Year 9

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Term	Activities	iLowerSecondary objectives covered
Autumn Term 1 1. Powers and roots (11 hours teaching)	Find the reciprocal of a number; Work with reciprocals; Use negative indices; Work out powers of fractions; Write numbers using standard form; Order numbers written in standard form; Calculate with numbers written in standard form; Calculate with fractional indices; Use surds; Understand the difference between rational and irrational numbers.	**N9.1C** Understand negative and 0 indices. **A9.1F** Use index notation and index laws for positive and negative integer powers, including zero. **N9.3A** Write large and small numbers using standard form. **N9.3B** Enter and read standard-form numbers on a calculator. **N9.3C** Order numbers written in standard form. **N9.3D** Add, subtract, multiply and divide numbers in standard form and be able to solve problems involving standard form calculations.
Autumn Term 1 2. Quadratics (10 hours teaching)	Generate sequences using quadratic expressions; Find an expression for the *n*th term of a quadratic sequence; Multiply pairs of brackets; Square a linear expression; Use quadratic identities; Factorise quadratic expressions into two brackets; Solve quadratic equations by factorising.	**A9.4A** Use the *n*th term to generate a linear or quadratic sequence. **A9.4D** Solve problems involving sequences. **A9.1G** Expand the product of two linear expressions (where both expressions have x coefficient 1). **A9.1I** Distinguish between expressions, identities and equations **A9.1H** Factorise quadratic expressions of the form $x^2 + bx + c$ (where the squared term has coefficient 1). **A9.1E** Expand and factorise expressions involving powers. **A9.2C** Solve equations involving an x^2 term and a number.

		A9.2D Solve quadratic equations of the form $x^2 + bx + c = 0$, by factorising (where the squared term has coefficient 1). **A9.1K** Recognise and factorise the difference of two squares.
Autumn Term 2 3. Inequalities, equations and formulae (11 hours teaching)	Solve linear equations and represent the solution on a number line; Multiply both sides of an inequality by a negative number; Use index laws with zero and negative powers; Explain the difference between equations, formulae and functions; Construct and solve complex equations; Change the subject of a formula; Change algebraic fractions to equivalent fractions; Solve problems with fractions in formulae.	**A9.3A** Solve linear inequalities in one unknown. **A9.3B** Understand and use symbols relating to inequality. **A9.3C** Represent solutions to linear inequalities on a number line. **A9.1F** Use index notation and index laws for positive and negative integer powers, including zero. **A9.1I** Distinguish between expressions, identities and equations. **A9.2A** Construct and solve equations with the unknown on both sides. **A9.2B** Construct and solve equations with the unknown on both sides and including brackets and fractions. **A9.1C** Substitute values into a formula and find the value of a variable that is not the subject. **A9.1D** Change the subject of a simple formula, involving any of the four operations, powers or roots.

<u>Autumn Term 2</u> 4. Collecting and analysing data (12 hours teaching)	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; Draw and interpret stem and leaf diagrams; Construct and interpret frequency polygons; Use frequency polygons to compare data; Estimate the mean and range from a grouped frequency table; Draw conclusions from tables and charts; Interpret statistics; Draw and interpret box plots; Compare data using box plots; Draw cumulative frequency graphs for grouped data; Interpret cumulative frequency graphs; Construct and interpret histograms.	**S9.1A** Identify sources of primary and secondary data. **S9.1B** Choose a suitable sample size and what data to collect. **S9.1C** Identify factors that might affect data collection and plan to reduce bias. **S9.2B** Draw and interpret frequency polygons. **S8.1C** Compare two sets of data using statistics or the shape of the graph. **S8.1A** Calculate the mean from a frequency table (ungrouped data). **S9.1F** Estimate the range from a grouped frequency table. **S9.1G** Calculate an estimate of the mean from a grouped frequency table. **S8.1D** Solve problems involving comparing data. **S9.2C** Solve problems by drawing or interpreting graphs, charts and tables. **S9.1I** Solve problems by collecting and analysing data. **S9.1D** Analyse and write questions for a questionnaire. **S9.1E** Design and use data collection sheets and tables. **S9.1H** Identify and suggest reasons for outliers in data. **S9.1J** Know and use correct set language and notation.
<u>Spring Term 1</u> 5. Multiplicative reasoning (10 hours teaching)	Recognise data sets that are in proportion; Set up equations that show direct proportion; Use algebra to solve problems involving proportion; Use algebra to solve problems involving different types of proportion; Work out the length of an arc; Work out the area of a sector; Solve problems involving arcs and sectors.	**N9.4B** Identify a proportional relationship between sets of data. **A9.2E** Write equations to represent direct proportion. **N9.4A** Calculate an unknown quantity from quantities that vary in direct proportion. **N9.4C** Solve word problems using ratio and/or proportion.

