8. Mensuration

Exercise 8.1

1. Question

A solid right circular cylinder has radius of 14 cm and height of 8 cm. Find its curved surface area and total surface area.

Answer

Given : radius of cylinder = r = 14 cm

height of cylinder = h = 8 cm

To find : Curved surface area = CSA of cylinder = ?

Total surface area = TSA of cylinder = ?

Formula : CSA of cylinder = 2πrh

TSA of cylinder = 2πr (h + r)

Solution : CSA of cylinder = $2\pi rh = 2 \times \frac{22}{7} \times 14 \times 8$

$= 44 \times 16 = 704\ cm^2$

TSA of cylinder = $2\pi r\ (h + r) = 2 \times \frac{22}{7} \times 14\ (8 + 14)$

$= 88 \times 22 = 1936\ cm^2$

∴ The curved surface area and the total surface area of the right circular cylinder is 704 cm^2 and 1936 cm^2 respectively.

2. Question

The total surface area of a solid right circular cylinder is 660 sq.cm. If its diameter of the base is 14 cm, find the height and curved surface area of the cylinder.

Answer

Given : Total surface area (TSA) of cylinder = 660 sq.cm.

Diameter of the base of the cylinder = d = 14 cm

To find : Height of cylinder = h = ?

Curved surface area (CSA) of cylinder = ?

Formula : d = 2r

TSA of cylinder = 2πr (h + r)

CSA of cylinder = 2πrh

Solution : diameter = d = 2r

$\Rightarrow$ Radius = $r = \frac{d}{2} = \frac{14}{2} = 7$ cm

TSA of cylinder = $2\pi r\ (h + r)$

$\Rightarrow 660 = 2 \times \frac{22}{7} \times 7\ (h + 7)$

$660 = 44\ (h + 7)$

$44\ (h + 7) = 660$

$\Rightarrow h + 7 = \frac{660}{44}$

h + 7 = 15

⇒ h = 15 – 7

h = 8 cm

CSA of cylinder = $2\pi rh = 2 \times \frac{22}{7} \times 7 \times 8$

$= 44 \times 8 = 352\ cm^2$

∴ The height of the right circular cylinder is 8 cm and its curved surface area is 352 cm^2.

3. Question

Curved surface area and circumference at the base of a solid right circular cylinder are 4400 sq.cm and 110 cm respectively. Find its height and diameter.

Answer

Given : CSA of cylinder = 4400 sq.cm

Circumference of the base of cylinder = 110 cm

To find : Height of cylinder = h = ?

Diameter = d = ?

Formula : circumference = 2πr

CSA of cylinder = 2πrh

Solution : circumference of base = $2\pi r$

⇒ $110 = 2\pi r$ (1)

CSA of cylinder = $2\pi rh = 2\pi r \times h$

4400 = 110 × h [from (1)]

⇒ $h = \frac{4400}{110} = 40$ cm

Circumference = πd

⇒ $110 = \frac{22}{7} \times d$

$d = \frac{110 \times 7}{22} = 35$ cm

∴ The height and diameter of the right circular cylinder are 40 cm and 35 cm respectively.

4. Question

A mansion has 12 right cylindrical pillars each having radius 50 cm and height 3.5 m. Find the cost to paint the lateral surface of the pillars at Rs 20 per square metre.

Answer

Given : Radius of cylindrical pillar = r = 50 cm = 0.5 m

Height of cylindrical pillar = h = 3.5 m

Number of cylindrical pillars = 12

Cost of painting per square metre = Rs 20

To find : The cost of painting the lateral surface of the pillars

Formula : CSA of cylinder = 2πrh

Solution : The lateral surface of a cylinder is the curved surface of the cylinder.

Area to be painted for one pillar = CSA of cylinder = 2πrh

$= 2 \times \frac{22}{7} \times 0.5 \times 3.5$

$= 11\ m^2$

Total area to be painted for 12 cylinders = 11 × 12 = 132 m^2

Total cost of painting = Area to be painted × cost of painting per square meter

= 132 × 20 = Rs 2640

∴ The cost of painting 12 cylindrical pillars is Rs 2640.

5. Question

The total surface area of a solid right circular cylinder is 231 cm^2. Its curved surface area is two thirds of the total surface area. Find the radius and height of the cylinder.

Answer

Given : TSA of cylinder = 231 cm^2

CSA of cylinder $= \frac{2}{3}$ TSA of cylinder $= \frac{2}{3} \times 231 = 154\ cm^2$

To find : Radius of cylinder = r = ?

Height of cylinder = h = ?

Formula : CSA of cylinder = 2πrh

TSA of cylinder = 2πr (h + r)

Solution : CSA of cylinder = 2πrh

$\Rightarrow 2 \times \frac{22}{7} \times r \times h = 154$

$r \times h = \frac{154 \times 7}{2 \times 22} = 24.5$ (1)

TSA of cylinder = 2πr (h + r)

$\Rightarrow 2\pi rh + 2\pi r^2 = 231$

$154 + 2\pi r^2 = 231$

$\Rightarrow 2\pi r^2 = 231 - 154 = 77$

$2 \times \frac{22}{7} \times r^2 = 77$

$\Rightarrow r^2 = \frac{77 \times 7}{2 \times 22} = \frac{49}{4}$

$\Rightarrow r = \frac{7}{2} = 3.5$ cm

From (1),

$r \times h = 24.5$

$\Rightarrow 3.5 \times h = 24.5$

$\Rightarrow h = \frac{24.5}{3.5}$

h = 7 cm

∴ The radius and height of the right circular cylinder is 3.5 cm and 7 cm respectively.

