## Year 7 - Mathematics

|  | | **HT1**  **PLACE VALUE &**  **PROPERTIES OF NUMBER** | **HT2**  **ALGEBRAIC THINKING/**  **TIME** | **HT3**  **SHAPE &**  **GEOMETRY** | **HT4**  **GEOMETRY &**  **MEASURE & UNITS** | **HT5**  **FRACTIONAL THINKING, DIRECTED NUMBERS &** | **HT6**  **STATISTICS , Probability & Time** |
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| Learning outcomes/ composite knowledge:  Pupils will be able to… | | **LO1: Place Value**  To understand place value.  **LO2: Ordering Whole**  **Numbers and decimals.**  To compare and order whole numbers and decimals.  **LO3: Solving problems**  **with Addition and Subtraction.**  To solve problems with  addition and subtraction.  **LO4: Solving problems**  **with Multiplication and**  **division.**  To solve problems with  multiplication and division.  **LO5: Prime numbers, factors and multiples**  To introduce the concept of prime numbers, factors and  multiples. | **LO1: Sequences.**  To explore sequences  **LO2: Understand and use algebraic notation.**  To understand and use algebraic notation, one step and two step rules.  **LO3: Equality and Equivalence.**  To form and solve one-step linear equations and to consider equivalence and the difference between this and equality.  **LO4: Time**  To be able to read the clock; o’clock, half past, quarter past & quarter to. | **LO1: 2D Shapes.**  To recognise and describe 2D shapes.  **LO2: Property of shapes.**  To recognise the properties of  shapes.  **L03: Construct,**  **Measurement and notation**  To use skills using a ruler,  protractor and other measuring equipment to construct and measure simple diagrams.  **LO4: Angles**  To be able to name and  measure angles. | **LO1: 3D Shapes**  To recognise and describe 3D shapes.  **LO2: Perimeter**  To measure and compare  perimeters.  **LO3: Area**  To find the area of rectangles and rectilinear shapes.  **LO4: Volume**  To find the volume of a shape.  **LO5: Converting Units to**  **measure**  To convert between units of the same measure using  conversion factors.  **LO6: Symmetry and reflection in shape.**  To describe shapes or patterns reflectively and rotationally symmetric.  To identify properties of, and  describe the results of  reflections and rotations applied to given  figures | **LO1: Operations and Equations with Directed Number**.  To use operations and equations with directed number  **LO2: Addition and Subtraction of Fractions**  To apply the rules of addition and subtraction of fractions  L03: Fractions, Decimals and Percentages  To convert between fractions decimals and percentages mentally  **LO4: Ratio and Scale**  To work with ratio and scale  **LO5: Multiplicative Change**  To understand multiplicative change | **LO1: Tally Charts,**  **Pictograms, Bar Charts (Graphs)**  Complete and interpret  frequency tables.  Draw and interpret bar  charts, dual bar charts  and pictograms    **LO2: Two-way Tables**  Complete and interpret a two-way table.  **LO3: Line Graphs**  To be able to plot a  line graph  **LO4: Circles**  Name the parts of a circle.  **LO5: Pie charts**  Draw and interpret a pie chart.  **LO6: Mode, Median, Mean & Range**  To find the range, mode, median and mean of a set of data, and use them to compare data sets  **LO7: Probability Scale**  To calculate probabilities.  **LO8: Basic Probability**  To draw sample space diagrams and use them to find probabilities.  **LO:9 Time**  To tell the time to the nearest minute on digital and analogue clocks. |
| Knowledge Components | Declarative knowledge | **LO1, LO2: Place Value**  I know the place value of digits in the ones, tens, hundreds, and thousands column.  I know that 10 hundreds are equivalent to 1,000.  I know the order of numbers from 0 to 1,000.  I know the place value of digits in the ones, tens, hundreds, thousands, ten thousand, and hundred-thousand columns.  I know that 10 thousand are equivalent to 10,000 and ten 10,000s are equivalent to 100,000.  I know the order of numbers from 0 to 100,000.  I know that the height of the bar on a chart represents a numerical value.  **LO3: Solving Problems with Addition and Subtraction.**  I know what the properties of addition and subtraction are  **LO4, L05: Solving Problems with Multiplication and Division**  I know what factors and multiples are  I know what the correct order of operations is | **LO1: Sequences**  I know what a sequence is.  I know what linear and numerical mean.  I know the difference between linear and non-linear sequences.  **LO2: Understand and use algebraic notation.**  I know what inverse means.  I know the meaning of equality.  I know what like and unlike terms are.  I know what substitute means  **LO3: Equality and Equivalence.**  I know the meaning of equivalence.  I know what fact families are.  **LO4. Time**  I know the meaning of each hand on an analogue clock.  