



KING'S COLLEGE SCHOOL
WIMBLEDON

Mathematics Department

Handbook 2019-2020

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§1 Schemes of Work

1.01 Intermediate Maths Challenge Questions by topic

		2010	2009	2008	2007	2006	2005	2004	2003	2002	2001
Number	Bodmas	1	1		5						
	Multiples		10,11	5,22	7,11,19						4,6
	Prime numbers	3	2,16	2		3					
	HCF		18								
	Negative integers				14						1
	Estimation	4					12	8			9
	Percentages		3	4,11	13	13,17	2,22				
	Fractions	5	6		2,4	1	8	10			3
	Decimals			3							
	MDV						17				
	DST	18	19			6					
	Proportion						15				
	Ratio	22	9,23		9		25				
	Indices		14			18					
	Problem solving	8				10,16					
	Recurring decimals			18		15					
Shape and space											
	Int. and ext. angles	2	12	21	10,15	19	7,14	4			10
	Triangle geometry	6	4	10,21			13	15			
	Circle geometry	9,19	7,13	17	12	11,21					
	Perimeter				16						
	Surface area	12		9,12	13		9,16,18	7,9,12			
	Similarity		17			23					
	Scale factors	17									
	Pythagoras' theorem	23,25	20	20,25	20,21	14,21,24	11,21				
	Area		8								8
	Trigonometry			24	25						
	Congruency				3						
Algebra	Symmetry						3				
	Geometric reasoning			6		5,12					5
	Sequences	7		16		20		16			
	Simultaneous linear equations	13,14					23				
	Linear algebra	16,18	15	16	8,9,18		10,22	5,14			
	Multiplying out brackets						4				
Graphs	Inequalities	20									
	Quadratic equations		5	7	23						
	Difference of two squares			19							
Data											
	y = mx + c	15						13			
	Sketching				12						
Assorted											
	Probability		22	14				2			
	Permutations/combinations	21,24	21	14,23							
	Mean, median, mode			13	6,8	4,15	6,20				2,7
	Calendar knowledge!	10		1,8	1						
	Logic	11	24,25	15	17,22,24	2,7,9,22,25	5,19	3,6			
	Clock problems				17	8					

Autumn Term

			Notes
1	Number Skills	Book 1 Unit 2	<ul style="list-style-type: none"> Primes, factors, multiples (Venn Diagrams could be used). Understand, order and use place value for negatives (use of a number line). Use of < and > with negatives. Use the four operations with negatives. Long multiplication and division. Square numbers and cube numbers, powers and roots. Use conventional notation for the priority of operations, including brackets, powers, roots and reciprocals. Use a scientific calculator to calculate results accurately and then interpret and round if necessary. Use a scientific calculator (fx – 85WA): exploration of the functions; in particular square, square root, π, x^y, cube, cube root, reciprocal, fraction and Exp keys and what they mean; key in fractions and recognise equivalent decimal forms; use memory and bracket keys.
2	Equations, Functions and Formulae	Book 1 Unit 2	<ul style="list-style-type: none"> Use and interpret algebraic notation, e.g. ab, $3y$, a^2, a^2b, $\frac{a}{b}$, fractional coefficients and brackets. Understand and use the concepts and vocabulary of expressions, equations and terms. Collect like terms. Multiply algebraic terms. Construct expressions. Substitute numerical values into formulae (including powers) and derive formulae. Expand single brackets. Factorise expressions.
3	Fractions	Book 1 Unit 3	<ul style="list-style-type: none"> Understand, order and use place value for fractions of any size. Understand the idea of equivalent fractions, mixed numbers and top heavy fractions. Work interchangeably with terminating decimals and their
4			
5*		Book 1 Unit 4	

6			<p>corresponding fractions.</p> <ul style="list-style-type: none"> • Use fractions as operators, e.g. fractions of amounts. • Use of the four operations with proper and improper fractions, and mixed numbers. • Extension: fractions within fractions.
HALF TERM			
7			<ul style="list-style-type: none"> • Understand, order and use place value with decimals. • Round numbers and measures to appropriate degrees of accuracy, to decimal places. • Use of the four operations with decimals. • Work interchangeably with terminating/recurring decimals and their corresponding fractions and percentages. • Interpret percentages and percentage change as a fraction or decimal. • Find percentages of amounts. • Express one quantity as a percentage of another.
8	Decimals	Book 1 Unit 6	<ul style="list-style-type: none"> • Solve percentage increase and decrease problems, including profit and loss.
9			<ul style="list-style-type: none"> • Apply the properties of angles at a point, on a straight line, in a triangle and vertically opposite. • Understand and use the relationship between parallel lines and alternate and corresponding angles. • Name regular polygons. • Symmetry of regular polygons, including rotational. • Find exterior and interior angles of a polygon.
10 *	Angles and Shapes	Book 1 Unit 5	
11	Christ mas Activiti es!		

Spring Term

			Notes
1	Equations	Book 1 Unit 7 (not 7.4)	<ul style="list-style-type: none"> • Recognise and use relationships between operations including inverse operations. • Use algebraic methods to solve linear equations in one variable, including: two step and unknown on both sides (including brackets, but only simple fractions). • Solve problems using equations.
2			<ul style="list-style-type: none"> • Use ratio notation and reduce ratios to their simplest form. • Divide a given quantity into a two or three part ratio and manipulate backwards to find an original total amount. • Use the idea of ratio and proportion to change freely between related units and other quantities, e.g. currencies and map scales. • Solve simple word problems involving ratio and direct/inverse proportion. • Find unitary ratios and use of the unitary method.
3	Ratio and Proportion	Book 1 Unit 8 (not 8.1)	<ul style="list-style-type: none"> • Derive and illustrate properties of triangles, quadrilaterals and other plane figures using appropriate language and terminology (e.g. side lengths, parallel sides, diagonals, angles, etc.) • Derive and apply formulae to calculate and solve problems involving perimeter and area of triangles, parallelograms, trapezia, including compound shapes. • Use the properties of faces, surfaces, edges and vertices of 3D solids and know their nets. • Find the surface area and volume of cubes and cuboids (including composite solids). • Understand and convert between relevant units.
4*			
5	Perimeter, Area and Volume (to be finished in week 6 after half term)	Book 1 Unit 9 (9.6 if time)	
HALF TERM			

6	Perimeter, Area and Volume (finishing off from week 5 before half term)	Book 1 Unit 9 (9.6 if time)	<ul style="list-style-type: none"> Derive and illustrate properties of triangles, quadrilaterals and other plane figures using appropriate language and terminology (e.g. side lengths, parallel sides, diagonals, angles, etc.) Derive and apply formulae to calculate and solve problems involving perimeter and area of triangles, parallelograms, trapezia, including compound shapes. Use the properties of faces, surfaces, edges and vertices of 3D solids and know their nets. Find the surface area and volume of cubes and cuboids (including composite solids). Understand and convert between relevant units.
7	Sequences and Graphs		<ul style="list-style-type: none"> Find and describe term-to-term rules. Find an nth term (or position-to-term) for arithmetic sequences. Substitute into nth term rule to find particular values. Generate sequences and predict how they will continue. Recognise geometric sequences and work out the term-to-term rule. Work with coordinates in all four quadrants. Work out the midpoint of a line segment. Fill in tables of values from an equation and use them to draw a straight line. Recognise straight line graphs parallel to the axes. <ul style="list-style-type: none"> Recognise graphs of $y=x$ and $y=-x$. Extension: investigate linear and quadratic graphs.
8		Book 1 Unit 10	<ul style="list-style-type: none"> Appreciate different types of data (continuous, discrete, quantitative, qualitative etc.) Construct and interpret bar charts, pie charts and pictograms, as well as vertical line (or bar charts) for ungrouped and grouped numerical data. Find averages (mean, median and mode, also range) from lists of data and tables of discrete data. Use grouped frequency tables to calculate means, medians and modes Comparison of multiple data sets using measures of central tendency and spread. Discussion of most appropriate measures for analysis in different scenarios. Describe simple mathematical relationships between two variables and illustrate using scatter graphs. (Include ideas of correlation: weak/strong positive/negative).

Summer Term

			Notes
1	Factors and Powers	Book 2 Unit 1 (not 1.3)	<ul style="list-style-type: none"> Revise factors and multiples. Understand prime factorisation and use it to find LCMs and HCFs (Venn Diagrams could be used). Use simple indices rules (with numbers not algebra). Round numbers and measures to appropriate degrees of accuracy, to significant figures (revise rounding to decimal places). Estimate using rounding.
2			<ul style="list-style-type: none"> Simplify algebraic expressions involving collecting like terms, terms with powers and expanding brackets. Use indices rules with algebraic terms, including cancelling simple algebraic fractions. Factorise an algebraic expression into one bracket. Substitute integers into expression as well as constructing and solving equations.
3	Manipulating Algebra (Mostly revision)	Book 2 Unit 2	<ul style="list-style-type: none"> Simplify algebraic expressions involving collecting like terms, terms with powers and expanding brackets. Use indices rules with algebraic terms, including cancelling simple algebraic fractions. Factorise an algebraic expression into one bracket. Substitute integers into expression as well as constructing and solving equations.
4*			
5	Revision		
HALF TERM			
6	Exams and Trip		
7	Logic and Venn Diagrams	n/a	<ul style="list-style-type: none"> Count and list sets, intersections and unions from tables, grids and Venn Diagrams. Not set notation Concepts of the infinite sets of integers, real and rational numbers.
8	Enrichment Activities		
9	Project Week		

Boys will be introduced to the Classwiz calculator but all tests will be non-calculator throughout the year.

Extension material is included in every chapter of the textbooks.

The use of Manga High will be encouraged.

Boys will be introduced to the Classwiz calculator but there will also be some non-calculator tests throughout the year. Extension material is included in every chapter of the textbooks.

Autumn Term

			Notes
1	Shapes and solids	Book 2 Unit 3	<ul style="list-style-type: none"> • Know the definition of a prism and specific names. • Use nets as 2D representations of 3D solids. • Calculate the surface area and volume of prisms. • Use appropriate language and terminology for the parts of a circle. • Understand the significance of π and be able to use it on a calculator. • Calculate and solve problems involving the circumference and area of a circle, as well as related composite shapes (semi-circles, quadrants and annuli, not sectors or segments). • Apply knowledge of prisms and circles to cylinders. • Use Pythagoras' Theorem to find a missing hypotenuse or a shorter side using a calculator and then rounding to a given degree of accuracy. • Knowledge of Pythagorean triples. • (Geometrical proofs of Pythagoras' Theorem. • Application of the theorem to real life problems.)
2			
3			
4	Transformations	Book 2 Unit 5 (Not 5.6)	<ul style="list-style-type: none"> • Describe and carry out translations (including with vectors), reflections (use equations for mirror lines) and rotations. Tracing paper may be used. • Describe and carry out enlargements using positive integer, negative and fractional scale factors. • Transform 2D shapes using a combination of transformations.
5*			
7	Fractions, Decimals and Percentages	Book 2 Unit 6 (6.1 and 6.4 if time)	<ul style="list-style-type: none"> • Revise fractions, decimals and percentages. • Use multipliers to calculate percentage changes, • Work out an original quantity before a percentage change.
8			
9	Constructions and Loci	Book 2 Unit 7	<ul style="list-style-type: none"> • Use a pair of compasses to accurately draw circles. • Construct triangles accurately using rulers and compasses. • Draw diagrams to scale.

