

Year 12			Year 12			
Teacher 1 - P&M			Teacher 2 - P&S			
Quadratics	Solving Quadratic Equations: by factorising, by formula with simple sketches of curves	HW1	Algebra	P1.2, P1.3	HW1	
	Solving Quadratics equations: by completing the square, leading to sketching curves		Indices	P1.1 P1.4 Indices 1: laws of indices, evaluate expressions including negative, fractional and zero indices		
	Solving quadratic equations: introduce discriminant (more later after inequalities), equations that can be transformed into a quadratic using a substitution, problem solving		Surds	P1.5 Surds 1: manipulate surds, multiply and divide		
Simultaneous Equations	Solving simultaneous equations: linear, graphical interpretation, intersection of two lines, leading onto one linear, one quadratic			P1.6 Surds 2: Rationalise the denominators, difference of two squares for rationalising		
Inequalities	Inequalities: linear and quadratic	HW2	Algebraic Division	P2.6 Algebraic division by factorising and cancelling in algebraic fractions and dividing a polynomial by a linear expression	HW2	
	Inequalities: discriminant problems		Factor Theorem	P2.6 Factor theorem application and use to fully factorise a cubic expression		
Graphs and Transformations	Sketching: cubics, quartics, reciprocals		HW2	Proof	P2.6 Proof by deduction, exhaustion and disproof by a counter-example, following logical steps	
	Transformations of functions				P2.6 Proof by deduction, exhaustion and disproof by a counter-example, following logical steps	
Exponentials	Exponential functions - properties and graph of $y = a^x$ <i>Begin with a brief overview of functions and inverse functions - domain and range</i>	HW3	Binomial Expansion	P4.1 Binomial expansion 1 using Pascal's triangle and factorial notation	HW3	
Logarithms	Logarithms - introduce and use $\log_a n = x$ and $a^x = n$ . Introduce log laws			P4.1 Binomial expansion 2 using formula including finding individual coefficients		
	Logarithms - solve equations in the form $a^x = b$			P4.1 Binomial expansion 2 using formula including finding individual coefficients and estimates		
Assessment 1	Quadratics, simultaneous equations, inequalities, graphs and transformations		Assessment 1	Indices, surds, factor theorem and proof		
HALF TERM			HALF TERM			

Coordinate Geometry - lines	Co-ordinate Geometry - straight lines: gradients, equation of a straight line, parallel and perpendicular lines, midpoints, lengths of line segments	HW4	Probability Distributions	A3.1 Probability - mutually exclusive events, independent events, set notation, tree diagrams and venn diagrams("and" "or" rules)	HW4
	Co-ordinate Geometry - straight lines: intersection of two lines			A3.1 Probability - mutually exclusive events, independent events, set notation, tree diagrams and venn diagrams("and" "or" rules)	
	Co-ordinate Geometry - straight lines: parallel and perpendicular lines, length and area			A4.1 Discrete probability distributions (note calculating the expected value and variance are not included at AS)	
	Co-ordinate Geometry - straight lines: problem solving			A4.1 Discrete distributions - consolidation	
Coordinate Geometry - circles	Co-ordinate Geometry - circles: equation of a circle	HW5		A4.1 Binomial distribution - basic concepts, manual calculations, how to use calculator, link to Binomial expansion	
	Co-ordinate Geometry - circles: intersections of straight lines and circles			A4.1 Binomial distribution - further calcs, use of tables	
	Co-ordinate Geometry - circles: problems involving tangents and chords			A4.1 Binomial distribution - further calcs, use of tables	
	Co-ordinate Geometry - circles: problems involving circles and triangles				
Velocity/Time Graphs	Distance time graphs and velocity time graphs	HW6	Differentiation	P7.1 and P7.2 Differentiation introduction - gradient at a point (tangent and limits), understanding why it works	HW5
	Distance time graphs and velocity time graphs			P7.1 and P7.2 Differentiation - standard method practice (including fractional and negative indices). And exponentials!	
Kinematics 1	SUVAT: understand and derive SUVAT equations			P7.1 and P7.2 Equations of tangents and normals	
	SUVAT: problem solving			P7.1 and P7.2 Increasing and decreasing functions and stationary points	
	SUVAT: motion under gravity			P7.1 and P7.2 Increasing and decreasing functions and stationary points	
	SUVAT: consolidate			Optimisation problems	
CHRISTMAS			CHRISTMAS		
Vectors	Vectors: introduction, column vectors, I and j form, magnitude of a vector, adding vectors, unit vectors, multiplying by scalars	HW7	Assessment 2		

