TOPIC

- CYLINDER - Introduction
- Sum based on Cylinder
- Cone-Introduction
- SPHERE

SURFACE AREAS AND VOLUMES

- **CYLINDER - Introduction**

RIGHT CIRCULAR CYLINDER

Examples :

Roller wheels

Let us see few examples of right circular cylinder

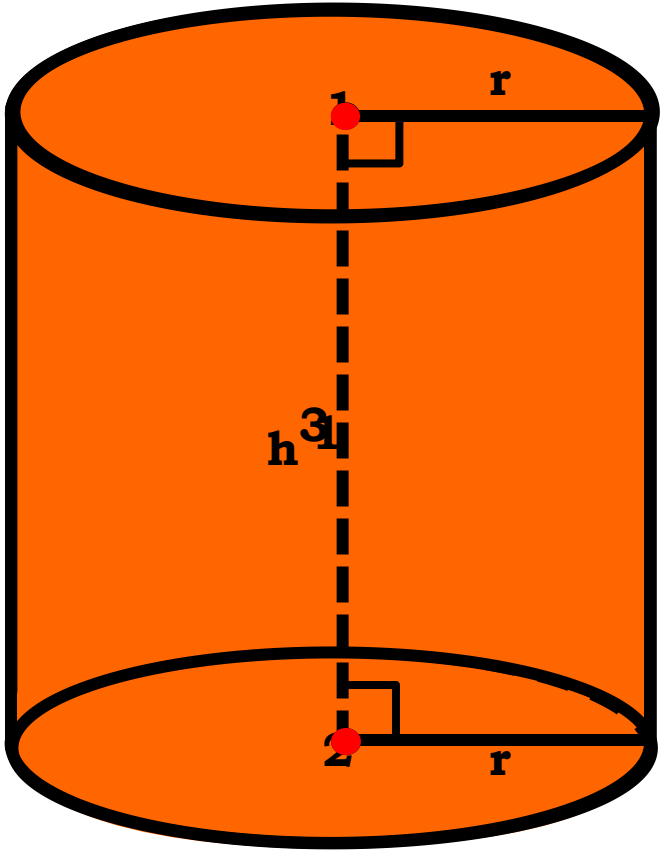
Pipes

Cylindrical candles

RIGHT CIRCULAR CYLINDER

- The right circular cylinder has three faces.
  - Two circular faces
  - One curved face
- Cylinder has radius ‘r’ and height ‘h’.

