



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)⁸
- 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.⁹

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"> • The position (place) of a digit in a number determines its value. Hence the term <i>place value</i>.
Addition and subtraction	<ul style="list-style-type: none"> • Understanding that addition of two or more numbers can be done in any order is important to support children's fluency. When adding two numbers it can be more efficient to put the larger number first. For example, given $3 + 8$ it is easier to calculate $8 + 3$. • When adding three or more numbers it is helpful to look for pairs of numbers that are easy to add. For example, given $5 + 8 + 2$ it is easier to add $8 + 2$ first than to begin with $5 + 8$. • Understanding the importance of the equals sign meaning 'equivalent to' (i.e. that $6 + 4 = 10$, $10 = 6 + 4$ and $5 + 5 = 6 + 4$ are all valid uses of the equals sign) is crucial for later work in algebra. Empty box problems can support the development of this key idea. Correct use of the equals sign should be reinforced at all times. Altering where the equals sign is placed develops fluency and flexibility.
Multiplication and division	<ul style="list-style-type: none"> • It is important that pupils both commit multiplication facts to memory and also develop an understanding of conceptual relationships. This will aid them in using known facts to work out unknown facts and in solving problems. • Pupils should look for and recognise patterns within tables and connections between them (e.g. $5 \times$ is half of $10 \times$). • Pupils should recognise multiplication and division as inverse operations and use this knowledge to solve problems. They should also recognise division as both grouping and sharing. • The recognition of pattern in multiplication helps pupils commit facts to memory, for example doubling twice is the same as multiplying by four, or halving a multiple of ten gives you the related multiple of five.
Fractions	<ul style="list-style-type: none"> • Fractions involve a relationship between a whole and parts of a whole. Ensure children express this relationship when talking about fractions. For example, <i>'If the bag of 12 sweets is the whole, then 4 sweets are one third of the whole.'</i> • Partitioning or 'fair share' problems when each share is less than one gives rise to fractions. • Measuring where the unit is longer than the item being measured gives rise to fractions.
Measurement	<ul style="list-style-type: none"> • We need standard units of measure in order to compare things more accurately and consistently.
Geometry	<ul style="list-style-type: none"> • It is not uncommon for pupils to say that this  is a square and this is  not, or that something like this is a triangle  • It is important for pupils to know what the properties are that make up certain shapes, and for them not to just learn the names of typical proto looking shapes. • It is helpful to think about non examples of shapes. For example, why this is not a triangle: • Recognising pattern and generalising structures and relationships are key elements for laying the foundations for later work in algebra.
Statistics	<ul style="list-style-type: none"> • Data need to be collected with a question or purpose in mind. Tally charts are used to collect data over time (cars passing the school, birds on the bird table).