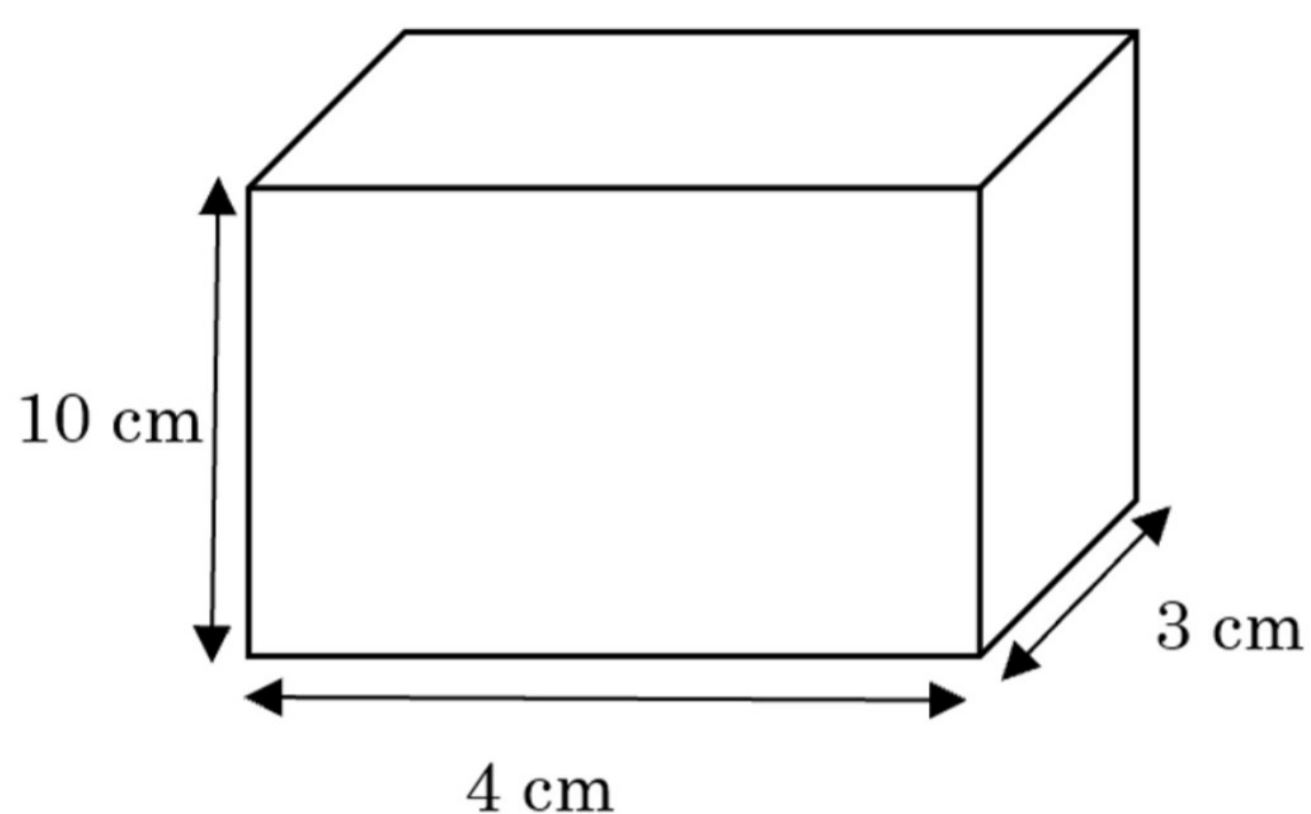




Volume of a Prism Exam Practice

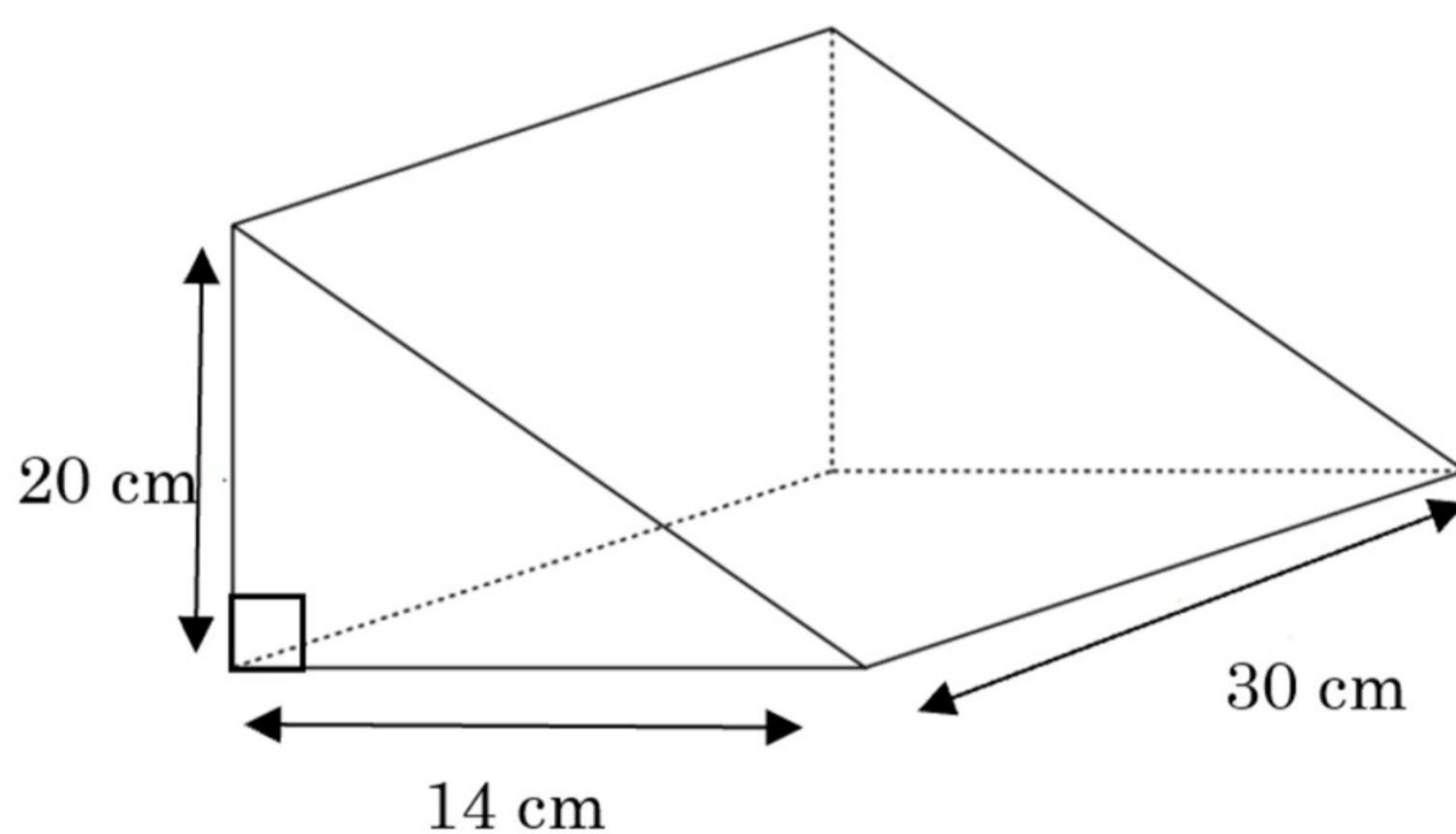
Q1. Work out the volume of the cuboid shown, stating the units.



$$V = 10 \times 4 \times 3 \\ = 120 \text{ cm}^3$$

Answer: 120 cm³
(2 marks)

Q2. Work out the volume of the shape shown, stating the units.

