Solutions

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

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

2.1

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

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

2.2

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

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

2.3

- distance = speed $\times$ 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

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

2.6

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

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

(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

- mass = density $\times$ volume

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

3.3

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

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

- $1.5 \times 60 = \mathbf{90}$ 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 $= \dfrac{135}{90} = 1.5$ h - total distance = 270 km, total time $= 1.8 + 1.5 = 3.3$ h

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

(d)

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

(e)

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