Year 9 Foundation: Curriculum Implementation Plan

Mathematics – Year 9 Foundation – Overview				
Knowledge and Skills – Students will be taught to…	Reading, Oracy, Literacy	Formative Assessment	Summative Assessment	Link to GCSE Content
Please see individual units below.	• Reading worded questions to understand the context and decide how to approach a problem • Paired discussion of problems • Writing responses to worded questions such as "Explain why…" • Expanding vocabulary of key mathematical terms • Giving verbal responses in class question-and-answer	• Questioning in class • Self-assessment • Peer-assessment • Starter and homework questions • Mini-tests • Show of hands and other forms of whole-class feedback • Review of student work during lessons • Mini-whiteboards	Whole-class assessments towards the end of each term, based on work completed during the year to date, and including GCSE-style questions.	Please see individual units below.

chaseterraceacademy

Mathematics – Unit 1 – Numbers 1	
Knowledge and Skills – Students will be taught to…	Links to KS3 National Curriculum Content (green) and KS4 Content (red)
• Add or subtract a positive number in context, where the calculation involves directed numbers e.g. 15 – 32, -25 + 7 (REVISION) • Add or subtract a negative number e.g. 15 + -7, -23 - -14 (REVISION) • Multiply and divide with negative numbers (REVISION) • Use a scientific calculator with negative numbers, including squaring • Write a number as a product of its prime factors, understanding that there is only one such decomposition for each composite integer (REVISION) • Use prime factorisation to find the HCF or LCM of two numbers (REVISION) • Solve problems involving HCF and LCM, identifying which is appropriate to the context	Use the four operations applied to integers, decimals, proper and improper fractions, and mixed numbers, all both positive and negative Use a calculator and other technologies to calculate results accurately and then interpret them appropriately Use the concepts and vocabulary of prime numbers, factors, multiples, common factors, common multiples, highest common factor, and lowest common multiple Use prime factorisation, including using product notation and the unique factorisation property
Mathematics – Unit 2 – Algebra 1	
Knowledge and Skills – Students will be taught to…	Links to KS3 National Curriculum Content (green) and KS4 Content (red)
• Substitute into expressions with more complex algebraic notation, including: a² b in place of a × a × b, coefficients written as fractions rather than as decimals (REVISION) • Substitute positive and negative numbers into formulae, including scientific formulae • Recognise equivalent terms such as a^2b and ba^2, understanding the convention to list unknowns in alphabetical order • Simplify an expression involving terms with mixed variables e.g. $3a^2b + 4ab^2 + 2a^2 - a^2b$ • Understand the meaning of a negative index, and evaluate in simple cases e.g. 3^{-2} • Manipulate algebraic expressions involving powers of -1 and other negative powers • Simplify numerical and algebraic expressions using the law of indices for multiplication, division and power 0 (REVISION) • Apply the index law for powers of powers (brackets)	Substitute numerical values into expressions and formulae, including scientific formulae Use and interpret algebraic notation, including ab, 3y, a^2, a^3, a^2b, a/b, brackets Understand and use the concepts and vocabulary of expressions, terms and equations Write coefficients as fractions rather than as decimals Simplify and manipulate algebraic expressions by collecting like terms Simplify expressions involving sums, products and powers, including the laws of indices
Mathematics – Unit 3 – Probability	
Knowledge and Skills – Students will be taught to…	Links to KS3 National Curriculum Content (green) and KS4 Content (red)

