Subject: Mathematics
Year 9 Overview – Omega

ST. MARY MAGDALENE C OF E SCHOOL
PENINSULA CAMPUS
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Key content – knowledge and skills	National Curriculum focus
All include the national curriculum reference – full outline in the national curriculum focus. **Autumn 1: Unit 1:** Number. **[N2 – N9, N14 & N15]** **Autumn 2: Unit 2:** Algebra. **[A2 – A7, A17 & A21 – A24]** **Spring 1: Unit 3 & 4:** Interpreting and representing data & Fractions, ratio and percentages. **[S1 – S5 & N2, N3, N8, N10 – N13 & R3 – R10]** **Spring 2: Unit 5:** Angles and trigonometry. **[N7, N8, N15 & G1-G4, G6, G20, G21]** **Summer 1: Unit 6 & 7:** Graphs & Area and Volume. **[A8 – A17 & G11 & R8, R10, R11 & N13 – N16, G1, G9, G14 & G16-G18]** **Summer 2: Unit 8:** Transformations and constructions. **[R2, R6 & G1, G2, G7, G8, G12, G13, G15 & G24]**	Subject content from the National Curriculum Framework Document: Pupils will be taught: - N2: To apply the four operations, including formal written methods, to integers, decimals and simple fractions (proper and improper), and mixed numbers – all both positive and negative; understand and use place value (e.g. when working with very large or very small numbers, and when calculating with decimals). - N3: To 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. - N4: To use the concepts and vocabulary of prime numbers, factors (divisors), multiples, common factors, common multiples, highest common factor, lowest common multiple, prime factorisation, including using product notation and the unique factorisation theorem. - N5: To apply systematic listing strategies, including use of the product rule for counting (i.e. if there are m ways of doing one task and for each of these, there are n ways of doing another task, then the total number of ways the two tasks can be done is m × n ways). - N6: To use positive integer powers and associated real roots (square, cube and higher), recognise powers of 2, 3, 4, 5; estimate powers and roots of any given positive number. - N7: To calculate with roots, and with integer and fractional indices

	- N8: To calculate exactly with fractions, surds and multiples of π; simplify surd expressions involving squares (e.g. $\sqrt{12} = \sqrt{(4 \times 3)} = \sqrt{4} \times \sqrt{3} = 2\sqrt{3}$) and rationalise denominators. - N9: To calculate with and interpret standard form $A \times 10^n$, where $1 \leq A < 10$ and n is an integer. - N14: To estimate answers; check calculations using approximation and estimation, including answers obtained using technology. - N15: To round numbers and measures to an appropriate degree of accuracy (e.g. to a specified number of decimal places or significant figures); use inequality notation to specify simple error intervals due to truncation or rounding. - A2: To substitute numerical values into formulae and expressions, including scientific formulae. - A3: To understand and use the concepts and vocabulary of expressions, equations, formulae, identities, inequalities, terms and factors. - A4: To simplify and manipulate algebraic expressions (including those involving surds and algebraic fractions) by: ● collecting like terms ● multiplying a single term over a bracket ● taking out common factors ● expanding products of two or more binomials ● factorising quadratic expressions of the form $x^2 + bx + c$, including the difference of two squares; factorising quadratic expressions of the form $ax^2 + bx + c$ ● simplifying expressions involving sums, products and powers, including the laws of indices - A5: To understand and use standard mathematical formulae; rearrange formulae to change the subject. - A6: To 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 and proofs. - A7: Where appropriate, interpret simple expressions as functions with inputs and outputs; ; interpret the reverse process as the 'inverse function'; interpret the succession of two functions as a 'composite function' (the use of formal function notation is expected). - A14: To plot and interpret graphs (including reciprocal graphs and exponential graphs) and graphs of non-standard functions in real contexts. - A21: To 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. - A22: To solve linear inequalities in one or two variable(s), and quadratic inequalities in one variable; represent the solution set on a number line, using set notation and on a graph. - A23: To generate terms of a sequence from either a term-to-term or a position-to-term rule. - A24: To 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 rational number > 0 or a surd) and other sequences. - S1: To infer properties of populations or distributions from a sample, while knowing the limitations of sampling. - S2: To 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. - S3: To construct and interpret diagrams for grouped discrete data and continuous data, i.e. histograms with equal and unequal class intervals and cumulative frequency graphs, and know their appropriate use. - S4: To interpret, analyse and compare the distributions of data sets from univariate empirical distributions through: ● appropriate graphical representation involving discrete, continuous and grouped data, including box plots ● appropriate measures of central tendency (median, mean, mode and modal class) and spread (range, including consideration of outliers, quartiles and inter-quartile range). - S5: To apply statistics to describe a population. - N10: To work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and 7/2 or 0.375 or 3/8); change recurring decimals into their corresponding fractions and vice versa. - N11: To identify and work with fractions in ratio problems. - N14: To interpret fractions and percentages as operators. - N15: To use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where appropriate. - R3: To express one quantity as a fraction of another, where the fraction is less than 1 or greater than 1. - R4: To use ratio notation, including reduction to simplest form. - R5: To 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; apply ratio to real contexts and problems (such as

