HUNTINGTON SCHOOL

MATHEMATICS DEPARTMENT

Year 12 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

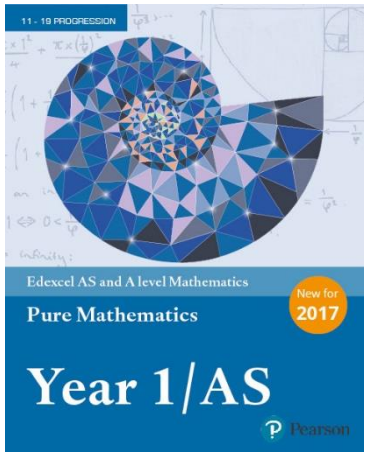
- Verbal feedback is recognised as having the greatest impact on student progress and will be at the core of our everyday teaching.
- Within lessons there is an expectation that students will self/peer assess their work as solutions are shared.
- Meaningful homework will be set each week so that the 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.

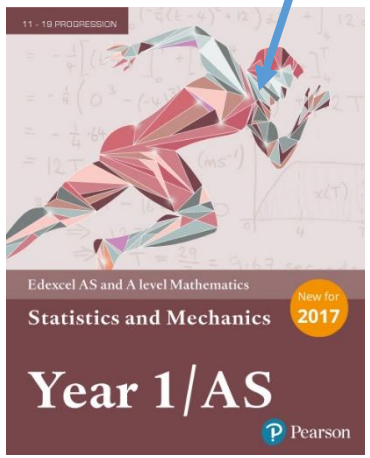
How do I support my child?

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.

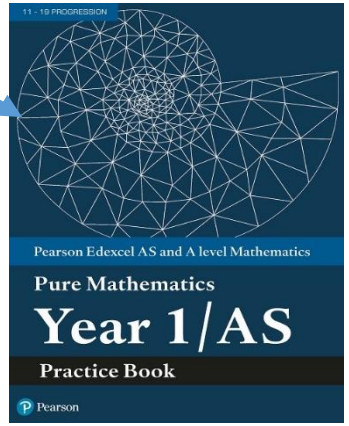
ActiveLearn

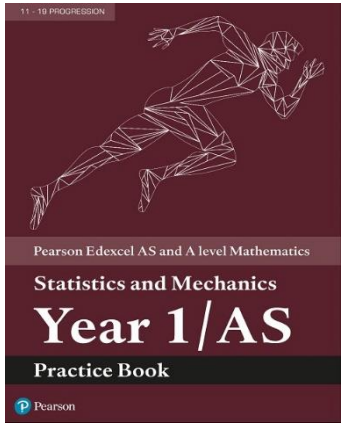
During lessons, students use Pearson textbooks. The scheme shows which chapters are covered each term.





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





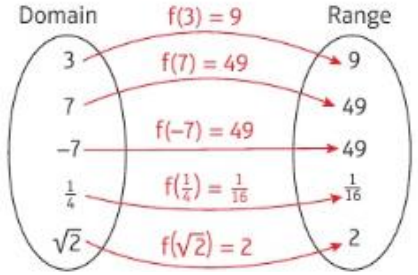
Outside of lessons, students use online versions of the textbooks on their ActiveLearn account. The textbooks include explanations, full worked examples, exercises and solutions.

2.3 Functions

A function is a mathematical relationship that maps each value of a set of inputs to a single output. The notation f(x) is used to represent a function of x.

- **The set of possible inputs for a function is called the domain.**
- **The set of possible outputs of a function is called the range.**

This diagram shows how the function f(x) = x^2 maps five values in its domain to values in its range.



- **The roots of a function are the values of x for which f(x) = 0.**

Example 8

The functions f and g are given by f(x) = $2x - 10$ and g(x) = $x^2 - 9$, $x \in \mathbb{R}$.

a Find the values of f(5) and g(10).

b Find the value of x for which f(x) = g(x).

a f(5) = 2(5) − 10 = 10 − 10 = 0
g(10) = $(10)^2$ − 9 = 100 − 9 = 91

b f(x) = g(x)
$2x - 10 = x^2 - 9$
$x^2 - 2x + 1 = 0$
$(x - 1)^2 = 0$
$x = 1$

To find f(5), substitute $x = 5$ into the function f(x).

