

AI1110 assignment1(ICSE Class 10 2017)

Bhargava Ram Rajulapati, CS21BTECH11052

QUESTION 6(B)

A conical tent is to accommodate 77 persons. Each person must have $16m^3$ of air to breathe. Given the radius of the tent as $7m$ find the height of the tent and also its curved surface area.

SOLUTION:

Given a conical tent which can accommodate 77 persons and each person must have $16m^3$ of air to breathe.

so the volume of conical tent is,

$$v = 77 \times 16m^3 \quad (1)$$

$$v = 1232m^3 \quad (2)$$

Symbol	formula	Value	Description
r	-	$7m$	radius of the tent
v	$\frac{\pi r^2 h}{3}$	$1232m^3$	volume of the tent
h	$\frac{3v}{\pi r^2}$?	height of the tent
s	$\pi r l$?	curved surface area

TABLE I

we know that volume of conical tent is same as a cone having radius r , height h ,

$$v = \frac{\pi r^2 h}{3} \quad (3)$$

from the question we are given radius of cone,
 $r = 7m$

height of cone is

$$h = \frac{3v}{\pi r^2} \quad (4)$$

By substituting values we can get,
 $h = 24m$

Now we know radius and height so we can find lateral height l which is given by,

$$l = \sqrt{r^2 + h^2} \quad (5)$$

$$\Rightarrow l = \sqrt{7^2 + 24^2} \quad (6)$$

$$\Rightarrow l = 25m \quad (7)$$

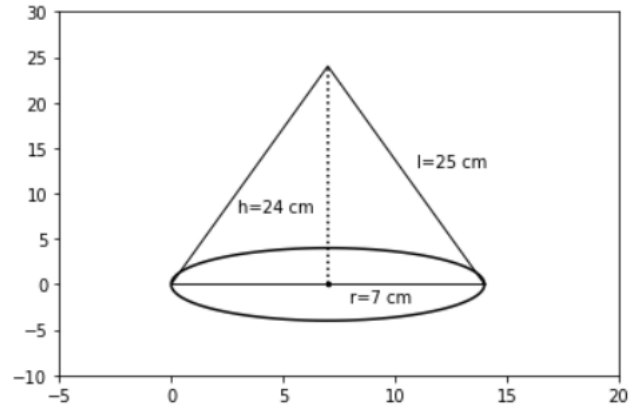


Fig. 1: Tent in the shape of cone

STEPS FOR GENERATING THE FIGURE

- 1) First construct a isosceles triangle taking length of base as $14m$ and height of triangle as $24m$.
- 2) Then, construct a ellipse taking center at mid-point of base of triangle.
- 3) Taking semi-major axis length $7m$ and semi-minor axis length $4m$ for ellipse.
- 4) To indicate height of cone construct a dotted line which is median of triangle and indicate other dimensions also.

We know that lateral/curved surface area s of a cone is given by,

$$s = \pi \times r \times l \quad (8)$$

$$\Rightarrow s = \frac{22}{7} \times 7 \times 25 \quad (9)$$

$$\Rightarrow s = 550m^2 \quad (10)$$

Hence the curved surface area is $550m^2$.