



Mathematics Department

Long-term sequencing Year 12 Pure Mathematics

HALF TERM 1:	HALF TERM 2:	HALF TERM 3:
<p>STUDENTS MUST KNOW:</p> <p>Chapter 2: Quadratics</p> <ul style="list-style-type: none"> Solve quadratic equations using factorisation, the quadratic formula and completing the square. Read and use $f(x)$ notation when working with functions. Sketch the graph and find the turning point of a quadratic function. Find and interpret the discriminant of a quadratic expression Use and apply models that involve quadratic functions. <p>Chapter 3: Equations and Inequalities</p> <ul style="list-style-type: none"> Solve simultaneous equations in two variables by elimination and by substitution, including one linear and one quadratic equation. Solve linear and quadratic inequalities in a single variable and interpret such inequalities graphically, including inequalities with brackets and fractions. Express solutions through correct use of 'and' and 'or', or through set notation. Represent linear and quadratic inequalities such as $y > x + 1$ and $y > ax^2 + bx + c$ graphically. <p>Chapter 4: Graphs and Transformations</p> <ul style="list-style-type: none"> Understand and use graphs of functions; sketch curves defined by simple equations including polynomials, and (including their vertical and horizontal asymptotes; interpret algebraic solution of equations graphically; use intersection points of graphs to solve equations. Understand and use proportional relationships and their graphs. Understand the effect of simple transformations on the graph of $y = f(x)$ including sketching associated graphs, and combinations of these transformations. <p>HOW THIS WILL BE ASSESSED: Low stakes knowledge tests as starters End of unit assessments at the end of each half term</p>	<p>STUDENTS MUST KNOW:</p> <p>Chapter 5: Straight line graphs</p> <ul style="list-style-type: none"> Understand and use the equation of a straight line; Know and be able to apply the gradient conditions for two straight lines to be parallel or perpendicular; Find lengths and areas using equations of straight lines; Use straight-line graphs in modelling. <p>Chapter 6: Circles</p> <ul style="list-style-type: none"> Find the midpoint of a line segment; Understand and use the equation of a circle; Find points of intersection between a circle and a line; Solve geometric problems involving straight lines and circle; Know and be able to use the properties of chords and tangents <p>Chapter 7: Algebraic Methods</p> <ul style="list-style-type: none"> Be able to use algebraic division; Know and be able to apply the factor theorem; Be able to fully factorise a cubic expression; <p>Chapter 8: The binomial expansion</p> <ul style="list-style-type: none"> Understand and use the binomial expansion of for positive integer n; the notations $n!$ and nCr; link to binomial probabilities <p>HOW THIS WILL BE ASSESSED: Low stakes knowledge tests as starters End of unit assessments at the end of each half term</p>	<p>STUDENTS MUST KNOW:</p> <p>Chapter 9: Trigonometry ratios</p> <ul style="list-style-type: none"> Understand and be able to use the definitions of sine, cosine and tangent for all arguments; Understand and be able to use the sine and cosine rules; Understand and be able to use the area of a triangle in the form $\frac{1}{2}ab \sin C$; Understand and be able to use the sine, cosine and tangent functions; their graphs, symmetries and periodicity. <p>Chapter 10: Trigonometric identity and equations</p> <ul style="list-style-type: none"> Understand and be able to use $\tan \theta = \frac{\cos \theta}{\sin \theta}$ Understand and use $\sin^2 \theta + \cos^2 \theta = 1$ Solve trigonometric equations within a given interval. <p>Chapter 12: Differentiation</p> <ul style="list-style-type: none"> Understand and use the derivative of as the gradient of the tangent to the graph of at a general point (x, y); the gradient of the tangent as a limit; interpretation as a rate of change; sketching the gradient function for a given curve; second derivatives; differentiation from first principles for small positive integer powers of x. Understand and use the second derivative as the rate of change of gradient Differentiate, for rational values of x^n and related constant multiples, sums and differences. Apply differentiation to find gradients, tangents and normal, maxima and minima and stationary points Identify where functions are increasing or decreasing. <p>HOW THIS WILL BE ASSESSED: Low stakes knowledge tests as starters End of unit assessments at the end of each half term</p>

<p>HALF TERM 4: STUDENTS MUST KNOW:</p> <p>Chapter 13: Integration</p> <ul style="list-style-type: none"> • Know and use the Fundamental Theorem of Calculus • Integrate (excluding $n = -1$), and related sums, differences and constant multiples nx • Evaluate definite integrals; use a definite integral to find the area under a curve. <p>HOW THIS WILL BE ASSESSED: Low stakes knowledge tests as starters End of unit assessments at the end of each half term</p> <p>Home learning set: Independent task set in class.</p>	<p>HALF TERM 5: STUDENTS MUST KNOW:</p> <p>Chapter 14: Exponentials and Logarithms</p> <ul style="list-style-type: none"> • Know and use the function a^x and its graph, where a is positive Know and use the function e^x and its graph • Know that the gradient of e^{kx} is equal to ke^{kx} and hence understand why the exponential model is suitable in many applications • Know and use the definition of $\log_a x$ as the inverse of a^x, where a is positive and $x \geq 0$ Know and use the function $\ln x$ and its graph Know and use $\ln x$ as the inverse function of e^x • Understand and use the laws of logarithms: • Solve equations of the form $a^x = b$ • Use logarithmic graphs to estimate parameters in relationships of the form $y = ax^n$ and $y = kb^x$, given data for x and y • Understand and use exponential growth and decay; use in modelling (examples may include the use of e in continuous compound interest, radioactive decay, drug concentration decay, exponential growth as a model for population growth); consideration of limitations and refinements of exponential models. <p>Chapter 11: Vectors</p> <ul style="list-style-type: none"> • Use vectors in two dimensions • Calculate the magnitude and direction of a vector and convert between component form and magnitude/direction form • Add vectors diagrammatically and perform the algebraic operations of vector addition and multiplication by scalars, and understand their geometrical interpretations • Understand and use position vectors; calculate the distance between two points represented by position vectors • Use vectors to solve problems in pure mathematics and in context, (including forces). <p>HOW THIS WILL BE ASSESSED: Low stakes knowledge tests as starters End of unit assessments at the end of each half term</p>	<p>HALF TERM 6: STUDENTS MUST KNOW:</p> <p>Start A2: Chapter 1: Algebraic methods.</p> <ul style="list-style-type: none"> • Proof by contradiction (including proof of the irrationality of $\sqrt{2}$ and the infinity of primes, and application to unfamiliar proofs) • Manipulate polynomials algebraically, including expanding brackets and collecting like terms, factorisation and simple algebraic division; use of the factor theorem. • Simplify rational expressions including by factorising and cancelling, and algebraic division (by linear expressions only) • Decompose rational functions into partial fractions (denominators not more complicated than squared linear terms and with no more than 3 terms, numerators constant or linear) <p>HOW THIS WILL BE ASSESSED: Low stakes knowledge tests as starters End of unit assessments at the end of each half term</p>
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