Set f(x) equal to g(x) and solve for x.

Notation If the input of a function, x, can be any real number the domain can be written as $x \in \mathbb{R}$.

The symbol $\in$ means 'is a member of' and the symbol $\mathbb{R}$ represents the real numbers.

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 12 Scheme

Autumn	Chapter 1: Algebraic Expressions	Chapter 2: Quadratics	Chapter 3: Equations and Inequalities
	Chapter 4: Graphs and Transformations	Chapter 5: Straight Line Graphs	Chapter 7: Algebraic Methods
	Chapter 8: Binomial Expansion	Chapter 9: Trigonometry	Chapter 12: Differentiation
Spring	Chapter 6: Circles	Chapter 10: Trig Identities and Equations	Chapter 11: Vectors
	Applied 1: Data Collection	Applied 2: Measures of Location and Spread	Applied 3: Representations of Data
	Applied 8: Modelling in Mechanics	Applied 9: Constant Acceleration	Applied 10: Forces and Motion
Summer	Chapter 13: Integration	Chapter 14: Exponentials and Logarithms	Applied 4: Correlation
	Applied 5: Probability	Applied 6: Statistical Distributions	Applied 7: Hypothesis Testing
	Applied 11: Variable Acceleration	Statistics: The Large Data Set	Revision

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 Expressions

Textbook Section	Topic	Video	Exam questions	Exam Solutions
1.1	Index laws	Laws of Indices Video	Algebraic Expressions Exam Questions	Algebraic Expressions Solutions
1.2	Expanding brackets	Expanding Brackets Video		
1.3	Factorising	Factorising Video		
1.4	Negative and fractional indices	Laws of Indices Video		
1.5	Surds	Surds Video		
1.6	Rationalising denominators	Surds Video		

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

Year 12 Scheme

Autumn	Chapter 1: Algebraic Expressions	Chapter 2: Quadratics	Chapter 3: Equations and Inequalities
	Chapter 4: Graphs and Transformations	Chapter 5: Straight Line Graphs	Chapter 7: Algebraic Methods
	Chapter 8: Binomial Expansion	Chapter 9: Trigonometry	Chapter 12: Differentiation
Spring	Chapter 6: Circles	Chapter 10: Trig Identities and Equations	Chapter 11: Vectors
	Applied 1: Data Collection	Applied 2: Measures of Location and Spread	Applied 3: Representations of Data
	Applied 8: Modelling in Mechanics	Applied 9: Constant Acceleration	Applied 10: Forces and Motion
Summer	Chapter 13: Integration	Chapter 14: Exponentials and Logarithms	Applied 4: Correlation
	Applied 5: Probability	Applied 6: Statistical Distributions	Applied 7: Hypothesis Testing
	Applied 11: Variable Acceleration	Statistics: The Large Data Set	Revision

Chapter 1: Algebraic Expressions

Textbook Section	Topic	Video	Exam questions	Exam Solutions
1.1	Index laws	Laws of Indices Video	Algebraic Expressions Exam Questions	Algebraic Expressions Solutions
1.2	Expanding brackets	Expanding Brackets Video		
1.3	Factorising	Factorising Video		
1.4	Negative and fractional indices	Laws of Indices Video		
1.5	Surds	Surds Video		
1.6	Rationalising denominators	Surds Video		

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Chapter 2: Quadratics

Textbook Section	Topic	Video	Exam questions	Exam Solutions
2.1	Solving quadratic equations	Solving Quadratics Video		
2.2	Completing the square	Completing the Square Video	Completing the Square Exam Questions	Completing the Square Solutions
2.3	Functions	Functions Video		
2.4	Quadratic Graphs	Quadratic Graphs		
2.5	The discriminant	Discriminant Video	Discriminant Exam Questions	Discriminant Solutions
2.6	Modelling with quadratics	Modelling Video		

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Chapter 3: Equations and Inequalities