	those involving conversion, comparison, scaling, mixing, concentrations). - R6: To express a multiplicative relationship between two quantities as a ratio or a fraction. - R7: To understand and use proportion as equality of ratios. - R8: To relate ratios to fractions and to linear functions. - R9: To define percentage as `number of parts per hundred¿; interpret percentages and percentage changes as a fraction or a decimal, and interpret these multiplicatively; express one quantity as a percentage of another; compare two quantities using percentages; work with percentages greater than 100%; solve problems involving percentage change, including percentage increase/decrease and original value problems, and simple interest including in financial mathematics. - R10: To solve problems involving direct and inverse proportion, including graphical and algebraic representations. - G1: To use conventional terms and notation: points, lines, vertices, edges, planes, parallel lines, perpendicular lines, right angles, polygons, regular polygons and polygons with reflection and/or rotation symmetries; use the standard conventions for labelling and referring to the sides and angles of triangles; draw diagrams from written description. - G3: To 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). - G4: To derive and apply the properties and definitions of special types of quadrilaterals, including

	square, rectangle, parallelogram, trapezium, kite and rhombus; and triangles and other plane figures using appropriate language. - G6: To apply angle facts, triangle congruence, similarity and properties of quadrilaterals to conjecture and derive results about angles and sides, including Pythagoras' theorem and the fact that the base angles of an isosceles triangle are equal, and use known results to obtain simple proofs. - G20: To know the formulae for: Pythagoras' theorem $a^2 + b^2 = c^2$, and the trigonometric ratios, $\sin\theta$ = opposite/hypotenuse, $\cos\theta$ = adjacent/hypotenuse and $\tan\theta$ = opposite/adjacent apply them to find angles and lengths in right-angled triangles and, where possible, general triangles in two and three dimensional figures. - G21: To know the exact values of $\sin\theta$ and $\cos\theta$ for $\theta = 0°, 30°, 45°, 60°$ and $90°$; know the exact value of $\tan\theta$ for $\theta = 0°, 30°, 45°$ and $60°$. - A8: To work with coordinates in all four quadrants. - A9: To plot graphs of equations that correspond to straight-line graphs in the coordinate plane; use the form $y = mx + c$ to identify parallel and perpendicular lines; find the equation of the line through two given points or through one point with a given gradient. - A10: To identify and interpret gradients and intercepts of linear functions graphically and algebraically. - A11: To identify and interpret roots, intercepts, turning points of quadratic functions graphically; deduce roots algebraically and turning points by completing the square. - A12: To recognise, sketch and interpret graphs of linear functions, quadratic functions, simple cubic functions, the reciprocal function $y = 1/x$ with $x \neq 0$, exponential