• Understand the 0-1 probability scale (REVISION) • Find theoretical probabilities for events with equally likely outcomes (REVISION) • Know the difference between an outcome and an event • Identify all the outcomes for an experiment or situation, and identifying theoretical probabilities, using a list (REVISION) • Identify outcomes and probabilities using a sample space diagram (including for sums, products and differences) (REVISION) • Use the fact that the sum of probabilities of all outcomes is 1 to simple algebraic problems presented in a table • Identify the relative frequency of an event from experimental data • Understand that increasing the number of trials leads to outcomes that are closer to theoretical probability, and that repeating an experiment may change the outcome • Use theoretical and experimental probability to calculate expected outcomes	Understand that the probabilities of all possible outcomes sum to 1 Generate theoretical sample spaces for single and combined events with equally likely, mutually exclusive outcomes and use these to calculate theoretical probabilities 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 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
Mathematics – Unit 4 – Kinematics	
Knowledge and Skills – Students will be taught to…	**Links to KS3 National Curriculum Content (green) and KS4 Content (red)**
• Solve simple problems involving speed, including finding an average speed • Plot and interpret piecewise-linear distance-time graphs • Interpret the gradient of a distance-time graph as speed • Interpret piecewise-linear speed-time graphs in simple cases • Interpret the gradient of a speed-time graph as acceleration • Substitute into the kinematics formulae $v = u + at$, $s = ut + \frac{1}{2}at^2$, $v^2 = u^2 + 2as$	Use compound units such as speed, unit pricing and density to solve problems Substitute numerical values into formulae, including scientific formulae Find approximate solutions to contextual problems from given graphs of a variety of functions, including piece-wise linear graphs Interpret the gradient of a straight line graph as a rate of change Plot and interpret graphs in real contexts, to find approximate solutions to problems such as simple kinematic problems involving distance, speed and acceleration
Mathematics – Unit 5 – Fractions, Decimals & Percentages	
Knowledge and Skills – Students will be taught to…	**Links to KS3 National Curriculum Content (green) and KS4 Content (red)**

• Know the correct notation for recurring decimals (REVISION) • Divide an integer/decimal by an integer where the result is a recurring decimal • Divide an integer/decimal by a decimal by transforming to division by an integer • Convert fluently between fractions, terminating and recurring decimals, and percentages (REVISION) • Continue to write fractions with a horizontal (not slanted) line • Perform calculations involving a mixture of decimals and fractions, choosing an appropriate conversion strategy e.g. $0.42 + \frac{3}{5}$ or $4\frac{2}{3} - 0.7$ • Order combinations of fractions, decimals and percentages (REVISION) • Simplify a fraction involving an unknown or π e.g. $\frac{35\pi}{15}$ or $\frac{15x+10}{5}$ • Use a scientific calculator with fractions, both positive and negative • Use a calculator to change any fraction to a decimal	Work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and 7/2 or 0.375 and 3/8) Use the four operations applied to proper and improper fractions, and mixed numbers, all both positive and negative Use a calculator and other technologies to calculate results accurately and then interpret them appropriately Change fractions into their corresponding recurring decimals Calculate exactly with fractions
Mathematics – Unit 6 – Angles & Construction	
Knowledge and Skills – Students will be taught to…	Links to KS3 National Curriculum Content (green) and KS4 Content (red)
• Identify and use alternate angles, corresponding angles, and co-interior angles near parallel lines (REVISION) • Solve increasingly complex angle problems using a mixture of rules met previously, including base angles in an isosceles triangle • Use a map scale to convert between map distances and real-life distances, both ways • Understand the purpose of bearings and how they are measured • Identify a bearing and distance on a map, using the map scale • Construct a point on a map given a bearing, distance and the map scale • Work out a 'back bearing' (the bearing of the return journey) • Solve problems involving interior and exterior angles in polygons (REVISION) • Construct an angle bisector • Construct the perpendicular bisector of a line segment	Apply the properties of angles at a point, angles at a point on a straight line, vertically opposite angles Understand and use the relationship between parallel lines and alternate and corresponding angles Draw and measure angles in geometric figures, including interpreting scale drawings Derive and use the sum of angles in a triangle and use it to deduce the angle sum in any polygon, and to derive properties of regular polygons Use scale factors, scale diagrams and maps Interpret scale drawings Draw and measure angles in geometric figures, including interpreting scale drawings Derive and use the standard ruler and compass constructions (perpendicular bisector of a line segment, bisecting a given angle) Interpret and use bearings
Mathematics – Unit 7 – Graphs	

