Topic Sequence: Reasoning with Algebra

1	2	3
Straight Line Graphs	Forming and Solving Equations	Testing Conjectures

Topic Overview: Testing Conjectures

Reasoning is encouraged throughout the maths curriculum, and this block allows time for direct teaching of this. The opportunity is taken to revisit primes, factors and multiples which provides a wealth of opportunity to make and test simple conjectures. Students also develop their algebraic skills through developing chains of reasoning and learning how to expand a pair of binomials.

Learning Sequence:

Factors, Multiples and Primes (R)
This step will review previous knowledge on factors, multiples and primes which will be the base on forthcoming work on conjectures. Misconceptions will be addressed as well as a recap of how to express a number as a product of primes.

True or False
This step is an introduction into forming and testing conjectures, looking at identifying whether a given statement is true or false. This will mostly use students prior knowledge, with some questions requiring some reasoning to determine whether true or false, before moving into more complex scenarios.

Always, Sometimes, Never true
This step builds on the previous step of true or false, requiring students to find and identify examples to prove that a statement can be true and false, which proves it is sometimes true. This step will require students to consider fractions and negative numbers, as statements often appear true when only considering positive integers.

Show that
This step develops more formal demonstrations that a statement is true or not. Starting with simple numerical verification, students will proceed to verifying algebraic identities and simple proofs.

Conjectures about Numbers
Students will use conjectures about sums and products of odd and even numbers that can be verified with diagrams. This step is a vital part of understanding the later algebraic approach.

Expand a pair of binomials
This step focuses on expansion where all terms are positive, but can be extended to include negatives. The expansions produced will be used to form and test conjectures in this and future steps. Students need to be familiar with the language of binomial (i.e. having two terms) and quadratic (i.e. having four terms, although these will simplify to three or fewer).

Conjectures with algebra
Building upon previous steps, students will now look at forming and testing conjectures with algebra. A key aspect would be to understand that expressions of the form $2n$ are even and those of the form $2n + 1$ are odd.

Explore the 100 grid
This step provides an introduction to more formal proof with students using the hundred square to form expressions and then practising the skills of simplification and expanding two binomials.

Expand three binomials (H)
This step extends upon expanding a pair of binomials with the expansion of three binomials. Students need to be work carefully and be confident with directed number to find the expansions involving negative terms accurately.

Sequence of Learning:		Topic Resources:	
1	Factors, Multiples and Primes (R)	**Knowledge Maps:**	Algebraic Manipulation and Notation
2	True or False		
3	Always, Sometimes, Never true		
4	Show that	**Assessment**	
5	Conjectures about Numbers	**Knowledge:**	End of Topic test
6	Expand a pair of binomials	**Application of Knowledge:**	Termly mixed topic assessment
7	Conjectures with algebra	**Supportive Reading:**	
8	Explore the 100 grid		Sparx Maths www.sparxmaths.co.uk
9	Expand three binomials (H)		Corbett Maths : www.corbettmaths.com
			AQA Revision Guide