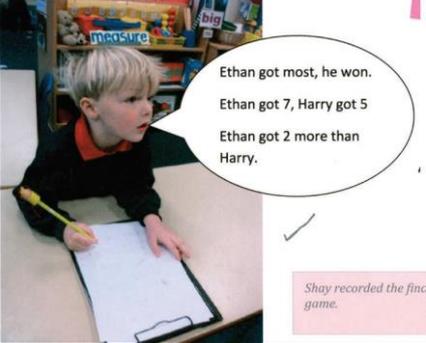
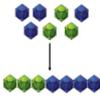
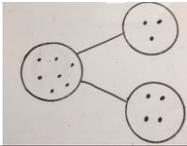
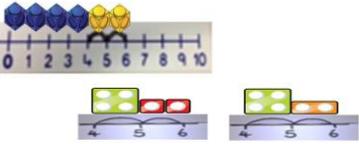
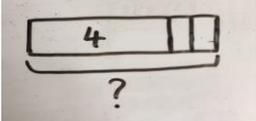
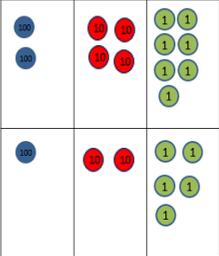


## Addition

For each of the following progressive stages of addition calculation it is recommended to use concrete, pictorial and abstract to aid understanding.

<p><b>Reception pupils should be taught to:</b></p> <ul style="list-style-type: none"> <li>count reliably with numbers from 1 to 20,</li> <li>place numbers in order and say which number is one more or one less than a given number.</li> <li>add two single-digit numbers, using quantities and objects</li> <li>count on to find the answer.</li> </ul>		<p><b>Vocabulary:</b></p> <p>add, more, plus, and make, sum, total, altogether, score          one more, two more, ten more....          how many more to make ...?          how many more is.... than ...?          equals, is the same as =          together is</p>
<p>Children will take part in lots of practical activities, and an adult will record their verbal explanations of their use of numbers.</p>		<p>Today, whilst playing a game he added up a 6 on one dice and a 5 on another, and got the total 11.</p> <p>"I know I have got to move 11 because 5 add 6 makes 11."</p>
<p>Concrete</p>	<p>Pictorial</p>	<p>Abstract</p>
<p>Combining two sets of objects to make a whole, which will progress onto adding on to a set.</p> 	<p>Children to represent the cubes using dots or crosses. They could put each part on a part whole model too.</p> 	<p><math>4 + 3 = 7</math></p> <p>4 is a part, 3 is a part and the whole is 7.</p>
<p><b>Year One pupils should be taught to:</b></p> <ul style="list-style-type: none"> <li>read and write numbers from 1 to 20 in numerals and words</li> <li>count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number</li> <li>count, read and write numbers to 100 in numerals; count in multiples of 2s, 5s and 10s</li> <li>identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least</li> <li>read, write and interpret mathematical statements involving addition (+) and equals (=) signs</li> <li>represent and use number bonds within 20</li> <li>add one-digit and two-digit numbers to 20, including 0</li> <li>solve one-step problems that involve addition, using concrete objects and pictorial representations, and missing number problems such as <math>7 = ? - 9</math></li> </ul>	<p><b>New vocabulary:</b></p> <p>units, ones          tens          exchange          digit          'teens' number          eleventh.. to twentieth.          +, plus          near double          how much more is...?          =, equals, sign,</p>	
<p>Progression from Reception:  <math>2 + 7</math> (no bridging); <math>2 + 9</math> (bridging); <math>12 + 6</math> (no bridging)          Counting on using number lines, using cubes or Numicon</p> 	<p>A bar model can be used, which encourages children to count on, rather than count all. This also helps to develop understanding of relationships between operations.</p> 	<p><b>The abstract number line:</b>          What is 2 more than 4?          What is the sum of 2 and 4?          What is the total of 4 and 2?  <math>4 + 2 =</math></p> 
<p>Re-grouping to make 10; using ten frames and counters /cubes or using Numicon.</p>	<p>Children to draw the ten frame and counters / cubes.</p>	<p>Children to develop an understanding of equality eg.</p> <p><math>6 + \square = 11</math></p>

