ARTHI EDUCATIONAL CENTRE

Annual important qus - Unit 7

10th Standard

Date : 02-Jan-24

Maths

Reg.No. : | | | | | | |

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Time : 01:00:00 Hrs

Total Marks : 125

I. Answer All Questions

9 x 1 = 9

1) If two solid hemispheres of same base radius r units are joined together along their bases, then curved surface area of this new solid is

(a) $4\pi r^2$ sq.units (b) $6\pi r^2$ sq.units (c) $3\pi r^2$ sq.units (d) $8\pi r^2$ sq.units

2) If the radius of the base of a right circular cylinder is halved keeping the same height, then the ratio of the volume of the cylinder thus obtained to the volume of original cylinder is

(a) 1:2 **(b) 1:4** (c) 1:6 (d) 1:8

3) The height of a right circular cone whose radius is 5 cm and slant height is 13 cm will be

(a) 12 cm (b) 10 cm (c) 13 cm (d) 5 cm

4) The total surface area of a hemi-sphere is how much times the square of its radius.

(a) π (b) 4π **(c) 3π** (d) 2π

5) If the radius of the base of a cone is tripled and the height is doubled then the volume is

(a) made 6 times **(b) made 18 times** (c) made 12 times (d) unchanged

6) If the radius of the cylinder is doubled, the new volume of the cylinder will be _____ times the original volume.

(a) same (b) 3 **(c) 4** (d) 2

7) A solid sphere of radius x cm is melted and cast into a shape of a solid cone of same radius. The height of the cone is

(a) 3x cm (b) x cm **(c) 4x cm** (d) 2x cm

8) The height and radius of the cone of which the frustum is a part are h_1 units and r_1 units respectively. Height of the frustum is h_2 units and radius of the smaller base is r_2 units. If $h_2 : h_1 = 1:2$ then $r_2 : r_1$ is

(a) 1:3 **(b) 1:2** (c) 2:1 (d) 3:1

9) The ratio of the volumes of a cylinder, a cone and a sphere, if each has the same diameter and same height is

(a) 1:2:3 (b) 2:1:3 (c) 1:3:2 **(d) 3:1:2**

II. Answer All Questions

18 x 2 = 36

10) A cylindrical drum has a height of 20 cm and base radius of 14 cm. Find its curved surface area and the total surface area.

Answer : Given that, height of the cylinder h = 20 cm ; radius r =14 cm

Now, C.S.A. of the cylinder = 2pπh sq. units

C.S.A. of the cylinder = $2 \times \frac{22}{7} \times 14 \times 20 = 2 \times 22 \times 2 \times 20$

T.S.A. of the cylinder $= 2\pi r(h + r)$sq.units

$= 2 \times \frac{22}{7} \times 14 \times (20 + 14) = 2 \times \frac{22}{7} \times 14 \times 34$

= 2992 cm^2

Therefore, C.S.A. = 1760 cm^2 and T.S.A. = 2992 cm^2

11) A garden roller whose length is 3 m long and whose diameter is 2.8 m is rolled to level a garden. How much area will it cover in 8 revolutions?

Answer : Given that, diameter d = 2.8 m and height = 3 m

radius r = 1.4 m

Area covered in one revolution = curved surface area of the cylinder

= 2πrh sq. units

$2 \times \frac{22}{7} \times 1.4 \times 3 = 26.4$

$2 \times \frac{}{7} \times 1.4 \times 3 = 26.4$

Area covered in 1 revolution = 26.4 m^2

Area covered in 8 revolutions = 8 x 26.4 = 211.2

Therefore, area covered is 211.2 m^2

12) If the total surface area of a cone of radius 7cm is 704 cm^2, then find its slant height.

Answer : Given that, radius r = 7 cm

Now, total surface area of the cone = $\pi r(l + r)$sq.units

T.S.A = 704 cm^2

704 = $\frac{22}{7} \times 7(l + 7)$

32 = l + 7 implies l = 25 cm

Therefore, slant height of the cone is 25 cm.

