# The Hermitage School – 'Maths' Skills Progression

The principal focus of mathematics teaching over Key Stage 2 is to ensure that pupils become increasingly fluent with whole numbers and the 4 operations, including number facts and the concept of place value. This should ensure that pupils develop efficient written and mental methods and perform calculations accurately with increasingly large whole numbers. This should then 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 wide range of problems, including with simple fractions and decimal place value, before developing to include increasingly complex properties of numbers and arithmetic, and problems demanding efficient written and mental methods of calculation in Upper Key Stage 2. Teaching should also ensure that pupils draw with increasing accuracy and develop mathematical reasoning so they can analyse shapes and their properties, and confidently describe the relationships between them. It should ensure that they can use measuring instruments with accuracy and make connections between measure and number. 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.

**Pupils should be taught:**

- To become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- To reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language.
- To solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

| | Year 3 | Year 4 | Year 5 | Year 6 |
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| Topics studied | Number and place value<br>Addition and subtraction<br>Multiplication and division<br>Fractions<br>Measurement<br>Geometry – properties of shape<br>Statistics | Number and place value<br>Addition and subtraction<br>Multiplication and division<br>Fractions (including decimals)<br>Measurement<br>Geometry – properties of shape<br>Geometry – position and direction<br>Statistics | Number and place value<br>Addition and subtraction<br>Multiplication and division<br>Fractions (including decimals and percentages)<br>Measurement<br>Geometry – properties of shape<br>Geometry – position and direction<br>Statistics | Number and place value<br>Addition and subtraction<br>Multiplication and division<br>Fractions (including decimals and percentages)<br>Measurement<br>Geometry – properties of shape<br>Geometry – position and direction<br>Statistics<br>Ratio and proportion<br>Algebra |
| Number Place Value | • count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number | • count in multiples of 6, 7, 9, 25 and 1,000 | • read, write, order and compare numbers to at least 1,000,000 and determine the value of each digit | • read, write, order and compare numbers up to 10,000,000 and determine the value of each digit |

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| | • recognise the place value of each digit in a 3-digit number (100s, 10s, 1s)<br><br>• compare and order numbers up to 1,000<br><br>• identify, represent and estimate numbers using different representations<br><br>• read and write numbers up to 1,000 in numerals and in words<br><br>• solve number problems and practical problems involving these ideas | • find 1,000 more or less than a given number<br><br>• count backwards through 0 to include negative numbers<br><br>• recognise the place value of each digit in a four-digit number (1,000s, 100s, 10s, and 1s)<br><br>• order and compare numbers beyond 1,000<br><br>• identify, represent and estimate numbers using different representations<br><br>• round any number to the nearest 10, 100 or 1,000<br><br>• solve number and practical problems that involve all of the above and with increasingly large positive numbers<br><br>• read Roman numerals to 100 (I to C) and know that over time, the numeral system changed to include the concept of 0 and place value | • count forwards or backwards in steps of powers of 10 for any given number up to 1,000,000<br><br>• interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through 0<br><br>• round any number up to 1,000,000 to the nearest 10, 100, 1,000, 10,000 and 100,000<br><br>• solve number problems and practical problems that involve all of the above<br><br>• read Roman numerals to 1,000 (M) and recognise years written in Roman numerals | • round any whole number to a required degree of accuracy<br><br>• use negative numbers in context, and calculate intervals across 0<br><br>• solve number and practical problems that involve all of the above |
| Addition and Subtraction | • add and subtract numbers mentally, including:<br>O a three-digit number and 1s<br>O a three-digit number and 10s | • add and subtract numbers with up to 4 digits using the formal written methods of | • add and subtract whole numbers with more than 4 digits, including using formal | • use their knowledge of the order of operations to carry out calculations involving the 4 operations |

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| | O a three-digit number and 100s<br><br>• add and subtract numbers with up to 3 digits, using formal written methods of columnar addition and subtraction<br><br>• estimate the answer to a calculation and use inverse operations to check answers<br><br>• solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction | columnar addition and subtraction where appropriate<br><br>• estimate and use inverse operations to check answers to a calculation<br><br>• solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why | written methods (columnar addition and subtraction)<br><br>• add and subtract numbers mentally with increasingly large numbers<br><br>• use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy<br><br>• solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why | • solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why<br><br>• solve problems involving addition, subtraction, multiplication and division<br><br>• use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy |
| Multiplication and Division | • recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables<br><br>• write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods<br><br>• solve problems, including missing number problems, involving multiplication and | • recall multiplication and division facts for multiplication tables up to 12 × 12<br><br>• use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together 3 numbers<br><br>• recognise and use factor pairs and commutativity in mental calculations<br><br>• multiply two-digit and three-digit numbers by a one-digit | • identify multiples and factors, including finding all factor pairs of a number, and common factors of 2 numbers<br><br>• know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers<br><br>• establish whether a number up to 100 is prime and recall prime numbers up to 19<br><br>• multiply numbers up to 4 digits by a one- or two-digit number using a formal written | • multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication<br><br>• 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<br><br>• 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 |

