Exercise 20.2   Page No: 20.20

Question 1: Find the volume of the right circular cone with:
(i) Radius 6cm, height 7cm
(ii)Radius 3.5cm, height 12cm
(iii) Height is 21cm and slant height 28cm

Solution:

(i) Radius of cone(r)=6cm

Height of cone(h)=7cm

We know, Volume of a right circular cone = 1/3 πr²h

By substituting the values, we get

= 1/3 x 3.14 x 6² x 7

= 264

Volume of a right circular cone is 264 cm³

(ii) Radius of cone(r)=3.5 cm

Height of cone(h)=12cm

Volume of a right circular cone = 1/3 πr²h

By substituting the values, we get

= 1/3 x 3.14 x 3.5² x 12

=154

Volume of a right circular cone is 154 cm³

(iii) Height of cone(h)=21 cm

Slant height of cone(l) = 28 cm

Find the measure of r:

We know, $l^2 = r^2 + h^2$

$28^2 = r^2 + 21^2$

or r = 7√7

Now,

Volume of a right circular cone = 1/3 $\pi r^2 h$

By substituting the values, we get

= 1/3 x 3.14 x (7√7)^2 x 21

=7546

Volume of a right circular cone is 7546 cm^3

Question 2: Find the capacity in litres of a conical vessel with:
(i) radius 7 cm, slant height 25 cm
(ii) height 12 cm, slant height 13 cm.

Solution:

(i) Radius of the cone(r) =7 cm

Slant height of the cone (l) =25 cm

As we know that, $l^2 = r^2 + h^2$

$25^2 = 7^2 + h^2$

or h = 24

Now, Volume of a right circular cone = = 1/3 $\pi r^2 h$

By substituting the values, we get

= 1/3 x 3.14 x (7)^2 x 24
= 1232
Volume of a right circular cone is 1232 cm^3 or 1.232 litres
   [1 cm^3 = 0.01 liter]

(ii) Height of cone(h)=12 cm

Slant height of cone(l)=13 cm

As we know that, $l^2 = r^2 + h^2$

$13^2 = r^2 + 12^2$

or r = 5

Now, Volume of a right circular cone = 1/3 $\pi r^2 h$

By substituting the values, we get
= 1/3 x 3.14 x (5)^2 x 12

= 314.28

Volume of a right circular cone is 314.28 cm^3 or 0.314 litres.
   [1 cm^3 = 0.01 liters]

Question 3: Two cones have their heights in the ratio 1:3 and the radii of their bases in the ratio 3:1. Find the ratio of their volumes.

Solution:

Let the heights of the cones be h and 3h and radii of their bases be 3r and r respectively. Then, their volumes are

Volume of first cone (V1) = 1/3 $\pi(3r)^2 h$
Volume of second cone (V2) = 1/3 $\pi r^2(3h)$

Now, V1/V2 = 3/1

Ratio of two volumes is 3:1.

Question 4: The radius and the height of a right circular cone are in the ratio 5:12. If its volume is 314 cubic meter, find the slant height and the radius. (Use π=3.14).

Solution:

Let us assume the ratio of radius and the height of a right circular cone to be x.

Then, radius be 5x and height be 12x

We know, $l^2 = r^2 + h^2$

$= (5x)^2 + (12x)^2$

$= 25 x^2 + 144 x^2$

or l = 13x

Therefore, slant height is 13 m.

Now it is given that volume of cone = 314 m^3

$=> 1/3 \pi r^2 h = 314$

$=> 1/3$ x 3.14 x $(25x^2)$ x $(12x) = 314$

$=> x^3 = 1$

or x = 1

So, radius = 5x 1 = 5 m
Therefore ,

Answer: Slant height = 13m
Radius = 5m

Question 5: The radius and height of a right circular cone are in the ratio 5 : 12 and its volume is 2512 cubic cm. Find the slant height and radius of the cone. (Use π=3.14).

Solution:

Let the ratio of radius and height of a right circular cone be y.

Radius of cone(r) = 5y

Height of cone (h) = 12y

Now we know, $l^2 = r^2 + h^2$

$= (5y)^2 + (12y)^2$

= 25 y² + 144 y²

or l = 13y

Now, volume of the cone is given 2512cm³

=>1/3πr²h=2512

=>1/3 x 3.14 x (5y)² x 12y = 2512

=> y³ = (2512 x 3)/(3.14 x 25 x 12) = 8

or y = 2

Therefore,
Radius of cone = 5y = 5x2 = 10cm
Slant height (l) =13y = 13x2 = 26cm

Question 6: The ratio of volumes of two cones is 4 : 5 and the ratio of the radii of their bases is 2 : 3. Find the ratio of their vertical heights.

Solution:

Let the ratio of the radius be x and ratio of the volume be y.

Then, Radius of 1st cone (r₁) =2x

Radius of 2nd cone (r₂) =3x

Volume of 1st cone (V₁)= 4y

Volume of 2nd cone (V₂)= 5y

We know formula for volume of a cone = 1/3πr²h

Let h₁ and h₂ be the heights of respective cones.

$$\frac{V_1}{V_2} = \frac{4}{5} = \frac{\frac{1}{3}\pi r_1^2 h_1}{\frac{1}{3}\pi r_2^2 h_2} = \frac{4}{5} = \frac{4h_1}{9h_2} = \frac{4}{5} = \frac{h_1}{h_2} = \frac{9}{5}$$

Therefore, heights are in the ratio of 9 : 5.

Question 7: A cylinder and a cone have equal radii of their bases and equal heights. Show that their volumes are in the ratio 3:1.

Solution:
We are given, a cylinder and a cone are having equal radii of their bases and heights.

Let, radius of the cone = radius of the cylinder = r and

Height of the cone = height of the cylinder = h

Now,

$$\frac{volume\ of\ cylinder}{volume\ of\ the\ cone} = \frac{\pi r^2 h}{\frac{1}{3}\pi r^2 h} = \frac{3}{1}$$

Therefore, ratio of their volumes is 3:1.