Spring Term 1 6. Non-linear graphs (10 hours teaching)	Understand and draw graphs of quadratic functions; Identify quadratic graphs and their features; Solve problems using quadratic graphs; Use quadratic graphs to solve equations; Understand and draw graphs of cubic functions; Identify cubic graphs and their features; Identify and draw graphs of reciprocal functions; Solve problems using reciprocal graphs.	**A9.5F** Draw graphs of quadratic functions. **A9.5G** Solve problems by sketching, drawing and interpreting real-life linear and quadratic graphs.
Spring Term 2 7. Accuracy and measures (9 hours teaching)	Solve problems involving rates of change; Convert units with compound measures; Calculate density and pressure; Solve problems involving compound measures; Understand the effects of rounding; Find upper and lower bounds; Calculate the lower and upper bound of areas and volumes; Calculate the lower and upper bounds of compound measures; Use upper and lower bounds to solve complex problems.	**N9.1E** Find upper and lower bounds for discrete data. **G9.1J** Solve problems using compound measures and rates.
Summer Term 1 8. Graphical solutions (11 hours teaching)	Solve a pair of simultaneous equations; Rearrange equations of graphs to find the gradient and the *y*-intercept; Find the equation of the line between two points; Solve more complex simultaneous equations; Solve simultaneous equations by drawing graphs; Solve inequalities by graphing straight lines; Solve inequalities that involve quadratic graphs.	**A9.2F** Solve a pair of simultaneous linear equations. **A9.2G** Solve problems involving simultaneous linear equations or direct proportion. **A9.5B** Recognise that equations of the form y = mx + c are straight line graphs and state their gradient m and intercept (0, c). **A9.5E** Solve a pair of linear simultaneous equations by drawing graphs.

Summer Term 1 9. Trigonometry (12 hours teaching)	Use conventions for naming 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; Work out the sine of any angle; Use the sine ratio to work out an unknown side of a right-angled triangle; Work out the cosine of any angle; Use the cosine ratio to work out an unknown side in a right-angled triangle; 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; Plot and sketch graphs of the trigonometric functions; Use the trigonometric ratios with any angle from 0 to 360°.	**G9.5C** Know, understand and use sine, cosine and tangent of acute angles to calculate lengths in a right-angled triangle. **G9.5D** Solve problems involving right-angled triangles. **G9.5E** Use trigonometry to calculate lengths and angles in a right-angled triangle.
Summer Term 2 10. Mathematical reasoning (9 hours teaching)	Explain, show and justify a mathematical solution; Draw graphs to solve mathematical problems; Identify the difference between giving an example and proving a theory; Understand how to use mathematical proof; Present a logical argument using algebra.	**A8.3H** Solve problems by sketching, drawing and interpreting real-life graphs. **A9.5G** Solve problems by sketching, drawing and interpreting real-life linear and quadratic graphs. **S8.2H** Solve problems by drawing or interpreting graphs, charts and tables. **A9.1J** Solve problems involving formulae and expressions.