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**Knowledge Rich Curriculum Plan**

Year 10 Higher – Algebra 3

| **Lesson/Learning Sequence**  | **Intended Knowledge:***Students will know that…* | **Tiered Vocabulary**  | **Prior Knowledge:***In order to know this students, need to already know that…* | **Assessment**  |
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| **To learn how to find the nth term of a quadratic sequence** | * Students will know how to continue a quadratic sequence and use the nth term to generate terms
* Students will know how to find the nth term of a quadratic sequence.
* Students will know how to solve problems involving the nth term of quadratic sequences
 | **Quadratic –** involving a squared algebraic term but no other power higher than 2**Substitute –** use or add in place of | * Students will need to know how to find the nth term of a linear sequence
* Students will need to know how to generate a sequence for a given nth term, including those in the form an2
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| **To learn how to interpret quadratic graphs** | * 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
* Students will need to know how to draw graphs in the form y = a, x = a
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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 factorise and solve quadratics** | * Students will know how to factorise and solve quadratic equations in the form ax2 + bx + c = 0 where a = 1
* Students will know that in order to factorise and solve quadratic equations they must be equal to zero.
* Students will know how to rearrange equations to make them equal to zero before factorising and solving them
* Students will know how to form and solve quadratic equations where the coefficient of x2 is 1
 | **Factorise –** put back into brackets by bringing common factors outside**Quadratic –** involving a squared algebraic term but no other power higher than 2 | * Students need to be able to factorise quadratics where the co-efficient of x2 is 1
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| **To learn how to factorise and solve quadratics** | * Students will know how to factorise and solve quadratic equations in the form ax2 + bx + c = 0 where a > 1
* Students will know that in order to factorise and solve quadratic equations they must be equal to zero.
* Students will know how to rearrange equations to make them equal to zero before factorising and solving them
* Students will know how to form and solve quadratic equations by factorising where the coefficient of x2 is >1
 | **Co-efficient –** a number placed before and multiplying the variable in an algebraic expression | * Students need to be able to factorise quadratics where the co-efficient of x2 is greater than 1
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| **To learn how to solve quadratics using the quadratic formula** | * Students will know that the quadratic formula is $x=\frac{-b\pm \sqrt{b^{2}-4ac}}{2a}$
* Students will know that we use the quadratic formula when a quadratic cannot be factorised
* Students will know how to identify the values for a, b and c from a quadratic equation including where the equation is not necessarily in the order ax2 + bx + c
* Students will know how to substitute the values for a, b and c into the quadratic formula to solve the corresponding quadratic equation
* Students will know that in order to solve quadratic equations they must be equal to zero.
* Students will know how to rearrange equations to make them equal to zero before using the quadratic formula to solve them
* Students will know how to form and solve quadratic equations using the quadratic formula
 | **Formula –** A mathematical relationship or rule expressed in symbols.  | * Students need to be able to use a calculator efficiently
* Students need to be able to substitute numbers into formulae
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| **To learn how to find turning points 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)
 | **Turning Point** – The point at which the gradient changes of a curve (the maximum or minimum point on a curve).  | * Students need to know how to expand and simplify a squared bracket
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| **To learn how to solve quadratic/linear 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 use iteration to estimate solutions to equations** | * Students will know how to show that a solution to an equation lies between two integers
* Students will know how to rearrange an existing formula to give an iteration formula
* Students will know how to use iteration to find approximate solutions to equations, for simple equations in the first instance, then quadratic and cubic equations.
* Students will know how to use iteration with simple converging sequences.
* Students will know that converging sequences if approaches a limit.
 | **Iteration** – the repetition of a process | * Students will need to know how to substitute into formulae
* Students will need to know how to rearrange formulae
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| **To learn how to simplify algebraic fractions** | * Students will know how to simplify algebraic fractions
 |  | * Students will need to know how to factorise into single brackets
* Students will need to know how to factorise into double brackets
 | Exam Prep 2 |
| **To learn how to add and subtract algebraic fractions** | * Students will know how to add and subtract algebraic fractions where the denominator is numerical
* Students will know how to add and subtract algebraic fractions where the denominator is algebraic
* Students will know how to solve equations involving the addition and subtraction of algebraic fractions but only where the denominator is numerical
 | **Denominator –** the bottom number in a fraction**Numerator –** the top number in a fraction | * Students will need to know how to add and subtract fractions
* Students will need to know how to expand brackets
 | Exam Prep 2 |