

Solutions

Marking: **M1** a correct method, **A1** the correct answer.

Each answer shows the steps, then the **result**.

2.1

- $\text{speed} = \frac{\text{distance}}{\text{time}}$

$$\frac{120 \text{ km}}{2 \text{ h}} = \mathbf{60 \text{ km/h}}$$

2.2

- $\text{density} = \frac{\text{mass}}{\text{volume}}$

$$\frac{240 \text{ g}}{30 \text{ cm}^3} = \mathbf{8 \text{ g/cm}^3}$$

2.3

- $\text{distance} = \text{speed} \times \text{time}$

$$5 \text{ m/s} \times 40 \text{ s} = \mathbf{200 \text{ m}}$$

2.4

- divide km/h by 3.6 to get m/s

$$\frac{72}{3.6} = \mathbf{20 \text{ m/s}}$$

2.5

$$\frac{480 \text{ g}}{60 \text{ cm}^3} = \mathbf{8 \text{ g/cm}^3}$$

2.6

- $\text{pressure} = \frac{\text{force}}{\text{area}}$

$$\frac{250 \text{ N}}{0.5 \text{ m}^2} = \mathbf{500 \text{ N/m}^2}$$

(or 500 Pa)

3.1

- 1 h 30 min = 1.5 h

$$\frac{150 \text{ km}}{1.5 \text{ h}} = \mathbf{100 \text{ km/h}}$$

3.2

- $\text{mass} = \text{density} \times \text{volume}$

$$19.3 \text{ g/cm}^3 \times 50 \text{ cm}^3 = \mathbf{965 \text{ g}}$$

3.3

- $\text{time} = \frac{\text{distance}}{\text{speed}}$

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

- $1.5 \times 60 = \mathbf{90 \text{ minutes}}$

3.4

(a)

- 1 h 48 min = 1.8 h

$$\frac{135 \text{ km}}{1.8 \text{ h}} = \mathbf{75 \text{ km/h}}$$

(b)

$$\frac{75}{3.6} = \mathbf{20.8 \text{ m/s}}$$

(3 s.f.)

(c)

- return time = $\frac{135}{90} = 1.5 \text{ h}$ - total distance = 270 km, total time = $1.8 + 1.5 = 3.3 \text{ h}$

$$\frac{270 \text{ km}}{3.3 \text{ h}} = \mathbf{81.8 \text{ km/h}}$$

(d)

- average speed is **total distance** $\div$ **total time**
- the lorry spends longer at the slower speed, so the mean of 75 and 90 is not correct

(e)

- $0.4 \text{ m}^3 = 0.4 \times 10^6 = 400\,000 \text{ cm}^3$
- $\text{mass} = 400\,000 \times 7.8 = 3\,120\,000 \text{ g}$
- **3.12 tonnes**