Solutions

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

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

2.1

- fraction $= \dfrac{72}{360} = \dfrac{1}{5}$
- arc $= \dfrac{1}{5} \times 2 \times \pi \times 10$

$$= 12.566\ldots = \mathbf{12.6}\text{ cm}$$

2.2

- area $= \dfrac{1}{5} \times \pi \times 10^2$

$$= 62.83\ldots = \mathbf{62.8}\text{ cm}^\mathbf{2}$$

2.3

- rectangle $= 10 \times 6 = 60$ cm^2
- semicircle of RADIUS 3: $\frac{1}{2} \times \pi \times 3^2 = 14.137\ldots$

$$60 + 14.137 = \mathbf{74.1}\text{ cm}^\mathbf{2}$$

- the diameter is 6, so the radius is 3 – halving it is the step most often missed

2.4

- area $= \frac{1}{2}\pi r^2 = \frac{1}{2} \times \pi \times 7^2 = 24.5\pi$

$$= 76.96\ldots = \mathbf{77.0}\text{ cm}^2$$

2.5

- whole rectangle minus the cut-out: $10 \times 8 - 4 \times 3 = 80 - 12$

$$= \mathbf{68}\text{ cm}^2$$

3.1

(a)

- the two semicircles make one whole circle of diameter 70 m
- circle circumference $= \pi \times 70 = 219.91\ldots$ m
- the two straight sides are 84 m each; the ends are curved, so the 70 m widths are NOT part of the perimeter

$$2 \times 84 + 219.91 = 387.9\ldots = \mathbf{388}\text{ m}$$

(b)

- rectangle $= 84 \times 70 = 5880$ m^2
- the two semicircles make a circle of radius 35 m
- circle area $= \pi \times 35^2 = 3848.45\ldots$ m^2

$$5880 + 3848.45 = 9728.4\ldots = \mathbf{9730}\text{ m}^\mathbf{2}$$

3.2

- $33.5 = \dfrac{\theta}{360} \times \pi \times 8^2$
- $\theta = \dfrac{33.5 \times 360}{\pi \times 64}$

$$= 59.98\ldots = \mathbf{60}^\circ$$

3.3

- the sides of the square are inside the shape, so the perimeter is four semicircular arcs of diameter 4 cm
- each arc $= \frac{1}{2} \times \pi \times 4 = 2\pi$

$$4 \times 2\pi = 8\pi = 25.13\ldots = \mathbf{25.1}\text{ cm}$$

3.4

- square: $10^2 = 100$ cm^2; circle: $\pi \times 5^2 = 25\pi = 78.54$ cm^2

$$100 - 78.54 = 21.46\ldots = \mathbf{21.5}\text{ cm}^2$$

3.5

- sector area $= \dfrac{60}{360} \times \pi \times 6^2 = 6\pi = 18.850$ cm^2
- triangle area $= \frac{1}{2}ab\sin C = \frac{1}{2} \times 6 \times 6 \times \sin 60^\circ = 15.588$ cm^2
- segment = sector − triangle $= 18.850 - 15.588$

$$= 3.261\ldots = \mathbf{3.26}\text{ cm}^2$$