CLASS IX: MATHS
Chapter 11: Surface Areas and Volume

Questions and Solutions | Exercise 11.3 - NCERT Books

Q1. Find the volume of the right circular cone with
(i) radius 6 cm, height 7 cm
(ii) radius 3.5 cm, height 12 cm

Sol. (i) $r = 6$ cm, $h = 7$ cm

$$\text{Volume} = \frac{1}{3} \times \frac{22}{7} \times (6)^2 \times 7 \text{ cm}^3 = 264 \text{ cm}^3$$

(ii) $r = \frac{7}{2}$ cm, $h = 12$ cm

$$\text{Volume} = \frac{1}{3} \times \frac{22}{7} \times \left(\frac{7}{2}\right)^2 \times 12 \text{ cm}^3 = 154 \text{ cm}^3$$

Q2. Find the capacity in litres of a conical vessel with
(i) radius 7 cm, slant height 25 cm.
(ii) height 12 cm, slant height 13 cm.

Sol. (i) $r = 7$ cm, $\ell = 25$ cm

$r^2 + h^2 = \ell^2$

$\Rightarrow (7)^2 + h^2 = (25)^2 \Rightarrow h^2 = (25)^2 - (7)^2$

$\Rightarrow h^2 = 625 - 49 \Rightarrow h^2 = 576$

$\Rightarrow h = \sqrt{576} \Rightarrow h = 24$ cm

$$\therefore \text{Capacity} = \frac{1}{3}\pi r^2 h = \frac{1}{3} \times \frac{22}{7} \times (7)^2 \times 24$$

$$= 1232 \text{ cm}^3 = 1.232 \ \ell.$$

(ii) $h = 12$ cm, $\ell = 13$ cm

$r^2 + h^2 = \ell^2$

$\Rightarrow r^2 + (12)^2 = (13)^2 \Rightarrow r^2 + 144 = 169$

$\Rightarrow r^2 = 169 - 144 \Rightarrow r^2 = 25$

$\Rightarrow r = \sqrt{25} \Rightarrow r = 5$ cm

$\therefore$ Capacity $= \frac{1}{3}\pi r^2 h = \frac{1}{3} \times \frac{22}{7} \times (5)^2 \times 12$

$= \frac{2200}{7}$ cm^3 $= \frac{2200}{7000}\ \ell = \frac{11}{35}\ \ell.$

Q3. The height of a cone is 15 cm. If its volume is 1570 cm^3, find the radius of the base. (Use $\pi = 3.14$)

Sol. h = 15 cm, volume = 1570 cm^3

$\Rightarrow \frac{1}{3} \times 3.14 \times r^2 \times 15 = 1570$

$\Rightarrow r^2 = \frac{1570}{15.70} = 100$

$\Rightarrow r = 10$ cm

Q4. If the volume of a right circular cone of height 9 cm is 48 π cm^3, find the diameter of its base.

Sol. h = 9 cm, volume = 48 πcm^3

$\frac{1}{3}\pi r^2 \times h = 48\ \pi$

$\Rightarrow \frac{1}{3} r^2 \times 9 = 48$

$\Rightarrow r^2 = 16 \Rightarrow r = 4$ cm

Q5. A conical pit of top diameter 3.5 m is 12 m deep. What is its capacity in kilolitres?

Sol. For conical pit

Diameter = 3.5 m

$\therefore$ Radius (r) $= \frac{3.5}{2}$ m = 1.75 m

Depth (h) = 12 m

$\therefore$ Capacity of the conical pit

$= \frac{1}{3}\pi r^2 h = \frac{1}{3} \times \frac{22}{7} \times (1.75)^2 \times 12\ m^3$

$= 38.5\ m^3 = 38.5 \times 1000\ \ell = 38.5$ kl.

Q6. The volume of a right circular cone is 9856 cm^3. If the diameter of the base is 28 cm, find (i) height of the cone (ii) slant height of the cone (iii) curved surface area of the cone

Sol. (i) Volume = 9856 cm^3, r = 14 cm

$\Rightarrow \frac{1}{3} \times \frac{22}{7} \times (14)^2 \times 4 = 9856$

$\Rightarrow h = \frac{9856 \times 3}{22 \times 28} cm \Rightarrow h = 48$ cm

(ii) $\ell^2 = h^2 + r^2 = (48)^2 + (14)^2 = 2500$

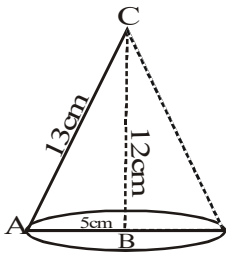
$\Rightarrow \ell = 50$ cm

(iii) Curved surface area $= \frac{22}{7} \times 14 \times 50\ cm^2$

$= 2200\ cm^2$

Q7. A right triangle ABC with sides 5 cm, 12 cm and 13 cm is revolved about the side 12 cm. Find the volume of the solid so obtained.

Sol.

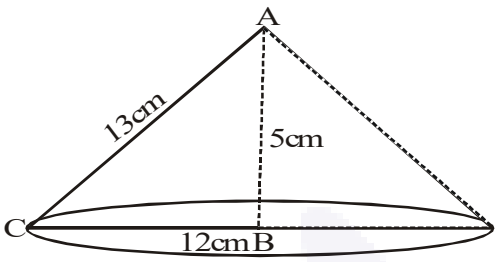


Radius, r = 5 cm ; height, h = 12 cm & slant height, ℓ = 13 cm] $= \frac{1}{2}\pi 5^2 \times 12 = 100\pi$

Q8. If the triangle ABC in the question 7 above is revolved about the side 5 cm, then find the volume of the solid so obtained. Find also the ratio of the volumes of the two solids obtained in Question

7 and 8.

Sol.



Radius, r = 12 cm ; height, h = 5 cm & slant height, ℓ = 13 cm]

Vol. $= \frac{1}{3}\pi 12^2 \times 5 = 240\pi$

Ans. 240 π cm^3 ; 5 : 12.

Q9. A heap of wheat is in the form of a cone whose diameter is 1 0.5 m and height is 3 m. Find its volume. The heap is to be covered by canvas to protect it from rain. Find the area of the canvas required.

Sol. Diameter = 10.5 m

$\therefore$ Base Radius (r) = $\frac{10.5}{2}$ m = $\frac{105}{20}$ m

Height (h) = 3m

$\therefore$ Volume of the heap = $\frac{1}{3}\pi r^2 h$

$= \frac{1}{3} \times \frac{22}{7} \times \left(\frac{105}{20}\right)^2 \times 3$

$= 86.625\ m^3$

$\therefore$ Area of the canvas = $\pi r \ell$

where, $\ell = \sqrt{r^2 + h^2}$

$= \sqrt{\left(\frac{10.5}{2}\right)^2 + (3)^2} = \sqrt{\frac{110.25}{4} + 9}$

$= \sqrt{\frac{146.25}{4}} = 6.046$ m (approx)

Now, $\pi r\ell = \frac{22}{7} \times \frac{10.5}{2} \times 6.05\ m^2$

$= 11 \times 1.5 \times 6.05\ m^2$

$= 99.825\ m^2$

Thus, the required area of the canvas is $99.825\ m^2$