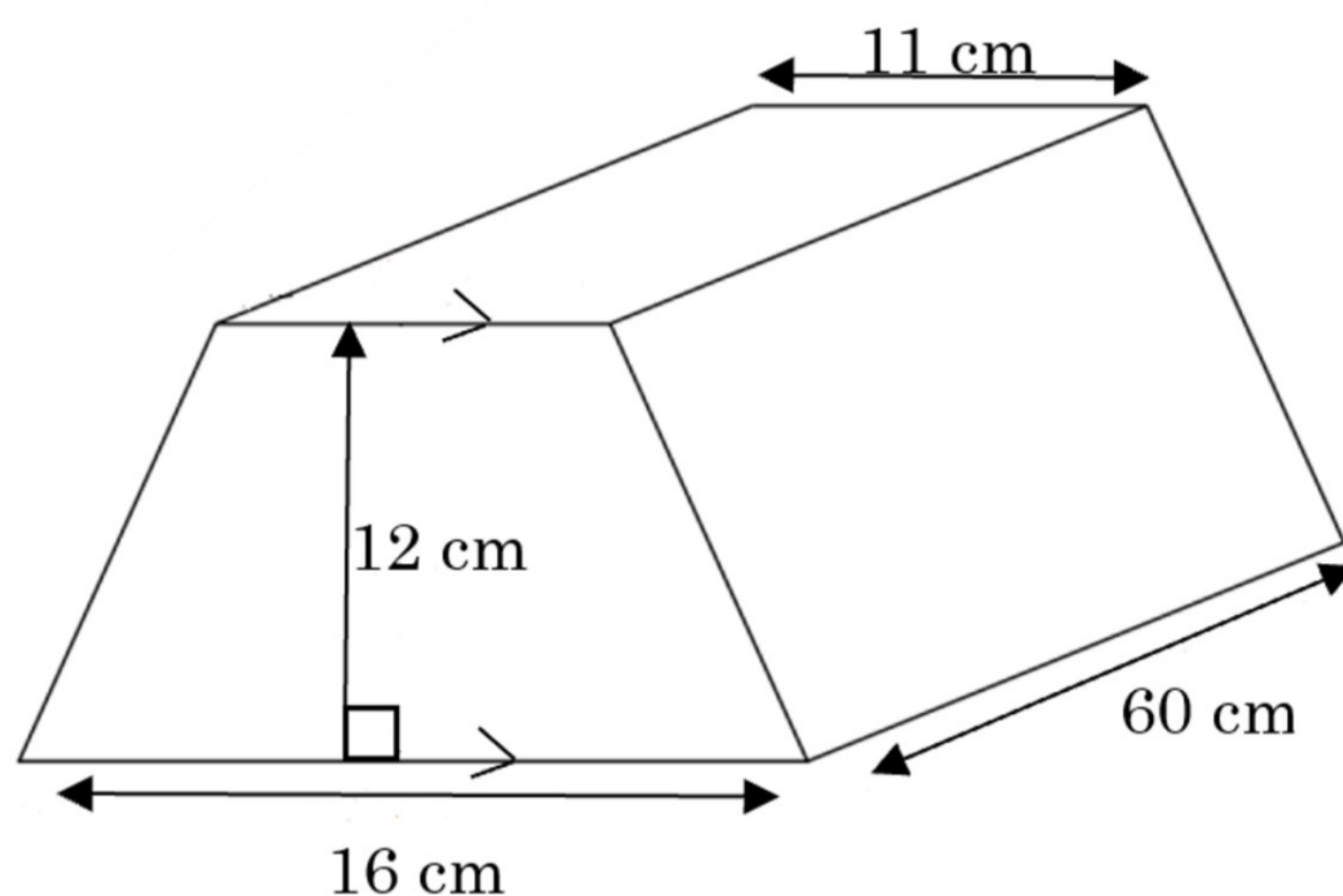


$$V = \text{area cross-section} \times \text{length} \\ = \frac{1}{2}(20 \times 14) \times 30 \\ = 4200 \text{ cm}^3$$

Answer: 4200 cm³
(3 marks)



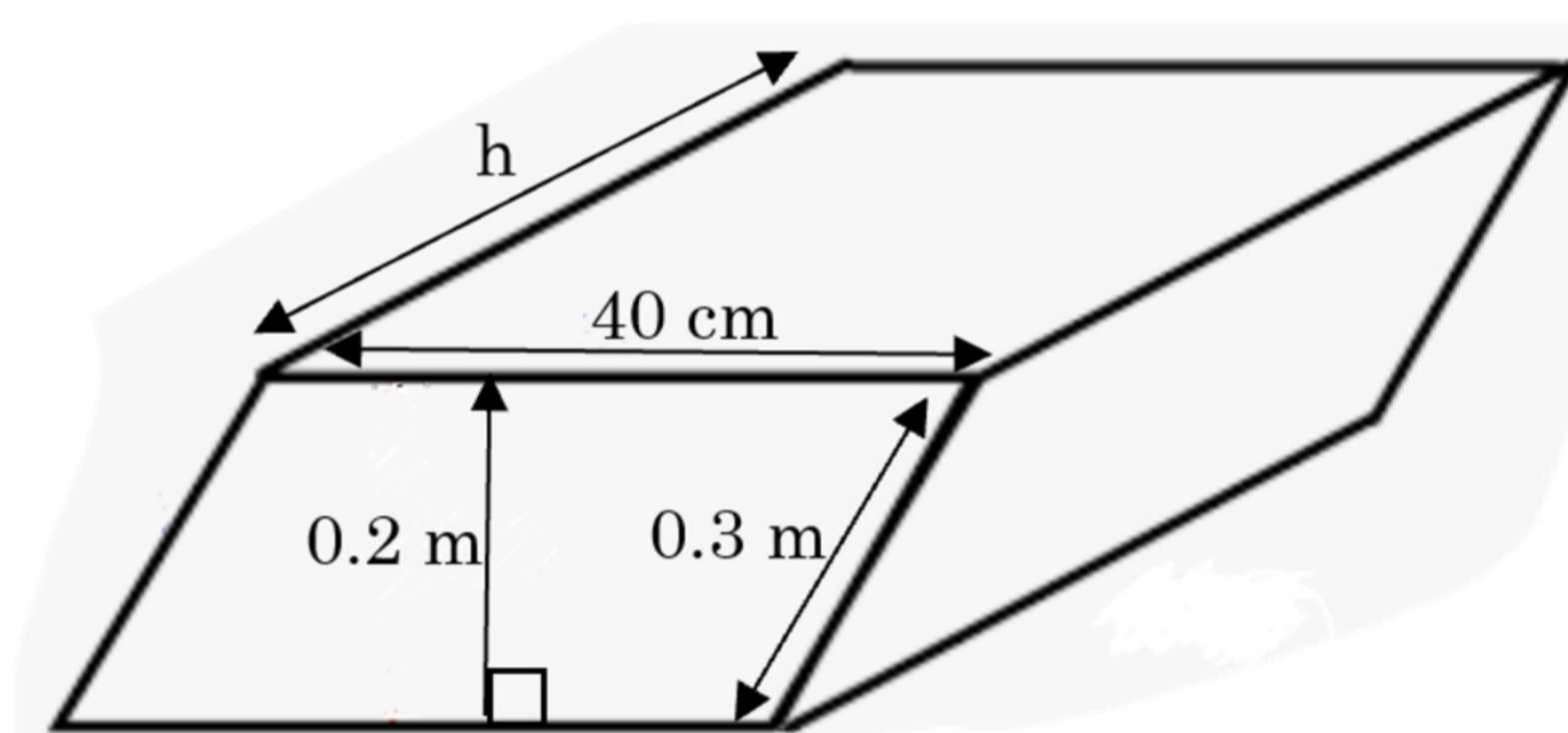
Q3. Work out the volume of the prism shown.



