RD SHARMA

Solutions

Class 8 Maths

Chapter 22

Ex 22.1

Q1. Find the curved surface area and total surface area of a cylinder, the diameter of whose base is 7 cm and height is 60 cm.

Soln:

Let r and h be the radius and the height of the cylinder,

Given: r = $\frac{7}{2}$cm h = 60 cm

Curved area of the cylinder = $2\Pi \times r \times h$

$= 2 \times \frac{22}{7} \times \frac{7}{2} \times 60$

$= 22 \times 60 = 1320\ cm^2$

Total surface area of the cylinder = $2\Pi \times r \times (r + h)$

$= 2 \times \frac{22}{7} \times \frac{7}{2} \times (\frac{7}{2} + 60) = 22$

$= 22 \times \frac{127}{2}$

$= 11 \times 127 = 1397\ cm^2$

Q2. The curved surface area of a cylindrical rod is 132 cm^2. Find its length if the radius is 0.35 cm.

Soln:

Consider h to be the height of the cylindrical rod

Given: Radius, r = 0.35 cm

Curved surface area = 132 cm^2

We know; curved surface area $2\Pi \times r \times h$

$132 = 2 \times \frac{22}{7} \times 0.35 \times h$

h = h = $\frac{132 \times 7}{2 \times 22 \times 0.35}$

h = 60

Therefore, the length of the cylindrical rod is 60 cm.

Q3. The area of the base of a right circular cylinder is 616 cm2 and its height is 2.5 cm. Find the curved surface area of the cylinder.

Soln:

Given: Area of the base of a right circular = 616 cm^2

Height = 2.5 cm

Let r be the radius of the base of a right cylinder, $\Pi r^2 = 616$

$=> r^2 = 616 \times \frac{7}{22}$

$=> r^2 = 196$

=> r = 14 cm

Curved surface area of the circular cylinder = $2\Pi rh = 2 \times \frac{22}{7} \times 14 \times 2.5 = 220\ cm^2$

Q4. The circumference of the base of a cylinder is 88 cm and its height is 15 cm. Find its curved surface area and total surface area.

Soln: Given: Height, h = 15 cm

Circumference of the base of the cylinder = 88 cm^2

Let r be the radius of the radius of the cylinder. The circumference of the base of the cylinder = $2\Pi r88 = 2 \times \frac{22}{7} \times rr = \frac{88 \times 7}{2 \times 22} = 14cm$

Curved surface area = $2 \times \Pi \times r \times h$

$= 2 \times \frac{22}{7} \times 14 \times 15 = 1320cm^2$

Total surface area = $2 \times \Pi \times r \times (r + h) = 2 \times \frac{22}{7} \times 14 \times (14 + 15) = 2552cm^2$

Q5. A rectangular strip 25 cm x 7 cm is rotated on the longer side. Find the total surface area of the solid thus generated.

Soln: Since the rectangle strip of 25 cm **x** 7 cm is rotated about the longer side, we have:

Height, h = 25 cm

Radius, r = 7cm

∴ Total surface area = $2\Pi r(r + h) = 2\Pi(7)(25 + 7) = 14\Pi(32) = 448\Pi cm^2 = 448 \times \frac{22}{7} = 1408cm^2$

Q6. A rectangular sheet of paper, 44 cm x 20 cm, is rolled along its length to form a cylinder. Find the total surface area of the cylinder thus generated.

Soln:

The rectangular sheet of paper 44 cm **x** 20 cm is rolled along its length to from a cylinder. The height of the cylinder is 20 cm and circumference is 44 cm.

We have: Height, h = 20 cm

Circumference = $2 \times \Pi \times r = 44cm$

∴ Total surface area is $S = 2\Pi rh = 44 \times 20cm^2 = 880cm^2$

Q7. The radii of two cylinders are in the ratio 2 : 3 and their heights are in the ratio 5 : 3. Calculate the ratio of their curved surface areas.

Soln:

Let the radii of two cylinders of 2r and 3r, respectively, and their heights be 5h and 3h, respectively. Let S_1 and S_2 be the curved surface areas of the two cylinders. S_1 = Curved surface area of the cylinder of height 5h and radius 2rS_2 = curved surface area of the cylinder of height 3h and radius 3r.

∴ $S_1 : S_2 = 2\Pi rh = \frac{2\times\Pi\times2r\times5h}{2\times\Pi\times3r\times3h} 10 : 9$

Q8.The ratio between the curved surface area and the total surface area of a right circular cylinder is 1:2. Prove that its height and radius are equal.

