## Queen Elizabeth <br> High School

| Scheme of Work S |  | SUBJECT: Mathematics | YEAR: 10 Higher (set 2) ~ Autumn term 1 |  |
| :---: | :---: | :---: | :---: | :---: |
|  | Number recap and review | Construction and loci | Basic probability | Properties of polygons |
| Key concepts | 1) Change recurring decimals into their corresponding fractions and vice versa <br> 2) Apply and interpret limits of accuracy including upper and lower bounds <br> 3) Deduce expressions to calculate the nth term of linear and Quadratic sequences <br> 4) Recognise and use simple geometric progressions ( $\mathrm{r} \mathrm{r}^{\text {n }}$ where `n` | 1) Use the standard ruler and compass constructions: <br> - perpendicular bisector of a line segment <br> - constructing a perpendicular to a given line from / at a given point <br> - bisecting a given angle <br> 2) Know that the perpendicular distance from a point to a line is the shortest distance to the line | 1) Record, describe and analyse the frequency of outcomes of probability experiments using tables and frequency trees <br> 2) Apply the property that the probabilities of an exhaustive set of outcomes sum to 1 <br> 3) Apply the property that the probabilities of an exhaustive set of mutually exclusive events sum to 1 <br> 4) Construct theoretical possibility spaces for single and combined experiments | 1) 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) <br> 2) Derive and apply the properties and definitions of: <br> - special types of quadrilaterals, including square, rectangle, parallelogram, trapezium, kite and rhombus <br> - Special triangles |


|  | is an integer and ' $\mathbf{r}$ ' is a surd) <br> 5) Calculate exactly with surds <br> 6) Simplify surd expressions involving squares eg $\begin{aligned} & \sqrt{12}=\sqrt{ }(4 \times 3) \\ & \sqrt{12}=\sqrt{4} \times \sqrt{3} \\ & \sqrt{12}=2 \sqrt{3} \end{aligned}$ <br> 7) Rationalise denominators <br> 8) Calculate with roots and with integer and fractional indices | 3) Use these to construct given figures and solve loci problems | with equally likely outcomes and use these to calculate theoretical probabilities | - Other plane figures using appropriate language |
| :---: | :---: | :---: | :---: | :---: |
| Themes | Fractions and surds | Constructions and loci | Basic probability | Properties of polygons |
| Challenge | 1) Convert recurring decimals greater than 1 into | 1) Construct points of a compass (N, NE, E, SE, S, SW, W, NW) by just using a | 1) Introduce the term 'Relative frequency' and know the best estimate of probability from an | 1) Solve geometric multistep problems using properties of polygons |


| mixed fractions and vice versa <br> 2) Identify error intervals, write using inequalities <br> 3) nth term of a quadratic sequence of the form $a x^{2}+b x+c$ <br> 5) Perform the four operations with surds in the following format $a \sqrt{b}+c \sqrt{d}$ <br> 6) Focus on larger numbers which may take several steps to simplify <br> 7) Rationalise denominators including brackets <br> 7) Solve multi-step problems involving surds and linking to other areas of mathematics | compass and a straight edge <br> 3) Solve practical problems using loci <br> 3) Solve loci problems when the answer is a region | experiment is the one with the greatest number of trials. <br> 4) Create sample space diagrams for combined events |
| :---: | :---: | :---: |


|  | 8) Solve problems using a variety of the rules of indices |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Support | 1) Convert fractions to decimals, leading on to recurring decimals as answers. <br> 1) Convert terminating decimals to fractions <br> 2) Rounding to significant figures <br> 2) Identify greatest and least values which can be rounded to a given value <br> 3) Focus on finding the nth term of a linear sequence <br> 4) Can Identify arithmetic and geometric sequences <br> 4) Create geometric sequences from rules <br> 5) Recap square numbers <br> 5) Focus on the methods for performing the four operations with surds, but | 3) Focus on basic loci which involve one or two simple rules <br> - Locus of a point from a fixed point <br> - Locus of a point which is always the same distance from two fixed points <br> - Locus of a point from a line <br> - Locus of a point which is always the same distance from two fixed lines | 1) Frequency trees are new addition; hence students will not have come across them before now. <br> 2 \& 3) Calculate probability from equally likely outcomes <br> 4) Listing all possible outcomes in lists and tables | 1) Find missing angles in polygons and more complex problems by recapping over the basic rules of angle properties |


