

Topic: Volume

25.01

$$\begin{aligned}
 V_{\text{CONE}} &= \frac{1}{3} \pi r^2 h \\
 &= \frac{1}{3} \times \pi \times 4^2 \times 15 \\
 &= 251.33 \text{ cm}^3
 \end{aligned}$$

$$\begin{aligned}
 V_{\text{HEMISPHERE}} &= \frac{4}{3} \pi r^3 / 2 \\
 &= \frac{4}{3} \times \pi \times 3.7^3 / 2 \\
 &= 106.09 \text{ cm}^3
 \end{aligned}$$

$$\begin{aligned}
 V_{\text{GLASS}} &= V_{\text{CONE}} - V_{\text{HEMISPHERE}} \\
 &= 251.33 - 106.09 \\
 &= 145.24 \text{ cm}^3 \\
 &= 150 \text{ cm}^3 \text{ to 2 s.f.}
 \end{aligned}$$

25.02

$$\begin{aligned}
 V_{\text{CONE}} &= \frac{1}{3} \pi r^2 h \\
 &= \frac{1}{3} \times \pi \times 8^2 \times 32 \\
 &= 2144.660585
 \end{aligned}$$

$$\begin{aligned}
 V_{\text{2 CONE}} &= \frac{1}{3} \pi r^2 h \\
 &= \frac{1}{3} \times \pi \times 5^2 \times 20 \\
 &= 523.5987756
 \end{aligned}$$

$$\begin{aligned}
 V_{\text{CONTAINER}} &= 2144.66 - 523.60 \\
 &= 1621.06 \\
 &= 2000 \text{ cm}^3 \text{ to 1 significant figure.}
 \end{aligned}$$

Topic: Volume

25.03

$$\begin{aligned} \text{a) } A_{\text{RECTANGLE}} &= l \times b \\ &= 30 \times 46 \\ &= 1380 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} A_{\text{CIRCLE}} &= \pi r^2 \\ &= \pi \times 15^2 \\ &= 706.86 \text{ cm}^2 \end{aligned}$$

$$A_{\text{TROUGH}} = 1380 + 706.86 = 2086.86 \text{ cm}^2$$

$$\begin{aligned} V_{\text{TROUGH}} &= Ah \\ &= 2086.86 \times 25 \\ &= 52171.5 \\ &= 52000 \text{ cm}^3 \text{ to 2 s.f.} \end{aligned}$$

$$\text{b) } V = \frac{1}{4} \pi r^2 h$$

$$r = \sqrt{\frac{4V}{\pi h}}$$

$$\begin{aligned} &= \sqrt{\frac{4 \times 30000}{\pi \times 20}} \\ &= 13.82 \text{ cm} \end{aligned}$$

25.04

$$\begin{aligned} V_{\text{CONE}} &= \frac{1}{3} \pi r^2 h \\ &= \frac{1}{3} \times \pi \times 5.2^2 \times 20 \\ &= 566.3244357 \\ &= 566.3 \text{ cm}^3 \end{aligned}$$

$$\begin{aligned} V_{\text{CYLINDER}} &= \pi r^2 h \\ &= \pi \times 5.5^2 \times 5.8 \\ &= 551.1924311 \\ &= 551.2 \text{ cm}^3 \end{aligned}$$

The cone is better value for money because the volume is higher.

Topic: Volume

25.05

$$\begin{aligned}
 V_{\text{SPHERE}} &= \frac{4}{3} \pi r^3 \\
 &= \frac{4}{3} \times \pi \times 0.6^3 \\
 &= 0.5235987786 \\
 &= 0.52 \text{ cm}^3 \text{ to 2 significant figures}
 \end{aligned}$$

$$V_{\text{CYLINDER}} = \pi r^2 h \rightarrow \text{Change the subject to } h$$

$$h = \frac{V}{\pi r^2}$$

$$= \frac{0.52}{\pi \times 0.7^2}$$

$$= 0.3377932466$$

$$= 0.34 \text{ cm}^3$$

25.06

$$\begin{aligned}
 V_1 &= \frac{1}{3} \pi r^2 h \\
 &= \frac{1}{3} \times \pi \times 15^2 \times 24 \\
 &= 5654.866776
 \end{aligned}$$

$$\begin{aligned}
 V_2 &= \frac{1}{3} \pi r^2 h \\
 &= \frac{1}{3} \times \pi \times 5^2 \times 8 \\
 &= 209.4398102
 \end{aligned}$$

$$\text{Volume of water} = 5654.87 - 209.44$$

$$= 5445.43$$

$$= 5400 \text{ cm}^3$$

to 2 significant figures

Topic: Volume

25.07

$$\begin{aligned} \text{a) } A_{\text{RECTANGLE}} &= l \times b \\ &= 24 \times 30 \\ &= 720 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} A_{\text{CIRCLE}} &= \pi r^2 \\ &= \pi \times 12^2 \\ &= 452.39 \text{ cm}^2 \end{aligned}$$

$$A_{\text{BASKET}} = 1172.39 \text{ cm}^2$$

$$\begin{aligned} V_{\text{BASKET}} &= Ah \\ &= 1172.39 \times 50 \\ &= 58619.47 \text{ cm}^3 \rightarrow 58600 \text{ to 3sf} \end{aligned}$$

$$\begin{aligned} \text{b) } V &= Ah \\ V &= lbh \\ h &= \frac{V}{lb} \\ &= \frac{29300}{35 \times 28} \\ &= 29.9 \text{ cm} \end{aligned}$$