	<b>Vectors:</b> working with vectors, position vectors, use vectors to solve geometric problems		<b>Trigonometry</b>	Graphs and Transformations <i><b>*Sine and Cosine Rule to be set as flipped learning</b></i>	<b>HW6</b>
	<b>Vectors:</b> modelling with vectors, use vectors in speed and distance calculations			Graphs and Transformations	
	<b>Vectors:</b> consolidate			Solving equations	<b>HW7</b>
<b>Assessment 2</b>				Solving equations	
<b>Forces and Newton's Laws</b>	<b>Forces:</b> types of force, drawing force diagrams, Newton's first law, forces as vectors in i and j form, mass and weight	<b>HW8</b>		Solving equations using the tan identity	
	<b>Newton's second law</b> - basic concepts, introducing resultant force = $ma$ .			Solving equations using the Pythagorean identities	
	<b>Newton's second law</b> - problem solving, including in terms of i and j			Solving equations using the Pythagorean identities	
	<b>Newton's third law</b> - introduction, connected particles car and trailer			Consolidation	
	Using <b>Newton's second law</b> - connected particles lifts		<b>Statistical Measures</b>	<b>A2.3 Measures of location and variation 1 and 2:</b> measures of central tendency: mean, median, mode including grouped data and using interpolation to find median also range, inter-quartile range and inter-percentile range including use of linear interpolation	<b>HW8</b>
	<b>Newton's third law</b> - connected particles pulleys			<b>A2.3 Measures of location and variation 1 and 2:</b> measures of central tendency: mean, median, mode including grouped data and using interpolation to find median also range, inter-quartile range and inter-percentile range including use of linear interpolation	
	<b>Newton's third law</b> - smooth pulleys			<b>A2.3 Measures of location and variation 3: variance and standard deviation</b>	
<b>HALF TERM</b>			<b>HALF TERM</b>		
<b>Integration</b>	<b>Integration</b> - understand as the reverse of differentiation, understand the need for +c, integrate polynomials	<b>HW9</b>	<b>Coding</b>	<b>A2.3 Coding</b> for mean and standard deviation	

	<b>Integration</b> - simple expressions, given $f'(x)$ and a point on the curve, find an equation of the form $f(x)$		<b>Presenting Data</b>	<b>A2.1 Single variable data 1: histograms and frequency polygons</b> - possibly using big data set for examples, include mean and standard deviation for a histogram	
	<b>Integration</b> - evaluate a definite integral			<b>A2.1 Single variable data 2: cumulative frequency diagrams and box and whisker plots</b> - possibly using big data set for examples and including outliers	
	<b>Integration</b> - finding area bounded by a curve and the x-axis			<b>A 2.4 Bivariate data:</b> scatter graphs, correlation, and regression, independent and dependent variables. Interpolation and danger of extrapolation. Equation of line of best fit, and linear regression	<b>HW9</b>
	<b>Integration</b> - area bounded by curves and straight lines			<b>Large Data Set</b>	<b>HW10</b>
<b>Kinematics 2</b>	<b>Kinematics variable acceleration (rates of change)</b> - introduce displacement, velocity and acceleration as functions of time, use differentiation to model motion for a particle moving with variable acceleration	<b>HW10</b>	<b>Assessment 3</b>	Differentiation (optimisation), Trigonometry, Statistical Measures	
	<b>Kinematics variable acceleration</b> - understand gradients of graphs link to rates of change; find max and min velocities and understand how this links with $a=0$		<b>Hypothesis Testing</b>	<b>A5.1 Intro to hypothesis testing using the Binomial distribution</b> - null hypothesis, alternative hypothesis, significance level, p-value	<b>HW11</b>
<b>Assessment 3</b>	<b>Vectors, forces and integration</b>			<b>A5.1 Hypothesis testing</b> using probability of test statistic (p value) and comparing it to significance level, understanding critical regions and acceptance regions	
<b>Kinematics 2</b>	<b>Kinematics variable force (integration)</b> - introduce integration to model motion of a particle moving under a variable force			<b>A 5.2 Hypothesis testing</b> - one and two tail tests	
	<b>Kinematics variable force (integration)</b> - understand area under the graph leads to an integral, use initial conditions - use calculus to derive the constant accelerations formulae			A 5.2 Hypothesis testing - one and two tail tests	
<b>Consolidation</b>				A 5.2 Hypothesis testing - one and two tail tests	
<b>EASTER</b>			<b>EASTER</b>		
<b>Revision</b>			<b>Revision</b>		
<b>PPE's</b>			<b>Exams</b>		