13) The curved surface area of a right circular cylinder of height 14 cm is 88 cm^2 . Find the diameter of the cylinder.

Answer : Given that, C.S.A. of the cylinder = 88 sq. cm

$2\pi rh = 88$

$2 \times \frac{22}{7} \times 14 = 88$ (given h = 14cm)

2r = $\frac{88 \times 7}{22 \times 14} = 2$

Therefore, diameter = 2 cm

14) The radius of a conical tent is 7 m and the height is 24 m. Calculate the length of the canvas used to make the tent if the width of the rectangular canvas is 4 m?

Answer : Let r and h be the radius and height of the cone respectively.

Given that, radius r = 7 m and height h = 24 m

Hence, l = $\sqrt{r^2 + h^2}$

$= \sqrt{49 + 576}$

$l = \sqrt{625} = 25m$

C.S.A. of the conical tent = πrl sq. units

Area of the canvas $= \frac{22}{7} \times 7 \times 25 = 550m^2$

Now, length of the canvas $\frac{Area\ of\ the\ canvas}{width} = \frac{550}{4} = 137.5m$

Therefore, the length of the canvas is 137.5 m

15) If the base area of a hemispherical solid is 1386 sq. metres, then find its total surface area?

Answer : Let r be the radius of the hemisphere.

Given that, base area = πr^2 = 1386 sq. m

T.S.A. = 3 πr^2 sq.m

= 3 x 1386 = 4158

Therefore, T.S.A. of the hemispherical solid is 4158 m^2.

16) The slant height of a frustum of a cone is 5 cm and the radii of its ends are 4 cm and 1 cm. Find its curved surface area.

Answer : Let l, R and r be the slant height, top radius and bottom radius of the frustum.

Given that, l = 5 cm, R = 4 cm, r = 1 cm

Now, C.S.A. of the frustum π(R + r)l sq.units

$\frac{22}{7} \times (4 + 1) \times 5$

$= \frac{550}{7}$

Therefore, C.S.A. = 78.57 cm^2

17) Find the diameter of a sphere whose surface area is 154 m^2.

Answer : Let r be the radius of the sphere. Given that, surface area of sphere = 154 m^2

$4\pi r^2 = 154$

$4 \times \frac{22}{7} \times r^2 = 154$

gives $r^2 = 154 \times \frac{1}{4} \times \frac{7}{22}$

hence, $r^2 = \frac{49}{4}$ We get r = $\frac{7}{2}$

Therefore, diameter is 7 m

18) The radius of a spherical balloon increases from 12 cm to 16 cm as air being pumped into it. Find the ratio of the surface area of the balloons in the two cases.

Answer : Let r_1 and r_2 be the radii of the balloons.

Given that, $\frac{r_1}{r_2} = \frac{12}{16} = \frac{3}{4}$

Now, ratio of C.S.A. of balloons $= \frac{4\pi r_1^2}{4\pi r_2^2} = \frac{r_1^2}{r_2^2} = \left(\frac{r_1}{r_2}\right)^2 = \left(\frac{3}{4}\right)^2 = \frac{9}{16}$

Therefore, ratio of C.S.A. of balloons is 9:16.

19) The external radius and the length of a hollow wooden log are 16 cm and 13 cm respectively. If its thickness is 4 cm then find its T.S.A.

Answer : External radius of hollow cylinder R = 16 cm

length h = 13 cm

Thickness R - r = 4

16 - r = 4

r = 12 cm

Total surface area of hollow cylinder $= 2\pi(\mathrm{R}+\mathrm{r})(\mathrm{R}-\mathrm{r}+\mathrm{h})$ sq. units

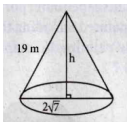
$= 2 \times \frac{22}{7} \times (16+12)(4+13)$

$= 2 \times \frac{22}{7} \times 28 \times 17$

= 2992 sq. cm

20) 4 persons live in a conical tent whose slant height is 19 cm. If each person require 22 cm^2 of the floor area, then find the height of the tent.

