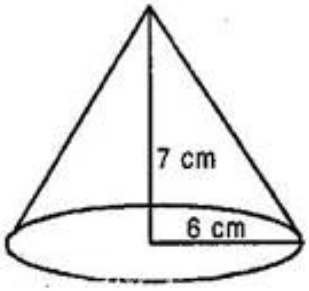
NCERT solutions for class-9 maths surface areas and volumes Ex 13.7

Assume $\pi = \frac{22}{7}$ unless stated otherwise.

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



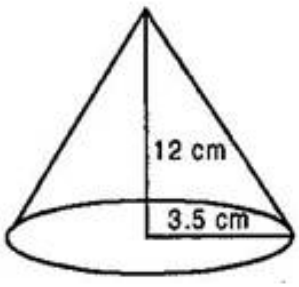
Ans: (i) Given: r = 6 cm, h = 7 cm

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

$= \frac{1}{3} \times \frac{22}{7} \times 6 \times 6 \times 7$

= 264 cm^3

(ii) Given: r = 3.5 cm, h = 12 cm



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

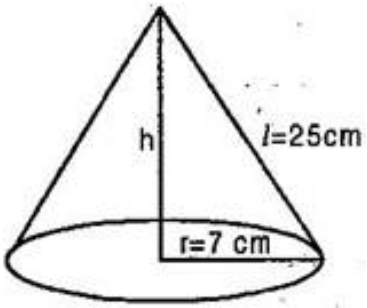
$= \frac{1}{3} \times \frac{22}{7} \times 3.5 \times 3.5 \times 12$

= 154 cm^3

Q2. Find the capacity of a conical vessel with:

(i) Radius 7 cm, Slant height 25 cm

(ii) Height 12 cm, Slant height 13 cm



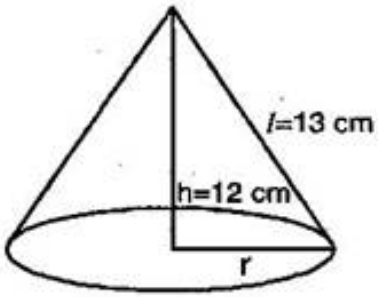
Ans: (i) Given: $r = 7$ cm, $l = 25$ cm

$h = \sqrt{l^2 - r^2} = \sqrt{(25)^2 - (7)^2} = \sqrt{625 - 49} = \sqrt{576} =$ 24 cm

Capacity of conical vessel = $\frac{1}{3}\pi r^2 h$

$= \frac{1}{3} \times \frac{22}{7} \times 7 \times 7 \times 24 = 1232 \text{ cm}^3$

= 1.232 liters [$\because$ 1000 cm^3= 1liter]



(ii) Given: $h = 12$ cm, $l = 13$ cm

$r = \sqrt{l^2 - h^2} = \sqrt{(13)^2 - (12)^2}$

$= \sqrt{169 - 144}$

$= \sqrt{25} = 5$ cm

Capacity of conical vessel = $\frac{1}{3}\pi r^2 h$

$= \frac{1}{3} \times \frac{22}{7} \times 5 \times 5 \times 12 = \frac{2200}{7} \text{ cm}^3$

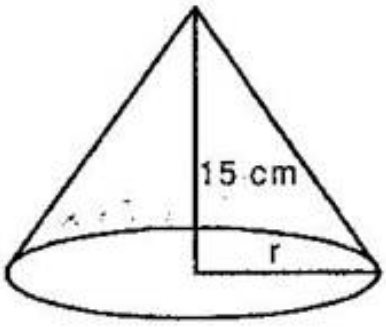
$= \frac{2200}{7} \times \frac{1}{1000}$ liters

[$\because$ 1000 cm^3= 1liter]

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

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

Ans: Height of the cone (h) = 15 cm



Volume of cone = 1570 cm^3

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

$$\Rightarrow \frac{1}{3}\times\frac{22}{7}\times r^2 \times 15 = 1570$$

$$\Rightarrow 15.70r^2 = 1570$$

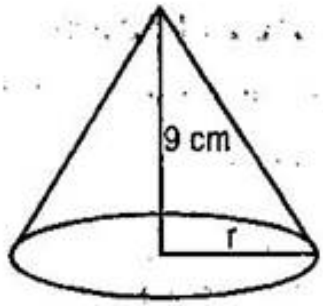
$$\Rightarrow r^2 = 1570\times\frac{100}{1570} = 100$$

$$\Rightarrow r = 10 \text{ cm}$$

Hence required radius of the base is 10 cm.

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

Ans: Height of the cone (h) = 9 cm



Volume of cone = 48π cm^3

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

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

$\Rightarrow 3r^2 = 48$

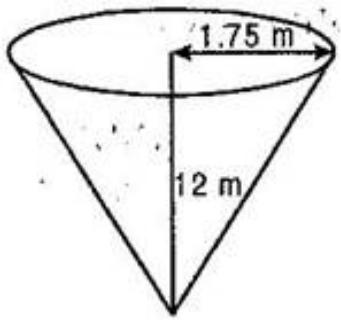
$\Rightarrow r^2 = \frac{48}{3} = 16$

$\Rightarrow r = 4$ cm

$\therefore$ Diameter of base = $2r = 2 \times 4 = 8$ cm

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

Ans: Diameter of pit = 3.5 m



$\therefore$ Radius of pit = $\frac{3.5}{2}$ = 1.75 m

Depth of pit (h) = 12 m

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

$= \frac{1}{3} \times \frac{22}{7} \times 1.75 \times 1.75 \times 12$

$= \frac{1}{3} \times \frac{22}{7} \times \frac{175}{100} \times \frac{175}{100} \times 12$

