Waterville Primary School Progression of Skills and Vocabulary in MATHS

Year 6

KS2 National Curriculum

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:

*Understand the relationship between powers of 10 from 1 hundredth to 10 million.

*Recognise the place value of each digit in a number up to 10 million.

*Reason about the location of any number up to 10 million in the linear number system.

*Divide powers of 10, from 1 hundredth to 10 million.

*Understand that 2 numbers can be related additively or multiplicatively.

*Use a given additive or multiplicative calculation to derive or complete a related calculation.

*Solve problems involving ratio relationships.

*Solve problems with 2 unknowns.

*Express fractions in a common denomination and use this to compare fractions that are similar in value.

*Recognise when fractions can be simplified.

*Compare fractions with different denominators including fractions greater than 1.

*Draw, compose and decompose different shapes according to different properties.

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TEACH – MODEL – USE MANIPULATIVES – RECORD – INVESTIGATE – MASTER - REPEAT

Year 6 Maths Skills	Number – Number and Place Value	Number – Addition and Subtraction	Number – Multiplication and Division	Number – Fractions	Ratio and Proportion
	Counting To use negative numbers in context, and calculate intervals across zero. **Comparing Numbers** To read, write, order and compare numbers up to 10 000000 and determine the value of each digit. **Reading and Writing Numbers** To read, write, order and compare numbers up to 10 000000 and determine the value of each digit. **Understanding Place Value** To read, write, order and compare numbers up to 10 000000 and determine the value of each digit. To identify the value of each digit to three decimal places and multiply and divide numbers by 10, 100 and 1000 where the answers are up to three decimal places. **Rounding** To round any whole number to a required degree of accuracy. To solve problems which require answers to be rounded to specified degrees of accuracy. **Problem Solving** To solve number and practical problems that involve all of the above.	**Mental Calculation** To perform mental calculations, including with mixed operations and large numbers. To use their knowledge of the order of operations to carry out calculations involving the four operations. **Inverse Operations, Estimating and Checking Answers** To use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy. **Problem Solving** To solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why. To Solve problems involving addition, subtraction, multiplication and division.	**Mental Calculation** To perform mental calculations, including with mixed operations and large numbers. To associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. $^3/_8$). **Written Calculation** To multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication. To divide numbers up to 4-digits by a two-digit whole number using the formal written method of short division where appropriate for the context 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. To use written division methods in cases where the answer has up to two decimal places **Properties of number** To identify common factors, common multiples and prime numbers. To use common factors to simplify fractions; use common multiples to express fractions in the same denomination. To calculate, estimate and compare volume of cubes and cuboids using standard units, including centimetre cubed (cm^3) and cubic metres (m^3), and extending to other units such as mm^3 and km^3. **Oder of Operations** To use their knowledge of the order of operations to carry out calculations involving the four operations. **Inverse Operations** To use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy. **Problem Solving** To solve problems involving addition, subtraction, multiplication and division. To solve problems involving similar shapes where the scale factor is known or can be found.	**Comparing Fractions** To compare and order fractions, including fractions >1. **Comparing Decimals** To identify the value of each digit in numbers given to three decimal places. **Rounding** To solve problems which require answers to be rounded to specified degrees of accuracy. **Equivalence** To use common factors to simplify fractions; use common multiples to express fractions in the same denomination. To associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. $^3/_8$). To recall and use equivalences between simple fractions, decimals and percentages, including in different contexts. **Addition and Subtraction of Fractions** To add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions. **Multiplication and division of Fractions** To multiply simple pairs of proper fractions, writing the answer in its simplest form (e.g. $^1/_4 \times ^1/_2 = ^1/_8$). To multiply one-digit numbers with up to two decimal places by whole numbers. To divide proper fractions by whole numbers (e.g. $^1/_3 \div 2 = ^1/_6$). To multiply one-digit numbers with up to two decimal places by whole numbers. To multiply and divide numbers by 10, 100 and 1000 where the answers are up to three decimal places. To identify the value of each digit to three decimal places and multiply and divide numbers by 10, 100 and 1000 where the answers are up to three decimal places. To associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. $^3/_8$). To use written division methods in cases where the answer has up to two decimal places.	To solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts. To solve problems involving the calculation of percentages [for example, of measures, and such as 15% of 360] and the use of percentages for comparison. To solve problems involving similar shapes where the scale factor is known or can be found. To solve problems involving unequal sharing and grouping using knowledge of fractions and multiples.

Vocabulary

Millions, ten millions.		Multi-digit numbers, long division.		Relative size, missing values, integer multiplication, percentages, scale factor, unequal sharing and grouping.

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TEACH – MODEL – USE MANIPULATIVES – RECORD – INVESTIGATE – MASTER - REPEAT

Year 6 Maths Skills	Algebra	Measurement	Geometry – Properties of Shape	Geometry – Position and Direction	Statistics
	Equations To express missing number problems algebraically. To find pairs of numbers that satisfy number sentences involving two unknowns. To enumerate all possibilities of combinations of two variables. **Formulae** To use simple formulae. To recognise when it is possible to use formulae for area and volume of shapes. **Sequences** To generate and describe linear number sequences.	**Comparing and Estimating** To calculate, estimate and compare volume of cubes and cuboids using standard units, including centimetre cubed (cm^3) and cubic metres (m^3), and extending to other units such as mm^3 and km^3. **Measuring and Calculating** To solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate. To recognise that shapes with the same areas can have different perimeters and vice versa. To calculate the area of parallelograms and triangles. To calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres (cm^3) and cubic metres (m^3), and extending to other units [e.g. mm^3 and km^3]. To recognise when it is possible to use formulae for area and volume of shapes. **Converting** To 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. To solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate. To convert between miles and kilometres.	**Identifying Shapes and their Properties** To recognise, describe and build simple 3-D shapes, including making nets. To illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius. **Drawing and Constructing** To draw 2-D shapes using given dimensions and angles. To recognise, describe and build simple 3-D shapes, including making nets. **Comparing and Classifying** To compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons. **Angles** To recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles.	**Position, Direction and Movement** To describe positions on the full coordinate grid (all four quadrants). To draw and translate simple shapes on the coordinate plane, and reflect them in the axes.	**Interpreting, Constructing and Presenting Data** To interpret and construct pie charts and line graphs and use these to solve problems. **Solving Problems** To calculate and interpret the mean as an average.
			Vocabulary		
	Formulae, linear number sequences, algebraically, equation, unknowns, combinations, variables.	**Measure and Length** Conversion, miles, formulae, parallelograms, triangles, feet. **Height, Weight and Capacity** Cubic metre, cubic millimetre, cubic kilometre, gallons, stones, ounces.	Radius, diameter, circumference, dimensions.	Four quadrants, co-ordinate plane.	Pie chart, mean.