Answer :



Each person requires 22 m^2 of floor area.

Required base area = 22 x 4 = 88 m^2

$\pi r^2 = 88$

$r^2 = \frac{88 \times 7}{22} = 4 \times 7$

$r = 2\sqrt{7}\ \mathrm{m}$

slant height = 19 m

height of the tent, h $= \sqrt{l^2 - r^2}$

$= \sqrt{(191)^2 - (2\sqrt{7})^2}$

$= \sqrt{361 - 28} = \sqrt{330} = 18.25\ \mathrm{m}$

Height of the tent = 18.25 m

21) Find the volume of a cylinder whose height is 2 m and whose base area is 250 m^2.

Answer : Let r and h be the radius and height of the cylinder respectively.

Given that, height h = 2 m, base area = 250 m^2

Now, volume of a cylinder = $\pi r\ h^2$ cu. units

= base area x h

= 250 x 2 = 500 m^3

Therefore, volume of the cylinder = 500 m^3

22) Water is flowing at the rate of 15 km per hour through a pipe of diameter 14 cm into a rectangular tank which is 50 m long and 44 m wide. Find the time in which the level of water in the tanks will rise by 21 cm.

Answer : Diameter of cylindrical pipe = 14 cm

Radius = 7 cm

Length of the pipe = Speed of the water

= 15 km = 15000 m

Length of the water tank = 50 m

Width of the water tank = 44 m

Height of the water tank = Water level

= 21 cm

= 0.21 cm

volume of water tank = l x b x h cu. units

= 50 x 44 x 0.21 = 462 m^3

Volume of cylindrical Pipe = Volume of Rectangular tank

$\frac{\pi r^2 h}{} h = 462$

$\frac{22}{7} \times 0.07 \times 0.07 \times h = 462$

$\mathrm{h} = \frac{462 \times 7}{22 \times 0.07 \times 0.07}$

$= \frac{3234}{0.1078} = 30000$

Time required $= \frac{30000}{15000} = 2 \text{ hrs.}$

23) The volume of a solid right circular cone is 11088 cm^3. If its height is 24 cm then find the radius of the cone.

Answer : Let r and h be the radius and height of the cone respectively.

Given that, volume of the cone = 11088 cm^3

$\frac{1}{3}\pi r^2 h = 11088$

$\frac{1}{3} \times \frac{22}{7} \times r^2 \times 24 = 11088$

$r^2 = 441$

Therefore, radius of the cone r = 21 cm.

24) The heights of two right circular cones are in the ratio 1 : 2 and the perimeters of their bases are in the ratio 3 : 4. Find the ratio of their volumes.

Answer : Let the radii of their bases be r and R and their heights be h and 2h respectively. Then 2πr/2πR = 3/4 R=4/3r. Ratio of volumes = 1/3π r2h/1/3π4/3r2 2h = 9 : 32.

25) A 14 m deep well with inner diameter 10 m is dug and the earth taken out is evenly spread all around the well to form an embankment of width 5 m. Find the height of the embankment.

Answer : Radius of well = 5 m

Depth of well = 14 m

Volume of earth taken out $= \pi r^2 h$

$= \frac{22}{7} \times (5)^2 \times 14$

= 1100 m^3

Now, it is spread to form an embankment, which is in the form of hollow cylinder

Innerradius = 5m

Width of embankment = 5 m

Outer radius = 5 + 5 = 10 m

height = h

Volume of hollow cylinder = $\pi h \left(\mathrm{R}^2 - \mathrm{r}^2\right)$

$\therefore \pi h \left(\mathrm{R}^2 - \mathrm{r}^2\right) = 1100$

$\frac{22}{7} \times h \left(10^2 - 5^2\right) = 1100$

height of the embankment

$h = \frac{1100 \times 7}{22 \times 75} = 4.67 \text{ m}$

26) If the ratio of radii of two spheres is 4 : 7, find the ratio of their volumes.

