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1. The curved surface area of a right circular cylinder of height 14 cm is 88 cm^2. Find the diameter of the base of the cylinder. (Assume $\pi = 22/7$)

Solution:
Height of cylinder, h = 14cm
Let the diameter of the cylinder be d
Curved surface area of cylinder = 88 cm^2
We know that, formula to find Curved surface area of cylinder is $2\pi rh$.
So $2\pi rh = 88\ cm^2$ (r is the radius of the base of the cylinder)
$2\times(22/7)\times r\times 14 = 88\ cm^2$
$2r = 2$ cm
$d = 2$ cm
Therefore, the diameter of the base of the cylinder is 2 cm.

2. It is required to make a closed cylindrical tank of height 1m and base diameter 140cm from a metal sheet. How many square meters of the sheet are required for the same? Assume $\pi = 22/7$

Solution:
Let h be the height and r be the radius of a cylindrical tank.

Height of cylindrical tank, h = 1m
Radius = half of diameter = (140/2) cm = 70cm = 0.7m

Area of sheet required = Total surface are of tank = $2\pi r(r+h)$ unit square
$= [2\times(22/7)\times 0.7(0.7+1)]$
= 7.48 square meters
Therefore, 7.48 square meters of the sheet are required.

3. A metal pipe is 77 cm long. The inner diameter of a cross section is 4 cm, the outer diameter being 4.4cm. (see fig. 13.11). Find its

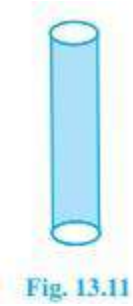

Fig. 13.11

(i) inner curved surface area,
(ii) outer curved surface area
(iii) total surface area

(Assume π=22/7)

Solution:
Let r_1 and r_2 Inner and outer radii of cylindrical pipe
r_1 = 4/2 cm = 2 cm
r_2 = 4.4/2 cm = 2.2 cm
Height of cylindrical pipe, h = length of cylindrical pipe = 77 cm

(i) curved surface area of outer surface of pipe = $2\pi r_1 h$
$= 2\times(22/7)\times2\times77$ cm^2
$= 968$ cm^2
(ii) curved surface area of outer surface of pipe = $2\pi r_2 h$
$= 2\times(22/7)\times2.2\times77$ cm^2
$= (22\times22\times2.2)$ cm^2
$= 1064.8$ cm^2

(iii) Total surface area of pipe = inner curved surface area+ outer curved surface area+ Area of both circular ends of pipe.
$= 2\pi r_1 h+2\pi r_2 h+(r_1^2-r_2^2)$
$= 9668+1064.8+2\pi(2.2^2-2^2)$
$= 2031.8+5.28$
$= 2038.08$ cm^2

Therefore, the total surface area of the cylindrical pipe is 2038.08 cm^2.

4. The diameter of a roller is 84 cm and its length is 120 cm. It takes 500 complete revolutions to move once over to level a playground. Find the area of the playground in m^2? (Assume π = 22/7)

Solution:

A roller is shaped like a cylinder.
Let h be the height of the roller and r be the radius.
h = Length of roller = 120 cm
Radius of the circular end of roller = r = (84/2) cm = 42 cm
Now, CSA of roller = $2\pi rh$
$= 2\times(22/7)\times42\times120$
$= 31680$ cm^2

Area of field = 500×CSA of roller
= (500×31680) cm^2
= 15840000 cm^2
= 1584 m^2.
Therefore, area of playground is 1584 m^2.

5. 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.
(Assume π = 22/7)

Solution:
Let h be the height of a cylindrical pillar and r be the radius.
Given:
Height cylindrical pillar = h = 3.5 m
Radius of the circular end of pillar = r = diameter/2 = 50/2 = 25cm = 0.25m
CSA of pillar = 2πrh
= 2×(22/7)×0.25×3.5
= 5.5 m^2
Cost of painting 1 m^2 area = Rs. 12.50
Cost of painting 5.5 m^2 area = Rs (5.5×12.50)
= Rs.68.75
Therefore, the cost of painting the curved surface of the pillar at the rate of Rs. 12.50 per m^2 is Rs 68.75.

