|  | | **HT2**  **Number** | **HT1**    **ALGEBRAIC THINKING** | **HT3**  **NUMBER** | **HT4**  **GEOMETRY &**  **SHAPE** | **HT5**  **PROBABILITY, STATISTICS & GEOMETRY** | **HT6**  **GEOMETRY & GRAPHS** |
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| Learning outcomes/ composite knowledge:  Pupils will be able to… | | **LO1: Place Value**  Order positive and negative integers, decimals and fractions; use the symbols =, ≠, <, > , ≤, ≥  **LO2: 4 Operations**  Apply the four operations, including formal written methods, to integers, decimals and simple fractions (proper and improper), and mixed numbers – understand and use place value (e.g. when working with very large or very small numbers, and when calculating with decimals)  Use standard units of mass, length, time, money and other measures (including standard compound measures)  **LO3: Directed Negative numbers.**  Apply all 4 operations with negative numbers where appropriate  **LO4: BIDMAS**  Use BIDMAS to work out  calculations including brackets, Powers, Roots and fractions.  Find the reciprocal of an  expression.  **LO5: Factors**  Find factors, common factors and HCF  **LO6: Multiples**  Find multiples, common multiples and LCM  **LO7: Prime Numbers**  Identify prime numbers in a set of numbers  LO8: Venn Diagrams  Using venn diagrams ti identify LCM and HCF  **LO9: Prime Factor Trees**  Write a number as a product of primes including writing it in index form.  **LO10: Indices and Roots**  Recognise and use relationships between operations, including inverse operations (e.g. cancellation to simplify calculations and expressions); use conventional notation for priority of operations, including brackets, powers, roots and reciprocals;  Use positive integer powers and associated real roots (square, cube and higher), recognise powers of 2, 3, 4, 5;  Calculate with roots, and with integer indices | **LO1: Collecting like terms**  Use and interpret algebraic manipulation;  Collect like terms  **LO2: Powers and roots.**  Simplifying algebraic expressions involving sums, products and powers, including the laws of indices;  **LO3: Multiplying out brackets**  Multiply a single term over a bracket;  Expand products of 2 binomials;  **LO4: Factorising:**  Take out common factors from an algebraic expression;  Factorise quadratic expressions, including difference of 2 squares;  **LO5: Solving equations.**  Solve linear equations with one unknown algebraically;  Solve quadratic equations algebraically  **LO6: Expression, Formula and functions.**  Substitute numerical values into formulae and expressions, including scientific formulae;  Understand and use the concepts and vocabulary of expressions, equations, formulae, identities, inequalities, terms and factors;  Re-arrange formulae to change the subject;  Interpret simple expressions as functions with inputs and outputs;  **LO7: Sequences.**  Generate a sequence from either a term to term or position to term rule;  Recognise and use sequences of triangular, square and cube numbers, simple arithmetic sequences;  Deduce expressions to calculate the nth term of a linear sequence;  **LO8: Inequalities.**  Solve linear inequalities on a number line and algebraically;  **LO9: Solving Simultaneous Equations:**  Solve two simultaneous equations in two variables algebraically; find approximate solutions using a graph | **LO1: Equivalent fractions.**  Calculate using all 4 operations with fractions  Convert between mixed numbers and improper fractions  Order fractions  **LO2: Fraction, Decimals and percentages. (FDP).**  Work interchangeably with terminating decimals and their corresponding fractions  Interpret fractions and percentages as operators;  Solve problems involving % change including simple interest;  **LO3:Ratio and proportion**  Simplify a ratio;  Write a ratio in the form 1: n or n:1  Work with fractions in ratio problems  Divide a quantity into a given ratio;  Express a multiplicative relationship between two quantities as a ratio or a fraction;  Solve problems involving direct and inverse proportion;  **LO4: Rounding.**  Round numbers and measures to an appropriate degree of accuracy (eg. to a specified number of decimal places or significant figures); use inequality notation to specify simple error intervals due to truncation or rounding  **LO5: Estimating**  Estimate answers; check calculations using approximation and estimation, including answers obtained using technology  **LO6:Standard Form**  Calculate with and interpret standard form A × 10n, where 1 ≤ A < 10 and n is an integer | **LO1: Nets and 3D shapes**  Identify properties of the faces, surfaces, edges and vertices of: cubes, cuboids, prisms, cylinders, pyramids, cones and spheres;  Construct and interpret plans and elevations of 3D shapes  **LO2: Area & Perimeter**  Know and apply formulae to calculate: area of triangles, parallelograms, trapezia; volume of cuboids and other right prisms (including cylinders);  **LO3: Circles**  Identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment;  Calculate arc lengths, angles and areas of sectors of circles;  **LO4: Compound shapes.