<table>
<tr><td colspan="4">Number and the number system</td></tr>
<tr><td>Y3</td><td>Y4</td><td>Y5</td><td>Y6</td></tr>
<tr><td>Pupils represent and explain the base ten structure of the number system (up to thousands) in different contexts.</td><td>Pupils represent and explain how the multiplicative nature of the number system includes whole numbers beyond thousands and decimal numbers (up to two decimal places) in different contexts.</td><td colspan="2">Pupils represent and explain how the multiplicative nature of the number system includes whole numbers up to 10 million and decimal numbers beyond hundredths, in different contexts. They use this understanding to convert between different units of measures, explaining and justifying their decisions.</td></tr>
<tr><td>Pupils place and identify numbers (up to one thousand) on a number line (linear number system including scales in measures and statistics) using their understanding of
how close the numbers are to previous and next multiples of 10 and 100 boundaries,
dividing 100 and 1000 into 2, 4, 5 and 10 equal parts
explaining and justifying their decisions.</td><td>Pupils place and identify whole and decimal numbers on a number line (linear number system including scales in measures and statistics) using their understanding of
how close the numbers are to previous and next multiples of 10/100/1000 boundaries,
dividing 100, 1000 and 10 000 into 2, 4, 5 and 10 equal parts
explaining and justifying their decisions and using this understanding to round numbers.</td><td colspan="2">Pupils place and identify whole numbers up to 10 million and decimal numbers (beyond hundredths) on a number line (including scales in measures and statistics) using their understanding of
how close the numbers are to
dividing 1 into 2, 4, 5 and 10 equal parts
negative numbers
explaining and justifying their decisions and using this understanding to round numbers.</td></tr>
</table>

Additive reasoning			**See below 'choosing from and using…'*
Y3	Y4	Y5	Y6
Pupils represent and explain addition and subtraction problems involving one-, two- and three-digit numbers in different contexts (including extracting information from graphs, charts, tables and measuring scales). They solve these problems by taking account of the numbers involved, appropriately choosing to use mental or written methods, using what they know and understand*, explaining their decisions and justifying their solutions.	Pupils represent and explain addition and subtraction problems involving one-, two-, three-, and four-digit numbers in different contexts (including extracting information from graphs, charts, tables and measuring scales). They solve these problems by taking account of the numbers involved, appropriately choosing mental or written methods using what they know and understand*, explaining their decisions and justifying their solutions.	Pupils represent and explain addition and subtraction problems including problems involving numbers with more than four-digits in different contexts (including extracting information from graphs, charts, timetables and measuring scales). They solve these problems by taking account of the numbers involved, appropriately choosing mental or written methods using what they know and understand*, explaining their decisions and justifying their solutions.	Pupils represent and explain addition and subtraction problems, including those involving decimals and calculating the interval across zero in different contexts (including extracting information from graphs, charts, timetables and measuring scales). They solve these problems by taking account of the numbers involved, appropriately choosing mental or written methods using what they know and understand*, explaining their decisions and justifying their solutions and level of accuracy. Pupils explain the use of letters to represent relationships, variables and unknowns in familiar additive situations and use their understanding to solve problems involving letters.

