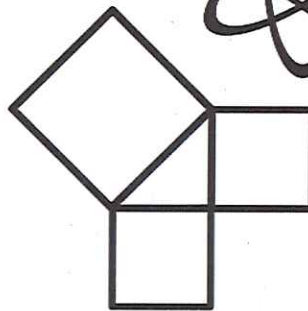
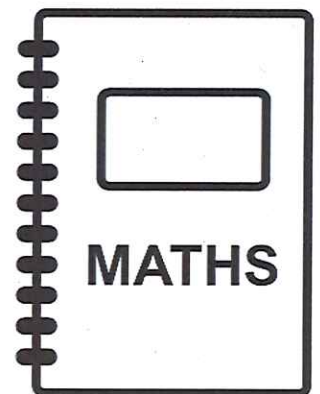
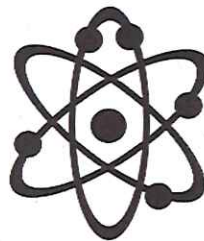
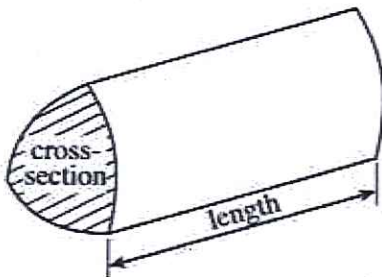


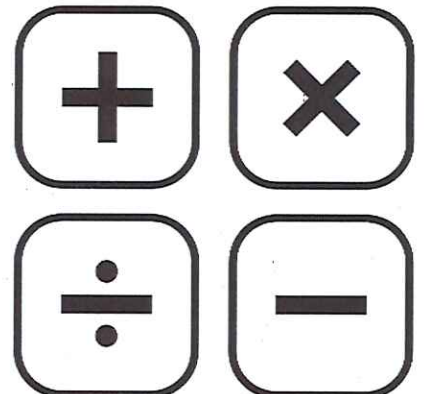
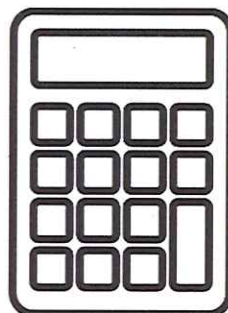
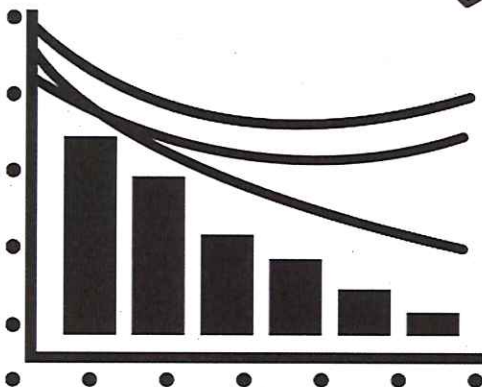
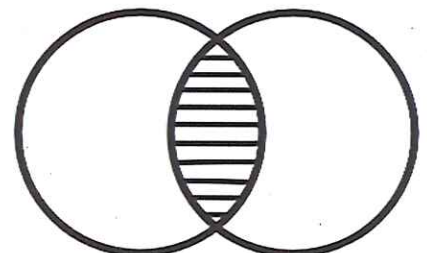
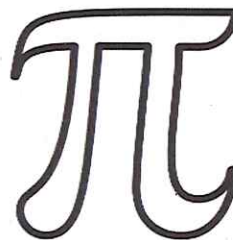
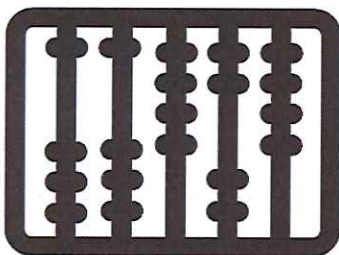
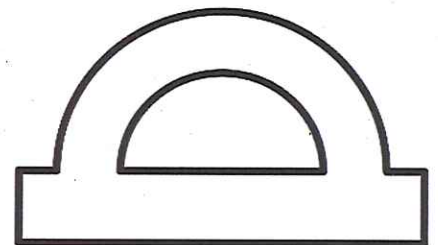
GCSE TOPIC BOOKLET VOLUME OF A PRISM

