

Mathematics

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(Chapter - 13)(Surface Areas and Volumes)

(Class - 9)

Exercise 13.3

Question 1:

Diameter of the base of a cone is 10.5 cm and its slant height is 10 cm. Find its curved surface area.

Answer 1:

Radius of cone $r = 10.5/2 = 5.25$ cm and slant height $l = 10$ cm

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

$$= \frac{22}{7} \times 5.25 \times 10$$

$$= 22 \times 0.75 \times 10$$

$$= 165 \text{ cm}^2$$

Hence, the curved surface area of cone is 165 cm^2 .

Question 2:

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

Answer 2:

Radius of cone $r = 24/2 = 12$ cm and slant height $l = 21$ cm

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

$$= \frac{22}{7} \times 12 \times (12 + 21)$$

$$= \frac{22}{7} \times 12 \times 33$$

$$= 1244.57 \text{ m}^2$$

Hence, the total surface area of cone is 1244.57 m^2 .

Question 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.

Answer 3:

(i) Curved surface area of cone = 308 cm^2 and slant height $l = 14$ cm

Let, the radius of base of cone = r cm

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

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

$$\Rightarrow 308 = 44r$$

$$\Rightarrow r = \frac{308}{44} = 7 \text{ cm}$$

Hence, the radius of base of cone is 7 cm.

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

$$= \frac{22}{7} \times 7 \times (7 + 14)$$

$$= 22 \times 21$$

$$= 462 \text{ cm}^2$$

Hence, the total surface area of cone is 462 cm^2 .

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Question 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 m² canvas is ₹ 70.

Answer 4:

(i) Radius of cone $r = 24$ m and height $h = 10$ m

Let, the slant height = l m

We know that, $l^2 = r^2 + h^2$

$$\Rightarrow l^2 = 24^2 + 10^2 = 576 + 100 = 676$$

$$\Rightarrow l = \sqrt{676} = 26 \text{ m}$$

(ii) Area of canvas to make the tent = $\pi r l$

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

Cost of 1 m² canvas = ₹ 70

$$\text{Therefore, the cost of } \frac{22}{7} \times 24 \times 26 \text{ m}^2 \text{ canvas} = ₹ 70 \times \frac{22}{7} \times 24 \times 26 = ₹ 137280$$

Hence, the cost of canvas to make the tent is ₹ 137280.

Question 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 20 cm (Use $\pi = 3.14$).

Answer 5:

Radius of cone $r = 6$ m and height $h = 8$ m

Let, the slant height = l m

We know that, $l^2 = r^2 + h^2$

$$\Rightarrow l^2 = 6^2 + 8^2 = 36 + 64 = 100$$

$$\Rightarrow l = \sqrt{100} = 10 \text{ m}$$

Area of tarpaulin to make the tent = $\pi r l$

$$= 3.14 \times 6 \times 10 = 188.40 \text{ m}^2$$

Let, the length of 3 m wide tarpaulin = L

Therefore, the area of tarpaulin required = $3 \times L$

According to question,

$$3 \times L = 188.40$$

$$\Rightarrow L = \frac{188.40}{3} = 62.80 \text{ m}$$

Extra tarpaulin for stitching margins and wastage = 20 cm = 0.20 m

Therefore, the total length of tarpaulin = $62.80 + 0.20 = 63$ m

Hence, the length of 3 m wide tarpaulin is 63 m to make the tent.

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Question 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 ₹ 210 per 100 m².

Answer 6:

Radius of conical tomb $r = 14/2 = 7$ m and slant height $l = 25$ m

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

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

$$\text{Cost of white washing at the rate of ₹ 210 per } 100 \text{ m}^2 = ₹ 550 \times \frac{210}{100} = ₹ 1155$$

Hence, the cost of white washing curved surface area is ₹ 1155.

Question 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.

Answer 7:

Radius of right circular cone $r = 7$ cm and height $h = 24$ cm

Let, the slant height $= l$ m

We know that $l^2 = r^2 + h^2$

$$\Rightarrow l^2 = 7^2 + 24^2 = 49 + 576 = 625$$

$$\Rightarrow l = \sqrt{625} = 25 \text{ cm}$$

Area of sheet required to make 1 cap $= \pi r l$

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

Therefore, area of sheet required to make 10 such caps $= 10 \times 550 = 5500 \text{ cm}^2$

Hence, area of sheet to make 10 such caps is 5500 cm².

Question 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 ₹12 per m², what will be the cost of painting all these cones? (Use $\pi = 3.14$ and take $\sqrt{1.04} = 1.02$)

Answer 8:

Radius of cone $r = 40/2 = 20$ cm $= 0.2$ m and height $h = 1$ m

Let the slant height $= l$ m

We know that $l^2 = r^2 + h^2$

$$\Rightarrow l^2 = (0.2)^2 + 1^2 = 0.04 + 1 = 1.04$$

$$\Rightarrow l = \sqrt{1.04} = 1.02 \text{ m}$$

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

$$= 3.14 \times 0.2 \times 1.02 = 6.4056 \text{ m}^2$$

Curved surface area of 50 cones $= 50 \times 6.4056 = 32.028 \text{ m}^2$

Cost of painting at the rate of ₹ 12 per m² $= ₹ 12 \times 32.028 = ₹ 384.34$ (approx.)

Hence, the cost of painting the curved surface of 50 cones is ₹ 384.34.

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