SpeedLabs

MATHS

CBSE 9th

TEEVRA EDUTECH PVT. LTD.

SURFACE AREAS AND VOLUMES
Exercise- 13.7

1. Find the volume of the right circular cone with

(i) Radius 6 cm, height 7 cm

(ii) Radius 3.5 cm, height 12 cm

$\left[\text{Assume } \pi = \frac{22}{7}\right]$

Ans - **(i)** Radius (r) of cone = 6 cm

Height (h) of cone = 7 cm

Volume of cone $= \frac{1}{3}\pi r^2 h$

$= \left[\frac{1}{3} \times \frac{22}{7} \times (6)^2 \times 7\right] \text{cm}^3$

$= (12 \times 22)\text{cm}^3$

$264\ \text{cm}^3$

Therefore, the volume of the cone is 264 cm^3.

(ii) Radius (r) of cone = 3.5 cm

Height (h) of cone = 12 cm

Volume of cone $= \frac{1}{3}\pi r^2 h$

$= \left[\frac{1}{3} \times \frac{22}{7} \times (3.5)^2 \times 12\right] \text{cm}^3$

$= \left[\frac{1}{3} \times 22 \times \frac{1}{2} \times 3.5 \times 12\right] \text{cm}^3$

$= 154\ \text{cm}^3$

Therefore, the volume of the cone is 154 cm^3.

Q.2 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

$\left[\text{Assume } \pi = \frac{22}{7}\right]$

Ans- **(i)** Radius (r) of cone = 7 cm

Slant height (l) of cone = 25 cm

Height (h) of cone $= \sqrt{l^2 - r^2}$

$= \left[\sqrt{25^2 - 7^2}\right] \text{cm}$

$= 24$ cm

Volume of cone $= \frac{1}{3}\pi r^2 h$

$= \left[\frac{1}{3} \times \frac{22}{7} \times (7)^2 \times 24\right] cm^3$

$= (154 \times 8) cm^3$

$= 1232\ cm^3$

Therefore, capacity of the conical vessel

$= \left(\frac{1232}{1000}\right)$ litre (1 litre $= 1000 cm^3$

$= 1.232$ litres

(ii) Height (h) of cone $= 12$ cm

Slant height (l) of cone $= 13$ cm

Radius (r) of cone $\sqrt{l^2 - r^2}$

$= \left[\sqrt{13^2 - 12^2}\right] cm$

$= 5$ cm

Volume of cone $= \frac{1}{3}\pi r^2 h$

$= \left[\frac{1}{3} \times \frac{22}{7} \times (5)^2 \times 12\right] cm^3$

$= \left(4 \times \frac{22}{7} \times 25\right) cm^3$

$= \left(\frac{2200}{7000}\right)\ cm^2$

Therefore, capacity of the conical vessel

$= \left(\frac{2200}{7000}\right)$ litre (1 litre $= 1000\ cm^3$)

$= \frac{11}{35}$ litres

Q.3 The height of a cone is 15 cm. If its volume is 1570 cm^3, find the diameter of its base. [Use $\pi = 3.14$]

Ans - Height (h) of cone $= 15$ cm

Let the radius of the cone be r.

Volume of cone $= 1570\ cm^3$

$\frac{1}{3}\pi r^2 h = 1570\ cm^2$

$\Rightarrow \left(\frac{1}{3} \times 3.14 \times r^2 \times 15\right) cm = 1570\ cm^3$

$\Rightarrow r^3 = 10\ cm^2$

$\Rightarrow r = 10$ cm

Therefore, the diameter of the base of cone is $10 \times 2 = 20$ cm.

Q.4 If the volume of a right circular cone of height 9 cm is 48π cm^3, find the diameter of its base.

Ans - Height (h) of cone = 9 cm

Let the radius of the cone be r.

Volume of cone = 48π cm^3

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

$\Rightarrow \left(\frac{1}{3}\pi r^2 \times 9\right)$ cm $= 48\pi$ cm^3

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

$\Rightarrow r = 4$ cm

Diameter of base = $2r = 8$ cm.

Q.5 A conical pit of top diameter 3.5 m is 12 m deep. What is its capacity in kilolitres?

