

**MODULE 2**  
**MATEMATIK SPM "ENRICHMENT"**  
**TOPIC: SOLID GEOMETRY**  
**TIME: 2 HOURS**

1.

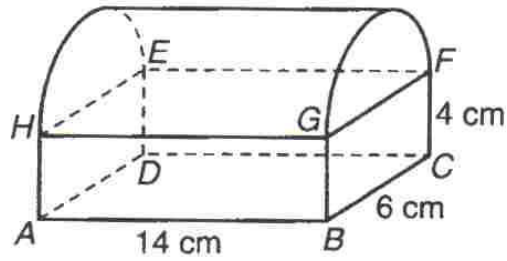


DIAGRAM 1

Diagram 1 shows a solid formed by joining a cuboid and a half-cylinder. Using  $\pi = \frac{22}{7}$ , calculate the volume, in  $\text{cm}^3$ , of the solid. [4 marks]

*Answer:*

2.

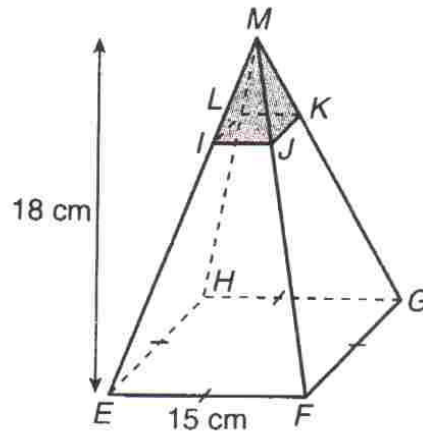


DIAGRAM 2

Diagram 2 shows a solid pyramid. A small pyramid (shaded region) with base square 6cm and height 4 cm is taken out of the solid. Calculate the volume, in  $\text{cm}^3$ , of the remaining solid. [4 marks]

Answer:

3. Diagram 3 shows a solid formed from a cone and hemisphere.

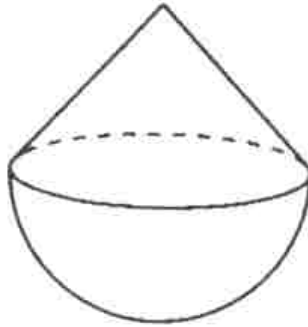


DIAGRAM 3

The diameters of the cone and the hemisphere are 21cm each. The volume of the solid is  $4\,042.5\text{ cm}^3$ . Using  $\pi = \frac{22}{7}$ , calculate the height of the cone in cm. [4 marks]

*Answer:*

4. Diagram 4 shows a solid formed by joining a right pyramid and a cuboid.

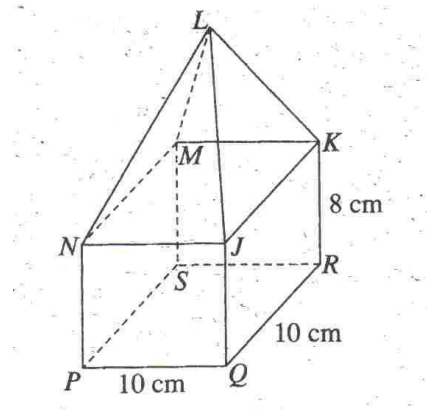


DIAGRAM 4

The volume of the solid is  $1\,100\text{ cm}^3$ . Calculate the height of the pyramid.

[4 marks]

Answers:

5. Diagram 5 shows a solid formed by joining a cone and a cylinder.

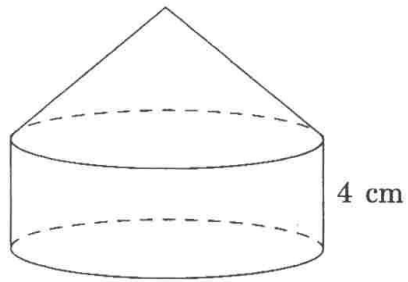


DIAGRAM 5

The diameter of the cylinder and the diameter of the base of the cone are both 7 cm.

The volume of the solid is  $231 \text{ cm}^3$ . By using  $\pi = \frac{22}{7}$ , calculate the height, in cm, of the cone. [4 marks]

*Answer:*

6. Diagram 6 shows a solid cylinder of height 20cm and diameter 14 cm. A cone with radius 7 cm and height 9 cm is taken out of the solid. Calculate the volume in  $\text{cm}^3$  of the remaining solid. (Use  $\pi = \frac{22}{7}$ ). [4 marks]