25.08

$$\begin{aligned} V_1 &= \pi r^2 h \\ &= \pi \times 41^2 \times 900 \\ &= 4752915.526 \end{aligned}$$

$$\begin{aligned} V_2 &= \pi r^2 h \\ &= \pi \times 37^2 \times 900 \\ &= 3870756.308 \end{aligned}$$

$$\begin{aligned} \text{Volume of aluminium} &= 4752915.53 - 3870756.31 \\ &= 882159.22 \\ &= 882000 \text{ mm}^3 \end{aligned}$$

Topic: Volume

25.09

$$\begin{aligned}
 V &= \pi r^2 h \\
 h &= \frac{V}{\pi r^2} \\
 &= \frac{3260}{\pi \times 6.4^2} \\
 &= 25.33 \text{ cm}
 \end{aligned}$$

25.10

$$\begin{aligned}
 \text{a) } V_{\text{CYLINDER}} &= \pi r^2 h \\
 &= \pi \times 1.5^2 \times 15 \\
 &= 106.03 \text{ m}^3
 \end{aligned}$$

$$\text{b) } V_{\text{CONE}} = \frac{1}{3} \pi r^2 h$$

$$\begin{aligned}
 h &= \frac{3V}{\pi r^2} \\
 &= \frac{3 \times 5.7}{\pi \times 1.5^2} \\
 &= 2.4 \text{ m}
 \end{aligned}$$

Total Height

$$\begin{aligned}
 &= 15 + 2.4 \\
 &= 17.4 \text{ m}
 \end{aligned}$$

Topic: \_\_\_\_\_

25.11

$$* \text{ Radius of sphere and cylinder} = \frac{23-15}{2} = 4 \text{ mm}$$

$$\begin{aligned} V_{\text{CYLINDER}} &= \pi r^2 h \\ &= \pi \times 4^2 \times 15 \\ &= 753.9822369 \end{aligned}$$

$$\begin{aligned} V_{\text{SPHERE}} &= \frac{4}{3} \pi r^3 \\ \text{(2 HEMISPHERES)} \\ &= \frac{4}{3} \times \pi \times 4^3 \\ &= 268.0828731 \end{aligned}$$

Volume of cod liver oil capsule

$$\begin{aligned} &= 753.98 + 268.08 \\ &= 1022.06 \text{ mm}^3 \end{aligned}$$

25.12

$$\begin{aligned} V_{\text{CONE}} &= \frac{1}{3} \pi r^2 h \\ &= \frac{1}{3} \times \pi \times 10^2 \times 12 \\ &= \frac{1}{3} \times 3.14 \times 10^2 \times 12 \\ &= 1256 \text{ cm}^3 \end{aligned}$$

Topic: Volume

25.13

$$\begin{aligned}V &= \pi r^2 h \\&= \pi \times 5^2 \times 4 \\&= 3.14 \times 5^2 \times 4 \\&= 314 \text{ cm}^3\end{aligned}$$

25.14

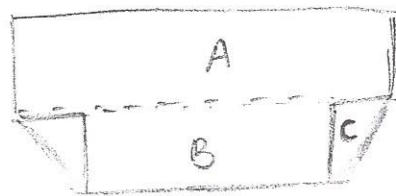
$$\begin{aligned}V_{\text{SPHERE}} &= \frac{4}{3} \pi r^3 \\&= \frac{4}{3} \times \pi \times 3^3 \\&= \frac{4}{3} \times 3.14 \times 3^3 \\&= 113.04 \text{ cm}^3\end{aligned}$$