10*			<ul style="list-style-type: none"> Construction of perpendicular bisectors and angle bisectors. Draw a locus and use loci to solve problems.
11			<ul style="list-style-type: none"> Use appropriate probability language (likely, certain, impossible, even chance, unlikely) and the 0 – 1 probability scale. Identify mutually exclusive events, Use probability notation and appreciate that $p(E') = 1 - p(E)$. Calculate relative frequency and use it to make estimates of the probability of an event and to calculate expected frequencies. Record, describe and analyse the frequency of outcomes of simple probability experiments involving randomness, fairness, equally and unequally likely outcomes. Work out expected results when an experiment is repeated. Generate theoretical sample spaces (e.g. lists of outcomes or tables) for single and combined events and use these to calculate theoretical probabilities. Use tree diagrams to find the probability of two or more events. <p style="text-align: right;">Extension: Probability with Venn Diagrams.</p>
12	Probability	Book 2 Unit 8	

Spring Term

			Notes
1	Graphs	Book 2 Unit 10 (not 10.5 or 10.6)	<ul style="list-style-type: none"> Plot straight line graphs from tables (cover up method or rearranging may be required). Find the y-intercept of a straight line. Find the gradient of a straight line. Plot graphs using the y-intercept and gradient. Use $y=mx+c$ and find the equation of a line from its graph. Understand the relationship between parallel and perpendicular lines.
2			<ul style="list-style-type: none"> Revise direct proportion. Draw and Interpret distance-time graphs. Use the graphs to solve problems. Calculate average speed from distance and time (relate to gradient).
3	Speed, Distance and Time	Book 2 Unit 4 (Not 4.2, 4.5 if time)	<ul style="list-style-type: none"> Interpret scale drawings and use a scale in converting between real and drawn distances e.g. 1 : 100 000 is equivalent to 1cm to 1km. Relate scales to ratio. Revise angle rules in parallel lines. Bearings measured in degrees, clockwise from the
4*	Scale drawings and Measures	Book 2 Unit 9	

5				<p>North. Calculate Back-bearings.</p> <ul style="list-style-type: none"> • The link between Bearings and Eight-point compass directions. • Combining up to three stages of a journey, given in terms of distances and bearings. <p>Similarity and congruence.</p>
6				<ul style="list-style-type: none"> • Revise fractions. • Find the reciprocal of a number and work with reciprocals. • Revise indices rules. • Work with negative indices and work out powers of fractions. • Write and order numbers in standard form (positive and negative powers). • Calculate with numbers in standard from.
7			Book 3 Unit 1 <small>(1.5 if time, not 1.6)</small>	
8				<ul style="list-style-type: none"> • Solve linear inequalities and represent the solution on a number line. • Use indices laws with algebraic terms, including zero and negative powers. • Revise solving linear equations. • Solve linear equations involving algebraic fractions. • Change the subject of a basic formula. • Change algebraic fractions in equivalent fractions, finding an algebraic common denominator. • Solve more complex problems with fractions in formulae.
9*			Book 3 Unit 3	
10				
	Powers and Roots			
		Inequalities, Equations and Formulae		

Summer Term

			Notes
1	Graphical Solutions	Book 3 Unit 8 <small>(not 8.5)</small>	<ul style="list-style-type: none"> • Solve simple simultaneous equations by substitution and elimination. • Solve more complex simultaneous equations. • Revise $y=mx+c$ and rearrange equations to find the gradient and y-intercept. • Find an equation of a line between two points. • Solve simultaneous equations by drawing graphs.
2			<ul style="list-style-type: none"> • Understand the parabolic shape of quadratic functions and identify their graphs. • Draw quadratic graphs from tables of values.
3	Quadratic Graphs	Book 3 Unit 6.1	
4*	Revision		
5	Revision		
HALF TERM			
6	Progress Tests		
7	Returning Tests		
8	Proof	Book 3 Unit 10 <small>(10.2 if time)</small>	<ul style="list-style-type: none"> • Explain, show and justify a mathematical solution. • Identify the difference between giving an example and proving a theory. • Understand how to use mathematical proof. • Present a logical argument using algebra.
9	Enrichment Activities		

1.3 Fourth Form

Autumn Term

1	Indices
2	Standard form
3	Pythagoras
4	Right angled Trigonometry
5	Right angled Trigonometry (triangles formed by radius and either chord or tangent)
6	[Test 1] Linear equations
7	Linear graphs (parallel and perpendicular)
8	Changing the subject of formulae
9	Simultaneous equations (two linear)
10	Multiplying out brackets
11	[Test 2] Factorising quadratic expressions
12	Solving quadratic equations by factorising (not formula)
13	Reverse percentages and repeated proportional change

Spring Term

1	Area and Volume
2	Arc, sector and segment
3	Average, range
4	[Test 3] Cumulative frequency and Box Plots
5	Histograms (unequal class widths, continuous data)
6	Bounds
7	Similarity, use of the term congruent (not proofs)
8	Length, area and volume of similar shapes
9	[Test 4]
10	Inequalities (quadratic inequalities as optional extension)
11	Shading regions

Summer Term

1	Transformations
2	Probability, conditional probability
3	Tangents to curved graphs, distance-time and speed-time
4	[Test 5]
5	Revision
6	[Exam 1 and 2]
7	Plotting simple quadratic graphs
8	Simple transformations of quadratic graphs

1.4 Lower Fifth Sets A-E

Autumn Term

1	Surds, rationalising denominator $\frac{1}{(3 + \sqrt{2})}$ Recurring decimals
2	Indices
3	Algebra, expanding up to three brackets and factorising
4	Solving quadratic equations by factorising
5	Solving quadratic equations by the formula [Test 1]
6	Pythagoras, trigonometry, 3D problems
7	Sine rule, cosine rule
8	Area of a triangle
9	[Test 2] Trigonometric graphs
10	Direct and inverse proportion
11	Rearranging formulae
12	Algebraic fractions
13	Algebraic fractions

Spring Term

1	Solving equations with algebraic fractions
2	(Eight) Circle theorems
3	Intersecting chords
4	IMC week [Test 3] Constructions
5	Sets
6	Sets
7	Functions, composition, inverses
8	Domain and range, piece-wise functions
9	[Test 4] Coordinate geometry (midpoint, distance, gradient)
10	Linear (parallel and perpendicular) and non-linear graphs

Summer Term

1	Graphical solution of equations
2	Vectors
3	Vectors
4	[Test 5]
5	Revision
6	[Exam 1 and 2]
7	Transformations of trigonometric graphs
8	Transformations of trigonometric graphs

1.5 Lower Fifth Sets F-G

Autumn Term

1	Surds, rationalising denominator $\frac{1}{(3 + \sqrt{2})}$ Recurring decimals
2	Indices
3	Algebra, expanding up to three brackets and factorising
4	Solving quadratic equations by factorising
5	Solving quadratic equations by the formula [Test 1]
6	Pythagoras, trigonometry, 3D problems
7	Sine rule, cosine rule
8	Area of a triangle
9	[Test 2] Trigonometric graphs
10	Direct and inverse proportion
11	Rearranging formulae
12	Algebraic fractions (taster)
13	Algebraic fractions (taster)

Spring Term

1	Solve equations with fractions (taster)
2	Arcs and sectors
3	Volume and surface area
4	Similarity, triangles, length, area and volume
5	(Eight) circle theorems
6	Intersecting chords [Test 3]
7	Sets
8	Sets
9	[Test 4] Probability
10	Tree diagrams

Summer Term

1	Coordinate geometry (midpoint, distance, gradient)
2	Linear (parallel and perpendicular)
3	Non-linear graphs
4	[Test 5]
5	Revision
6	[Exam 1 and 2]
7	Transformations of trigonometric graphs
8	Transformations of trigonometric graphs

1.6 Upper Fifth Sets A-D

AQA Level 2 Certificate in Further Maths 8365

Autumn Term		Syllabus	Text	
1	Coordinate geometry. Parallel, perpendicular, distance, midpoint. Unstructured IGCSE problem solving questions.	3.1-3.6	5A, 5B, 5D	
2	Completing the square.	2.12	2F	
2	Solving quadratic equations, sketching quadratic graphs.	2.12	3F, 4A 4F (disq ^d quad ^d)	
3	Transformations of quadratic graphs.	IGCSE	-	
4	Trigonometry, equations and identities, exact form for known angles, ambiguous case of sine rule.	6.6-6.10	6E, 6F, 7B	
5	The circle.	3.7-3.8	5E	
5	Equation of a tangent to a circle	3.9	5F	
6	Simultaneous equations, linear and quadratic.	2.15	4B	
6	Three unknowns.	2.16	4K	
7	Quadratic inequalities.	2.17	4D, 4E	
8	Factor theorem.	<i>Optional content:</i> <i>Algebraic division</i> <i>Equating coefficients</i> <i>Remainder Theorem</i>	2.11	4C
9	Arithmetic series; terms (learn formula) and sums (given formula).	IGCSE	-	
10	n^{th} term of linear and quadratic sequences.	2.21-2.22	4H, 4I	
10	Limit of a sequence.	2.20	4J	
11	Permutations.	1.2	1I	
11	The Binomial Expansion.	2.7	1F, 1G	
12	Differentiation.	<i>Optional content:</i> <i>First principles</i>	4.1-4.3	8A, 8B
12	Tangents and normal.	4.4	8C	
13	Stationary points. The terms “increasing” and “decreasing”. Second Derivative. Application to kinematics (not suvat).	4.5-4.7, 4.9	8D, 8E	
13	Optimisation.	4.8	8F	

Spring Term		Syllabus	Text
1	Mock 1 (IGCSE)		
2	Mock 2 (Further Maths)		
3	Completion of any outstanding autumn term topics		
4	2x2 and 2x1 Matrices. Identity matrix. Transformations of the unit square (rotations multiples of 90 about O, reflections in the axes or $y=\pm x$, enlargements about O). Matrix products for compound transformations.	5.1-5.4	9A, 9B, 9C, 9D
5	Algebraic proof.	2.19	4G
6	Exponential Functions. Graph of $y = ab^{\pm x}$	2.12	3H 4F (exp. eqns)
	IGCSE and Further Maths revision.		

1.7 Upper Fifth Set E

Autumn Term

1	Completing the square Solving quadratic equations, sketching quadratic graphs.
2	Transformations of quadratic graphs.
3	Graph sketching, linear, quadratic, cubic, reciprocal Graphical solution of equations
4	Quadratic inequalities, $4x^2 > 25$ Quadratic inequalities, $x^2 + 3x + 2 > 0$
5	[Test 1] Simultaneous equations; one linear, one quadratic
6	Vectors
7	Vectors

Half term homework: Past paper questions

8	Differentiation, gradient
9	Max and min, kinematics
10	[Test 2] Arithmetic series; terms (learn formula)
11	Arithmetic series; sums (given formula)
12	Algebraic fractions, simplifying, solving equations
13	Algebraic proof
14	Revision of IGCSE by papers

Christmas holiday homework: IGCSE papers

Spring Term

1	Mock 1 (IGCSE Paper 3H)
2	Mock 2 (IGCSE Paper 4H)
3	Go over mocks
4	IGCSE revision
5	IGCSE revision
6	IGCSE revision
7	IGCSE revision
8	IGCSE revision
9	IGCSE revision
10	IGCSE revision

Easter holiday homework: IGCSE papers

Summer Term

1	IGCSE revision
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1.8 Upper Fifth Sets F-G

Autumn Term

1	Completing the square
2	Solving quadratic equations, sketching quadratic graphs
3	Transformations of quadratic graphs
4	Graph sketching, linear, quadratic, cubic, reciprocal
5	[Test 1] Graphical solution of equations
6	Quadratic inequalities, $4x^2 > 25$ Quadratic inequalities, $x^2 + 3x + 2 > 0$
7	Simultaneous equations; one linear, one quadratic

Half term homework: Past paper questions

8	Differentiation, gradient
9	Max and min, kinematics
10	<i>Test 2</i> Functions, notation, domain, range
11	Functions, composition, inverse
12	Vectors
13	Vectors
14	Constructions

Christmas holiday homework: IGCSE papers

Spring Term

1	Mock 1 (IGCSE Paper 3H)
2	Mock 2 (IGCSE Paper 4H)
3	Arithmetic series; terms (learn formula)
4	Arithmetic series; sums (given formula)
5	Algebraic fractions, simplifying, solving equations
6	Algebraic proof
7	IGCSE revision
8	IGCSE revision
9	IGCSE revision
10	IGCSE revision

Easter holiday homework: IGCSE papers

Summer Term

1 - 3	IGCSE revision
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1.9 Lower Sixth Single A Level

Autumn Term - Chapters refer to Pearson books. (5) = Year 1 book Chapter 5. [5] = Year 2 book Chapter 5.

