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| **Our Lady Queen of Peace**  Catholic Engineering College | Curriculum Overview |
| Year 10 Higher Mathematics | |

|  | **Knowledge & Understanding** | | | **Subject Specific Literacy Development** | **Cultural Capital / Enrichment Opportunities** |
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|  | **Composites**  **(Bigger Picture)** | **Components**  **(Key Concepts)** | **Recall & Retrieval Practice Focus** | **Key Vocabulary** |
| **Half Term 1** | Basic and Real-Life Graphs | Draw and interpret straight-line graphs  Draw distance–time and velocity–time graphs  Use graphs to calculate various measures  Find the coordinates of the midpoint of a line segment with a diagram given and coordinates  Calculate the length of a line segment given the end points . | Key skills from Y9 HT6  Class specific based on Y9 AC3 QLA | Midpoint –  Quadrant –  Line Segment – |  |
| Linear Graphs and Coordinate Geometry | Plot and draw graphs of y = a, x = a, y = x and y = –x  Identify and interpret the gradient of a line segment  Recognise that equations of the form y = mx + c correspond to straight-line graphs  Identify & interpret the gradient and y-intercept of a linear graph  Find the equation of a straight line from a graph in the form y = mx + c  Plot, draw accurately & sketch graphs of straight lines  Find the equation of the line : one point and a given gradient  Identify and interpret gradient from an equation ax + by = c  Find the equation of a straight line from a graph and plot/draw graphs in the form ax + by = c  Generate equations of lines parallel and perpendicular to the given line  Use the fact that when y = mx + c is the equation of a straight line, then the gradient of a line parallel to it will have a gradient of m and a line perpendicular to this line will have a gradient of | Parallel –  Gradient –  y-intercept –  Perpendicular – |
| Quadratic, Cubic and Other Graphs | Recognise a linear, quadratic, cubic, reciprocal & circle graphs  Generate points and plot graphs of quadratic functions  Find approximate solutions of a quadratic equation from the graph of the corresponding quadratic function  Draw graphs of simple cubic functions using tables of values  Draw graphs of the reciprocal function  Draw circles that are centred around the origin | Quadratic –  Linear –  Cubic – |
| Transformation | Perform and describe rotations  Identify the equation of a line of symmetry  Describe and perform reflections on a coordinate grid  Perform and describe translations using column vectors  Describe and transform 2D shapes using enlargements by a positive integer, positive fractional, and negative scale factor;  Describe and transform 2D shapes using combined rotations, reflections, translations, or enlargements  Describe the changes and invariance achieved by combinations of rotations, reflections and translations | Rotations –  Translations –  Enlargements – |
| **Half Term 2** | 3D Forms and Volume inc. Cylinders, Cones and Spheres | Find the surface area of prisms  Convert between metric volume measures and capacity  Use volume to solve problems  Find the volume and surface area of a cylinder  Use the formula for surface area and volume of a pyramid  Use the formulae for volume and surface area of spheres and cones  Solve problems involving more complex shapes and solids, including segments of circles and frustums of cones  Find the surface area and volumes of compound solids constructed from cubes, cuboids, cones, pyramids, spheres, hemispheres, cylinders  Give answers to an appropriate degree of accuracy or in terms of π  Form equations involving more complex shapes and solve these equations. |  | Surface Area –  Frustums –  Prism – |  |
| Similarity and Congruence | Understand and use SSS, SAS, ASA and RHS conditions to prove the congruence of triangles  Understand similarity of triangles  Prove that two shapes are similar by giving the scale factor  Understand the effect of enlargement on angles, perimeter, area and volume of shapes and solids  Identify the scale factor of an enlargement of a similar shape as the ratio of the lengths of two corresponding sides, using integer or fraction scale factors  Write the lengths, areas and volumes of two shapes as ratios in their simplest form  Find missing lengths, areas and volumes in similar 3D solids  Know the relationships between linear, area and volume scale factors of mathematically similar shapes and solids  Solve problems involving frustums of cones where you have to find missing lengths first using similar triangles | Congruence –  Similarity –  Scale Factor – |
