



Scheme of Work		SUBJECT: Mathematics		YEAR: 11 Higher (set 1) ~ Autumn term 1	
	Statistics recap and review	Algebra: further quadratics, rearranging formulae and identities	Growth and decay	Circle theorem	
Key concepts	<ol style="list-style-type: none"> 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 2. Interpret, analyse and compare distributions of data sets from univariate empirical distributions through appropriate graphical representation involving discrete, 	<ol style="list-style-type: none"> 1. Simplify and manipulate algebraic expressions (including those involving surds) by: <ol style="list-style-type: none"> a. <u>expanding products of two or more binomials</u> b. <u>factorising quadratic expressions of the form $ax^2 + bx + c$ including the difference of two squares</u> c. factorising quadratic expressions of the form $ax^2 + bx + c$ d. simplifying expressions involving sums, products 	<ol style="list-style-type: none"> 1. <u>Set up, solve and interpret the answers in growth and decay problems, including compound interest and work with general iterative processes</u> 	<ol style="list-style-type: none"> 1. Apply and prove the standard circle theorems concerning angles, radii, tangents and chords and use them to prove related results, including <ol style="list-style-type: none"> a. angle at centre is equal to twice angle at circumference; b. angle in a semi-circle is 90°; c. angles in the same segment are equal; d. opposite angles in a cyclic quadrilateral sum to 180°; 	



	<p>continuous and grouped data, including box plots</p> <ol style="list-style-type: none"> 3. interpret, analyse and compare the distributions of data sets from univariate empirical distributions through consideration of outliers, quartiles and inter-quartile range 4. <u>Draw estimated lines of best fit</u> 5. <u>Make predictions</u> 6. <u>Interpolate and extrapolate apparent trends whilst knowing the dangers of doing so</u> 7. <u>Infer properties of populations or distributions from a sample, whilst knowing the limitations of sampling</u> 	<p>and powers, including the laws of indices</p> <ol style="list-style-type: none"> 2. Understand and use standard mathematical formulae 3. Rearrange formulae to change the subject 4. <u>Know the difference between an equation and an identity</u> 5. <u>Argue mathematically to show algebraic expressions are equivalent, and use algebra to support and construct arguments</u> <p>and proofs</p> <ol style="list-style-type: none"> 6. Where appropriate, interpret simple expressions as functions with inputs and outputs 7. Interpret the reverse process as the ‘inverse function’ 8. Interpret the succession of two 		<ol style="list-style-type: none"> e. tangent at any point on a circle is perpendicular to the radius at that point f. tangents from an external point are equal in length; g. the perpendicular from the centre to a chord bisects the chord; h. alternate segment theorem
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		functions as a 'composite function'		
Themes	Representing data	Algebraic manipulation	Iteration	Circle theorems
Challenge	<ul style="list-style-type: none"> 1) Calculating frequencies from histogram 1) Estimating frequencies above or below a given value, both on a histogram and a cumulative frequency diagram 1) Estimating key statistics from a cumulative frequency diagram 2) Compare two data sets from box plot by comparing the medians, IQR and spread of the data, include values in answer 4) Describing the relationship between the two variables as well as stating its correlation, understand the 	<ul style="list-style-type: none"> 1. Perform each of the skills on expressions involving surds 1. Expanding three brackets 1. Factorising expressions with a coefficient of 'a' 3. Rearrange formulae where the subject appears more than once 5. More complex proof problems 7. Calculate composite functions of algebraic expressions using algebra only 8. Calculate inverse functions of more complex functions (i.e. subject appears twice) 	<ul style="list-style-type: none"> 1. More complex iterative problems 1. Rearranging formulae to give the iterative formula 	<ul style="list-style-type: none"> 1) Recap using SSS, SAS and ASA to prove two triangles are congruent 1) Use circle theorems to complete proof questions



	difference between these			
Support	<ul style="list-style-type: none"> 1) Recap the meaning of frequency tables and interpretation of inequalities for intervals 1) Recap constructing and interpreting frequency diagrams and polygons 2) Compare two data sets using an average and the range 2) Calculate interquartile range from a set of raw data 4) Recap constructing scatter diagrams 4) Recap correlation 	<ul style="list-style-type: none"> 1) Recap FOIL method, or other methods covered for expanding two brackets 1) Recap the meaning of 'Factorising' Factorise into a single bracket 1) Recap rules of indices 3) Rearranging formulae using flow charts for those struggling 5) Understand the difference between 'show' and 'Prove' 	<ul style="list-style-type: none"> 1) Recap methods of substitution 1) Remind students that BIDMAS applies to algebraic expressions 	<ul style="list-style-type: none"> 1) Recap parts of a circle 1) Recap basic angle properties and practice solving problems using more than 1 property
Literacy focus	Key words: Frequency, frequency density, histogram, interval, cumulative frequency, interquartile range, quartiles, scatter diagrams, correlation, box plot	Key words: Factorise, completing the square, formulae, functions, composite, inverse	Key words: Compound measures, iteration, iterative formula	Key words: Subtended, alternative theorem, radius, circumference, segment
Cross-curricular links				
SMSC & MBV				
ASSESSMENTS	Assessment 1 ~ October	Assessment 1 ~ October	Assessment 1 ~ October	Assessment 1 ~ October