(app 5) = Year 1 applied book chp 5.

Week	Teacher A – Calculus – 4 lessons per week	Teacher B – Trig – 3 lessons per week
1	Surds and Indices (1)	Co-ordinates, Points and Lines (5)
2	Quadratics (2) – continue to review chp1/2 throughout term	Co-ord' Geom'/Circles (6)
3	Differentiation (12.1-7) – incl from first principles but doesn't need to be done first	Circles (6)
4	As above	Circles/Quadratic Inequalities(3.5)
5 Test 1	Test 1/ Graphs sketching and transformations (4)	Test 1/ regions on graphs (3.6-7)
6	Graphs sketching and transformations (4) – trans' trig graphs is done with other teacher	Simultaneous equations(3.2-3)/ Binomial Exp – n=1,2,3,... (8)
7	Applications of Diff (12.8-11)	Binomial Exp – n=1,2,3,... (8)
HT		Trig equations (10) –recap sine/cosine rule (9.1-3) with hwk?
8	Applications of Diff (12.8-11)	Trig equations (10)
9 Test 2	Test single, both topics. Exp and logs (14.1-7) – 14.8 covered by other teaching in Spring	Trig equations (10)
10	Exp and logs (14.1-7)	Transforming trig graphs (9.5-6)
11	Exp and logs (14.1-7)	Algebraic fractions/poly division (7.1-7.2)
12	Integration of poly' terms (13)	Factor theorem (7.3) – could teach rem' thm' [extension] as well
13	Consolidation	Consolidation

Spring Term

Week		
1	Test 3/Integration: finding areas(13)	Test 3/ Recap logs and cover log graphs (14.8)
2	Integration: areas between two curves (though only between curves and lines in book) (13) – hand out applied year 1 book	Recap logs and cover log graphs (14.8) – hand out year 2 book
3 Test	Stats – measures of spread incl var' and s.d/coding (App chp 2)	Functions [2]
4	Sampling (app 1) – could be completed as research using book, good grid in shared drive. /representation (app 3) mostly gcse recap	Functions [2] - incl modulus
5	Regression (app 4) just interpretation no need to find eqn of regression line on calc or otherwise. Probability (app 5)	Radians – incl small angle approx [5] use old c2 resources to recap trig equations but in radians
6	Discrete dist: uniform and general excl. E(X) or Var(x). Binomial dist using calc and table (app 6)	Recip' trig fns and trig inverse [6]
7	Hyp test for bin (app 7)	Recip' trig fns and trig inverse [6]

8	Hyp test/consolidation	Trig [7.1-6] compound, double angle, $r\cos(x+a)$, identities
9	Stats Consolidation – Qs on discrete pdfs from past papers	Trig [7.1-6]. {Trig graph modelling completed next year}
10	Diff of exp and ln	Sequences and series [3]

Summer term

Week		
1	Chain Rule/product rule/quotient rule but not chapter 9 as trig diff is not covered yet. Use old C3 solomon sheets.	Sequences and series [3]
2	As above	Sequences and series [3] incl periodic seqs (sheet in shared drive)/revision
3	Revision/Modelling questions	revision
4	Revision Summer Exams. Pupils have covered all AS material for pure and stats plus some year 2 pure topics.	
5		
6		
7		
8		
9	Proof [1]	Differentiation of sin and cos [9.1] recap [9.2-6]
10		

Notes on stats

- Stats chpts 1,3,4,5 should be quick with use of homework as well, leaving time for challenging exam Q practice at the end. Most of chp 1,3,4,5, is recap. Textbook questions are reasonable for practice to start but before the summer exam pupils would benefit from seeing some past paper questions on discrete pdfs for example.
- Large data set – please don't devote significant time to this on its own. There are a few homework tasks on the KLP which are okay. There is a presentation covering the key knowledge in the shared drive. SAW will show them this is the U6th before their final exams.
- Students should understand commands words such as: *Give an interpretation on the relationship between the variables on the scatter graph*

1.10 Upper Sixth Single A Level

Autumn Term – Chapters refer to Pearson books. [5] = Year 2 book Chapter 5. (5) = Year 1 book Chapter 5.

Week	Teacher A – Calculus	Teacher B – Trig
1	Rates of change [9.10] recap diff for: exps, logs, trig, chain rule, product rule, quotient	Start Mechanics. Hand out year 1 and 2 applied books. Vectors (App 10.1-4). Use (11) and [12] for some pure vectors hwk, just igcse recap; no scalar prod or equation of line.
2	Integration [11.1-11.5]	SUVAT/travel graphs [9]
3	Integration by sub [11.1-11.5] and parts [11.6]	Freefall/projectiles [6]
4	Partial fractions [1] incl integration [11.7] excl binomial exp until next week	Projectiles [6]
5	Binomial –ve and frac n [4]	Forces horizontal and vertical (10.5-6) incl pulleys
6	As above	Forces incl friction and slopes [7]
7	Trapezium rule [11.9] and finding areas [11.8] which is mostly recap.	Application of forces [7] equilibrium problem, connected particles, slopes
	HT hwk: recap of year 1 stats	HT: Use (11) and [12] for some pure vectors hwk
8	Start stats year 2. Regression [app 1]	Application of forces [7] equilibrium problem, connected particles, slopes
9	Conditional prob – bayes theorem [app 2]/Normal dist[3]	Variable acceleration (9)/[8]
10	Normal incl approx. to binomial [3.1-3.6] mostly with calc	Variable acceleration (9)/[8]
11	Test/ Hyp test with normal	Moments [4]
12	Hyp test with normal	Moments [4] incl ladders and hinges
13	<i>Consolidation</i>	<i>Consolidation</i>

Spring Term

Week		
1	Test	Test
2	Diff equations [11.10-11]	Parametric equations [8]
3	Diff equations [11.10-11]	Parametric equations [8]
4	Review chapter 11	parametric diff and integration [9.7]-para int' not in book see shared drive or old Edex' C4
5	Numerical methods [10]	implicit diff [9.8]
6	Trig graph modelling [7.7]	Binomial exp [4] (review)
7	Review trig [5,6,7]	Sequences [3] (review) incl periodic
8	Revision	Curvature/POIs (review)
9	Revision	Revision
10	revision	Revision

Summer term: 2-3 weeks of revision/tests

1.11 Lower Sixth Further Maths A Level

Autumn Term - Chapters refer to Pearson books. (5) = Year 1 book Chapter 5. [5] = Year 2 book Chapter 5.

(app 5) = Year 1 applied book chp 5. First term is about building key skills

Week	Topics A – Pure	Topics B – Pure and Mech	Topics C – Pure and stats
Throughout term recap with hwk:	Triangle geom/trig/algebraic fractions	Surds/indices, quadratics – sketching, discriminant	Coordinate geom, proportionality, sim eqns
1	Transforming graphs and sketching	Poly division/factor/remainder theorem and solving cubics	Review coordinate geometry (5) and circles (6)
2	Graph sketching – repeated roots, behaviour at infinity, dominant part	Surds/Indices/differentiation; incl First Principles. (12)	Inequalities – quadratics and 2D regions with curves (3)
3	Trigonometric Functions (10)	Applications of differentiation (12) NB: POI/concave/convex using 2 nd deriv in week 12	Exp and logs: basic understanding, laws of logs and eqns (14.4-6)
4	Radians [5] [hand out yr2 book] sectors, arcs, equations, small angle approx	Modelling with diff [12]	e and ln x and their derivatives and graphs (14.1-3, 14.7)
5	Modulus/functions [2]	Integration (13) - Not covered in gcse further maths so needs intro	Plotting log graphs (14.8)
6	Functions [2] Trig recip/inverse Fns [6]	Integration for finding areas (13)	Sequences and Series [3]
7	Trig: addition/double angle identities, proof, solving [7]	Differentiation [9.1-6]	Sequences and Series [3]
8	Trig: Rcos(theta+alpha) and trig graph modelling [7]	Differentiation [9.1-6]	Binomial Exp – n=1,2,3,... (8)- wasn't covered in gcse further maths 18-19
9	Trig consolidation [7]	Integration [11.1-11.4]	Binomial rational/-ve n [4]
10	Trapezium rule [11.9]	Integration [11.1-11.4]	Parametric equations [8]
11	Iteration incl staircase/cobweb [10]	Implicit and parametric differentiation (9.8)	Parametric equations [8]
12	Newt-Raphs [10]	2 nd deriv: POIs/concave/convex. Rates of change [9.9-10]	Algebra incl partial fractions [1] incl binomial exp but no integration
13	Review [10]/Consolidation	Review differentiation [9]	consolidation

Spring Term -

Week		Start mechanics	Start Stats
1	Test/Complex numbers intro (CP1 chp1)	Test/ Vectors (App 10.1-4). Use (11) and [12] for some pure vectors hwk, just igcse recap; no scalar prod or equation of line.	Test/Start stats
2	Complex numbers	Vectors/SUVAT/travel graphs	Stats – measures of spread incl var' and s.d/coding (App chp 2)
3	Complex numbers (CP1 Chp 5)	Freefall/projectiles [6]	Sampling (app 1)/representation (app 3) mostly gcse recap
4	Integration by PF [11.7]/ int by sub [11.5]	Projectiles [6]	Regression (app 4) just interpretation no need to find eqn of regression line on calc or otherwise. Conditional probability (app 5)
5	Integration by sub incl trig [11.5]	Forces horizontal and vertical (10.5-6) incl pulleys	Discrete dist: uniform and general. excl. E(X) or Var(x). Binomial dist using calc and table (app 6)
6	Parametric Int/Int by parts [11.6]. Para Int – not in book see shared drive or old Edex' C4	Resolving forces incl friction and slopes [7]	Hyp test for bin (app 7)
7	Volumes of revolutions	Resolving forces incl friction and slopes [7]	Regression [app 1]
8	Diff Equations [11.10-11]	Application of forces [7] equilibrium problem, connected particles, slopes	Conditional prob – bayes theorem [app 2]/Normal dist[3]
9	Vectors –scalar product, line eqn, cross prod (CP1 chp 7)	Variable acceleration (9)/[8]	Normal incl approx. to binomial [3.1-3.6] mostly with calc
10	Vectors –scalar product, line eqn, cross prod (CP1 chp 7)	Moments [4]	Hyp test with normal (not incl CLT)
	Use AEA papers throughout if you get ahead		

Summer term

Week			
1	Matrices multiplication (CP1 chp 2)	Mechanics Consolidation	Consolidation of Stats
2	Matrix transformations (CP1 chp 2)	Induction (CP1 chp 4)	Consolidation of Stats
3	Don't cover: det, inverses, solving eqns	Consolidation	You can start combinatorics from next year if you wish
4	Consolidation	Consolidation	
5			
6			
7			
8			
9	Matrices (CP1 chp 6)	Roots and coeffs of poly equations up to quartics	Sum and series incl method of differences [CP2]
10			