Knowledge and Skills – Students will be taught to…	Links to KS3 National Curriculum Content (green) and KS4 Content (red)
• Recognise a linear graph from a range of equation forms, including $y = mx + c$, $x + y = c$ and $ax + by = c$ (REVISION) • Plot line graphs of the forms $y = mx + c$ and $ax + by = c$ • Know what can be deduced from a line equation of the form $y = mx + c$ • Use line equations of the form $y = mx + c$ to identify parallel lines • Use a line equation to decide whether a given point would lie on the line • Identify the gradient, y-intercept and equation of a straight line from a graph [*simple gradient from a unit grid was covered in Y8*] • Sketch line graphs of the forms $y = mx + c$ and $ax + by = c$ • Plot graphs of simple quadratic functions of the form $y = x^2 + c$ • Identify values of y for given values of x, and vice versa	Recognise, sketch and produce graphs of linear functions of one variable with appropriate scaling, using equations in x and y and the Cartesian plane Interpret mathematical relationships both algebraically and graphically Calculate and interpret gradients and intercepts of graphs of linear equations numerically, graphically and algebraically Use linear graphs to estimate values of y for given values of x and vice versa Use the form y=mx+c to identify parallel lines
Mathematics – Unit 8 – Representing Data	
Knowledge and Skills – Students will be taught to…	Links to KS3 National Curriculum Content (green) and KS4 Content (red)
• Use charts to identify probabilities • Construct pie charts by calculating angles, including with 'awkward' totals (REVISION) • Construct a pie chart using information from a different type of chart/diagram • Recognise what can and cannot be deduced from a comparison of two pie charts • Construct a frequency polygon for grouped data • Construct/interpret stem and leaf diagrams • Identify the mode, median and range from a stem and leaf diagram	Construct and interpret appropriate tables, charts, and diagrams, including frequency tables, bar charts, pie charts, and pictograms for categorical data Describe, interpret and compare observed distributions of a single variable through appropriate graphical representation involving discrete, continuous and grouped data Describe, interpret and compare observed distributions of a single variable through appropriate measures of central tendency (mean, mode, median) and spread (range, consideration of outliers) Interpret, analyse and compare the distributions of data sets from univariate empirical distributions through appropriate graphical representation involving discrete, continuous and grouped data, and through appropriate measures of central tendency (including modal class) and spread (the range)
Mathematics – Unit 9 – Increase & Decrease	
Knowledge and Skills – Students will be taught to…	Links to KS3 National Curriculum Content (green) and KS4 Content (red)

• Find the final value in a problem involving percentage increase, decrease, profit or loss (REVISION) • Find the percentage of an increase, decrease, profit or loss (REVISION) • Find the percentage of an increase or decrease by a percentage greater than 100% • Use a calculator to increase an amount by a percentage greater than 100% • Use a calculator to increase or decrease an amount by a non-integer percentage • Solve financial problems, including simple interest • Solve original value problems when working with percentages • Calculate fractions of amounts for fractions greater than 1 • Increase or decrease a quantity by a fraction	Interpret percentages as operators Work with percentages greater than 100% Interpret percentages and percentage changes as a fraction or a decimal, interpret these multiplicatively Compare two quantities using percentages Set up, solve and interpret the answers in growth and decay problems
Mathematics – Unit 10 – Algebra 2	
Knowledge and Skills – Students will be taught to…	**Links to KS3 National Curriculum Content (green) and KS4 Content (red)**
• Expand a single bracket, and multiple single brackets, including terms involving indices (REVISION) • Factorise an algebraic expression by taking out more complex common factors e.g. $3x$, $4x^2$, a^2b • Apply expanding brackets and factorising to simple algebraic contexts e.g. area of a rectangle • Change the subject of a one-step formula • Understand the meaning of 'subject' and 'in terms of'	Simplify and manipulate algebraic expressions by multiplying a single term over a bracket Simplify and manipulate algebraic expressions by taking out common factors Rearrange formulae to change the subject
Mathematics – Unit 11 – Solids	
Knowledge and Skills – Students will be taught to…	**Links to KS3 National Curriculum Content (green) and KS4 Content (red)**
• Recognise and describe the properties of a cube, cuboid, prism, cylinder, pyramid, cone and sphere • Calculate the volume of a cube or cuboid • Calculate the volume of a right prism • Know/use the link between volume and capacity • Calculate the volume of a right prism • Compare lengths, areas and volumes using ratio notation • Convert between units of area and units of volume • Construct a solid from its plan & elevations	Derive and apply formulae to calculate and solve problems involving the perimeter and area of triangles, parallelograms, and trapezia Derive and apply formulae to calculate and solve problems involving the volume of cuboids (including cubes) and other prisms Use the properties of faces, surfaces, edges and vertices of cubes, cuboids, prisms, and cylinders to solve problems in 3D Construct and interpret plans and elevations of 3D shapes