Textbook Section	Topic	Video	Exam questions	Exam Solutions
3.1	Linear simultaneous equations	Simultaneous Equations Video	Quadratic Inequalities and Simultaneous Equations Exam Questions	Quadratic Inequalities and Simultaneous Equations Solutions
3.2	Quadratic simultaneous equations	Quadratic Simultaneous Equations Video		
3.3	Simultaneous equations on graphs	Simultaneous Equations Video		
3.4	Linear inequalities	Solving Inequalities Video		
3.5	Quadratic inequalities	Solving Inequalities Video		
3.6	Inequalities on graphs	Solving Inequalities Video		
3.7	Regions	Solving Inequalities Video		

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Chapter 4: Graphs and Transformations

Textbook Section	Topic	Video	Exam questions	Exam Solutions
4.1	Cubic graphs	Cubic, Quartic and Reciprocal Graphs Video	Sketching and Transforming Graphs Exam Questions	Sketching and Transforming Curves Solutions
4.2	Quartic graphs	Cubic, Quartic and Reciprocal Graphs Video		
4.3	Reciprocal graphs	Cubic, Quartic and Reciprocal Graphs Video		
4.4	Points of intersection	Intersections Video		
4.5	Translating graphs	Transforming Graphs Video		
4.6	Stretching graphs	Transforming Graphs Video		
4.7	Transforming functions	Transforming Graphs Video		

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Chapter 5: Straight Line Graphs

Textbook Section	Topic	Video	Exam questions	Exam Solutions
5.1	y = mx + c	Straight Lines Video	Equation of a Line Exam Questions	Equation of a Line Solutions
5.2	Equations of straight lines	Straight Lines Video		
5.3	Parallel and perpendicular lines	Parallel and Perpendicular Video		
5.4	Length and area	Length and Area Video		
5.5	Modelling with straight lines	Straight Lines Video		

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Chapter 6: Circles

Textbook Section	Topic	Video	Exam questions	Exam Solutions
6.1	Midpoints and perpendicular bisectors	Midpoints Video	Equation of a Circle Exam Questions	Equation of a Circle Solutions
6.2	Equation of a circle	Circles Video		
6.3	Intersections of straight lines and circles	Circles Video		
6.4	Use tangent and chord properties	Circles Video		
6.5	Circles and triangles	Circles Video		

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Chapter 7: Algebraic Methods

Textbook Section	Topic	Video	Exam questions	Exam Solutions
7.1	Algebraic fractions	Algebraic Fractions Video	Algebraic Fractions Exam Questions	Algebraic Fractions Solutions
7.2	Dividing polynomials	Dividing Polynomials Video	Factor Theorem and Algebraic Division Exam Questions	Factor Theorem and Algebraic Division Exam Questions
7.3	The factor theorem	Factor Theorem Video		
7.4	Mathematical proof	Proof Video	Proof Exam Questions	Proof Solutions
7.5	Methods of proof	Other Proof Video		

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Chapter 8: Binomial Expansion

Textbook Section	Topic	Video	Exam questions	Exam Solutions
8.1	Pascal's triangle	Pascal's Triangle Video	Binomial Expansion Exam Questions	Binomial Expansion Solutions
8.2	Factorial notation	Factorial Notation Video		
8.3	The binomial expansion	Binomial Expansion Video		
8.4	Solving binomial problems	Solving Binomial Problems Video		
8.5	Binomial estimation	Binomial Estimation Video		

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Chapter 9: Trigonometry

Textbook Section	Topic	Video	Exam questions	Exam Solutions
9.1	The cosine rule	Cosine Rule Video	Sine Rule, Cosine Rule and Area of a Triangle Exam Questions	Sine Rule, Cosine Rule and Area of a Triangle Solutions
9.2	The sine rule	Sine Rule Video		
9.3	Area of triangles	Area of Triangles Video		
9.4	Solving triangle problems	Solving Triangle Problems Video		
9.5	Graphs of sine, cosine and tangent	Trig Graphs Video		
9.6	Transforming trigonometric graphs	Transforming Trig Graphs Video		

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Chapter 10: Trig Identities and Equations

