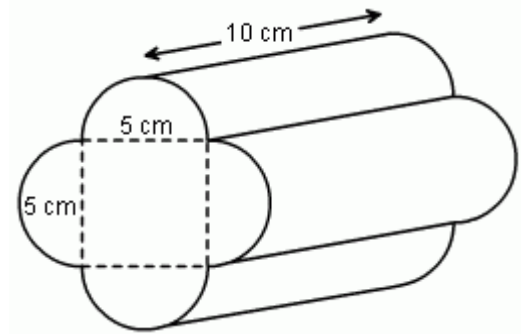


MENSURATION

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MENSURATION

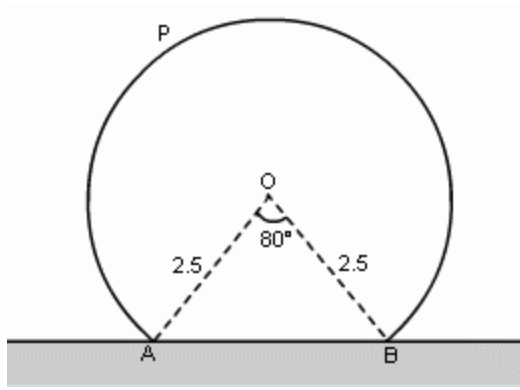
- 1 Find the **volume** and **surface area** of the solid figure below. The cross-section is made up of a square and four semicircles. ($\pi = 3.14$)



- 2 A pyramid with a square base has a volume of 324 cm^3 . If the length of the square base is 9 cm, calculate the height of the pyramid.
- 3 A solid metal ball of radius 8 cm is melted and made into a solid cone of vertical height of 10 cm. Find the radius of the cone.

$$\left[\text{Volume of cone} = \frac{1}{3} \pi r^2 h, \text{ Volume of sphere} = \frac{4}{3} \pi r^3 \right]$$

4



The cross-section of a railway tunnel is the major segment APB of a circle centre O, as shown in the diagram. Given that $OA = OB = 2.5$ m, $\angle AOB = 80^\circ$

(a) Taking π to be 3.142, calculate

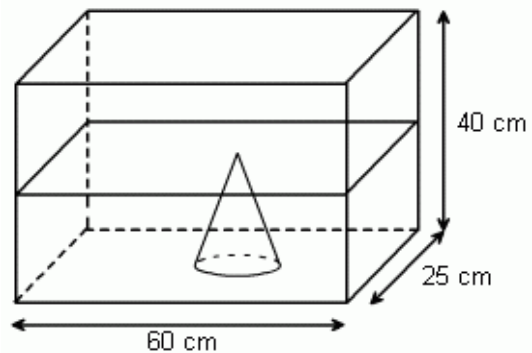
- (i) the length of the arc APB
- (ii) AB
- (iii) the area of the triangle OAB
- (iv) the volume of air in a straight 20 m section of the tunnel

(b) The tunnel is 424 m long. Calculate the number of seconds it will take a train 76 m long, traveling at 200 km/h to pass through the tunnel completely.

In this question take $\pi = 3.142$

5

An open rectangular tank of depth 40 cm has a horizontal base of length 60 cm and breadth 25 cm. A solid metal cone of volume $6\,500\text{ cm}^3$ rests with its base on the bottom of the tank. $33\,000\text{ cm}^3$ of water is poured into the tank at a rate of $55\text{ cm}^3/\text{s}$



(a) Calculate how many minutes it takes for all the water to be poured in

(b) Given that the water just covers the cone as shown in the diagram, calculate

- (i) the depth of the water and
- (ii) the radius of the base of the cone

6 A spherical container of radius 15 cm is partly filled with water, as shown in the diagram below. If the radius of the horizontal water surface is 12 cm, calculate

- (a) (i) the height of this water surface above the centre of the container
 (ii) the depth of water in the container
- (b) (i) Water is added to the spherical container until it completely fills it.

The valve of the container is opened and water flows into a number of smaller cylindrical containers at a rate of $59 \text{ cm}^3/\text{s}$. Calculate how many minutes it takes for all the water to flow out

- (ii) The smaller cylindrical containers have a base radius of 75 mm and height of 130 mm. Find the maximum number of cylindrical containers needed to fill all the water

$$\left[\text{Volume of a sphere} = \frac{4}{3}\pi r^3, \text{ Surface area of a sphere} = 4\pi r^2 \right]$$