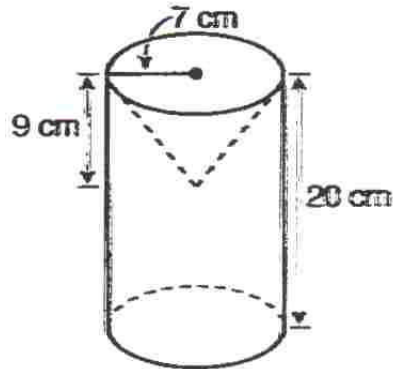


DIAGRAM 6

*Answer:*

7. Diagram 7 shows a solid formed by combining a right prism with a half cylinder on the rectangular plane DEFG.

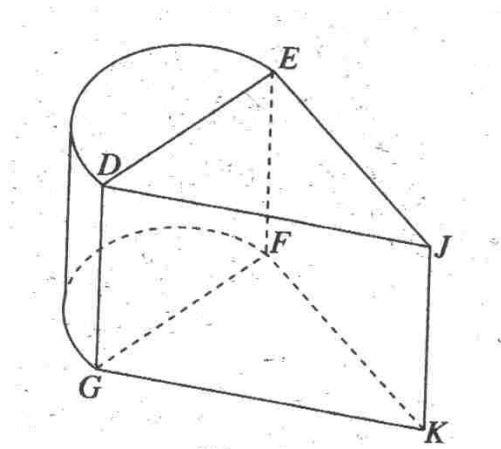


DIAGRAM 7

$DE = 14$  cm,  $EJ = 8$  cm,  $\angle DEJ = 90^\circ$  and the height of the prism is 6 cm. Calculate the volume, in  $\text{cm}^3$ , of the solid. (Use  $\pi = \frac{22}{7}$ )

[4 mark

*Answer:*

**MODULE 2 – ANSWERS**  
**TOPIC : SOLID GEOMETRY**

1. Volume of solid = Volume of cuboid + volume of half-cylinder

$$\begin{aligned} &= 14 \times 6 \times 4 + \frac{1}{2} \times \frac{22}{7} \times 3^2 \times 14 \\ &= 336 \text{ cm}^3 + 197.92 \text{ cm}^3 \\ &= 533.92 \text{ cm}^3 \\ &\approx 534 \text{ cm}^3 \end{aligned}$$

2. Volume of remaining solid = volume of big pyramid - volume of small pyramid

$$\begin{aligned} &= \left(\frac{1}{3} \times 15^2 \times 18\right) - \left(\frac{1}{3} \times 6^2 \times 4\right) \\ &= \left(\frac{1}{3} \times 225 \times 18\right) - \left(\frac{1}{3} \times 36 \times 4\right) \\ &= (1350 - 48) \\ &= 1302 \text{ cm}^3 \end{aligned}$$

3. Volume of solid = Volume of cone + Volume of hemisphere

$$\begin{aligned} &= \frac{1}{3} \pi r^2 h + \frac{1}{2} \times \frac{4}{3} \times \pi r^3 \\ 4042.5 &= \left[ \frac{1}{3} \times \frac{22}{7} \times \left(\frac{21}{2}\right)^2 \times h \right] + \left[ \frac{1}{2} \times \frac{4}{3} \times \frac{22}{7} \times \left(\frac{21}{2}\right)^3 \right] \end{aligned}$$

$$4042.5 = 115.5 h + 2425.5$$

$$h = 14 \text{ cm}$$

4. Volume of pyramid = volume of solid – volume of cuboid

$$= 1100 \text{ cm}^3 - (10 \times 10 \times 8)$$

$$= 1100 - 800$$

$$= 300 \text{ cm}^3$$

$$\text{Volume of pyramid} = \frac{1}{3} \times \text{Area of base} \times h$$

$$= \frac{1}{3} \times (10 \times 10) \times h$$

$$= \frac{100}{3} \times h$$

$$\begin{aligned}\frac{100}{3}h &= 300 \\ &= 300 \times \frac{3}{100} \\ &= 9 \text{ cm}\end{aligned}$$

5. Volume of cylinder =  $\pi r^2 h$

$$\begin{aligned}&= \frac{22}{7} \times 3.5^2 \times 4 \\ &= 154 \text{ cm}^3\end{aligned}$$

Volume of cone =  $\frac{1}{3} \pi r^2 h$

$$\begin{aligned}&= \frac{1}{3} \times \frac{22}{7} \times 3.5^2 \times t \\ &= \frac{269.5}{21} t \text{ cm}^3\end{aligned}$$

Volume of solid =  $231 \text{ cm}^3$

$$154 + \frac{269.5}{21} t = 231$$

$$269.5 t = 1617$$

$$t = \frac{1617}{269.5}$$

$$= 6 \text{ cm}$$

6. Volume of remaining solid = Volume of cylinder – volume of cone

$$\begin{aligned} &= \pi r^2 h - \frac{1}{3} \pi r^2 h \\ &= \left[ \frac{22}{7} \times 7 \times 7 \times 20 \right] - \left[ \frac{1}{3} \times \frac{22}{7} \times 7 \times 7 \times 9 \right] \\ &= 3080 - 462 \\ &= 2618 \text{ cm}^3 \end{aligned}$$

7. Volume of solid = Volume of half – cylinder + volume of prism

$$\text{Volume of half – cylinder} = \frac{1}{2} \times \pi r^2 h$$

Volume of prism = area of base x height

Volume of solid = Volume of half – cylinder + volume of prism

$$\begin{aligned} &= \left[ \frac{1}{2} \times \frac{22}{7} \times \left( \frac{14}{2} \right)^2 \times 6 \right] + \left[ \frac{1}{2} \times 14 \times 8 \times 6 \right] \\ &= 462 + 336 \\ &= 798 \text{ cm}^2 \end{aligned}$$