Surface Area and volume of A Right Circular cylinder Ex 19.2 Q26

Answer :

Given data is as follows:
Diameter of the tank = 1.4 m
Height of the tank = 2.1 m
Diameter of the pipe = 3.5 cm
Water flow rate = 2 m/sec
We have to find the time required to fill the tank using this pipe.
The diameter of the tank is given which is 1.4 m. Let us find the radius.

$$r = \frac{1.4}{2}$$

$=0.7$ m
Volume of the tank = $\pi r^2 h$

$$= \frac{22}{7} \times 0.7 \times 0.7 \times 2.1$$

Given is the diameter of the pipe which is 3.5 cm. Therefore, radius is $\frac{3.5}{2}$ cm. Let us convert it to meters. It then becomes, $\frac{3.5}{200}$ m.

Volume of water that flows through the pipe in 1 second = $\frac{22}{7} \times \frac{3.5}{200} \times \frac{3.5}{200} \times 2$

Let the time taken to fill the tank be x seconds. Then we have,

Volume of water that flows through the pipe in x seconds = $\frac{22}{7} \times \frac{3.5}{200} \times \frac{3.5}{200} \times 2 \times x$

We know that volume of the water that flows through the pipe in x seconds will be equal to the volume of the tank. Therefore, we have
Volume of water that flows through the pipe in x seconds= Volume of the tank

$$\frac{22}{7} \times \frac{3.5}{200} \times \frac{3.5}{200} \times 2 \times x = \frac{22}{7} \times 0.7 \times 0.7 \times 2.1$$

$x=1680$ seconds

$$x = \frac{1680}{60} \text{ minutes}$$

$x=28$ minutes
Hence, it takes 28 minutes to fill the tank using the given pipe.

Surface Area and volume of A Right Circular cylinder Ex 19.2 Q27

Answer :

Given data is as follows:
Dimensions of the rectangular sheet of paper = 30 cm × 18 cm
We have to find the ratio of the volumes of the cylinders formed by rolling the sheet along its length and along its breadth.
Let V_1 be the volume of the cylinder which is formed by rolling the sheet along its length.
When the sheet is rolled along its length, the length of the sheet forms the perimeter of the base of the cylinder. Therefore, we have,

$$2\pi r_1 = 30$$

$$r_1 = \frac{15}{\pi}$$

The width of the sheet will be equal to the height of the cylinder. Therefore,
$h_1=18$ cm
Therefore,

$$V_1 = \pi r_1^2 h_1$$

$$= \pi \times \frac{15}{\pi} \times \frac{15}{\pi} \times 18$$

$$V_1 = \frac{225}{\pi} \times 18 \text{cm}^3$$

Let V_2 be the volume of the cylinder formed by rolling the sheet along its width.

When the sheet is rolled along its width, the width of the sheet forms the perimeter of the base of the cylinder. Therefore, we have,

$2\pi r_2 = 18$

$r_2 = \frac{9}{\pi}$

The length of the sheet will be equal to the height of the cylinder. Therefore,

$h_2 = 30$ cm

Now,

$V_2 = \pi r_2^2 h_2$

$= \pi \times \frac{9}{\pi} \times \frac{9}{\pi} \times 30$

$V_2 = \frac{81 \times 30}{\pi}$

Now that we have the volumes of the two cylinders, we have,

$\frac{V_1}{V_2} = \frac{225 \times 18}{18 \times 30}$

$\frac{V_1}{V_2} = \frac{5}{3}$

Therefore, the ratio of the volumes of the two cylinders is 5:3

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