**  Find areas of compound shapes  **LO5: Volume and Surface Area**  Find the volume and surface areas of prisms  **LO6: Vectors**  To describe a translation as a vector;  Add, subtract and multiply a vector by a scalar;  Use diagrammatical representations of vectors;  **LO7: Transformations**  To describe transformations using mathematical terminology;  **LO8:Congruency and Scale**  Use scale factors, scale diagrams and maps;  Identify shapes that are mathematically similar versus congruent;  Interpret maps and scale drawings and use of bearings; | **LO1: Probability.**  Record, describe and analyse the frequency of outcomes of probability experiments using tables and frequency trees;  Apply ideas of randomness, fairness and equally likely events to calculate expected outcomes of multiple future experiments;  Relate relative expected frequencies to theoretical probability, using appropriate language and the 0-1 probability scale;  Apply the property that the probabilities of an exhaustive set of outcomes sum to one; apply the property that the probabilities of an exhaustive set of mutually exclusive events sum to one;  **LO2: Collecting, Representing and Interpreting Data**  Infer properties of populations or distributions from a sample, while knowing the limitations of sampling;  Interpret and construct tables, charts and diagrams, including frequency tables, bar charts, pie charts and pictograms for categorical data, vertical line charts for ungrouped discrete numerical data, tables and line graphs for time series data and know their appropriate use; Draw appropriate graphical representation involving discrete, continuous and grouped data;  **LO3: Interior and exterior**  **angles**  Apply the properties of angles at a point, angles at a point on a straight line, vertically opposite angles; understand and use alternate and corresponding angles on parallel lines; derive and use the sum of angles in a triangle (e.g. to deduce and use the angle sum in any polygon, and to derive properties of regular polygons);  Calculate with bearings. | **LO1: Pythagoras’ Theorem**  To be able to use Pythagoras’ Theorem to find missing sides of right angled triangles  **LO2: Coordinates**  Work with coordinates in all 4 quadrants;  Plot graphs of equations that correspond to straight line graphs;  Identify and interpret gradients and intercepts of linear functions;  Identify and interpret roots, intercepts, turning points of quadratic functions graphically;  Recognise, sketch and interpret graphs of linear, quadratic and non-standard functions in real life contexts  **End of Year 10 Assessment QLA to inform curriculum for remainder of year** |
| Knowledge Components | Declarative knowledge | **LO1: Place Value**  I know the meaning of mathematical symbols such as =, ≠, <, > , ≤, ≥  **LO2: 4 Operations**  I know the processes for calculating with all 4 operations for integers, decimals and fractions.  I know conversions for standard units of mass, length, time, money and other measures (including standard compound measures)  **LO4: BIDMAS**  I know the order of operations.  I know what a reciprocal is.  **LO5, LO6, LO7: Factors, Multiples and Prime Numbers**  I know what a factor, multiple and prime number is.  **LO9: Prime Factor Trees**  I know how to write a product of primes in index form. | **LO1: Collecting like terms**  I know algebraic conventions eg simplifying fractions.  I know what ‘like terms’ mean.  **LO2: Powers and roots.**  I know the laws of indices  **LO3, LO4: Multiplying out brackets, Factorising**  I know the meaning of expanding and factorising.  **LO6: Expression, Formula and functions.**  I understand and can use the vocabulary of expressions, equations, formulae, identities, inequalities, terms and factors;  **LO7: Sequences.**  I can recognise sequences of triangular, square and cube numbers, as well as simple arithmetic sequences;  **LO8: Inequalities.**  I know what is meant by an inequality. | **LO1: Equivalent fractions.**  I know the difference between a mixed number and an improper fraction.  **LO2: Fraction, Decimals and percentages. (FDP).**  I know how to convert between common fractions, decimals and percentages mentally.  I know how to use a calculator to convert between fractions, decimals and percentages.  I know what simple interest is.  **LO3:Ratio and proportion**  I know what a ratio is and I know how it links to proportion.  I can describe the difference between direct and inverse proportion.  **LO4: Rounding.**  I can explain the difference between rounding using DP and SF  **LO5: Estimating**  I can give everyday examples of when we would round or approximate an answer.  **LO6:Standard Form**  I can recognise when a number is written in standard form. | **LO1: Nets and 3D shapes**  I can identify properties of the faces, surfaces, edges and vertices of: cubes, cuboids, prisms, cylinders, pyramids, cones and spheres;  I know what plan views, front and side views are.  **LO2: Area & Perimeter**  I know formulae to calculate: area of triangles, parallelograms, trapezia; volume of cuboids and other right prisms (including cylinders);  **LO3: Circles**  I can identify circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment;  **LO4: Compound shapes.**  I know what a compound shape is.  **LO5: Volume and Surface Area**  I can describe what is meant by volume and surface area.  **LO6: Vectors**  I know what transformation a translation represents.  **LO7: Transformations**  I know what the 4 transformations are.  **LO8:Congruency and Scale**  I can identify shapes that are mathematically similar versus congruent; | **LO1: Probability.**  I know the property that the probabilities of an exhaustive set of outcomes sum to one;  I know the property that the probabilities of an exhaustive set of mutually exclusive events sum to one  **LO2: Collecting, Representing and Interpreting Data**  I know the limitations of sampling.  **LO3: Interior and exterior**  **angles**  I know angle facts for triangles, quadrilaterals and parallel lines.  I know that exterior angles of a polygon add to 360. | **LO1: Pythagoras’ Theorem**  I know what Pythagoras’ Theorem is used for  **LO2: Coordinates**  I can label quadrants.  I know what is meant by a gradient.  I can identify roots, intercepts, turning points of quadratic functions graphically;  I can recognise, graphs of linear, quadratic and non standard functions in real life contexts |
| Procedural knowledge | **LO1: Place Value**  I can order positive and negative integers, decimals and fractions; use the symbols =, ≠, <, > , ≤, ≥  **LO2: 4 Operations**  I can apply the four operations, including formal written methods, to integers, decimals and simple fractions (proper and improper), and mixed numbers – understand and use place value (e.g. when working with very large or very small numbers, and when calculating with decimals)  I can use standard units of mass, length, time, money and other measures (including standard compound measures)  **LO3: Directed Negative numbers.**  I can apply all 4 operations with negative numbers where appropriate  **LO4: BIDMAS**  I can use BIDMAS to work out  calculations including brackets, Powers, Roots and fractions.  I can find the reciprocal of an  expression.  **LO5: Factors**  I can find factors, common factors and HCF  **LO6: Multiples**  I can find multiples, common multiples and LCM  **LO7: Prime Numbers**  I can identify prime numbers in a set of numbers  LO8: Venn Diagrams  I can use a Venn diagram to identify LCM and HCF  **LO9: Prime Factor Trees**  I can write a number as a product of primes including writing it in index form.  **LO10: Indices and Roots**  I can use relationships between operations, including inverse operations (e.g. cancellation to simplify calculations and expressions); I can use conventional notation for priority of operations, including brackets, powers, roots and reciprocals;  I can use positive integer powers and associated real roots (square, cube and higher), recognise powers of 2, 3, 4, 5;  I can calculate with roots, and with integer indices | **LO1: Collecting like terms**  I can use and interpret algebraic manipulation;  I can collect like terms  **LO2: Powers and roots.**  I can simplify algebraic expressions involving sums, products and powers, including the laws of indices;  **LO3: Multiplying out brackets**  I can mulitiply a single term over a bracket;  I can expand products of 2 binomials;  **LO4: Factorising:**  I can take out common factors from an algebraic expression;  I know how to factorise quadratic expressions, including difference of 2 squares;  **LO5: Solving equations.**  I can solve linear equations with one unknown algebraically;  I can solve quadratic equations algebraically  **LO6: Expression, Formula and functions.**  I can substitute numerical values into formulae and expressions, including scientific formulae;  I understand and use the concepts and vocabulary of expressions, equations, formulae, identities, inequalities, terms and factors;  I can re-arrange formulae to change the subject;  I know how to interpret simple expressions as functions with inputs and outputs;  **LO7: Sequences.**  I can generate a sequence from either a term to term or position to term rule;  I can use sequences of triangular, square and cube numbers, simple arithmetic sequences;  I know how to deduce expressions to calculate the nth term of a linear sequence;  **LO8: Inequalities.**  I know how to solve linear inequalities on a number line and algebraically;  **LO9: Solving Simultaneous Equations:**  I can solve two simultaneous equations in two variable algebraically and find approximate solutions using a graph | **LO1: Equivalent fractions.**  I can calculate using all 4 operations with fractions  I can convert between mixed numbers and improper fractions  I know how to order fractions  **LO2: Fraction, Decimals and percentages. (FDP).**  I know how to work interchangeably with terminating decimals and their corresponding fractions  I can interpret fractions and percentages as operators;  I can solve problems involving % change including simple interest;  **LO3:Ratio and proportion**  I can simplify a ratio;  I know how to write a ratio in the form 1: n or n:1  I can work with fractions in ratio problems  I can divide a quantity into a given ratio;  I can express a multiplicative relationship between two quantities as a ratio or a fraction;  I can solve problems involving direct and inverse proportion;  **LO4: Rounding.