Textbook Section	Topic	Video	Exam questions	Exam Solutions
10.1	Angles in all four quadrants	Angles in 4 Quadrants Video	Solving Trigonometric Equations Exam Questions	Solving Trigonometric Equations Solutions
10.2	Exact values of trigonometric ratios	Exact Trig Values Video		
10.3	Trigonometric identities	Trig Identities Video		
10.4	Simple trigonometric equations	Simple Trig Equations Video		
10.5	Harder trigonometric equations	Solving Harder Trig Equations Video		
10.6	Equations and identities	Trig Equations and Identities Video		

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Chapter 11: Vectors

Textbook Section	Topic	Video	Exam questions	Exam Solutions
11.1	Vectors	Vectors Intro Video	Vectors Exam Questions	Vectors Solutions
11.2	Representing vectors	Representing Vectors Video		
11.3	Magnitude and direction	Magnitude and Direction Video		
11.4	Position vectors	Position Vectors Video		
11.5	Solving geometric problems	Geometric Problems Video		
11.6	Modelling with vectors	Modelling with Vectors Video		

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Chapter 12: Differentiation

Textbook Section	Topic	Video	Exam questions	Exam Solutions
12.1	Gradients of curves	Differentiation Intro Video	Differentiation from First Principles Exam Questions	Differentiation from First Principles Solutions
12.2	Finding the derivative	First Principles Video		
12.3	Differentiating x^n	Differentiation Video	Differentiation Exam Questions	Differentiation Solutions
12.4	Differentiating quadratics	Differentiation Video		
12.5	Differentiating functions with two or more terms	Differentiation Video		
12.6	Gradients, tangents and normal	Tangents and Normals		
12.7	Increasing and decreasing functions	Increasing and Decreasing Video		
12.8	Second order derivatives	Second Order Derivatives Video		
12.9	Stationary points	Stationary Points Video		
12.10	Sketching gradient functions	Sketching Gradient Functions Video		
12.11	Modelling with differentiation	Modelling Video		

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Chapter 13: Integration

Textbook Section	Topic	Video	Exam questions	Exam Solutions
13.1	Integrating x^n	Integration Intro Video	Integration Exam Questions	Integration Solutions
13.2	Indefinite integrals	Integration Intro Video		
13.3	Finding functions	Finding Functions Video		
13.4	Definite integrals	Definite Integrals Video		
13.5	Area under curves	Area Under Curves Video		
13.6	Areas under the x-axis	Area Under Curves Video		
13.7	Areas between curves and lines	Area Under Curves Video		

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Chapter 14: Exponentials and Logarithms

Textbook Section	Topic	Video	Exam questions	Exam Solutions
14.1	Exponential functions	Exponential Functions Video	Exponentials and Logarithms Exam Questions	Exponentials and Logarithms Solutions
14.2	y = e^x	E and Natural Logarithm Video		
14.3	Exponential modelling	Exponential Modelling Video		
14.4	Logarithms	Logarithms Video		
14.5	Laws of logarithms	Logarithms Video		
14.6	Solving equations using logarithms			
14.7	Working with natural logarithms	E and Natural Logarithm Video		
14.8	Logarithms and non-linear data	Non-Linear Data Logs Video		

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Applied Chapter 1: Data Collection

Textbook Section	Topic	Video	Exam Questions	Exam Solutions
1.1	Populations and samples	Sampling Video	Sampling Exam Questions	Sampling Solutions
1.2	Sampling	Sampling Video		
1.3	Non-random sampling	Sampling Video		
1.4	Types of data	Types of Data Video		
1.5	The large data set	Large Data Set Video		

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Applied Chapter 2: Measures of Location and Spread

Textbook Section	Topic	Video	Exam Questions	Exam Solutions
2.1	Measures of central tendency	Mean Median and Mode Video	Interpolation and Standard Deviation Exam Questions	Interpolation and Standard Deviation Solutions
2.2	Other measures of location	Quartiles and Percentiles Video		
2.3	Measures of spread	IQR including Linear Interpolation Video		
2.4	Variance and standard deviation	Variance and Standard Deviation Video		
2.5	Coding	Coding Video		

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Applied Chapter 3: Representations of Data