I know the AM and PM refer to morning and afternoon/evening. | **LO1: 2D Shapes.**  I know the names of 2D  shapes with 3 to 10 sides.  **LO2: Property of shapes.**  I know the symmetry of  shapes.  I know day to day  examples of shapes.  **L03: Construct,**  **Measurement and notation**  I know the meaning of symbols commonly used to describe the properties of shape.  **LO4: Angles**  I know how to describe an angle using mathematical  language (eg., Obtuse) | **LO1: 3D Shapes**  I know the name of 3D shapes that are commonly used.  I know everyday examples of common 3D shapes eg a football is a sphere.  **LO2: Perimeter**  I know that perimeter is the outside length around a closed 2D shape.  I know notation for length (mm, cm, m, km)  I know 1 cm = 1 mm, 1 m = 100 cm, and 1 km = 1,000 m  I know what units to use when measuring perimeter  **LO3: Area**  I know that a rectilinear shape is a 2D shape with all sides meeting at right-angles.  I know what area means.  I know what units to use when measuring area.  **LO4: Volume**  I know what volume means.  I know what units to use when measuring volume.  **LO5: Converting Units to measuring**  I know conversion facts between units of money, length, mass and capacity  **LO6: Symmetry and reflection in shape.**  I know what reflection and rotational symmetry are. | **LO1: Operations and Equations with Directed Number (Y7)**  I know what directed numbers are.  I can give everyday examples of when we use directed number  **LO2: Addition and Subtraction of Fractions**  I understand representations of fractions.  I know what equivalent fractions are.  L03: Fractions, Decimals and Percentages  I know common conversions between fractions decimals and percentages mentally eg., 25%, 50%, 10%, 75%  **LO4: Ratio and Scale.**  I understand the meaning and representation of ratio and ratio notation  **LO5 Multiplicative Change.**  I understand scale factors as multiplicative representations | **LO1: Tally Charts**  **Pictograms, Bar Charts**  **(Graphs)**  I know how to read and  interpret tally charts,  pictograms, bar charts and graphs. (Reading link)  **LO2: Two-way Tables**  I know how to read and  interpret a two-way table.  **LO3: Line Graphs**  I know how to read and  interpret a line graph.  **LO4: Circles**  I know how to describe the properties of a circle using mathematical language  **LO:5 Pie charts**  I know how to read and interpret a pie chart as part of a whole. (Not using degrees).  **LO6: Mode, Median, Mean & Range**  I know the difference between the measures of central tendency;  I know the difference between measures of central tendency and the range  **LO:7 Probability Scale**  I know that probabilities are between 0 and 1;  I know that probabilities add up to 1;  **LO8: Basic Probability**  I am familiar with the detail of different contexts used for probability eg playing cards |
| Procedural knowledge | **LO1, LO2: Place Value**  I can read and write  numbers to 10,000.  I can partition numbers by their place value.  I can order and compare numbers to a 10,000.  I can round numbers to the nearest 10, 100, or 1,000.  I can read and write  numbers to 1,000,000.  I can partition numbers by their place value.  I can order and compare numbers to a 1,000,000. I can round numbers to the nearest 10, 100, 1,000, 10,000 and 100,000.  **LO3: Solving Problems with Addition and Subtraction**  I know how to use mental strategies for addition and subtraction  I know how to use informal/formal methods for addition of integers and decimals  I know how to use informal/formal methods for subtraction of integers and decimals  I know what the most appropriate method to use is: mental strategies, informal/formal written or calculator  I know how to solve financial maths problems I know how to solve problems involving tables and timetables.  **LO4, LO5: Solving Problems with Multiplication and Division.**  I know how to use factors and multiples  I know how to multiply and divide integers and decimals by powers of 10  I know how to use formal methods to multiply integers can decimals  I know how to use formal methods to divide integers and decimals  I know how to use order of operations | **LO1: Sequences**  I can describe and continue a sequence given diagrammatically.  I can predict and check the next term(s) of a sequence.  I know how to represent sequences in tabular and graphical forms.  I know how to continue numerical linear and non-linear sequences.  I know how to explain the term-to-term rule of numerical sequences in words.  **LO2: Understand and use algebraic notation**  I know how to find the output of a single function machine  I know how to use inverse operations to find the input given the output  I know how to use diagrams and letters to generalise number operations  I know how to use diagrams and letters with single function machines  I know how to substitute values into single operation expressions  I know how to find numerical inputs and outputs for a series of two function machines.  