Topic: Volume

25.15

$$x = \frac{3 - 1.5}{2}$$

$$= 0.75 \text{ m}$$



$$A_A = l \times b$$

$$= 0.6 \times 3$$

$$= 1.8 \text{ m}^2$$

$$A_B = l \times b$$

$$= (1.4 - 0.6) \times 1.5$$

$$= 1.2 \text{ m}^2$$

$$A_C = \frac{(1.4 - 0.6) \times 0.75}{2}$$

$$= 0.3 \text{ m}^2$$

$$A_T = 1.8 + 1.2 + 0.3 + 0.3$$

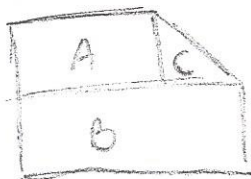
$$= 3.6 \text{ m}^2$$

$$V = Ah$$

$$= 3.6 \times 2$$

$$= 7.2 \text{ m}^3$$

25.16



$$A_A = l \times b$$

$$= (65 - 30) \times 40$$

$$= 1400 \text{ cm}^2$$

$$A_B = l \times b$$

$$= 30 \times 80$$

$$= 2400 \text{ cm}^2$$

$$A_C = \frac{l \times b}{2}$$

$$= \frac{(80 - 40) \times (65 - 30)}{2}$$

$$= 700 \text{ cm}^2$$

$$V = Ah$$

$$= 4500 \times 100$$

$$= 450000 \text{ cm}^3$$

$$A_T = 4500 \text{ cm}^2$$



Topic: Volume

25.17

$$V_{\text{cube}} = l^2 h$$

$$V_{\text{cylinder}} = \pi r^2 h$$

$$V = 20l^2$$

$$V = \pi \times 6^2 \times 20$$

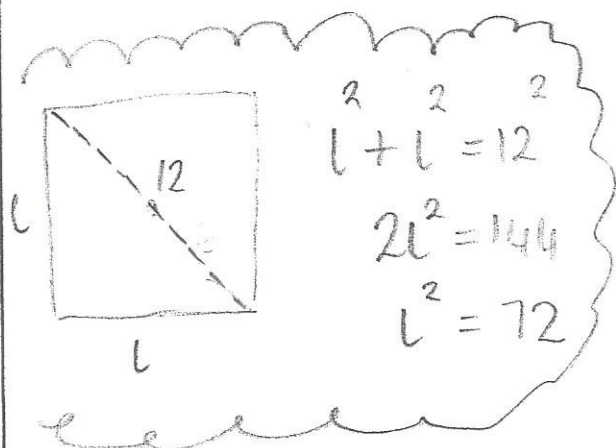
$$V = 20 \times 72$$

$$V = 720\pi$$

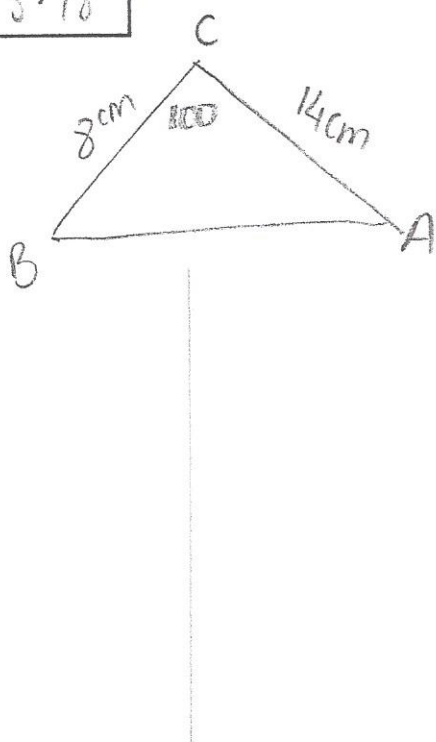
$$= 1440 \text{ cm}^3$$

$$V_{\text{SPACE}} = 720\pi - 1440$$

$$= 720(\pi - 2) \text{ cm}^3$$



25.18



$$A = \frac{1}{2} ab \sin C$$

$$= \frac{1}{2} \times 8 \times 14 \times \sin 100$$

$$= 55.1 \text{ cm}^2$$

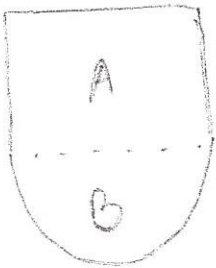
$$V = Ah$$

$$= 55.1 \times 5$$

$$= 275.7 \text{ cm}^3$$

Topic: Volume

2S.19



$$A_A = l \times b$$

$$= 0.6 \times 0.25$$

$$= 0.15 \text{ m}$$

$$A_B = \frac{1}{2} \pi r^2$$

$$= \frac{1}{2} \times \pi \times 0.3^2$$

$$= 0.14 \text{ m}$$

$$A_T = 0.29 \text{ m}^2$$

$$V = Ah$$

$$= 0.29 \times 4$$

$$= 1.16 \text{ m}^3$$

$$= 1.2 \text{ m}^3 \text{ to 2sf}$$

2S.20

$$a) V_{\text{CYLINDER}} = \pi r^2 h$$

$$= \pi \times 5^2 \times 14$$

$$= 1099.6 \text{ cm}^3$$

$$b) 600 \text{ ml} = 600 \text{ cm}^3$$

h = depth

$$V = \pi r^2 h$$

$$h = \frac{V}{\pi r^2}$$

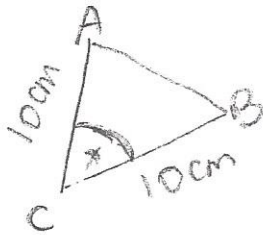
$$= \frac{600}{\pi \times 5^2}$$

$$= 7.6 \text{ cm}$$

Topic: Volume

25.21

Regular = equal sized triangles



$$x = 360^\circ \div 5$$

$$= 72^\circ$$

$$A = \frac{1}{2} ab \sin C$$

