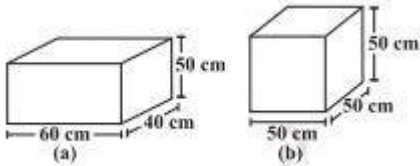Exercise 11.3   Page No: 186

1. There are two cuboidal boxes as shown in the adjoining figure. Which box requires the lesser amount of material to make?

Solution: (a) Given: Length of cuboidal box (l) = 60 cm

Breadth of cuboidal box (b) = 40 cm

Height of cuboidal box (h) = 50 cm

∴ Total surface area of cuboidal box = 2(lb + bh + hl)

= 2 (60 x 40 + 40 x 50 + 50 x60)

= 2 (2400 + 2000 + 3000)

= 14800 cm^2

(b) Length of cubical box (l) = 50 cm

Breadth of cubical box (b) = 50 cm

Height of cubical box (h) = 50 cm

∴ Total surface area of cubical box = 6(side)^2

= 6(50 x 50) = 6 (2500)

= 15000

Surface area of the cubical box is 15000 cm^2

From the result of (a) and (b), cuboidal box requires the lesser amount of material to make.

2. A suitcase with measures 80 cm x 48 cm x 24 cm is to be covered with a tarpaulin cloth. How many meters of tarpaulin of width 96 cm is required to cover 100 such suitcases?

Solution: Length of suitcase box, l = 80 cm,

Breadth of suitcase box, b= 48 cm

And Height of cuboidal box , h = 24 cm

Total surface area of suitcase box = 2(lb + bh + hl)

 = 2 (80 x 48 + 48 x 24 + 24 x 80)

= 2 (3840 + 1152 + 1920)

= 2 x 6912

= 13824

Total surface area of suitcase box is 13824 cm^2

Area of Tarpaulin cloth = Surface area of suitcase

l x b = 13824

l x 96 = 13824

l = 144

Required tarpaulin for 100 suitcases = 144 x 100 = 14400 cm = 144 m

Hence tarpaulin cloth required to cover 100 suitcases is 144 m.

3. Find the side of a cube whose surface area is 600 cm^2 .

Solution: Surface area of cube = 600 cm^2 (Given)

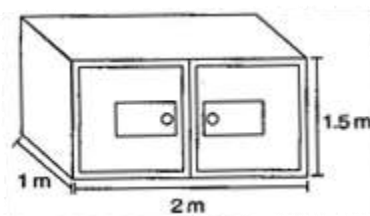Formula for surface area of a cube = 6(side)^2

Substituting the values, we get

6(side)^2 = 600

(side)^2 = 100

Or side = ±10

Since side cannot be negative, the measure of each side of a cube is 10 cm

4. Rukshar painted the outside of the cabinet of measure 1 m x 2 m x 1.5 m. How much surface area did she cover if she painted all except the bottom of the cabinet?

Solution: Length of cabinet, l = 2 m, Breadth of cabinet, b = 1 m and Height of cabinet, h = 1.5 m

∴ Surface area of cabinet = lb + 2 (bh+ hl)

= 2 x 1 + 2 (1 x 1.5 + 1.5 x 2)

= 2 + 2 (1.5 + 3.0)

= 2 + 9.0 = 11

Required surface area of cabinet is 11m².

5. Daniel is paining the walls and ceiling of a cuboidal hall with length, breadth and height of 15 m, 10 m and 7 m respectively. From each can of paint 100 m^2 of area is painted. How many cans of paint will she need to paint the room?

