HUNTINGTON SCHOOL

MATHEMATICS DEPARTMENT

Year 13 Mathematics Curriculum

Curriculum intent

A level mathematics builds from GCSE level mathematics and introduces calculus and its applications. It emphasises how mathematical ideas are interconnected and how mathematics can be applied to model situations mathematically using algebra and other representations, to help make sense of data, to understand the physical world and to solve problems in a variety of contexts. Students will regularly complete practice exam questions and use technology such as advanced calculators.

Feedback and assessment

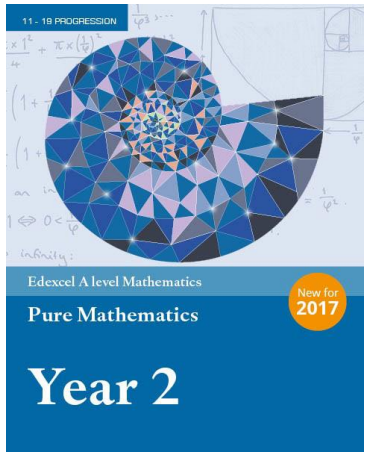
- Verbal feedback is recognised as having the greatest impact on student progress and will be at the core of our everyday teaching.
- Within lessons there is an expectation that students will self/peer assess their work as solutions are shared.
- Meaningful homework will be set each week so that the work can be assessed appropriately using a range of teacher, peer and self-assessment. There is an expectation that students will be pro-active in their use of the online textbooks and practice books on ActiveLearn to complete independent study beyond the specific tasks set.
- Mini-whiteboards will be used in lessons so that teachers can check understanding and support students as needed
- Summative assessments (as per assessment calendar for each year group) will be completed and teacher marked. Individual areas for improvement are specified and subsequent lessons are planned in accordance with assessment outcomes.
- Students sit external exams at the end of year 13. The exam board is Edexcel and there are 3 papers, each 2 hours long.

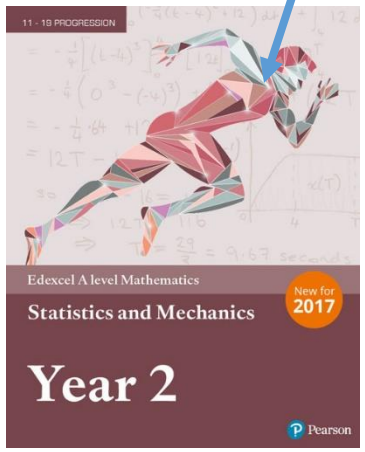
How do I support my child?

For each textbook chapter there is a set of videos and exam question booklets. We recommend that students watch the relevant videos, complete the exam questions (closed book as much as possible), mark their work and then speak to their teachers for support on any questions they still do not understand.

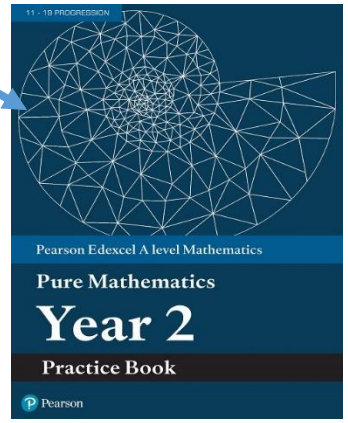
ActiveLearn

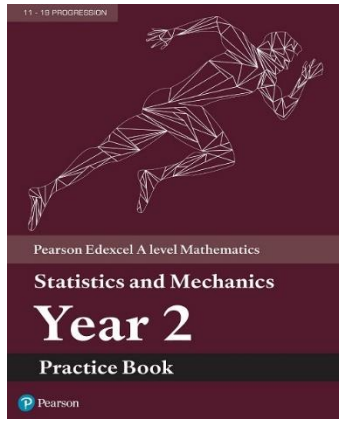
During lessons, students use Pearson textbooks. The scheme shows which chapters are covered each term.





There are also practice books which provide extra exercises and solutions.