		$6 + 5 = \square +$ $6 + 5 = \square + 4$
<p><b>Year Two pupils should be taught to:</b></p> <ul style="list-style-type: none"> <li>read and write numbers from 1 to 100 in numerals and words</li> <li>count in steps of 2, 3, and 5 from 0, and in 10s from any number, forward and backward</li> <li>recognise the place value of each digit in a two-digit number (10s, 1s)</li> <li>add numbers using concrete objects, pictorial representations, and mentally, including: <ul style="list-style-type: none"> <li>a two-digit number and 1s</li> <li>a two-digit number and 10s</li> <li>2 two-digit numbers</li> <li>adding 3 one-digit numbers</li> </ul> </li> <li>recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problem</li> </ul>		<p><b>New Vocabulary:</b></p> <p>one or two digit number place, place value stands for, represents carry twenty first, twenty second... addition ten more tens boundary commutative</p>
<p>TO + 0 using base 10 or Numicon. Continue to develop understanding of partitioning and place value:</p> <p>41 + 8 =</p>	<p>Children to represent the base 10 eg. use lines for tens and dots / crosses for ones.</p>	<p>Moving onto the <b>expanded column method</b>:</p> $\begin{array}{r} 41 = 40 + 1 \\ + 8 = \quad 8 \\ \hline 49 = 40 \quad 9 \end{array}$ <p>Use money representations too.</p>
<p>Progress onto TO + TO using base 10 or Numicon.</p>	<p>Children to then represent in a place value chart.</p>	<p>Moving to the <b>expanded column method</b></p> $\begin{array}{r} 36 = 30 + 6 \\ + 25 = 20 + 5 \\ \hline 61 = 50 + 11 \end{array}$ <p>Children also need to know that addition is commutative.</p>
<p><b>Year Three pupils should be taught to:</b></p> <ul style="list-style-type: none"> <li>recognise the place value of each digit in a three digit number</li> <li>add numbers with up to 3 digits, using formal written methods of columnar addition</li> <li>estimate the answer to a calculation and use inverse operations to check answers</li> <li>solve problems, including missing number problems, using number facts, place value, and more complex addition, involving two steps</li> </ul>		<p><b>New vocabulary:</b></p> <p>one hundred more hundreds hundreds boundary carry</p>
<p>Children to extend their knowledge of the expanded method to develop understanding further, using place value counters if needed.</p> $243 = 200 + 40 + 3$ $+ 368 = 300 + 60 + 8$ $\hline 611 = 500 + 100 + 11$	<p>Children to then move this to a vertical method, to help explain the carrying.</p> $\begin{array}{r} 243 \\ +368 \\ \hline 11 \quad (3+8) \\ 100 \quad (40+60) \\ \hline 500 \quad (200+300) \\ \hline 611 \end{array}$	<p>Moving to the <b>formal method</b></p> $\begin{array}{r} 243 \\ + 368 \\ \hline 611 \\ \hline 11 \end{array}$
<p><b>Year Four pupils should be taught to:</b></p> <ul style="list-style-type: none"> <li>recognise the place value of each digit in a four digit number</li> <li>add numbers with up to 4 digits, using formal written methods of columnar addition</li> <li>estimate and use inverse operations to check answers to a calculation</li> <li>solve two-step problems in contexts, deciding which operations and methods to use and why</li> </ul>		<p><b>New vocabulary:</b></p> <p>thousands one thousand more hundreds boundary carry increase &lt;or&gt; round to the nearest hundred integer, positive, negative above/below zero, minus</p>

<p><b>Expanded column addition</b> with place value counters, progressing to calculations with 4-digit numbers.</p>  $200 + 40 + 7$ $100 + 20 + 5$ $300 + 60 + 12 = 372$ $\begin{array}{r} 247 \\ +125 \\ \hline 12 \\ 60 \\ \hline 300 \\ 372 \end{array}$	<p><b>Formal column method</b></p> <p>Extend to numbers with at least four digits.</p> $\begin{array}{r} 3456 \\ + 2749 \\ \hline 6205 \\ \phantom{0}111 \end{array}$		<p>Extend to decimals (same number of decimal places).</p> $\begin{array}{r} 72.8 \\ + 36.9 \\ \hline 109.7 \\ \phantom{0}1 \end{array}$ <p>Also, to adding several numbers (with different amounts of digits).</p> $\begin{array}{r} 3,458 \\ + 17 \\ + 123 \\ \hline 3,598 \\ \phantom{0}1 \end{array}$
<p><b>Year Five pupils should be taught to:</b></p> <ul style="list-style-type: none"> <li>recognise the place value of each digit in a seven digit number (up to 1,000,000)</li> <li>add whole numbers with more than 4 digits, using formal written methods of columnar addition</li> <li>use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy</li> <li>solve multi-step problems in contexts, deciding which operations and methods to use and why</li> </ul>	<p><b>New Vocabulary</b></p> <p>numbers to a million</p> <p><math>\geq</math>, greater than or equal to</p> <p>, less than or equal to</p> <p>ascending , descending units boundary, tenths boundary</p>	<p><b>Formal column method</b></p> <p>As year 4, progressing when understanding of the expanded method is secure, children will move on to the formal columnar method for whole numbers and decimal numbers as an efficient written algorithm, extending to numbers with more than four digits.</p> <p>Place value counters can be used alongside the columnar method to develop understanding of addition with decimal numbers.</p> $\begin{array}{r} 347,284 \\ + 425,468 \\ \hline 772,752 \\ \phantom{0}111 \end{array}$	<p>Extend to decimals (same number of decimal places).</p> $\begin{array}{r} 172.83 \\ + 54.68 \\ \hline 227.51 \\ \phantom{0}111 \end{array}$ <p>Also, to adding several numbers (with different amounts of digits).</p> $\begin{array}{r} 34,589 \\ + 157 \\ + 1234 \\ \hline 35,980 \\ \phantom{0}12 \end{array}$
<p><b>Year Six pupils should be taught to:</b></p> <ul style="list-style-type: none"> <li>recognise the place value of each digit in an eight digit number (up to 10,000,000)</li> <li>solve multi-step problems in contexts, deciding which operations and methods to use and why</li> <li>use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy</li> </ul>	<p><b>New Vocabulary</b></p> <p>numbers to ten million orders of operation</p>	<p><b>Written methods</b></p> <p>As year 5, progressing to larger numbers, up to 8 digit numbers, aiming for both conceptual understanding and procedural fluency with columnar method to be secured. Continue calculating with decimals, including those with different numbers of decimal places.</p> $\begin{array}{r} 34,728,435 \\ + 42,546,846 \\ \hline 77,275,281 \\ \phantom{0}1111 \end{array}$	<p>Continue with decimal calculations with varied amounts of digits,</p> $\begin{array}{r} 172.8 \\ 34.7 \\ + 254.68 \\ \hline 462.18 \\ \phantom{0}12 \end{array}$ <p>Also, to adding several numbers (with different amounts of digits) and decimals together.</p> <p><b>Problem Solving</b> Teachers should ensure pupils have the opportunity to apply their knowledge in a variety of contexts and problems (exploring cross curricular links) to deepen their understanding.</p>