CHAPTER – 7

MENSURATION

LONG QUESTIONS AND ANSWERS

Q. 1

Find the volume of a cone if the radius of its base is 1.5 cm and its perpendicular height is 5 cm.

Given: For the cone

radius (r) = 1.5 cm,

perpendicular height (h) = 5 cm

To find: Volume of the cone

SOLUTION:

Volume of cone = $\frac{1}{3}\ \pi\ r^2 h$

$= \frac{1}{3} \pi\ (1.5)^2\ 5$

$= \frac{1}{3}\ (3.14)\ (1.5)\ (1.5)\ 5$

$= 11.785$

Ans.: The volume of the cone is 11.79 cm^3

Q. 2

Find the volume of a sphere of diameter 6 cm. [π = 3.14]

SOLUTION:

Given: For the sphere, diameter (d) = 6 cm

To find: Volume of the sphere.

Radius (r) = $\frac{d}{2}$ = 62 = 3 cm

Volume of sphere = $\frac{4}{3}\ \pi\ r^3$

$= \frac{4}{3} \times 3.14 \times (3)^3$

$= 4 \times 3.14 \times 3 \times 3$

$= 113.04\ cm^3$

∴ Ans.: The volume of the sphere is 113.04 cm^3

Q. 3

Find the total surface area of a cylinder if the radius of its base is 5 cm and height is 40 cm. [π = 3.14]

SOLUTION:

Given: For the cylinder,

radius (r) = 5 cm,

height (h) = 40 cm

To find: Total surface area of the cylinder.

Total surface area of cylinder = $2\pi r(r + h)$

$= 2 \times 3.14 \times 5\,(5 + 40)$

$= 2 \times 3.14 \times 5 \times 45$

$= 1413\ cm^2$

The total surface area of the cylinder is 1413 cm^2

Ans.: The total surface area of the cylinder is 1413 cm^2

Q. 4

Find the surface area of a sphere of radius 7 cm.

SOLUTION:

Given: For the sphere, radius (r) = 7 cm

To find: Surface area of the sphere.

Surface area of sphere = $4 \pi r^2$

$= 4 \times \frac{22}{7} \times (7)^2$

$= 88 \times 7$

$= 616\ cm^2$

∴ Ans.: The surface area of the sphere is 616 cm^2.

Q. 5

The dimensions of a cuboid are 44 cm, 21 cm, 12 cm. It is melted and a cone of height 24 cm is made. Find the radius of its base.

SOLUTION:

Given: For the cuboid,

length (l) = 44 cm, breadth (b) = 21 cm,

height (h) = 12 cm

For the cone, height (H) = 24 cm

To find: Radius of base of the cone (r).

Volume of cuboid = $l \times b \times h$

$$= 44 \times 21 \times 12 \text{ cm}^3$$

Volume of cone $= \frac{1}{3}\pi r^2 H$

$$= 13 \times \frac{22}{7} \times r^2 \times 24 \text{ cm}^3$$

Since the cuboid is melted to form a cone,

volume of cuboid = volume of cone

$\therefore l \times b \times h = \frac{1}{3}\pi r^2 H$

$\therefore 44 \times 21 \times 12 = \frac{1}{3} \times \frac{22}{7} \times r^2 \times 24$

$\therefore r^2 = \frac{44 \times 21 \times 12 \times 7 \times 3}{22 \times 24}$

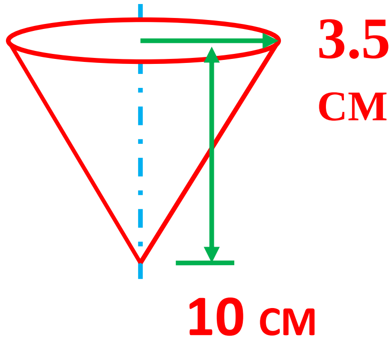
$\therefore r^2 = (21 \times 21)$

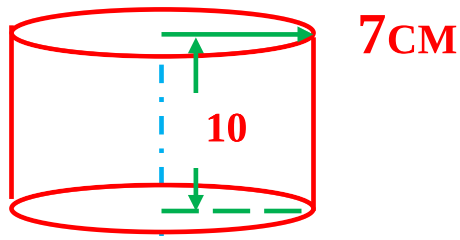
$\therefore r = 21$

Ans.: Radius of base 21 cm

Q. 6

Observe the measures of pots in the given figures. How many jugs of water can the cylindrical pot hold?





SOLUTION:

Given: For the conical water jug,

radius (r) = 3.5 cm, height (h) = 10 cm

For the cylindrical water pot,

radius (R) = 7 cm, height (H) = 10 cm

To find: Number of jugs of water the cylindrical pot can hold.

Volume of conical jug $= \frac{1}{3} \pi r^2 h$

$= \frac{1}{3} 3.14 (3.5)^2 (10)$

Volume of cylindrical jug $= \pi R^2 H$

$= 3.14 (7)^2 10$

$$= (3.14)\ (49)\ 10$$

No of jugs $= \dfrac{volume\ of\ cylindrical\ pot}{volume\ o\ conical\ jug}$

No of jugs $= \dfrac{(3.14\ )(49)10}{\frac{1}{3}(\ 3.14\ )(3.5)^2\ (10)}$

No of jugs $= \dfrac{3\ (49)}{(3.5)^2}$

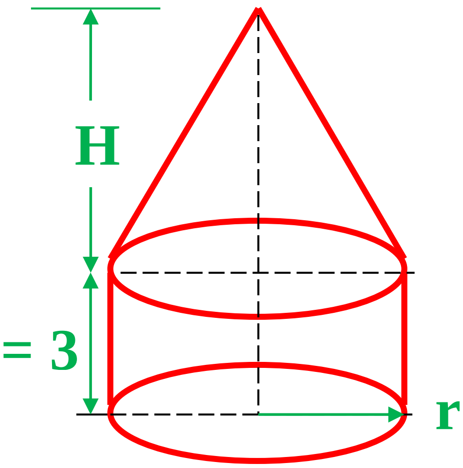
$= \dfrac{3\ (49)100}{(35)(35)}$

$= 12$

Ans.: The cylindrical pot can hold 12 jugs of water.

Q. 7

A cylinder and a cone have equal bases. The height of the cylinder is 3 cm and the area of its base is 100 cm^2. The cone is placed up on the cylinder. Volume of the solid figure so formed is 500 cm^3. Find the total height of the figure



SOLUTION:

Given: For the cylindrical part,

height (h) = 3 cm,

area of the base (πr^2)= 100 cm^2

Volume of the entire figure = 500 cm^3

To find: Total height of the figure.

A cylinder and a cone have equal bases.

∴ They have equal radii.

Radius of cylinder = radius of cone = r

Area of base = 100 cm^2

$\therefore \pi r^2 = 100$ … (i)

Let the height of the conical part be H.

Volume of the entire figure

= Volume of the cylinder + Volume of cone

$\therefore\ 500 = \pi\ r^2 h + \frac{1}{3}\ \pi\ r^2 H$

$\therefore\ 500 = \pi\ r^2 (h + \frac{1}{3} H)$

$\therefore\ 500 = 100\ (3 + \frac{1}{3}\ H)$

$\therefore\ \frac{500}{100} = (3 + \frac{1}{3}\ H)$

$\therefore\ 5 - 3 = \frac{1}{3} H$

$\therefore\ 2 = \frac{1}{3}\ H$

$\therefore\ H = 6$ cm

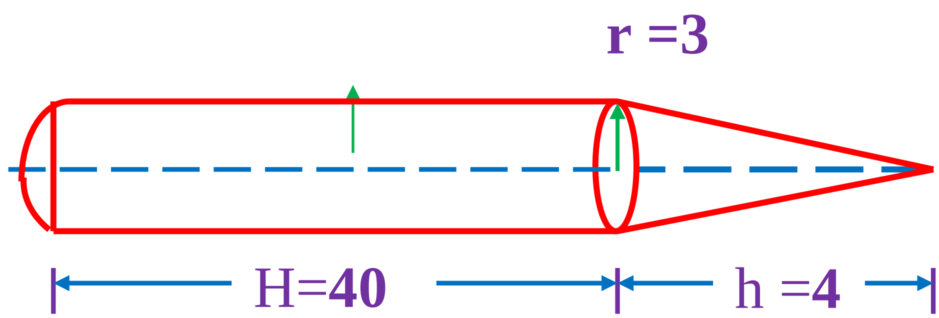
Height of entire figure = $h_1 + h_2$

$= 3 + 6 = 9$ cm.

Ans.: Height of the figure is 9 cm.

Q. 8

In the given figure, a toy made from a hemisphere, a cylinder and a cone is shown. Find the total area of the toy.



SOLUTION:

Given: For the conical Part,

height (h) = 4 cm, radius (r) = 3 cm

For the cylindrical part,

height (H) = 40 cm, radius (r) = 3 cm

For the hemispherical part,

radius (r) = 3 cm

To find: Total area of the toy.

Slant height of cone (L) = $\sqrt{(h)^2 + (r)^2}$

$= \sqrt{(4)^2 + (3)^2}$

$= \sqrt{16 + 9}$

$= \sqrt{25}25$

= 5 cm

Curved surface area of cone = π **r l**

$= \pi \times 3 \times 5$

$= 15\ \pi\ cm^2$

Curved surface area of cylinder $= 2\ \pi\ r\ H$

$= 2 \times \pi \times 3 \times 40$

$= 240\ \pi\ cm^2$

Curved surface area of hemisphere $= 2\ \pi\ r^2$

$= 2 \times \pi \times 3^2$

$= 18\ \pi\ cm^2$

Total area of the toy

= Curved surface area of cone + Curved surface area of cylinder + Curved surface area of hemisphere

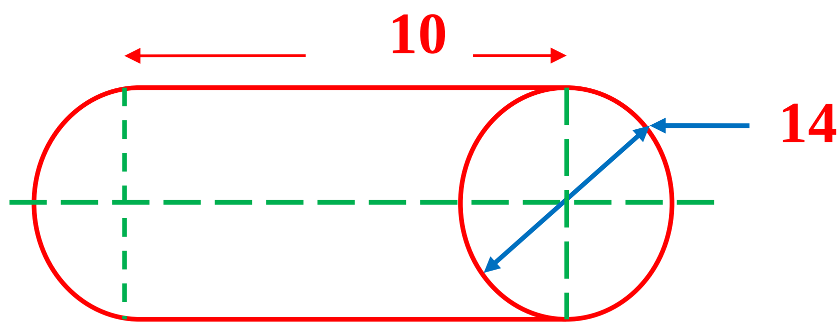
$= 15\ \pi + 240\ \pi + 18\ \pi$

$= 273\ \pi\ cm^2$

Ans.: The total area of the toy is $273\ \pi\ cm^2$**.**

Q. 9

In the given figure, a cylindrical wrapper of flat tablets is shown. The radius of a tablet is 7 mm and its thickness is 5 mm. How many such tablets are wrapped in the wrapper?