Distance between the centers of t… h… Height is the perpendicular distance



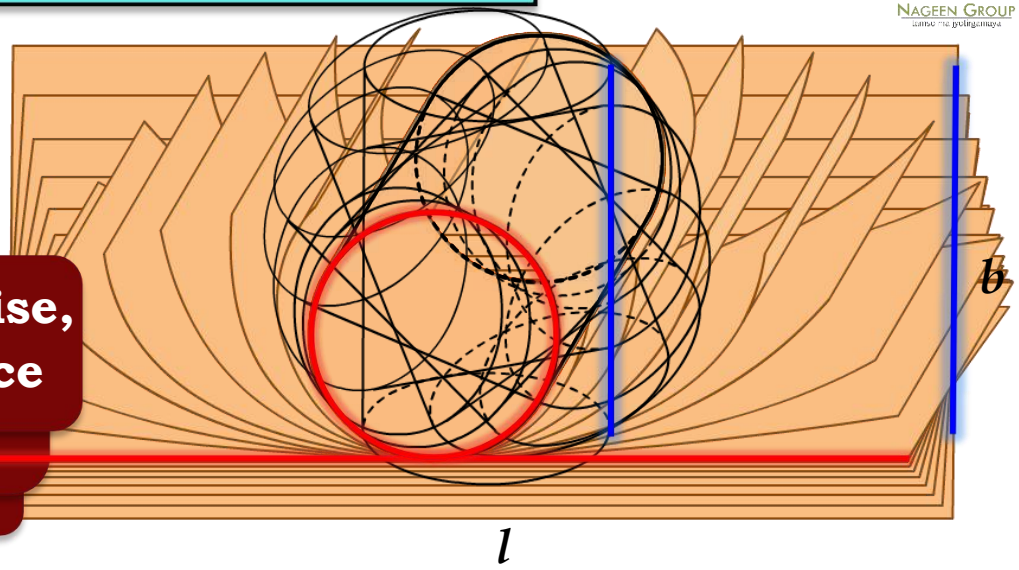
CURVED SURFACE AREA OF CYLINDER

CSA of cylinder = $2\pi rh$

Let us first understand curved surface area of cylinder

When we fold the sheet lengthwise,
length of sheet = Circumference

Breadth of sheet = h



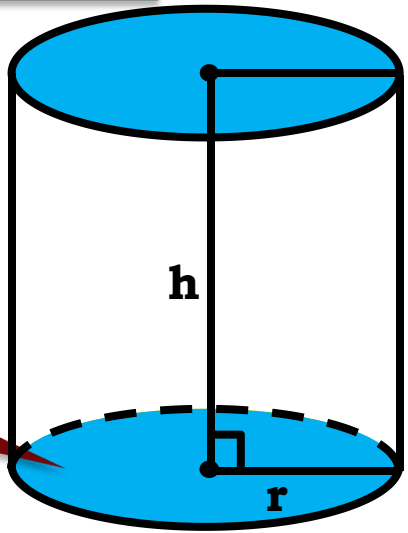
Area of the sheet	=	**CSA of cylinder**
$l \times b$	=	**CSA of cylinder**
$2\pi r \times h$	=	**CSA of cylinder**

TOTAL SURFACE AREA OF CYLINDER

Total Surface Area = $2\pi r(r + h)$

The circular faces have equal radii and are parallel

Area of circular face = πr^2



TSA = CSA of a cylinder + Area of 2 circular

$= 2\pi rh + 2 \times$ Area of a circular face

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

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

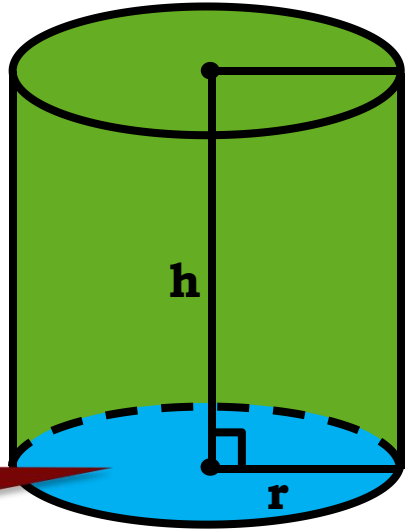
VOLUME OF CYLINDER

Volume = $\pi r^2 h$

Volume of the cylinder is the capacity of the cylinder

The circular faces of the cylinde and are p

Area of circular face = πr^2



Volume of cylinder = Area of base × Height

$= \pi r^2 \times h$

SURFACE AREAS AND VOLUMES

- **Sum based on Cylinder**

Q. The radius of a right circular cylinder is 3 cm, height is 7 cm.
Find (i) curved surface area (ii) total surface area
(iii) volume of the right circular cylinder. $\left(\pi = \frac{22}{7}\right)$

Sol.

Radius (r) = 3 cm

Height (h) = 7 cm

Curved surface area of cylinder $= 2\pi rh$

What is formula for finding curved surface area of cylinder ?

$2\pi rh$

$$= 2 \times \frac{22}{7} \times 3 \times 7$$

$$= 2 \times 22 \times 3$$

$\therefore$ **Curved surface area of cylinder** $= 132\ cm^2$

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

What is formula for finding total surface area of cylinder ?

$2\pi r(r+h)$

$$= 2 \times \frac{22}{7} \times 3 \times (3 + 7)$$

$$= \frac{2 \times 22 \times 3 \times 10}{7}$$

$$= \frac{1320}{7}$$

$\therefore$ **Total surface area of cylinder** $= 188.57\ cm^2$

Q. The radius of a right circular cylinder is 3 cm, height is 7 cm. Find (i) curved surface area (ii) total surface area (iii) volume of the right circular cylinder. $\left(\pi = \frac{22}{7}\right)$

Sol.

