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**Knowledge Rich Curriculum Plan**

Year 11 Higher+ Algebra 2



| **Lesson/Learning Sequence**  | **Intended Knowledge:***Students will know that…* | **Tiered Vocabulary**  | **Prior Knowledge:***In order to know this…* | **Assessment**  |
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| **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
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| **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 ax2 + 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
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| **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 ≠ 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 = ax**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
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| **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 ± a)2 ± 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
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| **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
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| **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
* 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
 | **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 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. | * 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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| **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
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