Solution: Length of wall, l = 15 m, Breadth of wall, b = 10 m and Height of wall, h = 7 m

∴ Total Surface area of classroom = lb + 2 (bh + hl)

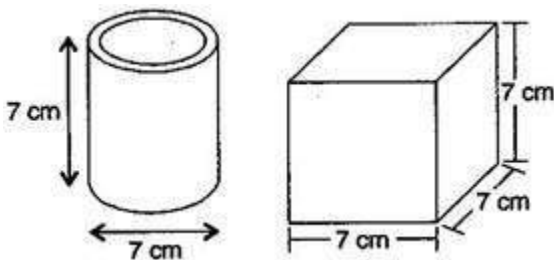= 15 x 10 + 2 (10 x 7 + 7 x 15)

= 150 + 2 (70 + 105)

= 150 + 350

= 500

Now, Required number of cans = Area of hall / Area of one can

= 500/100 = 5

Therefore, 5 cans are required to paint the room.

6. Describe how the two figures below are alike and how they are different. Which box has larger lateral surface areas?

Solution:

Diameter of cylinder = 7 cm (Given)

Radius of cylinder, r = 7/2 cm

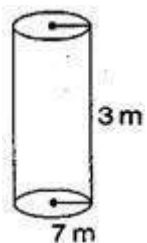Height of cylinder, h = 7 cm

Lateral surface area of cylinder = 2 π r h

= 2 x 22/7 x 7/2 x 7 = 154

So, Lateral surface area of cylinder is 154 cm^2
Now, lateral surface area of cube = 4 (side)^2 = 4 x 7^2 = 4 x 49 = 196

Lateral surface area of cube is 196 cm^2

Hence, the cube has larger lateral surface area.

7. A closed cylindrical tank of radius 7 m and height 3 m is made from a sheet of metal. How much sheet of metal is required?

Solution:

Radius of cylindrical tank, r = 7 m

Height of cylindrical tank , h = 3 m

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

= 2 x 22/7 x 7 (3+ 7)

= 44 x 10 = 440

Therefore, 440 m^2 metal sheet is required.

8. The lateral surface area of a hollow cylinder is 4224 cm^2 . It is cut along its height and formed a rectangular sheet of width 33 cm. Find the perimeter of rectangular sheet?

Solution: Lateral surface area of hollow cylinder = 4224 cm^2

Height of hollow cylinder, h = 33 cm and say r be the radius of the hollow cylinder

Curved surface area of hollow cylinder = 2 π r h

4224 = 2 x π x r x 33

r = (4224)/ (2 π x 33)

r = 64 / π

Now, Length of rectangular sheet, l = 2 π r

l = 2 π (64 / π) = 128 (using value of r)

So the length of the rectangular sheet is 128 cm.

Also, Perimeter of rectangular sheet = 2 (l + b)

= 2 (128 + 33)

= 322

The perimeter of rectangular sheet is 322 cm.

9. A road roller takes 750 complete revolutions to move once over to level a road. Find the area of the road if the diameter of a road roller is 84 cm and length 1 m.

Solution:

Diameter of road roller, d = 84 cm

Radius of road roller, r = d/2 = 84/2 = 42 cm

Length of road roller, h = 1 m = 100 cm

Formula for Curved surface area of road roller = 2 π r h
= 2 x 22/7 x 42 x 100 = 26400
Curved surface area of road roller is 26400 cm^2
Again, Area covered by road roller in 750 revolutions = 26400 x 750 cm^2

= 1,98,00,000 cm^2

= 1980 m^2   [∵ 1 m² = 10,000 cm^2]

Hence the area of the road is 1980 m^2.

10. A company packages its milk powder in cylindrical container whose base has a diameter of 14 cm and height 20 cm. Company places a label around the surface of the container (as shown in figure). If the label is placed 2 cm from top and bottom, what is the area of the label?

Solution: Diameter of cylindrical container , d = 14 cm

Radius of cylindrical container, r = d/2 = 14/2 = 7 cm

Height of cylindrical container = 20 cm

Height of the label, say h = 20 – 2 – 2 (from the figure)

= 16 cm

Curved surface area of label = 2 π r h

= 2 x 22/7 x 7 x 16
= 704

Hence, the area of the label is 704 cm^2.