$$\begin{aligned} V &= \text{area cross-section} \times \text{length} \\ &= \frac{1}{2} \times (11 + 16) \times 12 \times 60 \\ &= 9720 \text{ cm}^3 \end{aligned}$$

Answer: 9720 cm³
(3 marks)

Q4. The prism below, which has a parallelogram cross-section, has volume 60000 cm³. Find the length h.

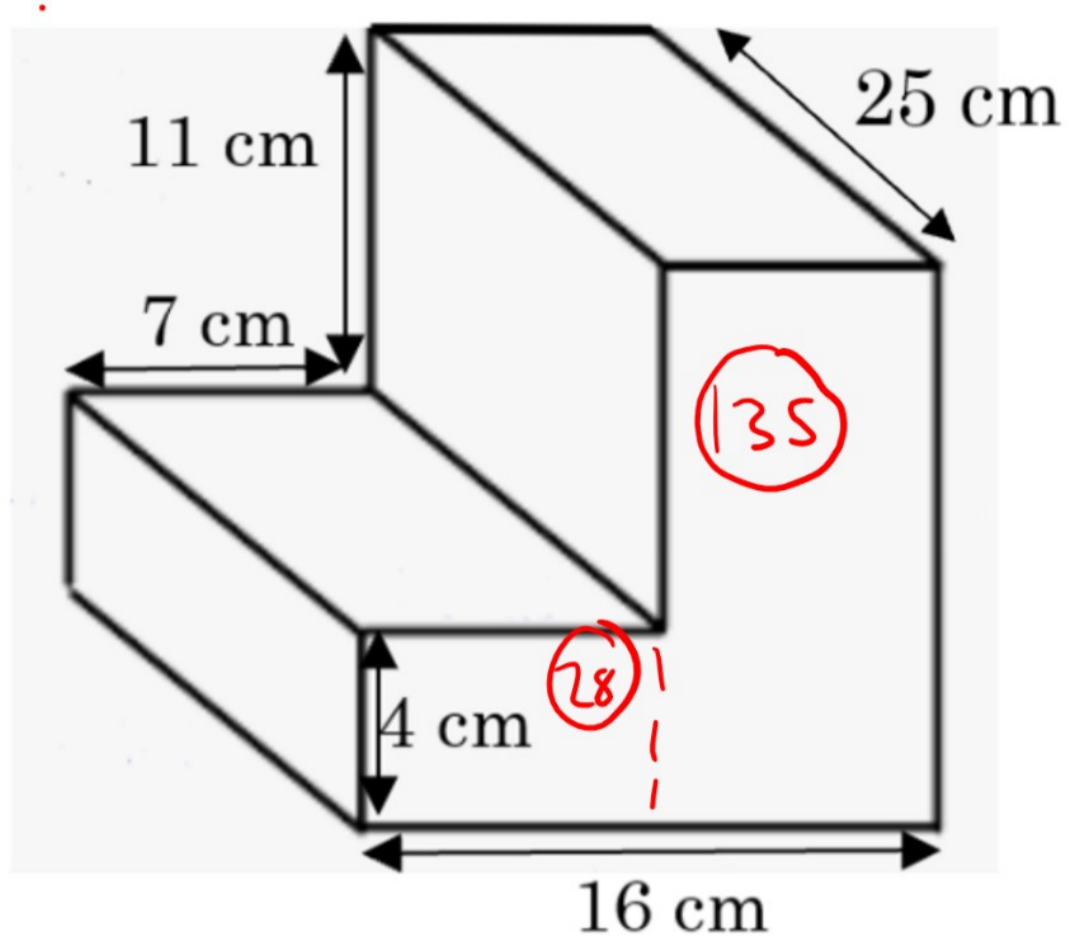


$$\begin{aligned} \text{Vol} &= \text{area cross-section} \times \text{length} \\ 60000 &= 40 \times 20 \times h \\ h &= \frac{60000}{800} \\ h &= 75 \text{ cm} \end{aligned}$$

