



NCERT Solutions for Class 10 Maths Chapter 13 Surface Areas and Volumes Exercise 13.4

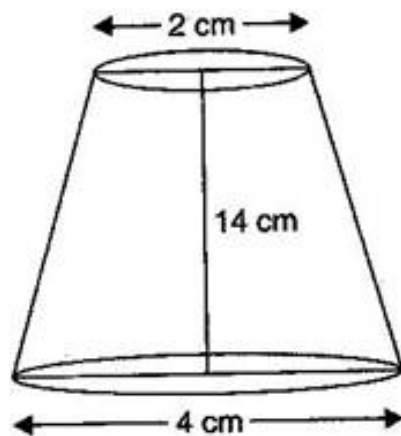
Exercise 13.4

Unless stated otherwise, take $\pi = \frac{22}{7}$.

1. A drinking glass is in the shape of a frustum of a cone of height 14 cm. The diameters of its two circular ends are 4 cm and 2 cm. Find the capacity of the glass.

Ans. Here, $r_1 = \frac{4}{2} = 2$ m,

$r_2 = \frac{2}{2} = 1$ m and $h = 14$ m



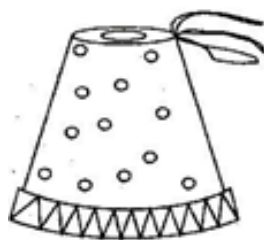
$$\therefore \text{Capacity of the glass} = \frac{1}{3} \pi h (r_1^2 + r_2^2 + r_1 r_2)$$

$$= \frac{1}{3} \times \frac{22}{7} \times 14 (2 \times 2 + 1 \times 1 + 2 \times 1)$$

$$= \frac{1}{3} \times \frac{22}{7} \times 14 \times 7$$

$$= \frac{308}{3} = 102\frac{2}{3} \text{ cm}^3$$

2. The slant height of a frustum of a cone is 4 cm and the perimeters (circumference) of its circular ends are 18 cm and 6 cm. Find the curved surface area of the frustum.



Ans. Let r_1 cm and r_2 cm be the radii of the ends ($r_1 > r_2$) of the frustum of the cone.

Then, $l = 4$ cm

$$2\pi r_1 = 18 \text{ cm}$$

$$\Rightarrow \pi r_1 = 9 \text{ cm}$$

$$2\pi r_2 = 6 \text{ cm}$$

$$\Rightarrow \pi r_2 = 3 \text{ cm}$$

$$\text{Now, CSA of the frustum} = \pi(r_1 + r_2)l$$

$$= (\pi r_1 + \pi r_2)l$$

$$= (9 + 3) \times 4 = 48 \text{ cm}^2$$

3. A fez, the cap used by the Turks, is shaped like the frustum of a cone (see figure). If its radius on the open side is 10 cm, radius at the upper base is 4 cm and its slant height is 15 cm, find the area of material used for making it.

Ans. Here, $r_1 = 10$ cm,

$r_2 = 4$ cm and $l = 15$ cm

$$\therefore \text{Surface area} = \pi(r_1 + r_2)l + \pi r_2^2$$

$$= \frac{22}{7}(10+4) \times 15 + \frac{22}{7}(4)^2$$

$$= 660 + \frac{352}{7} = \frac{4972}{7} = 710\frac{2}{7} \text{ cm}^2$$

4. A container, opened from the top and made up of a metal sheet, is in the form of a frustum of a cone of height 16 cm with radii of its lower and upper ends as 8 cm and 20 cm respectively. Find the total cost of milk which can completely fill the container at the rate of Rs. 20 per liter. Also find the cost of metal sheet used to make the container, if it costs Rs. 8 per 100 cm^2 . (Take $\pi = 3.14$)

Ans. Here, $r_1 = 20$ cm,

$r_2 = 8$ cm and $h = 16$ cm

$$\therefore \text{Volume of container} = \frac{1}{3} \pi h (r_1^2 + r_2^2 + r_1 r_2)$$

$$= \frac{1}{3} \times 3.14 \times 16 \times (20)^2 \{ (20)^2 + (8)^2 + 20 \times 8 \}$$

$$= \frac{1}{3} \times 3.14 \times 16 (400 + 64 + 160)$$

Ans. Here, $r_1 = 10$ cm,

$r_2 = 4$ cm and $l = 15$ cm

\therefore Surface area = $\pi(r_1 + r_2)l + \pi r_2^2$

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$r_2 = 8$ cm and $h = 16$ cm

\therefore Volume of container = $\frac{1}{3} \pi h (r_1^2 + r_2^2 + r_1 r_2)$

$$= \frac{1}{3} \times 3.14 \times 16 \times (20)^2 \left\{ (20)^2 + (8)^2 + 20 \times 8 \right\}$$

$$= \frac{1}{3} \times 3.14 \times 16 (400 + 64 + 160)$$

$$= \frac{1}{3} \times 3.14 \times 16 \times 624$$

***** END *****