Multiplicative reasoning			*See below 'choosing from and using…'
Y3	Y4	Y5	Y6
Pupils represent and explain, in appropriate contexts: multiplication as both repeated addition and scaling (including fractions) and division as both partitive and quotative. They represent and explain how numbers within the multiplication tables can be multiplicatively composed and factorised in different contexts (including measures).		Pupils multiply and divide numbers by 10 and 100; understand this as equivalent to making a number 10 or 100 times the size, or one tenth or one hundredth times the size.	
Pupils represent and explain multiplication and division problems (involving 2s, 3s, 4s, 5s, 8s and 10s) in different contexts (including statistics).	Pupils represent and explain multiplication (including two- and three-digit numbers by one-digit numbers) and division problems in different contexts (including measures).	Pupils represent and explain multiplication and division problems (including two-, three- and four-digit numbers by one-digit numbers) and multi-step problems (involving addition, subtraction, multiplication, and division), in different contexts (including measures and statistics).	Pupils represent and explain multiplication, division and ratio problems (including two-, three- and four-digit numbers by two-digit numbers and fractions and decimals) and multi-step problems (involving addition, subtraction, multiplication and division), in different contexts (including measures and statistics).
They solve these problems by taking account of the numbers involved, appropriately choosing from and using what they know and understand*, explaining their decisions and justifying their solutions	They solve these problems by taking account of the numbers involved, appropriately choosing from and using what they know and understand*, explaining their decisions and justifying their solutions.	They solve these problems by taking account of the numbers involved and their properties (square, prime, common multiples etc.), appropriately choosing mental or written methods and using what they know and understand*, explaining their decisions and justifying their solutions.	They solve these problems by taking account of the numbers involved and their properties (square, prime common multiples etc.), appropriately choosing mental or written methods and using what they know and understand*, explaining their decisions and justifying their solutions and level of accuracy. Pupils explain the use of letters to represent relationships, variables and unknowns in familiar multiplicative situations and use their understanding to solve problems involving letters.

Fractions			
Y3	Y4	Y5	Y6
Pupils count in unit fraction steps and know when they have reached a fraction equivalent to one. They connect counting in unit fraction steps to a number line. Pupils represent and explain unit fractions as the result of a division in an appropriate context (including one object and a discrete set of objects). They explain how they know that, for unit fractions, as the denominator increases the size of the number decreases, and they add and subtract fractions with the same denominator within 1.	Pupils represent and explain unit and non-unit fractions as the result of a division in an appropriate context (including one object and a discrete set of objects). They represent and explain the equivalence between improper fractions and mixed numbers (with the same denominator) and add and subtract fractions with the same denominator including beyond one.	Pupils represent and explain equivalent fractions, including why they occupy the same position in the number system and why subtracting one from another results in zero, e.g. 6/7 – 12/14 = 0 They solve problems involving adding and subtracting fractions where the denominators are either the same or multiples of each other and finding non-unit fractions of quantities.	Pupils represent and explain addition and subtraction problems involving fractions with different denominators in different contexts. They solve these problems by taking account of the numbers involved, appropriately choosing when they can be solved by reasoning and when to apply understanding of equivalent fractions (simplifying fractions or using a common denominator). Pupils represent and explain the relationship between decimals, fractions, percentages and ratio and use their understanding to solve problems
Pupils place and identify unit fractions on a number line, explaining and justifying their decisions.	They place and identify non-unit fractions and mixed numbers on a number line, explaining and justifying their decisions.	They place and identify fractions on a number line, explaining and justifying their decisions.	

Geometric reasoning			
Y3	Y4	Y5	Y6
Pupils represent and explain angle as a measure of turn. Pupils explain the properties of 2D shapes related to the angles (acute, obtuse and right angles), the sides (horizontal, vertical, perpendicular and parallel lines) and the perimeter and draw shapes to demonstrate their understanding.	Pupils draw, describe and explain the properties of different triangles and quadrilaterals, including angles, sides, lines of symmetry and perimeter.	Pupils draw, measure, identify and explain angles (including angles at a point on a straight line, one whole turn and reflex angles) and use their understanding of angle to describe the properties of different shapes (regular and irregular).	Pupils recognise 3D shapes represented in different ways (including as 2D drawings and nets) and can draw accurate 2D shapes using given information (including to form nets) explaining and justifying their thinking. Pupils explain the use of letters to represent relationships, variables and unknowns in familiar geometric situations and use their understanding to solve problems involving letters.
	Pupils explain how to locate points on a grid in the first quadrant and use this knowledge and understanding to solve problems including drawing polygons.	Pupils explain how to reflect and translate shapes on a grid in the first quadrant and use this knowledge and understanding to solve problems.	Pupils represent and explain positions on a grid with four quadrants and how to reflect and translate shapes and use this knowledge and understanding to solve problems.
		Pupils represent and explain perimeter and area in relation to rectangles (linked to the array) and use this understanding and their understanding of calculation, to solve problems involving rectilinear shapes, explaining and justifying their decisions.	Pupils represent and explain how to find the volume of cubes and cuboids and use their understanding of properties of shapes (including circles), area and volume to solve problems.