Answer : Let r_1, r_2 be the radii of two spheres

$\text{Given } \frac{r_1}{r_2} = \frac{4}{7} \Rightarrow \mathrm{r}_1 = \frac{4r_2}{7}$

Ratio of the volumes = $\frac{V_1}{V_2} = \frac{\frac{4}{3}\pi r_1^3}{\frac{4}{3}\pi r_2^3}$

$= \frac{\left(\frac{4r_2}{7}\right)^3}{r_2^3} = \frac{4^3}{7^3}$

Ratio of volumes $V_1 : V_2 = 64 : 343 = \frac{64}{343}$

27) The volumes of two cones of same base radius are 3600 cm^3 and 5040 cm^3 . Find the ratio of heights.

Answer : $h_1 : h_2 = 5 : 7$

II. Answer All Questions

16 x 5 = 80

28) A solid iron cylinder has total surface area of 1848 sq.m. Its curved surface area is five – sixth of its total surface area. Find the radius and height of the iron cylinder.

Answer : Given total surface area of cylinder

= 1848 sq.m

(h + r) = 1848

It is given that C.S.A $= \frac{5}{6}(\text{T.S.A})$

$\text{C.S.A} = \frac{5}{6}(1848) = 1540$

$\text{C.S.A} = \frac{5}{6}(\text{T.S.A})$

$2\pi rh = \frac{5}{6}(2\pi r(h + r))$

h = 5r

We have C.S.A = 1540

2rh = 1540

$2 \times \frac{22}{7} \times r \times 5r = 1540$

$r^2 = \frac{1540 \times 7}{44 \times 5} = 49$

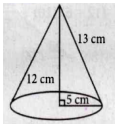
r = 7

h = 5r = 5(7) = 35

radius = 7 m , height = 35 m

29) A girl wishes to prepare birthday caps in the form of right circular cones for her birthday party, using a sheet of paper whose area is 5720 cm^2, how many caps can be made with radius 5 cm and height 12 cm.

Answer :



Area of the paper = 5720 cm^2

Given radius of birthday cap r = 5 cm

height of birthday cap 'h' = 12 cm

slant height $l = \sqrt{h^2 + r^2}$

$= \sqrt{12^2 + 5^2} = \sqrt{144 + 25}$

$= \sqrt{169} = 13 \text{ cm}$

CSA of conical cap = πrl sq. units

$= \frac{22}{7} \times 5 \times 13 = \frac{1430}{7}$

Number of birthday caps

$= \frac{\text{Area of paper sheet}}{\text{CSA of conical cap}}$

$= \frac{5720}{1430} \times 7 = 28 \text{ caps}$

30) The radius and height of a cylinder are in the ratio 5 : 7 and its curved surface area is 5500 sq.cm. Find its radius and height.

Answer : Given that radius and height of a cylinder are in the ratio 5 : 7

i.e., $\frac{r}{h} = \frac{5}{7} \Rightarrow h = \frac{7r}{5}$

Curved surface area = 5500 sq. cm

$2\pi rh = 5500$

$2 \times \frac{22}{7} \times r \times \frac{7r}{5} = 5500$

$r^2 = \frac{5500 \times 5}{2 \times 22}$

$r^2 = 625 \Rightarrow r = 25$

$= \frac{7(25)}{5} = 35$

radius = 25 cm, height = 35 cm

31) The frustum shaped outer portion of the table lamp has to be painted including the top part. Find the total cost of painting the lamp if the cost of painting 1 sq.cm is Rs. 2.