|  | leaving answers in unsimplified form <br> 6) Focus on smaller numbers, i.e. multiples of 4 , $9,25,100$ etc <br> 8) Recap the basic rules of indices, multiplying, dividing and brackets |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Literacy focus | Key words: Fractions, decimals, recurring, terminating, limits, accuracy, bounds, upper, lower, linear, quadratic, sequence, expression, term, arithmetic, geometric, surds, rationalise, denominator, indices, operations | Key words: Constructions, perpendicular, bisector, loci, locus, equidistant | Key words: Probability, events, outcomes, equally likely, sample space diagrams, experiment, theoretical, exhaustive, mutually exclusive, frequency trees | Key words: <br> Polygons, triangles, quadrilaterals, pentagons, hexagons, octagons, decagons, equilateral, isosceles |
| Cross-curricular links | Science, Design technology, Geography, Business | Design technology Art |  | Design technology Art |
| SMSC \& MBV |  |  |  |  |
| ASSESSMENTS | Assessment 1 ~ October | Assessment 1 ~ October | Assessment 1 ~ October | Assessment 1 ~ October |
| Out of school learning | Weekly homework based on work covered in class | Weekly homework based on work covered in class | Weekly homework based on work covered in class | Weekly homework based on work covered in class |

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| Scheme of Work S |  | SUBJECT: Mathematics | YEAR: 10 Higher (set 2) ~ Autumn term 2 |  |
| :---: | :---: | :---: | :---: | :---: |
|  | Collecting and representing discrete data. BC \& PC | Scatter diagrams | Linear and quadratic equations and their graphs | Congruence and similarity |
| Key concepts | 1) Interpret and construct tables, charts and diagrams including, for categorical data: <br> - frequency tables <br> - bar charts <br> - pie charts <br> - pictograms <br> - vertical line charts for ungrouped discrete numerical data <br> 2) Tables and line graphs for time series data know their appropriate use | 1) Use and interpret scatter graphs of bivariate data <br> 2) Recognise correlation and know that it does not indicate causation <br> 3) Draw estimated lines of best fit. <br> 4) Make predictions Interpolate and extrapolate apparent trends whilst knowing the dangers of doing so | 1) Solve linear equations in one unknown algebraically, including: <br> - those with the unknown on both sides of the equation <br> - Find approximate solutions using a graph <br> 2) Solve quadratic equations algebraically by factorising | 1) Use the basic congruence criteria for triangles (SSS, SAS, ASA, RHS) <br> 2) Apply angle facts, triangle congruence, similarity and properties of quadrilaterals to conjecture and derive results about angles and sides including the base angles of an isosceles triangle are equal, and use known results to obtain simple proofs |

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|  | 3) Interpret, analyse and compare distributions of data sets from univariate empirical distributions through appropriate graphical representation involving discrete, continuous and grouped data, including boxplots <br> 4) 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 |  | - Find approximate solutions using a graph <br> 3) Translate simple situations or procedures into algebraic expressions or formulae; derive an equation and the solve the equation and interpret the solution | 3) Apply and use the concepts of congruence and similarity, including the relationships between lengths, areas and volumes in similar figures |
| :---: | :---: | :---: | :---: | :---: |
| Themes | Representing data | Scatter diagrams | Linear and quadratic equations | Congruence and similarity |
| Challenge | 1) Construct composite and comparative bar charts <br> 2) Calculate and plot moving average to | 4) Interpret scatter diagrams in relation to the original context of the question | 1) Solving equations involving fractions on both sides of the equation | 1) Begin to understand how to prove two shapes are congruent |



|  | 4) Calculate frequencies from a histogram <br> 4) Solve problems such as calculating the mean, proportion of responses above a certain value etc. |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Support | 1) Aware that when drawing a bar chart there should be gaps between the bars <br> 1) Interpret frequency tables <br> 3) When comparing data sets, use two statements one based of the average, mean or median and the other based on spread of the data, range or interquartile range. <br> 4) When constructing frequency polygons, cumulative frequency curves and histograms ensure students use a continuous scale along the horizontal axes. | 1) Understands that a scatter diagram is used to represent two pieces of data from each subject and we the tables as coordinates. <br> 1) Recap plotting coordinates <br> 2) Can describe in words the relationship between the variables and not just say it is positive or negative correlation. | 1) Using inverse operations to solve equations <br> 1) When unknowns are on both sides they need to collect all the unknowns on one side. <br> 1) Show the link/visual representations between an equation and a graph and how to use the graph to solve an equation. <br> 2) Recap methods of factorisation <br> 2) Recap methods of factorising quadratics of the form $x^{2}+b x+c$ <br> 2) Plotting quadratic graphs | 1) Ensure students understand the difference between congruent shapes and similar shapes. <br> 1) Understand the notation SSS, SAS, ASA, RHS <br> 2) Properties of angles and sides of special triangles and quadrilaterals <br> 3) Understand that similar shapes are enlargements of one another <br> 3) Know that angles in similar shapes are the same. |