SOLUTIONS

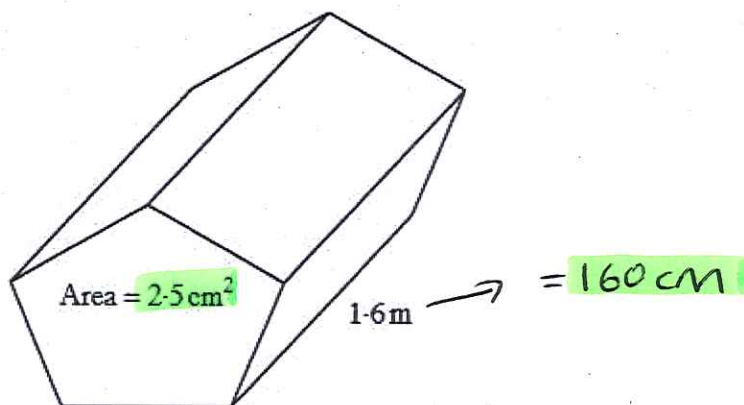
Volume of prism = area of cross-section $\times$ length



$$a^2 = b^2 + c^2$$



1. Calculate the volume of a prism with an area of cross-section 2.5 cm^2 and length 1.6 m , giving your answer in cm^3 .



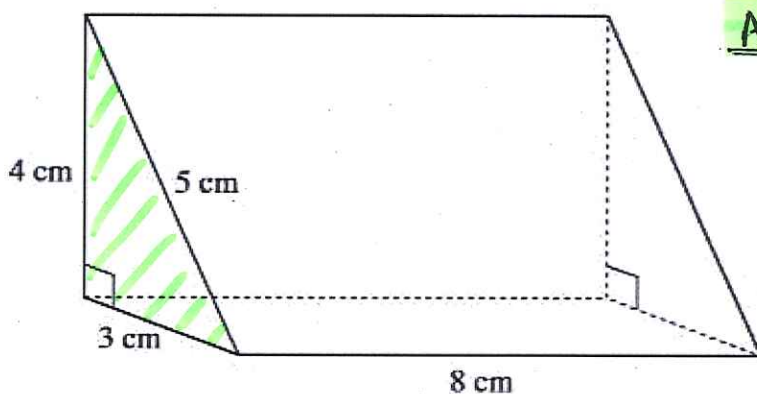
Volume of prism = area of cross section $\times$ length

$$= 2.5 \times 160$$

$$= \underline{\underline{400 \text{ cm}^3}}$$

[3]

2. Calculate the volume of the triangular prism



Area of triangle

$$= \frac{1}{2} \text{ base} \times \text{height}$$

$$= \frac{1}{2} \times 3 \times 4$$

$$= \frac{1}{2} \times 12 = \underline{\underline{6 \text{ cm}^2}}$$

Volume of prism = Area of cross section $\times$ length

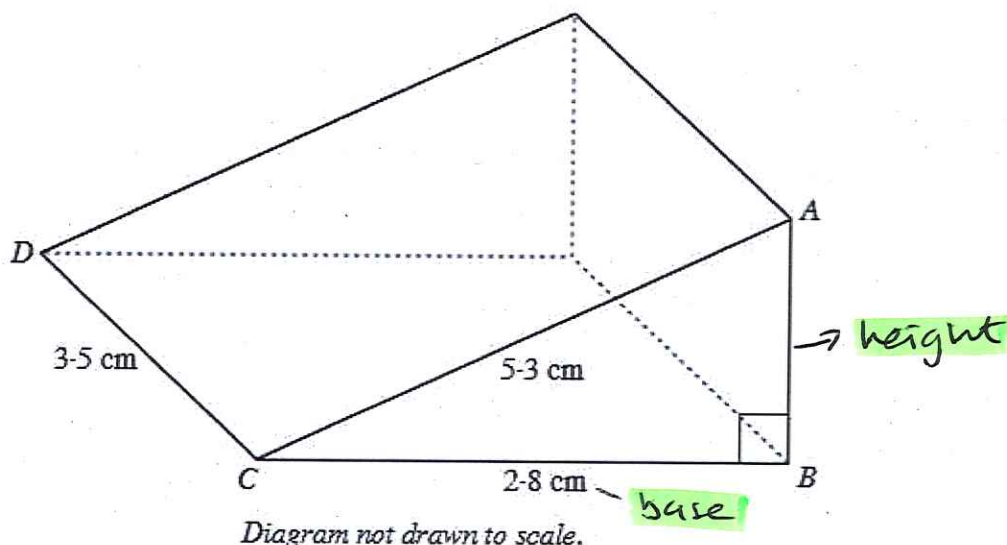
$$= 6 \times 8$$

$$= \underline{\underline{48 \text{ cm}^3}}$$

(3)

3.

A prism has a uniform cross-section in the shape of a right-angled triangle ABC .