<b>Exponentials and Logarithms</b>	recap lesson	<b>HW11</b>	<b>Functions</b>	Domain, range, composite, inverse, for simple functions	<b>HW12</b>
<b>Exponentials</b>	e sketch, solve, differentiation, modelling			Domain, range, composite, inverse, for simple functions	
	e sketch, solve, differentiation, modelling			composite and inverse with e and ln	
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<b>Logarithms</b>	ln sketch, solve, modelling			modulus functions	
	modelling with logs			modulus functions	
<b>HALF TERM</b>			<b>HALF TERM</b>		
<b>Radians</b>	Introduce radians, conversions, exact values and graphs	<b>HW12</b>	<b>Algebraic Fractions</b>	Year 2 content	<b>HW13</b>
	Radian measures - arcs and sectors		<b>Partial Fractions</b>		
	Solving trig equations in radians (including use of tan and Pythagorean identities)			Introduction - two and three linear terms	
	Solving trig equations in radians (including use of tan and Pythagorean identities)			Repeated linear term	
	Small angle approximations			Improper algebraic fractions	
<b>Differentiation - standard functions</b>	<i>Sin and cos from first principles to be covered by the trig teacher</i>	<b>HW13</b>	<b>Sequences and series</b>	Iterative/recurrence relations	<b>HW14</b>
				Arithmetic	
				Arithmetic	
				Geometric	
				Geometric	

Year 13	
Trigonometry (Part 2)	Work with radian measure, including use for arc length and area of sector
	Know and use exact values of sin, cos and tan for common values
	Understand and use the definitions of secant, cosecant and cotangent and of arcsin, arccos and arctan. Understand their relationships to sine, cosine and tangent. Understanding of their graphs; their ranges and domains. Inverse functions and their graphs
	$\sec^2\theta = 1 + \tan^2\theta$ Understand and use; $\operatorname{cosec}^2\theta = 1 + \cot^2\theta$
	Understand and use double angle formulae. Use of addition formulae, double angle formulae, R formula
Differentiation	Understand and use the derivative of $\sin x$ and $\cos x$ .
	The second derivative and its connection to convex and concave sections of curves and points of inflection.
	Differentiate using the product rule, the quotient rule and the chain rule, including problems involving connected rates of change and inverse functions
Assessment 1	Trig and Differentiation
Integration	Integrate standard functions and related sums, differences and constant multiples
	Use a definite integral to find the area between two curves. Understand and use integration as the limit of a sum
	Carry out simple cases of integration by substitution and integration by parts
HALF TERM	

<b>Normal Distribution</b>	Understand and use the Normal distribution as a model; find probabilities using the Normal distribution
	Link to histograms, mean, standard deviation, points of inflection and the binomial distribution
	Select an appropriate probability distribution for a context, with appropriate reasoning, including recognising when the binomial or Normal model may not be appropriate
	Conduct a statistical hypothesis test for the mean of a Normal distribution with known, given or assumed variance and interpret the results in context
<b>Moments</b>	Understand and use derived quantities and units: moment
	Understand and use moments in simple static contexts
<b>Vectors</b>	Use vectors in three dimensions
	Use vectors to solve problems in kinematics
	Use trigonometric functions to solve problems in context, including problems involving vectors, kinematics and forces
<b>Forces &amp; Friction</b>	Understand and use addition of forces, resultant forces and dynamics for motion in a plane
	Coefficient of friction, understand and use the model for friction, motion of a body on a rough surface, limiting frictions and statics.
<b>Projectiles</b>	Understand, use and derive the formulae for constant acceleration for motion in 2 dimensions using vectors
	Use calculus in kinematics for motion in 2 dimensions using vectors
	Model motion under gravity in a vertical plane using vectors. Projectiles.
<b>CHRISTMAS</b>	

<b>PPE's</b>	
<b>Conditional Probability</b>	Understand and use conditional probability, including the use of tree diagrams, Venn diagrams, two-way tables
<b>Application of Forces</b>	Understand and use Newton's second law for motion in situations where forces need to be resolved (restricted to 2 dimensions)
	Resolving forces in 2 dimensions
	Equilibrium of a particle under coplanar forces
<b>Functions &amp; Graphs</b>	Simplify rational expressions including by factorising and cancelling, and algebraic division (by linear expressions only)
	The modulus of a linear function
	Understand and use composite functions
	Combinations of transformations (translations and stretches)
<b>Binomial Expansion</b>	Extend the binomial theorem to any rational value of $n$ (including negatives and fractions), including its use for approximation and being aware of when the expansion is valid.
<b>Numerical Methods</b>	Understand and use numerical integration of functions, including the use of the trapezium rule and estimating the approximate area under a curve and limits that it must lie between. Locate roots of $f(x) = 0$ . Solve equations approximately using simple iterative methods; be able to draw associated cobweb and staircase diagrams
	Solve equations using the Newton-Raphson method and other recurrence relations
<b>Parametric Equations</b>	Understand and use the parametric equations of curves and conversion between Cartesian and parametric forms. Use parametric equations in modelling in a variety of contexts. Differentiate and integrate parametric equations.
<b>HALF TERM</b>	



Regression & Correlation	Interpret scatter diagrams and regression lines for bivariate data,
Proof	Proof by contradiction
Revision	
EASTER	

Revision

HALF TERM