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| | division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects | number using formal written layout<br><br>• solve problems involving multiplying and adding, including using the distributive law to multiply two-digit numbers by 1 digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects | method, including long multiplication for two-digit numbers<br><br>• multiply and divide numbers mentally, drawing upon known facts<br><br>• divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context<br><br>• multiply and divide whole numbers and those involving decimals by 10, 100 and 1,000<br><br>• recognise and use square numbers and cube numbers, and the notation for squared ($^2$) and cubed ($^3$)<br><br>• solve problems involving multiplication and division, including using their knowledge of factors and multiples, squares and cubes<br><br>• solve problems involving addition, subtraction, multiplication and division and a combination of these, | • perform mental calculations, including with mixed operations and large numbers<br><br>• identify common factors, common multiples and prime numbers |

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| | | | including understanding the meaning of the equals sign<br><br>• solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates | |
| Fractions, Decimals and Percentages | • count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10<br><br>• recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators<br><br>• recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators<br><br>• recognise and show, using diagrams, equivalent fractions with small denominators<br><br>• add and subtract fractions with the same denominator within one whole [for example, 5/7 + 1/7 = 6/7] | • recognise and show, using diagrams, families of common equivalent fractions<br><br>• count up and down in hundredths; recognise that hundredths arise when dividing an object by 100 and dividing tenths by 10<br><br>• solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number<br><br>• add and subtract fractions with the same denominator<br><br>• recognise and write decimal equivalents of any number of tenths or hundreds | • compare and order fractions whose denominators are all multiples of the same number<br><br>• identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths<br><br>• recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number [for example, 2/5 + 4/5 = 6/5 = 1 1/5]<br><br>• add and subtract fractions with the same denominator, and denominators that are multiples of the same number<br><br>• multiply proper fractions and mixed numbers by whole | • use common factors to simplify fractions; use common multiples to express fractions in the same denomination<br><br>• compare and order fractions, including fractions >1<br><br>• add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions<br><br>• multiply simple pairs of proper fractions, writing the answer in its simplest form [for example, 1/4 × 1/2 = 1/8]<br>• divide proper fractions by whole numbers [for example, 1/3 ÷ 2 =1/6]<br><br>• associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example, 3/8]<br><br>• identify the value of each digit in numbers given to 3 decimal places |

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| | • compare and order unit fractions, and fractions with the same denominators<br><br>• solve problems that involve all of the above | • recognise and write decimal equivalents to 1/4, 1/2, ¾<br><br>• find the effect of dividing a one- or two-digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths<br><br>• round decimals with 1 decimal place to the nearest whole number<br><br>• compare numbers with the same number of decimal places up to 2 decimal places<br><br>• solve simple measure and money problems involving fractions and decimals to 2 decimal places | numbers, supported by materials and diagrams<br><br>• read and write decimal numbers as fractions [for example, 0.71 = 71/100]<br><br>• recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents<br><br>• round decimals with 2 decimal places to the nearest whole number and to 1 decimal place<br><br>• read, write, order and compare numbers with up to 3 decimal places<br><br>• solve problems involving number up to 3 decimal places<br><br>• recognise the per cent symbol (%) and understand that per cent relates to 'number of parts per 100', and write percentages as a fraction with denominator 100, and as a decimal fraction<br><br>• solve problems which require knowing percentage and decimal equivalents of 1/2, 1/4, | and multiply and divide numbers by 10, 100 and 1,000 giving answers up to 3 decimal places<br><br>• multiply one-digit numbers with up to 2 decimal places by whole numbers<br><br>• use written division methods in cases where the answer has up to 2 decimal places<br><br>• solve problems which require answers to be rounded to specified degrees of accuracy<br><br>• recall and use equivalences between simple fractions, decimals and percentages, including in different contexts |