**  I can round numbers and measures to an appropriate degree of accuracy (eg. to a specified number of decimal places or significant figures);  I can use inequality notation to specify simple error intervals due to truncation or rounding  **LO5: Estimating**  I know how to estimate answers; check calculations using approximation and estimation, including answers obtained using technology  **LO6:Standard Form**  I can calculate with and interpret standard form A × 10n, where 1 ≤ A < 10 and n is an integer | **LO1: Nets and 3D shapes**  I can construct and interpret plans and elevations of 3D shapes  **LO2: Area & Perimeter**  I can apply formulae to calculate: area of triangles, parallelograms, trapezia; volume of cuboids and other right prisms (including cylinders);  **LO3: Circles**  I can apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment;  I can calculate arc lengths, angles and areas of sectors of circles;  **LO4: Compound shapes.**  I can find areas of compound shapes  **LO5: Volume and Surface Area**  I can find the volume and surface areas of prisms  **LO6: Vectors**  I know how to describe a translation as a vector;  I can add, subtract and multiply a vector by a scalar;  I can use diagrammatical representations of vectors;  **LO7: Transformations**  I can describe transformations using mathematical terminology;  **LO8:Congruency and Scale**  I can use scale factors, scale diagrams and maps;  I can interpret maps and scale drawings and use bearings; | **LO1: Probability.**  I can record, describe and analyse the frequency of outcomes of probability experiments using tables and frequency trees;  I know how to apply ideas of randomness, fairness and equally likely events to calculate expected outcomes of multiple future experiments;  I can relate relative expected frequencies to theoretical probability, using appropriate language and the 0-1 probability scale;  I can apply the property that the probabilities of an exhaustive set of outcomes sum to one;  I can apply the property that the probabilities of an exhaustive set of mutually exclusive events sum to one;  **LO2: Collecting, Representing and Interpreting Data**  I can infer properties of populations or distributions from a sample.  I can interpret and construct tables, charts and diagrams, including frequency tables, bar charts, pie charts and pictograms for categorical data, vertical line charts for ungrouped discrete numerical data, tables and line graphs for time series data and know their appropriate use;  I can draw appropriate graphical representation involving discrete, continuous and grouped data;  **LO3: Interior and exterior**  **angles**  I can apply the properties of angles at a point, angles at a point on a straight line, vertically opposite angles; understand and use alternate and corresponding angles on parallel lines;  I can derive and use the sum of angles in a triangle (e.g. to deduce and use the angle sum in any polygon, and to derive properties of regular polygons); | **LO1: Pythagoras’ Theorem**  I know how to use Pythagoras’ Theorem to find missing sides of right angled triangles  **LO2: Coordinates**  I can work with coordinates in all 4 quadrants;  I can plot graphs of equations that correspond to straight line graphs;  I can identify and interpret gradients and intercepts of linear functions;  I know how to identify and interpret roots, intercepts, turning points of quadratic functions graphically;  I can recognise, sketch and interpret graphs of linear, quadratic and non standard functions in real life contexts |
| Contextual knowledge | **LO8: Venn Diagrams**  I can make an appropriate choice of method to calculate HCF and LCM.  **LO9: Prime Factor Trees**  I can read a problem and make an appropriate choice of visual diagram to help me solve the problem  **LO10: Indices and Roots**  I can recognise relationships between operations, including inverse operations (e.g. cancellation to simplify calculations and expressions); | **LO3, LO4, LO5: Multiplying out Brackets, Factorising and Solving Equations**  I can make sensible choices of how to simplify an algebraic expression in order to solve an equation.  **LO7: Sequences.**  I can scrutinise a sequence a decide if it is arithmetic or if it involves square, cube or triangular numbers.  **LO8: Inequalities.**  I can make appropriate choices whether it is best to solve an inequality using a number line or algebraically.  **LO9: Solving Simultaneous Equations:**  I can scrutinise simultaneous equations and decide whether it is best to solve graphically or algebraically. | **LO2: Fraction, Decimals and percentages. (FDP).**  I can look at a question involving fractions, decimals or percentages and decide whether it is best to use a mental or calculator method.  **LO4: Rounding.**  I can make sensible choice as about how many DP or SF to give a solution to  **LO5: Estimating**  I can make sensible choices about the degree of accuracy required in a given context.  **LO6:Standard Form**  I can make an appropriate choice about when to write a number in standard form instead of ordinary form. | **LO3: Circles**  Given a problem I can interpret whether I need to calculate lengths, angles or areas of sectors of circles;  **LO4: Compound shapes.**  I can scrutinise a compound shape and split it up into known shapes that are easy to calculate the area and perimeter of.  **LO7: Transformations**  I can scrutinise a transformation and decide whether it is a reflection, rotation, enlargement or a translation, or whether it is a combination of these. | **LO1: Probability.**  I can make appropriate choices of diagram to record frequencies of an experiment;  I can consider bias when undertaking an experiment;  **LO2: Collecting, Representing and Interpreting Data**  I can scrutinise a solution and make sensible decisions about the reliability of the findings.  I can make appropriate choices of graph to display data  **LO3: Interior and exterior**  **angles**  I can identify sensible routes for finding missing angles to help me solve a problem. | **LO1: Pythagoras’ Theorem**  I can read a problem and decide how best to solve it. |
