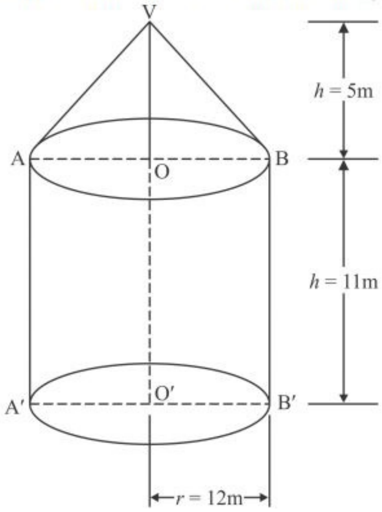
Surface Areas and Volumes Ex.16.2 Q1

Answer :

We have a right circular cylinder surmounted by a cone.
Diameter of cylinder = 24 m, Height if cylindrical portion = 11 m and the vertex of the cone is 16 meters above the ground. We have to find the area of canvas required for the tent.
Suppose curved area of the cone portion is S_1.



From the above figure the slant height of the top is given by

$$l = \sqrt{5^2 + 12^2}$$
$$= 13 \text{ m}$$
$$r = \frac{24}{2} = 12 \text{ m}$$
$$S_1 = \pi r l$$
$$= \frac{22}{7} \times 12 \times 13 \text{ m}^2$$

Now, Let us suppose that the curved area of cylinder is S_2

$$S_2 = 2\pi r h$$
$$= 2 \times \frac{22}{7} \times 12 \times 11 \text{ m}^2$$

Therefore, the area of canvas is given by

$$S = S_1 + S_2$$
$$= \left(\frac{22}{7} \times 12 \times 13 + 2 \times \frac{22}{7} \times 12 \times 11\right) \text{ m}^2$$
$$= \frac{22}{7}(12 \times 13 + 2 \times 12 \times 11) \text{ m}^2$$
$$= \frac{22}{7} \times 420 \text{ m}^2$$
$$= 1320 \text{ m}^2$$

Hence, $\boxed{S = 1320 \text{ m}^2}$

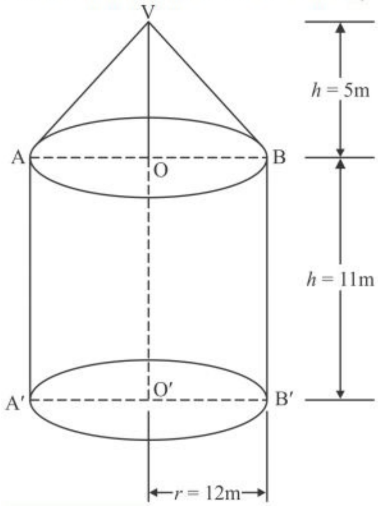
Surface Areas and Volumes Ex.16.2 Q2

Answer :

Given:

Radius of the cylinder $r = 2.5$ m, height of the cylinder, $h = 21$ m, slant height of the cone $l = 8$ m .We have to find total surface area and volume of the rocket

Let us assume that the area of the cone is S_1.



$$\begin{aligned} S_1 &= \pi r l \\ &= 3.14 \times 2.5 \times 8 \\ &= 62.8 \text{ m}^2 \end{aligned}$$

The area of the cylinder S_2 is given by

$$\begin{aligned} S_2 &= 2\pi r h + \pi r^2 \\ &= 3.14 \times 2.5(2 \times 21 + 2.5) \\ &= 349.33 \text{ m}^2 \end{aligned}$$

Total area S is

$$\begin{aligned} S &= S_1 + S_2 \\ &= 62.8 + 349.33 \\ &= 412.13 \text{ m}^2 \end{aligned}$$

Now, we are going to find the volume of the rocket V.

Volume of the cone is given by

$$\begin{aligned} V_1 &= \frac{1}{3}\pi r^2 h \\ &= \frac{1}{3} \times 3.14 \times 2.5^2 \sqrt{8^2 - 2.5^2} \\ &= 49.71 \text{ m}^3 \end{aligned}$$

Volume of the cylinder is

$$\begin{aligned} V_2 &= \pi r^2 h \\ &= 3.14 \times 2.5^2 \times 21 \\ &= 412.13 \text{ m}^3 \end{aligned}$$

Total volume of the cone is given by

$$\begin{aligned} V &= V_1 + V_2 \\ &= 49.71 + 412.13 \\ &= 461.84 \text{ m}^3 \end{aligned}$$

Hence, the area and the volume of the rocket is $\boxed{S = 412.13 \text{ m}^2,\ \text{V} = 461.84 \text{ m}^3}$

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