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Factorisation

IGCSE Mathematics

The Panda Math Tutor

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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

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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:

$$\underset{\text{Factorised form}}{5(x+3)} \xrightarrow{\text{Expanding}} \underset{\text{Expanded form}}{5x+15}$$

$$\underset{\text{Expanded form}}{5x+15} \xrightarrow{\text{Factorising}} \underset{\text{Factorised form}}{5(x+3)}$$

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:

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

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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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