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| **SUBJECT:** | **Mathematics** | **YEAR GROUP:** | **8** |

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| **Term** | **Topic** | * **Content Outline** | **Learning Outcomes** |
| Term 1 | **Significant figures, powers and standard form**  **2D Shapes and 3D Solids**  **Quadratics**  **Construction** | * STEM:Powers of 10 * Calculating and estimating * Indices * Standard form * Calculating with standard form * Surface area of prisms * Volume of prisms * Circumference of circle * Area of circles * Cylinders * Pythagoras’ Theorem * Arithmetic and quadratic sequences * *Geometric sequence* * *Expanding* * *Factorizing* * *Solving quadratic expressions* * *Constructing shapes* * *Constructions1* * *Constructions2* | * Recall prefixes for powers of 10 * Use and understand powers of 10 * Multiply and divide by any integer power of 10 * Simplify expressions containing powers * Calculate with powers * Round to a number of significant figures * Recall law of indices * Use negative indicies * Evaluate powers of fractions * Identify standard form * Write number using standard form * Order numbers written in standard form * Rearrange order of numbers and power of 10 * Apply law of indices to simplify powers of 10 * Calculate with numbers written in standard form * Define prisms * Describe nets of 3D solids * Calculate the surface area of prisms * Find volume of right prisms * Calculate missing side using given volume * Solve word problems involving volume of prisms * Identify arc,radius,diameter and sector of a circle * Explain relation between radius and diameter * Calculate circumference of a circle * Formulate the area of a circle * Divide into different parts to find area of combined shapes * Work out the area of shaded region:circles inscribed in polygons * Identify Cylinder and its net * Find surface area and volume of cylinder * Evaluate missing lengths of cylinder given its area and volume * Label the hypotenuse , opposite and adjacent side * Explain Pythagoras’ Theorem * Apply Pythagoras’ theorem to determine missing side length * Recognize arithmetic and quadratic sequences * Find nth term of an arithmetic sequence * Generate a sequence using nth term * Define geometric sequence and common ratio * Compare and contrast similarities and differences between geometric and arithmetic sequence * Solve word problems involving geometric sequence * Multiply pairs of brackets * Use quadratic identities * Square a linear expression * Expand a perfect square and simplify * Apply a formula for the difference of two squares * Factorize quadratic expressions with three terms * Recall square roots * Factorize the quadratic expression * Solve quadratic equation * Name 3D solid made by each net * Sketch accurate nets of 3D solids * Construct a triangles using ruler and composes * Bisect a line using ruler and compasses * Construct the perpendicular to a line from a given point not on the line * Construct the perpendicular to a line at a given point on the line * Define angle bisector * Bisect angles using ruler and compasses * Draw accurate diagrams to solve problems |
| Term 2 | **Inequalities, equations and formulae**  **Collecting and analysing data**  **Multiplicative reasoning**  **Scale drawing and mesauring** | * Substitution * Inequalities * Using index law * Expressions, equations, identities and formulae * Solving Equations * Changing the subject * STEM: Planning a survey * Collecting data * Calculating averages and range * Displaying and analysing data * Direct proportion * Solving problems using direct proportion * Translations and enlargements * Negative and fractional scale factors * Percentage change * Maps and scales * Bearings * Scales and ratios * Congruent and similar shapes * Solving geometrical problems | * Substitute values into expressions and formulae involving powers, roots and brackets. * Derive expressions and formulae involving more than one variable. * Solve problems involving formulae and expressions * Recall solving linear inequalities in one unknown. * Interpret and use symbols relating to inequality. * Represent solutions to linear inequalities on a number line * Discuss the application of indices in real life contexts * Recall index notation and index laws for positive and negative integer powers, including zero * Simplify algebraic fractions * Distinguish between expressions, identities and equations. * Recognise and factorise the difference of two squares. * Expand and factorise expressions involving powers. * Recall the addition of algebraic fractions * Construct linear and complex equations * Solve equations involving an X2 term and a number * Use the reverse of BIDMAS and balance method * Change the subject of a simple formula involving any of the four operations, power and   roots.   * Substitute values into a formula and find the value of a variable that is not the subject. * Identify sources of primary and secondary data. * Choose a suitable sample size. * Understand how to reduce bias in sampling and questionnaires. * Identify a random sample. * Analyse and write questions for a questionnaire. * Design and use data collection sheets and tables. * Justify what is good questionnaire * Estimate the range from a grouped frequency table. * Calculate an estimate of the mean from a grouped frequency table. * Deduce the best average * Construct and use a line of best fit to estimate missing values. * Identify and explain outliers in data. * Identify further lines of enquiry. * Construct and use frequency polygons. * Recognise data sets that are in proportion. * Set up equations that show direct proportion. * Solve word problems using ratio and/or proportion. * Set up equations to show direct proportion. * Use algebra to solve problems involving proportion. * Solve problems involving simultaneous linear equations or direct proportion * Understand and use column vectors in translations. * Work out the scale factor of an enlargement. * Enlarge shapes using positive scale factors, about a centre of enlargement. * Describe an enlargement on a coordinate grid * Enlarge 2D shapes using a negative whole number scale factor. * Enlarge 2D shapes using a fractional scale factor. * Understand that the scale factor is the ratio of the lengths of corresponding sides * Use inverse operations to work out the original amount after a percentage increase or decrease. * Calculate percentage change. Solve problems involving percentage increase, decrease and change. * Recite the conversion of unit of distance * Read scales in maps and plans. * interpret maps and calculate missing distances * Describe, use and interpret 3 figure bearings. * Draw diagrams to scale using bearings * Measure/Solve problems involving 3 figure bearings and or scale drawings * Draw diagrams to scale. * Use and interpret scale drawings. * Solve problems involving 3 figure bearings and/or scale drawings. * Know the properties of congruent shapes * Identify congruent and similar shapes. * Use congruence to solve problems in triangles and quadrilaterals. * Use congruent shapes to solve problems about triangles and quadrilaterals. * Identify two shapes that are mathematically similar. * Solve problems involving similar triangles. |
| Term 3 | **Accuracy and measures**  **Graphical Solutions**  **Trigonometry**  **Probability** | * Rates of change * Density and pressure * Upper and lower bounds * Drawing straight-line graphs * Graphs of quadratic functions * Simultaneous equations * Using y=mx+c * More simultaneous equations * Graphs and simultaneous equations * The tangent ratio * The sine ratio * The cosine ratio * Using trigonometry to find angles * Solving problems using trigonometry * Set notation and Venn diagrams * Probability diagrams * Tree diagrams * Experimental and theoretical probabilities | * Discover the relationship between rate of change and starting amount * Solve problems involving rates of change. * Convert units with compound measures. * Discover the relationship between pressure and density * Calculate density and pressure. * Solve problems involving compound measures. * Understand the effect of rounding. * Approximating a number to a given number of significant figures, * Find upper and lower bounds. * Draw graphs with equation y = mx + c. * Draw graphs with equation ax + by = c. * Identify parallel lines. * Understand and draw graphs of quadratic functions. * Identify quadratic graphs and their features. * Solve problems using quadratic graphs. * Define ''simultaneous equations'' * Demonstrate multiple methods of solving simultaneous equations * Solve a pair of simultaneous equations. * Graph linear functions. * Rearrange equations of graphs to find the gradient and y-intercept. * Find the equation of the line between two points. * Calculate the slope of a line * Solve applications of linear equation * Solve practical problems with simulataneous equations * Simplify inequalities * Identify logical reasoning for choosing one method of solution over another * Solve more complexsimultaneous equations. * Be able to sketch graphs * Solve simultaneous equations by drawing graphs. * Compare drawn graph * Use conventions for naming the sides of a right-angled triangle. * Work out the tangent of any angle. * Use the tangent ratio to work out an unknown side of a right-angled triangle. * Solve a right triangle using Pythagorean Theorem, * Work out the sine of any angle. * Use the sine ratio to work out an unknown side of a right-angled triangle. * Find solutions of a trigonometric equation * Work out the cosine of any angle. * Use the cosine ratio to work out an unknown side in a right-angled triangle. * Find all solutions of a trigonometric equation * Use the trigonometric ratios to work out an unknown angle in a right-angled triangle. * Use trigonometry to solve problems involving missing lengths and angles. * Indicate sets by the description method * Use correct set language and notation. * Sort and compare sets of data using Venn diagrams. * Use correct set language and notation. * Present the possible outcomes of single events, or two successive events using lists, tables, Venn diagrams and sample space diagrams. * Identify mutually exclusive outcomes and events. * Be able to create tree diagrams * Be able to figure probabilities based on tree diagrams * Use tree diagrams to find the probabilities of two or more events. * Compare experimental and theoretical probabilities. * Compare probabilities. * Solve problems involving probability. |