The Sutton Academy

Knowledge Rich Curriculum Plan

Year 11 Higher+ Algebra 2

Lesson/Learning Sequence	Intended Knowledge: *Students will know that…*	Tiered Vocabulary	Steps to Success	Prior Knowledge: *In order to know this…*	Feedback
To learn how to interpret the equation of a straight line and calculate gradient	• Students will know how to identify the gradient and y-intercept of a straight line given the equation including where rearrangement is required • Students will know how to calculate gradient between two pairs of coordinates. • Students will know how to solve more complex problems involving gradient.	**Gradient** – steepness. The gradient of a line tells us how steep the line is.	•	• Students will need to know how to rearrange formulae	Exam Prep 3
To learn how to find the equation of a straight line from coordinates and find the equation of parallel lines	• Students will know how to determine the equation of a straight line from two pairs of coordinates • Students will know how to solve problems by finding the equation of a straight line • Students will know how to find x-intercepts given the equation of a straight line • Students will know that parallel lines have the same gradient • Students will know how to find the equation of a straight line that is parallel to another given line • Students will know how to solve more complex problems involving parallel lines	**Parallel –** parallel lines are two lines that are side by side and have the same distance continuously between them.	•	• Students should already know how to find the equation of a straight line from a graph	Exam Prep 3
To learn how to find the equation of perpendicular lines	• Students will know that the gradients of two perpendicular lines are negative reciprocals of one another • Students will know how to find the equation a straight line that is perpendicular to another given line • Students will know how to solve more complex problems involving perpendicular lines	**Perpendicular –** at a right angle to **Reciprocal** – The reciprocal of a number is 1 divided by the number	•	• Students will need to know how to find the reciprocal of an integer • Students will need to know how to find the reciprocal of a fraction	Exam Prep 3
To learn how to find the length of a line	• Students will know how to find the midpoint of a line • Students will know how to use the midpoint to find the coordinates of the end of a line • Students will know how to solve coordinate problems involving midpoints • Students will know how to find the length of a line using Pythagoras' Theorem • Students will know how to solve more complex problems involving the length of a line	**Midpoint -** the exact middle point.	•	• Students will need to know how to use Pythagoras' theorem to work out the hypotenuse of a right-angled triangle	Exam Prep 3
To learn how to solve more complex problems involving the equation of straight lines	• Students will know how to solve more complex problems involving the equation of straight lines including problems involving x-intercepts and points of intersection	**Intersection -** a point at which two or more things intersect (cross)	•	• Students will need to know how to find the equation of parallel lines and perpendicular lines	

Lesson/Learning Sequence	Intended Knowledge: *Students will know that…*	Tiered Vocabulary	Steps to Success	Prior Knowledge: *In order to know this…*	Feedback
To learn how to draw quadratic graphs and find roots and turning points	• Students will know how to recognise graphs of quadratic functions. • Students will know that the shape of a quadratic graph is called a parabola • Students will know how to generate points and plot graphs for quadratic functions, with and without a calculator. • Students will know how to identify the line of symmetry of a quadratic graph • Students will know how to find approximate and exact solutions to quadratic equations by identifying the roots of a graph • Students will know how to identify the turning point for a drawn quadratic graph. • Students will know how to find approximate and exact solutions to quadratic equations in the form $ax^2 + bx + c = d$ where d is an integer or decimal number by drawing a suitable horizontal straight line •	**Quadratic –** An expression or equation where the highest power is 2. **Symmetry –** A shape or object has symmetry if it can be divided into 2 or more identical pieces. **Turning Point** – The point at which the gradient changes of a curve (the maximum or minimum point on a curve). **Root** – A solution to an equation where a line or curve crosses the x-axis. **Parabola –** the U or ∩ shape of a quadratic graph	•	• Students will need to know how to substitute both positive and negative numbers into equations involving squared terms •	
To learn how to draw and recognise quadratic, cubic and reciprocal graphs	• Students will know how to recognise and sketch simple cubic functions. • Students will know how to recognise and sketch graphs of the reciprocal function $y=1/x$ with $x \neq 0$ • Students will know how to recognise and sketch graphs of exponential functions. • Students will know how to complete a table of values and plot reciprocal graphs with and without a calculator. • Students will know how to complete a table of values and plot a cubic function. • Students will know how to interpret graphs of simple cubic functions, including finding solutions to cubic equations. • Students will know how to recognise the shape of different graphs and match equations to sketches.	**Cubic –** Of the third power, order, or degree. In maths a cubic function is one involving a cubed algebraic term but no other power higher than 3. **Reciprocal –** The reciprocal of a number is: 1 divided by the number **Exponential –** a relation of the form $y = a^x$ **Function –** a relation or expression involving one or more variables **Parabola –** the U or ∩ shape of a quadratic graph	•	• Students will need to know how to substitute numbers into formulae involving cubes and fractions • Students will need to know how to convert a fraction to a decimal	
To learn how to draw, recognise and interpret graphs of trig functions	• Students will know how to recognise and draw the graph of $y = \sin(x)$ • Students will know how to recognise and draw the graph of $y = \cos(x)$ • Students will know how to recognise and draw the graph of $y = \tan(x)$ • Students will know how to read values from a trig graph and find second, third and fourth etc. solutions for trig equations using the graphs		•	• Students will need to know how to read values off a graph • Students will need to know how to substitute into formulae involving the trig ratios	

