2$ $+ \quad 4$ $\hline 1 \ 9 \ 6$ <p>so, $196 \div 6 = 32$ r.4 or $32 \frac{4}{6}$ or $32 \frac{2}{3}$</p> </td> </tr> </table>	$196 \div 6 =$ 60 (x10) $+ 60$ (x10) 120 $+ 60$ (x10) 180 $+ 12$ (x2) 192 $+ 4$ 196	<p>Where necessary dividing by 'groups of the divisor' using groups of 10, 5 and 2 (see left) and then using 'multiple groups of 10, 5 and 2 (see right)</p>	$\div 6$ $1 \ 8 \ 0$ (x30) $+ \quad 1 \ 2$ (x2) $\hline 1 \ 9 \ 2$ $+ \quad 4$ $\hline 1 \ 9 \ 6$ <p>so, $196 \div 6 = 32$ r.4 or $32 \frac{4}{6}$ or $32 \frac{2}{3}$</p>	<p>School examples of division: Each paper clip is made from 9.2 centimetres of wire. What is the greatest number of paper clips that can be made from 10 metres of wire? $10\text{m} \div 9.2\text{cm} = 1000 \div 9.2$ i.e. '10m or 1000cm of wire divided into lengths (groups) of 9.2cm' is approximately $1000 \div 10 = 100$</p> <p>Leading on from Year 4 and Year 5, divide into 'groups of the divisor' using multiples of groups of 10, 5 and 2 wherever possible and record on a number line.</p>  <p>So, '1000 divided into lengths of 9.2 equals 108 paper clips with 6.4cm of wire remaining.</p> <p>When children's understanding is secure, use vertical recording. Demonstrate vertical recording alongside number line recording. Begin to record information vertically introducing 'repeated addition/additive chunking'.</p> <table border="1" data-bbox="2211 1102 2864 1291"> <tr> <td> $\div 9.2$ $9 \ 2 \ 0$ (x100) $+ \quad 7 \ 3 \ . \ 6$ (x8) $\hline 9 \ 9 \ 3 \ . \ 6$ $+ \quad 6 \ . \ 4$ $\hline 1 \ 0 \ 0 \ 0 \ . \ 0$ </td> <td> <p>So, $1000 \div 9.2 = 108$ r. 6.4</p> </td> </tr> </table>	$\div 9.2$ $9 \ 2 \ 0$ (x100) $+ \quad 7 \ 3 \ . \ 6$ (x8) $\hline 9 \ 9 \ 3 \ . \ 6$ $+ \quad 6 \ . \ 4$ $\hline 1 \ 0 \ 0 \ 0 \ . \ 0$	<p>So, $1000 \div 9.2 = 108$ r. 6.4</p>
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$\div 9.2$ $9 \ 2 \ 0$ (x100) $+ \quad 7 \ 3 \ . \ 6$ (x8) $\hline 9 \ 9 \ 3 \ . \ 6$ $+ \quad 6 \ . \ 4$ $\hline 1 \ 0 \ 0 \ 0 \ . \ 0$	<p>So, $1000 \div 9.2 = 108$ r. 6.4</p>							
		<p>For Year 5 and Year 6: When children are secure with 'chunking' and tables facts, introduce short division for single digit divisors using Base 10 equipment or place value counters to secure children's understanding of the process. For example, $196 \div 6$ i.e. '196 divided into groups of 6' is approximately $180 \div 6 = 30$</p>						
		<p>a. Set out 1 hundred, 9 tens and 6 ones.</p> 	<p>b. 'One hundred divided into (groups of) six is difficult using the counters, so exchange 1 hundred for 10 tens. Set out counters as indicated and amend written layout.</p> 					
		<p>d. 'One ten and six ones divided into (groups of) six is difficult using the counters, so</p>	<p>e. 'Sixteen ones divided into (groups of) six equals two (groups of six 'ones counters')</p> 					
			<p>c. 'Nineteen tens divided into (groups of) six equals three (groups of six 'tens counters') with one ten remaining'. Set out counters as indicated and amend written layout.</p> 					

		<p>exchange 1 ten for 10 ones. Set out counters as indicated and amend written layout.</p>	<p>with four ones remaining.' Set out counters as indicated and amend written layout.</p>	
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Links: Fractions work within other curriculum areas and in real life links naturally to division work. The notion of equal groups can emerge in many different activities and contexts, e.g. when packing boxes

Links:

- Convert between different units of measure [for example, kilometre to metre; hour to minute]
- solve problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to days.