• Draw a solid on isometric paper, given its plan and elevations • Draw the plan and elevations of a given solid • Calculate the surface area of a cube, cuboid • Calculate the surface area of a right prism	
Mathematics – Unit 12 – Proportion	
Knowledge and Skills – Students will be taught to…	Links to KS3 National Curriculum Content (green) and KS4 Content (red)
• Understand a relationship between two quantities which are in direct proportion • Apply understanding of proportion to simple problems, including recipes (REVISION) • Find a relevant multiplier in a situation involving proportion • Know the features of tables that represent direct proportion • Know the features of graphs that represent direct proportion • Calculate the price per unit e.g. price per pack if 5 packs costs £4 • Identify the best deal, using a calculator, by finding the price per unit • Identify the best deal, without a calculator, by scaling up to a common quantity	Solve problems involving direct proportion, including graphical and algebraic representations Recognise and interpret graphs that illustrate direct proportion Interpret equations that describe direct proportion
Mathematics – Unit 13 – Numbers 2	
Knowledge and Skills – Students will be taught to…	Links to KS3 National Curriculum Content (green) and KS4 Content (red)
• Convert between ordinary numbers and standard form, apply the four operations to numbers given in standard form (REVISION) • Use a calculator to calculate in standard form (REVISION) • Apply standard form to problems in greater context • Apply the order of operations to expressions involving powers and roots • Round to any given number of significant figures • Estimate the answer to a calculation involving powers or roots, using the symbol ≈	Interpret and compare numbers in standard form A x 10^n $1 \leq A < 10$, where n is a positive or negative integer or zero Use conventional notation for the priority of operations, including brackets, powers and roots Use approximation through rounding to estimate answers Round numbers and measures to an appropriate degree of accuracy e.g. to a number of decimal places or significant figures Calculate with numbers in standard form
Mathematics – Unit 14 – Equations	
Knowledge and Skills – Students will be taught to…	Links to KS3 National Curriculum Content (green) and KS4 Content (red)
• Solve linear equations where the unknown term is positive (REVISION) • Solve a linear equation where the unknown term is negative e.g. $53 - 2x = 37$	Recognise and use relationships between operations including inverse operations Use algebraic methods to solve linear equations in one variable Interpret mathematical relationships both algebraically and graphically