SOLUTION:

Given: For the cylindrical tablets,

radius (r) = 7 mm,

thickness = height (h) = 5 mm

For the cylindrical wrapper,

diameter (D) = 14 mm, height (H) = 10 cm

To find: Number of tablets that can be wrapped.

Radius of wrapper (R) = $\frac{\text{Diameter}}{2} = \frac{14}{2}$ **= 7 mm**

Height of wrapper (H) = 10 cm

$= 10 \times 10$ mm

$= 100$ mm

Volume of a cylindrical wrapper $= \pi R^2 H$

$= \pi (7)^2 \times 100$

$= 4900\, \pi$ mm^3

Volume of a cylindrical tablet $= \pi r^2 h$

$= \pi (7)^2 \times 5$

$= 245\, \pi$ mm^3

No. of tablets that can be wrapped

$$= \frac{\text{Volume of a cylindrical wrapper}}{\text{Volume of a cylindrical tablet}}$$

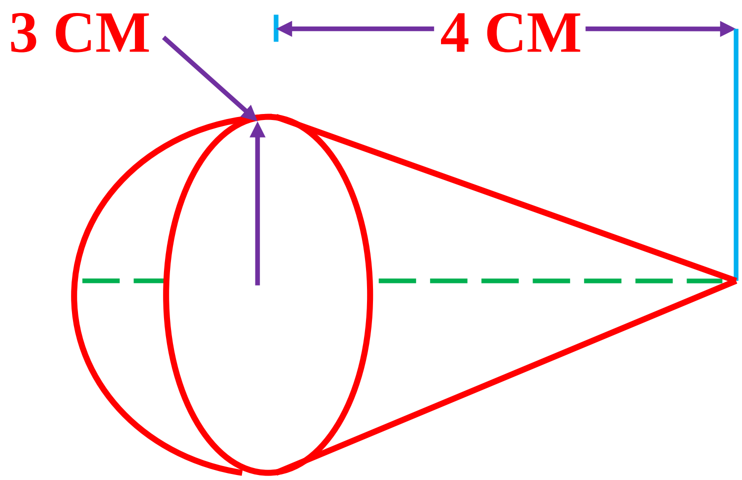
$$= \frac{4900\ \pi}{245\ \pi} = 20$$

Ans.: 20 tables can be wrapped in the wrapper

Q. 10

The given figure shows a toy. Its lower part is a hemisphere and the upper part is a cone. Find the

volume and the surface area of the toy from the measures shown in the figure. ($\pi = 3.14$)



SOLUTION:

Given: For the conical part,

height (h) = 4 cm, radius (r) = 3 cm

Slant height of cone

$= \sqrt{(l)^2 + (r)^2}$

$= \sqrt{(3)^2 + (4)^2}$

$= \sqrt{9 + 16}$

$= \sqrt{25}$

$= 5$

Volume of cone = $\frac{1}{3}\pi(3)^2 \times 4$

$= 12\pi\ cm^2$

Surface area of cone = $\pi r l$

$= \pi (3)(5)$

$= 15\pi\ cm^2$

Curved surface area of hemisphere= $2\pi r^2$

$= 2\pi 3^2$

$=18\pi\ cm^2$

Now, volume of the toy

= Volume of cone + volume of hemisphere

$= 12\pi + 18\pi$

$= 30\pi$

$= 30 \times 3.14$

$= 94.20\ cm^3$

Also, surface area of the toy

= Curved surface area of cone + Curved surface area of hemisphere

$= 15\pi + 18\pi$

$= 33\pi$

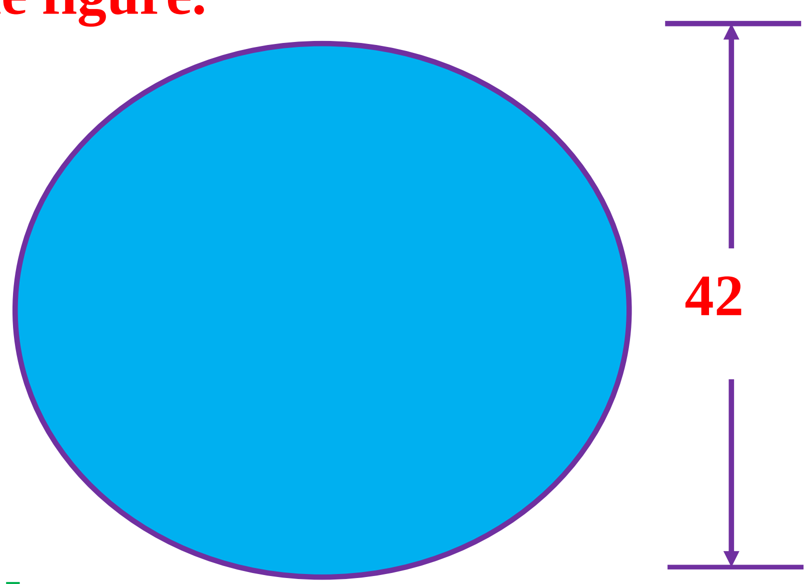
$= 33 \times 3.14$

$= 103.62\ cm^2$

Ans.: The volume and surface area of the toy is $94.20\ cm^3$ and $103.62\ cm^2$ respectively.

Q. 11

Find the surface area and the volume of a beach ball shown in the figure.



SOLUTION:

Given: For the spherical ball,

diameter (d) = 42cm

To find: Surface area and volume of the beach ball.

Solution:

Radius (r) = $\frac{d}{2} = \frac{42}{2}$ = 21 cm

Surface area of sphere = 4 π r^2

= $4 \times 3.14 \times (21)^2$

= $4 \times 3.14 \times 21 \times 21$

= 5538.96 cm^2

Volume of sphere = $\frac{4}{3}$ π r^3

= $\frac{4}{3} \times 3.14 \times (21)^3$

= $\frac{4}{3} \times 3.14 \times 21 \times 21 \times 21$

= $4 \times 3.14 \times 7 \times 21 \times 21$

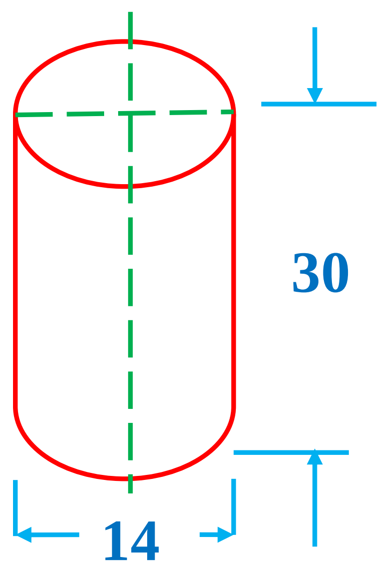
= 38772.72 cm^3

∴ The surface area and the volume of the beach ball are 5538.96 cm^2 and 38772.72 cm^3 respectively.

Ans: The surface area and the volume of the beach ball are 5538.96 cm^2 and 38772.72 cm^3 respectively.

Q. 12

As shown in the figure, a cylindrical glass contains water. A metal sphere of diameter 2 cm is immersed in it. Find the volume of the water.



Given: For the metal sphere,

diameter (d) = 2 cm

For the cylindrical glass, diameter (D) =14 cm,

height of water in the glass (H) = 30 cm

To find: Volume of water in the glass.

SOLUTION:

Let the radii of the sphere and glass be r and R respectively.

Radius of the sphere = r = $\frac{d}{2}$ = $\frac{2}{2}$ = 1cm

Radius of the glass = R = $\frac{14}{2}$ = 7 cm

Volume of sphere =$\frac{4}{3}\pi r^3$

$= \frac{4}{3}\pi (1)^3$

$= \frac{4}{3}\pi\ cm^3$

Volume of water with sphere in it = $\pi R^2 H$

$= \pi \times (7)^2 \times 30$

$= 1470\pi\ cm^3$

Volume of water in the glass

= Volume of water with sphere in it – Volume of sphere

$= 1470\pi - \frac{4}{3}\pi$

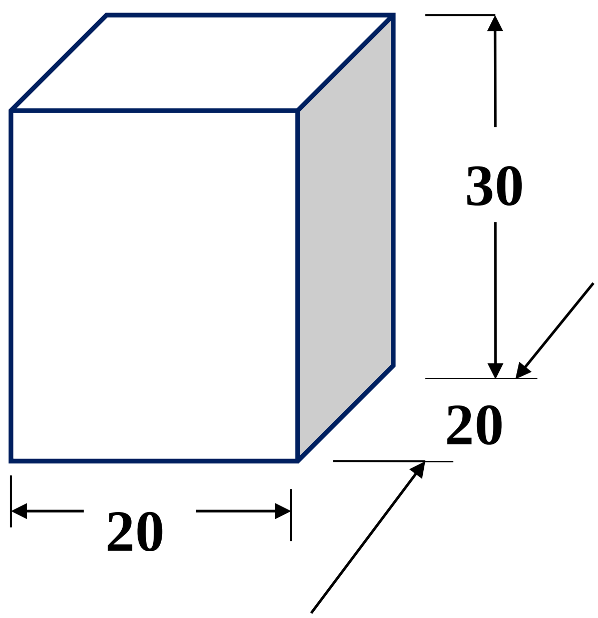
= 1470π - 1.33 π

= 1468.67 π

Ans.: The volume of the water in the glass is 1468.67 π cm^3 (i.e. 4615.80 cm^3).

Q. 13

The length, breadth and height of an oil can are 20 cm, 20 cm and 30 cm respectively as shown in the adjacent figure. How much oil will it contain? (1 litre = 1000 cm^3)



SOLUTION:

Given: For the cuboidal can,

length (l) = 20 cm,

breadth (b) = 20 cm,

height (h) = 30 cm

To find: Oil that can be contained in the can.

Volume of cuboid = l × b × h

$= 20 \times 20 \times 30$

$= 12000 \text{ cm}^3$

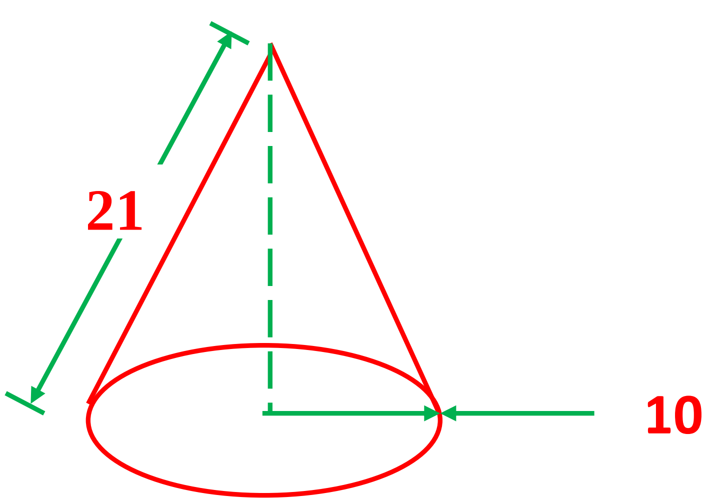
$= \frac{12000}{1000}$ liters

$= 12$ liters

Ans.: The oil can will contain 12 liters of oil.