| Accuracy and Bounds | Calculate the upper and lowers bounds of numbers given to varying degrees of accuracy  Calculate the upper and lower bounds of an expression involving the four operations  Find the upper and lower bounds in real-life situations using measurements and perimeters, areas, and volumes of 2D and 3D shapes given to appropriate degrees of accuracy  Use inequality notation to specify an error interval due to truncation or rounding. | Bound  Error interval |
| **Half Term 3** | Compound Measures and Multiplicative Reasoning | Understand and use compound measures and  convert between metric speed measures, density measures and pressure measures;  Use kinematics formulae from the formulae sheet to calculate speed, acceleration, etc  Express a multiplicative relationship between two quantities as a ratio or a fraction  Solve proportion problems using the unitary method  Work out which product offers best value and consider rates of pay  Work out the multiplier for repeated proportional change as a single decimal number  Solve problems involving compound interest and depreciation; | Key skills from HT1 & 2  Class specific based on QLA | Best Value –  Multiplier –  Density –  Pressure – |  |
| Solving Quadratic Equations | Factorise quadratic expressions in the form ax2 + bx + c  Solve quadratic equations by factorisation and completing the square  Solve quadratic equations that need rearranging  Set up and solve quadratic equations  Solve quadratic equations by using the quadratic formula | Quadratic –  Factorisation – |
| Simultaneous Equations | Find the exact solutions of two simultaneous equations in two unknowns using elimination or substitution to solve simultaneous equations  Solve exactly, by elimination of an unknown, two simultaneous equations in two unknowns including linear / quadratic and linear / x2 + y2 = r2;  Set up and solve a pair of linear simultaneous equations in two variables, including to represent a situation  Interpret the solution in the context of the problem | Unknowns –  Elimination – |
| **Half Term 4** | Inequalities | Show inequalities on number lines  Write down whole number values that satisfy an inequality  Solve simple linear inequalities in one variable  Solve two linear inequalities in x, find the solution sets and compare them to see which value of x satisfies both  Use the correct notation to show inclusive and exclusive inequalities | Key skills from HT2 & 3  Class specific based on QLA | Inequalities –  Number line – |  |
| Quadratics | Sketch a graph of a quadratic function, identifying roots, y-intercept and turning point  Be able to identify from a graph if a quadratic equation has any real roots  Find approximate solutions to quadratic equations using a graph  Expand the product of more than two linear expressions  Sketch a graph of a quadratic function and a linear function, identifying intersection points  Solve simultaneous equations graphically  Solve quadratic inequalities in one variable, by factorising and sketching the graph to find critical values  Solve linear inequalities in two variables graphically  Show the solution set of several inequalities in two variables on a graphs  Use iteration with simple converging sequences | Turning point –  Intersection –  Iteration – |
| Graphs of Trigonometric Functions | Recognise, sketch and interpret graphs of the trigonometric functions, y = sin x, y = cos x and y = tan x for angles of any size  Know the exact values of sin θ, cos θ and tan θ for θ = 0°, 30°, 45° , 60° and 90°  Apply to the graph of y = f(x) the transformations y = f(x) + a, y = f(x + a), y = –f(x), y = f(–x) for sine, cosine and tan functions f(x) | Function –  Exact value – |
| **Half Term 5** | Further Trigonometry | Know and apply Area = ½ ab sin C to calculate the area, sides or angles of any triangle  Know the sine and cosine rules, and use to solve 2D problems (including involving bearings).  Use the sine and cosine rules to solve 3D problems.  Solve geometrical problems on coordinate axes.  Use trigonometric relationships and Pythagoras’ Theorem in right-angled triangles to solve problems in 3D configurations.  Calculate the length of a diagonal of a cuboid.  Find the angle between a line and a plane. | Key skills from HT3 & 4  Class specific based on QLA | Cosine –  Sine - |  |
