

Rates, units and best buys

Topic cliff notes / objectives, key ideas and examples

Learning objectives

- Calculate speed and density using consistent units.
- Convert area units and compare unit costs.

Key ideas

- A compound unit combines the units of both quantities.

$$\text{speed} = \frac{\text{distance}}{\text{time}}, \quad \text{density} = \frac{\text{mass}}{\text{volume}}$$

- Convert minutes to hours before finding speed in kilometres per hour.

$$\text{hours} = \frac{\text{minutes}}{60}$$

- Area units square the length conversion.

$$1 \text{ m} = 100 \text{ cm}, \quad 1 \text{ m}^2 = 10\,000 \text{ cm}^2$$

- For best buys, compare costs for one item or one common unit.

$$\text{unit cost} = \frac{\text{total cost}}{\text{quantity}}$$

Worked example

A cyclist covers thirty-six kilometres in one hour and thirty minutes. Find the average speed.

$$t = 1 + \frac{30}{60} = 1.5 \text{ h}$$

$$v = \frac{36}{1.5} = 24 \text{ km/h}$$

Answer

24 km/h

Quick example

Convert the area from square metres to square centimetres.

$$2.5 \text{ m}^2 = 2.5 \times 10\,000 \text{ cm}^2 = 25\,000 \text{ cm}^2$$

Answer

25 000 cm²

Watch out

Square the conversion factor for area. Thirty minutes is half an hour, not three tenths of an hour.