Answer : From the figure

r = 6 cm

R = 12 cm

h = 8 cm

$l = \sqrt{h^2 + (\mathrm{R} - \mathrm{r})^2}$

$= \sqrt{8^2 + (12 - 6)^2}$

$= \sqrt{64 + 36}$

$= \sqrt{100} = 10 \text{ cm}$

Area to be painted = C.S.A + area of top circular region

$= \pi(R + r)l + \pi r^2$

$= \frac{22}{7}(12 + 6)(10) + \frac{22}{7}(6)^2$

$= \frac{22}{7}(180) + \frac{22}{7}(36)$

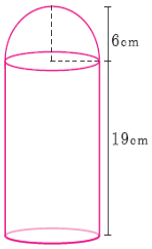
$= \frac{22}{7}(180 + 36)$

$= \frac{22}{7}(216) = \frac{4752}{7} = 678.86$

Cost of painting per sq. cm = Rs. 2

Total cost = 678.86 x 2 = Rs. 1357.72

32) A toy is in the shape of a cylinder surrounded by a hemisphere. The height of the toy is 25 cm. Find the total surface area of the toy if its common diameter is 12 cm.



Answer : Let r and h be the radius and height of the cylinder respectively.

Given that, diameter d = 12 cm, radius r = 6 cm

Total height of the toy is 25 cm

Therefore, height of the cylindrical portion = 25 - 6 = 19 cm

T.S.A. of the toy = C.S.A. of the cylinder + C.S.A. of the hemisphere + Base Area of the cylinder

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

$= \pi r(2h + 3r) \quad sq.units$

$\frac{22}{7} \times 6 \times 56 = 1056$

Therefore, T.S.A. of the toy is 1056 cm^2

33) The volume of a solid hemisphere is 29106 cm^3. Another hemisphere whose volume is two-third of the above is carved out. Find the radius of the new hemisphere.

Answer : Let r be the radius of the hemisphere.

Given that, volume of the hemisphere = 29106 cm^3

Now, volume of new hemisphere = $\frac{2}{3}$(Volume of original sphere)

= $\frac{2}{3}$ x 29106

Volume of new hemisphere = 19404 cm^3

$\frac{2}{3}\pi r^3 = 19404$

$r^3 = \frac{19404 \times 3 \times 7}{2 \times 22} = 9261$

$r = \sqrt[3]{9261} = 21cm$

Therefore, r = 21 cm

34) A cylindrical glass with diameter 20 cm has water to a height of 9 cm. A small cylindrical metal of radius 5 cm and height 4 cm is immersed it completely. Calculate the raise of the water in the glass?

Answer : Diameter of Glass = 20 cm

radius = 10 cm

water upto height = 9 cm

radius of cylindrical metal = 5 cm

height of cylindrical metal = 4 cm

Volume of water displaced = Volume of cylindrical metal

$\pi r_1^2 h_1 = \pi r_2^2 h_2$

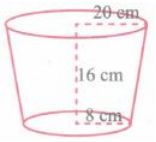
$(10)^2 h_1 = (5)^2(4)$

$h_1 = \frac{100}{100} = 1 \text{ cm}$

Hence, the increase in water level is 1 cm.

35) A container open at the top is in the form of a frustum of a cone of height 16 cm with radii of its lower and upper ends are 8 cm and 20 cm respectively. Find the cost of milk which can completely fill a container at the rate of Rs. 40 per litre.

Answer :



Given radius of lower end r = 8 cm

radius of upper end R = 20 cm

height h = 16 cm

Volume $= \frac{\pi h}{3}\left(\mathrm{R}^2 + \mathrm{Rr} + \mathrm{r}^2\right) \text{ cu. } units$

$= \frac{22\times16}{7\times3}\left((20)^2 + (20)(8) + (8)^2\right)$

$= \frac{22\times16}{21}[400 + 160 + 64]$

$= \frac{22\times16}{21}(624) = 10459.43 \text{ cm}^3$

$= \frac{10459.43}{1000}\left[\because 1000 \text{ cm}^3 = 1\, litre\right]$

= 10.45943 litre

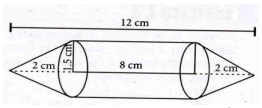
Cost of milk per litre = Rs. 40

Total cost = 10.459 x 40

= Rs. 418.36

36) Nathan, an engineering student was asked to make a model shaped like a cylinder with two cones attached at its two ends. The diameter of the model is 3 cm and its length is 12 cm. If each cone has a height of 2 cm, find the volume of the model that Nathan made.