Radius (r) = 3 cm

Height (h) = 7 cm

What is formula for finding volume of cylinder $\pi r^2 h$

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

$$= \frac{22}{\cancel{7}} \times 3 \times 3 \times \cancel{7}$$

$$= 22 \times 9$$

$\therefore$ **Volume of cylinder = 198 cm³**

$\therefore$ **Curved surface area is 132 cm², Total surface area is 188.57 cm² and Volume is 198 cm³**

SURFACE AREAS AND VOLUMES

- **Sum based on Cylinder**

Q. The radius and height of a cylinder are in the ratio 3 : 7 and its volume is 1584 cm³. Find its radius.

Sol.

$r : h = 3 : 7$

Let the common multiple be 'x'.

$\therefore$ Radius (r) = $3x$, height (h) = $7x$

Volume of cylinder = 1584 cm³

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

$\therefore \quad 1584 = \pi r^2 h$

$\therefore \quad 1584 = \frac{22}{7} \times (3x)^2 \times 7x$

$\therefore \quad 1584 = 22 \times 9 \times x^2 \times x$

$\therefore \quad \frac{1584}{22 \times 9} = x^3$ (8, 176)

$\therefore \quad x^3 = 8$

$\therefore \quad x = 2$

What is formula for finding volume of cylinder ? $\pi r^2 h$

Radius (r) = $3x$

$= 3 \times 2$

$\therefore \quad r = 6$ cm

$\therefore$ Radius of given cylinder is 6 cm

SURFACE AREAS AND VOLUMES

- **Cone-Introduction**
- **Sum based on Cone**

RIGHT CIRCULAR CONE

Examples :

Ice Cream cone

Let us see some examples of Right Circular Cone

Conical candles

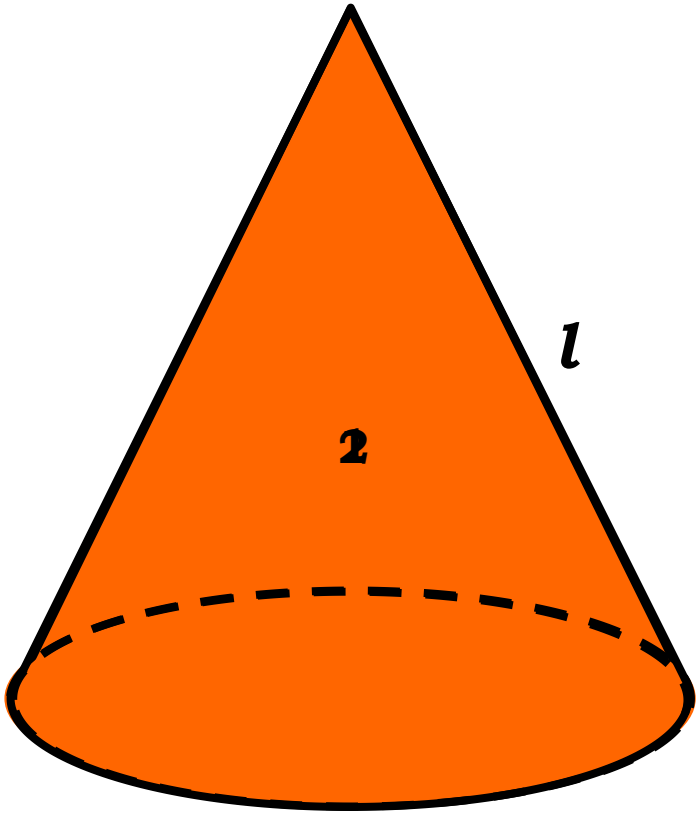
Sand cone

RIGHT CIRCULAR CONE

- A Right Circular Cone has two faces.
  - O
  - O

Let us see geometrical figure of right circular cone

- A cone has radius (r), height (h) and slant height (l)