| National Curriculum references | | Consolidate their numerical and mathematical capability from key stage 3 and extend their understanding of the number system to include powers, roots;  Select and use appropriate calculation strategies to solve increasingly complex problems, including exact calculations involving multiples, use of standard form and application and interpretation of limits of accuracy;  Move freely between different numerical, algebraic, graphical and diagrammatic representations, including of linear, quadratic, reciprocal, functions;  Use mathematical language and properties precisely;  Make and test conjectures about the generalisations that underlie patterns and relationships; look for proofs or counter-examples; begin to use algebra to support and construct arguments;  Reason deductively in geometry, number and algebra, including using geometrical constructions;  Interpret when the structure of a numerical problem requires additive, multiplicative or proportional reasoning; Apply systematic listing strategies;  Calculate with roots, and with integer indices;  Calculate exactly with fractions, multiples of π; | Consolidate their algebraic capability from key stage 3 and extend their understanding of algebraic simplification and manipulation to include quadratic expressions;  Extend fluency with expressions and equations from key stage 3, to include quadratic equations, simultaneous equations and inequalities;  Move freely between different numerical, algebraic, graphical and diagrammatic representations, including of linear, quadratic, reciprocal, functions;  Use mathematical language and properties precisely;  Extend their ability to identify variables and express relations between variables algebraically and graphically;  Make and test conjectures about the generalisations that underlie patterns and relationships; look for proofs or counter-examples; begin to use algebra to support and construct arguments; Reason deductively in geometry, number and algebra, including using geometrical constructions;  Simplify and manipulate algebraic expressions;  Know the difference between an equation and an identity; argue mathematically to show algebraic expressions are equivalent, and use algebra to support and construct arguments;  Where appropriate, interpret simple expressions as functions with inputs and outputs;  Solve quadratic equations algebraically by factorising,  Solve two simultaneous equations in two variables (linear/linear) algebraically;  Translate simple situations or procedures into algebraic expressions or formulae; derive an equation (or two simultaneous equations), solve the equation(s) and interpret the solution;  Solve linear inequalities in one variable**,** represent the solution set on a number line; recognise and use sequences of triangular, square and cube numbers, simple arithmetic progressions, Fibonacci type sequences, quadratic sequences, and simple geometric progressions (*r n* where *n* is an integer, and *r* is a positive rational number; Deduce expressions to calculate the *n*th term of linear sequences; | Consolidate their numerical and mathematical capability from key stage 3 and extend their understanding of the number system to include powers, roots;  Select and use appropriate calculation strategies to solve increasingly complex problems, including exact calculations involving multiples of π, use of standard form and application and interpretation of limits of accuracy;  Move freely between different numerical, algebraic, graphical and diagrammatic representations, including of linear, quadratic, reciprocal, functions;  Use mathematical language and properties precisely;  Extend and formalise their knowledge of ratio and proportion, including trigonometric ratios, in working with measures and geometry, and in working with proportional relations algebraically and graphically;  Make and test conjectures about the generalisations that underlie patterns and relationships; look for proofs or counter-examples;  Begin to use algebra to support and construct arguments; reason deductively in geometry, number and algebra, including using geometrical constructions;  Interpret when the structure of a numerical problem requires additive, multiplicative or proportional reasoning; Calculate with numbers in standard form *A x* 10*n*, where 1 ≤ *A* < 10 and *n* is an integer;  Identify and work with fractions in ratio problems;  Apply and interpret limits of accuracy when rounding or truncating;  Compare lengths, areas and volumes using ratio notation and/or scale factors; make links to similarity;  Convert between related compound units (speed, rates of pay, prices, density, pressure) in numerical and algebraic contexts;  Interpret equations that describe direct and inverse proportion; | Select and use appropriate calculation strategies to solve increasingly complex problems, including exact