Mathematics

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(Chapter – 13) (Surface Areas and Volumes)

(Class – IX)

EXERCISE 13.3

Q.1. *Diameter of the base of a cone is* 10.5 *cm and its slant height is* 10 *cm. find its curved surface area.*

Sol. Here, $r = \dfrac{10\cdot5}{2}$ cm = 5.25 cm, l = 10 cm.

Curved surface area of the cone = $\pi r l$

$$= \dfrac{22}{7} \times 5.25 \times 10 \text{ cm}^2 = \textbf{165 cm}^2 \textbf{ Ans.}$$

Q.2. *Find the total surface area of a cone, if its slant height is* 21 *m and diameter of its base is* 24 *m.*

Sol. Here, l = 21 m, $r = \dfrac{24}{2}$ m = 12 m

Total surface area of the cone = $\pi r(l + r)$

$$= \dfrac{22}{7} \times 12 \ (21 + 12) \text{ m}^2$$

$$= \dfrac{22}{7} \times 12 \times 33 \text{ m}^2 = \textbf{1244.57 m}^2 \textbf{ Ans.}$$

Q.3. *Curved surface area of a cone is* 308 *cm*^{2} *and its slant height is* 14 *cm. Find (i) radius of the base and (ii) total surface area of the cone.*

Sol. Here, l = 14 cm, curved surface area = 308 cm^2, r = ?

(i) Curved surface area of the cone = $\pi r l$

$$\Rightarrow 308 = \dfrac{22}{7} \times r \times 14$$

$$\Rightarrow r = \dfrac{308}{22 \times 2} = 7$$

Hence, base radius of the cone **= 7 cm.**

(ii) Total surface area of the cone = $\pi r \ (l + r)$

$$= \dfrac{22}{7} \times 7 \ (14 + 7) \text{ cm}^2 = 22 \times 21 \text{ cm}^2 \ = \textbf{462 cm}^2 \textbf{ Ans.}$$

Q.4. *A conical tent is* 10 *m high and the radius of its base is* 24 *m. Find*
 (i) slant height of the tent.
 (ii) cost of the canvas required to make the tent, if the cost of 1 *m*^{2} *canvas is Rs* 70.

Sol. Here, h = 10 m, r = 24 m
(i) We have, $l^2 = h^2 + r^2$

$$= (10)^2 + (24)^2$$
$$= 100 + 576 = 676$$

$$\Rightarrow \qquad l = \sqrt{676} \ \textbf{= 26 m Ans.}$$

(ii) Curved surface area of the tent = $\pi r l$

$$= \dfrac{22}{7} \times 24 \times 26 \text{ m}^2$$

Cost of 1 m^2 canvas = Rs 70

$\therefore$ Cost of $\dfrac{22}{7} \times 24 \times 26$ m^2 of canvas = Rs 70 $\times \dfrac{22}{7} \times 24 \times 26$

= Rs 137280 Ans.

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Q.5. *What length of tarpaulin 3 m wide will be required to make conical tent of height 8 m and base radius 6 m? Assume that the extra length of material that will be required for*
Stitching margins and wastage in cutting is approximately 29 cm (use π = 3.14)

Sol. Here h = 6 m, r = 8 m

We have, $l^2 = \sqrt{r^2 + h^2}$
$= \sqrt{36 + 64} = \sqrt{100} = 10$ m

Curved surface area of the tent = $\pi r l$
$= 3.14 \times 6 \times 10$ m^2

∴ required length of tarpaulin = $\dfrac{3.14 \times 6 \times 10}{3}$ m + 20 cm

$= 62.8$ m $+ 0.2$ m **= 63 m Ans.**

Q.6. *The slant height and base diameter of a conical tomb are 25 m and 14 m respectively. Find the cost of white washing its curved surface at the rate of Rs 210 per 100 m^2.*

Sol. Here, l = 25 m, $r = \dfrac{14}{2}$ m = 7 m

Curved surface area of the tomb = $\pi r l$

$= \dfrac{22}{7} \times 7 \times 25$ m^2 = 550 m^2

Cost of white washing 100 m^2 = Rs 210

∴ Cost of white washing 550 m^2 = Rs $\dfrac{210}{100} \times 550$ **= Rs 1155 Ans.**

Q.7. *A joker's cap is in the form of a right circular cone of base radius 7 cm and height 24 cm. Find the area of the sheet required to make 10 such caps.*

Sol. Here, r = 7 cm, h = 24 cm

We have, $l = \sqrt{h^2 + r^2} = \sqrt{(24)^2 + 7^2}$

$= \sqrt{576 + 49} = \sqrt{625} = 25$ cm

Total curved surface area of 1 cap = $\pi r l$

$= \dfrac{22}{7} \times 7 \times 25$ cm^2 = 550 cm^2

Area of sheet required to make 10 such caps = 10 × 550 cm^2 **= 5500 cm^2 Ans.**

Q.8. *A bus stop is barricaded from the remaining part of the road, by using 50 hollow cones made of recycled cardboard. Each cone has a base diameter of 40 cm and height 1 m. If the outer side of each of the cones is to be painted and the cost of painting is Rs 12 per m^2, what will be the cost of painting all these cones? (Use π = 3.14 and take $\sqrt{1.04} = 1.02$)*

Sol. Here, $r = \dfrac{40}{2}$ cm = 20 cm = 0.20 m, h = 1 m

$l = \sqrt{h^2 + r^2} = \sqrt{1^2 + (0.2)^2} = \sqrt{1.04} = 1.02$ m

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Curved surface area of 1 cone = $\pi r l$
Curved surface area of 50 cones = 50 × 3.14 × 0.2 × 1.02 m^2
                                                      = 32.028 m^2
Cost of painting an area of 1 m^2 = Rs 12
∴ Cost of painting an area of 32.028 m^2 = Rs 12 × 32.028
                                                      = Rs 384.34 (approx) Ans.