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Introduction to Algebra

IGCSE Mathematics

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Prepared by

Nikolas Agisilaou

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1 Introduction to Algebra

Note

Algebra is the branch of mathematics that uses letters and symbols to represent numbers and quantities. It allows us to write general rules, describe patterns, and solve problems where values are unknown.
In this chapter, we will explore:

- What variables and constants are
- How to write algebraic expressions from words
- The rules and conventions of algebraic notation
- Substitution into expressions
- Simplifying algebraic expressions
- Forming expressions from real-world situations
- Using formulas

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2 Variables and Constants

Definition

A **variable** is a letter (or symbol) used to represent an unknown or changing value.
A **constant** is a fixed value that does not change.
Example: In the expression $5x + 3$, the letter x is a **variable** and the number 3 is a **constant**. The number 5 is called the **coefficient** of x.

Note

Why do we use letters?
Letters let us write statements that are true for many different values at once.

- Instead of saying "a number plus five equals twelve," we write $x + 5 = 12$
- Instead of saying "the area of any rectangle is its length times its width," we write $A = l \times w$
- Instead of saying "whatever number you start with, doubling it and adding

one gives an odd number," we write $2n + 1$

Definition

The parts of an algebraic expression have specific names:

- **Term:** A single number, variable, or the product of numbers and variables, separated by $+$ or $-$ signs. For example, $3x$, $-5y^2$ and 7 are all terms.
- **Coefficient:** The numerical part of a term that multiplies the variable. In $6m$, the coefficient is 6.
- **Constant term:** A term with no variable. In $4x + 11$, the constant term is 11.
- **Expression:** A collection of terms combined using operations, such as $7a + 2b - 3$.

Example

Identify the terms, coefficients, and constant in the expression $7m^2 + 4m - 9$.

Solution:

Term	Variable part	Coefficient
$7m^2$	m^2	7
$4m$	m	4
-9	none (constant)	—

The expression has **3 terms**. The constant term is $\mathbf{-9}$.

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3 Algebraic Notation and Conventions

Definition

Algebra follows specific **conventions** (agreed rules) for writing expressions clearly and concisely.

- We write $3x$ instead of $3 \times x$
- We write xy instead of $x \times y$

Preview ends here

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