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To learn how to find turning points and solve quadratics by completing the square	• Students will know that we can find the turning point of a quadratic by writing it in the form $(x \pm a)^2 \pm b$ • Students will know that the coordinates of the turning point of a quadratic written in the form $(x + a)^2 + b$ is (-a, b) • Students will know how to solve quadratic equations by completing the square	**Turning Point** – The point at which the gradient changes of a curve (the maximum or minimum point on a curve).	•	• Students should already know how to complete the square	
To learn how to sketch quadratic graphs	• Students will know how to sketch a quadratic graph by completing the square to find the turning point, solving the quadratic to find the roots and substituting in x = 0 to determine the y-intercept	**Turning Point** – The point at which the gradient changes of a curve (the maximum or minimum point on a curve). **Root** – A solution to an equation where a line or curve crosses the x-axis. **Parabola –** the U or ∩ shape of a quadratic graph **Y-intercept** – the y-intercept tells us where a graph crosses the y-axis, this where x = 0	•	• Students will need to know how to solve quadratic equations • Students will need to know how to complete the square	
To learn how to find, identify and interpret the equation of a circle	• Students will know how to draw the circle with equations of $x^2 + y^2 = r^2$ • Students will know how to recognise and use the equation of a circle with the centre as its origin		•	• Students will need to know how to substitute numbers into expressions and equations • Students will need to know how to use a compass to draw accurate circles	
To learn how to find the equation of a tangent to a circle	• Students will know how to find the equation of a tangent to a circle from a given point.		•	• Students will need to know how to find the equation of perpendicular lines.	
To learn how to solve quadratic simultaneous equations graphically	• Students will know how to solve quadratic simultaneous equations by identifying the points of intersection between a straight line and a curve • Students will know how to solve quadratic simultaneous equations by drawing the curve and the straight line and identifying the points of intersection	**Quadratic –** involving a squared algebraic term but no other power higher than 2 **Simultaneous –** occurring, operating, or done at the same time. **Simultaneous equations –** equations involving two or more unknowns that are to	•	• Students will need to know how to draw quadratic graphs • Students will need to know how to draw straight line graphs	

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	• Students will know how to solve a different quadratic equation to that drawn by deriving and drawing a suitable straight line on a quadratic graph •	have the same values in each equation. **Linear Equation –** an equation between two variables that can be written in the form y=mx+c. Linear equations give a straight line when plotted on a graph.			
To learn how to solve quadratic simultaneous equations algebraically	• Students will know how to solve simultaneous equations algebraically where one equation is a quadratic or a circle and the other is a straight line. Students will know how to do this where they make the two equations equal to each other and also where students have to substitute a linear expression into the middle of a quadratic one.		•	• Students will need to know how to expand double brackets • Students will need to know how to solve quadratic equations using either the quadratic formula or by factorising	
To learn how to form algebraic proofs	• Students will be know how to prove simple proofs in 'show that' style questions • Students will know to prove questions involving consecutive integers, odd and even and squares	**Proof -** A mathematical proof is a sequence of statements that follow on logically from each other that shows that something is always true.	•	• Students will know how to expand double brackets	