Answer :



From the figure, radius of cylinder = $\frac{3}{2} = 1.5 \text{ cm}$

Height = 8 cm

Volume of cylinder $= \pi r^2 h \text{ cu. units}$

$= \frac{22}{7} \times 1.5 \times 1.5 \times 8$

Radius of cone = 1.5 cm

Height of cone = 2 cm

Volume of 2 cones $= 2\left(\frac{1}{3}\pi r^2 h\right)\ cu.\ units$

$= \frac{2}{3} \times \frac{22}{7} \times 1.5 \times 1.5 \times 2$

Volume of the model = Volume of cylinder + Volume of 2 cones

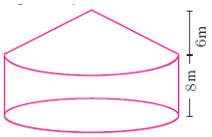
$= \frac{22}{7} \times (1.5)^2 \left[8 + \frac{4}{3}\right]$

$= \frac{22}{7} \times 2.25 \times \frac{28}{3}|$

$= \frac{1386}{21} = 66 \text{ cm}^3$

37) Arul has to make arrangements for the accommodation of 150 persons for his family function. For this purpose, he plans to build a tent which is in the shape of cylinder surmounted by a cone. Each person occupies 4 sq. m of the space on ground and 40 cu. meter of air to breathe. What should be the height of the conical part of the tent if the height of cylindrical part is 8 m?

Answer :



Let h_1 and h_2 be the height of cylinder and cone respectively

Area for one person = 4 sq.m

Total number of persons = 150

Therefore total base area = 150 x 4

$\pi r^2 = 600$ .....(1)

Volume of air required for 1 person = $40m^3$

Total Volume of air required for 150 persons = 150 x 40 = 6000 m^3

$\pi r^2 h_1 + \frac{1}{3}\pi r^2 = 6000$

$\pi r^2 \left(h_1 + \frac{1}{3}h_2\right) = 6000$

$600 \left(8 + \frac{1}{3}h_2\right) = 6000 \quad [using\ (1)]$

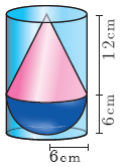
$8 + \frac{1}{3}h_2 = \frac{6000}{600}$

$\frac{1}{3}h_2 = 10 - 8 = 2$

h_2 = 6 m

Therefore, the height of the conical tent h_2 is 6 m

38) A solid consisting of a right circular cone of height 12 cm and radius 6 cm standing on a hemisphere of radius 6 cm is placed upright in a right circular cylinder full of water such that it touches the bottom. Find the volume of the water displaced out of the cylinder, if the radius of the cylinder is 6 cm and height is 18 cm.



Answer : Radius of hemisphere = 6 cm

Volume of hemisphere $= \frac{2}{3}\pi r^3$ cu. units

$= \frac{2}{3}\pi(6)^3$

$= \frac{2}{3}\pi(216)$

$= 144\pi cm^3$

base of cone = 6 cm

Height of the cone = 12 cm

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

$= \frac{1}{3}\pi(6)^2(12)$

= 144 cm^3

volume of the solid = Volume of cone + Volume of hemisphere

$= 144\pi + 144\pi = 288\pi$

Volume of water displaced

= Volume of the solid placed in the cylinder

$= 288\pi = 288 \times \frac{22}{7}$

= 905.14 cm^3

39) From a solid cylinder whose height is 2.4 cm and the diameter 1.4 cm, a cone of the same height and same diameter is carved out. Find the volume of the remaining solid to the nearest cm^3.