Given that $\hat{ABC} = 90^\circ$, $CB = 2.8$ cm, $CA = 5.3$ cm and that the length, CD , of the prism is 3.5 cm, calculate the volume of the prism.

Need to use pythagoras first to calculate AB

$$AB^2 = AC^2 - CB^2$$

$$AB^2 = 5.3^2 - 2.8^2 = 20.25$$

$$AB = 4.5 \text{ cm}$$

$$\begin{aligned} \text{Area of triangle} &= \frac{1}{2} \text{ base} \times \text{height} \\ &= \frac{1}{2} \times 2.8 \times 4.5 \\ &= 6.3 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Volume of prism} &= \text{Area of cross section} \times \text{length} \\ &= 6.3 \times 3.5 \\ &= 22.05 \text{ cm}^3 \end{aligned}$$

[6]

4.

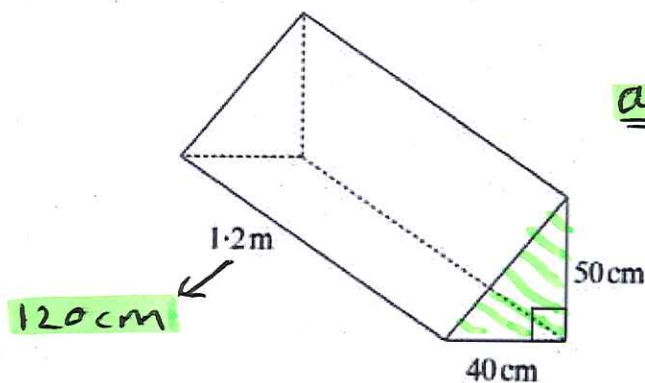


Diagram not drawn to scale

area of triangle

$$= \frac{1}{2} \text{ base} \times \text{height}$$

$$= \frac{1}{2} \times 40 \times 50$$

$$= \underline{\underline{1000 \text{ cm}^2}}$$

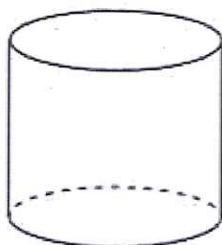
Calculate the volume of the triangular prism, giving your answer in cm^3 .

$$\underline{\text{Volume}} = \text{Area of cross section} \times \text{length}$$

$$= 1000 \times 120 = \underline{\underline{120,000 \text{ cm}^3}}$$

[4]

5.



Jenny knows that this cylinder has a volume of 300 cm^3 . If the cylinder is 15 cm tall, what is the area of the circular base?

$$\text{Volume of prism} = \text{Area of cross section} \times \text{length}$$

$$300 = \text{area of circle} \times 15$$

$$\frac{300}{15} = \text{area of circle}$$

$$\underline{\underline{\text{Area of circular base} = 20 \text{ cm}^2}}$$

(3)

6. The volume of a square based cuboid is 150 cm^3 . The height of the cuboid is 6 cm .

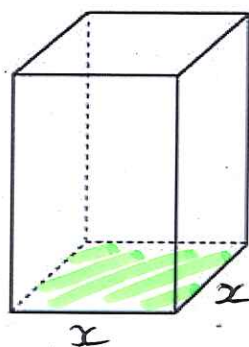


Diagram not drawn to scale.

Find the length of the sides of the base of the cuboid.

$$\text{Volume of prism} = \text{area of cross section} \times \text{length}$$

$$150 = \text{area of cross section} \times 6$$

$$150/6 = \text{area of cross section} = 25 \text{ cm}^2$$

$$\text{Area of square} = 25 \text{ cm}^2$$

$$x^2 = 25$$

$$x = \sqrt{25}$$

[3]

$$\underline{x = 5 \text{ cm}}$$

The length of the sides of the base of the cuboid are 5 cm .

7.

The uniform cross-section $ABCD$ of a solid block is a parallelogram with $DC = 10.6$ cm and the perpendicular distance between the parallel sides, EF , is 8.2 cm as shown below. The length of the block is 15.7 cm.

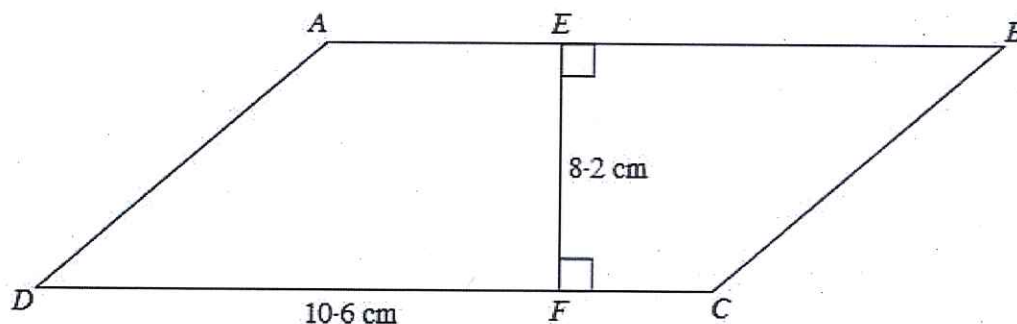


Diagram not drawn to scale.

