Autumn Learning Journey for Maths
Year 11H Unit 1 Equations and Graphs

Ad Astra

How does this unit link to prior learning?

- Surds
- Substitution
- Inequalities
- Expanding double bracket
- Factorising quadratics

Prior Knowledge Check

1. Simplify these surds a) $\sqrt{27}$ b) $\sqrt{200}$ c) $\sqrt{20}$

2. Work out the value of y when x=0 a) $y = 2x - 7$ b) $2y - 3x = 12$ c) $y = x^2 - 2x + 7$

3. Solve these inequalities: a) $x + 4 \geq 7$ b) $2x - 5 > 9$ c) $3x - 2 \leq 18 - x$

4. Expand and simplify a) $(x + 3)(x + 7)$ b) $(2x + 3)(x + 6)$ c) $(x - 4)^2$

5. Factorise a) $x^2 + 7x + 10$ b) $x^2 + 2x - 15$ c) $x^2 - 1$

What will you be learning about?	How does this link to the wider curriculum?
• Simplify and manipulate algebraic expressions. • Draw graphs of algebraic functions. • Recognise and describe features of cubic and reciprocal graphs.	• The five British values are embedded in maths lessons through collaborative problem-solving, mutually respecting discussions of different methods, following classroom rules, making independent choices and appreciating diverse perspectives and contributions. •

We will develop our learning each week by focusing on:

	RAG		RAG
1. Solving simultaneous equations graphically • Solve simultaneous equations graphically.		**2. Naming Lines on a graphs** • Recognise, name and plot straight-line graphs parallel to the axes	
3. Graphs of quadratic functions • Recognise and draw quadratic functions.		**4. Solving quadratic equations graphically** • Find approximate solutions to quadratic equations graphically. • Identify and sketch the turning point, roots and the y intercept.	

5. Graphs of cubic functions • Expand 3 brackets. • Find the roots of cubic equations. • Sketch graphs of cubic functions. • Solve cubic equations using an iterative process.		**6. Iteration** • Solve quadratic equations using an iterative process. • Solve cubic equations using an iterative process.	
7. Revision Lesson • Select topics you feel the class need to revise. • Classroom based or Mathswatch.		**8. Assessment Lesson** • Do 10-minute top up and go through answers together, students self-assess. • Open book assessment done in silence.	
9. Feedback Lesson • Student to highlight their traffic light sheet. • Teacher to go through test and students to self-assess in green. • Students to complete the NOW section of the WOW-HOW-NOW sheet.			

Key Vocabulary

Simultaneous	Equation	Graph	Graphically	Inequalities	Functions	Quadratic

How will this help you in the future?

Algebraic graphs show how one thing changes in relation to another. They help us spot patterns, trends, and connections, which is very useful in real life. Adults use graphs to make predictions, compare information, and make good decisions.

For example, graphs are used to track money, plan journeys, understand phone data usage, monitor fitness progress, and see how things like speed, time, or cost change. Being able to read and understand graphs helps people avoid mistakes and understand information clearly.

Jobs that use algebraic graphs

Many jobs rely on algebraic graphs, including:

- Scientists – to study experiments and see relationships between variables
- Engineers – to understand forces, motion, and performance
- Economists and accountants – to track profits, costs, and trends
- Doctors and health workers – to monitor heart rates, growth, and test results
- Data analysts – to interpret large amounts of information
- Meteorologists – to predict weather patterns
- Sports analysts and coaches – to track performance and improvement

Learning algebraic graphs helps develop logical thinking and decision-making skills, which are useful in many careers and everyday life.

Autumn Learning Journey for Maths
Year 11H Unit 2 Circle Theorems

How does this unit link to prior learning?
• Properties of a circle • Angles in triangles • Gradient of a straight line

Prior Knowledge Check

1) Describe the following parts of a circle:

a) Tangent:

b) Radius:

c) Chord:

d) Segment:

2) One angle in an isosceles triangle is 50°. What could the other two be?