Outside of lessons, students use online versions of the textbooks on their ActiveLearn account. The textbooks include explanations, full worked examples, exercises and solutions.

3.4 Geometric series

A geometric **series** is the sum of the terms of a geometric **sequence**. 3, 6, 12, 24, … is a geometric sequence. 3 + 6 + 12 + 24 + … is a geometric series.

- **The sum of the first n terms of a geometric series is given by the formula**

$$S_n = \frac{a(1-r^n)}{1-r}, r \neq 1$$

or $$S_n = \frac{a(r^n-1)}{r-1}, r \neq 1$$

where a is the first term and r is the common ratio.

Hint These two formulae are equivalent. It is often easier to use the first one if $r < 1$ and the second one if $r > 1$.

Example 12

A geometric series has first term a and common difference r. Prove that the sum of the first n terms of this series is given by $S_n = \frac{a(1-r^n)}{1-r}$

Let $S_n = a + ar + ar^2 + ar^3 + \ldots ar^{n-2} + ar^{n-1}$ (1)

$rS_n = ar + ar^2 + ar^3 + \ldots ar^{n-1} + ar^n$ (2)

(1) − (2) gives $S_n - rS_n = a - ar^n$

$S_n(1-r) = a(1-r^n)$

$S_n = \frac{a(1-r^n)}{1-r}$

Multiply by r.

Subtract rS_n from S_n.

Take out the common factor.

Divide by $(1-r)$.

Problem-solving

You need to learn this proof for your exam.

If students forget their login details, they should speak to Mrs Mansfield who can help them

How to…

On the next page there is an overview of all the blocks that a Y12 student will cover at Huntington school.

Year 13 Scheme

Autumn	Chapter 1: Algebraic Methods	Chapter 2: Functions and Graphs	Chapter 3: Sequences and Series
	Chapter 4: Binomial Expansion	Chapter 5: Radians	Chapter 6: Trig Functions
	Chapter 9: Differentiation	Applied 1: Regression and Correlation	Applied 4: Moments
Spring	Chapter 7: Trig Modelling	Chapter 8: Parametric Equations	Chapter 10: Numerical Methods
	Chapter 11: Integration	Chapter 12: Vectors	Applied 2: Conditional Probability
	Applied 5: Forces and Friction	Applied 6: Projectiles	Applied 7: Applications of Forces
Summer	Applied 3: Normal Distribution	Applied 8: Further Kinematics	Revision
	Mocks and revision		
	Study leave and external exams		

Each chapter is hyperlinked to a more in-depth explanation of what is covered within that chapter.

On the in-depth chapter page there are links to helpful videos, exam questions and solutions

Chapter 1: Algebraic Methods

Textbook	Topic	Video	Exam Questions	Exam Solutions
1.1	Proof by contradiction	Proof by contradiction Video	Proof by Contradiction Exam Questions	Proof by contradiction Solutions
1.2	Algebraic fractions	Algebraic fractions video		
1.3	Partial fractions	Partial fractions video	Partial fractions exam questions	Partial fractiosn solutions
1.4	Repeated factors	Partial fractions video		
1.5	Algebraic division	Algebraic division video	lgebraic division exam questions	Algebraic division solutions

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If you wish to return to the overview at any point click here.

Year 13 Scheme

Autumn	Chapter 1: Algebraic Methods	Chapter 2: Functions and Graphs	Chapter 3: Sequences and Series
	Chapter 4: Binomial Expansion	Chapter 5: Radians	Chapter 6: Trig Functions
	Chapter 9: Differentiation	Applied 1: Regression and Correlation	Applied 4: Moments
Spring	Chapter 7: Trig Modelling	Chapter 8: Parametric Equations	Chapter 10: Numerical Methods
	Chapter 11: Integration	Chapter 12: Vectors	Applied 2: Conditional Probability
	Applied 5: Forces and Friction	Applied 6: Projectiles	Applied 7: Applications of Forces
Summer	Applied 3: Normal Distribution	Applied 8: Further Kinematics	Revision
	Mocks and revision		
	Study leave and external exams		