| Collecting Data | Specify the problem and plan; decide what data to collect and what analysis is needed, understand primary and secondary data sources, consider fairness  Understand what is meant by a sample and a population  Understand how different sample sizes may affect the reliability of conclusions drawn  Identify possible sources of bias and plan to minimise it  Write questions to eliminate bias, and understand how the timing and location of a survey can ensure a sample is representative | Primary –  Secondary –  Sample –  Bias –  Survey – |
| Cumulative Frequency, Box Plots, Histograms | Know the appropriate uses of cumulative frequency diagrams  Construct and interpret cumulative frequency tables and graphs  Compare the mean and range of two distributions, or median and interquartile range  Draw and interpret box plots to find median, quartiles, range and interquartile range and draw conclusions  Know the appropriate uses of histograms  Construct and interpret histograms from class intervals with unequal width  From histograms: complete a grouped frequency table;  understand and define frequency density;  Estimate the mean from a histogram  Estimate the median from a histogram with unequal class widths or any other information from a histogram, such as the number of people in a given interval. | Cumulative –  Frequency –  Distribution –  Quartile – |
| **Half Term 6** | Probability | Estimate the number of times an event will occur, given the probability and the number of trials  Find the probability of successive events, such as several throws of a single dice  Know that the sum of the probabilities of all outcomes is 1  Work out probabilities from Venn diagrams to represent real-life situations and also ‘abstract’ sets of numbers/values  Use union and intersection notation  Understand conditional probabilities and decide if two events are independent  Draw a probability tree diagram based on given information, and use this to find probability and expected number of outcome  Calculate the probability of independent and dependent combined events  Use a Venn diagram and a tree diagram to calculate conditional probability  Compare experimental data and theoretical probabilities  Compare relative frequencies from samples of different sizes | Key skills from HT4 & 5  Class specific based on QLA | Experimental –  Outcome –  Event –  Sample Space – |  |

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| Key Assessments | | | |
| **When** | **What will be assessed?** | **Why is this being assessed?** | **How will results be stored & students receive feedback?** |
| Interim 1 (HT1) | Basic and Real Life Graphs  Linear Graphs and Coordinate Geometry | To assess the students understanding of and their retention of the topics taught. This information will be used to inform the topics that make up the recall and retention starter activiites. | Scores will be stored on SIMS and student feedback will be through individualised Fix IT Questions. |
| Interim 2 (HT2) | Quadratic and Cubic Graphs  Transformations  3D Volumes inc. Cones and Spheres |
| Interim 3 (HT3) | Similarity and Congruence  Accuracy and Bounds  Compound Measures  Multiplicative Reasoning  Solving Quadratic Equations |
| Interim 4 (HT4) | Simultaneous Equations  Inequalities |
| Interim 5 (HT5) | Quadratics  Further Trigonometry  Trigonometric Graphs |
| Midyear Assessment | Assess all content across the Y10H scheme covered at time of assessment. | Summative assessment to assess the students understanding of and their retention of the topics taught. Progress tracked against expectations and intervention put in place where needed. This information will be used to inform the topics that make up the recall and retention starter activities. | Teacher marks, results stored on SIMs. Fix It lesson for induvial quick fixes, reteach lesson for larger topics.  Possible retest after optional sessions to correct misconceptions.  Students self-fill a Success Criteria to identify areas of strength and development moving forward. |
| End of Year Assessment |
| Topic Tasks  (aprrox. 10) | Assess recently learnt topics over the last 3-4 weeks. | More formal formative assessment to track the understanding and retention of students with recently learnt topics to better impact long term progress and possession of knowledge. | Teacher marked with areas of success and development highlighted for students. Students address small misconceptions with a Fix It, larger gaps across the class are given a reteach lesson. |