$\left[\text{Assume } \pi = \frac{22}{7}\right]$

Ans - Radius (r) of pit = $\left(\frac{3.5}{2}\right)$ m = 1.75 m

Height (h) of pit = Depth of pit = 12 m

Volume of pit $= \frac{1}{3}\pi r^2 h$

$= \left[\frac{1}{3} \times \frac{22}{7} \times (1.75)^2 \times 12\right]$ cm^3

$= 38.5$ m^3

Thus, capacity of the pit = (38.5×1) kilolitres = 38.5 kilolitres.

Q.6 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

$\left[\text{Assume } \pi = \frac{22}{7}\right]$

Ans - **(i)** Radius of cone = = $\left(\frac{28}{2}\right)$ cm = 14 cm

Let the height of the cone be h.

Volume of cone = 9856 cm^3

$\Rightarrow \frac{1}{3}\pi r^2 h = 9856\ cm^3$

$\Rightarrow \left[\frac{1}{3} \times \frac{22}{7} \times (14)^2 \times h\right] cm^2 = 9856\ cm^3$

$h = 48$ cm

Therefore, the height of the cone is 48 cm.

(ii) Slant height (l) of cone $= \sqrt{l^2 - r^2}$

$= \left[\sqrt{(14)^2 + (48)^2}\right] cm$

$= \left[\sqrt{196 + 2304}\right] cm$

$= 50$ cm

Therefore, the slant height of the cone is 50 cm.

(iii) CSA of cone $= \pi rl$

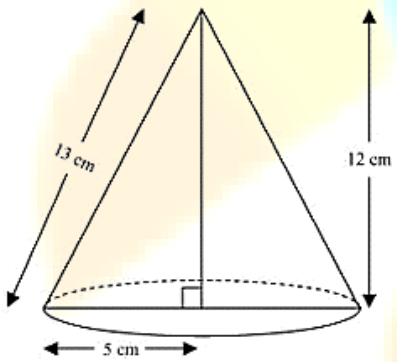
$= \left(\frac{22}{7} \times 14 \times 50\right) cm^2$

$= 2200\ cm^2$

Therefore, the curved surface area of the cone is 2200 cm^2.

Q.7 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.

Ans -



When right-angled ΔABC is revolved about its side 12 cm, a cone with height (h) as 12 cm, radius (r) as 5 cm, and slant height (l) 13 cm will be formed.

Volume of cone $= \frac{1}{3}\pi r^2 h$

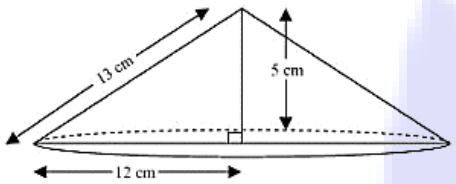
$= \left[\frac{1}{3} \times \pi \times (5)^2 \times 12\right] cm^3$

$= 100\pi\ cm^3$

Therefore, the volume of the cone so formed is $100\pi\ cm^3$.

Q.8 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 Questions 7 and 8.

Ans -



When right-angled ΔABC is revolved about its side 5 cm, a cone will be formed having radius (r) as 12 cm, height (h) as 5 cm, and slant height (l) as 13 cm.

Volume of cone $= \frac{1}{3}\pi r^2 h$

$= \left[\frac{1}{3} \times \pi \times (12)^2 \times 5\right] cm^3$

$= 240\pi\ cm^3$

Therefore, the volume of the cone so formed is $240\pi\ cm^3$.

Required ratio $= \frac{100\pi}{240\pi}$

$= \frac{5}{12} = 5:12$

Q.9 A heap of wheat is in the form of a cone whose diameter is 10.5 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.

$\left[\text{Assume } \pi = \frac{22}{7}\right]$

Ans - Radius (r) of heap $= \left(\frac{10.5}{2}\right)$ m $= 5.25$ m

Height (h) of heap $= 3$ m

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

$= \left(\frac{1}{3} \times \frac{22}{7} \times (5.25)^2 \times 3\right) m^3$

$= 86.625\ m^2$

Therefore, the volume of the heap of wheat is $86.625\ m^3$.

Area of canvas required = CSA of cone

$= \left[\frac{22}{7} \times 5.25 \times \sqrt{(5.25)^2 + (3)^2}\right] m^2$

$= \left(\frac{22}{7} \times 5.25 \times 6.05\right) m^2 = 99.825\ m^2$

Therefore, $99.825\ m^2$ canvas will be required to protect the heap from rain.