Area and volume ofcylinder

Exercise

Solution 1:

Diameter (d) of the cylindrical tin = 80 cm = 0.8 m

Thus, the radius (r) of the cylindrical tin = 0.4 m

Height (h) of the cylindrical tin = 1.5 m

Curved surface area of the cylindrical tin = $2\pi rh$

$= 2 \times 3.14 \times 0.4 \times 1.5$

$= 3.768\ m^2$

Thus, the curved surface area of the cylindrical tin is $3.768\ m^2$.

Solution 2:

Radius (r) = 1.4 m and Height (h) = 2 m

Total surface area of the open cylindrical tank

$= \pi r(2h + r)$

$= \frac{22}{7} \times 1.4(2 \times 2 + 1.4)$

$= 4.4 \times 5.4$

$= 23.76\ m^2$

Thus, the total surface area of the tank is $23.76\ m^2$.

Solution 3:

For the closed cylinder,

Radius (r) = $\frac{\text{Diameter}}{2} = \frac{3.6}{2} = 1.8$ cm

And height (h) = 8.2 cm

Total surface area of the closed cylinder

$= 2\pi r(h + r)$

$= 2 \times 3.14 \times 1.8(8.2 + 1.8)$

$= 2 \times 3.14 \times 1.8 \times 10$

$= 113.04\ cm^2$

Thus, the total surface area of the cylinder is $113.04\ cm^2$.

Solution 4:

For each open cylinder to be prepared,
Diameter (d) = 4 cm = 2r
Radius (r) = 2 cm
Height (h) = 15 cm

Curved surface area of an open cylinder
$= 2\pi rh$
$= 2 \times 3.14 \times 2 \times 15$
$= 188.4\ cm^2$

$\therefore$ Area of the sheet required to prepare 1 cylinder
$= 188.4\ cm^2$
$\therefore$ Area of the sheet required to prepare 50 cylinders
$= (188.4 \times 50)\ cm^2$
$= 9420\ cm^2$
Thus, $9420\ cm^2$ of sheet is required to prepare 50 open cylinders.
The Cost of $100\ cm^2$ of the sheet = Rs. 20
$\therefore$ Cost of $9420\ cm^2$ of sheet = Rs. $\left(\frac{9420 \times 20}{100}\right)$
= Rs. 1884
Thus, the total cost of the sheet required is Rs. 1884.

Solution 5:

Radius (r) of the cylindrical well = 3.5 m
height (h) of the cylindrical well = 10 m

Volume of the cylindrical well = $\pi r^2 h$
$= \frac{22}{7} \times 3.5 \times 3.5 \times 10$
$= \frac{22}{7} \times \frac{35}{10} \times \frac{35}{10} \times 10$
$= 385\ m^3$
Labour cost of digging $1\ m^3$ = Rs. 60
$\therefore$ Labour cost of digging $385\ m^3$ = Rs. (385×60)
= Rs. 23,100
Thus, the labour cost of digging the well is Rs. 23,100.

Solution 6:

Radius (r) of the cylindrical tank = 7 m
height (h) of the cylindrical tank = 4 m

Volume of the cylindrical tank = $\pi r^2 h$
$= \frac{22}{7} \times 7 \times 7 \times 4$
$= 616\ m^3$
Now, $1\ m^3$ = 1 kilolitre
$\therefore$ $616\ m^3$ = 616 kilolitres
Thus, 616 kilolitres of water can be occupied in the tank.

Solution 7:

For the given cylinder,

Radius (r) = $\frac{\text{Diameter}}{2} = \frac{20}{2} = 10$ cm

$\therefore$ Height (h) = Radius (r) = 10 cm

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

$= 3.14 \times 10 \times 10 \times 10$

$= 3140 \text{ cm}^3$

Thus, the volume of the cylinder is 3140 cm^3.

Practice 1

Solution 1:

Radius of the cylinder (r) = 7 cm

Height of the cylinder (h) = 10 cm

Curved surface area of the cylinder = $2\pi rh$

$= 2 \times \frac{22}{7} \times 7 \times 10$

$= 440 \text{ cm}^2$

$\therefore$ Curved surface area of the cylinder is 440 cm^2.

Solution 2:

Radius of the cylinder (r) = 3.5 cm = $\frac{35}{10} = \frac{7}{2}$ cm

Height of the cylinder (h) = 40 cm

Curved surface area of the cylinder = $2\pi rh$

$= 2 \times \frac{22}{7} \times \frac{7}{2} \times 40$

$= 880 \text{ cm}^2$

$\therefore$ The curved surface area of the cylinder is 880 cm^2.

