

# Scheme of Learning: Year 11 Higher Spring Term

## Topic Sequence: Reasoning

1	2	
<b>Multiplicative Reasoning</b>	<b>Geometric Reasoning</b>	<b>Algebraic Reasoning</b>

## Topic Overview: Algebraic Reasoning

As well as introducing formal function notation, this topic builds on previous work looking at functions and graphs and develops students' algebraic reasoning by looking at algebraic proof. Content includes interpreting simple expressions as functions with inputs and outputs and interpreting the reverse process as the 'inverse function' and interpreting the succession of two functions as 'composite functions'. Students build on previous work looking at solving inequalities and also linear and quadratic graphs to explore how number lines and graphs can be used to represent the solutions to inequalities. Looking at the difference between equations and inequalities, students establish the difference between a solution and a solution set or range of solutions. Students solve linear inequalities in one or two variables and quadratic inequalities in one variable, representing the solution set on a number line using set notation and on a graph and need to recognise, sketch and interpret graphs of quadratic functions. Students extend their work on sequences, finding the nth term of quadratic sequences and investigating iteration

## Learning Sequence:

### Use function notation

Students are introduced to formal function notation such as  $f(x)$  which is a function applied to  $x$ . Students should be aware that other letters can be used, with different letters used to distinguish between different functions within the same question.

### Composite functions and inverse functions

Students learn that a composite function is a function made from other functions, where the output of one is the input of the other. Students are introduced to inverse functions and make the link to inverse operations, ensuring they are secure with rearranging formula in advance

### Graphs of quadratic functions

This step revisits work in year 10 on recognising and plotting quadratic graphs, including identifying the turning point of a quadratic by completing the square

### Solving quadratic inequalities

Students consolidate factorising quadratics and link their factorisation to the solution set. Solutions are represented on a graph, and number line and using set notation.

### Inequalities in two variables

Students extend previous work solving simultaneous equations to solving inequalities and explore inequalities in more than one variable, using a graphical approach.

### Formal algebraic proof

Students build on previous knowledge of algebraic manipulation to complete formal algebraic proof. They should also know the meaning of the word counterexample and how to show a conjecture is false

### Quadratic Sequences

Students learn how to find the nth term of a quadratic sequence when the coefficient of  $n^2$  is both 1 and above

### Iteration and notation

Students are introduced to the iterative process as a recurrence relationship and its notation

### Rearrange equations to a given form

Students find possible rearrangements of equations that can lead to an iterative formula.

### Use the iterative process to find approximate solutions to equations

Students learn how to find approximate solutions to equations using the iterative process

### Use the iterative process to identify if there is a root between two values

Students investigate the fact that a root happens when a graph crosses the x-axis so when the graph goes from a positive y value to a negative, or vice versa and use the iterative process to identify if there is a solution to an equation between two points

Sequence of Learning:		Topic Resources:	
<b>1</b>	Using function notation	<b>Knowledge Map:</b>	Algebraic proof and functions Algebraic manipulation and notation Functions Sequences Iteration
<b>2</b>	Composite and inverse functions		
<b>3</b>	Graphs of quadratic functions		
<b>4</b>	Solving quadratic inequalities	<b>Assessment:</b>	
<b>5</b>	Inequalities in two variables	<b>Knowledge:</b>	End of Topic Test
<b>6</b>	Formal algebraic proof	<b>Application of Knowledge:</b>	Termly Summative Assessments
<b>7</b>	Quadratic Sequences	<b>Supportive Reading:</b>	
<b>8</b>	Iteration	<b>Any supported reading listed here</b>	Sparx maths: <a href="http://www.sparxmaths.co.uk">www.sparxmaths.co.uk</a> Corbett Maths: <a href="http://www.corbettmaths.com">www.corbettmaths.com</a> AQA Revision guide