Queen Elizabeth High School



Out of school learning	Exam questions ~ ½ Churchill exam paper ~ to be marked in class next week	Exam questions ~ ½ Churchill exam paper ~ to be marked in class next week	Exam questions ~ ½ Churchill exam paper ~ to be marked in class next week	Exam questions ~ ½ Churchill exam paper ~ to be marked in class next week
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Scheme of Work		SUBJECT: Mathematics		YEAR: 11 Higher (set 1) ~ Autumn term 2	
	Equation of a circle	Further equations and graphs	Geometry and measures recap and review		
Key concepts	<ol style="list-style-type: none"> 1) Recognise and use the equation of a circle with centre at the origin 2) Find the equation of a tangent to a circle at a given point. 	<ol style="list-style-type: none"> 1) Solve linear equations in one unknown algebraically <u>including those with the unknown on both sides of the equation</u> 2) Find approximate solutions using a graph 3) <u>Solve quadratic equations (including those that require rearrangement) algebraically by factorising, by completing the square and by using the quadratic formula</u> 4) <u>Find approximate solutions using a graph</u> 5) Recognise, sketch and interpret graphs of linear and quadratic functions 	<ol style="list-style-type: none"> 1) Solve geometrical problems on co-ordinate axes 2) Identify, describe and construct congruent and similar shapes, including on co-ordinate axes, by considering rotation, reflection, translation and enlargement (<u>including fractional and negative scale factors</u>) 3) Describe the changes and invariance achieved by combinations of rotations, reflections and translations including using column vector notation for translations 4) <u>Find the surface area of pyramids and composite solids</u> 		



		<p>6) <u>Identify and interpret roots, intercepts and turning points of quadratic functions graphically; deduce roots algebraically and turning points by completing the square</u></p> <p>7) <u>Translate simple situations or procedures into algebraic expressions or formulae</u></p> <p>8) <u>derive an equation, solve the equation and interpret the solution</u></p>	<p>5) <u>Calculate surface area of spheres, cones and composite solids</u></p> <p>6) <u>Calculate the volume of spheres, pyramids, cones and composite solids</u></p> <p>7) including frustums</p> <p>8) <u>Calculate arc lengths, angles and areas of sectors of circles</u></p>
Themes	Equation of a circle	Solving linear and quadratic equations	Geometry and measures recap and review
Challenge	<p>2) Gradient of perpendicular lines</p> <p>2) Link into trigonometry to calculate area of sectors and segments</p> <p>2) Link into other areas of mathematics to solve more complex problems</p>	<p>3) Solve quadratics with a coefficient of 'a' using factorising and completing the square</p> <p>6) Make the link between the turning point and completing the square</p> <p>8) Derive and solve quadratic equation to solve problems</p> <p>8) Derive and solve simultaneous equations, where one is linear and the other quadratic</p>	<p>7) Calculating volume and surface area of frustums</p> <p>1 – 8) Link into other areas of maths to solve more complex multi-step questions</p>
Support	<p>2) Find equation of a straight line</p>	<p>1) Solving a range of linear equations</p> <p>3) Solve quadratics by factorising</p> <p>8) Derive and solve linear equations to solve problems</p>	<p>2) Recap basic methods for simple transformations</p> <p>2) Describing a transformation which has taken place</p> <p>4) Recap formulas for area of 2D shape</p>



		8) Derive and solve simultaneous equations, where both are linear	6) Recap methods of substitution and remind students that BIDMAS apply to algebraic expressions 8) Calculate area and perimeter of semi-circles and quarter circles
Literacy focus	Key words: Radius, tangent, gradient, y-intercept, $y=mx+c$, sectors, segments	Key words: Linear, quadratic, simultaneous, factorise, completing the square	Key words: Reflection, rotation, translation, enlargement, scale factor, vector, surface area, volume, cone, cylinder, sphere, pyramid, composite shapes, frustum, arcs, sectors
Cross-curricular links			
SMSC & MBV			
ASSESSMENTS	Assessment 2 ~ Mocks #1	Assessment 2 ~ Mocks #1	Assessment 2 ~ Mocks#1
Out of school learning	Exam questions ~ $\frac{1}{2}$ Churchill exam paper ~ to be marked in class next week	Exam questions ~ $\frac{1}{2}$ Churchill exam paper ~ to be marked in class next week	Exam questions ~ $\frac{1}{2}$ Churchill exam paper ~ to be marked in class next week



