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| **UNIT 5: Equations, inequalities and sequences** |

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**SPECIFICATION REFERENCES**

N1 order positive and negative integers, decimals and fractions; use the symbols =, ≠, <, >, ≤, ≥

N15 round numbers and measures to an appropriate degree of accuracy (e.g. to a specified number of decimal places or significant figures); use inequality notation to specify simple error intervals due to truncation or rounding

N16 apply and interpret limits of accuracy

A2 substitute numerical values into formulae and expressions, including scientific formulae

A3 understand and use the concepts and vocabulary of expressions, equations, formulae, identities, inequalities, terms and factors

A5 understand and use standard mathematical formulae; rearrange formulae to change the subject

A7 where appropriate, interpret simple expressions as functions with inputs and outputs

A17 solve linear equations in one unknown algebraically (including those with the unknown on both sides of the equation); find approximate solutions using a graph

A21 translate simple situations or procedures into algebraic expressions or formulae; derive an equation, solve the equation and interpret the solution

A22 solve linear inequalities in one variable; represent the solution set on a number line

A23 generate terms of a sequence from either a term-to-term or a position-to-term rule

A24 recognise and use sequences of triangular, square and cube numbers, simple arithmetic progressions; Fibonacci type sequences and simple geometric progressions (*rn* where *n* is an integer, and *r* is a rational number > 0)

A25 deduce expressions to calculate the *n*th term of linear sequences.

**PRIOR KNOWLEDGE**

Students should be able to use inequality signs between numbers.

Students should be able to use negative numbers with the four operations, recall and use the hierarchy of operations and understand inverse operations.

Students should be able to deal with decimals and negatives on a calculator.

Students should be able to use index laws numerically.

Students should be able to draw a number line.

**KEYWORDS**

Arithmetic, geometric, function, sequence, *n*th term, derive, quadratic, triangular, cube, square, odd, even, solve, change, subject, inequality, represent, substitute, bracket, expand, linear, equation, balance, accuracy

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| **5b. Sequences**  (A7, A23, A24, A25) | **Teaching time**  4-6 hours |

**OBJECTIVES**

By the end of the sub-unit, students should be able to:

* Recognise sequences of odd and even numbers, and other sequences including Fibonacci sequences;
* Use function machines to find terms of a sequence;
* Write the term-to-term definition of a sequence in words;
* Find a specific term in the sequence using position-to-term or term-to-term rules;
* Generate arithmetic sequences of numbers, triangular number, square and cube integers and sequences derived from diagrams;
* Recognise such sequences from diagrams and draw the next term in a pattern sequence;
* Find the next term in a sequence, including negative values;
* Find the *n*th term
* for a pattern sequence;
* a linear sequence;
* of an arithmetic sequence;
* Use the *n*th term of an arithmetic sequence to
* generate terms;
  + decide if a given number is a term in the sequence, or find the first term over a certain number;
* find the first term greater/less than a certain number;
* Continue a geometric progression and find the term-to-term rule, including negatives, fraction and decimal terms;
* Continue a quadratic sequence and use the *n*th term to generate terms;
* Distinguish between arithmetic and geometric sequences.

**POSSIBLE SUCCESS CRITERIA**

Given a sequence, ‘Which is the 1st term greater than 50?’

What is the amount of money after *x* months saving the same amount or the height of tree that grows 6 m per year?

What are the next terms in the following sequences?

1, 3, 9, … 100, 50, 25, … 2, 4, 8, 16, …

Write down an expression for the *n*th term of the arithmetic sequence 2, 5, 8, 11, …

Is 67 a term in the sequence 4, 7, 10, 13, …?

**OPPORTUNITIES FOR REASONING/PROBLEM SOLVING**

Evaluating statements about whether or not specific numbers or patterns are in a sequence and justifying the reasons.

**NOTES**

Emphasise use of 3*n* meaning 3 × *n*.

Students need to be clear on the description of the pattern in words, the difference between the terms and the algebraic description of the *n*th term.

Students are not expected to find the *n*th term of a quadratic sequence.