3) What is the gradient and y-intercept of the following line? $y = 2x + 5$

What will you be learning about?	How does this link to the wider curriculum?
• Identify properties of circles. • Understand, prove and use circle theorems.	• The five British values are embedded in maths lessons through collaborative problem-solving, mutually respecting discussions of different methods, following classroom rules, making independent choices and appreciating diverse perspectives and contributions. •

We will develop our learning each week by focusing on:

1. Radii and chords • Solve problems involving angles, triangles and circles. • Understand and use facts about chords and their distance from the centre of a circle. • Solve problems involving chords and radii.	•	**2. Tangents** • Understand and use facts about tangents at a point and from a point. • Give reasons for angle and length calculations involving tangents.	**RAG**
3. Angles in circles 1 • Understand, prove and use facts about angles subtended at the centre and the circumference of circles. • Understand, prove and use facts about the angle in a semicircle being a right angle. • Find missing angles using these theorems and give reasons for answers.		**4. Angles in circles 2** • Understand, prove and use facts about angles subtended at the circumference of a circle. • Understand, prove and use facts about cyclic quadrilaterals. • Prove the alternate segment theorem.	

5. Applying circle theorems • Solve angle problems using circle theorems. • Give reasons for angle sizes using mathematical language. • Find the equation of the tangent to a circle at a given point.		**6. Revision Lesson** • Select topics you feel the class need to revise. • Classroom based or Mathswatch.	
7. Assessment Lesson (non-calculator) • Do 10-minute top up and go through answers together, students self-assess. • Open book assessment done in silence.		**8. Feedback Lesson** • Student to highlight their traffic light sheet. • Teacher to go through test and students to self-assess in green. • Students to complete the NOW section of the WOW-HOW-NOW sheet.	

Key Vocabulary

Radius	Tangent	Chord	Segment	Arc	Cyclic	Diameter

How will this help you in the future?

Circle theorems help us understand the rules and patterns inside circles, such as angles, arcs, and symmetry. These ideas are useful because circles appear everywhere in real life, from wheels and clocks to gears and round buildings. Knowing how angles in circles work helps people design, measure, and build things accurately.

Circle theorems also help develop **logical thinking and reasoning skills**. They teach us how to follow steps, explain our thinking clearly, and prove that something must be true — skills that are useful in many adult situations and jobs.

Jobs that use circle theorems

Circle theorems are used in many careers, including:

- **Engineers** – to design wheels, gears, and rotating parts
- **Architects** – when designing curved buildings, arches, and domes
- **Mechanical designers** – to make moving parts fit and work smoothly
- **Surveyors** – when measuring land with curved boundaries
- **Graphic designers** – when creating logos, layouts, and circular designs
- **Astronomers** – to study orbits and circular motion

Learning circle theorems helps build **precision, problem-solving, and reasoning skills**, which are valuable in both work and everyday life.

Autumn Learning Journey for Maths
Year 11H Unit 3 Vectors and Geometric Proof

How does this unit link to prior learning?
• Vector notation • Pythagoras • Ratio • Properties of 2D shapes

Prior Knowledge Check

1) Write down the vector for the translation of 3 right and 2 down.

2) Find the length of the hypotenuse: 3m

4m

3) Split 45m into the ratio 3:2

4) Name three properties of a parallelogram

What will you be learning about?	How does this link to the wider curriculum?
• Work with vectors; understand them, calculate with them, solve problems with them and use them for proofs.	• The five British values are embedded in maths lessons through collaborative problem-solving, mutually respecting discussions of different methods, following classroom rules, making independent choices and appreciating diverse perspectives and contributions. •

We will develop our learning each week by focusing on:

	RAG		RAG
1. Vectors and vector notation • Understand and use vector notation. • Work out the magnitude of a vector.		**2. Vector arithmetic** • Calculate using vectors and represent the solutions graphically. • Calculate the resultant of two vectors.	
3. More vector arithmetic • Solve problems using vectors. • Use the resultant of two vectors to solve vector problems.		**4. Parallel vectors and collinear points** • Express points as position vectors. • Prove lines are parallel. • Prove points are collinear.	