Q. 14

The adjoining figure shows the measures of a Joker's dap. How much cloth is needed to make such a cap? (Textbook pg. no. 141)



SOLUTION:

Given: For the conical cap,

radius (r) = 10 cm,

slant height (l) = 21 cm

To find: Cloth required to make the cap.

Cloth required to make the cap

= Curved surface area of the conical cap

$= \pi r l = \frac{22}{7} \times 10 \times 21$

$= 22 \times 10 \times 3$

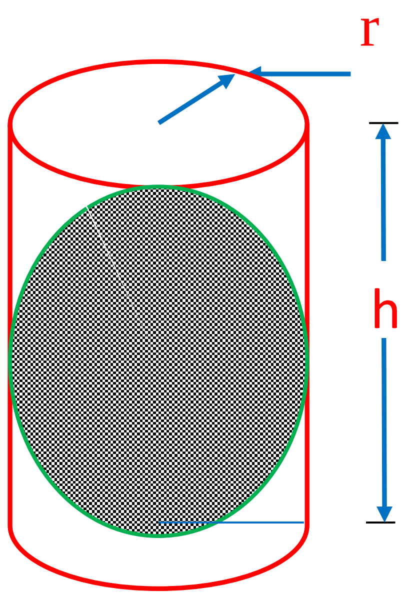
$= 660\ cm^2$

Ans : 660 cm^2 of cloth will be required to make the cap

Q. 15

As shown in the adjacent figure, a sphere is placed in a cylinder. It touches the top, bottom and the

curved surface of the cylinder. If radius of the base of the cylinder is 'r',



i. What is the ratio of the radii of the sphere and the cylinder ?

ii. What is the ratio of the curved surface area of the cylinder and the surface area of the sphere?

iii. What is the ratio of the volumes of the cylinder and the sphere? (Textbook pg. no. 141)

SOLUTION:

Radius of base of cylinder = radius of sphere

∴ Radius of sphere = r

Also, height of cylinder = diameter of sphere

∴ h = d

∴ h = 2 r …(i)

∴ radius of sphere : radius of cylinder = 1 : 1

$$\frac{curved\ surface\ area\ of\ cylinder}{curved\ surface\ area\ of\ sphere}$$

$$= \frac{2\,\pi\,r\,h}{4\,\pi\,r^2}$$

$$= \frac{h}{2\,r}$$

∴ Curved surface area of Cylinder: Surface area of Sphere = 1:1

(Volume of cylinder)/(Volume of sphere)

= (πr2h)/(4/3πr3)

= 3h/4r = 3(2r)/4r ....[Form(i)]

= 3/2

∴ volume of cylinder : volume of sphere = 3 :2

Ans.: Volume of Cylinder: Volume of Sphere = 3 : 2.

Q. 16

The radii of two circular ends of frustum shaped buckets are 14 cm and 7 cm. Height of the bucket is 30 cm. How many liters of water it can hold? (1 litre = 1000 cm^3)

Given: Radii (r_1) = 14 cm, and (r_2) = 7 cm,

height (h) = 30 cm

To find: Amount of water the bucket can hold

SOLUTION:

Volume of frustum $= \frac{1}{3} \pi h (r_1^2 + r_2^2 + r_1 \times r_2)$

$= \frac{1}{3} \pi (30) (14^2 + 7^2 + 14 \times 7)$

$= \frac{1}{3} \pi (30) (196 + 49 + 98)$

$= \frac{1}{3} \times \frac{22}{7} \times (30) (196 + 49 + 98)$

$= \frac{22}{7} \times (10) (196 + 49 + 98)$

$= \frac{22}{7} \times (10) (196 + 49 + 98)$

$= \frac{220}{7}$ x (343)

$= 10780\ cm^3$ ($1000\ cm^3$ = 1ltr)

$= 10.780\ ltrs$

Ans.: The bucket can hold 10.78 liters of water

Q. 17

The radii of ends of a frustum are 14 cm and 6 cm respectively and its height is 6 cm. Find its

i. curved surface area

ii. total surface area

iii. Volume, (π = 3.14)

Given: Radii (r_1) = 14 cm, and (r_2) = 6 cm,

height (h) = 6 cm

SOLUTION:

Slant height of frustum (l)

$\sqrt{h^2 + (r1 - r2)^2}$

$= \sqrt{6^2 + (14 - 6)^2}$

$= \sqrt{36 + (8)^2}$

$= \sqrt{36 + 64}$

$= \sqrt{100}$

= 10 cm

i. Curved surface area of frustum

$= \pi l (r_1 + r_2)$

= 3.14 × 10 (14 + 6)

= 3.14 × 10 × 20 = 628 cm^2

∴ The curved surface area of the frustum is 628 cm^2

ii. Total surface area of frustum

$= \pi l (r_1 + r_2) + \pi r_1^2 + \pi r_2^2$

$= 628 + 3.14 \times (14)^2 + 3.14 \times (6)^2$

= 628 + 3.14 × 196 + 3.14 × 36

= 628 + 3.14 (196 + 36)

= 628 + 3.14 × 232

= 628 + 728.48

= 1356.48 cm^2

∴ The total surface area of the frustum is 1356.48 cm^2

iii. Volume of frustum

$= \frac{1}{3}\pi h(r_1^2 + r_2^2 + r_1 \times r_2)$

$= \frac{1}{3} \times 3.14 \times 6\,(14^2 + 6^2 + 14 \times 6)$

$= 3.14 \times 2(196 + 36 + 84)$

$= 3.14 \times 2 \times 316$

$= 1984.48\ cm^3$

Ans.: The volume of the frustum is 1984.48 cm^3

Q. 18

The circumferences of circular faces of a frustum are 132 cm and 88 cm and its height is 24 cm. To find the curved surface area of frustum, complete the following activity. ($\pi = 22/7$)

SOLUTION:

Circumference 1 = $2\pi r_1$

$2\pi\, r_1 = 132$

$r_1 = \frac{132}{2\pi}$

$r_1 = \frac{132}{2} \times \frac{7}{22}$

$r_1 = 21$ cm

Circumference 2 = $2\,\pi\, r_2$

$2\,\pi\, r_2 = 88$

$r_2 = \frac{88}{2\pi}$

$r_2 = \frac{88}{2} \times \frac{7}{22}$

$r_2 = 14\ cm$

Slant height of frustum, $l = \sqrt{h^2 + (r1 - r2)^2}$

$= \sqrt{24^2 + 7^2}$

$= 25$ cm.

Curved surface area of frustum = $\pi\,(r_1 + r_2)\, l$

$= \pi\,(21 + 14) \times 25$

$= \pi \times 35 \times 35$

= 227 × 35 × 25

= 2750 cm^2

Ans.: 2750 cm^2

Q. 19

Radius of a circle is 10 cm. Measure of an arc of the circle is 54°. Find the area of the sector associated with the arc. (π = 3.14)

Given: Radius (r) = 10 cm,

Measure of the arc (θ) = 54°

To find: Area of the sector.

SOLUTION:

Area of sector $= \frac{\theta}{360} \times \pi r^2$

$= \frac{54}{360} \times 3.14 \times (10)^2$

$= \frac{3}{20} \times 3.14 \times 100$

$= 3 \times 3.14 \times 5$

$= 15 \times 3.14$

= 47.10 cm^2

Ans: The area of the sector is 47.1 cm^2.

Q. 20

Measure of an arc of a circle is 80° and its radius is 18 cm. Find the length of the arc. (π = 3.14)

Given: Radius (r) = 18 cm,

Measure of the arc (θ) = 80°

To find: Length of the arc.

SOLUTION:

Length of arc $= \frac{\theta}{360} \times 2\pi r$

$= \frac{80}{360} \times 2 \times 3.14 \times 18$

$= 4 \times 2 \times 3.14$

= 25.12 cm

Ans.: The length of the arc is 25.12 cm.

Q. 21

Radius of a sector of a circle is 3.5 cm and length of its arc is 2.2 cm. Find the area of the sector.

SOLUTION:

Given: Radius (r) = 3.5 cm,

length of arc (l) = 2.2 cm

To find: Area of the sector

Area of sector = $\frac{l \times r}{2}$

$= \frac{2.2 \times 3.5}{2}$

$= 1.1 \times 3.5 = 3.85\ cm^2$

Ans.: The area of the sector is 3.85 cm^2.

Q. 22

Radius of a circle is 10 cm. Area of a sector of the circle is 100 cm^2. Find the area of its corresponding major sector. (π = 3.14)

SOLUTION:

Given: Radius (r) = 10 cm,

area of minor sector =100 cm^2

To find: Area of major sector.

Area of circle = πr^2

$= 3.14 \times (10)^2$

$= 3.14 \times 100 = 314\ cm^2$

Now, area of major sector

= area of circle – area of minor sector

= 314 – 100

= 214 cm^2

Ans: The area of the corresponding major sector is 214 cm^2

Q. 23

Area of a sector of a circle of radius 15 cm is 30 cm^2. Find the length of the arc of the sector.

SOLUTION:

Given: Radius (r) = 15 cm,

area of sector = 30 cm^2

To find: Length of the arc (l).