Statistics: The Large Data Set

Chapter 1: Algebraic Methods

Textbook	Topic	Video	Exam Questions	Exam Solutions
1.1	Proof by contradiction	Proof by contradiction Video	Proof by Contradiction Exam Questions	Proof by contradiction Solutions
1.2	Algebraic fractions	Algebraic fractions video		
1.3	Partial fractions	Partial fractions video	Partial fractions exam questions	Partial fractiosn solutions
1.4	Repeated factors	Partial fractions video		
1.5	Algebraic division	Algebraic division video	lgebraic division exam questions	Algebraic division solutions

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Chapter 2: Functions and Graphs

Textbook	Topic	Video	Exam Questions	Exam Solutions
2.1	The modulus function	Modulus functions video	Functions Exam Questions	Functions Solutions
2.2	Functions and mappings	Functions and mapping video		
2.3	Composite functions	Composite functions videos		
2.4	Inverse functions	Inverse functions video		
2.5	y = |f(x)| and y = f(|x|)	y=|f(x)| and y = f(|x|) video		
2.6	Combining transformations	Combining transformations video	Transformations Exam Questions	Transformations solutions
2.7	Solving modulus problems	Solving modulus problems video		

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Chapter 3: Sequences and Series

Textbook	Topic	Video	Exam Questions	Exam Solutions
3.1	Arithmetic sequences	Arithmetic sequences video	Arithmetic sequences and series exam questions	Arithmetic sequences and series solutions
3.2	Arithmetic series	Arithmetic Series video		
3.3	Geometric sequences	Geometric sequences	Geometric sequences and series exam questions	Geometric sequences and series solutions
3.4	Geometric series	Geometric Series video		
3.5	Sum to infinity	Sum to infinity video		
3.6	Sigma notation	Sigma notation video		
3.7	Recurrence relations	Recurrence relation video	Recurrenece relations exam questions	Recurrence relations solutions
3.8	Modelling with series			

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Chapter 4: Binomial Expansion

Textbook	Topic	Video	Exam Questions	Exam Solutions
4.1	Expanding (1 + x)^n	Expanding (1 + X)^n video	Binomial expansion exam questions	Binomial expansion exam solutions
4.2	Expanding (a + bx)^n	Expanding (a + bx)^n video		
4.3	Using partial fractions	Partial fractions video		

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Chapter 5: Radians

Textbook	Topic	Video	Exam Questions	Exam Solutions
5.1	Radian measure	Radians video	Radians exam questions	Radians solutions
5.2	Arc length	Areas and arc length of sectors and segments video		
5.3	Areas of sectors and segments	Areas and arc length of sectors and segments video		
5.4	Solving trigonometric equations	Solving trig equations video		
5.5	Small angle approximations	Small angle approximations video	Small angle exam questions	Small angle exam solutions

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Chapter 6: Trigonometric Functions

Textbook	Topic	Video	Exam Questions	Exam Solutions
6.1	Secant, cosecant and cotangent	Sec, cosec and cot video	Sec cosec cot exam questions	sec cosec cot exam questions
6.2	Graphs of sec, cosec and cot	Sec, cosec, cot video		
6.3	Using sec, cosec and cot	Sec, cosec, cot video		
6.4	Trigonometric identities	Trigonometric identities video	Trig identities exam questions	Trig identities solutions
6.5	Inverse trigonometric functions	Inverse trigonometric functions video		

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Chapter 7: Trigonometric Modelling

Textbook	Topic	Video	Exam Questions	Exam Solutions
7.1	Addition formulae	Addition formulae video	Angle formulae exam questions	Angle formulae solutions
7.2	Using the angle addition formulae	Addition angle video		
7.3	Double-angle formulae	Double angle video		
7.4	Solving trigonometric equations	Solving trig equation video		
7.5	Simplfying acosx + bsinx	Simplifying acosx + bsinx	acosx +bsinx exam questions	acosx + bsinx solutions
7.6	Proving trigonometric identities	Proving trig identities video		
7.7	Modelling with trigonometric functions	Modelling trig functions video		