1.12 Upper Sixth Further Maths (Pure)

(FM1 7) is Hodder FM Core year 1 book chp 7

Autumn Term

Week	Fp2. Hand out (FM1) and use for recap homework occasionally. Hand out [FM2]	Additional resources can be found here:
1	Vector recap/teach cross product, vector eqn of plane. Use [FM2 chp 1] and possibly (FM1 chp 7.3)	
2	As above/intersection of planes using matrices [FM2 2.2]. NB. Inverse of 3x3 by hand needed	
3	Recap Matrices including transformations. Teach det=area SF, finding invariant points. Use [FM2] and possibly (FM1 chp 2.5)	
4	Polar Coords [FM2 5]	Cambridge FP2 OCR book
5	Polar Coords	
6	Maclaurin Series [FM2 6]	Cambridge FP2 OCR book
7	Maclarurin/Hyp Trig	
8	Hyp Trig [FM2 7]	Cambridge FP2 OCR book
9	Integration: vol of rev(covered in yr 1), mean value fn [FM2 8]	
10	summarise integrals involving arctrig and arctrigh [FM2 8] Cambridge FP2	Cambridge FP2 OCR book
11	First order diff eqns. Modelling, sep variables, int factors [9.3]	Cambridge FP2 OCR book
12	As above	
13	Consolidation/ pupils should recap complex numbers yr 1	

Spring Term

Week		
1	Test	
2	Second order diff equations [FM2 12]	Cambridge FP3 OCR book
3	As above	
4	Complex numbers [FM2 10]	Cambridge FP3 OCR book
5	Vectors: finding distances [FM2 11]	Cambridge FP3 OCR book
6	As above	
7	Review Parametric Integration from single maths. Not in book, see shared drive or old Edex' C4	
8	Revision using – new syllabus resources plus old resources such as: FP2 OCR (excl: rational fns, reduction formulae, sandwich	
9	inequalities with series and ints, y squared sketching)	
10	FP3 OCR (excl: groups)	

Summer term - Revision/exams

1.13 Upper Sixth Further Maths (Mechanics)

[FMech chp 7] is Hodder FM Mechanics book chp 7

Autumn Term

Week	Further Mechanics - Chapter 1-4 are recap of mech from year 1, use for as necessary for lesson but mostly homework	Additional resources can be found here:
1	Recap of chapters 1-4 [FMech 1-4]	
2	Work, energy, power [FMech 5]	Old OCR M2 Cambridge book
3	As above	
4	As above	
5	Impulse/momentum [FMech 6]	Old OCR M1 Cambridge book
6	Dimensional analysis [FMech 7]	
7	Circular Motion [FMech 8]	Old OCR M2 Cambridge book
8	Centres of Mass [FMech 9 and 13]	
9	Centres of Mass [FMech 9 and 13]	
10	Centres of Mass [FMech 9 and 13]	
11	Motion under variable force [FMech 10]	
12	Motion under variable force [FMech 10]	
13	Consolidation	

Spring Term

Week		
1	Tests	
2	Circular Motion 2: variable speed, vertical circles [FMech 11] – for AS pupils need to know about vertical circles, see syllabus for more info.	
3	Circular Motion 2: variable speed, vertical circles [FMech 11]	
4	Hooke's Law [FMech 12]	Old OCR M3 Cambridge book
5	Hooke's Law [FMech 12]	
6	Hooke's Law [FMech 12]	
7	Oblique impacts	
8	Revision	
9	Revision	
10	Revision	

Summer term - Revision/exams

1.14 Upper Sixth Further Maths (Statistics)

[FStats chp 7] is Hodder FM statistics book chp 7

Autumn Term

Week	Further Stats	Additional resources can be found here:
1	Combinatorics [FStats 7]	Old OCR S1 Cambridge book
2	Combinatorics [FStats 7]	
3	Discrete RVs. Expectation and Var. [FStas 2]	
4	Fns of RVs [FStas 2]	
5	Binomial recap/Poisson [FStas 3]/geometric (not explicitly in spec but comes up in exams)	Old OCR S2 Cambridge book
6	Discrete RVs continued [FStas 3]	
7	Continuous RVs [FStats 8]	Old OCR S2 Cambridge book
8	Normal recap and sample mean distribution incl CLT [FStats 9]	Old OCR S2 Cambridge book
9	CLT/Confidence intervals [FStats 10]	
10	Confidence intervals [FStats 10]	
11	Hyp testing recap and then hyp testing using the sample mean distribution [FStats 11.1]. NB 11.2 comes later.	Old OCR S2 Cambridge book
12	As above	
13	Consolidation	

Spring Term

Week		
1	Tests	
2	Correlation [FStats 4]	
3	Regression [FStats 5]	
4	Chi Squared Tests [FStats 6]	
5	Consolidation of chp 4,5,6	
6	Goodness of fit testing [FStats 11.2]	
7	Non-parametric testing/Wilcoxon rank sum test [FStats 12]	
8	Revision	
9	Revision	
10	Revision	

Summer term - Revision/exams

1.15 Mathematics Higher Level Lower Sixth Topics A

3 Periods per week

Prior and assumed knowledge

Syllabus	
SL 1.1	Operations with numbers in standard form.
SL 1.5/1.7	Laws of exponents with integer and rational exponents.
SL 2.1	Different forms of the equation of a straight line. Gradient; intercepts. Parallel and perpendicular gradients.
SL 2.2	Function notation. The concept of a function as a mathematical model. Informal concept that an inverse function reverses or undoes the effect of a function.
SL 2.3/2.4	The graph of a function. Creating a sketch from information given or a context, including transferring a graph from screen to paper. Using technology to graph functions including their sums and differences. Determine key features of graphs. Finding the point of intersection of two curves or lines using technology.
SL 2.7	Solution of quadratic equations and the quadratic formula.
SL 2.8	The reciprocal function, its graph and self-inverse nature.
SL 2.10	Solving equations, both graphically and analytically. Use of technology to solve a variety of equations, including those where there is no appropriate analytic approach. Applications of graphing skills and solving equations that relate to real-life situations.
SL 3.1	Volume and surface area of three-dimensional solids including right-pyramid, right cone, sphere, hemisphere and combinations of these solids. The size of an angle between two intersecting lines or between a line and a plane.
SL 3.2	Use of sine, cosine and tangent ratios to find the sides and angles of right-angled triangles. The sine rule and cosine rules. Area of a triangle as $A = \frac{1}{2}ab \sin C$.
SL 3.3	Applications of right and non-right-angled trigonometry including Pythagoras. Angles of elevation and depression. Construction of labelled diagrams from written statements.
SL 4.2	Presentation of data (discrete and continuous): frequency distributions (tables). Histograms. Cumulative frequency; cumulative frequency graphs; use to find median, quartiles, percentiles, range and interquartile range (IQR).
SL 4.3	Measures of central tendency (mean, median and mode). Estimation of mean from grouped data. Modal class.
SL 4.5	Concepts of trial, outcome, equally likely outcomes, relative frequency, sample space (U) and event. The probability of an event A is $P(A) = \frac{n(A)}{n(U)}$. The complementary events A and A' . Expected number of occurrences.
SL 4.6	Use of Venn diagrams, tree diagrams, sample space diagrams and tables of outcomes to calculate probabilities.
SL 5.1	Derivative interpreted as gradient function and as rate of change.
SL 5.3	The derivative of functions of the form: $f(x) = ax^n + bx^{n-1} + \dots$
SL 5.4	Tangents and normals at a given point, and their equations.
HL 2.12	The factor theorem.

Autumn

Week	Syllabus	
2	SL 2.6/2.7	The quadratic function $f(x) = ax^2 + bx + c$, $f(x) = a(x - p)(x - q)$, $f(x) = a(x - h)^2 + k$, its graph and features. Solution of quadratic inequalities. The discriminant and the nature of the roots.
3	HL 2.12	Sum and product of the roots of polynomial equations.
4	HL 2.12	Polynomial functions, their graphs and equations; zeros, roots and factors.
5	HL 2.15	Solutions of inequalities analytically.
5	HL 2.12	The remainder theorem.
6	HL 1.11	Partial fractions.
7	SL 2.2	Concept of a function, domain, range and graph.
7	SL 2.5	Composite functions. Identity function.
8	HL 2.14	Odd and even functions. Finding the inverse function $f^{-1}(x)$, including domain restriction. Self-inverse functions.
9	SL 2.11	Transformations of graphs. Translations, Reflections , Stretches. Vertical stretch with scale factor $p : y = pf(x)$. Horizontal stretch with scale factor $\frac{1}{q} : y = f(qx)$ Composite transformations. Awareness of the relevance of the order of transformations e.g. $\sin(3x + 30)$, $2 \sin x + 1$
10	SL 3.7	The circular functions $\sin x$, $\cos x$, $\tan x$; amplitude, their periodic nature, and their graphs. Composite functions of the form $f(x) = a \sin(b(x + c)) + d$. Transformations. Real-life contexts.
10	HL 3.9	The reciprocal trigonometrical ratios $\sec \theta$, $\operatorname{cosec} \theta$ and $\cot \theta$ and the inverse functions $f(x) = \arcsin x$, $f(x) = \arccos(x)$, $f(x) = \arctan x$; their domains and ranges; their graphs.
11	HL 2.16	The graphs of the functions, $y = f(x) $ and $y = f(x)$, $y = \frac{1}{f(x)}$, $y = f(ax+b)$, $y = [f(x)]^2$ Solution of modulus equations and inequalities. e.g. $ 3x \cos^{-1} x > 1$
12	SL 2.8	Rational functions of the form $f(x) = \frac{ax+b}{cx+d}$ and their graphs. Equations of vertical and horizontal asymptotes.
12	HL 2.13	Rational functions of the form $f(x) = \frac{ax+b}{cx^2+dx+e}$ and $f(x) = \frac{ax^2+bx+c}{dx+e}$ Oblique asymptotes.
13	HL 2.15	Solutions of inequalities graphically.

Spring

Week	Syllabus	
1	SL 1.5	Introduction to logarithms with base 10 and e. Numerical evaluation of logarithms using technology.
2	SL 1.7	Laws of logarithms. Change of base of a logarithm. Solving exponential equations, including using logarithms.
3	SL 2.9	Exponential functions and their graphs. Logarithmic functions and their graphs.
3	HL 5.12	Informal understanding of continuity and differentiability of a function at a point. Understanding of limits (convergence and divergence). Definition of derivative from first principles.
4	HL 5.12 SL 5.2	Higher derivatives. The notation $f^{(n)}(x)$ Increasing and decreasing functions. Graphical interpretation of $f'(x) > 0, f'(x) = 0, f'(x) < 0$.
4	SL 5.8	Local maximum and minimum points. Testing for maximum and minimum. Points of inflection with zero and non-zero gradients. Concavity.
5	HL 5.14 SL 5.7	Optimisation problems. The relationship between the graphs of f, f' and f'' .
6	SL 5.6	The chain rule for composite functions. The product and quotient rules.
7	SL 5.6	Derivative of $\sin x, \cos x, e^x$ and $\ln x$. Differentiation of a sum and a multiple of these functions.
8	HL 5.14	Implicit differentiation.
9	HL 5.15	Derivatives of $\tan x, \sec x, \csc x, \cot x, a^x, \log_a x, \sin^{-1} x, \cos^{-1} x, \tan^{-1} x$.
9	HL 5.14	Related rates of change.
10	HL 5.13	The evaluation of limits of the form $\lim_{x \rightarrow a} \frac{f(x)}{g(x)}$ and $\lim_{x \rightarrow \infty} \frac{f(x)}{g(x)}$ using l'Hôpital's Rule. Repeated use of l'Hôpital's rule.