Textbook Section	Topic	Video	Exam Questions	Exam Solutions
3.1	Outliers	Outliers Video	Boxplots and Outliers Exam Questions	Boxplots and Outliers Solutions
3.2	Box plots	Boxplots Video		
3.3	Cumulative frequency	Cumulative Frequency Video		
3.4	Histograms	Histograms Video	Histograms Exam Questions	Histograms Solutions
3.5	Comparing data	Comparing Data Video		

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Applied Chapter 4: Correlation

Textbook Section	Topic	Video	Exam Questions	Exam Solutions
4.1	Correlation	Correlation Video	Correlation and Regression Exam Questions	Correlation and Regression Solutions
4.2	Linear regression	Linear Regression Video		

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Applied Chapter 5: Probability

Textbook Section	Topic	Video	Exam Questions	Exam Solutions
5.1	Calculating probabilities	Probability Video	Probability Exam Questions	Probability Solutions
5.2	Venn diagrams	Venn Diagrams Video		
5.3	Mutually exclusive/independence	Mutually Exclusive/ Independent Events Video		
5.4	Tree diagrams	Tree Diagrams Video		

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Applied Chapter 6: Statistical Distributions

Textbook Section	Topic	Video	Exam Questions	Exam Solutions
6.1	Probability distributions	Probability Distributions Video	Probability Distributions Exam Questions	Probability Distributions Solutions
6.2	The binomial distribution	Binomial Distribution Video	Binomial and Hypothesis Testing Exam Questions	Binomial and Hypothesis Testing Solutions
6.3	Cumulative probabilities	Cumulative Video		

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Applied Chapter 7: Hypothesis Testing

Textbook Section	Topic	Video	Exam Questions	Exam Solutions
7.1	Hypothesis testing	Hypothesis Testing Video	Binomial and Hypothesis Testing Exam Questions	Binomial and Hypothesis Testing Solutions
7.2	Finding critical values	Critical Regions Video		
7.3	One-tailed tests	1-tailed Tests Video		
7.4	Two-tailed tests	2-Tailed Tests Video		

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Applied Chapter 8: Modelling in Mechanics

Chapter 8 sets up the modelling needed for following chapters. There are not stand alone videos or exam questions but the skills needed are covered in chapters 9, 10 and 11

Textbook Section	Topic	Video	Exam Questions	Exam Solutions
8.1	Constructing a model			
8.2	Modelling assumptions			
8.3	Quantities and units			
8.4	Working with vectors			

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Applied Chapter 9: Constant Acceleration

Textbook Section	Topic	Video	Exam Questions	Exam Solutions
9.1	Displacement-time graphs	DT Graphs Video		
9.2	Velocity-time graphs	VT Graphs Video	Velocity Time Graphs Exam Questions	Velocity Time Graphs Solutions
9.3	Constant acceleration formulae 1	SUVAT Intro Video	SUVAT Exam Questions	SUVAT Solutions
9.4	Constant acceleration formulae 2	SUVAT 2 Video		
9.5	Vertical motion under gravity	Acceleration under Gravity Video		

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Applied Chapter 10: Forces and Motion

Textbook Section	Topic	Video	Exam Questions	Exam Solutions
10.1	Force diagrams	Force Diagrams Video		
10.2	Forces as vectors	Forces as Vectors Video	Forces as Vectors Exam Questions	Forces as Vectors Solutions
10.3	Forces and acceleration	F = ma Video	F = ma (including Pulleys) Exam Questions	F = ma (including Pulleys) Solutions
10.4	Motion in 2 dimensions	F = ma in 2D Video		
10.5	Connected particles	Connected Particles Video		
10.6	Pulleys	Pulleys Video		

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Applied Chapter 11: Variable Acceleration

Textbook Section	Topic	Video	Exam Questions	Exam Solutions
11.1	Functions of time	Functions of Time Video	Variable Acceleration Exam Questions	Variable Acceleration Solutions
11.2	Using differentiation	Using Differentiation Video		
11.3	Maxima and minima problems	Using Stationary Points Video		
11.4	Using integration	Using Integration Video		
11.5	Constant acceleration formulae	Deriving SUVAT 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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