Solutions

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

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

2.1

- $4 \times 3 \times 5 = \mathbf{60}$ cm$^\mathbf{3}$

2.2

- $V = \pi r^2 h$
- $\pi \times 3^2 \times 10 = \mathbf{90}\pi$ cm$^\mathbf{3}$

2.3

- $V = \frac{4}{3}\pi r^3$
- $\frac{4}{3}\pi \times 27 = \mathbf{36}\pi$ cm$^\mathbf{3}$

2.4

- curved SA $= \pi r l = \pi(6)(10)$
- $60\pi = \mathbf{188}$ cm$^\mathbf{2}$

2.5

$$l = \sqrt{8^2 + 15^2} = \sqrt{289} = \mathbf{17} \text{ cm}$$

2.6

- curved surface $= \frac{1}{2}(4\pi r^2) = 2\pi r^2$
- plus the flat face πr^2, giving $\mathbf{3\pi r^2}$

3.1

- $V = \frac{1}{3}\pi r^2 h$
- $\frac{1}{3}\pi \times 6^2 \times 8 = \mathbf{96}\pi$ cm$^\mathbf{3}$

3.2

- curved $= 2\pi(4)(9) = 72\pi$
- two ends $= 2\pi(4)^2 = 32\pi$
- total $\mathbf{104}\pi$ cm$^\mathbf{2}$

3.3

- $V = \frac{2}{3}\pi r^3$
- $\frac{2}{3}\pi \times 216 = \mathbf{144}\pi$ cm$^\mathbf{3}$

3.4

(a)

- cylinder: $\pi(3)^2(8) = 72\pi$
- cone: $\frac{1}{3}\pi(3)^2(4) = 12\pi$
- total $= 84\pi = \mathbf{264}$ m$^\mathbf{3}$ (3 s.f.)

(b)

$$l = \sqrt{3^2 + 4^2} = \mathbf{5} \text{ m}$$

(c)

- curved cylinder $= 2\pi(3)(8) = 48\pi$
- curved cone $= \pi(3)(5) = 15\pi$
- no base and the join is internal, so total $= 63\pi = \mathbf{198}$ m$^\mathbf{2}$

(d)

- 264 m^3 $= 264 \times 10^6$ cm^3
- mass $= 264 \times 10^6 \times 0.75 = 1.98 \times 10^8$ g
- **198** tonnes

(e)

- lengths 1 : 2 so volumes **1** : **8**
- surface areas **1** : **4**