Subject: Mathematics
Year 9 Overview – Gamma

ST. MARY MAGDALENE C OF E SCHOOL
PENINSULA CAMPUS
Excellence through innovation, founded in faith since 1840.

Key content – knowledge and skills	National Curriculum focus
Autumn 1: Indices and standard form, expressions and formulae Indices, calculations and estimates, more indices, standard form, substituting into expressions, writing expressions and formulae, using formulae, rules of indices and brackets, expanding double brackets. **Autumn 2: Dealing with data and multiplicative reasoning** Planning a survey, collecting data, calculating averages, display and analyse data, writing a report, Enlargement, negative and fractional scale factors, percentage change, rates of change, problem solving. **Spring 1: Constructions and Equations, inequalities and proportionality** Using scales, basic constructions, constructing triangles, loci, solving equations, using equations, trial and improvement, using and solving inequalities, proportion, simultaneous equations. **Spring 2: Circles, Pythagoras and prisms** Circumference of a circle, area of a circle, Pythagoras's theorem, prisms and cylinders, Errors and bounds. **Summer 1: Sequences and graphs, Probability** Nth term of a arithmetic sequence, non-linear sequences, graphing rates of change, using y=mx+c, more straight-line graphs, more simultaneous equations, graphs of quadratic functions, non-linear graphs. **Summer 2: Comparing shapes and Unit 1 of Year 10 SOL.**	Subject content from the National Curriculum Framework Document September 2015: Pupils will be taught: • To distinguish between exact representations of roots and their decimal approximations. • To interpret numbers in standard form $A \times 10n$ $1 \leq A < 10$, where n is a positive or negative integer or zero. • To compare numbers in standard form $A \times 10n$ $1 \leq A < 10$, where n is a positive or negative integer or zero. • To use and interpret algebraic notation: a^2b in place of $a \times a \times b$. • To use and interpret algebraic notation: b/a in place of $a \div b$. • To simplify and manipulate algebraic expressions to maintain equivalence: expanding products of two or more binomials. • To understand and use standard mathematical formulae. • To rearrange formulae to change the subject. • To describe, interpret and compare observed distributions of a single variable through: appropriate graphical representation involving discrete data. • To describe, interpret and compare observed distributions of a single variable through: appropriate graphical representation involving continuous and grouped data.

Congruent and similar shapes, ratios in triangles, the tangent ratio, the sine ratio, the cosine ratio.	• To describe, interpret and compare observed distributions of a single variable through: appropriate measures of central tendency (mean, mode, median). • To describe, interpret and compare observed distributions of a single variable through: appropriate measures of spread (range, consideration of outliers) • To construct and interpret frequency tables. • To Illustrate simple mathematical relationships between two variables (bivariate data) using scatter graphs. • To use compound units such as speed, unit pricing and density to solve problems. • To work with percentages greater than 100%. • To construct similar shapes by enlargement without coordinate grids. • To construct similar shapes by enlargement coordinate grids. • To interpret mathematical relationships both algebraically and geometrically. • To use scale diagrams. • To use maps. • To derive and use the standard ruler and compass constructions: perpendicular bisector of a line segment. • To derive and use the standard ruler and compass constructions: constructing a perpendicular to a given line from/at a given point. • To derive and use the standard ruler and compass constructions: bisecting a given angle. • To recognise and use the perpendicular distance from a point to a line as the shortest distance to the line.

	• To describe, sketch and draw using conventional terms and notations: points, lines, parallel lines, perpendicular lines, right angles, regular polygons, and other polygons that are reflectively and rotationally symmetric. • To use the properties of faces, surfaces, edges and vertices of cubes, cuboids, prisms, cylinders and pyramids to solve problems in 3-D. • To use the properties of surfaces of cones and spheres to solve problems in 3-D. • To use and interpret algebraic notation: coefficients written as fractions rather than as decimals. • To use and interpret algebraic notation: brackets. • To substitute numerical values into formulae and expressions, including scientific formulae. • To understand and use the concepts and vocabulary of expressions, equations, inequalities, terms and factors. • To simplify and manipulate algebraic expressions to maintain equivalence: collecting like terms. • To simplify and manipulate algebraic expressions to maintain equivalence: multiplying a single term over a bracket. • To simplify and manipulate algebraic expressions to maintain equivalence: taking out common factors. • To simplify and manipulate algebraic expressions to maintain equivalence: expanding products of two or more binomials. • To calculate possible errors resulting from estimating,

	expressed using inequality notation $a < x \leq b$ • To calculate and solve problems involving perimeters of circles. • To calculate and solve problems involving areas of circles. • To use Pythagoras' Theorem to solve problems involving right-angled triangles. • To model situations or procedures by using graphs • To recognise, sketch and produce graphs of quadratic functions of one variable with appropriate scaling, using equations in x and y and the Cartesian plane. • To reduce a given linear equation in two variables to the standard form $y = mx + c$. • To calculate and interpret gradients and intercepts of graphs of such linear equations numerically. • To calculate and interpret gradients and intercepts of graphs of such linear equations graphically. • To calculate and interpret gradients and intercepts of graphs of such linear equations algebraically. • To use linear graphs to estimate values of y for given values of x and vice versa and to find approximate solutions of simultaneous linear equations. • To use quadratic graphs to estimate values of y for given values of x and vice versa and to find approximate solutions of simultaneous linear equations. • To find approximate solutions to contextual problems from given graphs of a variety of functions: including piece-wise linear graphs.

	• To find approximate solutions to contextual problems from given graphs of a variety of functions: exponential graphs. • To find approximate solutions to contextual problems from given graphs of a variety of functions: reciprocal graphs. • To solve problems involving inverse proportion. • To enumerate sets and unions / intersections of sets systematically, using tables and grids. • To enumerate sets and unions / intersections of sets systematically, using Venn diagrams. • To generate theoretical sample spaces for single and combined events with equally likely and mutually exclusive outcomes. • To use sample spaces for single and combined events to calculate theoretical probabilities. • To describe simple mathematical relationships between two variables (bivariate data) in observational and experimental contexts. • To know and use the criteria for congruence of triangles. • To derive and illustrate properties of triangles, quadrilaterals, circles, and other plane figures [for example, equal lengths and angles] using appropriate language and technologies. • To identify and construct congruent triangles. • To use trigonometric ratios in similar triangles to solve problems involving right-angled triangles.
Key assessment points	

Summative assessment will take place each half term, with spelling tests for each unit being completed on SMH formative assessments to be carried out throughout the academic year. 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 will also encourage a wider scope on the natural world and further develop students sense of wonder, mainly focused around a firm financial understanding of money, saving and its impact on the day to day.

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.