I know how to use diagrams and letters with a series of two function machines  I know how to substitute values into two-step expressions.  I know how to generate sequences given an algebraic rule.  I know how to represent one and two-step functions graphically.  **LO3: Equality and Equivalence.**  I know how to use fact families, numerically and algebraically to solve an equation.  I know how to solve one-step linear equations involving +/−/ ×/÷ using inverse operations.  I know how to simplify algebraic expressions by collecting like terms, using the ≡ symbol.  **LO4: Time**  I can tell the time using o’clock, half past, quarter past & quarter to. | **LO2: Property of shapes.**  I can describe the properties of  2D shapes using mathematical language.  I can compare and contrast 2D shapes by using mathematical  language.    **L03: Construct,**  **Measurement and notation**  I know how to measure and draw lines and angles using a ruler and protector.  **LO4: Angles**  I can use a protector to  measure an obtuse and acute angle. | **LO1: 3D Shapes**  I can label the commonly used 3D shapes.  I can compare and contrast 3D shapes by using mathematical language.  **LO2; Perimeter**  I can calculate perimeter by adding side lengths of a shape.  I can measure length using a ruler.  I can convert between units of length.  I can calculate perimeter by adding side lengths of a shape  **LO3: Area**  I can calculate the area of  a shape by counting  squares.  I can calculate the area of  a shape from knowing the  side lengths.  **LO4: Volume**  I can measure volumes by counting cubes.  I can measure volumes using the dimensions of a 3D shape.  **LO5: Converting Units to measuring**  I can use conversion facts to convert between units of money, length, mass and capacity and read scales.  **LO6: Symmetry and reflection in shape.**  I can reflect a shape with a given line of symmetry.  I can identify where the line of symmetry is at any given reflection.  I can rotate a shape around a point by quarter, half and ¾ turns | **LO1: Operations and**  **Equations with**  **Directed Number.**  I know how to order directed numbers using lines and appropriate symbols.  I know how to perform calculations that cross zero  I know how to add, subtract, multiply and divide directed numbers  I know how to use a calculator for directed number calculations  I know how to evaluate algebraic expressions with directed number.  I know how to use order of operations with directed numbers  **LO2: Addition**  **and Subtraction of**  **Fractions.**  I know how to convert  between mixed numbers  and fractions.  I know how to add and  subtract fractions:  with the same  denominator,  from integers expressing  the answer as a single  fraction,  where denominators  share a simple common  multiple,  that are improper or  mixed numbers.  I know how to use  equivalent fractions  I know how to use  fractions in algebraic contexts  I know how to use equivalence to add and subtract decimals and fractions  L03: Fractions, Decimals and Percentages  I can convert between fractions decimals and percentages mentally eg., 25%, 50%, 10%, 75%  **LO4: Ratio and Scale**  I know how to solve problems involving ratios of the for 1:n and n:1;  I know how to divide a value into a given ratio;  I know how to express ratios in their simplest integer form;  I know how to compare ratios and related fractions;  **LO5: Multiplicative Change**  I know how to solve problems involving direct proportion;  I can explore relationships between similar shapes; | **LO1: Tally Charts**  **Pictograms, Bar Charts**  **(Graphs)**  I can draw and accurately label tally charts, pictograms, bar charts and graphs.  **LO2: Two-way Tables**  I can set up a two-way  table to display  information and use it to identify missing  information  **LO3: Line Graphs**  I can draw a line graph to  display given information.  **LO4: Circles**  I can label a circle using mathematical language  **LO5: Pie charts**  I can answer questions  about a pie chart in terms of a part of a whole.  I can draw a simple pie  chart from given information as part of a whole.  **LO6: Mode, Median, Mean & Range**  I can calculate the mean, median and mode of a set of data;  I can calculate the range of a set of data;  **LO7, LO:8 Basic Probability**  I can calculate simple probabilities;  **LO9. Time**  I can use the minute and hour hand on an analogue clock to tell the time.  I can convert between 24- and 12- hour digital clocks to tell the time |
