Surface Areas and Volumes Ex.16.1 Q13

Answer :

The height and radius of the cylindrical bucket are $h = 32$ cm and $r = 18$ cm respectively. Therefore, the volume of the cylindrical bucket is

$$V = \pi r^2 h$$
$$= \frac{22}{7} \times (18)^2 \times 32$$

The bucket is full of sand and is emptied in the ground to form a conical heap of sand of height $h_1 = 24$ cm. Let, the radius and slant height of the conical heap be r_1 cm and l_1 cm respectively. Then, we have

$$l_1^2 = r_1^2 + h_1^2$$
$$\Rightarrow \quad r_1^2 = l_1^2 - h_1^2$$
$$\Rightarrow \quad r_1^2 = l_1^2 - (24)^2$$

The volume of the conical heap is

$$V_1 = \frac{1}{3}\pi r_1^2 h_1$$
$$= \frac{1}{3} \times \frac{22}{7} \times r_1^2 \times 24$$
$$= \frac{22}{7} \times r_1^2 \times 8$$

Since, the volume of the cylindrical bucket and conical hear are same, we have

$$V_1 = V$$
$$\Rightarrow \quad \frac{22}{7} \times r_1^2 \times 8 = \frac{22}{7} \times (18)^2 \times 32$$
$$\Rightarrow \quad r_1^2 = (18)^2 \times 4$$
$$\Rightarrow \quad r_1 = 18 \times 2$$
$$\Rightarrow \quad r_1 = 36$$

Then, we have

$$l_1^2 = r_1^2 + h_1^2$$
$$\Rightarrow l_1^2 = (36)^2 + (24)^2$$
$$\Rightarrow \quad l_1 = 43.27$$

Therefore, the radius and the slant height of the conical heap are 36 cm and 43.27 cm respectively.

Surface Areas and Volumes Ex.16.1 Q14

Answer :

The fallen rains are in the form of a cuboid of height 1 cm, length 6 m = 600 cm and breadth 4 m = 400 cm. Therefore, the volume of the fallen rains is

$$V = 600 \times 400 \times 1 = 240000 \text{ cm}^3$$

The fallen rains are transferred into a cylindrical vessel of internal radius r_1 = 20 cm. Let, the height of the water in the cylindrical vessel is h_1 cm. Then, the volume of the water in the cylinder is

$$V_1 = \pi r_1^2 h_1 = \frac{22}{7} \times (20)^2 \times h_1$$

Since, the volume of the water in the cylinder is same as the volume of the rainfalls, we have

$$V_1 = V$$
$$\Rightarrow \quad \frac{22}{7} \times (20)^2 \times h_1 = 240000$$
$$\Rightarrow \quad h_1 = \frac{240000 \times 7}{(20)^2 \times 22}$$
$$\Rightarrow \quad = 190.9$$

Therefore, the height of the water in the cylinder is 190.9 cm.

Surface Areas and Volumes Ex.16.1 Q15

Answer :

The base-radius and height of the conical flask are r and h respectively. Let, the slant height of the conical flask is l. Therefore, the volume of the water in the conical flask is

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

The water in the conical flask is poured into a cylindrical flask of base-radius mr. Let, the height of the water in the cylindrical flaks is h_1. Then, the volume of the water in the cylindrical flaks is

$$V_1 = \pi \times (mr)^2 \times h_1$$

Since, the volume of the water in the cylindrical flaks is same as the volume of the water in the conical flaks, we have

$$V_1 = V$$

$$\Rightarrow \pi \times (mr)^2 \times h_1 = \frac{1}{3} \times \pi \times r^2 \times h$$

$$\Rightarrow \quad m^2 \times h_1 = \frac{1}{3} \times h$$

$$\Rightarrow \quad h_1 = \frac{h}{3m^2}$$

Therefore, the height of the water in the cylinder is $\boxed{\frac{h}{3m^2}}$

********** END **********