6. Curved surface area of a right circular cylinder is 4.4 m^2. If the radius of the base of the base of the cylinder is 0.7 m, find its height. (Assume π = 22/7)

Solution:

Let h be the height of the circular cylinder and r be the radius.
Radius of the base of cylinder, r = 0.7m
CSA of cylinder = 2πrh
CSA of cylinder = 4.4m^2
Equating both the equations, we have
2×(22/7)×0.7×h = 4.4
Or h = 1
Therefore, the height of the cylinder is 1 m.

7. The inner diameter of a circular well is 3.5m. It is 10m deep. Find
(i) its inner curved surface area,
(ii) the cost of plastering this curved surface at the rate of Rs. 40 per m^2.
(Assume π = 22/7)

Solution:
Inner radius of circular well, r = 3.5/2m = 1.75m
Depth of circular well, say h = 10m
(i) Inner curved surface area = 2πrh
= (2×(22/7)×1.75×10)
= 110m^2
Therefore, the inner curved surface area of the circular well is 110 m^2.

(ii) Cost of plastering 1 m^2 area = Rs.40
Cost of plastering 110 m^2 area = Rs (110×40)
= Rs.4400
Therefore, the cost of plastering the curved surface of the well is Rs. 4400.

8. In a hot water heating system, there is cylindrical pipe of length 28 m and diameter 5 cm. Find the total radiating surface in the system. (Assume π = 22/7)

Solution:
Height of cylindrical pipe = Length of cylindrical pipe = 28m
Radius of circular end of pipe = diameter/ 2 = 5/2 cm = 2.5cm = 0.025m
Now, CSA of cylindrical pipe = 2πrh, where r = radius and h = height of the cylinder
= 2×(22/7)×0.025×28 m^2
= 4.4m^2
The area of the radiating surface of the system is 4.4m^2.

9. Find
(i) the lateral or curved surface area of a closed cylindrical petrol storage tank that is 4.2 m in diameter and 4.5m high.
(ii) How much steel was actually used, if 1/12 of the steel actually used was wasted in making the tank. (Assume π = 22/7)

Solution:

Height of cylindrical tank, h = 4.5m
Radius of the circular end , r = (4.2/2)m = 2.1m
(i) the lateral or curved surface area of cylindrical tank is 2πrh
= 2×(22/7)×2.1×4.5 m^2
= (44×0.3×4.5) m^2
= 59.4 m^2
Therefore, CSA of tank is 59.4 m^2.

(ii)Total surface area of tank = 2πr(r+h)
= 2×(22/7)×(2.1+4.5)
= 44×0.3×6.6
= 87.12 m^2
Now, Let S m^2 steel sheet be actually used in making the tank.

$S(1 - 1/12) = 87.12\ m^2$

This implies, $S = 95.04\ m^2$

Therefore, $95.04 m^2$ steel was used in actual while making such a tank.

10. In fig. 13.12, you see the frame of a lampshade. It is to be covered with a decorative cloth. The frame has a base diameter of 20 cm and height of 30 cm. A margin of 2.5 cm is to be given for folding it over the top and bottom of the frame. Find how much cloth is required for covering the lampshade. (Assume $\pi = 22/7$)

Fig. 13.12

Solution:

Say h = height of the frame of lampshade, looks like cylindrical shape
r = radius
Total height is h = (2.5+30+2.5) cm = 35cm and
r = (20/2) cm = 10cm
Use curved surface area formula to find the cloth required for covering the lampshade which is $2\pi rh$
$= (2\times(22/7)\times10\times35)\ cm^2$
$= 2200\ cm^2$
Hence, $2200\ cm^2$ cloth is required for covering the lampshade.

11. 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? (Assume $\pi = 22/7$)

Solution:

Radius of the circular end of cylindrical penholder, r = 3cm
Height of penholder, h = 10.5cm
Surface area of a penholder = CSA of pen holder + Area of base of penholder
$= 2\pi rh+\pi r^2$
$= 2\times(22/7)\times3\times10.5+(22/7)\times3^2= 1584/7$
Therefore, Area of cardboard sheet used by one competitor is $1584/7\ cm^2$
So, Area of cardboard sheet used by 35 competitors $= 35\times1584/7 = 7920\ cm^2$

Therefore, 7920 cm^2 cardboard sheet will be needed for the competition.