Summer

Week	Syllabus	
1,2		Complete any outstanding topics from autumn/spring terms
3,4		Revision and past paper practice

1.16 Mathematics Higher Level Lower Sixth Higher Topics B

3 Periods per week

Prior and assumed knowledge – see 1.15 above

Autumn

Week	Syllabus	
2	SL1.2	Arithmetic sequences and series. Use of sigma notation for sums of arithmetic sequences. Applications. Analysis, interpretation and prediction where a model is not perfectly arithmetic in real-life. e.g. approximating common differences
3	SL 1.3	Geometric sequences and series.
	SL 1.4	Use of sigma notation for the sums of geometric sequences.
	SL 1.8	Sum of infinite convergent geometric sequences. Applications. e.g. population growth Financial applications of geometric sequences and series: Compound interest, annual depreciation
4,5	HL 1.10	Counting principles, including permutations and combinations. Not required, circular arrangements, repeated elements
6	SL 1.6	Simple deductive proof, numerical and algebraic; how to lay out a left-hand side to right-hand side (LHS to RHS) proof. e.g. show that $(x - 3)^2 + 5 \equiv x^2 - 6x + 14$ The symbols and notation for equality and identity.
6,7	HL 1.15	Proof by mathematical induction
7	HL 1.15	Proof by contradiction; e.g. $\sqrt{3}$ irrational, infinite number of primes, if $a \in \mathbb{Q}, b \notin \mathbb{Q}$ then $a + b \notin \mathbb{Q}$ Use of a counterexample to show that a statement is not always true. e.g. use a counter example to disprove the statement $n^2 + 41n + 41$ is prime
8	SL 3.4	The circle: radian measure of angles; length of an arc; area of a sector.
9	SL 3.5	Definition of $\cos x$ and $\sin x$ in terms of the unit circle, $\tan x$ in terms of $\cos x$ and $\sin x$. Exact values of trigonometric ratios of $0, \frac{\pi}{6}, \frac{\pi}{4}, \frac{\pi}{3}, \frac{\pi}{2}$ and their multiples. Extension of the sine rule to the ambiguous case.
9	HL 3.9	Definition of the reciprocal trigonometrical ratios $\sec \theta, \operatorname{cosec} \theta$ and $\cot \theta$.
10,11	SL 3.6 HL 3.10	The Pythagorean trigonometric identities. Compound angle identities. Double angle identities. The relationship between trigonometric ratios. e.g. given $\sin x$, find $\tan x$ without finding x
12	SL 1.6	Simple deductive proof, numerical and algebraic; how to lay out a left-hand side to right-hand side (LHS to RHS) proof. The symbols and notation for equality and identity.
13	HL 3.11	Relationships between trigonometric functions and the symmetry properties of their graphs.
13	SL 3.8	Solving trigonometric equations in a finite interval, both graphically and analytically. Equations leading to quadratic equations in $\sin x, \cos x, \tan x$

Spring

Week	Syllabus		
1	SL 4.6/4.11	<i>Mathematical Exploration</i>	Probability of combined events. Mutually exclusive events. Conditional probability. Independent events.
1	HL 4.13		Use of Bayes' theorem for a maximum of three events.
2	SL 4.1		Concepts of population, sample, random sample, discrete and continuous data. Reliability of data sources and bias in sampling. Interpretation of outliers. Sampling techniques and their effectiveness.
3	SL 4.2 SL 4.3		Production and understanding of box and whisker diagrams, including outliers and determining whether normal from symmetry . Measures of dispersion (interquartile range, standard deviation and variance). Effect of constant changes on the original data. Quartiles of discrete data.
4	SL 4.4/4.10		Linear correlation of bivariate data. Correlation vs causation . Pearson's product-moment correlation coefficient, r . Calculation of r by hand not required, awareness that only meaningful for linear relationships . Scatter diagrams; lines of best fit, by eye, passing through the mean point. Equation of the regression line of y on x and x on y . Use of the equation of the regression line for prediction purposes. Interpret the meaning of the parameters, a and b , in a linear regression $y = ax + b$.
5	SL 4.7		Concept of discrete random variables and their probability distributions. Expected value (mean) for discrete data. Applications.
6	HL 4.14		Variance of a discrete random variable. Continuous random variables and their probability density functions, including piece-wise. Mode and median of continuous random variables. Mean, variance and standard deviation of both discrete and continuous random variables. The effect of linear transformations of X .
7	SL 1.9		The binomial expansion for positive integer powers. Use of Pascal's triangle and ${}^n C_r$. e.g. find r when ${}^6 C_r = 20$, using a table of values generated with technology
8	HL 1.10		Extension of the binomial theorem to fractional and negative indices. $(a + b)^n, n \in \mathbb{Q}$
8	SL 4.8		Binomial distribution. Mean and variance of the binomial distribution.
9	SL 4.9		The normal distribution and curve. Properties of the normal distribution. Diagrammatic representation. Normal probability calculations. 68%, 95%, 99.7%
10	SL 4.12		Standardization of normal variables (z-values). Inverse normal calculations where mean and standard deviation are unknown.

Summer

Week	Syllabus		
1, 2		<i>Mathematical Exploration</i>	Complete any outstanding topics from autumn/spring terms
3, 4			Revision and past paper practice

3 Periods per week

Autumn

Week	Syllabus	
1	HL 1.12	Complex numbers. Cartesian form; the terms real part, imaginary part, conjugate. Modulus and argument. The complex plane.
2	HL 1.13	Modulus-argument (polar) form. Euler form. Sums, products and quotients in Cartesian, polar or Euler forms and their geometric interpretation.
3	HL 1.14	Complex conjugate roots of quadratic and polynomial equations with real coefficients.
4	HL 1.14	De Moivre's theorem and its extension to rational exponents.
4	HL 1.14	Powers and roots of complex numbers.
5	SL 3.1	The distance between two points in three-dimensional space, and their midpoint.
5	HL 3.12	Concept of a vector; position vectors; displacement vectors. Representation of vectors using directed line segments. Column vectors. Base vectors i, j, k . Algebraic and geometric approaches to the following: Magnitude of a vector, unit vectors. Proofs of geometrical properties using vectors.
6	HL 3.13	The definition of the scalar product of two vectors. Properties of scalar product, commutativity, distributive law, etc. The angle between two vectors Perpendicular vectors; parallel vectors.
6	HL 3.14	Vector equation of a line in two and three dimensions. The angle between two lines. Vector, parametric, Cartesian Simple applications to kinematics. Interpret λ as time and \mathbf{b} velocity in $\mathbf{r} = \mathbf{a} + \lambda\mathbf{b}$
7	HL 3.15	Coincident, parallel, intersecting and skew lines, distinguishing between these cases. Points of intersection.
8	HL 3.16	The definition of the vector product of two vectors. Properties of vector product, commutativity, distributive law, etc. Properties of the vector product. Geometric interpretation of $ \mathbf{v} \times \mathbf{w} $. Area of parallelogram and triangle
9	HL 3.17	Vector equations of a plane. $\mathbf{r} \cdot \mathbf{n} = \mathbf{a} \cdot \mathbf{n}$ equation of a plane. Cartesian equation of a plane.
11	HL 3.18	Intersections of: a line with a plane, two planes, three planes. Angle between: a line and a plane, two planes.
12,13	HL 1.16	Solutions of systems of linear equations (a maximum of three equations in three unknowns), including cases where there is a unique solution, an infinite number of solutions or no solution(s).

Spring

Week	Syllabus	
1		School Mocks.
2 - 9		Past Papers (Paper 1, 2, 3).
10		Department Mock.

Autumn

Week	Syllabus	
1	SL 5.5/5.11	Introduction to integration. Anti-differentiation with a boundary condition to determine the constant term. Definite integrals, including analytical approach. Definite integrals using technology.
2,3	SL 5.10 HL 5.15	Indefinite integral of $x^n, \sin x, \cos x, \frac{1}{x}, e^x$ Indefinite integrals of the derivatives of $\tan x, \sec x, \csc x, \cot x, a^x, \log_a x, \sin^{-1} x, \cos^{-1} x, \tan^{-1} x$. The composites of any of these with a linear function. Use of partial fractions to rearrange the integrand. Family of curves.
4,5	HL 5.16	Integration by substitution. Substitutions will be provided if not of the form $\int g'(x)f(g(x))dx$
5	HL 5.16	Integration by parts. Repeated integration by parts.
6	SL 5.5/5.11	Areas between a curve $y = f(x)$ and the x-axis. Areas between curves.
7	HL 5.17	Area of the region enclosed by a curve and the y-axis in a given interval. Volumes of revolution about the x-axis or y-axis.
7	SL 5.9	Kinematic problems involving displacement s, velocity v, acceleration a and total distance travelled.
8-10	HL 5.18	First order differential equations, variables separable. Homogeneous differential equation $\frac{dy}{dx} = f\left(\frac{y}{x}\right)$ using the substitution $y = vx$. Solution using the integrating factor.
11	HL 5.18	Numerical solution of $\frac{dy}{dx} = f(x, y)$ using Euler's method.
12	HL 5.19	Maclaurin series to obtain expansions for $e^x, \sin x, \cos x, \ln(1 + x), (1 + x)^p$. Use of simple substitution, products, integration and differentiation to obtain other series. Maclaurin series developed from differential equations.
13	HL 5.13	The evaluation of limits of the form $\lim_{x \rightarrow a} \frac{f(x)}{g(x)}$ and $\lim_{x \rightarrow \infty} \frac{f(x)}{g(x)}$ using Maclaurin series. Horizontal asymptotes.

Spring

Week	Syllabus	
1		School Mocks.
2 - 9		Past Papers (Paper 1, 2, 3).
10		Department Mock.

1.19 Upper Sixth Higher Level Topics A

2 Periods per week

Autumn

Week	Syllabus	
1	(1.5)	Complex Numbers, modulus and argument.
2	1.6	Polar form and Euler's form (i.e. exponential form). Argand diagram.
3	1.7	De Moivre's theorem and nth roots.
4	1.7	De Moivre's theorem and nth roots.
5	4.1 4.2	Vectors. Scalar product.
6	4.3	Lines.
7	4.4	Lines.
8	4.5	Vector product.
9	4.6	Planes.
10	4.7	Angles (line and plane, 2 planes).
11	4.7	Intersections (line and plane, 2 planes).
12	4.7	Intersections (line and plane, 2 planes).
13	4.7	Intersection of 3 planes.

Spring

Week	Syllabus	
1		School Mocks.
2		Past Papers (Core, Paper 1 & 2).
↓		↓
		Department Mocks.

1.20 Mathematics Higher Level Upper Sixth Higher Topics B Sets, Relations and Groups

4 Periods per week

Autumn

Week	Syllabus	
1	8.1	Sets, basic concepts, distributive laws, De Morgan's laws.
2	8.1	Proof of subset, proof of equality (by subset), proof by set algebra.
3	8.2	Cartesian product.
4	8.2	Relations, equivalence relations, equivalence classes.
5	8.2	Relations as subsets of Cartesian product.
6	8.2/3	Matrices of relations.
7	8.3	Functions, methods for showing a function injective/surjective.
8	8.3	Bijective functions, inverse functions.
9	8.3	Other examples of functions.
10	8.4/5	Binary operations, closed, associative, commutative, distributive.
11	8.6	Identity, inverse, operation tables.
12	8.7	Groups, definition, examples.
13	8.8	Examples from modular arithmetic, symmetry groups, groups of functions.

Spring

Week	Syllabus	
1		School Mocks.
2	8.9	Order of an element, order of a group, cyclic groups.
3	8.10	Permutations, cycles.
4	8.11	Subgroups.
5	8.11	Cosets, Lagrange's Theorem.
6	8.12	Isomorphism.
7	8.12	Homomorphism, kernel, range.
8		Revision.
9		Revision.
10		Department Mocks.

1.21 Mathematics Higher Level Upper Sixth Higher Topics B Statistics and Probability

4 Periods per week

Autumn

Week		
1	Review of relevant core stats: mean, standard deviation, random variables, binomial, poisson, normal	
2	Expectation and variance of functions of random variables. Combining independent random variables.	
3	Expectation and variance of sample mean and sample sum, linear combinations of normal variables.	
4	Central limit theorem	
5	Geometric distribution, negative binomial distribution	
6	Probability generating functions and their applications including mean and variance.	Examples of manipulating the pgf using the chain rule are needed
7	Cumulative probability functions for both discrete and continuous distributions; including medians and interquartile range.	
8	Distribution of a function of a random variable using the cdf	
9	Unbiased estimators of mean and variance, unbiased estimator theory	
10	Confidence intervals for population mean with known variance	
11	t-distribution and confidence intervals for population mean with unknown variance	
12	Hypothesis tests general theory	
13	Hypothesis tests for population mean when the variance is known.	