Arc of sector = $\frac{\text{Length of the arc} \times \text{radius}}{2}$

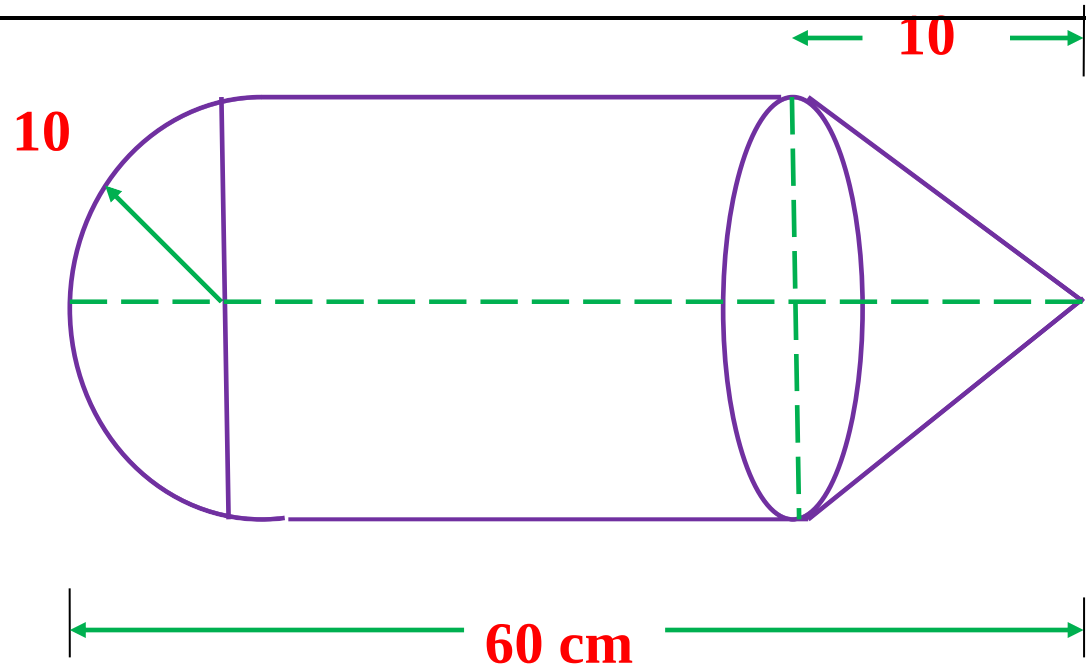
$\therefore$ **30 =** $\frac{\text{Length of the arc} \times 15}{2}$

$\therefore$ **Length of the arc** $= \frac{30 \text{ x } 2}{15}$ **= 4**

Ans.: The length of the arc is 4 cm.

Q. 24

As shown in figure radius of a toy made up of half circle, cone, and cylinder is 10 cm. Height of cone is 10 cm and total height of cone is 60 cm, find the volume of the toy. (jeewan deep 57)



SOLUTION:

1) Radius of hemi - sphere = 10 cm

Volume of hemi - sphere = $\frac{2}{3}\pi r^3$

$= \frac{2}{3}\pi (10)^3$

$= \frac{2000}{3}\pi \text{ cm}^3$

2) Radius of cylindrical shape = 10 cm

Height of cylindrical shape = 60 – 10 – 10 = 40 cm

Volume of cylinder = $\pi r^2 h$

$= \pi (10)^2 40$

$= 4000\,\pi$ **cm3**

3) Base radius of cone (r) = 10 cm

Height = 10 cm

Volume of cone = $\frac{1}{3}\pi(r)^2 h$

$$= \frac{1}{3}\pi(10)^2 \times 10$$

$$= \frac{1}{3}\pi \times 100 \times 10$$

$$= \frac{1000}{3}\pi$$

Total volume of toy

= Volume of hemisphere + Volume of Cylinder + Volume 0f Cone

$$= \frac{2000}{3}\pi + 4000\pi + \frac{1000}{3}\pi$$

$$= \frac{2000\pi + 12000\pi + 1000\pi}{3}$$

$$= \frac{15000\pi}{3}$$

$$= 5000\pi$$

$$= 5000 \times 3.14 \text{ cm}^3$$

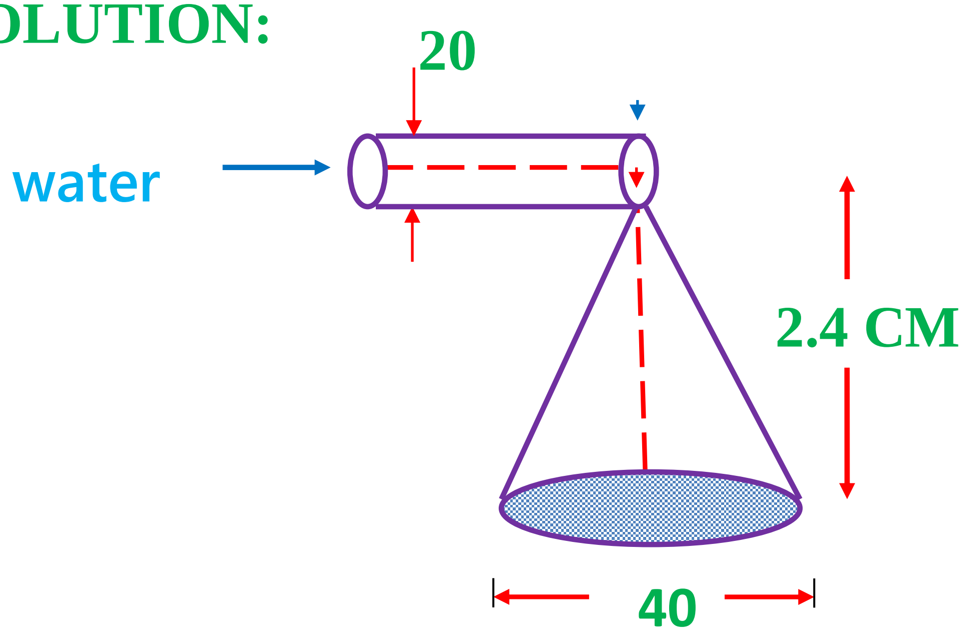
$$= 15700 \text{ cm}^3$$

Ans.: Total volume of toy =15700cm^3

Q. 25

Through a cylindrical pipe of diameter 20 cm, water is flowing at the speed of 10 meter per minute, Calculate the time, it will take to fill up a conical pot of base diameter 40 cm & 24 cm depth.

SOLUTION:



Diameter of Cylindrical shape pipe = (D) = 20 mm

Radius of pipe = 10 mm = 1 cm

Rate of flow of water through the pipe = 10m/minute

h = 1000 cm / minute

For conical pot,

Diameter of base = (D) = 40 cm

Radius of base =(R) = 20 cm

Height (H) = 24 cm

Suppose the pot fills in x minutes

The volume of water passing through the pipe in x minutes

= Volume of water that will be filled in the conical pot

$\therefore \pi (r)^2 h x = \frac{1}{3} \pi (R)^2 H$

$\therefore (r)^2 h x = \frac{1}{3} (R)^2 H$

$\therefore (1 \times 1) \times 1000 \times x = \frac{1}{3} \times (20 \times 20) \times 24$

$\therefore 1000 x = 400 \times 8$

$\therefore x = \frac{3200}{1000}$

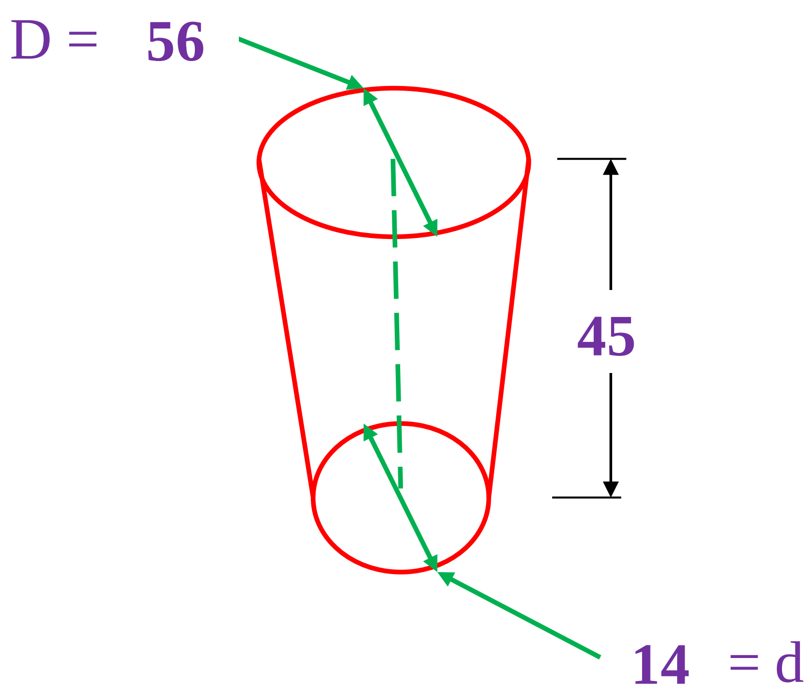
$\therefore x = 3.2$ **minutes (1 min = 60sec, 0.2 min =** $\frac{2}{10} \times 60)$

$\therefore$ x = 3 minute 12 seconds

Ans.: 3 minute 12 seconds

Q. 26

A frustum of a cone shaped bucket has its upper circular side diameter is 56 cm and bottom side base diameter is 14 cm, Height of bucket is 45 cm. Find out the water holding capacity of the bucket



SOLUTION:

Top circle diameter = D = 56 CM

Bottom circle diameter (d) = 14 cm

Bottom circle radius r = 7 cm

Height of bucket = 45 cm

Water holding capacity of bucket

= volume of frustum of the cone

$= \frac{1}{3}\pi\ (R^2 + r^2 + R \times r)\ h$

$= \frac{1}{3} \times \frac{22}{7} \times 45\ (28^2 + 7^2 + 28 \times 7)$

$= \frac{22 \times 15}{7} \times (784 + 49 + 196)$

$= 22 \times 15 \times 147$

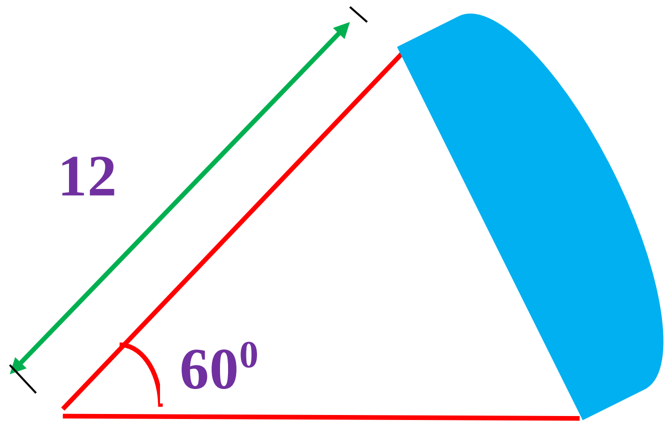
$= 48510\ cm^3$

= 48.510 Liters

Ans: Water holding capacity of bucket is 48.510 liters.