Answer: 75 cm
(4 marks)



Q5. Find the volume of the L-shaped prism below.



$$V = \text{area cross-section} \times \text{length}$$

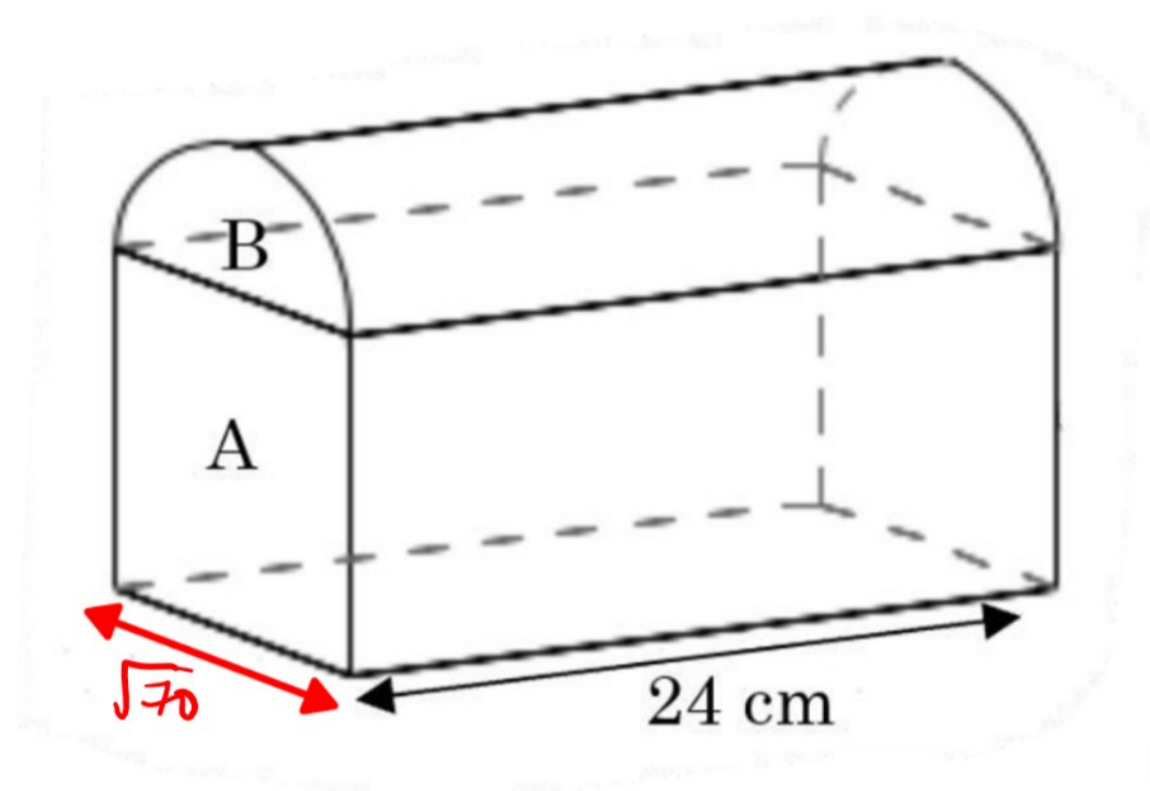
$$V = (28 + 135) \times 25$$

$$V = 4075 \text{ cm}^3$$

Answer: 4075 cm³
(3 marks)



- Q6. The prism below has a cross-section which is made up of shape A, which is a square, and shape B, which is a semi-circle, as shown. Shape A has area 70 cm^2 . Find the volume of the prism to 1 d.p.