Calculate the volume of the block.

$$\begin{aligned} \text{Area of parallelogram} &= b \times h = 10.6 \times 8.2 \\ &= \underline{\underline{86.92 \text{ cm}^2}} \end{aligned}$$

$$\begin{aligned} \text{Volume of prism} &= \text{area of cross section} \times \text{length} \\ &= 86.92 \times 15.7 \\ &= \underline{\underline{1364.644 \text{ cm}^3}} \end{aligned}$$

[3]

8. The uniform cross-section of a trapezoidal prism is shown below. The length of the prism is 14 cm. Calculate the volume of the trapezoidal prism.

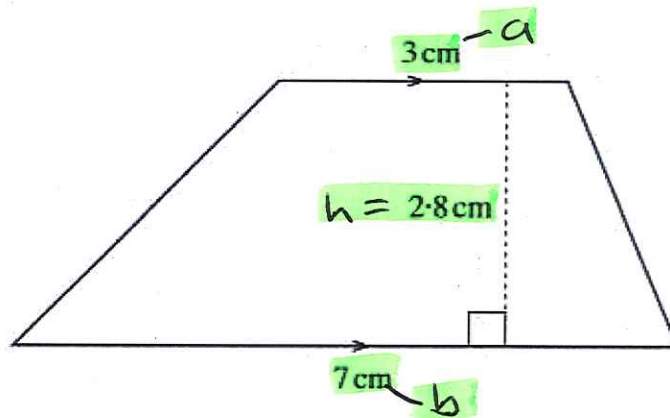


Diagram not drawn to scale.

$$\begin{aligned} \text{Area of trapezium} &= \frac{1}{2}(a+b) \times h = \frac{1}{2}(3+7) \times 2.8 \\ &= 14 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Volume of prism} &= \text{Area of cross section} \times \text{length} \\ &= 14 \times 14 \\ &= 196 \text{ cm}^3 \end{aligned}$$

(5)

9. The uniform cross-section of a trapezoidal prism is shown below. The length of the prism is 0.4 m. Calculate the volume of the trapezoidal prism.

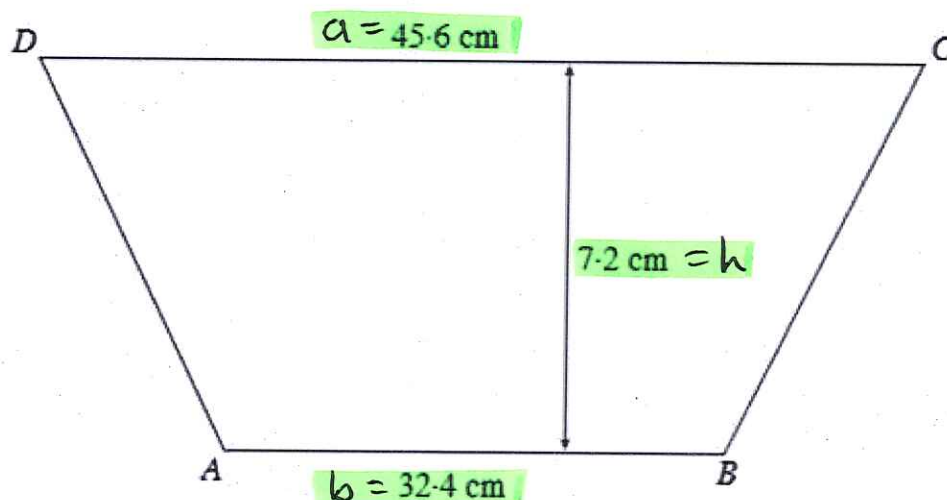


Diagram not drawn to scale.

$$\text{Area of trapezium} = \frac{1}{2}(a+b) \times h = \frac{1}{2}(45.6 + 32.4) \times 7.2$$

$$= 280.8 \text{ cm}^2$$

$$\text{Length of prism} = 0.4 \text{ m} \times 100 = 40 \text{ cm}$$

$$\text{Volume of prism} = \text{Area of cross section} \times \text{length}$$

$$= 280.8 \times 40$$

$$= 11232 \text{ cm}^3$$

(6)