Solution 3:

Diameter of the cylinder = 50 cm

$\therefore$ Radius (r) of the cylinder = $\frac{\text{Diameter}}{2} = \frac{50}{2} = 25$ cm

And height (h) of the cylinder = 20 cm

Curved surface area of the cylinder = $2\pi rh$

$= 2 \times 3.14 \times 25 \times 20$

$= 3140 \text{ cm}^2$

Thus, the curved surface area of the cylinder is 3140 cm^2.

Solution 4:

Radius (r) of the cylinder = 20 cm

Height (h) of the cylinder = 30 cm

Curved surface area of the cylinder = $2\pi rh$

$= 2 \times 3.14 \times 20 \times 30$

$= 3768 \text{ cm}^2$

Thus, the curved surface area of the cylinder is 3768 cm^2.

Solution 5:

Diameter of the cylinder = 28 cm = 2r
Height (h) of the cylinder = 10 cm
Curved surface area of the cylinder = $2\pi rh = \pi 2rh$

$$= \frac{22}{7} \times 28 \times 10$$
$$= 22 \times 4 \times 10$$
$$= 880 \text{ cm}^2$$

Thus, the curved surface area of the cylinder is 880 cm^2.

Practice 2

Solution 1:

Since the rate of white washing is given per cm^2,
we need to convert the radius into cm.

Radius of platform, r = 2 m = 200 cm
Height of platform, h = 50 cm

Curved surface area of the cylindrical platform
$= 2\pi rh$
$= 2 \times 3.14 \times 200 \times 50$
$= 62{,}800 \text{ cm}^2$

Cost of white washing 100 cm^2 = Rs. 1.25

$\therefore$ Cost of white washing 62,800 cm^2 = Rs. $\left(\frac{62800 \times 1.25}{100}\right)$
= Rs. 785

Thus, the cost of white washing the curved surface of the platform is Rs. 785.

*Cost would be Rs. 7850 for the rate of Rs. 1.25 per 100 cm^2.

Solution 2:

For the given open cylindrical tank,
Radius, r = 1.40 m and height h = 2.3 m

Total surface area of the open cylindrical tank
$= \pi r(2h + r)$
$= \frac{22}{7} \times 1.40(2 \times 2.3 + 1.4)$
$= \frac{22}{7} \times 1.40 \times 6$
$= 26.4 \text{ m}^2$

Cost of painting 1 m^2 region = Rs. 160
$\therefore$ Cost of painting 26.4 m^2 region = Rs. (160×26.4) = Rs. 4,224
Thus, the cost of painting the tank from outside is Rs. 4,224.

Solution 3:

A roller is cylindrical in shape and hence, in one rotation it will level the soil in the area which is equal to its curved surface area.
Hence, we'll find the curved surface area of the roller.

Radius (r) of cylindrical roller = 30 cm
And, height (h) of cylindrical roller = length of the roller = 91 cm.
Curved surface area of the cylindrical roller $= 2\pi rh$

$$= 2 \times \frac{22}{7} \times 30 \times 91$$

$$= 17,160 \text{ cm}^2$$

Thus, in one rotation the roller will level the soil in $17,160 \text{ cm}^2$ region.

Soil levelled in 1 rotation = $17,160 \text{ cm}^2$
$\therefore$ Soil levelled in 100 rotations = $(17,160 \times 100) \text{ cm}^2$
$= 17,16,000 \text{ cm}^2$
Now, $10,000 \text{ cm}^2 = 1 \text{ m}^2$

$$\therefore \quad 17,16,000 \text{ cm}^2 = \frac{1716000}{10000} \text{ m}^2 = 171.6 \text{ m}^2$$

Thus, 171.6 m^2 soil is levelled.

Solution 4:

For the given cylindrical chimney,

Diameter d = 80 cm = 0.80 m and height h = 12.5 m.

Curved surface area of the cylindrical chimney

$= \pi dh$

$= 3.14 \times 0.80 \times 12.5$

$= 31.4 \text{ m}^2$

Cost of painting 1 m^2 area = Rs. 140

$\therefore$ Cost of painting 31.4 m^2 area = Rs. (140 × 31.4)

= Rs. 4,396

Thus, the cost of painting the chimney from outside is Rs. 4,396.

Solution 5:

For the given cylindrical tank with cap,
Radius (r) = 2.1 m and height (h) = 2.9 m.
Total surface area of the cylindrical tank with a cap = $2\pi r(h + r)$

$$= 2 \times \frac{22}{7} \times 2.1(2.9 + 2.1)$$

$$= 2 \times 22 \times 0.3 \times 5$$

$$= 66 \text{ m}^2$$

Thus, the total surface area of the given cylindrical tank is 66 m^2.