Spring Term

1	School Mocks	
2	Hypothesis tests for population mean when the variance is unknown.	
3	Paired t-tests, Type I and Type II Errors	
4	Bivariate distributions	
5	Covariance, correlation and hypothesis tests for the correlation coefficient	
6	Linear regression, gradients of regression lines, y on x and x on y regression	
7-10	Revision	

1.22 Mathematics Standard Level Lower Sixth

Prior and assumed knowledge

	1.1	Standard form.
	2.1	Equation of parallel and perpendicular lines.
	2.10	Solving equations graphically and analytically. Use of technology when there is no analytic solution. Applications of skills to real-life situations.
	3.1	Volume and surface area of three-dimensional solids including right-pyramid, right cone, sphere, hemisphere and combinations of these solids. The size of an angle between two intersecting lines or between a line and a plane.
	3.2	Solution of triangles. The cosine rule. The sine rule. Area of a triangle as $\frac{1}{2}abs\sin C$.
	3.3	Applications of right-angled trigonometry and Pythagoras. Elevation and depression.

Autumn Term

Week	Topic	
1-2	1.5/2.9	The function $x \rightarrow a^x, a > 0$. The inverse function $x \rightarrow \log_a x, a > 0$. Graphs of $y = a^x$ and $y = \log_a x$. The exponential function $x \rightarrow e^x$. The logarithmic function $x \rightarrow \ln x, x > 0$.
2	1.7	Introduction to exponentials and logarithms. Laws of Logarithms Change of Base
3	1.7	Solution of $a^x = b$ using logarithms
4	2.6	The quadratic function $x \rightarrow ax^2 + bx + c$: its graph, y-intercept $(0, c)$. Axis of symmetry $x = -b/2a$. The form $x \rightarrow a(x-h)^2 + k$: vertex (h, k) The form $x \rightarrow a(x-p)(x-q)$, x-intercepts $(p, 0)$ and $(q, 0)$.
4	2.11	Introduction of transformations of graphs relating to completing the square.
5	2.7	The solution of $ax^2 + bx + c = 0$, $a \neq 0$. The quadratic formula. Use of the discriminant $\Delta = b^2 - 4ac$.
6	2.2/2.3/ 2.4/2.5	Concept of function $f: x \rightarrow f(x)$: domain, range, graph. Concept of a function as a model. Composite functions $f \circ g$; the identity function. Inverse function f^{-1} .
7	2.8	The reciprocal function $y = 1/x, x \neq 0$: its graph; its self-inverse nature. The rational function $y = (ax + b)/(cx + d)$. Asymptotes.
8	3.4	The circle: radian measure of angles; length of an arc; area of a sector.
9	3.5	The circular functions $\sin x$, $\cos x$ and $\tan x$; their domains and ranges; their periodic nature; their graphs. Extension of the sine rule to the ambiguous case
10	2.11	Return to transformation of graphs in relation to trigonometric graphs. Composite functions of the form $f(x) = \sin(b(x+c)) + d$.
11	3.5/3.7	Definition of $\cos\theta$ and $\sin\theta$ in terms of the unit circle. Amplitude, periodic nature, graphs. Definition of $\tan\theta$ as $\sin\theta/\cos\theta$. $\sin, \cos, \tan, \pi/6, \pi/4, \pi/3$.
12	3.6 1.6	The identity: $\cos^2\theta + \sin^2\theta = 1$. Double angle formulae: $\sin 2\theta = 2\sin\theta\cos\theta$; $\cos 2\theta = \cos^2\theta - \sin^2\theta$. Given $\sin\theta$ (e.g.) find possible values of $\tan\theta$ without finding θ . Simple deductive proof, LHS to RHS, equality and identity
13	3.7/3.8	Solution of trigonometric equations in a finite interval. Equations of the type $\sin(b(x+c)) = k$. Real life contexts. Equations leading to quadratic equations in, for example, $\sin x$.

Spring Term

Week	Topic		
1	5.1/5.3	Mathematical Exploration – Draft submission before Easter	Informal ideas of limit and convergence. Limit notation. Definition of derivative as a limit. Derivative of x^n ($n \in \mathbb{Q}$). (Including from first principles.) Derivative interpreted as a gradient function and as rate of change.
1	5.4		Tangents and normals.
2-3	5.6		The chain rule for composite functions. The product and quotient rules.
4	5.7 5.8		Increasing and decreasing functions. Local maximum and minimum points. Points of inflexion, including non-zero gradient. The second derivative and its use in relation to turning points. The relationship between the graphs of f, f', f''
5	5.6		Derivative of $\sin x$, $\cos x$, $\tan x$, e^x and $\ln x$.
6	5.8		Optimisation
7	5.5		Indefinite integration as anti-differentiation. Indefinite integral of x^n ($n \neq -1$). Anti-differentiation with a boundary condition to determine the constant term. Definite integrals.
8	5.6/5.11		Areas under curves (between the curve and x-axis), areas between curves.
9	5.10		Indefinite integral of $\sin x$, $\cos x$, $1/x$ and e^x . The integral of composites of any of these with the linear function $ax + b$.
10	5.9		Kinematic problems involving displacement, s , velocity, v , and acceleration, a .

Summer Term

Week	Topic		
1	5.10	Mathematical Exploration Final submission due before half term	Integration by substitution
2	5.10		Integration by substitution
3	1.2/1.3 1.6		Arithmetic and Geometric sequences. Simple deductive proof, LHS to RHS, equality and identity
4	1.2/1.3/ 1.4/1.8		Series – summing terms of finite arithmetic series. Geometric series and convergence. Sigma notation. Applications. Compound interest, annual depreciation. Analysis, interpretation and prediction where a model is not perfectly arithmetic in real-life.
5			Revision
6			School Examinations
7			Go through examination
8-10			ToK & Extended Essay week/Activity Week/End of Term

Autumn Term

Week	Topic	
1	4.5/4.6	Concepts of trial, outcome, equally likely outcomes, sample space (U) and event. The probability of an event A as $P(A) = n(A)/n(U)$. The complementary events A and A' (not A); $P(A)+P(A')=1$. Use of Venn diagrams, tree diagrams and tables of outcomes to solve problems.
2	4.6	Combined events, the formula: $P(A \cup B) = P(A) + P(B) - P(A \cap B)$. $P(A \cap B) = 0$ for mutually exclusive events.
3	4.6/4.11	Conditional probability; the definition: $P(A B) = P(A \cap B)/P(B)$. Independent events: the definition: $P(A B) = P(A) = P(A B')$.
4	4.1	Concepts of population, sample, random sample and frequency distribution of discrete and continuous data. Frequency histograms with equal class width (frequency density not required), box and whisker, outliers. Reliability of data sources and bias in sampling. Sampling techniques and their effectiveness.
5	4.3	Mean, median, mode; quartiles, percentiles. Range; interquartile range; variance; standard deviation. Effect of constant changes.
6	4.2	Histograms. Cumulative frequency; cumulative frequency graphs; use to find median, quartiles, percentiles. Box and whisker.
7,8	4.4 4.10	Linear correlation of bivariate data. Pearson's product-moment correlation coefficient, r . Scatter diagrams; lines of best fit, by eye, passing through the mean point. Equation of the regression line of y on x and x on y . Use of the equation of the regression line for prediction purposes. Interpret the meaning of the parameters in a linear regression.
9	1.9	The Binomial Theorem, expansion of $(a+b)^n$, $n \in \mathbb{N}$.
10,11	4.7	Concept of discrete random variables and their probability distributions. Expected value (mean), $E(X)$ for discrete data. Applications.
12,13	4.8	Binomial distribution. Mean and variance of the binomial distribution.

Spring Term

Week	Topic	
1		School Mock Examinations
2, 3	4.9/4.12	Normal distribution. Properties of the normal distribution. Standardization of normal variables. Inverse normal calculations, mean and standard deviation unknown.
4-		Revision
		Department Mocks.

Autumn Term

Week	Topic	
1	4.1	Vectors as displacements in the plane and in three dimensions. Components of a vector (with respect to $\mathbf{i}, \mathbf{j}, \mathbf{k}$); column representation. Algebraic and geometric approaches to the following topics: The sum and difference of two vectors; the zero vector, the vector $-\mathbf{v}$; Multiplication by a scalar, $k\mathbf{v}$; Magnitude of a vector $ \mathbf{v} $; Unit vectors; base vectors $\mathbf{i}, \mathbf{j}, \mathbf{k}$; Position vectors $OA = \mathbf{a}$.
2	4.2	The scalar product of two vectors. Perpendicular vectors; parallel vectors. The angle between two vectors.
3	4.3	Representation of a line as $\mathbf{r} = \mathbf{a} + t\mathbf{b}$. The angle between two lines.
4	4.4	Distinguishing between coincident and parallel lines. Finding whether/where lines intersect.
5	5.5	Concepts of trial, outcome, equally likely outcomes, sample space (U) and event. The probability of an event A as $P(A) = n(A)/n(U)$. The complementary events A and A' (not A); $P(A)+P(A')=1$. Use of Venn diagrams, tree diagrams and tables of outcomes to solve problems.
6	5.6	Combined events, the formula: $P(A \cup B) = P(A) + P(B) - P(A \cap B)$. $P(A \cap B) = 0$ for mutually exclusive events.
7	5.6	Conditional probability; the definition: $P(A B) = P(A \cap B)/P(B)$. Independent events: the definition: $P(A B) = P(A) = P(A B')$.
8	5.1	Concepts of population, sample, random sample and frequency distribution of discrete and continuous data. Frequency histograms with equal class width (frequency density not required), box and whisker, outliers.
9	5.2	Mean, median, mode; quartiles, percentiles. Range; interquartile range; variance; standard deviation. Effect of constant changes.
10	5.3	Cumulative frequency; cumulative frequency graphs; use to find median, quartiles, percentiles.
11	5.4	Correlation and regression.
12	1.3	The Binomial Theorem, expansion of $(a+b)^n$, $n \in \mathbb{N}$.
13	5.7	Concept of discrete random variables and their probability distributions. Expected value (mean), $E(X)$ for discrete data.

Spring Term

Week	Topic	
1		School Mock Examinations
2	5.8	Binomial distribution. Mean and variance of the binomial distribution.
3	5.9	Normal distribution. Properties of the normal distribution. Standardization of normal variables.
4-		Revision Department Mocks.

1.25 Mathematical Studies

One Year Course

Presumed knowledge

Topic	
1.2	Decimal places, significant figures, percentage errors, estimation.
1.3	Standard Form.
1.4	SI units.
1.6	Solutions of pairs of linear equations in two variables. Solutions of quadratic equations: by factorizing.
5.4	Coordinates in two dimensions: points; lines; midpoints. Distances between points.
5.1	Equation of a line in two dimensions: the forms $y=mx + c$ and $ax + by + d = 0$. Gradient; intercepts. Points of intersection of lines; parallel lines; perpendicular lines.
2.3	Grouped discrete or continuous data: frequency tables; mid-interval values; upper and lower boundaries. Frequency histograms (equal class intervals).
2.2, 2.4	Frequency tables with simple discrete and grouped discrete data. Cumulative frequency tables for grouped discrete data and for grouped continuous data; cumulative frequency curves. Median; quartiles.
2.5	For simple discrete data: mean; median; mode. For grouped discrete and continuous data: approximate mean; modal class.
2.6	Measures of dispersion: range; interquartile range.
5.2	Right-angled trigonometry. Angles of elevation and depression.
5.3	The sine rule. The cosine rule. Area of a triangle as $\frac{1}{2}ab\sin C$. Construction of labelled diagrams from verbal statements.
5.4	Geometry of three-dimensional solids: cuboid; prism; pyramid; cylinder; sphere; hemisphere; cone. Sizes of angles between two lines and between lines and planes.
5.5	Volume and surface area of three-dimensional solids.
3.5	Basic concepts of set theory: elements; subsets; intersection; union; complement. Venn diagrams and simple applications.
6.1	Domain and range of a function.
6.2	Linear functions and their graphs.
6.3	The graph of the quadratic function: $f(x) = ax^2 + bx + c$. Property of symmetry; vertex; intercepts. Equation of line of symmetry.
3.6	Probability. Complementary events.
3.7	Tree diagrams, Venn diagrams, Sample space, tables of outcomes. Probability with replacement.