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 High School|  |  |  | 2) Make the link between the roots of the graph and the factorised form of the equation. |  |
| :---: | :---: | :---: | :---: | :---: |
| Literacy focus | Key words Bar charts, composite, comparative, pie charts, angles, sectors, pictograms, cumulative frequency, histograms, box plots, interquartile range | Key words: Scatter diagrams, coordinates, correlation, negative, positive, line of best fit, estimate, predict, interpolate, extrapolate | Key words: <br> Linear, quadratic, equation, algebraically, graphs, factorise | Key words Congruent, congruence, similarity, scale factor, enlargement, triangles, quadrilaterals |
| Cross-curricular links | Science, Geography, Business | Science, Geography, Business |  |  |
| SMSC \& MBV |  |  |  |  |
| ASSESSMENTS | Assessment 2 ~ December | Assessment 2 ~ December | Assessment 2 ~ December | Assessment 2 ~ December |
| Out of school learning | Weekly homework based on work covered in class | Weekly homework based on work covered in class | Weekly homework based on work covered in class | Weekly homework based on work covered in class |


| Scheme of W | SUBJECT: Mathematics |  | YEAR: 10 Higher (set 2) ~ Spring term 1 |  |
| :---: | :---: | :---: | :---: | :---: |
|  | 2D representations of 3D shapes | Statistical measures | Sketching graphs | Volume |
| Key concepts | 1) Construct and interpret plans and elevations of 3D shapes | Interpret, analyse and compare the distributions of data sets from univariate empirical distributions through: <br> 1) Appropriate measures of central tendency (median, mean, mode and modal class) <br> 2) spread (range, including consideration of outliers, quartiles and interquartile range) | 1) Recognise, sketch and interpret graphs of: <br> - linear functions, <br> - quadratic functions, <br> - simple cubic functions <br> - reciprocal function where $y=\frac{1}{x}$ $\text { with } x \neq 0$ | 1) Compare lengths, areas and volumes using ratio notation. Link to scale factors and similarity <br> 2) Know and apply the formulae to calculate the volume of cuboids and other right prisms (including cylinders) <br> 3) Calculate the volume of spheres, pyramids, cones and composite solids <br> 4) Calculate exactly with multiples of 'pi` |
|  |  | 3) Apply statistics to describe <br> a population <br> 4) Infer properties of <br> populations or distributions <br> from a sample, whilst knowing <br> the limitations of sampling |  |  |
| :--- | :--- | :--- | :--- | :--- |
| Themes | Plans and elevations | Averages | Sketching graphs | Volume |
| Challenge | 1) Drawing 3D shapes <br> from plans and elevations | 1) Interpret answers in <br> context of the question <br> 1) Identify which type of <br> average is best and why | 1) Identify key points on the <br> graph, i.e. y-intercepts, <br> roots and turning points on <br> their graphs | 2) Multi-step problems <br> involving volume of cubes, <br> cuboids and other right <br> prisms (including cylinders) |
| 1) Include exponential |  |  |  |  |
| graphs and are aware that |  |  |  |  |
| they always cut y-axes at 1 |  |  |  |  |
| and why. |  |  |  |  |
| frequency table |  |  |  |  |
| 2) Calculate quartiles and |  |  |  |  |$\quad$| 3) Volume of frustums |
| :--- |
|  |  | 1) Calculate mean and mode of ungrouped and grouped frequency tables <br> 2) Calculate quartiles and interquartile range of raw data <br> 3) When comparing data sets always give two statements, one based on the average and one based on the spread of the data | equation would look like. <br> Matching exercises | Length ~ scale factor Area ~ (scale factor) ${ }^{2}$ Volume ~ (scale factor) ${ }^{3}$ <br> 3) Recap methods of substitution, reminding students that BIDMAS applies to algebra as well. <br> 3) These formulas will be provided in the exam |
| :---: | :---: | :---: | :---: | :---: |
| Literacy focus | Key words: <br> Plans, front elevation, side elevation, net, | Key words: <br> Mode, median, mean, range, quartiles, interquartile range, raw data, frequency tables | Key words: <br> Linear, quadratic, cubic, reciprocal, exponential, graphs, y-intercept, roots, turning point | Key words: <br> Volume, area, similarity, cube, cuboids, prisms, spheres, pyramids, cylinders, cones, frustums, substitute |
| Cross-curricular links | Design and technology | Science, Geography, Business | Science, Geography, Business |  |
| SMSC \& MBV |  |  |  |  |
| ASSESSMENTS | Assessment 3 ~ February | Assessment 3 ~ February | Assessment 3 ~ February | Assessment 3 ~ February |
| Out of school learning | Weekly homework based on work covered in class | Weekly homework based on work covered in class | Weekly homework based on work covered in class | Weekly homework based on work covered in class |