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Chapter 8: Parametric Equations

Textbook	Topic	Video	Exam Questions	Exam Solutions
8.1	Parametric equations	Parametric equations video	Parametric equations exam questions	Parametric equations solutions
8.2	Using trigonometric identities	Using trig video		
8.3	Curve sketching	Curve sketching video		
8.4	Points of intersection			
8.5	Modelling with parametric equations	Modelling parametric equations video		

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Chapter 9: Differentiation

Textbook	Topic	Video	Exam Questions	Exam Solutions
9.1	Differentiating sin x and cos x	Differentiating sinx and cosx video	Differentiating sin and cos exam questions	Differentiating sin and cos solutions
9.2	Differentiating exponentials and logs	Differentiating exp and log video		
9.3	The chain rule	Chain rule video	Chain rule exam questions	Chain rule solution
9.4	The product rule	Product rule video	Product rule exam questions	Product rule solutions
9.5	The quotient rule	Quotient rule video	Quotient rule exam questions	Quotient rule solutions
9.6	Differentiating trig functions	Differentiating trig video	Trig differentiation exam questions	Trig differentiation solutions
9.7	Parametric differentiation	Parametric differentiation video		
9.8	Implicit differentiation	Implicit differentiation video	Implicit differentiation exam questions	Implicit differentiation solutions
9.9	Using second derivatives			
9.10.	Rates of change	Rates of change video		

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Chapter 10: Numerical Methods

Textbook	Topic	Video	Exam Questions	Exam Solutions
10.1	Locating roots	Locating roots video	Iteration exam questions	Iteration solutions
10.2	Iteration	Iteration video		
10.3	The Newton-Raphson method	Newton Raphson video	Newton Raphson exam solutions	Newton Raphson solutions
10.4	Applications to modelling			

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Chapter 11: Integration

Textbook	Topic	Video	Exam Questions	Exam Solutions
11.1	Integrating standard functions	Integrating functions video	Exponential integration exam questions	Exponential integration solutions
11.2	Integrating f(ax+b)			
11.3	Using trigonometric identities	Integrating trig video	Trig integration exam solutions	Trig integration solutions
11.4	Reverse chain rule	Reverse chain rule video		
11.5	Integration by substitution	Integration substitution video	Integration by substitution exam questions	Integration by substitution solutions
11.6	Integration by parts	Integration by parts video	Integration by parts exam questions	Integration by parts solutions
11.7	Partial fractions	Partial fractions video		
11.8	Finding areas	FInding areas video		
11.9	The trapezium rule	Trapezium rule video	Trapezium rule exam solutions	Trapezium rule solutions
11.10.	Solving differential equations	Solving differential equations video	Differential equations exam questions	Differential equations solutions
11.11	Modelling with differential equations			
11.12	Integration as the limit of a sum			

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Chapter 12: Vectors

Textbook	Topic	Video	Exam Questions	Exam Solutions
12.1	3D coordinates	3D coords video	3D Vectors exam questions	3D vectors solutions
12.2	Vectors in 3D	Vectors in 3D video		
12.3	Solving geometric problems	Geometric video		
12.4	Applications to mechanics	Vectors in mechanics video		

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Applied Chapter 1: Regression and Correlation

Textbook	Topic	Videos	Exam questions	Solutions
1.1	Exponential models	Exponential models video	Correlation exam questions	Correlation solutions
1.2	Measuring correlation	Measuring correlation video		
1.3	Hypothesis testing for zero correlation	Hypothesis testing for zero correlation video		

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Applied Chapter 2: Conditional Probability