Answer : Diameter of a solid cylinder = 1.4 cm

Radius of a solid cylinder = $\frac{1.4}{2} = 0.7$ cm

Height of a solid cylinder = 2.4 cm

Volume of the cylinder = $\pi r^2 h$ cu. units

$= \frac{22}{7} \times 0.7 \times 0.7 \times 2.4$

Radius of cone = 0.7 cm

Height of cone = 2.4 cm

volume of cone $= \frac{1}{3}\pi r^2 h$ cu. units

$= \frac{1}{3} \times \frac{22}{7} \times 0.7 \times 0.7 \times 2.4$

Volume of the remaining solid = Volume of cylinder - Volume of cone

$= \frac{22}{7} \times 0.7 \times 0.7 \times 2.4 - \frac{1}{3} \times \frac{22}{7} \times 0.7 \times 0.7 \times 2.4$

$= \frac{22}{7} \times 0.7 \times 0.7 \times 2.4 \left(1 - \frac{1}{3}\right)$

$= \frac{22}{7} \times 0.7 \times 0.7 \times 2.4 \times \frac{2}{3}$

= 2.464 cm^3

40) A metallic sphere of radius 16 cm is melted and recast into small spheres each of radius 2 cm. How many small spheres can be obtained?

Answer : Let the number of small spheres obtained be n.

Let r be the radius of each small sphere and R be the radius of metallic sphere.

Here, R = 16 cm, r = 2 cm

Now, n×(Volume of a small sphere) = Volume of big metallic sphere

$n\left(\frac{4}{3}\pi r^2\right) = \frac{4}{3}\pi R^3$

$n\left(\frac{4}{3}\pi \times 2^3\right) = \frac{4}{3}\pi \times 16^3$

8n = 4096 gives n = 512

Therefore, there will be 512 small spheres.

41) A cone of height 24 cm is made up of modeling clay. A child reshapes it in the form of a cylinder of same radius as cone. Find the height of the cylinder.

Answer : Let h_1 and h_2 be the heights of a cone and cylinder respectively.

Also, let r be the raius of the cone.

Given that, height of the cone h_1 = 24 cm; radius of the cone and cylinder r = 6 cm

Since, Volume of cylinder = Volume of cone

$\pi r^2 = \frac{1}{3}\pi r^2 h_1$

$h_2 = \frac{1}{3} \times h_1 \quad gives \quad h_2 = \frac{1}{3} \times 24 = 8$

Therefore, height of cylinder is 8 cm

42) An aluminium sphere of radius 12 cm is melted to make a cylinder of radius 8 cm. Find the height of the cylinder.

Answer : Radius of sphere = 12 cm

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

= $\frac{4}{3}\pi(12)^3$

$= 2304\pi \text{cm}^3$

Radius of cylinder = 8 cm

height = h cm

Volume of cylinder = $\pi r^2 h$ cu. units

= $\pi(8)^2 h$

= $64\pi \text{hcm}^3$

Given that sphere is melted and cast into a cylinder

Volume of cylinder = Volume of sphere

$64\pi h = 2304\pi$

$h = \frac{2304\pi}{64\pi} = 36$

Height of the cylinder = 36 cm.

43) The internal and external diameter of a hollow hemispherical shell are 6 cm and 10 cm respectively. If it is melted and recast into a solid cylinder of diameter 14 cm, then find the height of the cylinder.

Answer : Hollow Hemisphere

Internal diameter = 6 cm

Internal radius 'r' = 3 cm

External diameter = 10 cm

External radius 'R' = 5 cm

$$\left.\begin{matrix}\text{Volume of hemisphere (or)}\\ \text{Volume of material used}\end{matrix}\right\} = \frac{2}{3}\pi\left(\mathrm{R}^3 - \mathrm{r}^3\right) \text{ cu. units}$$

$= \frac{2}{3}\pi\left(5^3 - 3^3\right)$

$= \frac{2}{3}\pi(125 - 27) = \frac{196\pi}{3}\ \mathrm{cm}^3$

Cylinder

Diameter = 14 cm

radius = 7 cm

height = h

Volume of cylinder $= \pi r^2 h\ cu.\ units$

$= \pi(7)^2 h$

$= 49\pi h\ \mathrm{cm}^3$

Given that hollow hemisphere is melted and cast into a solid cylinder

Volume of cylinder = volume of hollow hemisPhere

$49\pi h = \frac{196\pi}{3}$

$h = \frac{196}{3\times 49} = \frac{4}{3} = 1.33$

Height of the cylinder = 1.33 cm.