Teaching guidance for 'choosing from and using…'

The expectation is that as children move through the primary years they will have an increasing mathematical understanding and bank of known facts which they access when making decisions about how to solve a problem. Children's choices when calculating should reflect their understanding of additive and multiplicative relationships, make use of what they know and be appropriate for the numbers involved. They should have a sense of the size of the missing number and recognise when their solution cannot be correct. Teachers will need to ensure that children tackle a variety of problems which involve unknown numbers in different places and require different decisions. To help plan for and assess this, the knowledge and understanding which children should be choosing from and using to solve problems, for both additive reasoning and multiplicative reasoning, is set out below for each year group.

	Additive Reasoning	**Multiplicative Reasoning**
Y1	• number facts • understanding of equivalence • understanding of one more and one less. • understanding the effect of adding and subtracting 0	• understanding doubling and halving • counting in 2s, 5s and 10s • understanding of equivalence
Y2	• number facts • understanding of equivalence • understanding of place value • understanding of commutativity of addition • understanding of the structures of addition and subtraction and the relationship between them	• understanding doubling and halving • counting in 2s, 5s and 10s • understanding of equivalence • understanding of the array • number facts • understanding of commutativity of multiplication • understanding of multiplication and division and the relationship between them
Y3	• number facts • understanding of equivalence • understanding of place value • understanding of commutativity of addition • understanding of the structures of addition and subtraction and the relationship between them	• understanding doubling and halving • understanding of equivalence • understanding of the array • number facts • understanding of commutativity of multiplication • understanding of the structures of multiplication and division and the relationship between them • relationships between multiples of 2, 4 and 8 • understanding of place value
Y4	• number facts • understanding of equivalence • understanding of place value • understanding of commutativity of addition • understanding of the structures of addition and subtraction and the relationship between them	• understanding doubling and halving • understanding of equivalence • understanding of the array • number facts, including factor pairs • understanding of commutativity of multiplication • understanding of the structures of multiplication and division and the relationship between them • relationships between multiples • understanding of place value • understanding of fractions and the relationship between fractions, multiplication and division • understanding of multiplication as area of a rectangle (underpinned by the array) • understanding of the associative and distributive laws • understanding the effect of multiplying by 0 and 1 and dividing by 1

	Additive Reasoning	Multiplicative Reasoning
Y5	• number facts • understanding of equivalence • understanding of place value • understanding of commutativity of addition • understanding of the structures of addition and subtraction and the relationship between them • understanding of fractions, including mixed numbers and improper fractions • understanding of equivalent fractions involving denominators which are multiples of the same number	• understanding doubling and halving • understanding of equivalence • understanding of the array • number facts, including factor pairs • understanding of commutativity of multiplication • understanding of the structures of multiplication and division and the relationship between them • relationships between multiples • understanding of place value • understanding of fractions and percentages and the relationship between them and multiplication and division • understanding of multiplication as area of a rectangle (underpinned by the array) • understanding of the associative and distributive laws • understanding the effect of multiplying by 0 and 1 and dividing by 1 • understanding of primes, composites, squares and cubes
Y6	• number facts • understanding of equivalence • understanding of place value • understanding of commutativity of addition • understanding of the structures of addition and subtraction and the relationship between them • understanding of fractions, including mixed numbers and improper fractions • understanding of equivalent fractions and common multiples • understanding of negative numbers	• understanding doubling and halving • understanding of equivalence • understanding of the array • number facts, including factor pairs • understanding of commutativity of multiplication • understanding of the structures of multiplication and division and the relationship between them • relationships between multiples • understanding of place value • understanding of fractions, percentages and ratio and the relationship between them and multiplication and division • understanding of multiplication as area of a rectangle (underpinned by the array) • understanding of the associative and distributive laws • understanding the effect of multiplying by 0 and 1 and dividing by 1 • understanding of primes, composites, squares and cubes • understanding of mean • understanding of equivalent fractions