• Solve a linear equation with the unknown on both sides (when the solution is an integer, fraction or negative, including when the equation involves brackets) • Form and solve linear equations of the types listed above to solve problems • e.g. perimeter, area, angles • Recognise that the point of intersection of two graphs corresponds to the solution of a connected equation	Use algebraic methods to solve linear equations in one variable (including all forms that require rearrangement) Use linear graphs to estimate values of y for given values of x and vice versa
Mathematics – Unit 15 – Sequences	
Knowledge and Skills – Students will be taught to…	Links to KS3 National Curriculum Content (green) and KS4 Content (red)
• Generate terms of a sequence from a position-to-term rule (REVISION) • Recognise the sequences of square and triangular numbers (REVISION) • Recognise the sequence of cube numbers • Find the nth term of an ascending linear sequence • Find the nth term of a descending linear sequence • Use the nth term of a sequence to decide whether a given number is in a sequence and to find a later term	Generate terms of a sequence from either a term-to-term or a position-to-term rule Recognise arithmetic sequences Recognise geometric sequences and appreciate other sequences that arise Find the nth term of an arithmetic sequence Deduce expressions to calculate the nth term of linear sequences Recognise and use the sequences of triangular and square numbers, and simple arithmetic progressions
Mathematics – Unit 16 – Circles	
Knowledge and Skills – Students will be taught to…	Links to KS3 National Curriculum Content (green) and KS4 Content (red)
• Know circle parts, including chord, tangent, arc, sector, segment • Calculate the circumference of a circle, given the radius or diameter, including in terms of π (REVISION) • Give answers to 'an appropriate degree of accuracy' • Calculate the perimeter of composite shapes that include sections of a circle, including in terms of π • Calculate the area of a circle, given radius or diameter (REVISION) • Calculate the area of more complex composite shapes that include sections of a circle, including in terms of π	Derive and illustrate properties of triangles, quadrilaterals, circles, and other plane figures (e.g. equal lengths and angles) using appropriate language and technologies Calculate and solve problems involving: perimeters of 2-D shapes (including circles), areas of circles and composite shapes Identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector, segment Calculate exactly with multiples of π
Mathematics – Unit 17 – Inequalities	
Knowledge and Skills – Students will be taught to…	Links to KS3 National Curriculum Content (green) and KS4 Content (red)

• Represent an inequality on a number line • Identify the inequality represented on a given number line • Solve 2-step linear inequalities (REVISION) • Find the set of integers that are solutions to an inequality, including using set notation. • Solve a simple 3-part inequality with positive x term e.g. $10 < 3x + 9 < 40$	Use the symbols =, ≠, <, >, ≤, ≥ Solve linear inequalities in one variable, representing the solution set on a number line
Mathematics – Unit 18 – Ratio	
Knowledge and Skills – Students will be taught to…	Links to KS3 National Curriculum Content (green) and KS4 Content (red)
• Solve problems involving division in a ratio with two or more parts (REVISION) • Use a ratio and one part to find another part, or the whole • Understand and use the connections between ratios and fractions • Solve simple ratio problems involving comparison, mixing or concentrations • Write ratios in the form 1:n and use this for comparison • Solve simple problems involving combined ratios	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 Relate the language of ratios and the associated calculations to the arithmetic of fractions Identify and work with fractions in ratio problems
Mathematics – Unit 19 – Transformation	
Knowledge and Skills – Students will be taught to…	Links to KS3 National Curriculum Content (green) and KS4 Content (red)
• Identify the order of rotational symmetry of a shape • Rotate a shape through 90° or 180° on co-ordinate axes • Translate a shape using a vector • Enlarge a shape on co-ordinate axes using a positive integer scale factor and centre of enlargement • Fully describe a given enlargement where the scale factor is a positive integer	Use the standard conventions for labelling the sides and angles of triangle ABC Identify properties of, and describe the results of, translations, rotations and reflections applied to given figures
Mathematics – Unit 20 – Interpreting Data	
Knowledge and Skills – Students will be taught to…	Links to KS3 National Curriculum Content (green) and KS4 Content (red)
• Create a table and use it to group data, by tallying • Estimate the mean of grouped data (REVISION) • Find the modal class of a set of grouped data (REVISION) • Estimate the range from a grouped frequency table • Find the class containing the median from a set of grouped data • Increasingly interpret statistics in context • Understand the concepts and uses of measures of average and spread	Describe, interpret and compare observed distributions of a single variable through appropriate measures of central tendency (mean, mode, median) and spread (range, consideration of outliers) Construct and interpret appropriate tables, charts, and diagrams for grouped numerical data

• Choose appropriate statistics to describe a set of data • Compare data given in more than one form	Interpret, analyse and compare the distributions of data sets from univariate empirical distributions through appropriate measures of central tendency (including modal class) and spread (the range) Apply statistics to describe a population Infer properties of populations or distributions from a sample, whilst knowing the limitations of sampling