Textbook	Topic	Video	Exam Questions	Exam Solutions
2.1	Set notation		Probability exam questions	Probability solutions
2.2	Conditional probability	Conditional probability video		
2.3	Conditional probability Venn diagrams	Conditional probability venn diagram video		
2.4	Probability formulae	Probability formulae video		
2.5	Tree diagrams	Tree diagrams videos		

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Applied Chapter 3: Normal Distribution

Textbook	Topic	Video	Exam Questions	Exam Solutions
3.1	The normal distribution	Normal distribution video	Normal exam questions	Normal solutions
3.2	Probabilities for normal distributions	Probabilities normal video		
3.3	Inverse normal distribution	Inverse normal video		
3.4	Standard normal distribution	Standard normal video		
3.5	Finding μ and σ	Finding mean and SD video		
3.6	Approximating a binomial distribution	Approximating binomial video	Approximate Binomial distribution exam solutions	Approximate binomial solutions
3.7	Hypothesis testing normal distribution	Hypothesis normal video	Hypothesis normal exam questions	hypothesis normal solutions

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Applied Chapter 4: Moments

Textbook	Topic	Video	Exam Questions	Exam Solutions
4.1	Moments	Moments video	Moments exam questions	Moments solutions
4.2	Resultant moments	Resultant moments video		
4.3	Equilibrium	Equilibrium video		
4.4	Centres of mass	Centres of mass video		
4.5	Tilting	Tiliting video		

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Applied Chapter 5: Forces and Friction

Textbook	Topic	Video	Exam Questions	Exam Solutions
5.1	Resolving forces	Resolving forces video	Resolving forces exam questions	Resolving forces solutions
5.2	Inclined planes	Inclined planes video		
5.3	Friction	Friction video		

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Applied Chapter 6: Projectiles

Textbook	Topic	Video	Exam Questions	Exam Solutions
6.1	Horizontal projection	Horizontal projection video	Projectiles exam questions	Projectiles solutions
6.2	Horizontal and vertical components	Horizontal and vertical components		
6.3	Projection at any angle	Projection at angle video		
6.4	Projection motion formulae	Projection motion formulae video		

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Applied Chapter 7: Applications of Forces

Textbook	Topic	Video	Exam Questions	Exam Solutions
7.1	Static particles	Static particles video	Statics exam questions	Statics solutions
7.2	Modelling with statics			
7.3	Frictions and static particles			
7.4	Static rigid bodies	Static rigid bodies video		
7.5	Dynamics and inclined planes		Dynamics inclined planes exam questions	Dynamics inclined planes solutions
7.6	Connected particles	Connected particles video	Connected particles exam questions	Connected particles solutions

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Applied Chapter 8: Further Kinematics

Textbook	Topic	Video	Exam Questions	Exam Solutions
8.1	Vectors in kinematics		Kinematics exam questions	Kinematics solutions
8.2	Vector methods in projectiles	Vectors projectiles video	Projectiles exam questions	Projectiles solutions
8.3	Variable acceleration in one dimension	Variable acceleration video		
8.4	Differentiating vectors	Differentiating vectors video	Kinematics with calculus	Kinematics with calculus solutions
8.5	Integrating vectors	Integrating vectors video		

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Statistics: The Large Data Set

The Edexcel Large Data Set contains data about weather in several locations and during certain time periods.

The focus is to study weather patterns in these locations, make comparisons and be able to explain any findings using basic meteorological knowledge that students develop by working through the data set.

Some exam questions will test knowledge and familiarity of the large data set. Students will not be required to take copies of the large data set into the exam and are also not expected to have a detailed knowledge of the actual data within the data set.

Large Data Set Guide

Edexcel Large Data Set (Excel Spreadsheet)

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Revision

Students will complete practice exam questions in lesson but there is the expectation that students will be pro-active in finding past papers to help improve their exam technique, such as working under timed conditions and being able to identify which methods are required.

Students can find many past and practice exam papers on the following websites:

www.mathsgenie.co.uk (past papers and sample papers)

crashmaths.com (practice papers)

naikermaths.com (practice papers)

madasmaths.com (challenging practice papers)

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