Autumn Term

Week	Topic	
1	1.6	<i>Lower 6th Induction Week.</i> Quadratic and simultaneous equations by use of GDC including functions and sketching.
2	7.1	Concept of derivative as a rate of change (not from first principles). Tangent to a curve.
2	7.2	The principle that $f'(x) = ax^n \rightarrow f'(x) = anx^{n-1}$ $\rightarrow f'(x) = an(n-1)x^{n-2}$ The derivative of functions of the form $f(x) = ax^n + bx^{n-1} + \dots, n \in \mathbb{Z}$
3	7.3	Gradients of curves for given values of x . Values of x where $f'(x)$ is given. Equation of the tangent at a given point. Equation of the normal at a given point.
4	7.4	Increasing and decreasing functions. Graphical interpretation of $f'(x) > 0, f'(x) = 0, f'(x) < 0$.
4	7.5	Values of x where the gradient of a curve is 0: solution of $f'(x) = 0$. Local maximum and minimum points. (Including optimisation problems).
5	2.1	TEST 1 Classification of data as discrete and continuous.
5	2.2	Simple discrete data: frequency polygons.
5	2.4	Box and whisker plots (box plots).
6	2.5	Measures of central tendency.
6	2.6	Measures of dispersion: standard deviation.
7,8	4.1	The normal distribution. The concept of a random variable, parameters μ and σ . Awareness that 68%, 95% and 99% of the data lies between $\mu \pm \sigma, \mu \pm 2\sigma, \mu \pm 3\sigma$. Use of sketches and shading when using GDC. Normal calculations using GDC, not tables. Inverse normal calculations (finding mean and standard deviation not required). Expected value. (Standardizing normal variables and use of z scores not required).
9	4.2	Scatter diagrams; line of best fit, by eye, passing through the mean point. Bivariate data: the concept of correlation. Pearson's product-moment correlation coefficient, from GDC. Interpretation of positive, zero and negative correlations.
9	4.3	The regression line for y on x , from GDC. Use of the regression line for prediction purposes.
10	4.4	The χ^2 test for independence: formulation of null and alternative hypotheses; significance levels; contingency tables; expected frequencies; degrees of freedom; p-values. Calculation of expected frequencies by hand. χ^2 from GDC only. Critical values will be given in examinations.
11	7.6	TEST 2 <i>Introduction to Coursework.</i>
12,13		Revision for mocks. (Hand out presumed knowledge pack.)

October Half Term – Exam paper revision on presumed knowledge topics.

Christmas Holidays – Past paper questions with solutions.

Spring Term

Week	Topic	
1	1.7	MOCK – all paper 1 questions. Arithmetic sequences and series, and their applications and use of the formulae n^{th} term and the sum of the first n terms.
2	1.8	Geometric sequences and series, and their applications and Use of the formulae for the n^{th} term and the sum of n terms.
3	1.9, 1.5	TEST 3 Financial applications of geometric sequences and series. Compound interest, compounding periods, depreciation and currency conversions. Simple interest not required.
4	1.1	The sets of natural numbers N; integers, Z; rational numbers, Q; and real numbers, R Concept of a function as a mathematical model. Linear & Quadratic models.
5	6.4	Exponential functions and their graphs. Graphs and properties of exponential functions. $f(x)=ka^{bx} + c$; Concept and equation of horizontal asymptotes. Exponential models.
6	6.5	Models of the form $f(x) = ax^m + bx^n + \dots$ for integers m, n, \dots The y -axis as vertical asymptote.
6	6.6	Accurate graph drawing. Use of a GDC to sketch and analyse combinations of the functions above.
6	6.7	Use of GDC to solve equations involving combinations of the functions above.
		COURSEWORK (in before half term for moderation.)
7	3.1	Basic concepts of symbolic logic: definition of a proposition; symbolic notation of propositions.
7	3.5, 3.2	Revision of basic concepts of set theory: elements; subsets; intersection; union; complement and Venn diagrams. Compound statements: implication, \Rightarrow ; equivalence, \Leftrightarrow ; negation, \neg ; conjunction, \wedge ; disjunction, \vee ; exclusive disjunction, $\vee\!\!\!/\!$. Translation between verbal statements, symbolic form.
8	3.3	Truth tables; concepts of logical contradiction and tautology.
8	3.4	Converse; inverse; contrapositive. Logical equivalence. Testing validity of arguments using truth tables.
9	3.6, 3.7	Probability – mutually exclusive, independence, combined events and conditional probability Exam paper revision.
10		Exam paper revision. MOCK – paper 2 sat over a double.

February Half Term Holiday – Exam paper revision.

Easter Holiday – Exam papers with solutions.

Summer Term

Week		
1		Revision of harder topics. Exam paper revision.
2		Exam paper revision (including mocks to be sat over doubles.)
3		IB Examinations (one half day of study leave required)

§2 Appendices

2.1 Homework, Testing and the Coordinator Role

Middle School Homework

Two homeworks should be set each week.

At least one piece per week should be formally assessed: marked with a letter (A⁺ - E), the mark recorded by the teacher, and the work returned next lesson.

Sixth Form Homework

For Sixth Form classes, at least one substantial piece of homework should be set each week.

This should be formally assessed: marked with a letter (A⁺ - E), the mark recorded by the teacher, and the work returned next lesson.

Homework in general

Homework should be a discreet task

Homework might include elements of reinforcement, extension and a return to earlier topics

Testing

There are formal one-period tests for all mathematics classes throughout the year, set after approximately five or six weeks of teaching. The tests are common to all classes following a Scheme of Work and set by the Coordinator.

The marks are recorded in the Mathematics Department EXCEL Markbook.

The tests give an opportunity to compare the progress of pupils following a common course.

The Coordinator Role

The responsibilities of the coordinator are:

- To be the first point of contact for the course
- To be proactive in running the course
- To coordinate discussions between those teaching the course
- To collate and distribute teaching resources
- To set internal tests, exams and provide revision material and produce mark schemes
- To copy and distribute past papers

2.2 Sets and Teachers

UHMA1	KES	SJN		Core	Sets & Groups	
UHMA2	SJB	SJN		Core	Sets & Groups	
UHMA3	DSF	MPS		Core	Statistics	
USMA4X	TRS					
USMA4Y	MJS					
U6FM1	DSF	AXT	SAW	Pure	Mechanics	Statistics
U6FM3A	MJS	SMC	DSF	Pure	Mechanics	Statistics
U6FM3B	TRS	SMC	SJB	Pure	Mechanics	Statistics
U6MA1	JEMJ	OJV		Mechanics	Statistics	
U6MA2	OJV	RMB		Mechanics	Statistics	
U6MA3	EN	RMB		Mechanics	Statistics	
U6MA4	AXT	SAW		Mechanics	Statistics	
LHMA1	MPS	MJS		Topics A	Topics B	
LHMA2	KES	DSF		Topics A	Topics B	
LHMA3	SJN	SJB		Topics A	Topics B	
LSMA4X	SJB					
LSMA5	MJS					
LSMS4X	KES					
LSMS5	RMB					
L6FM1A	SBM	SAW	TRS	Pure	Mechanics	Statistics
L6FM1B	SBM	SMC	TRS	Pure	Mechanics	Statistics
L6FM1C	KXM	RMB	OJV	Pure	Mechanics	Statistics
L6FM3A	KES	SMC	DSF	Pure	Mechanics	Statistics
L6FM3B	JEMJ	AXT	OJV	Pure	Mechanics	Statistics
L6MA1	JEMJ	SJB		Pure and Statistics (4 periods)	Pure (3 periods)	
L6MA2	SBM	SJB		Pure and Statistics (4 periods)	Pure (3 periods)	
L6MA3A	SBM	KXM		Pure and Statistics (4 periods)	Pure (3 periods)	
L6MA3B	SAW	JEMJ		Pure and Statistics (4 periods)	Pure (3 periods)	
L6MA4	EN	AXT		Pure and Statistics (4 periods)	Pure (3 periods)	
U5MAA	SJN					
U5MAB	DSF					
U5MAC	MJS					
U5MAD	MPS					
U5MAE	AXT					
U5MAF	EN					
U5MAG	KES					
L5MAA	SJB					
L5MAB	SMC					
L5MAC	TRS					
L5MAD	KXM					
L5MAE	MJS					
L5MAF	SAW					
L5MAG	SJN					
4AMAA	OJV					
4AMAB	KXM					
4AMAC	SBM					
4AMAD	JEMJ					
4BMAA	AXT					
4BMAB	SBM					
4BMAC	RMB					
8MA1	KXM					
8MA2	SMC					
8MA3	OJV					
7MAK	KES					
7MAC	EN					
7MAS	JEMJ					

2.3 Members of the Department

Name	Year appointed
Ratna Bhattacharya	September – 2017
Simon Bradley	September – 2016
Sergio Coury	September – 2018
Douglas Fickling	September – 2015
Julia James	September – 2017
Kevin Meng	September – 2018
Susan Mitchell	September – 2019
Emma Nicholl	September – 2014
Simon Nye	September – 2005
Anna Panaite	September – 2011
Tim Squires	September – 2011
Mark Stables	September – 1998
Michael Stenning	September – 2018
Koren Sullivan	January – 2016
Alex Trosser	September – 2015
Oliver Vella	September – 2019
Shane Williams	September – 2015

2.4 Departmental Responsibilities

SJN	Head of Department Department Mentor (KXM, SBM, OJV) Wednesday MAT preparation 11+ Exam	6th Form Entrance Exam Upper 6th HL Sets and Groups Coordinator Lower 6th Early Morning Maths
SAW	Deputy Head of Department A Level Coordinator Timetabled Support sessions Maths Challenges and Olympiads	Transfer Exam Upper 6th AL Further Pure Coordinator Lower Fifth Sets F-G Coordinator Out of sequence Admissions (in AJP's absence)
RMB	Upper 6th AL Pure and Statistics Coordinator House Maths challenge	Maths Studies Coordinator
SJB	Upper 6th Higher Core Coordinator Upper 6th AL Further Statistics Coordinator	Upper 6th STEP preparation Support for Engineers
SMC	Oxbridge interview practice Ab initio STEP Lower School Maths Club (rota)	Lower 6th Double A Level Mechanics Coordinator Upper 6th AL Further Mechanics Coordinator
DSF	Friday MAT preparation Middle School Extension Club	Lower 6th Higher Topics A Coordinator Lower 6th Higher Topics B Coordinator
JEMJ	Lower School Maths Club (rota) Lower Fifth Sets A–E Coordinator	Upper 6th AL Pure and Mechanics Coordinator Senior Aspirations
SBM	Lower 6th Single A Level Pure and Statistics Coordinator	
KXM	Lower School Maths Club (rota) Lower School Problem of the Week Middle School Problem of the Week	Year 8 Scholarship preparation Lower 6th Single AL Pure Coordinator
EN	Lower School Coordinator Year 8 Coordinator Upper Fifth Sets F-G Coordinator	Lower School Maths Club (rota) IGCSE past paper copying
AJP	Maternity Leave	Cayley Challenge
KES	UQT Mentor (KXM) Lower 6th Double A Level Pure Coordinator Team Maths Challenge for Partnership Schools	Lower School Maths Club (rota) Year 7 Coordinator
MJS	Upper Fifth Sets A-D Further Maths Coordinator Lower 6th Standard Level Coordinator	Hans Woyda Team IB Mathematical Exploration
MPS	Upper 6th HL Statistics Coordinator	
TRS	Upper 6th Standard Level Coordinator	Scholarship Exam
AXT	Oxbridge interview practice Fourth Form Coordinator Upper Fifth Set E Coordinator	Intermediate Maths Challenges Support for Physicists
OJV	Lower 6th Double A Level Statistics Coordinator Partnership Schools GCSE Revision Sessions Lower School Maths Club (rota)	

