RD SHARMA

Solutions

Class 9 Maths

Chapter 19

Ex *19.1*

Q1. Curved surface area of a right circular cylinder is $4.4m^2$.If the radius of the base of the cylinder is 0.7m.Find its height.(Take $\pi = 3.14$)

Solution:

Given that

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

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

Let the height of the cylinder be h

The curved surface area of a cylinder is given by: $2\pi rh$

$2\pi rh=4.4m^2$

2*3.14*0.7*h=$4.4m^2$

h=$4.4 \div 2 * 3.14 * 0.7$

=1m

Therefore the height of the cylinder is 1m.

Q2. 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. (Take $\pi = 3.14$)

Solution:

Given that

Height of cylinder=length of cylindrical pipe

=28m

Radius(r) of circular end of pipe=5/2=2.5cm=0.025 m

Curved surface area of cylindrical pipe=$2\pi rh$=2*3.14*0.035*30=$4.4m^2$

Therefore the area of radiating surface of the system is $4.4m^2$ or 44000cm^{2}.

Q3. 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.(Take $\pi = 3.14$)

Solution:

Given that

Height of cylindrical pillar=3.5m

Radius(r) of circular end of pillar=50/2=25cm=0.25m

Curved surface area of cylindrical pillar=2π=2*3.14*0.25*3.5

=$5.5m^2$

The cost of whitewashing 1m^{2} is Rs 12.50

Cost of whitewashing $5.5m^2$ area=Rs(12.5*5.5) =Rs 68.75

Thus the cost of whitewashing the pillar is Rs68.75

Q4. It is required to make a closed cylindrical tank of height 1m and the base diameter of 140 cm from a metal sheet. How many square meters of the sheet are required for the same? (Take $\pi = 3.14$).

Solution:

Height of the cylindrical tank(h)=1 m

Base radius of cylindricall tank(r)= $\frac{140}{2}$ =70cm=0.7m

Area of sheet required =total surface area of tank= $2\pi rh$

=2*3.14*0.7(0.7+1)

=4.4*1.7 =$7.48m^2$

Therefore it will require $7.48m^2$ of metal sheet.

Q5.A solid cylinder has a total surface area of $462cm^2$.Its curved surface area is one-third of its total surface area. Find the radius and height of the cylinder. (Take $\pi = 3.14$).

Solution:

Given that

Curved or lateral surface area=$\frac{1}{3}$ * total surface area

$2\pi rh = \frac{1}{3}(2\pi rh + 2\pi r^2)$

$4\pi rh = 2\pi r^2$

2h=r

Total surface area =$462cm^2$

Curved surface area=$\frac{1}{3} * 462$

$2\pi rh = 154$

$2 * 3.14 * 2 * h^2$=154

h^2=49/4

h=$\frac{49}{4}$cm

= $\frac{7}{2}$cm

Now r=2h

Therefore r=2*$\frac{7}{2}$cm =7cm

The height and the radius of the cylinder is $\frac{7}{2}$cm and 7 cm respectively.

Q6. 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 7cm. Find the thickness of the cylinder.

Solution:

Let the inner radius of the hollow cylinder be r_1 cm

The outer radius of the hollow cylinder be r_2 cm

Then,

$2\pi r_1 * h + 2\pi r_2 * h + 2\pi r_2^2 - 2\pi r_1^2$=4620.....(a)

$\pi r_1^2 - \pi r_2^2 = 115.5$.....(b)

Now solving eq(a)

$2\pi r_1 h + 2\pi r_2 h + 2\pi r_2^2 - 2\pi r_1^2$=4620

=> $2\pi h(r_1 + r_2) + 2\pi(r_2^2 - r_1^2)$

=> $2\pi h(r_1 + r_2) + 2(\pi r_2^2 - \pi r_1^2)$

Now putting the value of (b) in (a) we get

=> $2\pi h(r_1 + r_2) + 231 = 4620$

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

=> $\pi(r_1 + r_2)$=313.5.....(c)

Now solving eq(b)

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

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

=> $\pi(r_2 + r_1)(r_2 - r_1)$.....(d)

Dividing equation (d) by (c) we get

$\frac{\pi r_1 + r_2(r_2 - r_1)}{\pi(r_1 + r_2)} = \frac{115}{313.5}$

=> $r_2 - r_1$ =0.3684 cm

Q7. 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 7.5m and 3.5 m respectively.

Solution:

Given that,

Radius of the cylinder(r)=3.5m

Height of the cylinder(h)=7.5m

Total Surface Area of cylinder (T.S.A)

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

Curved surface area of a cylinder(C.S.A)

= $2\pi rh$

Now ,

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

= $\frac{h+r}{h}$.....(1)

Putting the values in eq(1)

$= \frac{7.5+3.5}{7.5}$

$= \frac{11}{7.5}$

$= \frac{11*10}{7.5}$

$= \frac{22}{15}$

= 22:15

Therefore the ratio is 22:15.

Q8.The total surface of a hollow metal cylinder, open at both ends of an external radius of 8cm and height 10cm is 338cm^2.Take r to be the inner radius, obtain an equation in r and use it to obtain the thickness of the metal in the cylinder.