Fractions

- recognise and show, using diagrams, families of common equivalent fractions
- count up and down in hundredths; recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten
- recognise and write decimal equivalents to $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$
- find the effect of dividing a one- or two-digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths

Cross-curricular and real life connections

Money – shopping: working out fraction/percentage discounts and special offers, sharing bills.

Measurement – Scaling quantities (e.g. recipes) to cater for more and less people, reading scales and unlabelled increments on measuring apparatus, calculating area for carpets, decorating etc., scaling shapes to scale geometric artwork half its size? Comparing river lengths/building heights e.g. The height of Snowdon is (fraction) of the height of Everest.

Statistics – Reading scales and determining appropriate scales for different types of graph relating to weather, temperature, sound etc., Working with proportion, fractions and percentages using pie charts, comparing data using ratio, fractions and scaling such as proportion of children missing breakfast or 1 in 7 children under 10 now has a mobile phone etc.

Links:

Learners will encounter multiplication and division in:

Fractions (including decimals and percentages)

Requirements include:

- multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams
- solve problems involving number up to 3 decimal places

When working on multiplication and division and/or fractions (including decimals and percentages), there are opportunities to make connections between them, for example:

You could give the children strips of paper and ask them to fold them to show you different proper and mixed fractions, for example, $\frac{5}{8}$, $1\frac{3}{4}$. Next ask them to multiply these fractions by single digit numbers. They could use the strips to help them: $1\frac{5}{8} \times 6$

$1 \times 6 = 6$ $\frac{5}{8} \times 6 = \frac{30}{8}$ or $3\frac{6}{8}$ $1\frac{5}{8} \times 6 = 6 + 3\frac{6}{8} = 9\frac{6}{8}$ or $9\frac{3}{4}$

Numbers with decimals are frequently seen in real life, for example when using money, so give the children opportunities to multiply these in context. For example, you could give them take-away menus and ask them to find out how much it would cost to buy four of a meal deal or a particular course. You could give them the total cost of six of the same dish and ask to work out which dish you chose.

You could ask the children problems that involve multiplying numbers up to 3 decimal places and link to measures, such as:

- Jessie had eight lengths of rope. Each was 1m 36cm. If he put them side by side what would the total length be?
- Paddy had 12 cartons of orange juice. Each carton contained 0.750l. How much juice did he have altogether?
- Suzie, the baker, was making 14 loaves of bread for the local supermarket. For each loaf she needed 1.275kg of flour. What is the total amount of flour that she needed?
- India took part in a sponsored bike ride at her school. She cycled 25 times around the perimeter of the school playground. The perimeter is 105.34m. How far did she travel?

Measurement

When working on multiplication and division and/or measurement there are opportunities to make connections between them, for example:

You could give the children opportunities to rehearse multiplying by 10, 100 and 1000 by converting, for example, millimetres to centimetres, centimetres to metres, metres to kilometres. They could then multiply lengths, masses and capacities of different sizes, for example, 14.75kg by 8. You could then put these into problem format, eg:

- Benji, a party organiser, was going to make a fruit punch. For each guest he needed 0.250ml of orange juice and 0.250l of mango juice. If there are 25 guests coming to the party, what is the total amount of juice Benji needs?

You could give the children an approximate equivalence between miles and kilometres, for example 1.6km is approximately 1 mile. Then they multiply this amount to find approximate equivalences for other miles, for example 5 miles, 8 miles, 10 miles, 14 miles. The children could make a spider diagram for this and other equivalences.

You could give the children lengths of one side of different regular polygons, for example, pentagon, octagon, decagon, dodecagon and ask them to find their perimeters by multiplying each length by the number of sides the polygon has.

You could also give the children the lengths of different sized rectangles and ask them to find their areas, for example, a rectangle 28cm by 12cm.

Set problems involving time and money for the children to use, for example:

Links:

Fractions

- identify the value of each digit in numbers given to three decimal places and multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places
- multiply one-digit numbers with up to two decimal places by whole numbers
- use written division methods in cases where the answer has up to two decimal places
- divide proper fractions by whole numbers [e.g. $\frac{1}{3} \div 2 = \frac{1}{6}$]
- multiply simple pairs of proper fractions, writing the answer in its simplest form

When working on multiplication and division and/or fractions there are opportunities to make connections between them, for example:

Multiply numbers such as:

- 245.25 by 10, 100 and 1000
- 1.35 by 8
- $\frac{1}{4} \times \frac{1}{2}$

Divide numbers such as:

- 12 578 by 10, 100 and 1000
- 237 by 5
- $\frac{1}{3} \div 2$

Ratio and proportion

- solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts

When working on multiplication and division and/or ratio and proportion there are opportunities to make connections between them, for example:

Convert the ingredients in this lasagne recipe for 4 people so that it will serve 12:

- 350g minced beef
- 1 onion
- 1 clove garlic
- 600g tin of tomatoes
- 2 tablespoons tomato puree
- 175g lasagne sheets

Algebra

- express missing number problems algebraically
- use simple formulae

When working on multiplication and division and/or algebra there are opportunities to make connections between them, for example:

Solve missing number problems, e.g. $6(a + 12) = 144$

multiply out the equation: $6a + 72 = 144$

balance by -72: $6a + 72 - 72 = 144 - 72$

$6a = 72$

Use known division facts: $a = 72 \div 6$

$a = 12$

Find perimeters and areas of rectangles using the appropriate formulae, e.g. a square field has sides of 24.75m. What is its perimeter? What is its area?

Measurement

- solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate
- convert between miles and kilometres

When working on multiplication and division and/or measurement there are opportunities to make connections between them by solving problems such as:

- 1 pint = 0.57 litres, how many litres in 8 pints? How many pints in 12 litres?
- Dan was driving between two cities in France. The sign said the distance was 185km. He wanted to know what that was in miles. How can he find out? How many miles is it?

Statistics

- calculate and interpret the mean as an average

		<ul style="list-style-type: none"> • Samir spent 45 minutes completing his homework. It took Pete three times as long. How long did it take Pete to complete his homework? • It took Carol 1 ½ hours to drive from Oxford to London. It took Lorna a third of that time. How long did it take Lorna to travel to London? • Harry is given £3.75 a week as pocket money. He is saving it to buy a computer game. How much will he have saved over 8 weeks? What about 12 weeks? • Georgie saved £2.25 of her pocket money each week. How much will she have saved over 9 weeks? • Penny had saved £75 over a period of 12 weeks. She saved an equal amount every week. How much did she save each week? <p>Cross-curricular and real life connections Learners will encounter number and place value in: Within the geography curriculum there are opportunities to connect with multiplication and division, for example in the introduction of the Key Stage 2 Programme of Study it states that pupils should extend their knowledge and understanding beyond the local area to include the United Kingdom and Europe, North and South America. This will include the location and characteristics of a range of the world's most significant human and physical features. Children could, for example, find out about the currencies used in a selection of countries. They could then make up a currency converter using mental calculation strategies and then check using multiplication, for example: £1= 1.20 Euros £2 = 2.40 Euros £3 = 3.60 Euros £4 = 4.80 Euros £5 = 6 Euros</p>	<p>When working on multiplication and division and/or statistics there are opportunities to make connections between them, for example: Solve problems, e.g. find the mean monthly temperature for Reykjavik, Iceland Monthly temperatures for Reykjavik Jan Feb March April May June July Aug Sept Oct Nov Dec -2°C -1°C 3°C 6°C 10°C 13°C 14°C 14°C 11°C 7°C 5°C -2°C</p> <p>Cross-curricular and real life connections Learners will encounter multiplication and division in: Art & Design Within the art and design curriculum there are opportunities to connect with multiplication and division, for example in the introduction of the Key Stage 2 Programme of Study it states that pupils should be taught to develop their techniques, including their control and their use of materials, with creativity, experimentation and an increasing awareness of different kinds of art, craft and design. This could include designing and creating life size models of, for example a Barbara Hepworth sculpture or a Van Gogh painting where the children need to find realistic measurements and then scale them down using division. Geography Within the geography curriculum there are opportunities to connect with multiplication and division, for example in the introduction of the Key Stage 2 Programme of Study it states that pupils should extend their knowledge and understanding beyond the local area to include the United Kingdom and Europe, North and South America. This will include the location and characteristics of a range of the world's most significant human and physical features. Work on multiplication and division could include converting between miles and kilometres and vice versa when looking at distances between countries or famous locations, making currency converters for pounds sterling and the currency in the country they are investigating. See, for example: <ul style="list-style-type: none"> • Mathematics and geography History Within the history curriculum, there are opportunities to connect with multiplication and division, for example in the introduction of the Key Stage 2 Programme of Study it states that 'in planning to ensure the progression described above through teaching the British, local and world history outlined below, teachers should combine overview and depth studies to help pupils understand both the long arc of development and the complexity of specific aspects of the content'. The history curriculum requires that pupils should 'compare aspects of life in different periods', suggesting comparisons between Tudor and Victorian periods, for example. Scale models could be one way of learning about life in different periods. See, for example: <ul style="list-style-type: none"> • The Tudors • The Victorians • The Ancient Egyptians • The Ancient Greeks </p>
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