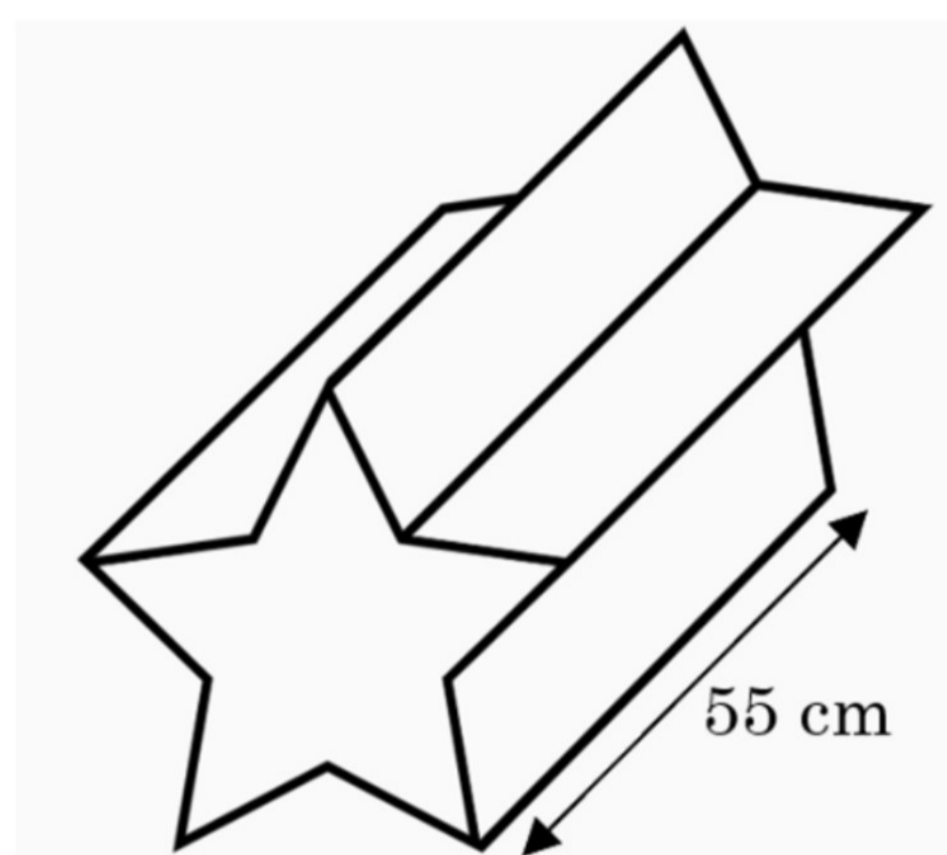


$$\begin{aligned} \cdot \text{ Area B} &= \frac{1}{2} \left(\pi \left(\frac{1}{2} \sqrt{70} \right)^2 \right) \quad \text{using } \frac{1}{2} \pi r^2 \text{ with } r = \frac{\sqrt{70}}{2} \\ &= \frac{35\pi}{4} \\ \cdot \text{ Vol} &= \text{area cross-section} \times \text{length} \\ &= \left(\frac{35\pi}{4} + 70 \right) \times 24 \\ &= 2339.73 \dots \end{aligned}$$

Answer: 2339.7 cm³
(3 marks)



Q7. The cross-section of the prism is 780 cm^2 . Work out the volume of the prism.

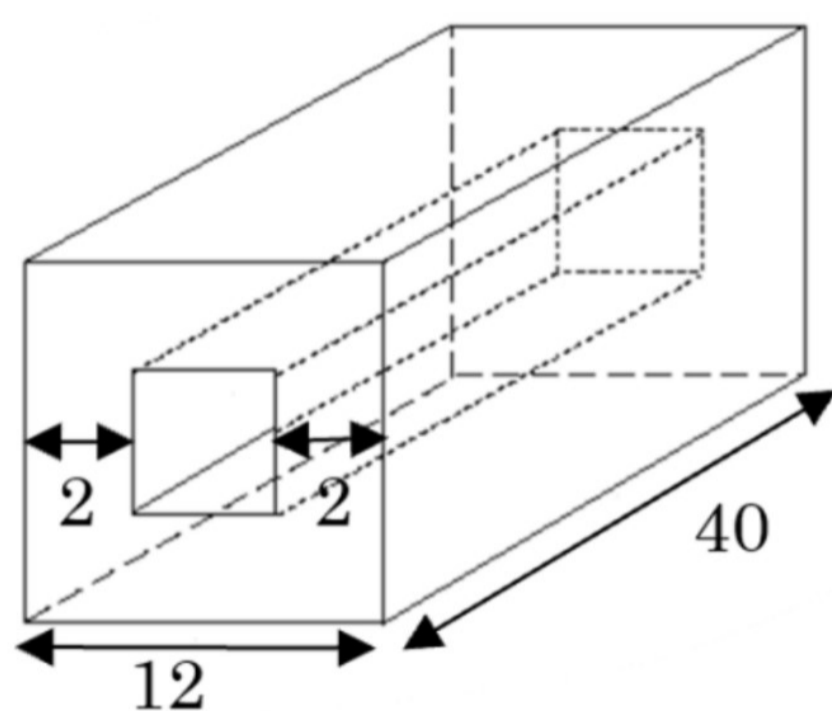


$$\begin{aligned} \text{Vol} &= \text{area cross-section} \times \text{length} \\ &= 780 \times 55 \\ &= 42900 \end{aligned}$$

Answer: 42900 cm³
(3 marks)



Q8. Below is a wooden cuboid. The cross-section is square and has a prism with square cross-section removed from the centre as shown. Find the volume of the shape.



