Solutions for Class 9 Maths Chapter 19 Surface Area and Volume of A Right Circular Cylinder

Exercise 19.1

Question 1: Curved surface area of a right circular cylinder is 4.4 m^2. If the radius of the base of the cylinder is 0.7 m. Find its height.

Solution:

Radius of the base of the cylinder = r = 0.7 m (Given)

Curved surface area of cylinder = C.S.A = 4.4m^2 (Given)

Let 'h' be the height of the cylinder.

We know, curved surface area of a cylinder = $2\pi rh$

Therefore,

$2\pi rh = 4.4$

$2 \times 3.14 \times 0.7 \times h = 4.4$

[using $\pi=3.14$]

or $h = 1$

Therefore the height of the cylinder is 1 m.

Question 2: In a hot water heating system, there is a cylindrical pipe of length 28 m and diameter 5 cm. Find the total radiating surface in the system.

Solution:

Height of cylinder (h) = Length of cylindrical pipe = 28 m or 2800 cm (Given)
[1 m = 100 cm]

Diameter of circular end of pipe = 5 cm (given)

Let 'r' be the radius of circular end, then r = diameter/2 = 5/2 cm

We know, Curved surface area of cylindrical pipe = $2\pi rh$

= 2 x 3.14 x 5/2 x 2800
[using π = 3.14]

= 44000

Therefore, the area of radiating surface is 44000 cm^2.

Question 3: A cylindrical pillar is 50 cm in diameter and 3.5 m in height. Find the cost of painting the curved surface of the pillar at the rate of Rs 12.50 per m^2.

Solution:
Height of cylindrical pillar (h) = 3.5 m

Radius of circular end of pillar (r) = 50/2 cm = 25 cm = 0.25 m
[As radius = half of the diameter] and [1 m = 100 cm]

Curved surface area of cylindrical pillar = 2πrh

= 2 x 3.14 x 0.25 x 3.5

= 5.5
Curved surface area of cylindrical pillar is 5.5 m.

Find the cost:

Cost of whitewashing 1m^2 is Rs 12.50 (Given)

Cost of whitewashing 5.5 m^2 area = Rs. 12.50 x 5.5 = Rs. 68.75

Thus the cost of whitewashing the pillar is Rs 68.75.

Question 4: It is required to make a closed cylindrical tank of height 1 m and the base diameter of 140 cm from a metal sheet. How many square meters of the sheet are required for the same?
Solution:

Height of cylindrical tank (h) = 1 m

Base radius of cylindrical tank (r) = diameter/2 = 140/2 cm = 70 cm = 0.7 m

[1 m = 100 cm]

Now,
Area of sheet required = Total surface area of tank (TSA) = $2\pi r(h + r)$

$=2 \times 3.14 \times 0.7(1 + 0.7)$

$= 7.48$

Therefore, 7.48 m^2 metal sheet is required to make required closed cylindrical tank.

Question 5: A solid cylinder has a total surface area of 462 cm^2. Its curved surface area is one-third of its total surface area. Find the radius and height of the cylinder.

Solution:
Total surface area of a cylinder = 462 cm^2 (Given)

As per given statement:
Curved or lateral surface area = 1/3 (Total surface area)

$\Rightarrow 2\pi rh = 1/3(462)$

$\Rightarrow 2\pi rh = 154$

$\Rightarrow h = 49/2r$ ....(1)
[Using $\pi = 22/7$]

Again,

Total surface area = 462 cm^2

$2\pi r(h + r) = 462$

$2\pi r(49/2r + r) = 462$

or $49 + 2r^2 = 147$

or $2r^2 = 98$

or $r = 7$

Substitute the value of r in equation (1), and find the value of h.
$h = 49/2(7) = 49/14 = 7/2$

Height (h) = 7/2 cm

Answer: Radius = 7 cm and height = 7/2 cm of the cylinder

Question 6: The total surface area of a hollow cylinder which is open on both the sides is 4620 sq.cm and the area of the base ring is 115.5 sq.cm and height is 7 cm. Find the thickness of the cylinder.

Solution:
Given:
Total surface area of hollow cylinder = 4620 cm^2
Height of cylinder (h) = 7 cm
Area of base ring = 115.5 cm^2

To find: Thickness of the cylinder

Let 'r_1' and 'r_2' are the inner and outer radii of the hollow cylinder respectively.

Then, $\pi r_2^2 - \pi r_1^2 = 115.5$ .....(1)
And,
$2\pi r_1 h + 2\pi r_2 h + 2(\pi r_2^2 - \pi r_1^2) = 4620$

Or $2\pi h (r_1 + r_2) + 2 \times 115.5 = 4620$
(Using equation (1) and h = 7 cm)

or $2\pi 7 (r_1 + r_2) = 4389$

or $\pi (r_1 + r_2) = 313.5$ ....(2)

Again, from equation (1),

$\pi r_2^2 - \pi r_1^2 = 115.5$

or $\pi(r_2 + r_1)(r_2 - r_1) = 115.5$
[using identity: a^2 – b^2 = (a – b)(a + b)]

Using result of equation (2),

$313.5 (r_2 - r_1) = 115.5$

or $r_2 - r_1 = 7/19 = 0.3684$

Therefore, thickness of the cylinder is 7/19 cm or 0.3684 cm.

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Question 7: Find the ratio between the total surface area of a cylinder to its curved surface area, given that height and radius of the tank are 7.5 m and 3.5 m.

Solution:
Height of cylinder (h) = 7.5 m
Radius of cylinder (r) = 3.5 m

We know, Total Surface Area of cylinder (T.S.A) = $2\pi r(r+h)$

And, Curved surface area of a cylinder(C.S.A) = $2\pi rh$

Now, Ratio between the total surface area of a cylinder to its curved surface area is

T.S.A/C.S.A = $2\pi r(r+h)/2\pi rh$

= $(r + h)/h$

= $(3.5 + 7.5)/7.5$

= $11/7.5$

= 22/15 or 22:15

Therefore the required ratio is 22:15.