Solution:

Given that

The external radius of the cylinder(R)=8cm

Height of the cylinder(h)=10 cm

The total surface area of the hollow cylinder(T.S.A) = $338\pi\text{cm}^2$

As we know that,

$2\pi r * h + 2\pi R * h + 2\pi R *^2 - 2\pi r^2 = 338\pi\text{cm}^2$

=> $h(r + R) + (R + r)(R - r)$=169

=> $10(8 + r) + (8 + r)(8 - r)$=169

=> $80 + 10r + 64 - r^2$=169

=> $r^2 - 10r + 25$=0

=> $r = 5$

$R - r$=8-5cm =3cm

Q9.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 1.4m, calculate the cost of tin-coating at the rate of Rs 3.50 per 1000cm^2.

Solution:

Given that

Radius of the vessel (r)=70cm

Height of the vessel (h)=1.4m=140cm

The area to be tin coated

=2*$(2\pi rh + \pi r^2)$

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

= 2*3.14*70[(2*140)+70]

=154000cm^2

Required cost= $\frac{154000*3.5}{1000}$ =Rs 539

Q10. The inner diameter of a circular well is 3.5 m. It is 10 m deep. Find:

(a)Inner curved surface area

(b)the cost of plastering this curved surface at the rate of Rs 40 per m^2.

Solution:

The inner diameter of the well=3.5m

Inner radius= $\frac{3.5}{2}$ =1.75m

Height of the well=10m

(a) Inner curved surface area

=$2\pi rh$

=2*3.14*1.75*10

=110m^2

(b) Cost of painting 1m^2 area of the well

=Rs 40

Cost of painting 110m^2 area of the well

=Rs (50*110) =Rs 4400

Q11.Find the lateral surface area of a petrol storage tank is 4.2 m in diameter and 4.5 m high. How much steel was actually used, if 1/12th of the steel actually used was wasted in making the closed tank?

Solution:

I t is given that

Diameter of cylinder=4.2m

Radius of cylinder= $\frac{4.2}{2}$ m

=2.1m

Height of cylinder=4.5m

Therefore,

Lateral or Curved surface area= $2\pi rh$

=2*3.14*2.1*4.5=59.4 m^2

Total surface area of tank = 2*π*r(r+h)

=2*($\frac{22}{7}$*2.1(2.1+4.5) m^2

= 87.12m^2

Let, A m^2 steel be actually used in making the tank

Area of iron present in cylinder=$(y - \frac{A}{12} m^2)$

=$\frac{11}{12} A\ m^2$

Hence,

$\frac{11}{12} A$=Total surface area of cylinder

=> A=$\frac{12}{11}$*Total surface area

=> A=$(\frac{12}{11} * 87.12) m^2$

= $95.04 m^2$

Thus, m^2 steel was actually wasted while constructing a tank.

Q12. The students of Vidyalaya were asked to participate in a competition for making and decorating penholders in the shape of a cylinder with a base using cardboard. Each penholder was to be of radius 3 cm and height 10.5 cm. The Vidyalaya was to supply the competitors with cardboard. If there were 35 competitors, how much cardboard was required to be bought for the competition? (Take $\pi = 3.14$).

Solution:

It is given that

Radius of the circular part of the penholder (r) =3cm

The height of the penholder (h) =10.5 cm

Surface area of one penholder (S.A)

= Curved surface area of penholder +Area of the circular base of penholder

= $2\pi rh + \pi r^2$

=(2*3.14*3*10.5)+3.14* 3^2

=198+ $\frac{198}{7}$

= $\frac{1584}{7}\ cm^2$

The total area of cardboard sheet used by one competitor= $\frac{1584}{7}\ cm^2$

The total area of cardboard sheet used by 30 competitors= $\frac{1584}{7}$*35 cm^2

=7920cm^2

Therefore, the school needs to buy 7920 cm^2 of cardboard sheet for the competition.

Q13. The diameter of roller 1.5 m long is 84cm.If it takes 100 revolutions to level a playground, find the cost of leveling this ground at the rate of 50 paise per square meter.

Solution:

Given that

Diameter of the roller (d)=85cm=0.84m

Length of the roller=1.5m

Radius of the roller(r) = $\frac{d}{2}$

= $\frac{0.84}{2}$ =0.42m

The total area of the playground covered by the roller in one revolution=covered area of the roller

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

=2*3.14*0.42*1.5

=0.12*22*1.5 m^2

Area of the playground=100*Area covered by roller in one revolution

= (100*0.12*22*1.5) m^2

=396 m^2

Now,

Cost of leveling 1 m^2=50p=Rs 0.5

Cost of leveling 396 m^2 =Rs.396*0.5 =Rs.198

Hence, cost of leveling 396m^2 is Rs.198

Q14. Twenty cylindrical pillars of the Parliament House are to be cleaned. If the diameter of each pillar is 0.50m and height is 4m.What will be the cost of cleaning them at the rate of Rs 2.50 per square meter?

Solution:

Diameter of each pillar =0.5,

Radius of each pillar(r)= $\frac{d}{2}$

= $\frac{0.5}{2}$ =0.25m

Height of each pillar=4m

Lateral surface area of one pillar

=$2\pi rh$ =2*3.14*0.25*4 = $\frac{44}{7}m^2$

Lateral surface area of 20 pillars=20*$\frac{44}{7}m^2$

Cost of cleaning one pillar =Rs2.50 per square meter

Cost of cleaning 20 pillars =Rs 2.50 *20*$\frac{44}{7}m^2$ =Rs. 314.28