2.5 Department Coordinators

Year 7	KES
Year 8	EN
Fourth Form	AXT
Lower Fifth	
Sets A – E	JEMJ
Sets F – G	SAW
Upper Fifth	
Sets A – D	MJS
Set E	AXT
Sets F – G	EN
Lower Sixth	
Higher Topics A	DSF
Higher Topics B	DSF
Standard	MJS
Studies	RMB
Single AL Pure and Statistics	SBM
Single AL Pure	KXM
Double AL Pure	KES
Double AL Mechanics	SMC
Double AL Statistics	OJV
Upper Sixth	
Higher Core	SJB
Higher Option Statistics	MPS
Higher Option Sets and groups	SJN
Standard	TRS
AL Single Mechanics	JEMJ
AL Single Statistics	RMB
AL Further Pure	SAW
AL Further Mechanics	SMC
AL Further Statistics	SJB

2.6 Test Timetable

Upper 6th Test Timetable

UHMA1	KES	Core	Friday 4
UHMA2	SJB	Core	Friday 2*
UHMA3	DSF	Core	Friday 3*
UHMA1	SJN	Sets and Groups	Monday 1
UHMA2	SJN	Sets and Groups	Monday 6*
UHMA3	MPS	Statistics	Tuesday 4*

(* in paired teacher's lesson)

USMA4X	TRS		Friday 5
USMA4Y	MJS		Friday 6

U6FM1	DSF	Pure	Thursday 2
U6FM3A	MJS	Pure	Thursday 7
U6FM3B	TRS	Pure	Thursday 3
U6FM1	AXT	Mechanics	Tues 8
U6FM3A	SMC	Mechanics	Tues 2
U6FM3B	SMC	Mechanics	Tues 5
U6FM1	SAW	Statistics	Wed 3
U6FM3A	DSF	Statistics	Wed 4
U6FM3B	SJB	Statistics	Wed 3

U6MA1	OJV	Statistics	Mon 2
U6MA2	RMB	Statistics	Mon 7
U6MA3	RMB	Statistics	Mon 8
U6MA4	SAW	Statistics	Mon 4
U6MA1	JEMJ	Mechanics	Wed 4
U6MA2	OJV	Mechanics	Tue 9
U6MA3	EN	Mechanics	Wed 2
U6MA4	AXT	Mechanics	Wed 3

(* in paired teacher's lesson)

Lower 6th Test Timetable

LHMA1	MPS	Topics A	Thursday 8*
LHMA2	KES	Topics A	Thursday 1
LHMA3	SJN	Topics A	Thursday 7
LHMA1	MJS	Topics B	Friday 4*
LHMA2	DSF	Topics B	Friday 2
LHMA3	SJB	Topics B	Friday 3

(* in paired teacher's lesson)

LSMA4X	SJB		Monday 3
LSMA5	MJS		Monday 4

LSMS4X	KES		Monday 3
LSMS5	RMB		Monday 4

L6FM1A	SBM	Pure	Mon 7
L6FM1B	SBM	Pure	Mon 7*
L6FM1C	KXM	Pure	Mon 7
L6FM3A	KES	Pure	Mon 8
L6FM3B	JEMJ	Pure	Mon 8*
L6FM1A	SAW	Mechanics	Thurs 1
L6FM1B	SMC	Mechanics	Thurs 9*
L6FM1C	RMB	Mechanics	Thurs 2*
L6FM3A	SMC	Mechanics	Thurs 3
L6FM3B	AXT	Mechanics	Thurs 4*
L6FM1A	TRS	Statistics	Wed 5
L6FM1B	TRS	Statistics	Wed 5*
L6FM1C	OJV	Statistics	Wed 4*
L6FM3A	DSF	Statistics	Wed 2
L6FM3B	OJV	Statistics	Wed 3

(* in paired teacher's lesson)

L6MA1	JEMJ	Calc/Stats (4 lessons)	Mon 2*
L6MA2	SBM	Calc/Stats (4 lessons)	Mon 6
L6MA3A	SBM	Calc/Stats (4 lessons)	Mon 9*
L6MA3B	SAW	Calc/Stats (4 lessons)	Mon 8
L6MA4	EN	Calc/Stats (4 lessons)	Mon 3
L6MA1	SJB	Trig (3 lessons)	Thur 8
L6MA2	SJB	Trig (3 lessons)	Thur 2*
L6MA3A	KXM	Trig (3 lessons)	Thur 7
L6MA3B	JEMJ	Trig (3 lessons)	Thur 7*
L6MA4	AXT	Trig (3 lessons)	Thur 4*

(* in paired teacher's lesson)

Middle School Test Timetable

U5MAA	SJN		Thursday 9
U5MAB	DSF		
U5MAC	MJS		
U5MAD	MPS		
U5MAE	AXT		
U5MAF	EN		
U5MAG	KES		

L5MAA	SJB		Tuesday 7
L5MAB	SMC		Tuesday 9
L5MAC	TRS		Tuesday 9
L5MAD	KXM		Tuesday 7
L5MAE	MJS		Tuesday 9
L5MAF	SAW		Tuesday 7
L5MAG	SJN		Tuesday 9

4AMAA	OJV		Tuesday 2
4AMAB	KXM		Tuesday 2
4AMAC	SBM		Tuesday 2
4AMAD	JEMJ		Tuesday 2
4BMA1	AXT		Tuesday 3
4BMA2	SBM		Tuesday 8
4BMA3	RMB		Tuesday 3

8MA1	KXM		Thursday 9
8MA2	SMC		
8MA3	OJV		
7MAK	KES		Monday 4
7MAC	EN		Monday 8
7MAS	JEMJ		Monday 5

2.7 List of textbooks to be issued in September

Year 7	KS3 Maths Progress ONE (Delta 1)	Pearson	Loan
	KS3 Maths Progress TWO (Delta 2)		
	CASIO fx-991EX ClassWiz		Purchase
Year 8	" " " "		
4 th Form	Extended Mathematics for Cambridge IGCSE	Rayner	Loan
Lower 5 th	New Maths for GCSE and IGCSE (for the Grade 9-1 Course)	CGP	Loan
Upper 5 th Sets A-G	" " " "		
Upper 5 th Sets A-D	AQA Certificate in Further Maths	Hanrahan	Loan
Lower 6 th A Level	Edexcel AS and AL Maths - Year 1	Pearson	Loan
	Edexcel AS and AL Maths - Year 2		
	Edexcel AS and AL Maths - Year 1 Stats & Mechanics		
CASIO fx-991EX ClassWiz			Purchase
Lower 6 th A Level Further Maths	Edexcel AS and AL Maths - Year 1	Pearson	Loan
	Edexcel AS and AL Maths - Year 2		
	Edexcel AS and AL Maths - Year 1 Stats & Mechanics		
	Edexcel AS and AL Maths - Year 2 Stats & Mechanics		
	OCR AL Further Mathematics A Core Year 1	Toller	Loan
CASIO fx-9860GII			Purchase
Upper 6 th A Level	Edexcel AS and AL Maths - Year 2 Stats & Mechanics	Pearson	Loan
Upper 6 th A Level Further Maths	OCR AL Further Mathematics A Core Year 2	Toller	Loan
	OCR AL Further Mathematics A Mechanics		
	OCR AL Further Mathematics A Statistics		
Lower 6 th IB (all)	CASIO fx-9860GII		Purchase
Lower 6 th IB Higher	Mathematics Analysis and Approaches	Oxford	Purchase
Lower 6 th IB Higher	Maths Higher for the IB Diploma	CUP	Loan
Lower 6 th IB Standard	Maths Standard for the IB Diploma	CUP	Loan
Lower 6 th IB Studies	Maths Studies for the IB Diploma	CUP	Loan
Upper 6 th IB Higher Stats Option	Maths Higher for the IB Diploma Topic 7 Statistics and Probability	CUP	Purchase
Upper 6 th IB Higher Sets Option	Maths Higher for the IB Diploma Topic 8 Sets & Groups	CUP	Purchase

§3 Public Examination Results

IGCSE MATHEMATICS EDEXCEL	A*	A	B	C			Total
2007	101	34	10				145
2008	108	34	4				146
2009	126	24					150
2010	119	25					144
2011	115	32	2				149
2012	135	31	2				168
2013	143	18					161
2014	130	23					153
2015	138	11					149
2016	123	23					146
2017	147	11	1				159

IGCSE MATHEMATICS EDEXCEL	9	8	7	6	5	4	Total
2018	101	35	11				147

ADDITIONAL MATHEMATICS FSMQ OCR	A	B	C	D	E	U	Total
2004	43	15	8	6	2		74
2005	54	9	5	3			71
2006	55	15	2	1		1	74
2007	70	10	5	3	1		89
2008	56	15	12	4	2	1	90
2009	81	13	4				98
2010	66	11	5	6	2		90
2011	74	8	5	2	1		90
2012	89	5	1				95
2013	86	7	2				95
2014	74	9	4	2			89
2015	83	6	4	1	1		95
2016	71	8	5	3	4		91
2017	76	5	7				88
2018	69	8	8	2	2		89

IB HIGHER MATHEMATICS							
	7	6	5	4	3	2	Total
2005	3	8	4	1			17
2006	6	10	7	3	1		27
2007	10	12	11	3	1		37
2008	15	12	5	4			36
2009	14	22	9	9	1	1	56
2010	17	19	6	2	1		45
2011	12	27	16	8	1	1	65
2012	20	23	4	2	1		50
2013	16	23	12	8			59
2014	20	25	16	9			70
2015	17	10	10	1			38
2016	7	2	10	2			21
2017	16	7	4				27
2018	16	16	2				34
IB MATHS STANDARD							
	7	6	5	4	3	2	Total
2005	5	5					10
2006	12	5		1			18
2007	4	7	12	2	1		26
2008	23	17	7	2			49
2009	12	12	10	3	1		38
2010	19	20	8				47
2011	8	14	11		2		35
2012	13	24	12	2	2		53
2013	10	30	15	7	1		63
2014	4	20	16	4	1		45
2015	5	3	5	1			14
2016	10	4	3	2			19
2017	4	3	1				8
2018	7	8	8	2	1		26
IB MATHEMATICAL STUDIES							
	7	6	5	4	3	2	Total
2005	14	13	1				28
2006	6	12	5	1			24
2007	12	22	10	4			48
2008	7	21	8	3			39
2009	18	20	7				45
2010	31	19	2	1			53
2011	24	17	3	1			45
2012	46	24	2				72
2013	36	18	6				60
2014 U6	47	18	9	1			75
2014 L6	16	1					17
2015	25	7					32
2016	19	1	1				21
2017	15	5					20
2018	13	7	2				22

A LEVEL MATHEMATICS OCR		A*	A	B	C	D	E	Total
2015	39	32	12	5				88
2016	31	31	13	5	1			81
2017	53	35	12	1				101
2018	30	28	12	5	2			77
A LEVEL FURTHER MATHEMATICS OCR								
	A*	A	B	C	D	E		Total
2015	13	5	1					19
2016	14	10	4	1				29
2017	22	4	2		1			29
2018	17	5						22