5. Solving geometric problems • Solve geometric problems in two dimensions using vector methods. • Apply vector methods for simple geometric proofs. • Find the equation of the tangent to a circle at a given point.		**6. Revision Lesson** • Select topics you feel the class need to revise. • Classroom based or Mathswatch.	
7. Assessment Lesson (non-calculator) • Do 10-minute top up and go through answers together, students self-assess. • Open book assessment done in silence.		**8. Feedback Lesson** • Student to highlight their traffic light sheet. • Teacher to go through test and students to self-assess in green. • Students to complete the NOW section of the WOW-HOW-NOW sheet.	

Key Vocabulary

Vector	Direction	Magnitude	Scalar	Parallel	Multiple	Collinear

How will this help you in the future?

Vectors are used to show **movement and direction**, not just size. They help explain how things travel, where they are going, and how far they move. In adult life, vectors are useful for navigation, planning routes, understanding motion, and working with forces.

For example, vectors help with giving directions, using GPS, understanding wind or currents, and working out how objects move in games or simulations.

Jobs that use vectors

- **Engineers** – to calculate forces, motion, and structures
- **Pilots and sailors** – to plan routes and adjust for wind or currents
- **Game developers** – to move characters and objects realistically
- **Physicists** – to study motion and forces
- **Robotics engineers** – to control movement and direction

Learning vectors helps build **spatial awareness and problem-solving skills**, which are valuable in many careers.

Autumn Learning Journey for Maths
Year 11H Unit 4 More Algebra

How does this unit link to prior learning?

- Lowest Common Multiple
- Factorise
- Fractions
- Solving equations

Prior Knowledge Check

1) Find the lowest common multiple of 15 and 10.

2) Factorise: a) $12x^2y + 9xy$ b) $x^2 + 7x + 12$

3) Find a) $\frac{2}{5} + \frac{1}{4}$ b) $\frac{3}{8} \times \frac{2}{9}$

4) Solve a) $4x + 7 = 31$ b) $5x + 3 = 3x + 15$

What will you be learning about?	How does this link to the wider curriculum?
• Work with algebraic fractions; simplify, add and subtract, multiply and divide, solve equations. • Rearrange formulae. Use surds. • Use function notations.	• The five British values are embedded in maths lessons through collaborative problem-solving, mutually respecting discussions of different methods, following classroom rules, making independent choices and appreciating diverse perspectives and contributions.

We will develop our learning each week by focusing on:

	RAG		RAG
1. Rearranging formulae • Change the subject of a formula where the power of the subject appears. • Change the subject of a formula where the subject appears twice.		**2. Algebraic fractions** • Add and subtract algebraic fractions. • Multiply and divide algebraic fractions. • Change the subject of a formula involving fractions where all the variables are in the denominators.	
3. Simplifying algebraic fractions • Simplify algebraic fractions.		**4. More algebraic fractions** • Add and subtract more complex algebraic fractions. • Multiply and divide more complex algebraic fractions.	
5. Solving algebraic fraction equations • Solve equations that involve algebraic fractions. • Find the equation of the tangent to a circle at a given point.		**6. Surds** • Simplify expressions involving surds. • Expand expressions involving surds. • Rationalise the denominator of a fraction including when the denominator is an expression.	

7. Functions • Use function notation.		**8. Composite Functions** • Find and solve composite functions.	
9. Inverse Functions • Find and solve inverse functions.		**10. Proof** • Prove a result using algebra.	
11. Revision Lesson • Select topics you feel the class need to revise. • Classroom based or Mathswatch.		**12. Assessment Lesson** • Do 10-minute top up and go through answers together, students self-assess. • Open book assessment done in silence.	
13. Feedback Lesson • Student to highlight their traffic light sheet. • Teacher to go through test and students to self-assess in green. • Students to complete the NOW section of the WOW-HOW-NOW sheet.			

Key Vocabulary

Rationalise	Surd	Irrational	Equation	Rearrange	Proof	Function

How will this help you in the future?

Algebra helps us solve problems when we don't know all the information yet. It teaches us how to use symbols and formulas to represent real-life situations, such as money, time, distance, or quantities. Adults use algebra when budgeting, planning projects, comparing prices, and working things out efficiently.

