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Factorisation

IGCSE Mathematics

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Quality Mathematics Education for Students

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1 Introduction to Factorisation

Note

Factorisation is the reverse process of expanding brackets. While expanding turns $5(x + 3)$ into $5x + 15$, factorising turns $5x + 15$ back into $5(x + 3)$. It is one of the most essential algebraic skills in IGCSE Mathematics.

In this chapter, we will explore:

- What factorisation means and why it is useful
- Taking out a single common factor
- Taking out a common factor that is an algebraic expression
- Factorising by grouping
- Factorising quadratic expressions of the form $x^2 + bx + c$
- Factorising quadratic expressions of the form $ax^2 + bx + c$
- Difference of two squares
- Perfect square trinomials
- Solving equations using factorisation

2 What is Factorisation?

Definition

Factorisation is the process of writing an expression as a product of its factors. A **factor** is a number or expression that divides exactly into another number or expression.

Expanding vs Factorising:

$$\begin{array}{ccc} 5(x + 3) & \xrightarrow{\text{Expanding}} & 5x + 15 \\ \text{Factorised form} & & \text{Expanded form} \\ \\ 5x + 15 & \xrightarrow{\text{Factorising}} & 5(x + 3) \\ \text{Expanded form} & & \text{Factorised form} \end{array}$$

Factorisation is sometimes called “expanding in reverse.”

Note**Why is factorisation useful?**

- It simplifies algebraic expressions
- It is essential for solving quadratic equations
- It helps simplify algebraic fractions
- It is used throughout higher-level mathematics

How to Check Your Factorisation

You can always verify your factorisation by expanding your answer. If you get back the original expression, your factorisation is correct.

Example: To check that $10x + 35 = 5(2x + 7)$, expand the right side:

$$5(2x + 7) = 10x + 35 \quad \checkmark$$

3 Taking Out a Common Factor (HCF)

Definition

The **Highest Common Factor (HCF)** of two or more terms is the largest factor that divides into every term exactly.

When we “take out” the HCF, we write it outside a bracket and place what remains inside the bracket.

Method**Taking Out a Common Factor**

Step 1: Identify the HCF of all the terms (consider both numbers and variables)

Step 2: Write the HCF outside the bracket

Step 3: Divide each term by the HCF and write the results inside the bracket

Step 4: Check by expanding

Memory aid: Ask yourself, “What is the biggest thing I can divide out of every term?”

Preview ends here

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