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Percentages

IGCSE Mathematics

The Panda Math Tutor

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1 Introduction to Percentages

Note

Percentages are one of the most practical topics in IGCSE Mathematics. From calculating sale prices and tax to working with interest rates and population growth, percentages appear everywhere in daily life and in every exam paper.

In this chapter, we will explore:

- What percentages are and how to convert between fractions, decimals, and percentages
- Finding a percentage of a quantity
- Expressing one quantity as a percentage of another
- Percentage increase and decrease using multipliers
- Percentage change
- Reverse percentages (finding the original value)
- Applications to real-world problems and algebraic proofs

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2 Understanding Percentages

Definition

A **percentage** is a way of expressing a number as a fraction of 100. The word "percent" comes from the Latin *per centum*, meaning "out of one hundred".

$$p\% = \frac{p}{100}$$

The symbol for percentage is %. For example, 37% means $\frac{37}{100} = 0.37$.

2.1 Converting Between Fractions, Decimals, and Percentages

Method

Conversion Rules

1. **Fraction → Percentage:** Divide numerator by denominator, then multiply by 100.
2. **Percentage → Fraction:** Write the percentage over 100 and simplify.
3. **Decimal → Percentage:** Multiply by 100 (move the decimal point 2 places right).
4. **Percentage → Decimal:** Divide by 100 (move the decimal point 2 places left).

Example

Convert each of the following:
(a) $\frac{7}{20}$ to a percentage **(b)** 64% to a fraction in its simplest form **(c)** 0.038 to a percentage **(d)** 155% to a decimal

Solution:
(a) $\frac{7}{20} = 7 \div 20 \times 100 = 0.35 \times 100 = \mathbf{35}\%$
(b) $64\% = \frac{64}{100} = \frac{8}{25}$
(c) $0.038 \times 100 = \mathbf{3.8}\%$
(d) $155 \div 100 = \mathbf{1.55}$

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