

Autumn 1: Algebraic thinking

Week 1 to 2: Exploring Sequences

Rather than rushing to find rules for n^{th} term, this week is spent exploring sequences in detail, using both diagrams and lists of numbers. Technology is used to produce graphs so students can appreciate and use the words "linear" and "non-linear" linking to the patterns they have spotted. Calculators are used throughout so number skills are not a barrier to finding the changes between terms or subsequent terms. Sequences are treated more formally later this unit. National curriculum content covered:

- move freely between different numerical, algebraic, graphical and diagrammatic representations
- make and test conjectures about patterns and relationships
- use a calculator and other technologies to calculate results accurately and then interpret them appropriately
- generate terms of a sequence from a term-to-term rule
- recognise arithmetic sequences
- recognise geometric sequences and appreciate other sequences that arise

Weeks 3 to 4: Understanding and using algebraic notation

The focus of these three weeks is developing a deep understanding of the basic algebraic forms, with more complex expressions being dealt with later. Function machines are used alongside bar models and letter notation, with time invested in single function machines and the links to inverse operations before moving on to series of two machines and substitution into short abstract expressions. National curriculum content covered:

- move freely between different numerical, algebraic, graphical and diagrammatic representations
- use algebra to generalise the structure of arithmetic, including to formulate mathematical relationships
- recognise and use relationships between operations including inverse operations

- model situations or procedures by translating them into algebraic expressions
- substitute values in expressions, rearrange and simplify expressions
- use and interpret algebraic notation, including:

ab in place of $a \times b$

$3y$ in place of $y + y + y$ and $3 \times y$

a^2 in place of $a \times a$

ab in place of $a \times b$

$\frac{a}{b}$ in place of $a \div b$

- generate terms of a sequence from a term-to-term rule
- produce graphs of linear functions of one variable

Weeks 5 and 6: Equality and equivalence

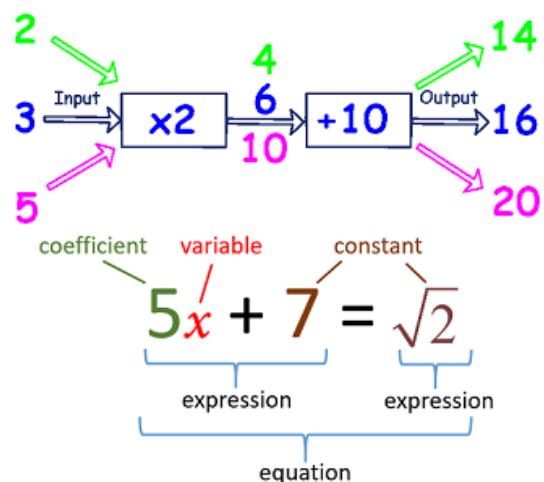
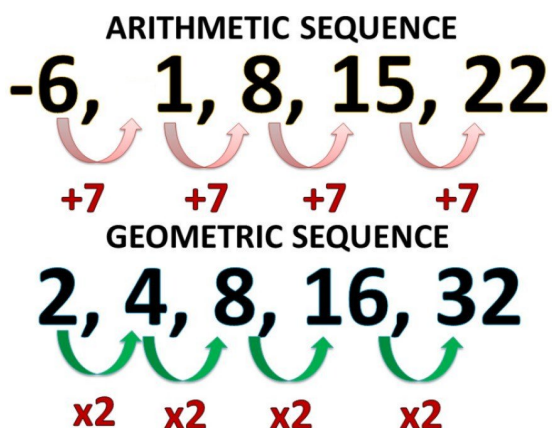
In this section students are introduced to forming and solving one-step linear equations, building on their study of inverse operations. The equations met will mainly require the use of a calculator, both to develop their skills and to ensure understanding of how to solve equations rather than spotting solutions. This work will be developed when two-step equations are met in the next place value unit and throughout the course. The unit finishes within consideration of equivalence and the difference between this and equality, illustrated through collecting like terms.

National curriculum content covered:

- use algebra to generalise the structure of arithmetic, including to formulate mathematical relationships
- simplify and manipulate algebraic expressions to maintain equivalence by collecting like terms
- use approximation through rounding to estimate answers
- use algebraic methods to solve linear equations in one variable

Key Vocabulary

sequence	table	Fibonacci	inverse
linear	axes	function	commutative
non-linear	difference	input	coefficient
term	ascending	output	variable
position	descending	estimate	bar model
rule	arithmetic	operation	expression
graph	geometric	square	substitute
equal	equivalent	equation	fact family
unknown	index	simplify	collect



Terms: $5x, 7, \sqrt{2}$