Scheme of Work		SUBJECT: Mathematics		YEAR: 11 Higher (set 1) ~ Spring term 1	
	Further sketching graphs	Transforming functions	Algebraic fractions		
Key concepts	<p>1. Recognise, sketch and interpret graphs of linear functions, quadratic functions, <u>simple cubic functions and the reciprocal</u></p> <p><u>function</u> $y = \frac{1}{x}$ with $x \neq 0$,</p> <p>exponential functions $y = kx$ for positive values of k, and the trigonometric functions (with arguments in degrees)</p> <p>$y = \sin x$, $y = \cos x$ and $y = \tan x$ for angles of any size</p>	<p>1. Sketch translations and reflections of a given function</p>	<p>1. Simplify and manipulate algebraic expressions involving algebraic fractions</p>		
Themes	Further sketching graphs	Transforming functions	Algebraic fractions		
Challenge	1) Sketch graphs of exponential functions	1) Combinations of translations and reflections of functions	1) Solve equations involving algebraic fractions		



	<ul style="list-style-type: none"> 1) Sketch graphs of trig functions 1) Reading values from trig graphs 	<ul style="list-style-type: none"> 1) Identifying the equation after a translation or reflection has taken place 	<ul style="list-style-type: none"> 1) Create and solve equations involving algebraic fractions 1) Link into other areas of mathematics to solve more complex problems
Support	<ul style="list-style-type: none"> 1) Sketch graphs of linear and quadratic functions 	<ul style="list-style-type: none"> 1) Recap equations of parallel and perpendicular lines 	<ul style="list-style-type: none"> 1) Recap factorising quadratics 1) Four operations involving fractions
Literacy focus	Key words: Linear, quadratic, cubic, exponential, reciprocal, Trigonometric functions	Key words: Translation, reflection, function, parallel, perpendicular	Key words: Algebraic fractions, factorise
Cross-curricular links			
SMSC & MBV			
ASSESSMENTS	Assessment 3 ~ Formal in class assessments	Assessment 3 ~ Formal in class assessments	Assessment 3 ~ Formal in class assessments
Out of school learning	Exam questions ~ ½ Churchill exam paper ~ to be marked in class next week	Exam questions ~ ½ Churchill exam paper ~ to be marked in class next week	Exam questions ~ ½ Churchill exam paper ~ to be marked in class next week



Scheme of Work		SUBJECT: Mathematics	YEAR: 11 Higher (set 1) ~ Spring term 2
	Gradients and rates of change	Pre-calculus and area under a curve	
Key concepts	<ol style="list-style-type: none"> 1. Interpret the gradient at a point on a curve as the instantaneous rate of change 2. Apply the concepts of average and instantaneous rates of change (gradients of chords and tangents) in numerical, algebraic and graphical contexts 3. <u>Interpret the gradient of a straight-line graph as a rate of change</u> 	<ol style="list-style-type: none"> 1. Calculate or estimate gradients of graphs and areas under graphs (including quadratic and other non-linear graphs) 2. Interpret the results in cases such as distance-time graphs, velocity-time graphs and graphs in financial contexts 	
Themes	Gradients and rates of change	Pre-calculus and area under a curve	
Challenge	<ol style="list-style-type: none"> 1) Equation of a tangent at a point 2) Estimating the rate at a given point 	<ol style="list-style-type: none"> 1) Estimating the area under a curve using the trapezium rule 	



Support	<ul style="list-style-type: none"> 1) Recap calculating gradient 1) Finding the gradient of a tangent to a point 3) Understand that the gradient of a graph represents the rate 	<ul style="list-style-type: none"> 1) Area of triangles and trapeziums 1) Velocity time graphs
Literacy focus	Key words: Gradient, tangent, rates of change	Key words: Velocity, trapezium
Cross-curricular links		
SMSC & MBV		
ASSESSMENTS	Assessment 4 ~ Mocks #2	Assessment 4 ~ Mocks #2
Out of school learning	Exam questions ~ ½ Churchill exam paper ~ to be marked in class next week	Exam questions ~ ½ Churchill exam paper ~ to be marked in class next week