Exercise 11.4

Question 1:

Given a cylindrical tank, in which situation will you find surface are and in which situation volume.

(a) To find how much it can hold.

(b) Number of cement bags required to plaster it.

(c) To find the number of smaller tanks that can be filled with water from it.

Answer 1:

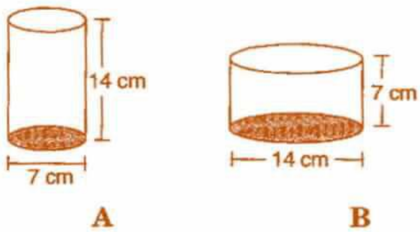
We find area when a region covered by a boundary, such as outer and inner surface area of a cylinder, a cone, a sphere and surface of wall or floor.

When the amount of space occupied by an object such as water, milk, coffee, tea, etc., then we have to find out volume of the object.

(a) Volume (b) Surface are (c) Volume

Question 2:

Diameter of cylinder A is 7 cm and the height is 14 cm. Diameter of cylinder B is 14 cm and height is 7 cm. Without doing any calculations can you suggest whose volume is greater? Verify it by finding the volume of both the cylinders. Check whether the cylinder with greater volume also has greater surface area.



Answer 2:

Yes, we can say that volume of cylinder B is greater, since radius of cylinder B is greater than that of cylinder A (and square of radius gives more value than previous).

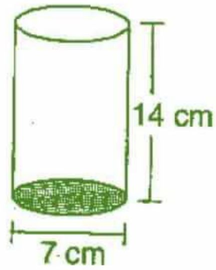
Diameter of cylinder A = 7 cm

$\Rightarrow$ Radius of cylinder A = $\frac{7}{2}$ cm

And Height of cylinder A = 14 cm

$\therefore$ Volume of cylinder A = $\pi r^2 h = \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times 14$

$= 539 \text{ cm}^3$



Now Diameter of cylinder B = 14 cm

$\Rightarrow$ Radius of cylinder B = $\frac{14}{2} = 7$ cm

And Height of cylinder B = 7 cm

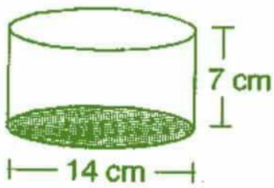
$\therefore$ Volume of cylinder A = $\pi r^2 h = \frac{22}{7} \times 7 \times 7 \times 7$

$= 1078 \text{ cm}^3$

Total surface area of cylinder A = $\pi r(2h + r)$

[$\because$ It is open from top]

$= \frac{22}{7} \times \frac{7}{2}\left(2 \times 14 + \frac{7}{2}\right) = 11 \times \left(28 + \frac{7}{2}\right)$



$= 11 \times \frac{63}{2}$ = 346.5 cm²

Total surface area of cylinder B = $\pi r(2h+r)$ [∵ It is open from top]

$= \frac{22}{7}$ x 7 (2 x 7 + 7)

= 22 x (14 + 7) = 22 x 21 = 462 cm²

Yes, cylinder with greater volume also has greater surface area.

Question 3:

Find the height of a cuboid whose base area is 180 cm² and volume is 900 cm³?

Answer 3:

Given: Base area of cuboid = 180 cm² and Volume of cuboid = 900 cm³

We know that, Volume of cuboid = $l \times b \times h$

⇒ 900 = 180 $\times h$ [∵ Base area = $l \times b = 180$(given)]

⇒ $h = \frac{900}{180}$ = 5 m

Hence, the height of cuboid is 5 m.

Question 4:

A cuboid is of dimensions 60 cm x 54 cm x 30 cm. How many small cubes with side 6 cm can be placed in the given cuboid?

Answer 4:

Given: Length of cuboid (l) = 60 cm, Breadth of cuboid (b) = 54 cm and

Height of cuboid (h) = 30 cm

We know that, Volume of cuboid = $l \times b \times h$ = 60 x 54 x 30 cm³

And Volume of cube = (Side)³ = 6 x 6 x 6 cm³

∴ Number of small cubes = $\frac{\text{Volume of cuboid}}{\text{Volume of cube}} = \frac{60 \times 54 \times 30}{6 \times 6 \times 6}$ = 450

Hence, the required cubes are 450.

Question 5:

Find the height of the cylinder whose volume if 1.54 m3 and diameter of the base is 140 cm.

Answer 5:

Given: Volume of cylinder = 1.54 m³ and Diameter of cylinder = 140 cm

∴ Radius (r) = $\frac{d}{2} = \frac{140}{2}$ = 70 cm

Volume of cylinder = $\pi r^2 h$

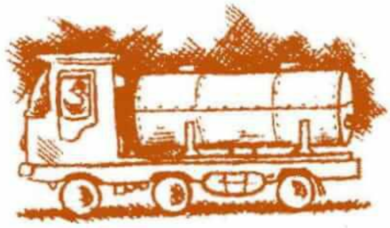
⇒ 1.54 = $\frac{22}{7} \times 0.7 \times 0.7 \times h$ ⇒ $h = \frac{1.54 \times 7}{22 \times 0.7 \times 0.7}$

⇒ $h = \frac{154 \times 7 \times 10 \times 10}{22 \times 7 \times 7 \times 100}$ = 1 m

Hence, the height of the cylinder is 1 m.

Question 6:

A milk tank is in the form of cylinder whose radius is 1.5 m and length is 7 m. Find the quantity of milk in liters that can be stored in the tank.



Answer 6:

Given: Radius of cylindrical tank (r) = 1.5 m

And Height of cylindrical tank (h) = 7 m

Volume of cylindrical tank = $\pi r^2 h$

$= \frac{22}{7} \times 1.5 \times 1.5 \times 7$ = 49.5 cm³

= 49.5 x 1000 liters [$\because$ 1 m³ = 1000 liters]

= 49500 liters

Hence, the required quantity of milk is 49500 liters.

Question 7:

If each edge of a cube is doubled,

(i) how many times will its surface area increase?

(ii) how many times will its volume increase?

Answer 7:

(i) Let the edge of cube be l.

Since, Surface area of the cube (A) = $6l^2$

When edge of cube is doubled, then

Surface area of the cube (A')= $6(2l)^2 = 6 \times 4l^2 = 4 \times 6l^2$

A' = 4 x A, Hence, the surface area will increase four times.

(ii) Volume of cube (V) = l^3

When edge of cube is doubled, then volume of cube (V')= $(2l)^3 = 8l^3$

V' = 8 x V, Hence, the volume will increase 8 times.

Question 8:

Water is pouring into a cuboidal reservoir at the rate of 60 liters per minute. If the volume of reservoir is 108 m³, find the number of hours it will take to fill the reservoir.

Answer 8:

Given: volume of reservoir = 108 m³

Rate of pouring water into cuboidal reservoir = 60 liters/minute

$= \frac{60}{1000}$ m³/minute $\left[\because 1l = \frac{1}{1000} m^3\right]$

$= \frac{60 \times 60}{1000}$ m³/hour

$\because$ $\frac{60 \times 60}{1000}$ m³ water filled in reservoir will take = 1 hour

$\therefore$ 1 m³ water filled in reservoir will take = $\frac{1000}{60 \times 60}$ hours

$\therefore$ 108 m³ water filled in reservoir will take = $\frac{108 \times 1000}{60 \times 60}$ hours = 30 hours

It will take 30 hours to fill the reservoir.