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| | | | 1/5, 2/5, 4/5and those fractions with a denominator of a multiple of 10 or 25 | |
| Statistics | • interpret and present data using bar charts, pictograms and tables<br><br>• solve one-step and two-step questions [for example 'How many more?' and 'How many fewer?'] using information presented in scaled bar charts and pictograms and tables | • interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs<br><br>• solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs | • solve comparison, sum and difference problems using information presented in a line graph<br><br>• complete, read and interpret information in tables, including timetables | • interpret and construct pie charts and line graphs and use these to solve problems<br><br>• calculate and interpret the mean as an average |
| Measure | • measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml)<br><br>• measure the perimeter of simple 2-D shapes<br><br>• add and subtract amounts of money to give change, using both £ and p in practical contexts<br><br>• tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks | • convert between different units of measure [for example, kilometre to metre; hour to minute]<br><br>• measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres<br><br>• find the area of rectilinear shapes by counting squares<br><br>• estimate, compare and calculate different measures, including money in pounds and pence | • convert between different units of metric measure [for example, kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre]<br><br>• understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints<br><br>• measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres | • solve problems involving the calculation and conversion of units of measure, using decimal notation up to 3 decimal places where appropriate<br><br>• 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 3 decimal places<br><br>• convert between miles and kilometres<br><br>• recognise that shapes with the same areas can have different perimeters and vice versa |

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| | • estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes and hours; use vocabulary such as o'clock, am/pm, morning, afternoon, noon and midnight<br><br>• know the number of seconds in a minute and the number of days in each month, year and leap year<br><br>• compare durations of events [for example, to calculate the time taken by particular events or tasks] | • read, write and convert time between analogue and digital 12- and 24-hour clocks<br><br>• solve problems involving converting from hours to minutes, minutes to seconds, years to months, weeks to days | • calculate and compare the area of rectangles (including squares), including using standard units, square centimetres ($cm^2$) and square metres ($m^2$), and estimate the area of irregular shapes<br><br>• estimate volume [for example, using 1 $cm^3$ blocks to build cuboids (including cubes)] and capacity [for example, using water]<br><br>• solve problems involving converting between units of time<br><br>• use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling | • recognise when it is possible to use formulae for area and volume of shapes<br><br>• calculate the area of parallelograms and triangles<br><br>• 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 [for example, $mm^3$ and $km^3$] |
| Properties of shape | • draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them<br><br>• recognise angles as a property of shape or a description of a turn | • compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes<br><br>• identify acute and obtuse angles and compare and order angles up to 2 right angles by size | • identify 3-D shapes, including cubes and other cuboids, from 2-D representations<br><br>• know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles<br><br>• draw given angles, and measure them in degrees (°) | • draw 2-D shapes using given dimensions and angles<br><br>• recognise, describe and build simple 3-D shapes, including making nets<br><br>• compare and classify geometric shapes based on their properties and sizes and find unknown angles |

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| | • identify right angles, recognise that 2 right angles make a half-turn, 3 make three-quarters of a turn and 4 a complete turn; identify whether angles are greater than or less than a right angle<br><br>• identify horizontal and vertical lines and pairs of perpendicular and parallel lines | • identify lines of symmetry in 2-D shapes presented in different orientations<br><br>• complete a simple symmetric figure with respect to a specific line of symmetry | •identify:<br>O angles at a point and 1 whole turn (total 360°)<br><br>o angles at a point on a straight line and half a turn (total 180°)<br><br>o other multiples of 90°<br><br>o use the properties of rectangles to deduce related facts and find missing lengths and angles<br><br>o distinguish between regular and irregular polygons based on reasoning about equal sides and angles | in any triangles, quadrilaterals, and regular polygons<br><br>• illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius<br><br>• recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles |
| Position and direction | | • describe positions on a 2-D grid as coordinates in the first quadrant<br><br>• describe movements between positions as translations of a given unit to the left/right and up/down<br><br>• plot specified points and draw sides to complete a given polygon | • identify, describe and represent the position of a shape following a reflection or translation, using the appropriate language, and know that the shape has not changed | • describe positions on the full coordinate grid (all 4 quadrants)<br><br>• draw and translate simple shapes on the coordinate plane, and reflect them in the axes |
| Algebra | | | | • use simple formulae |

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| | | | | • generate and describe linear number sequences<br><br>• express missing number problems algebraically<br><br>• find pairs of numbers that satisfy an equation with 2 unknowns<br><br>• enumerate possibilities of combinations of 2 variables |
| Ratio | | | | • solve problems involving the relative sizes of 2 quantities where missing values can be found by using integer multiplication and division facts<br><br>• solve problems involving the calculation of percentages [for example, of measures and such as 15% of 360] and the use of percentages for comparison<br><br>• solve problems involving similar shapes where the scale factor is known or can be found<br><br>• solve problems involving unequal sharing and grouping using knowledge of fractions and multiples |