

Cambridge International AS & A Level

Mathematics

9709

Paper 1 Pure Mathematics 1

Topic 4-Circular Measure

Question No (13)

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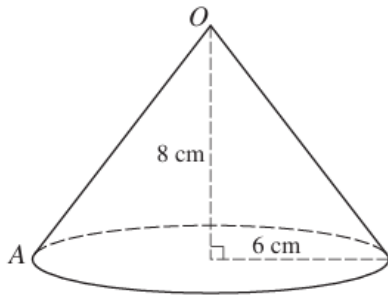
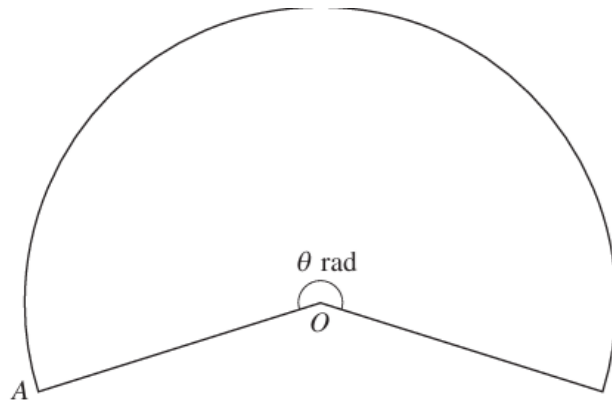
Question No (13)**Fig. 1****Fig. 2**

Fig. 1 shows a hollow cone with no base, made of paper. The radius of the cone is 6 cm and the height is 8 cm . The paper is cut from A to O and opened out to form the sector shown in Fig. 2. The circular bottom edge of the cone in Fig. 1 becomes the arc of the sector in Fig. 2. The angle of the sector is θ radians. Calculate

- (i) the value of θ ,
- (ii) the area of paper needed to make the cone.

Solution

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(2) on Fig 1

using pythagoras Theorem

slant height of the cone is

$$l = \sqrt{(8)^2 + (6)^2} \quad (\text{vertical})^2 + (\text{base})^2$$

$$= \sqrt{64 + 36}$$

$$= \sqrt{100}$$

$$l = 10 \text{ cm}$$

$\Rightarrow$ radius of the sector in Fig 2 is 10 cm

length of circular bottom edge of cone = $2\pi r$

$$= 2\pi(6) \quad (\text{circumference of circle})$$

$$= 12\pi \text{ cm}$$

$\therefore$ arc length in Fig 2 is 12π

using the arc length formula

$$s = r\theta$$

$$\Rightarrow 12\pi = 10\theta$$

$$\because r = 10$$

$$\theta = \frac{12\pi}{10}$$

$$\theta = 1.2\pi \text{ radians.}$$

(ii) now we find the area of paper needed to make the cone

= area of the sector

$$= \frac{1}{2} r^2 \theta$$

$$= \frac{1}{2} (10)^2 (1.2\pi)$$

$$= 60\pi \text{ cm}^2$$