Surface Areas and Volume of a Cuboid and Cube Ex 18.2 Q23

Answer :

It is given that

Length of the tank (l) = 80 m

$= 8,000\,\text{cm}$

Breadth of the tank (b) = 25 m

= 2500 cm

Area of the cross section of the pipe is 25 cm^2

The water flows at the rate of 16 km/hr.

We are asked to find the level of tank raised in 45 minutes

In 45 minutes, the water through the pipe will go,

$$L = (45\,\text{min}) \times \frac{16\,\text{km}}{60\,\text{min}}$$

$$= 12\,\text{km}$$

$$= 12000\,\text{m}$$

Area of the cross-section of the pipe is 25 cm^2.

So, the quantity of the water poured in 45 minutes,

$$V = 25\,\text{cm}^2 \times L$$

$$= 25\,\text{cm}^2 \times 12000\,\text{m}$$

$$= 25\,\text{cm}^2 \times 12,00,000\,\text{cm}$$

$$= 3,00,00,000\,\text{cm}^3$$

Let,

$h \rightarrow$ Height to which the water is raised

So,

$$V = lbh$$

$$3,00,00,000 = 8,000 \times 2500 \times h$$

$$h = \frac{3,00,00,000}{8,000 \times 2500}$$

$$= \frac{300}{8 \times 25}$$

$$= 1.5\,\text{cm}$$

In 45 minutes, the water level rises by $\boxed{1.5\,\text{cm}}$

Surface Areas and Volume of a Cuboid and Cube Ex 18.2 Q24

Answer :

Dimensions of the reservoir are,

$\text{Length}(l) = 80\,\text{m}$

$\text{Breadth}(b) = 60\,\text{m}$

$\text{Depth}(h) = 6.5\,\text{m}$

Side of the cross-section of the pipe $= 20\,\text{cm}$

$= 0.2\,\text{m}$

The flow of water through the water is;

$v = 15\,\text{km/hr}$

$= 15000\,\text{m/hr}$

We are asked to find the time in which the reservoir can be emptied

Here, volume of the water in the reservoir,

$V = lbh$

$= (80 \times 60 \times 6.5)\,\text{m}^3$

Since the side of the cross-section of the pipe $= 20\,\text{cm}$

$= 0.2\,\text{m}$

So, the area of the cross-section of the pipe,

$(0.2)^2$

$= 0.04\,\text{m}^2$

Velocity of the water,

$$v = 15\,\text{km/hr}$$
$$= 15000\,\text{m/hr}$$

Let,

$t \rightarrow$ Time required emptying the reservoir

So,

$$V = A \times v \times t$$
$$t = \frac{V}{A \times v}$$
$$= \frac{80 \times 60 \times 6.5}{0.04 \times 15000}$$
$$= \frac{80 \times 60 \times 6.5}{600}$$
$$= 52\,\text{hrs}$$

Using that pipe, the water is emptied in $\boxed{52\,\text{hrs}}$.

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