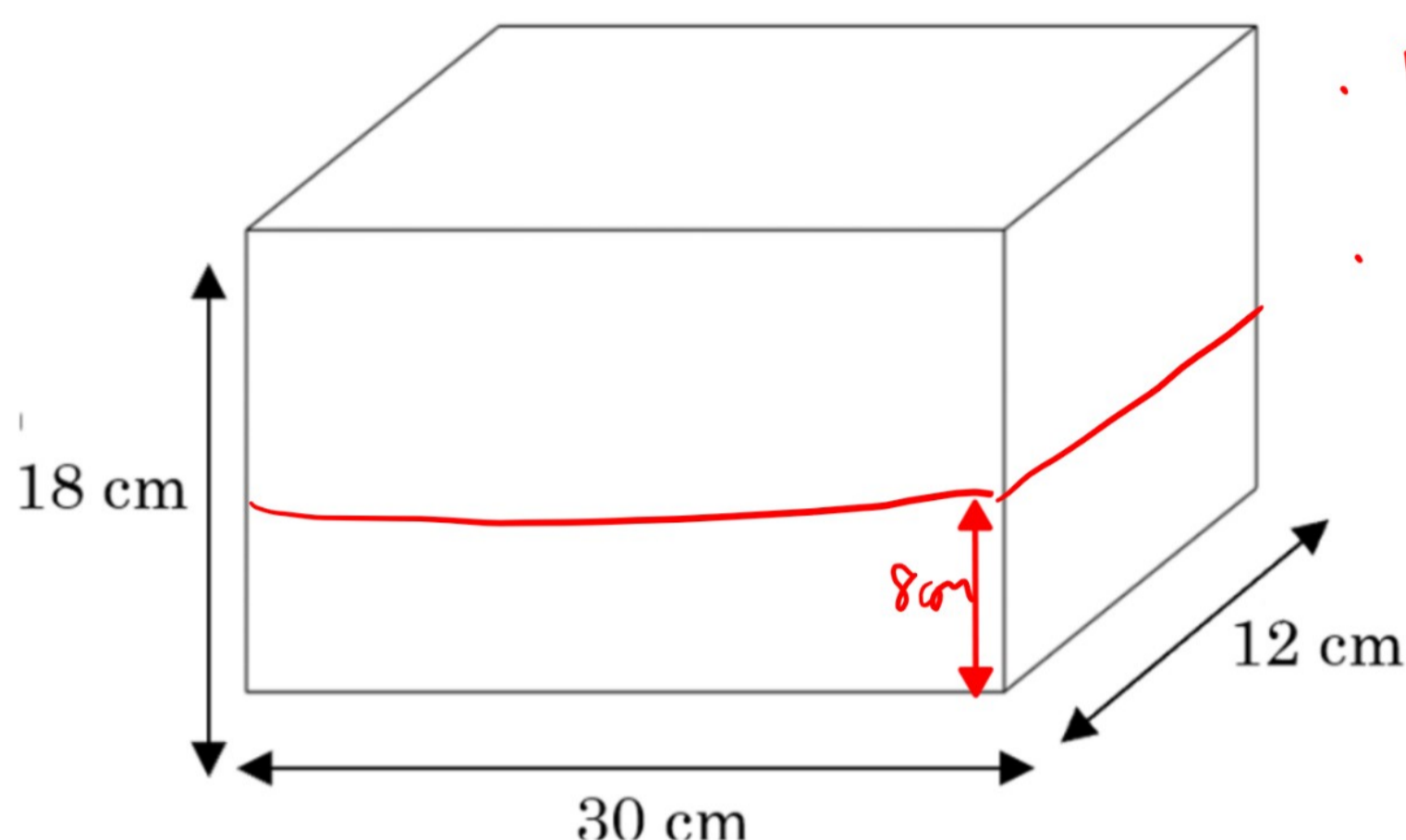
$$\begin{aligned} \text{Vol} &= \text{outer cuboid} - \text{inner cuboid} \\ &= 12 \times 12 \times 40 - 8 \times 8 \times 40 \\ &= 3200 \text{ cm}^3 \end{aligned}$$

Answer: 3200 cm³
(4 marks)



Q9. A sealed tank, as shown below, is in the shape of a cuboid. It is filled with water to a height of 8 cm. During storage, the tank is then turned and stood on its side.

a) Work out the new height of the water in the tank.



$$\begin{aligned} \cdot \text{Vol. of water} &= 2880 \\ \cdot \text{'New' base is } 18 \times 12 &= 216 \text{ cm}^2 \\ \Rightarrow 216 \times \text{new height} &= 2880 \\ \Rightarrow \text{Height} &= 13.3 \text{ cm} \end{aligned}$$

b) Another tank like this one is completely filled with water. There is a small hole in the bottom of this tank, through which water leaks out at a rate of $7 \text{ cm}^3/\text{s}$. If water is poured in at a rate of $4 \text{ cm}^3/\text{s}$, work out how long it will take for the tank to empty.

$$\begin{aligned} \cdot \text{Vol of tank} &= 30 \times 18 \times 12 \\ &= 6480 \text{ cm}^3 \end{aligned}$$