| Conditional Knowledge | **LO1, LO2: Place Value**  I can make appropriate choices of how to partition to best answer a question  I can make appropriate choices of rounding dependent on the context eg money  **LO3, 4 and 5: Calculating Using the 4 Operations**  I can make an appropriate choice of when it’s best to use a mental, informal, formal or calculator method  I can check my answers for reasonableness | **LO4: Time**  I can decide when it is best to approximate or give times accurately | **LO4: Angles**  I can decide an appropriate degree of accuracy depending on the context given | **LO2, 3 and 4:Perimeter, Area and Volume**  I can choose sensible units to give answers in depending on the given context explore what can and cannot be inferred in statistical and probabilistic settings, and begin to express their arguments formally. | **LO1: Operations and**  **Equations with**  **Directed Number.**  I can check my answers for reasonableness  **LO2: Addition and Subtraction of Fractions**  I can check my answers for reasonableness  L03: Fractions, Decimals and Percentages  I can make reasoned decisions whether it is best to calculate a question as a fraction, decimal or percentage; (eg., 25%, 50%, 10%, 75%)  **LO4: Ratio and Scale**  I know how to solve proportional problems involving the ratio m:n | **LO1: Tally Charts,**  **Pictograms, Bar Charts (Graphs)**  I know how to make an appropriate choice of graphical representation.  **LO6: Mode, Median, Mean & Range**  I know which is the best average to use for different contexts  I can discuss the limitations of different measures of central tendency;  I can compare sets of data using mathematical terminology;  **LO9: Time**  I can decide when it is best to approximate or give times accurately; |
| National Curriculum Reference | | Consolidate their numerical and mathematical capability from key stage 2 and extend their understanding of the number system and place value to include decimals, fractions, powers and roots;  Select and use appropriate calculation strategies to solve increasingly complex problems;  Use language and properties precisely to analyse numbers; Understand and use place value for decimals, measures and integers of any size;  Use the concepts and vocabulary of prime numbers, factors (or divisors), multiples, common factors, common multiples,  Develop their mathematical knowledge, in part through solving problems and evaluating the outcomes, including multi-step problems; Use conventional notation for the priority of operations, including brackets, powers, roots and reciprocals; recognise and use relationships between operations including inverse operations;  Use integer powers and associated real roots (square, cube and higher), recognise powers of 2, 3, 4, 5 and distinguish between exact representations of roots and their decimal approximations; Round numbers and measures to an appropriate degree of accuracy;  Use approximation through rounding to estimate answers; Appreciate the infinite nature of the sets of integers, real and rational numbers; | Use language and properties precisely to analyse numbers, algebraic expressions; Use algebra to generalise the structure of arithmetic, including to formulate mathematical relationships;  Extend their understanding of the number system; make connections between number relationships, and their algebraic and graphical representations; Generate terms of a sequence from either a term-to-term or a position-to-term  Recognise arithmetic sequences and find the *n*th term;  Substitute values in expressions, rearrange and simplify expressions, and solve equations,  Develop algebraic and graphical fluency;  Identify variables and express relations between variables algebraically and graphically;  Make and test conjectures about patterns and relationships; look for proofs or counter- examples;  Develop their mathematical knowledge, in part through solving problems and evaluating the outcomes, including multi-step problems; Use conventional notation for the priority of operations, including brackets, powers, roots and reciprocals;  Recognise and use relationships between operations including inverse operations;  Use and interpret algebraic notation, including:   * + *ab* in place of *a* × *b*   + 3*y* in place of *y* + *y* + *y* and 3 × *y*   + *a*2 in place of *a* × *a*, *a*3 in place of *a* × *a* × *a*; *a*2*b* in place of *a* × *a* × *b*   + *a* in place of *a*  *b;*   + Coefficients written as fractions rather than as decimals;   + Substitute numerical values into formulae and expressions, including scientific formulae   Understand and use the concepts and vocabulary of expressions, equations, inequalities, terms and factors  simplify and manipulate algebraic expressions to maintain equivalence by:   * + collecting like terms,   + multiplying a single term over a bracket;   + taking out common factors;   + Understand and use standard mathematical formulae; rearrange formulae to change the subject; | Use language and properties precisely to analyse numbers, 2-D a substitute values in expressions, rearrange and simplify expressions, and solve equations and 3-D shapes;  Develop their mathematical knowledge, in part through solving problems