Soln:

Let Si and S, be the curved surface area and total surface area of the circular cylinder, respectively.

Then, $S_1 = 2\Pi rh, S_2 = 2\Pi r(r + h)$

According to the question: $S_1 : S_2 = 1 : 22\Pi rh : 2\Pi r(r + h) = 1 : 2$

$\frac{h}{r+h} = \frac{1}{2}$

h : (r + h) = 1 : 2

2h = r + h

h = r Therefore, the height and the radius are equal.

Q9. The curved surface area of a cylinder is 1320 cm^2 and its base has diameter 21 cm. Find the height of the cylinder.

Soln:

Let h be the height of the cylinder.

Given: Curved surface area, S = 1320 cm^2

Diameter, d = 21 cm Radius, r = 10.5

$S = 2\Pi rh1320 = 2\Pi \times 10.5 \times h\ h = \frac{1320}{2\Pi\times10.5}$

h = 20 cm

Q10. The height of a right circular cylinder is 10.5 cm. If three times the sum of the areas of its two circular faces is twice the area of the curved surface area. Find the radius of its base

Soln:

Let r be the radius of the circular cylinder.

Height, h = 10.5 cm

Area of the curved surface, $S_1 = 2\Pi rh$ sum of the areas of its two circular faces, $S_1 = 2\Pi r^2$

According to question: $3S_2 = 2S_1 3 \times 2\Pi r^2 = 2 \times 2\Pi rh$

6r = 4h

3r = 2h

$r = \frac{2}{3} \times 10.5cm$

= 7 cm

Q11. Find the cost of plastering the inner surface of a well at Its 9.50 per m^2, if it is 21 m deep and diameter of its top is 6 m.

Soln:

Given: Height, h = 21 m

Diameter, d = 6 m

Radius = 3 m

Area of the linear surface of the well, S = $2\Pi rh = 2\Pi \times 3 \times 21m^2$

According to question, the cost per m^2 is Rs 9.5.

∴ Inner surface cost is Rs 396 **x** 9.50 = Rs 3762

Q12. A cylindrical vessel open at the top has diameter 20 cm and height 14 cm. Find the cost of tin-plating it on the inside at the rate of 50 paise per hundred square centimetres.

Soln:

Given: Diameter, d = 20 cm

Radius, r = 10 cm

Height, h = 14 cm

Area inside the cylindrical vessel that is to be tin- plated = SS =
$2\Pi rh + \Pi r^2 = 2\Pi \times 10 \times 14 + \Pi \times 10^2 = 280\Pi + 100\Pi = 380 \times \frac{22}{7} cm^2 = \frac{8360}{7} cm^2$

According to question: cost per 100 cm^2 = 50 paise

Cost per cm^2 = Rs 0.005

Cost of tin – plating the area inside the cylindrical vessel = $Rs\ 0.005 \times \frac{8360}{7} = \frac{41.8}{7} = Rs\ 5.97$

Q13. The inner diameter of a circular well is 3.5 m. It is 10 m deep. Find the cost of plastering its inner curved surface at Rs 4 per square meter.

Soln:

Given:Inner diameter of the circular well = 3.5m

∴ Inner radius of the circular well, r = 1.75 m

Deth of the circular well, h = 10 m

Inner curved surface area, S = $2\Pi rh$

$S = 2\Pi \times 1.75 \times 10m^2 = 2 \times \frac{22}{7} \times 1.75 \times 10m^2 = 110m^2$

Cost of plastering 1 m^2 = Rs 4

Cost of plastering 110 m^2 area = Rs(110 **x** 4) = Rs 440

Q14. The diameter of a roller is 84 cm and its length is 120 cm. It takes 500 complete revolutions moving once over to level a playground. What is the area of the playground?

Soln:

Given: Diameter of the roller = 84 cm

∴ Radius, r = $\frac{\text{Diameter}}{2}$ = 42 cm

In 1 revolution, it covers the distance of its lateral surface area.

Roller is a cylinder of height; h = 120 cm

Radius = 42 cm

Lateral surface area of the cylinder = $2\Pi rh = 2 \times \frac{22}{7} \times 42 \times 120 = 31680 cm^2$

It takes 500 complete revolutions to level a playground.

∴ Area of the field = 31680 **x** 500 = 15840000 cm^2

= 1584 m^2.

Thus, the area of the in m^2 is 1584 m^2.