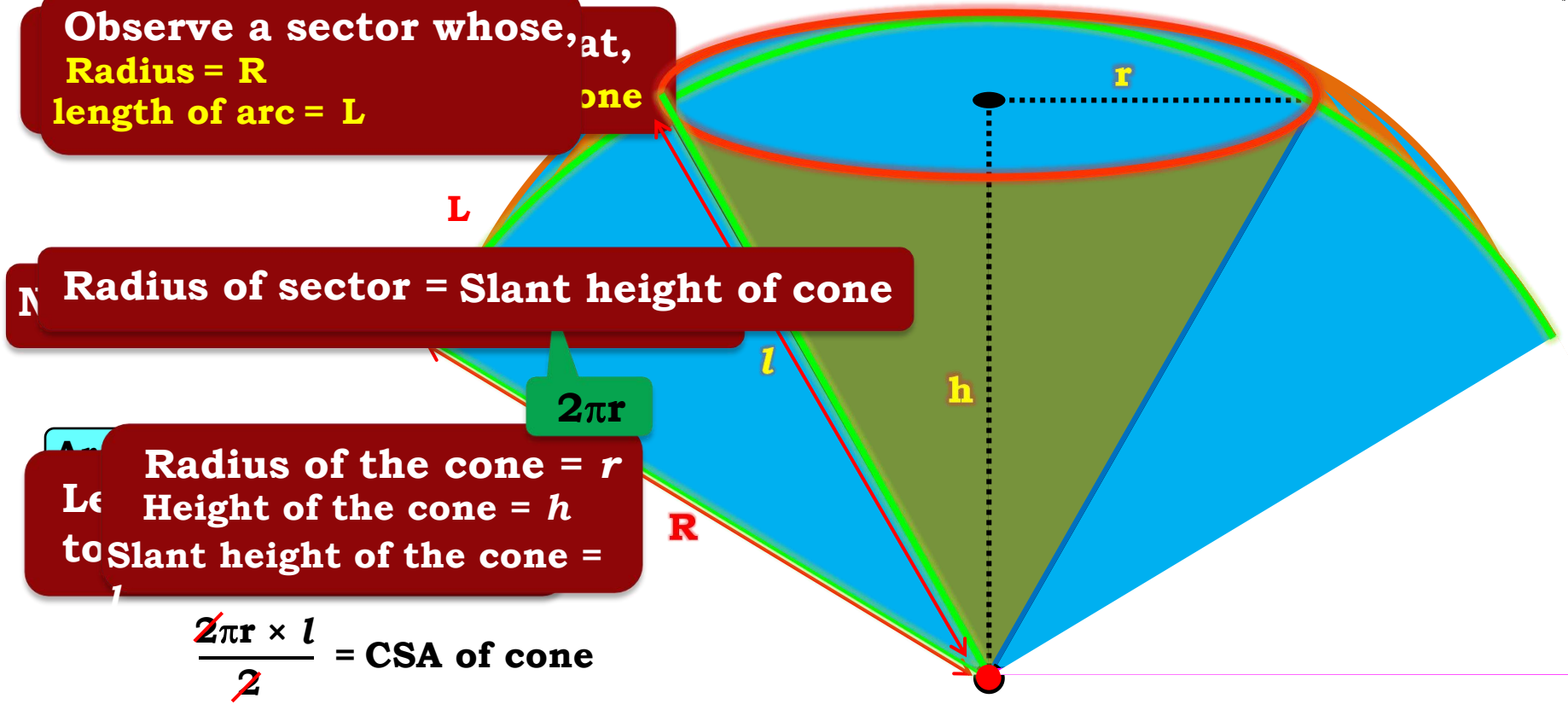


CURVED SURFACE AREA CONE

Observe a sector whose,
Radius = R
length of arc = L

Radius of sector = Slant height of cone

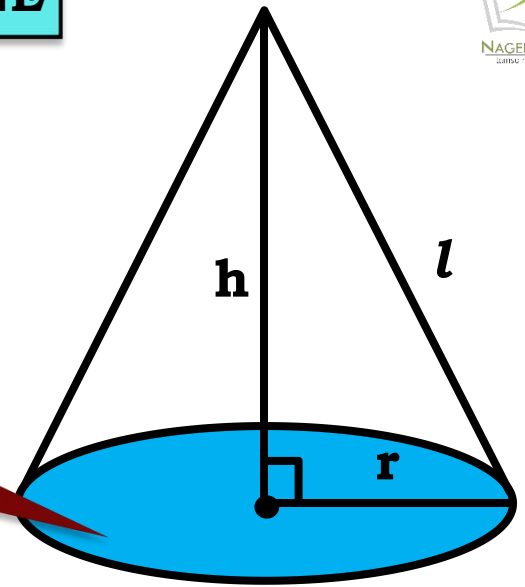
Radius of the cone = r
Height of the cone = h
Slant height of the cone = l



$$\frac{2\pi r \times l}{2} = \text{CSA of cone}$$

TOTAL SURFACE AREA OF CONE

Total surface area = π r (r + l)



Area of circular face = πr^2

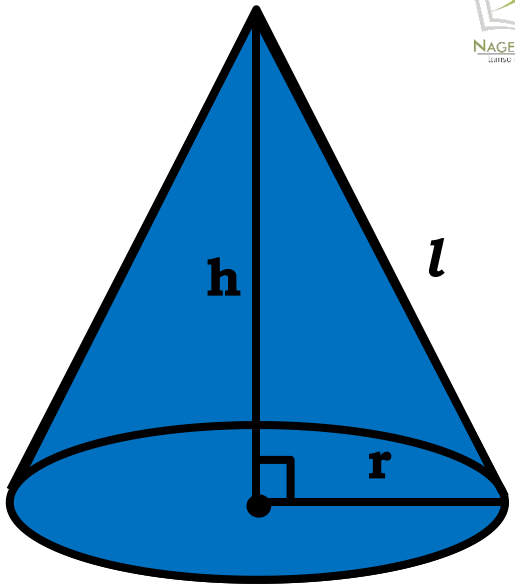
TSA = CSA + Area of circular face

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

$= \pi r (l + r)$

VOLUME OF CONE

$$\text{Volume} = \frac{1}{3} \times \pi r^2 h$$



Q. The curved surface area of a cone is 4070 cm^2 and its diameter is 70 cm. What is its slant height ?

Sol.

Curved surface area of a cone = 4070cm^2

Diameter (d) = 70 cm

$\therefore$ Radius (r) = $\frac{\cancel{70}^{35}}{\cancel{2}}$ = 35 cm

To find : l

What is formula for curved surface area of cone? πrl

Curved surface area of cone = πrl

$$\therefore 4070 = \frac{22}{7} \times 35 \times l$$

$$\therefore \frac{\cancel{4070}^{37\ \cancel{814}} \times \cancel{7}}{\cancel{22} \times \cancel{35}_{\cancel{5}}} = l$$

$$l = 37 \text{ cm}$$

$\therefore$ Slant height of a cone is 37 cm.