Solution 6:

For each cylinder to be made,
Diameter, d = 14 cm and height, h = 20 cm
Curved surface area of the cylinder = πdh

$$= \frac{22}{7} \times 14 \times 20$$
$$= 880\ cm^2$$

Sheet required to make 1 cylinder = $880\ cm^2$

$\therefore$ Sheet required to make 50 cylinders = $(50 \times 880)\ cm^2$
$$= 44{,}000\ cm^2$$

Now, $10{,}000\ cm^2 = 1\ m^2$

$\therefore\ 44{,}000\ cm^2 = \frac{44000}{10000}\ m^2 = 4.4\ m^2$

Thus, $4.4\ m^2$ sheet is required to make 50 cylinders.

Cost of $1\ m^2$ sheet = Rs. 200

$\therefore$ Cost of $4.4\ m^2$ sheet = Rs. (4.4×200) = Rs. 880

Thus, the expenditure of the sheet is Rs. 880.

Practice 3

Solution 1:

Radius (r) of the cylinder = 20 cm
height (h) of the cylinder = 21 cm
Volume of the cylinder = $\pi r^2 h$

$$= \frac{22}{7} \times 20 \times 20 \times 21$$
$$= 26{,}400\ cm^3$$

Thus, the volume of the cylinder is $26{,}400\ cm^3$.

Solution 2:

For the given cylinder,

Radius (r) = $\frac{\text{Diameter}}{2} = \frac{80}{2} = 40$ cm

height (h) = 50 cm.

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

$$= 3.14 \times 40 \times 40 \times 50$$
$$= 2{,}51{,}200\ cm^3$$

Thus, the volume of the cylinder is $2{,}51{,}200\ cm^3$.

Solution 3:

For a cylindrical well,
Radius (r) = 3.5 m
height (h) = 4 m
Volume of the cylindrical well = $\pi r^2 h$

$$= \frac{22}{7} \times 3.5 \times 3.5 \times 4$$
$$= \frac{22}{7} \times \frac{35}{10} \times \frac{35}{10} \times 4$$
$$= 154\ m^3$$

Cost of digging $1\ m^3$ = Rs. 100

$\therefore$ Cost of digging $154\ m^3$ = Rs. (154×100)
= Rs. 15,400

Thus, the cost of digging the well is Rs. 15,400.

Solution 4:

Radius (r) of the cylinder = $\frac{\text{Diameter}}{2} = \frac{70}{2} = 35$ cm

height (h) of the cylinder = 80 cm

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

$= \frac{22}{7} \times 35 \times 35 \times 80$

$= 3,08,000 \text{ cm}^3$

Now, $1 \text{ cm}^3 = 1$ ml

$\therefore 3,08,000 \text{ cm}^3 = 3,08,000$ ml

Hence, 3,08,000 ml medicine is filled in the cylinder.

Number of bottles filled with 25 ml medicine = 1

$\therefore$ Number of bottles filled with 3,08,000 ml medicine

$= \frac{308000}{25} = 12,320$

$\therefore$ 12,320 bottles will be filled from the medicine of this cylinder.

Solution 5:

For the cylinder tank of milk,

Radius (r) = 25 cm and height (h) = 2 m = 200 cm

Volume of the milk stored in the cylindrical tank

= Volume of the cylinder

$= \pi r^2 h$

$= 3.14 \times 25 \times 25 \times 200$

$= 3,92,500 \text{ cm}^3$

Now, $1 \text{ cm}^3 = 1$ ml

$\therefore 3,92,500 \text{ cm}^3 = 3,92,500$ ml

Thus, the volume of the milk in the tank is 3,92,500 ml.

Number of bags filled with 500 ml of milk = 1

$\therefore$ Number of bags filled with 3,92,500 ml of milk = $\frac{392500}{500} = 785$

Thus, 785 bags can be filled from the milk in the tank.

Solution 6:

Radius (r) of the metallic cylinder = 14 cm

And height (h) of the metallic cylinder = 10 cm

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

$= \frac{22}{7} \times 14 \times 14 \times 10$

$= 6160 \text{ cm}^3$

Weight of 1 cm^3 metal = 8 gm

$\therefore$ Weight of 6160 cm^3 metal = (6160×8) gm

$= 49,280$ gm

$= \frac{49280}{1000}$ Kg

$= 49.280$ Kg

Thus, the total weight of the metal is 49.280 Kg.