$$= \frac{1}{2} \times 10 \times 10 \times \sin 72$$

$$= 47.6 \text{ cm}^2$$

$$A_T = 47.6$$

$$\times 5$$

$$= 237.8$$

$$\text{cm}^2$$

$$V = Ah$$

$$= 237.8 \times 8$$

$$= 1902.4 \text{ cm}^3$$

25.22

$$V_{\text{CYLINDER}} = \pi r^2 h$$

$$V = Ah$$

$$= 28 \times 18$$

$$= 504 \text{ cm}^3$$

$$h = \frac{V}{\pi r^2}$$

$$= \frac{504}{\pi \times 0.7^2}$$

$$14 \text{ mm} = 1.4 \text{ cm}$$

$$\text{radius} = 0.7 \text{ cm}$$

$$= 327.4 \text{ cm}$$

Topic: Volume

25.23

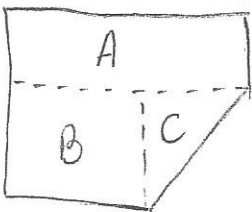
$$\begin{aligned} V_{\text{CYLINDER}} &= \pi r^2 h \\ &= \pi \times 3^2 \times 8 \\ &= 226.2 \text{ cm}^3 \end{aligned}$$

$$2 \text{ L} = 2000 \text{ ml} = 2000 \text{ cm}^3$$

$$\text{No of glasses} = \frac{2000}{226.2} = 8.8$$

$\Rightarrow$  8 full glasses

25.24



$$A_T = 4.65 \text{ m}^2$$

$$\begin{aligned} A_A &= l \times b \\ &= 2.5 \times 1 \\ &= 2.5 \text{ m}^2 \end{aligned}$$

$$\begin{aligned} A_B &= l \times b \\ &= (2-1) \times 1.8 \\ &= 1.8 \text{ m}^2 \end{aligned}$$

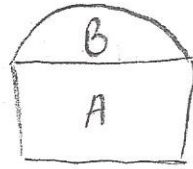
$$\begin{aligned} A_C &= \frac{l \times b}{2} \\ &= \frac{(2.5-1.8) \times (2-1)}{2} \\ &= \frac{0.7 \times 1}{2} \\ &= 0.35 \text{ m}^2 \end{aligned}$$

$$\begin{aligned} V &= Ah \\ &= 4.65 \times 2 \\ &= 9.3 \text{ m}^3 \end{aligned}$$

Topic: Volume

25.25

a)



$$A_A = l \times b$$

$$= 5 \times 7$$

$$= 35 \text{ m}^2$$

$$A_B = \frac{1}{2} \pi r^2$$

$$= \frac{1}{2} \times \pi \times 3.5^2$$

$$= 19.2 \text{ m}^2$$

$$A_T = 54.2 \text{ m}^2$$

$$V = Ah$$

$$= 54.2 \times 12$$

$$= 650.4 \text{ m}^3$$

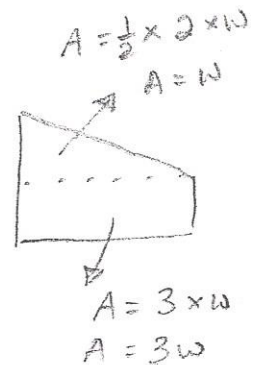
b)  $V_{\text{NEW}} = 650 + 200 = 850 \text{ m}^3$

$$V = Ah$$

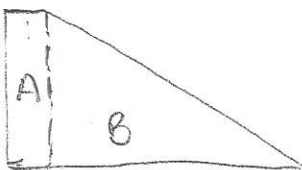
$$V = (3W + W) \times h$$

$$V = 4Wh$$

$$W = \frac{V}{4h} = \frac{850}{4 \times 12} = 17.7 \text{ m}$$



25.26



$$A = l \times b$$

$$= 2 \times 0.5$$

$$= 1 \text{ m}^2$$

$$A_B = \frac{1}{2} \times lb$$

$$= \frac{1}{2} \times 6.5 \times 2$$

$$= 6.5 \text{ m}^2$$

$$A_T = 7.5 \text{ m}^2$$

$$V = Ah$$

$$= 7.5 \times 3$$

$$= 22.5 \text{ m}^3$$