



Maths: Year 11H- Topic 11 Overview



Algebraic Reasoning

Students develop their algebraic reasoning by looking at more complex situations. They use their knowledge of sequences and rules to make inferences, and Higher tier students move towards formal algebraic proof. Forming and solving complex equations, including simultaneous equations, is revisited. Higher tier students also look at solving inequalities in more than one variable.

Key questions

How do you know when an expression is in its simplest form?

How does simplifying expressions relate to the laws of indices?

What's the connection between the coefficients of n in the rule for a linear sequence and the behaviour of the sequence? How would this change if n were negative?

What's the same and what's different about linear and quadratic sequences?

What's the difference between a linear sequence and a geometric sequence?

How can you identify a Fibonacci sequence?

What does simultaneous mean?

How can you check your solutions to a simultaneous equations question? Does it matter which equation you use?

How can you solve a quadratic equation when you cannot factorise?

Specialist key terms for this unit

Term, Expression, Simplify, Power, Index, Coefficient, Linear, Sequence, Non-linear, Geometric, Quadratic, Fibonacci, Equation, Inequality, Simultaneous, Eliminate, Substitute, Constant, Difference, Second difference, Proof, Demonstration, Counter-example, Justify, Even, Odd, Region, Satisfy, Integer, Test

Practise makes perfect

<https://www.mathsgenie.co.uk/sequences.html>

<https://www.mathsgenie.co.uk/quadratic-nth-term.html>

<https://www.mathsgenie.co.uk/simultaneous.html>

<https://www.mathsgenie.co.uk/simultaneous-quadratic.html>

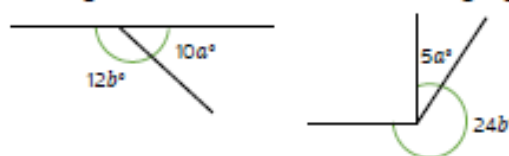
<https://www.mathsgenie.co.uk/proof.html>

Exemplar Questions

Show that 27 is a term in all these sequences.

15, 17, 19, 21	-1, 4, 3, 7, 10	$5n + 2$	$90 - 7n$
$8n - 5$	864, 432, 216, 108	$n^2 + 2$	

Use an algebraic method to work out the missing angles.



Assessment / Topic Reviews

1. Simplify complex expressions
2. Find the rule for the n th term of a linear sequence – **R**
3. Find the rule for the n th term of a quadratic sequence – **R H**
4. Use rules for sequences
5. Solve linear simultaneous equations – **R**
6. Solve simultaneous equations with one quadratic – **R H**
7. Formal algebraic proof – **H**
8. Inequalities in two variables – **H**

Suggested enrichment activities

Pocket money

Imagine your family agreed to give you some pocket money every day for a month! You can choose from the following options:

1. £10 every day
2. £3 on the first day, £3.50 on the second, £4 on the third, and so on, increasing by 50p per day
3. 1p on the first day, 2p on the second, 4p on the third, and so on, doubling each day.

Without doing any working out, which one would you choose, and why?

In a month with 31 days, how much money would you have by the end of the month, under each system? You may wish to explore using a spreadsheet...

Here are some questions you might like to consider:

In which months would option 1 be better than option 2?
If your family stopped your pocket money on day 8, which option would give you the most?
On which day of the month does option 3 become the most fruitful?
If you chose option 3, how many days would it be before you became a millionaire?