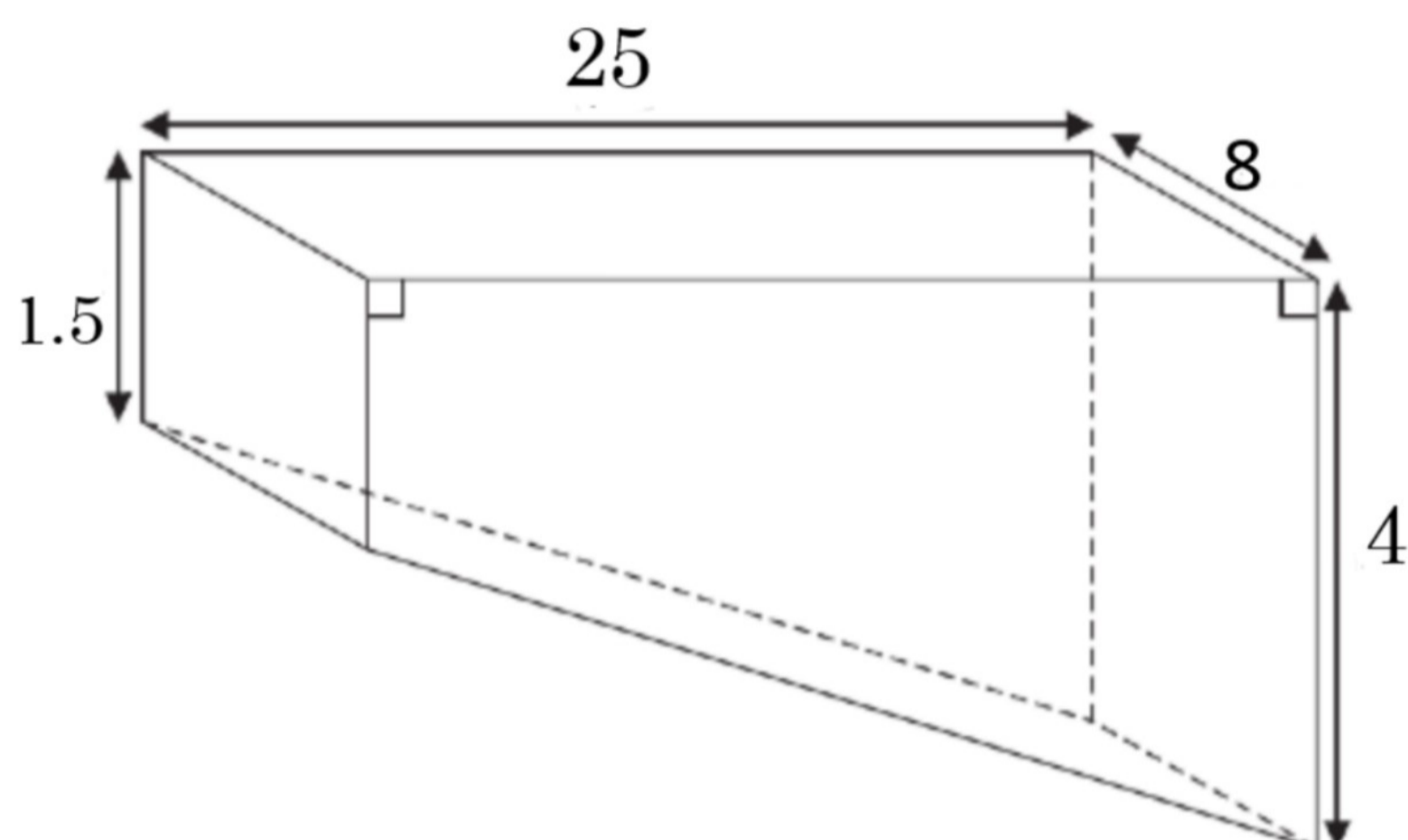
· Each second there is $4 - 7 = -3 \text{ cm}^3/\text{s}$ water is going in the tank, i.e. $3 \text{ cm}^3/\text{s}$ is leaving the tank.

$$\cdot 6480 \div 3 = 2160 \text{ seconds}$$

Answer: 2160 seconds
(5 marks)



Q10. Below is a picture of a swimming pool. All lengths are given in metres.



The pool is filled to 95% of its full capacity. Liquid chlorine is then added to the water as a disinfectant. If 2 cm^3 is needed per m^3 , work out the volume of chlorine required to disinfect the pool.

- $\text{Vol} = \text{area cross-section} \times \text{length}$
 $= \left(\frac{1}{2}(1.5 + 4) \times 25 \right) \times 8$
 $= 550 \text{ m}^3$
- $\text{water volume} = 0.95 \times 550$
 $= 522.5 \text{ m}^3$
- $\text{Vol. of chlorine required} = 522.5 \times 2$
 $= 1045 \text{ cm}^3$

Answer: 1045 cm³
(6 marks)