calculations involving multiples of π , use of standard form and application and interpretation of limits of accuracy;  Use mathematical language and properties precisely;  Extend and formalise their knowledge of ratio and proportion, including trigonometric ratios, in working with measures and geometry, and in working with proportional relations algebraically and graphically;  Make and test conjectures about the generalisations that underlie patterns and relationships; look for proofs or counter-examples; begin to use algebra to support and construct arguments;  Reason deductively in geometry, number and algebra, including using geometrical constructions;  Compare lengths, areas and volumes using ratio notation and/or scale factors; make links to similarity;  Convert between related compound units (speed, rates of pay, prices, density, pressure) in numerical and algebraic contexts;  Interpret and use fractional scale factors for enlargements;  Identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment;  Construct and interpret plans and elevations of 3D shapes;  Calculate arc lengths, angles and areas of sectors of circles;  Calculate surface areas and volumes of spheres, pyramids, cones and composite solids;  Apply the concepts of congruence and similarity, including the relationships between lengths, in similar figures;  Describe translations as 2D vectors;  Apply addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representations of vectors; | Use mathematical language and properties precisely;  Extend and formalise their knowledge of ratio and proportion, including trigonometric ratios, in working with measures and geometry, and in working with proportional relations algebraically and graphically;  Interpret and use bearings;  Extend their ability to identify variables and express relations between variables algebraically and graphically;  Reason deductively in geometry, number and algebra, including using geometrical constructions;  Explore what can and cannot be inferred in statistical and probabilistic settings, and express their arguments formally;  Assess the validity of an argument and the accuracy of a given way of presenting information;  Apply the property that the probabilities of an exhaustive set of mutually exclusive events sum to one;  Use a probability model to predict the outcomes of future experiments; understand that empirical unbiased samples tend towards theoretical probability distributions, with increasing sample size;  Infer properties of populations or distributions from a sample, whilst knowing the limitations of sampling; Interpret and construct tables and line graphs for time series data;  Interpret, analyse and compare the distributions of data sets from univariate empirical distributions through appropriate graphical representation involving discrete, continuous and grouped data;  Apply statistics to describe a population; | Move freely between different numerical, algebraic, graphical and diagrammatic representations, including of linear, quadratic, reciprocal, functions;  Use mathematical language and properties precisely;  Extend and formalise their knowledge of ratio and proportion, including trigonometric ratios, in working with measures and geometry, and in working with proportional relations algebraically and graphically;  Extend their ability to identify variables and express relations between variables algebraically and graphically;  Make and test conjectures about the generalisations that underlie patterns and relationships; look for proofs or counter-examples; begin to use algebra to support and construct arguments;  Reason deductively in geometry, number and algebra, including using geometrical constructions; Where appropriate, interpret simple expressions as functions with inputs and outputs;  Use the form y=mx + c to identify parallel lines; find the equation of the line through two given points, or through one point with a given gradient;  Identify and interpret roots, intercepts and turning points of quadratic functions graphically; deduce roots algebraically;  Recognise, sketch and interpret graphs of linear functions, quadratic functions, simple cubic functions and the reciprocal function;  Plot and interpret graphs (including reciprocal graphs and graphs of non-standard functions in real contexts, to find approximate solutions to problems such as simple kinematic problems involving distance, speed and acceleration;  Interpret the gradient of a straight line graph as a rate of change; recognise and interpret graphs that illustrate direct and inverse proportion;  Set up, solve and interpret the answers in growth and decay problems, including compound interest;  Apply Pythagoras’ Theorem and trigonometric ratios to find angles and lengths in right-angled triangles in two dimensional figures; |
| * 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 contexts * make and use connections between different parts of mathematics to solve problems * model situations mathematically and express the results using a range of formal mathematical representations, reflecting on how their solutions may have been affected by any modelling assumptions * select appropriate concepts, methods and techniques to apply to unfamiliar and non- routine problems; interpret their solution in the context of the given problem. | | | | | |