Algebra also helps us think **step by step**, spot patterns, and find solutions logically, which are important skills for everyday decision-making.

Jobs that use algebra

Algebra is used in many careers, including:

- **Accountants and bankers** – to manage money, loans, and budgets
- **Engineers and scientists** – to create formulas and solve technical problems
- **Computer programmers** – to write algorithms and code
- **Business managers** – to plan costs, profits, and targets
- **Economists** – to analyse trends and predict outcomes
- **Tradespeople** – to calculate materials, costs, and measurements

Learning more algebra builds **confidence with numbers, problem-solving skills, and logical thinking**, which are valuable in almost every job and in everyday adult life.

Autumn Learning Journey for Maths
Year 11H Unit 5 Proportion and Graphs

How does this unit link to prior learning?

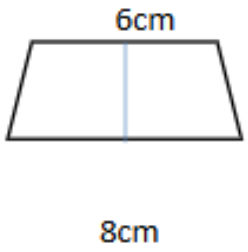
- Direct proportion
- Inverse Proportion
- Area of a trapezium
- Gradient of a line

Prior Knowledge Check

1) A is directly proportional to B. If A = 6 when b = 24, what is A if B = 40?

2) C is inversely proportional to D. If C is 6 when D is 10, what is D when C is 5?

3) What is the area of the trapezium on the right?



4) A and B lie on a straight line. A is at (3,5) and B is at (7,17). What is the gradient of the line?

What will you be learning about?	How does this link to the wider curriculum?
• Solve problems using direct and inverse proportion. • Recognise types of graphs and calculate gradients and areas under non-linear graphs. • Transform graphs of functions.	• The five British values are embedded in maths lessons through collaborative problem-solving, mutually respecting discussions of different methods, following classroom rules, making independent choices and appreciating diverse perspectives and contributions. •

We will develop our learning each week by focusing on:

1. Direct proportion	RAG	2. More direct proportion	RAG
• Write and use equations to solve problems involving direct proportion.		• Write and use equations to solve problems involving direct proportion. • Solve problems involving square and cubic proportionality. •	
3. Inverse proportion		**4. Exponential functions**	
• Write and use equations to solve problems involving inverse proportion. • Use and recognise graphs showing inverse proportion.		• Recognise graphs of exponential functions. • Sketch graphs of exponential functions.	

5. Non-linear graphs • Calculate the gradient of a tangent at a point. • Estimate the area under a non-linear graph. • Find acceleration and distance from velocity–time graphs. • Reflecting and stretching graphs of functions • Understand the relationship between translating a graph and the change in its function notation. • Understand the relationship between translating a graph and the change in its function notation.			**6. Translating graphs of functions** • Understand the relationship between translating a graph and the change in its function notation.			
7. Revision Lesson • Select topics you feel the class need to revise. • Classroom based or Mathswatch.			**8. Assessment Lesson (non-calculator)** • Do 10-minute top up and go through answers together, students self-assess. • Open book assessment done in silence.			
9. Feedback Lesson • Student to highlight their traffic light sheet. • Teacher to go through test and students to self-assess in green. • Students to complete the NOW section of the WOW-HOW-NOW sheet.						
Key Vocabulary						
Direct	Indirect	Inverse	Proportion	Exponential	Translate	Function

How will this help you in the future?

Proportion graphs show how one quantity changes **in direct relation** to another. They help us understand situations where increasing one thing increases another at a steady rate. Adults use proportion graphs to compare values, scale amounts up or down, and check whether relationships are fair and accurate.

For example, proportion graphs are useful when comparing prices, scaling recipes, working out pay based on hours worked, or understanding fuel usage and speed.

Jobs that use proportion graphs

Many jobs rely on proportion graphs, including:

- **Engineers** – to understand efficiency and performance
- **Business owners and managers** – to compare costs, sales, and profits
- **Scientists** – to check if results follow expected patterns
- **Economists** – to study relationships between quantities
- **Data analysts** – to interpret trends and make predictions
- **Tradespeople** – to scale measurements and materials accurately

Learning proportion graphs helps build **comparison skills, accuracy, and clear data interpretation**, which are useful in both work and everyday adult life.