and evaluating the outcomes, including multi-step problems;  Work with coordinates in all four quadrants; Draw and measure line segments and angles in geometric figures;  Describe, sketch and draw using conventional terms and notations: points, lines, parallel lines, perpendicular lines, right angles, regular polygons, and other polygons that are reflectively and rotationally symmetric; Derive and illustrate properties of triangles, quadrilaterals, circles, and other plane figures [for example, equal lengths and angles] using appropriate language and technologies; | Use language and properties precisely to analyse numbers, algebraic expressions, 2-D and 3-D shapes;  Develop their mathematical knowledge, in part through solving problems and evaluating the outcomes, including multi-step problems;  Use standard units of mass, length, time, money and other measures, including with decimal quantities; Derive and apply formulae to calculate and solve problems involving: perimeter and area of triangles, parallelograms, trapezia, volume of cuboids (including cubes) and other prisms;  Calculate and solve problems involving: perimeters of 2-D shapes;  Use the standard conventions for labelling the sides and angles of triangle ABC, and know and use the criteria for congruence of triangles; Derive and illustrate properties of triangles, quadrilaterals, circles, and other plane figures [for example, equal lengths and angles] using appropriate language and technologies;  Identify properties of, and describe the results of rotations and reflections applied to given figures;  Use the properties of faces, surfaces, edges and vertices of cubes, cuboids, prisms, cylinders, pyramids, cones and spheres to solve problems in 3-D; | Extend their understanding of the number system; make connections between number relationships, and their algebraic and graphical representations;  Use the four operations, including formal written methods, applied to integers, decimals, proper and improper fractions, and mixed numbers, all both positive and negative;  Select and use appropriate calculation strategies to solve increasingly complex problems;  Develop their mathematical knowledge, in part through solving problems and evaluating the outcomes, including multi-step problems; Order positive and negative integers, decimals and fractions; use the number line as a model for ordering of the real numbers; use the symbols =, ≠, <, >, ≤, ≥ ; Use conventional notation for the priority of operations, including brackets, powers, roots and reciprocals; recognise and use relationships between operations including inverse operations;  Use integer powers and associated real roots (square, cube and higher), recognise powers of 2, 3, 4, 5 and distinguish between exact representations of roots and their decimal approximations; Interpret fractions and percentages as operators;  Use approximation through rounding to estimate answers; Express one quantity as a fraction of another, where the fraction is less than 1 and greater than 1;  use ratio notation, including reduction to simplest form;  Divide a given quantity into two parts in a given part:part or part:whole ratio; express the division of a quantity into two parts as a ratio;  Understand that a multiplicative relationship between two quantities can be expressed as a ratio or a fraction; | Use language and properties precisely to analyse numbers, probability and statistics;  Explore what can and cannot be inferred in statistical and probabilistic settings, and begin to express their arguments formally;  Construct and interpret appropriate tables, charts, and diagrams, including frequency tables, bar charts, pie charts, and pictograms for categorical data, and vertical line (or bar) charts for ungrouped and grouped numerical data;  Record, describe and analyse the frequency of outcomes of simple probability experiments involving randomness, fairness, equally and unequally likely outcomes, using appropriate language and the 0-1 probability scale;  Understand that the probabilities of all possible outcomes sum to 1;  Describe, interpret and compare observed distributions of a single variable through: appropriate graphical representation involving discrete, continuous and grouped data; and appropriate measures of central tendency (mean, mode, median) and spread (range, consideration of outliers) |
| Develop their mathematical knowledge, in part through solving problems and evaluating the outcomes, including multi-step problems;  Develop their use of formal mathematical knowledge to interpret and solve problems, including in financial mathematics;  Begin to model situations mathematically and express the results using a range of formal mathematical representations;  Select appropriate concepts, methods and techniques to apply to unfamiliar and non- routine problems. | | | | | |

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