Solutions

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

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

2.1

- speed = distance ÷ time = $90 \div 1.5$

$$= \mathbf{60} \text{ km/h}$$

2.2

- acceleration = change in speed ÷ time = $20 \div 8$

$$= \mathbf{2.5} \text{ m/s}^\mathbf{2}$$

2.3

- the area is a triangle: $\frac{1}{2} \times 8 \times 20$

$$= \mathbf{80} \text{ m}$$

2.4

- 15 m/s is $15 \times 3600 = 54\,000$ m in one hour

$$54\,000 \text{ m} = \mathbf{54} \text{ km/h}$$

2.5

- 40 minutes $= \frac{40}{60} = \frac{2}{3}$ hour; distance = speed × time $= 18 \times \frac{2}{3}$

$$= \mathbf{12} \text{ km}$$

3.1

(a)

- $24 \div 12$

$$= \mathbf{2} \text{ m/s}^\mathbf{2}$$

(b)

- first stage, a triangle: $\frac{1}{2} \times 12 \times 24 = 144$ m
- middle stage, a rectangle: $30 \times 24 = 720$ m
- last stage, a triangle: $\frac{1}{2} \times 8 \times 24 = 96$ m

$$144 + 720 + 96 = \mathbf{960} \text{ m}$$

(c)

- total time $= 12 + 30 + 8 = 50$ s, so average speed $= 960 \div 50$

$$= \mathbf{19.2} \text{ m/s}$$

- note this is NOT the average of 0, 24 and 0

3.2

(a)

- deceleration = change in speed ÷ time $= (30 - 12) \div 20 = 18 \div 20$

$$= \mathbf{0.9} \text{ m/s}^\mathbf{2}$$

(b)

- the area is a trapezium: $\frac{1}{2} \times (30 + 12) \times 20$

$$= \mathbf{420} \text{ m}$$

3.3

(a)

- 45 minutes = 0.75 hour; speed $= 15 \div 0.75$

$$= \mathbf{20} \text{ km/h}$$

(b)

- time home $= 15 \div 20 = 0.75$ hour $= 45$ minutes
- 09:00 + 45 + 30 + 45 minutes = **11:00**

3.4

(a)

- first stage, a triangle: $\frac{1}{2} \times T \times 16 = 8T$; second stage, a rectangle: $20 \times 16 = 320$
- $8T + 320 = 400$, so $8T = 80$

$$T = \mathbf{10}$$

(b)

- $16 \div 10 = \mathbf{1.6}$ m/s$^\mathbf{2}$