SURFACE AREAS AND VOLUMES

- **SPHERE**

Sphere

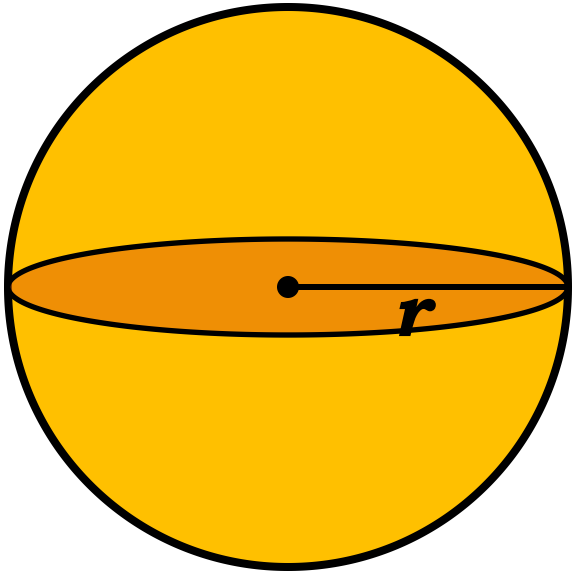
Let us see few examples of sphere

Football

Globe

Metallic Ball

Sphere



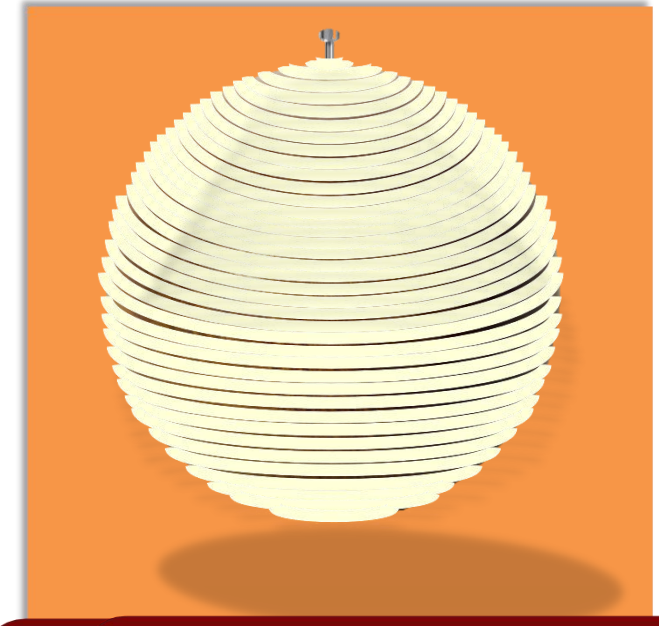
Formulae :

1. **Surface Area = $4 \pi r^2$**

2. **Volume** $= \frac{4}{3} \pi r^3$

Let us see an activity to understand the formula for total surface area of sphere

Surface area of sphere



Mark the starting and
fin string,
ar Let radius = 10 cm string
from the surface of the ball.

Wh part
of ng in
pl ing
ar all,
till e ball

Activity :

Total surface area of sphere
= Length of string
= $4\pi r^2$
= $4 \times 3.14 \times 10^2$
= 1256