Q. 27

Find the area of shaded portion given in the figure if r = 12 cm, θ = 60^0



SOLUTION:

The shaded portion is a sector of circle

Area of sector $= r^2\left[\frac{\theta\pi}{360} - \frac{\sin\theta}{2}\right]$

$= 12^2\left[\frac{(3.14)(60)}{360} - \frac{\frac{\sqrt{3}}{2}}{2}\right]\left(\sin 60 = \frac{\sqrt{3}}{2}\right)$

$= 144\left[\frac{3.14}{6} - \frac{\sqrt{3}}{4}\right]$

$= 144\left[\frac{3.14}{6} - \frac{1.73}{4}\right]$

$= 144\left[\frac{(3.14)(2) - (1.73)(3)}{12}\right]$

$= 144\left[\frac{6.28 - 5.19}{12}\right]$

$= 12 \times 1.09$

$= 13.09\ cm^2$

Ans.: Area of shaded portion in given figure = 13.09 cm^2

Q. 28

A bucket is frustum shaped, its height is 28 cm, radius of circular faces are 12 cm and 15 cm. Find the capacity of the bucket ($\pi = \frac{22}{7}$)

SOLUTION:

Capacity of bucket = Volume of frustum

Top circle radius = R = 15 CM

h = 45

Bottom circle radius = r = 12 cm

Height of bucket = 28 cm

Water holding capacity of bucket

= volume of frustum of the cone

$$= \frac{1}{3}\pi\,(R^2 + r^2 + R \times r)\,h$$

$$= \frac{1}{3} \times \frac{22}{7} \times 28\,(15^2 + 12^2 + 15 \times 12)$$

$= \frac{22X15}{7}$ x (225 + 144 + 180)

$= \frac{22X4}{3}$ x 549

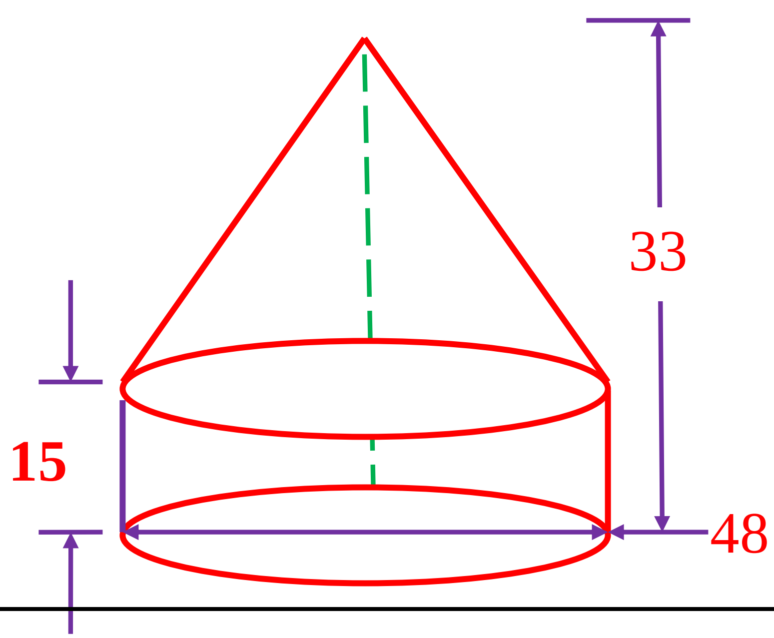
= 88 x 18

= 16104 cm^3

Ans: 16104 cm^3

Q. 29

A tent of circus is such that its lower part is cylindrical and upper part is conical. The diameter of the base of the tent is 48 cm and height of cylindrical part is 15 m. Total height of the tent is 33m. Find the area of canvas required to make the tent. Also find volume of air in the tent.



SOLUTION:

Total height of tent = 33 m

Let the height of cylindrical part be H

H = 15 m

Let the height of conical part be h

h = (33 – 15) = 18 cm

Slant height of cone l $= \sqrt{r^2 + h^2}$

$= \sqrt{24^2 + 18^2}$

$= \sqrt{576 + 324}$

$= \sqrt{900}$

= 30 m

Canvas required for the tent

= Curved surface area of cylindrical part + Curved surface area of conical part

$= 2\pi r H + \pi r l$

$= \pi r (H + l)$

$= \frac{22}{7} \times 24 (2 \times 15 + 30)$

$= \frac{22}{7} \times 24 \times 60$

$= 4525 .71 \text{ m}^2$

Volume of air in the tent = Volume of cylinder + Volume of cone

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

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

$= \frac{22}{7} (24)^2 (15 + \frac{1}{3} x 18)$

$= \frac{22}{7} \times 576 x 21$

$= 38,016 \text{ m}^3$

Ans: 38,016 m^3

Q. 30

How many solid cylinders of radius 10 cm and height 6 cm can be made by melting a solid sphere of radius 30 cm?

SOLUTION:

Radius of sphere r = 30 cm

Radius of cylinder R = 10 cm

Height of cylinder = H = 6 cm

Let the number of cylinder be n

Volume of sphere = n x volume of cylinder

$$n = \frac{\text{Volume of sphere}}{\text{volume of cylinder}}$$

$$= \frac{\frac{4}{3}\pi r^3}{\pi R^2 H}$$

$$= \frac{\frac{4}{3} \times (30)^3}{10^2 \times 6}$$

$$= \frac{\frac{4}{3} \times 30 \times 30 \times 30}{10 \times 10 \times 6}$$

= 60

Ans.: 60 cylinders can be made

Q. 31

The radius & height of cylindrical water reservoir is 2.8 m and 3.5 m, respectively.

i) How much maximum water can the tank hold?

ii) A person needs 70 litre of water per day. For how many persons is the water sufficient for the day? ($\pi = \frac{22}{7}$)

SOLUTION:

r = 2.8 cm

h = 3.5 cm

$\pi = \frac{22}{7}$

Capacity of water reservoir = Volume of cylindrical reservoir

$= \pi r^2 h$

$= \frac{22}{7} \times 2.8 \times 2.8 \times 3.5$

$= 86.24 \text{ m}^3$

= 86.24 × 1000

= 86240 liters

The reservoir can hold 86240 liters of water

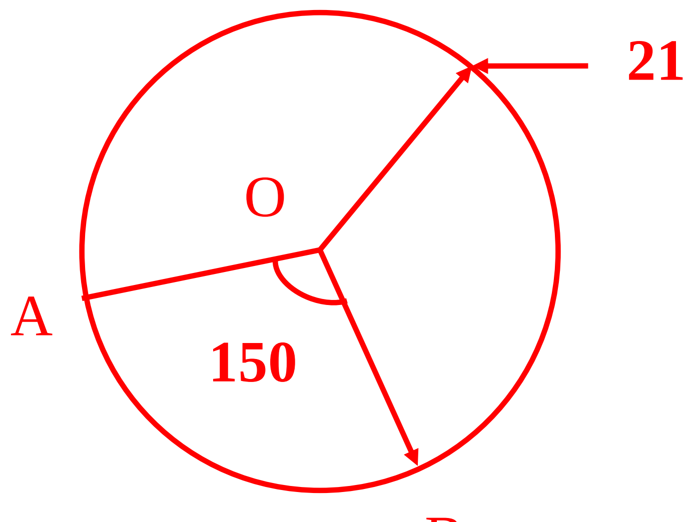
The daily requirement of water of a person is 70 ltr

Water in the tank is sufficient for $\frac{86240}{70}$ = 1232 persons

Ans.: 1232 persons

Q. 32

The measure of a central angle of a circle is 150^0 and radius of the circle is 21 cm. Find the length of arc and area of the sector associated with the central angle



SOLUTION:

r = 21 cm

θ = 150

$\pi = \frac{22}{7}$

Area of sector $= \frac{\theta}{360} \times \pi r^2$

$= \frac{150}{300} \times \pi r^2$

$= \frac{150}{300} \times \frac{22}{7} \times 21 \times 21$

$= \frac{1155}{2}$

$= 577.5 cm^2$

Length of arc $= l = \frac{\theta}{360} \times 2\pi r$

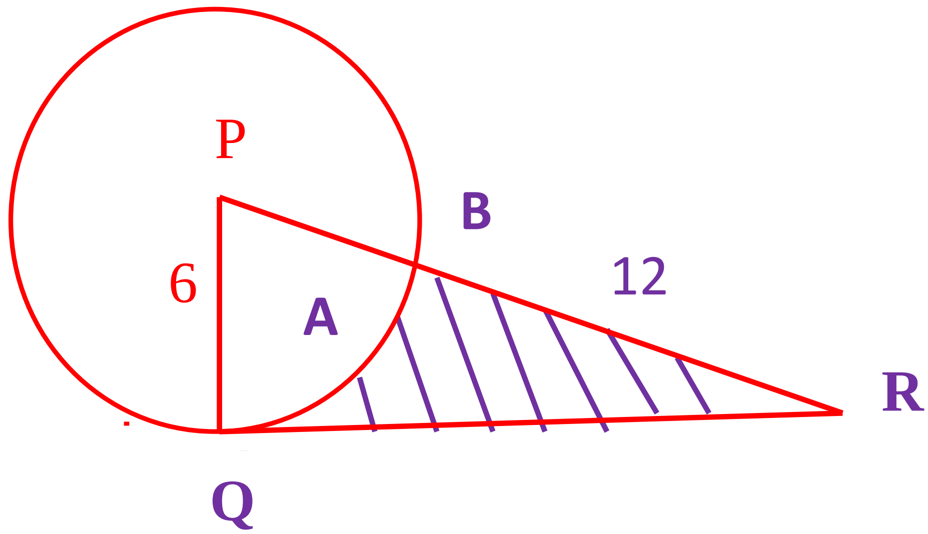
$= \frac{150}{300} \times 2 \times \frac{22}{7} \times 21$

$= 55$ cm

Ans.: 55 cm

Q. 33

In the figure, P is centre of the circle of radius 6 cm. Seg QR is a tangent at Q. If PR = 12, find the area of shaded portion QABR ($\sqrt{3} = 1.73$)



SOLUTION:

Radios joining point of contact of the tangent is perpendicular to the tangent

In ΔPQR, ∠PQR = 900

PQ = 6 cm

PR = 12 cm

PQ = $\frac{PR}{2}$

If one side of a right angle triangle is half the hypotenuse then angle opposite to, that side is of 30^0 **measure**

R = $\angle 30^0$ **P =** $\angle 60^0$

By $30^0 - 60^0 - 90^0$ **theorem,**

$QR = \frac{\sqrt{3}}{2} \times PR = \frac{\sqrt{3}}{2} \times 12 = 6\sqrt{3}$

$QR = 6\sqrt{3}$

$A(\Delta PQR) = \frac{1}{2} \times QR \times PQ$

$= \frac{1}{2} \times 6\sqrt{3} \times 6$

$= 18\sqrt{3}$

$= 18 \text{ x } 1.73$

$= 31.14 \text{ cm}^2$

Area of sector $= \frac{\theta}{360} \times \pi r^2$

$A (P - QAB) = \frac{60}{360} \times 3.14 \times 6^2$

$= \frac{1}{6} \times 3.14 \times 6 \times 6$

$= 3.14 \times 6$

$= 18.84 \text{ cm}^2$

Ans.: Area of shaded portion = A (PQR) – A (P – QAB) = 31.14 – 18.84 = 12.30 cm^2

Q. 34

Find the height of cone with its radius of base 10 cm & curved surface area 260 π cm^2.

