Mathematics – KS3 Programme of Study – St Christopher's

KS2 Prior Learning

The principal focus of mathematics teaching in upper key stage 2 is to ensure that pupils extend their understanding of the number system and place value to include larger integers. This should develop the connections that pupils make between multiplication and division with fractions, decimals, percentages and ratio. At this stage, pupils should develop their ability to solve a wider range of problems, including increasingly complex properties of numbers and arithmetic, and problems demanding efficient written and mental methods of calculation. With this foundation in arithmetic, pupils are introduced to the language of algebra as a means for solving a variety of problems. Teaching in geometry and measures should consolidate and extend knowledge developed in number. Teaching should also ensure that pupils classify shapes with increasingly complex geometric properties and that they learn the vocabulary they need to describe them. By the end of year 6, pupils should be fluent in written methods for all four operations, including long multiplication and division, and in working with fractions, decimals and percentages. Pupils should read, spell and pronounce mathematical vocabulary correctly

Number – Place Value

Pupils should be taught to:
- read, write, order and compare numbers up to 10 000 000 and determine the value of each digit
- round any whole number to a required degree of accuracy
- use negative numbers in context, and calculate intervals across zero
- solve number and practical problems that involve all of the above.

Number – addition, subtraction, multiplication and division

Pupils should be taught to:
- multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication
- divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context
- divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context
- perform mental calculations, including with mixed operations and large numbers
- identify common factors, common multiples and prime numbers
- use their knowledge of the order of operations to carry out calculations involving the four operations
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why Mathematics – key stages 1 and 2 40 Statutory requirements
- solve problems involving addition, subtraction, multiplication and division
- use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.

Number – fractions (including decimals and percentages)

Pupils should be taught to:
- use common factors to simplify fractions; use common multiples to express fractions in the same denomination

- compare and order fractions, including fractions > 1
- add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions
- multiply simple pairs of proper fractions, writing the answer in its simplest form [for example, $\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$]
- divide proper fractions by whole numbers [for example, $\frac{1}{3} \div 2 = \frac{1}{6}$]
- associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example, $\frac{3}{8}$]
- 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 Mathematics – key stages 1 and 2 41 Statutory requirements
- 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
- solve problems which require answers to be rounded to specified degrees of accuracy
- recall and use equivalences between simple fractions, decimals and percentages, including in different contexts.

Ratio and proportion

Pupils should be taught to:
- solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts
- solve problems involving the calculation of percentages [for example, of measures, and such as 15% of 360] and the use of percentages for comparison
- solve problems involving similar shapes where the scale factor is known or can be found
- solve problems involving unequal sharing and grouping using knowledge of fractions and multiples.

Algebra

Pupils should be taught to:
- use simple formulae
- generate and describe linear number sequences
- express missing number problems algebraically
- find pairs of numbers that satisfy an equation with two unknowns
- enumerate possibilities of combinations of two variables.

Measurement

Pupils should be taught to:
- solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate
- use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to three decimal places
- convert between miles and kilometres
- recognise that shapes with the same areas can have different perimeters and vice versa
- recognise when it is possible to use formulae for area and volume of shapes
- calculate the area of parallelograms and triangles

- calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres (cm3) and cubic metres (m3), and extending to other units [for example, mm3 and km3].

Geometry – properties of shapes

Pupils should be taught to:
- draw 2-D shapes using given dimensions and angles
- recognise, describe and build simple 3-D shapes, including making nets
- compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons
- illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius
- recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles.

Geometry – position and direction

Pupils should be taught to:
- describe positions on the full coordinate grid (all four quadrants)
- draw and translate simple shapes on the coordinate plane, and reflect them in the axes

Statistics

Pupils should be taught to:
- interpret and construct pie charts and line graphs and use these to solve problems
- calculate and interpret the mean as an average

KS3 Taught Content: Knowledge and Skills – building on KS2 learning

KS3	Number (Arithmetic)	Number (Place Value)	Geometry	Measure
	- Understand and use the structures that underpin addition and subtraction strategies - Use the laws and conventions of arithmetic to calculate efficiently - Understand and use the structures that underpin multiplication and division strategies - Estimate calculations by rounding	- Understand the value of digits in decimals, measure and integers - Compare and order positive and negative integers, decimals and fractions	- Understand the concept of multiplicative relationships - Connect coordinates, equations and graphs - Connect coordinates, equations and graphs - I can understand and use translations - I can understand and use rotations - I can understand and use reflections - I can understand and use enlargements	- Understand the concept of area and use it in a range of problem-solving situations - Understand the concept of perimeter and use it in a range of problem-solving situations

	• Compare and order positive and negative integers, decimals and fractions • Understand that percentages are an example of a multiplicative relationship and apply this understanding to a range of contexts • Understand that percentages are an example of a multiplicative relationship and apply this understanding to a range of contexts			
KS3	**Probability**	**Decimals and Fractions**	**Ratio & Proportion**	**Statistics**
	• Understand that fractions are an example of a multiplicative relationship and apply this understanding to a range of contexts • Explore, describe and analyse the frequency of outcomes in a range of situations • Systematically record outcomes to find theoretical probabilities	• Round numbers to a required number of decimal places • Understand that fractions are an example of a multiplicative relationship and apply this understanding to a range of contexts • Know, understand and use fluently a range of calculation strategies for addition and subtraction of fractions	• Understand the concept of multiplicative relationships • Construct accurately statistical representations • Understand that ratios are an example of a multiplicative relationship and apply this understanding to a range of contexts	• Understand and calculate accurately measures of central tendency and spread • Interpret reasonably statistical measures and representations • Construct accurately statistical representations

	• Calculate and use probabilities of single and combined events			

Subsequent Learning:
KS4 Raedwald Trust Mathematics PoS
Prepare for standardised assessments and qualifications (GCSEs/Functional Skills)