	functions $y = k^x$ for positive values of k, and the trigonometric functions (with arguments in degrees) y = sin x, y = cos x and y = tan x for angles of any size. - A13: To sketch translations and reflections of a given function. - A14: To plot and interpret graphs (including reciprocal graphs and exponential 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. - A15: To calculate or estimate gradients of graphs and areas under graphs (including quadratic and other non-linear graphs), and interpret results in cases such as distance-time graphs, velocity-time graphs and graphs in financial contexts (this does not include calculus). - A16: to recognise and use the equation of a circle with centre at the origin; find the equation of a tangent to a circle at a given point. - A17: To solve linear equations in one unknown algebraically (including those with the unknown on both sides of the equation); find approximate solutions using a graph. - G11: To solve geometrical problems on coordinate axes. - R8: To relate ratios to fractions and to linear functions. - R10: To solve problems involving direct and inverse proportion, including graphical and algebraic representations. - R11: To use compound units such as speed, rates of pay, unit pricing, density and pressure. - N16: To apply and interpret limits of accuracy, including upper and lower bounds. - G9: To identify and apply circle definitions and properties, including: centre, radius, chord,

	diameter, circumference, tangent, arc, sector and segment. - G14: To use standard units of measure and related concepts (length, area, volume/capacity, mass, time, money, etc.). - G16: To know and apply formulae to calculate: area of triangles, parallelograms, trapezia; volume of cuboids and other right prisms (including cylinders). - G17: To know the formulae: circumference of a circle = $2\pi r$ = πd, area of a circle = πr^2; calculate: perimeters of 2D shapes, including circles; areas of circles and composite shapes; surface area and volume of spheres, pyramids, cones and composite solids. - G18: To calculate arc lengths, angles and areas of sectors of circles. - R2: To use scale factors, scale diagrams and maps. - G2: To use the standard ruler and compass constructions (perpendicular bisector of a line segment, constructing a perpendicular to a given line from/at a given point, bisecting a given angle); use these to construct given figures and solve loci problems; know that the perpendicular distance from a point to a line is the shortest distance to the line. - G7: To identify, describe and construct congruent and similar shapes, including on coordinate axes, by considering rotation, reflection, translation and enlargement (including fractional and negative scale factors). - G8: To describe the changes and invariance achieved by combinations of rotations, reflections and translations. - G12: To identify properties of the faces, surfaces, edges and vertices of: cubes, cuboids, prisms, cylinders, pyramids, cones and spheres.

	- G13: To construct and interpret plans and elevations of 3D shapes. - G15: To measure line segments and angles in geometric figures, including interpreting maps and scale drawings and use of bearings. - G24: To describe translations as 2D vectors.

Key assessment points

Omega students will begin a three-year mastery GCSE course – based upon the higher scheme of learning outlined by Pearson education.

Summative assessment will take place each half term, with the end of term summative assessment incorporating all that has been taught that term. Formative assessments to be carried out throughout the academic year. All end of topic tests will be synoptic, including questions on all content covered up to that point. Assessment will focus on understanding of the content above – each assessment will cover progress steps as outlined by Pearson education of which can be directly translated to the 9-1 scale.

Christian ethos

A Christian ethos will be promoted in Maths lessons by encouraging a sense of wonder in the natural world and a respect for all of God's creation. Students will treat each other with mutual respect and learn to work together through group and practical activities, and consider Christian views on ethical issues discussed. The incorporation of real-life skills and a large emphasis on problem solving will also encourage a wider scope on the natural world and further develop students sense of wonder.

British values

- **Individual liberty** in the sense of being able to develop and express one's own views, **tolerance** and **mutual respect** for one another's views is taught through the topics in which different views and/or ethics are involved. Through students
- **The rule of law** is addressed in units of work covering the need to have speed limits, through students understanding the need for following classroom rules**.**
- **Democracy** is taught through student debates when reasoning mathematically and explaining proofs.
- Group activities in Maths require students to engage in **team work** and show **mutual respect** for each other.