SOLUTION:

Radius of base of cone = (r) = 10 cm

Curved surface area of cone = 260 π

$\pi r l = 260\pi$

$10 l = 260$

$l = \frac{260}{10}$

$= 26$ cm

$l^2 = r^2 + h^2$

$26^2 = 10^2 + h^2$

$676 = 100 + h^2$

$676 - 100 = h^2$

$h^2 = 576$

$h = \sqrt{576}$

= 24 cm

Ans.: Height of cone = 24 cm

Q. 35

Measure of an arc of a circle is 270° and its diameter is 10 cm. Find the length of the arc. (π = 3.14)

Diameter of circle (d) = 10 cm

Radius of circle (r)= $\frac{d}{2} = \frac{10}{2}$ = 5 cm,

Measure of the arc (θ) = 270° , π = 3.14

To find: Length of the arc.

SOLUTION:

Length of arc of sector = $\frac{\theta}{360^0} \times 2\,\pi\,r$

$= \frac{270}{360} \times 2 \times 3.14 \times 5$

$= \frac{3}{4} \times 3.14 \times 10$

$= \frac{9.42 \times 10}{4}$

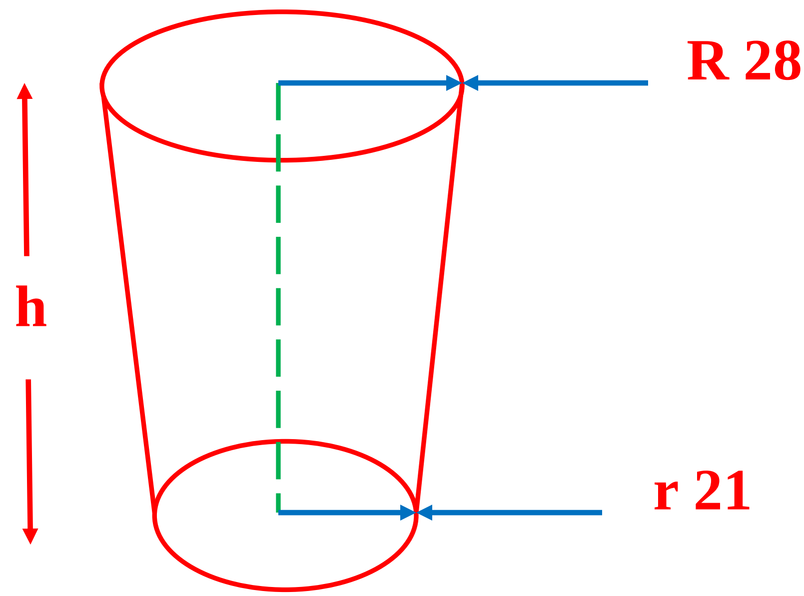
$= \frac{94.2}{4}$

= 23.55 cm

Ans.: The length of the arc is 23.55 cm.

Q. 36

A frustum shaped bucket is of capacity 28.490 liters, if radius of top circle of the bucket is 28 cm and radius of bottom circle of the bucket is 21 cm then find the height of bucket.



SOULTION:

$r_1 = 28$

$r_2 = 21$

v = 28.490 ltr = 28490 cc

Shape of bucket is frustum of a cone

$= \frac{1}{3} \pi (R^2 + r^2 + R \times r) h$

$\therefore 28490 = \frac{1}{3} \times \frac{22}{7} (28^2 + 21^2 + 28 \times 21) \times h$

$\therefore 28490 = \frac{1}{3} \times \frac{22}{7} \times (784 + 441 + 588) \times h$

$\therefore 28490 = \frac{1}{3} \times \frac{22}{7} \times 1813 \times h$

$\therefore 22 \times 1813 \times h = 28490 \times 3 \times 7$

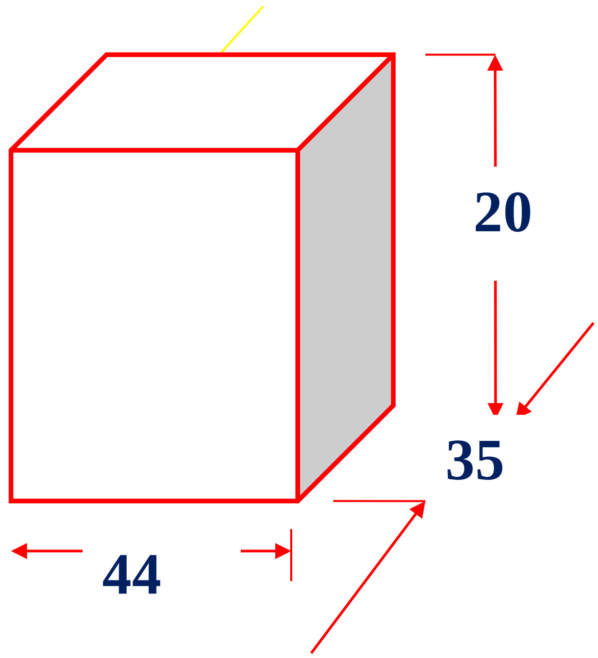
$\therefore h = \frac{28490 \times 3 \times 7}{22 \times 1813}$

$\therefore h = 15$ cm

Ans: Height of bucket = 15 cm

Q. 37

A cuboid shaped pot having dimensions 44 cm x 35 cm x 20 cm is filled with water, up to the height of 17 cm. When a solid spherical metallic ball is dropped in to the pot, then 231 cm^3 volume of water came out, then find the radius of sphere of metal ($\pi = \frac{22}{7}$)



SOLUTION:

Dimensions of the cuboids pot = 44 cm x 35 cm x 20 cm

Height of water in the cuboid pot = 17 cm

Height of empty portion in the pot = 20 – 17 = 3 cm

Volume of empty space in the pot = l x b x h

= 44 x 35 x 3 cm^3

= 4620 cm^3

Volume of metallic ball

= Volume of water displaced out

= Volume of empty portion + Volume of displaced water

Let r = radius of metal sphere

Volume of sphere = $\frac{4}{3}\pi r^3$

$\frac{4}{3}\pi r^3 = 4851$

$r^3 = \frac{4851 \times 3 \times 7}{4 \times 22}$

$r^3 = \frac{441 \times 21}{8}$

$r^3 = \frac{21^3}{2^3}$

$r = \sqrt[3]{\frac{21^3}{2^3}}$

$r = \frac{21}{2}$

Ans: r = 10.5 cm

Q. 38

Length of an arc of a circle is 6.05 cm and its circle radius is 5.5 cm. Find the measure of arc of circle.

$\left(\pi = \frac{22}{7}\right)$

SOLUTION:

Given:

Radius of circle (r) = 5.5 cm

Length of the arc = 6.05

Measure of the arc (θ) = ?°, $\pi = \frac{22}{7}$

To find:. Measure of the arc (θ) = ? °

Length of arc of sector = $\frac{\theta}{360^0} \times 2\pi r$

$6.05 = \frac{\theta}{360} \times 2 \times \frac{22}{7} \times 5.5$

$6.05 = \frac{\theta}{180} \times \frac{22}{7} \times 5.5$

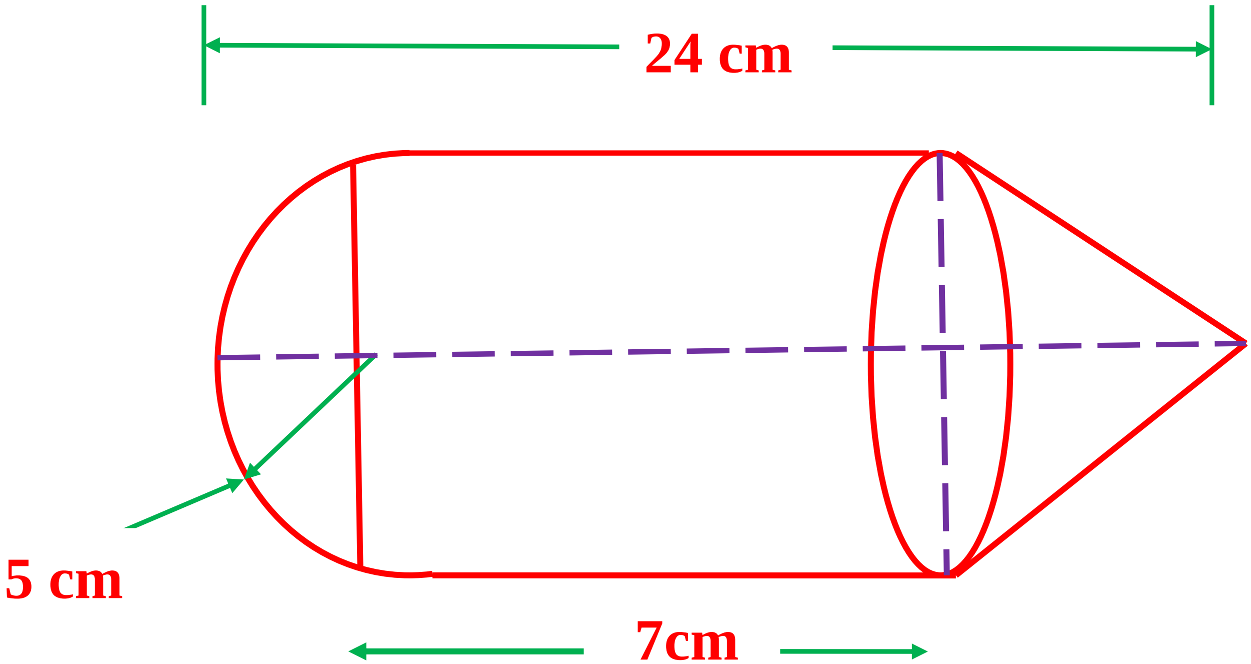
$\theta = \frac{6.05 \times 180 \times 7}{100 \times 22 \times 5.5}$

$\theta = 63^0$

Ans.: Measure of the arc (θ) = 63^0

Q. 39

A toy is made up of hemisphere, cylinder and cone. The radius of base of cylinder is 5 cm with height 7 cm. The total height of toy 24 cm, then find the surface area of the toy. ($\pi = \frac{22}{7}$)



SOLUTION:

Radius of hemisphere = Radius of base of cylinder

Radius of hemisphere = 5 cm

Surface area of hemisphere =2 π r^2

$= 2 \times \frac{22}{7} \times 5 \times 5$

$= \frac{1100}{7}\ cm^2$

Curved surface area of cylinder = 2 πrh

$= 2 \times \frac{22}{7} \times 5 \times 7$

$= 220\ \ cm^2$

Straight Height of cone = 24 – (7 + 5) = 24 – 12 = 12cm

Slant height of cone

$l^2 = h^2 + r^2$

$l^2 = 12^2 + 5^2$

$= 144 + 25 = 169$

$\therefore$ l = 13 cm

Curved surface area of cone = πrl

$= \frac{22}{7} \times 5 \times 13$

$= \frac{1430}{7}\ cm^2$

Total surface are of toy = surface are of hemisphere + curved surface are of cylinder + curved surface area of cone

$= \frac{1100}{7} + 220 + \frac{1430}{7}$

$= \frac{1100 + 1540 + 1430}{7}$

$= \frac{4070}{7}$ cm^2

Ans.: $\frac{4070}{7}$ cm^2

Q. 40

The total surface are of a cuboid is 166 cm^2. If the breadth and height the cuboid are 5 cm and 4 cm, find its length.

