



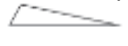
A pupil really understands a mathematical concept, idea or technique if he or she can:

- describe it in his or her own words;
- represent it in a variety of ways (e.g. using concrete materials, pictures and symbols – the CPA approach)<sup>8</sup>
- explain it to someone else;
- make up his or her own examples (and non-examples) of it;
- see connections between it and other facts or ideas;
- recognise it in new situations and contexts;

- make use of it in various ways, including in new situations.<sup>9</sup>

Developing mastery with greater depth is characterised by pupils' ability to:

- solve problems of greater complexity (i.e. where the approach is not immediately obvious), demonstrating creativity and imagination;
- independently explore and investigate mathematical contexts and structures, communicate results clearly and systematically explain and generalise the mathematics.

Number and place value	<ul style="list-style-type: none"> <li>• The position a digit is placed in a number determines its value.</li> <li>• The language used to name numbers does not always expose the place value, for example the word 'twelve' does not make it transparent that the value of this number is ten and two. It is important that children develop secure understanding of the value of each digit.</li> <li>• Place value is based on unitising: treating a group of things as one 'unit'. In mathematics, units can be any size, for example units of 1, 2, 5 and 10 are used in money.</li> <li>• In place value units of 1, 10 and 100 are used.</li> </ul>
Addition and subtraction	<ul style="list-style-type: none"> <li>• Relating numbers to 5 and 10 helps develop knowledge of the number bonds within 20. For example, given <math>8 + 7</math>, thinking of 7 as <math>2 + 5</math> and adding the 2 to 8 to make 10 and then the 5 to total 15.</li> <li>• Thinking of part whole relationships is helpful in linking addition and subtraction. For example, where the whole is 6, and 4 and 2 are parts. This means that 4 and 2 together form the whole, which is 6 and 6 subtract 4 leaves the 2 and 6 subtract 2 leaves the 4.</li> </ul>
Multiplication and division	<ul style="list-style-type: none"> <li>• Counting in steps of equal sizes is based on the big idea of 'unitising' ; treating a group of, say, five objects as one unit of five.</li> <li>• Working with arrays helps pupils to become aware of the commutative property of multiplication, that <math>2 \times 5</math> is equivalent to <math>5 \times 2</math>.</li> </ul>
Fractions	<ul style="list-style-type: none"> <li>• Fractions express a relationship between a whole and equal parts of the whole. Ensure children express this relationship when talking about fractions. For example, <i>'If the circle (where the circle is divided into four equal parts with one part shaded) is the whole, one part is one quarter of the whole circle.'</i></li> <li>• Halving involves partitioning an object, shape or quantity into two equal parts.</li> <li>• The two parts need to be equivalent in, for example, area, mass or quantity.</li> </ul>
Measurement	<ul style="list-style-type: none"> <li>• Measurement is about comparison, for example measuring to find out which rope is the longest.</li> <li>• Measurement is about equivalence, for example how many cubes are equivalent to the length of the table or the mass of the teddy?</li> <li>• Standard units can initially be introduced through using a unit that is greater than the things being compared, for example comparing the capacity of a cup and a carton by filling each and pouring into matching bottles to compare the two.</li> <li>• Measuring is a practical activity and the activities below should be conducted in practical contexts, using real materials.</li> </ul>
Geometry	<ul style="list-style-type: none"> <li>• It is important for children to be familiar with a range of 2-D and 3-D shapes and not just recognise them in specific orientations, e.g. thinking that  this is a triangle but this  or this  are not.</li> <li>• It is preferable to introduce 3-D shapes before 2-D shapes, since 2-D shapes only exist in the real world as faces of 3-D shapes.</li> <li>• An emphasis should be placed upon identifying and describing the properties of shapes. It is important that pupils develop the correct mathematical language to do so.</li> <li>• The development of precise language to describe position and movement is important..</li> </ul>
Statistics	<ul style="list-style-type: none"> <li>• N./A</li> </ul>