Q15. Twenty-one cylindrical pillars of the Parliament House are to be cleaned. If the diameter of each pillar is 0.50 m and height is 4 m, what will be the cost of cleaning them at the rate of Rs 2.50 per square meter?

Soln:

Given: Diameter of the pillars = 0.5 m

Radius of the pillars, r = 0.25 m

Height of the pillars, = h = 4 m

Number of pillars = 21

Rate of cleaning = Rs 2.5 per square meter

Curved surface area of one pillar = $2\Pi rh = 2 \times \frac{22}{7} \times 0.25 \times 4 = 2 \times \frac{22}{7} = \frac{44}{7} m^2$

∴ Curved surface area of one pillar = $\frac{44}{7} m^2$.

Cost of cleaning 21 pillars at the rate of Rs 2.50 per m^2 = Rs 330

Q16. The total surface area of a hollow cylinder which is open from both sides is 4620 sq. cm, the area of the base ring is 115.5 sq. cm and height 7 cm. Find the thickness of the cylinder.

Soln:

Given: Total surface area of the cylinder = 4620 cm^2

Area of the base ring = 115.5 cm^2

Height, h = 7 cm

Let R be the radius of the outer ring and r be the radius of the inner ring.

Area of the base ring = $\Pi R^2 - \Pi r^2 115.5 = \Pi(R^2 - r^2) R^2 - r^2 = 115.5 \times \frac{7}{22}$

$(R + r)(R - r) = 36.75$ ……(i)

Total surface area = inner curved surface area + outer curved surface area + Area of the bottom and top rings

$4620 = 2\Pi rh + 2\Pi Rh + 2 \times 115.5$

$2\Pi h(R + r) = 4620 - 231$

$R + r = \frac{4389 \times 7}{2 \times 22 \times 7} R + r = \frac{399}{4}$

……(ii)

Substitution the value of R + r from the equation (ii) in (i):

$\frac{399}{4}(R - r) = 36.75(R - r) = 36.75 \times \frac{4}{399} = 0.36 cm$

∴ Thickness of the cylinder = (R –r)= 0.368 cm

Q17. The sum of the radius of the base and height of a solid cylinder is 37 m. If the total surface area of the solid cylinder is 1628 m^2, find the circumference of its base.

Soln: Let r and h be the radius and height of the solid cylinder.

Given: r + h = 37 m

Total surface area, S = $2\Pi r(r + h)$

$1628 = 2\Pi \times r \times 37$ $r = \frac{1628}{2\Pi \times 37} = \frac{1628}{232.477} = 7$

Circumference of its base, $S_1 = 2\Pi r$

$= (2 \times \frac{22}{7} \times 7)m = 44m$

Q18. Find the ratio between the total surface area of a cylinder to its curved surface area, given that its height and radius are 7.5 cm and 3.5 cm.

Soln:

Let S_1 and S_2 be the total surface area and curved surface area, respectively.

Given: Height, h = 7.5cm

Radius, r = 3.5 cm

$S_1 = 2\Pi r(r + h)$ $S_2 = 2\Pi rh$

According to the question: $\frac{S_1}{S_2} = \frac{2\Pi r(r+h)}{2\Pi rh}$

$\frac{S_1}{S_2} = \frac{r+h}{h}$ $\frac{S_1}{S_2} = \frac{3.5+7.5}{7.5}$ $\frac{S_1}{S_2} = \frac{11}{7.5} = \frac{110}{75} = \frac{22}{15}$

Therefore, the ratio is 22 : 15

Q19. A cylindrical vessel, without lid, has to be tin-coated on its both sides. If the radius of the base is 70 cm and its height is 1.4 m, calculate the cost of tin-coating at the rate of Rs 3.50 per 1000 cm^2.

Soln:

Let r cm and h cm be the radius of the cylindrical vessel.

Given: Radius, r = 70 cm

Height, h = 1.4 m = 140 cm

Rate of tin- plating = Rs. 3.50 per 1000 cm^2

Cost of tin- plating the cylindrical vessel on both the surfaces (inner and outer): Total surface area of a vessel = Area of the outer side of the base + Area of the inner and the outer curved surface = $2(\Pi r^2 + 2\Pi rh) = 2\Pi r(r + 2h) = 2 \times \frac{22}{7} \times 70 \times (70 + 2 \times 140)$

$= 40 \times 10 \times 350 = 154000cm^2$

Cost of painting at the rate of Rs 3.50 per 1000 cm^2= $154000 \times \frac{3.50}{1000} = Rs\ 539$

Therefore, cost of painting is Rs 539.