$= \frac{1}{3} \times \frac{22}{7} \times \frac{7}{4} \times \frac{7}{4} \times 12$

$= 22 \times \frac{7}{4} = \frac{77}{2}$ m^3 = 35.8 m^3

= 38.5 kl [$\because$ 1 m^3 = 1 kl]

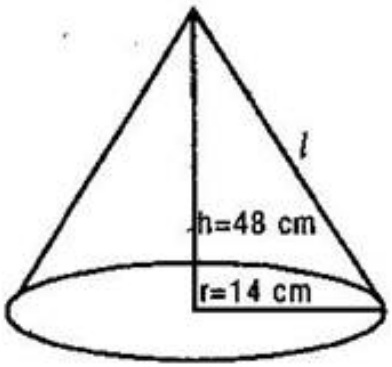
Q6. The volume of a right circular cone is 9856 cm^3. If the diameter of the base if 28 cm, find:

(i) Height of the cone

(ii) Slant height of the cone

(iii) Curved surface area of the cone.

Ans: (i) Diameter of cone = 28 cm



$\therefore$ Radius of cone = 14 cm

Volume of cone = 9856 cm^3

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

$$\Rightarrow \frac{1}{3}\times\frac{22}{7}\times 14\times 14\times h = 9856$$

$$\Rightarrow h = \frac{9856\times 3\times 7}{22\times 14\times 14} = 48 \text{ cm}$$

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

$$= \sqrt{(14)^2+(48)^2}$$

$$= \sqrt{196+2304}$$

$$= \sqrt{2500} = 50 \text{ cm}$$

(iii) Curved surface area of cone = πrl =

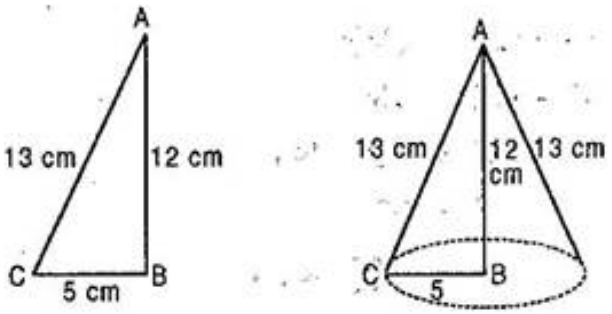
$\frac{22}{7}\times 14\times 50$ = 2200 cm^2

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.
(Use $\pi = 3.14$)

Ans: When right angled triangle ABC is revolved about side 12 cm, then the solid formed is a cone.

In that cone, Height (h) = 12 cm

And radius (r) = 5 cm



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

$= \frac{1}{3}\pi \times 5 \times 5 \times 12$

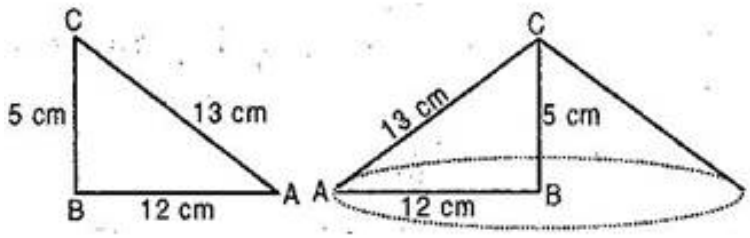
$= 100\pi \text{ cm}^3$

Q8. If the triangle ABC in 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 volume of the two solids obtained.

Ans: When right angled triangle ABC is revolved about side 5 cm, then the solid formed is a cone.

In that cone, Height (h) = 5 cm

And radius (r) = 12 cm



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

$= \frac{1}{3}\pi \times 12 \times 12 \times 5$

$= 240\pi \text{ cm}^3$

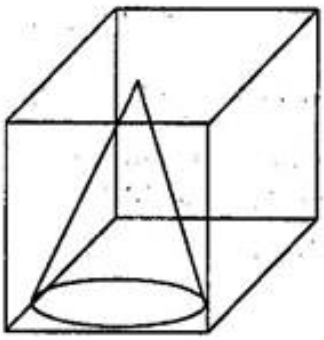
Now, $\frac{\text{Volume of cone in Q. No. 7}}{\text{Volume of vone in Q. No. 8}}$

$= \frac{100\pi}{240\pi} = \frac{5}{12}$

$\therefore$ Required ratio = 5 : 12

Q9. Find the volume of the largest right circular cone that can be fitted in a cube whose edge is 14 cm.

Ans: Since, diameter of the largest right circular cone that can be fitted in a cube = Edge of cube



$\Rightarrow 2r = 14 \text{ cm}$

$\Rightarrow r = 7 \text{ cm}$

And also Height of the cone (h) = Edge of cube = 14 cm

Now, Volume of the largest cone

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

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

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

$$= \frac{2156}{3}$$

$= 718.66 \text{ cm}^3$

Q10. 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.

Ans: Radius (r) of heap

$$= \left(\frac{10.5}{2}\right) \text{m} = 5.25 \text{ m}$$

Height (h) of heap = 3 m

Volume of heap

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

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

$$= 86.625 \text{ m}^3$$

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

Area of canvas required = CSA of cone

$$= \pi r l = \pi r \sqrt{r^2 + h^2}$$

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

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

$$= 99.825 \text{ m}^2$$

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

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