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| Scheme of | SUBJECT: M | ematics YEAR: 10 | YEAR: 10 Higher (set 2) ~ Spring term 2 |
| :---: | :---: | :---: | :---: |
|  | Collecting and representing continuous data CF \& Histograms | Simultaneous equations | Inequalities |
| Key concepts | 1) 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 | 1) Solve two simultaneous equations in two variables (linear / linear or linear/quadratic) algebraically <br> 2) Find approximate solutions using a graph <br> 3) Translate simple situations or procedures into algebraic expressions or formulae <br> 4) Derive two simultaneous equations, then solve the equations and interpret the solution | 1) Solve linear inequalities in one or two variables and quadratic inequalities in one variable <br> 2) Represent the solution set on a number line, using set notation and on a graph |
| Themes |  |  |  |


|  | Cumulative frequency and histograms | Simultaneous equations | Inequalities |
| :---: | :---: | :---: | :---: |
| Challenge | 1) Estimate the number of values that are less than or greater than a given value using a cumulative frequency curve <br> 1) Compare two sets of data using box plots, compare the medians and then the range or IQR <br> 1) Calculate frequencies from a histogram <br> 1) Solve problems such as calculating the mean, proportion of responses above a certain value etc. | 1) Use method of elimination to solve <br> 2 linear simultaneous equations <br> 1) Use the method of substitution to solve 2 simultaneous equations <br> 1) Solve two simultaneous equations, one linear and one quadratic using the method of substitution <br> 2) Represent graphically two linear equations and estimate the solution <br> 2) Represent graphically one linear one quadratic and estimate the solution <br> 4) Create a pair of linear equations and then solve using any of the methods covered above | 1) Solve linear inequalities in two variables <br> 1) Solve quadratic inequalities in the form $x^{2}+b x+c$ (helps to draw $a$ graph of the equation first) <br> 2) Represent 2 or more linear inequalities on the same graph and shade the region which satisfies all inequalities. <br> 2) Use graphs to show region satisfied by two inequalities, one quadratic and one linear. |
| Support | 1) When constructing frequency polygons, cumulative frequency curves and histograms ensure students use a continuous scale along the horizontal axes. | 1) Solve simultaneous equations using the elimination method, slowly building up to multiplying both equations | 1) Solve linear inequalities with one unknown on one side using the same methods as used for solving equations. |

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\(\left.$$
\begin{array}{|l|l|l|l|}\hline & & \begin{array}{l}\text { 2) Recap constructing graphs of linear } \\
\text { and quadratic equations }\end{array} & \begin{array}{l}\text { 2) Represent solution on a number } \\
\text { line, understanding the difference } \\
\text { between a clear circle and a shaded } \\
\text { circle }\end{array} \\
\text { 3) Create and solve linear equations } \\
\text { from worded descriptions }\end{array}
$$, \begin{array}{l}2) Recap drawing linear graphs using <br>
the gradient and y-intercept. <br>
2) Represent a single inequality on a <br>

graph\end{array}\right]\)| Literacy focus |
| :--- |

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|  | such as simple kinematics problems <br> involving distance, speed and <br> acceleration <br> 5) Solve linear equations in one <br> unknown algebraically Including those <br> with the unknown on both sides of the <br> equation |
| :--- | :--- |

$$
\operatorname{Tan} \theta=\frac{\text { Adjacent }}{\text { Opposite }}
$$

Apply them to find angles and
lengths in right-angled triangles and, where possible, general triangles in two and three dimensional figures
3) Know the exact values of