Total surface area of sphere = 1256 cm^2

Length of string = 1256

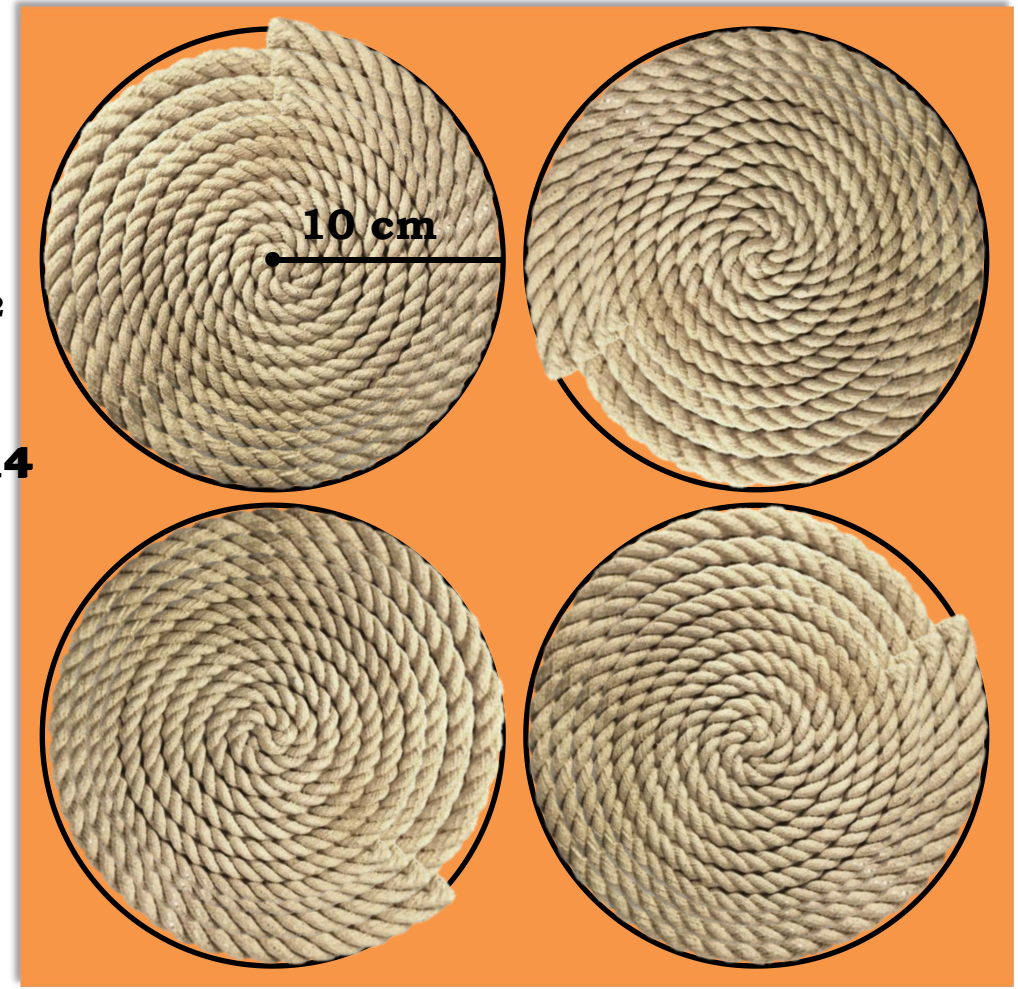
= 3.14×10^2

= 314

Length of remaining string = 1256 – 314

= 942

Start filling the next circle with the string



SURFACE AREAS AND VOLUMES

- **SPHERE**

Q. Find the volume and surface area of sphere of radius 4.2 cm. (= 22/7)

Sol. Radius of sphere = 4.2cm

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

What is formula for finding volume of sphere ? $\frac{4}{3}\pi r^3$

$$= \frac{4}{3} \times \frac{22}{7} \times 4.2 \times 4.2 \times 4.2$$

$$= \frac{4}{\cancel{3}} \times \frac{22}{\cancel{7}} \times \frac{\cancel{42}^{\,2\,14}}{10} \times \frac{42}{10} \times \frac{42}{10}$$

$$= \frac{4 \times 22 \times 2 \times 42 \times 42}{10 \times 10 \times 10}$$

$$= \frac{310464}{1000}$$

$$= 310.464 \text{ cm}^3$$

∴ Volume of sphere is 310.464 cm^3

Q. Find the volume and surface area of sphere of radius 4.2 cm. (= 22/7)

Sol. Radius of sphere = 4.2cm

What is formula for finding surface area of sphere ? $4\pi r^2$

Surface area of sphere = 4 r^2

$$= 4 \times \frac{22}{7} \times 4.2 \times 4.2$$

$$= 4 \times \frac{22}{\cancel{7}} \times \frac{\cancel{42}^{6}}{10} \times \frac{42}{10}$$

$$= \frac{4 \times 22 \times 6 \times 42}{10 \times 10}$$

$$= \frac{22176}{100}$$

$$= 221.76 \text{ cm}^2$$

∴ Surface area of sphere is 221.76 cm^2

Q. The surface area of sphere is 616 cm^2. What is its volume ? (= 22/7)

Hint :To find r.

Sol.

Surface area of sphere = 616cm^2

Surface area of sphere = 4 r^2

$\therefore \quad 616 = 4 \quad r^2$

$\therefore \quad 616 = 4 \times \frac{22}{7} \times r^2$

$\therefore \quad \frac{616 \times 7}{4 \times 22} = r^2$

$= 49$

What is formula for finding surface area of sphere ? $4\pi r^2$

$= 7$ cm

Q. The surface area of sphere is 616 cm^2. What is its volume ?
(= 22/7)

Sol.

r = 7 cm

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

$$= \frac{4}{3} \times \frac{22}{7} \times 7 \times 7 \times 7$$

$$= \frac{4 \times 22 \times 7 \times 7}{3}$$

$$= \frac{4312}{3}$$

$$= 1437.33 \text{ cm}^3$$

$\therefore$ **Volume of the sphere is 1437.33 cm^3**

Thank You