SOLUTION:

Breadth (b) = 5 cm

Height (h) = 4 cm

Total surface area of cuboid = 2 $[lb + bh + lh]$

166 = 2 $[l \times 5 + 5 \times 4 + l \times 4]$

166 = 2 $[9l + 20]$

$\frac{166}{2} = 9l + 20$

$\frac{166}{2} - 20 = 9l$

83 - 20 = $9l$

$\frac{63}{9} = l$

$l = 7$

Ans.: Length of cuboid = 7 cm

Q. 41

Area of a sector of a circle of radius 6 cm is 15π cm^2. Find the length of the arc corresponding to the sector. And also find measure of the Arc

Given: Radius (r) = 6 cm,

area of sector = 15 π cm^2

To find:

Length of the arc corresponding to the sector(l)

SOLUTION:

Area of sector = $\frac{\text{Length of the arc x radius}}{2}$

$15\,\pi = \frac{\text{Length of the arc x 6}}{2}$

Length of the arc = $\frac{15\pi \text{ x } 2}{6}$ = 5π

Length of the arc (l) corresponding to the sector is 5π cm.

Measure of the Arc

Area of sector = $\frac{\theta}{360^0} \times \pi r^2$

$15\pi = \frac{\theta}{360} \times \pi \times 6 \text{ x } 6$

$15\pi = \frac{\theta}{360^0} \times \pi \times 5.5$

$\theta = \frac{15 \text{ x } 360^0}{6 \text{ x } 6}$

$\theta = 150^0$

Ans.: the angular measure of arc is 150^0 and the length of the arc is 5π cm.

Q. 42

The radius of metallic sphere is 9 cm. It was melted to make wire diameter of 4 mm. Find the length of wire.

SOLUTION:

Radius of metallic sphere is(r) = 9 cm

Diameter of wire = 4 cm

$\therefore$ **Its radius (r_1) = 2 mm = $\frac{2}{10}$ cm (1 cm = 10 mm)**

Let the length be *h*

Sphere melted to make wire

$\therefore$ **Volume of wire = Volume of sphere**

$\therefore \pi \ r_1{}^2 h = \frac{4}{3} \pi \ r^3$

$\therefore \frac{2}{10} \times \frac{2}{10} \times h = \frac{4}{3} \times 9^3$

$\therefore h = \frac{4}{3} \times 9^3 \times \frac{10}{2} \times \frac{10}{2}$

$\therefore$ **h = 24300 cm or 243 m …. (1m = 100 cm)**

Ans.: length of wire is 24300 cm or 243 m

Q. 43

A cylindrical bucket of diameter 28 cm and height 20 cm was full of sand. When the sand in the bucket was poured on the ground, the sand got converted in

the shape of a cone. If the height of the cone was 14 cm. What was the base are of cone?

SOLUTION:

Diameter of cylindrical bucket = 28 cm

Its radius (r) = 14 cm

Its height (h) = 20 cm

Bucket is full of sand

Volume of sand in bucket = Volume of Cylinder

$= \pi \ r^2 h$

$= \pi \ (14)^2 \times 20$

$= 3920 \pi \ cm^3$

Sand when poured on ground was given shape of cone

The height of Cone (h_1) **= 14 cm**

Let its Radius be r_1

Volume of Cone = Volume of sand in bucket

$\therefore \frac{1}{3}\,\pi\, r_1{}^2\, h_1 = 3920\,\pi$

$\therefore \frac{1}{3}\,\pi\, r_1{}^2\, 14 = 3920\,\pi$

$\therefore\ \pi\, r_1{}^2 = \frac{3920\ x\ \frac{22}{7}\ \ x\ 3}{14}$

$\therefore\ \pi\, r_1{}^2 = 2640\ cm^2$

Ans.: Area of the base of the cone is $2640\ cm^2$

Q. 44

A washing tub in the shape of a frustum of a cone has height 21 cm. The radii of the circular top and bottom are 20 cm and 15 cm respectively. What is the capacity of the tub? ($\pi = \frac{22}{7}$)

SOLUTION:

The radii of circular top and bottom are 20 cm and 15 cm respectively

$\therefore r_1 = 20\ cm$

$\therefore r_2 = 15\ cm$

Its height (h) = 21 cm

Capacity of tub = $\frac{1}{3}\pi h(r_1^2 + r_2^2 + r_1 r_2)$

Capacity of tub

$= \frac{1}{3} \times \frac{22}{7} \times 21\,(20^2 + 15^2 + 20 \times 15)$

$= 22 \times (400 + 225 + 20 \times 300)$

$= 22 \times 925$

$= 20350\ cm^3$

= 20.35 ltrs.

Ans.: capacity of the tub is 20.35 ltrs.

Q. 45

A metal of parallelepiped measures 16 cm x 11 cm x 10 cm were melted to make coins. How many coins were made if the thickness and diameter of each coin was 2 mm and 2 cm respectively?

SOLUTION:

Length of the metal parallelepiped (l) = 16 cm

its breadth (b) = 10 cm

The diameter of coin = 2 cm

$\therefore$ Its radius (r) $= \frac{2}{2}$ = 1 cm

Its thickness (h_1) = 2mm = $\frac{2}{10}$ cm

Number of coins that were made

$$= \frac{\text{Volume of metal parallelepiped}}{\text{Volume of each coin}}$$

$$= \frac{l \ x \ b \ x \ h}{\pi \ \ r^2 \, h_1}$$

$$= \frac{16 \times 11 \times 10}{\frac{22}{7} \times 1 \times 1 \times \frac{2}{10}}$$

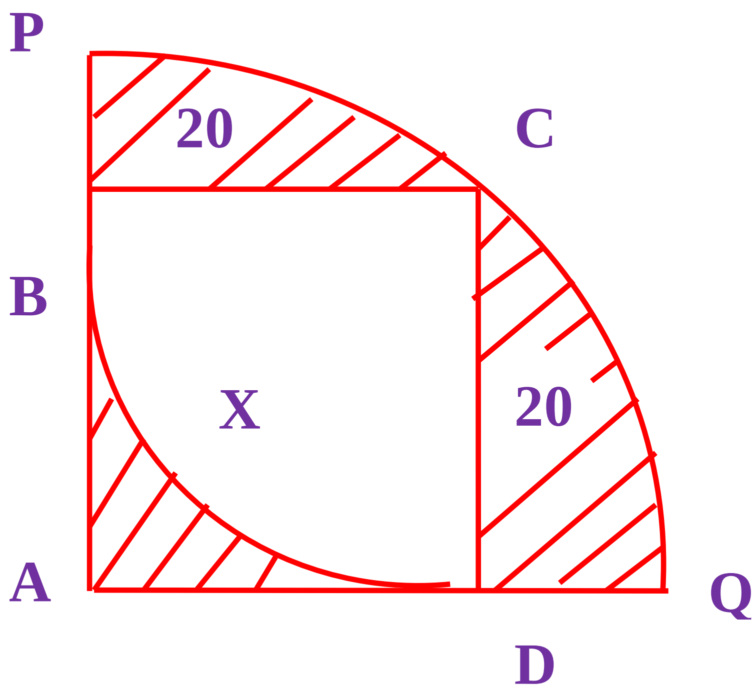
$$= \frac{16 \text{ x } 11 \text{ x } 10 \text{ x } 10 \text{ x } 7}{22 \text{ x } 1 \text{ x } 1 \text{ x } 2}$$

= 2800

Ans.: 2800 coins can be made of the given metal parallelepiped.

Q. 46

In the figure square ABCD is inscribed in the sector A-PCQ. The radius of sector C-BXD is 20 cm. Complete the following activity to find the area of shaded region.



SOLUTION:

Side of square ABCD = Radius of sector C- BXD = 2O

Area of square

$(side)^2 = (20)^2 = 400$ .... (1)

Area of shaded region inside the square =

Area of square ABCD – Area of sector C-BXD

$= 400 - \frac{\theta}{360^0} \times \pi r^2$

$= 400 - \frac{90}{360^0} \times 3.14 \times 400$

$= 400 - 314$

$= 86\ cm^2$

Radius of bigger sector = Length of diagonal of square ABCD = 20 $\sqrt{2}$

Area of shaded region outside the square

= Area of sector A – PCQ - Area of square ABCD

=A (A-PCQ) – A (□ ABCD)

$$= \frac{\theta}{360^0} \times \pi\, r^2 - \boxed{20^2}$$

$$= \frac{90}{360^0} \times \pi\, (20\sqrt{2})^2 - \boxed{20^2}$$

$$= \boxed{628} - \boxed{400}$$

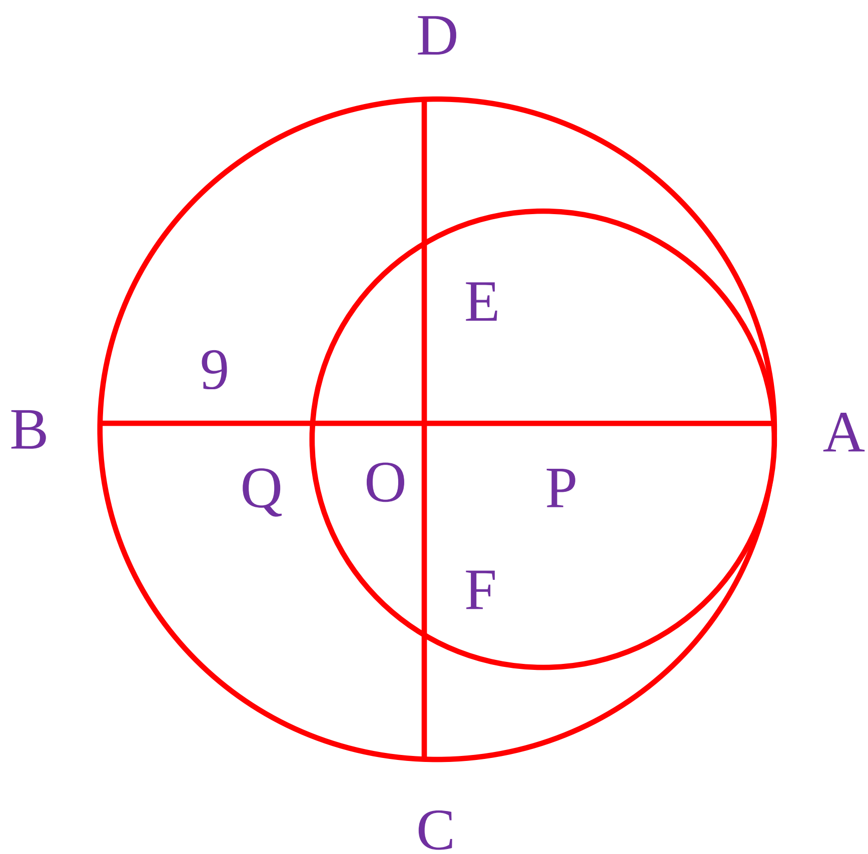
$$= \boxed{228 cm^2}$$

=

Ans.: Total area of shaded portion 86 + 228 = 314 sq. cm.