Sin $\theta$ and $\operatorname{Cos} \theta 0^{\circ}, 30^{\circ} 45^{\circ}$, $60^{\circ}$ and $90^{\circ}$

Know the exact value of
$\underline{\operatorname{Tan} \theta} 0^{\circ}, 30^{\circ}, 45^{\circ}$ and $60^{\circ}$
4) Apply angle facts, triangle congruence, similarity and properties of quadrilaterals to conjecture and derive results about angles and sides including Pythagoras' Theorem, use known results to obtain simple proofs

|  |  | 5) Compare lengths using ratio <br> notation; Make links to trigonometric <br> ratios |  |
| :--- | :--- | :--- | :--- |
| Themes | Graphs | Trigonometry and Pythagoras | Sine and cosine rule |
| Challenge | 1) Discuss the relationship between <br> the gradients of perpendicular lines <br> 2) Find the equation of perpendicular <br> lines | 1) Calculate missing side lengths in <br> 3D shapes | 1) Multi-step questions involving <br> Pythagoras <br> 1) Identify which rule to use in <br> different situations |
|  | 2) Find the equation of lines given in <br> geometric problems involving circles | 2) Calculate missing side lengths and <br> angles in 3D shapes | 2) Identify when to use rules for area <br> of triangles |
| 4) Calculate distance from a speed- <br> time graph, by calculating area under <br> the graph <br> 2) Multi-step questions involving <br> Trigonometry | 4) Estimate distance from a curved <br> speed-time graph by splitting into <br> rectangles and trapeziums | 4) Understand, calculate and interpret <br> acceleration. | 1) Recap drawing straight line graphs <br> using the gradient and intercept |
| 1) Calculate missing sides in right |  |  |  |
| angled triangles using Pythagoras's |  |  |  |
| Theorem |  |  |  |$\quad$| 1) Recap rules for substitution and |
| :--- |
| reiterate importance of BIDMAS in |
| algebra |


|  | 2) Calculate the gradient of a line segment <br> 3) Identify gradient and intercept from an equation <br> 3) Work out the equation of a straight line on a graph <br> 4) Plot quadratic and cubic graphs and estimate solutions from the graphs <br> 5) Recap methods for solving equations with one unknown. | 1) Calculate missing sides in special triangles <br> 2) Calculate missing sides and angles in right angled triangles <br> 2) Calculate missing sides and angles in special triangles <br> 3) Need to be able to recall these, Trig song on 'You tube' is useful | 1) Provide rules for angles <br> 2) Recap rule for calculating area of triangles when height is known |
| :---: | :---: | :---: | :---: |
| Literacy focus | Key words: Gradient, intercept, parallel, perpendicular, equation, linear, quadratic, cubic, reciprocal, exponential, speed, distance, time, acceleration | Key words: <br> Pythagoras, theorem, trigonometry, sine, cosine, tangent, opposite, adjacent, hypotenuse, triangles, isosceles, equilateral | Key words <br> Sine, Cosine, corresponding side/angle |
| Cross-curricular links |  | Design Technology |  |
| SMSC \& MBV |  |  |  |
| ASSESSMENTS | Assessment 5 ~ Year 10 mock | Assessment 5 ~ Year 10 mock | Assessment 5 ~ Year 10 mock |
| Out of school learning | Weekly homework based on work covered in class | Weekly homework based on work covered in class | Weekly homework based on work covered in class |


| Scheme of Work | SUBJECT: Mathematics | YEAR: 10 Higher (set 2) ~ Summer term 2 |
| :---: | :---: | :---: |
|  | Catch up time | Revision for year 10 Mocks |
| Key concepts | Use this time to either; <br> - Catch up on anything not done <br> Go back over anything the teacher feel needs redoing | Revision for Mock examinations ~ <br> At class teachers' discretion |
| Themes |  |  |
| Challenge |  |  |
| Support |  |  |
| Literacy focus | Key words | Key words |
| Cross-curricular links |  |  |
| SMSC \& MBV |  |  |
| ASSESSMENTS | Assessment 5 ~ Year 10 mock | Assessment 5 ~ Year 10 mock |

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