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**Knowledge Rich Curriculum Plan**

Year 11 Higher+ Algebra 4

| **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 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 solve real life problems using iterative processes** | * Students will know how to use iterative processes to solve real life problems involving exponential increase or exponential decay
 | **Exponential –** a relation of the form y = ax**Exponential decay –** the process of reducing an amount by a consistent percentage rate over a period of time. | * Students will need to know how to solve problems involving compound interest and depreciation
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| **To learn how to interpret function notation and substitute into functions and composite functions** | * Students will know how to interpret function notation
* Students will know how to substitute numbers into functions, for example f(2), g(-3) etc.
* Students will know how to substitute numbers into composite functions, for example fg(2), gf(-3), ff(4) etc.
 | **Function –** a relation or expression involving one or more variables. In maths we often call function f(x) or g(x) etc. | * Students will need to know how to substitute into formulae
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| **To learn how to find composite functions** | * Students will know how to form a composite function for example fg(x), gg(x), gf(x) etc.
 | **Composite** - made up of several parts or elements.**Composite function** - A function made of other functions, where the output of one is the input to the other. | * Students will need to know how to expand brackets and simplify algebraic expressions
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| **To learn how to find inverse functions** | * Students will know that to find an inverse function we write the original function equal to y, rearrange to make x the subject and then substitute x back into the place of y
* Students will know how to find inverse functions
* Students will know how to find the inverse of a composite function
 | **Inverse** - opposite**Inverse function** - the inverse function of a function f is a function that undoes the operation of f.  | * Students will need to know how to rearrange formulae
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| **To learn how to form and solve equations from functions** | * Students will know how to solve equations involving functions, for example solve f(x) = 3 including where f(x) is a quadratic
* Students will know how to solve equations such as f(x) = g(x)
* Students will know how to form composite functions and then solve equations involving them
* Students will know how to find inverse functions and solve equations involving them
* Students will know how to solve more complex problems involving composite and inverse functions
 |  | * Students will need to know how to solve linear equations including those with unknowns on both sides
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| **To investigate how and why functions are transformed** | * Students will know how to find functions of f(x + a) and f(x – a), sketch the resulting graph and understand why a function in the form f(x + a) is translated ‘a’ units to the left and why f(x – a) is translate ‘a’ units the right
* Students will know how to find functions of f(-x) and -f(x), sketch the resulting graph and understand why a function in the form f(-x) is reflected in the y-axis and why -f(x) is reflected in the x-axis
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| **To learn how to transform functions** | * Students will know that f(x) + *a* means the whole graph is translated by *a* in the positive *y* direction (up)
* Students will know that f(x) – *a* means the whole graph is translated by *a* in the negative *y* direction (down)
* Students will know that f(x + *a*) means the whole graph is translated by a in the negative *x* direction (left)
* Students will know that f(x – *a*) means the whole graph is translated by a in the positive *x* direction (right)
* Students will know that −*f*(*x*) means every positive *y* value is made negative and every negative *y* is made positive. As a result, the whole graph is reflected in the x-axis.
* Students will know that *f*(−*x*) means every positive *x* value is made negative and every negative *x* is made positive. As a result, the whole graph is reflected in the y-axis.
 | **Transform –** change **Transformation –** in maths, a transformation is a process that manipulates a polygon or other two-dimensional object on a plane or coordinate system**Translation –** the process of moving something from one place to another. | * Students will need to know how to translate shapes
* Students will need to know how to reflect shapes in the x-axis and y-axis
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| **To learn how to transform functions** | * Students will know how to transform functions by a single transformation
* Students will know how to transform functions involving a combination of transformations
* Students will know the effect of transformations on key coordinates for a function
* Students will know how to transform trigonometric functions and will know how to describe their effect on key coordinates
 |  | * Students will need to know how to transform functions by reflecting or translating them
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