Q. 47

In figure two circles with centers O and P are touching internally at point A. If BQ = 9, DE = 5, complete the following activity to find radii of the circle.



SOLUTION:

Let the radius of bigger circle be R and that of smaller circle be r

OA, OB, OC, and OD are the radii of bigger circle.

$\therefore OA = OB = OC = OD = R$

PQ – PA = r

OQ = OB – BQ = **(R - 9)**

OE = OD – DE = **(R - 5)**

As the chords QA and EF of the circle with centre P intersect in the interior of the circle, by the property of internal division of two chords of a circle.

OQ x OA = OE x OF

(R -9) x R = **(R - 5** **X** **(R - 5)**

R^2-9 R =R^2-10 R + 25

R = **25**

AQ = 2r =AB – BQ

2r = 50 -9 = 41

r = $\frac{41}{2}$ = 20.5

Q. 48

The radii at the ends of a frustum are 14 cm and 6 cm respectively and its height is 6 cm. Find its

(i) Curved Surface Area

(ii) Total surface area

SOLUTION:

The radii at the ends of the frustum are 14 cm and 16 cm

∴ r_1 = 14 cm , r_2 = 6 cm

Its height (*h*) = 6 cm

Let the slant height of the frustum be *l*

$l = \sqrt{h^2 + (r_1 - r_2)^2}$

$l = \sqrt{6^2 + (14 - 6)^2}$

$l = \sqrt{36 + 64}$

$l = \sqrt{36 + 64}$

$l = \sqrt{100}$

$l = 10$

Curved surface area of a frustum = $\pi \ l\,(r_1 + r_2)$

= 3.14 x 10 x (14 +6)

= 3.14 x 10 x 20

= 628 cm^2

Total surface area of frustum

$= \pi \ l\,(r_1 + r_2) + \pi r_1{}^2 + \pi r_2{}^2$

$= 628 + \pi\,(r_1{}^2 + r_2{}^2)$

$= 628 + 3.14\,(14^2 + 8^2)$

= 628 + 3.14 (196 + 36)

= 628 + 3.14 x 232

= 628 + 728.48

$= 1356.48 \ cm^2$

Volume of the frustum

$= \frac{1}{3} \pi h\,(r_1{}^2 + r_2{}^2 + (r_1 \text{ x } r_2)$

$= \frac{1}{3} \text{ x } 3.14 \text{ x } 6\,(14^2 + 6^2 + 14 \text{ x} 6)$

= 3.14 x 2 (196 + 36 + 84)

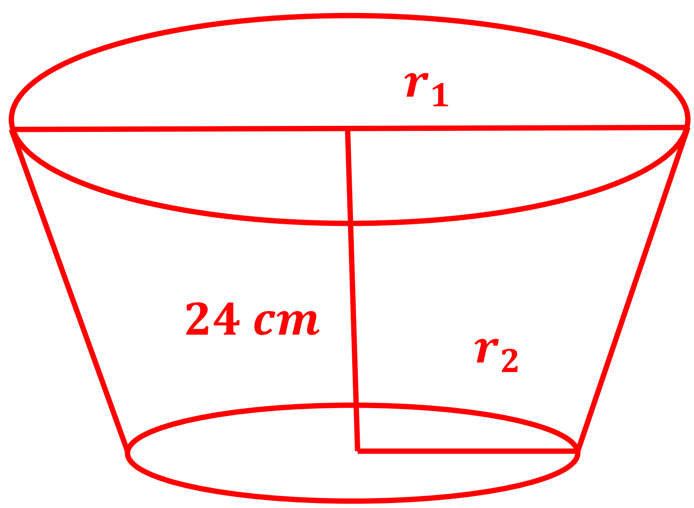
= 6.28 x 316

= 1984.48 cm^2

Ans.: Curved surface area of the frustum is 628 cm^2. Total surface area of a frustum is 1356.48 cm^2 and volume of frustum is 1984.48 cm^2

Q. 49

The circumference of circular faces of a frustum are 132 cm and 88 cm and its height is 24 cm. To find the curved surface area of frustum completes the following activity.



SOLUTION

Circumference = 2 $\pi r_1 = 132$

$r_1 = \frac{132}{2\ \pi}$ = **21**

circumference$_2$ = 2 $\pi\ r_2 = 88$

$r_2 = \frac{88}{2\ \pi} =$ **14 cm**

Slant height of frustum,

$l = \sqrt{h^2 + (r_1 - r_2)^2}$

$= \sqrt{24^2 + (7)^2}$

= **25** **cm**

Curved surface area of frustum

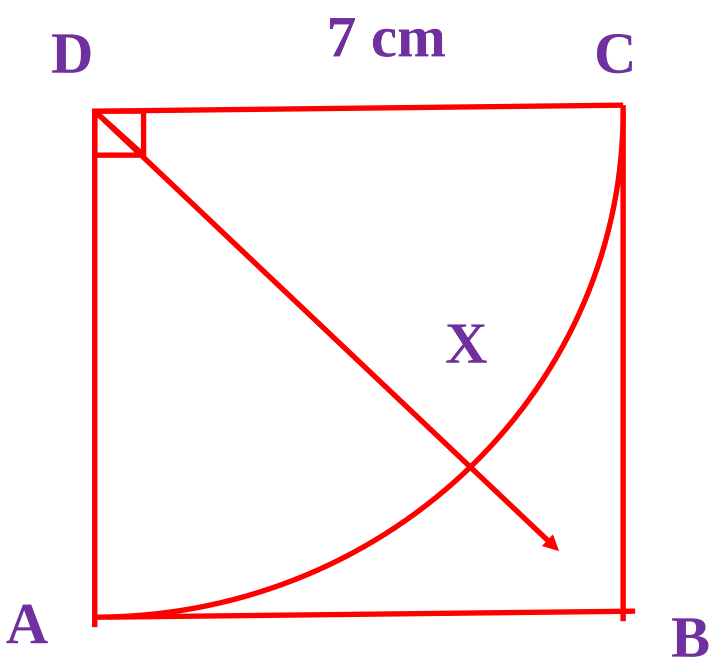
$= \pi\ l\,(r_1 + r_2)$

= π x **35** x **25**

= **2750** **sq, cm**

Q. 50

In the figure, side of square ABCD is 7 cm. With centre D and radius DA, sector D = AXC is drawn. Fill in the following boxes properly to find out the area of shaded region.



SOLUTION:

Area of Square = Side^2

$= (7)^2$

$= 49\ cm^2$

Area of Sector = $\frac{\theta}{360^0} \times \pi\, r^2$

Area of sector (D – AXC) = $\frac{90}{360°} \times \frac{22}{7} \times 7 \times 7$

Area of sector (D – AXC) = 38.5 cm^2

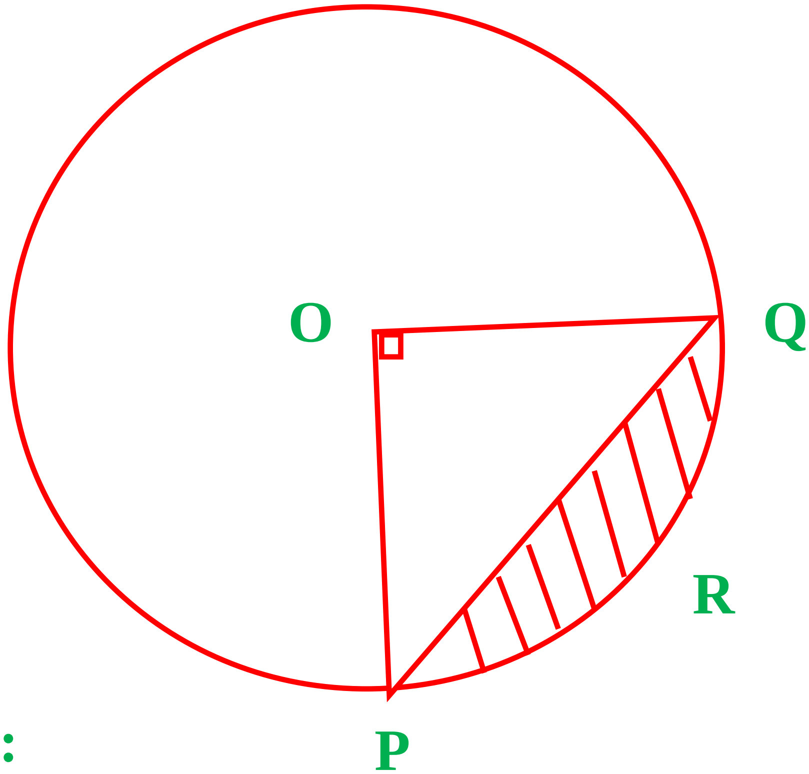
A (Shaded region) = A (square) – A sector (D – AXC)

= 49 cm^2 – 38.5 cm^2

= 10.5 cm^2

Q. 51

In the figure O is the centre of the circle, m (arc PQR) = 60^0, OP = 10 cm. Find the area of shaded region. (r = 3.14, $\sqrt{3}$ = 1.73)



SOLUTION:

The radius of circle (r) = OP = 10 cm

m **(arc PQR)** $= \theta = 60^0$

The shaded region is segment PQR

$$A\ (\text{segment PQR}) = r^2 \left[\frac{\pi\theta}{360} - \frac{\sin\theta}{2} \right]$$

$$= 10^2 \left[\frac{3.14 \times 60}{360} - \frac{\sin 60}{2} \right]$$

$$= 100 \left[\frac{3.14}{6} - \frac{\sqrt{3}}{2 \times 2} \right]$$

$$= 100 \left[\frac{3.14 \times 2 - 1.73 \times 3}{12} \right]$$

$$= 100 \left[\frac{6.28 - 5.19}{12} \right]$$

$$= 100 \left[\frac{1.09}{12} \right]$$

$$= \left[\frac{109}{12} \right]$$

$$= 9.083$$

$$= 9.083 cm^3$$

Ans.: $9.083 cm^3$