6. Question

The total surface area of a solid right circular cylinder is 1540 cm^2. If the height is four times the radius of the base, then find the height of the cylinder.

Answer

Given : TSA of cylinder = 1540 cm^2

To find : Height of cylinder = h = ?

Formula : TSA of cylinder = $2\pi r (h + r)$

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

According to the given condition,

$h = 4r$

$\Rightarrow r = \frac{h}{4}$

TSA of cylinder = $2\pi r (h + r)$

$\Rightarrow 1540 = 2 \times \frac{22}{7} \times \frac{h}{4} (h + \frac{h}{4})$

$1540 = \frac{11 \times h}{7} (\frac{5 \times h}{4})$

$h^2 = \frac{1540 \times 7 \times 4}{11 \times 5} = 28 \times 28$

$\Rightarrow h = 28$ cm

$\therefore$ The height of the right circular cylinder is 8 cm.

7. Question

The radii of two right circular cylinders are in the ratio of 3 : 2 and their heights are in the ratio 5 : 3. Find the ratio of their curved surface areas.

Answer

Given : Ratio of radii of two cylinders = $r_1 : r_2 = 3 : 2$

Ratio of heights of the two cylinders = $h_1 : h_2 = 5 : 3$

To find : Ratio of CSA of the two cylinders = $C_1 : C_2$ = ?

Formula : CSA of cylinder = $2\pi rh$

Solution : CSA of first cylinder = $C_1 = 2\pi r_1 h_1$

CSA of first cylinder = $C_2 = 2\pi r_2 h_2$

$\therefore \frac{C_1}{C_2} = \frac{2\pi r_1 h_1}{2\pi r_2 h_2} = \left(\frac{r_1}{r_2}\right)\left(\frac{h_1}{h_2}\right)$

$\Rightarrow \frac{C_1}{C_2} = \left(\frac{3}{2}\right)\left(\frac{5}{3}\right) = \frac{5}{2}$

$\therefore C_1 : C_2 = 5 : 2$

$\therefore$ The ratio of the curved surface areas of the two cylinders is 5 : 2.

8. Question

The external surface area of a hollow cylinder is 540 πsq.cm. Its internal diameter is 16 cm and height is 15 cm. Find the total surface area.

Answer

Given : External surface area of hollow cylinder = $CSA_{ext} = 540\pi$ cm^2

Internal diameter = d = 16 cm

Height of the hollow cylinder = h = 15 cm

To find : Total surface area = TSA of hollow cylinder = ?

Formula : $r = \frac{d}{2}$

CSA of cylinder = $2\pi rh$

Solution : Internal radius of cylinder = $r = \frac{d}{2} = \frac{16}{2} = 8$ cm

Internal surface area of hollow cylinder = $CSA_{int} = 2\pi rh$

$= 2\pi \times 8 \times 15$

$= 16\pi \times 15 = 240\pi$ cm^2

TSA of hollow cylinder = $CSA_{ext} + CSA_{int} = 540\pi + 240\pi$

$= 780\pi$ cm^2

∴ The total surface area of the hollow cylinder is 780π cm^2.

9. Question

The external diameter of a cylindrical shaped iron pipe is 25 cm and its length is 20 cm. If the thickness of the pipe is 1cm, find the total surface area of the pipe.

Answer

Given : External diameter of pipe = $d_{ext} = 25$ cm

Thickness of pipe = 1 cm

Height of the hollow cylinder = h = 20 cm

To find : Total surface area of pipe = TSA of hollow cylinder = ?

Formula : $r = \frac{d}{2}$

CSA of cylinder = $2\pi rh$

Solution : External radius of pipe = $r_{ext} = \frac{d_{ext}}{2} = \frac{25}{2} = 12.5$ cm

External surface area of pipe = $CSA_{ext} = 2\pi r_{ext}h$

$= 2\pi \times 12.5 \times 20$

$= 500\pi$ cm^2

Thickness of pipe = 1 cm

∴ Internal radius of pipe = $r_{int} = r_{ext} - 1 = 12.5 - 1 = 11.5$ cm

Internal surface area of pipe = $CSA_{int} = 2\pi r_{int}h$

$= 2\pi \times 11.5 \times 20$

$= 460\pi$ cm^2

TSA of hollow cylinder = $CSA_{ext} + CSA_{int} = 500\pi + 460\pi$

$= 960\pi$ cm^2

∴ The total surface area of the hollow cylinder is 960π cm^2.

10. Question

The radius and height of a right circular solid cone are 7 cm and 24 cm respectively. Find its curved surface area and total surface area.

Answer

Given : Radius of cone = r = 7 cm

Height of cone = h = 24 cm

To find : CSA of cone = ?

TSA of cone = ?

Formula : $l = \sqrt{(r^2 + h^2}$

CSA of cone = πrl

TSA of cone = $\pi r\ (r + l)$

Solution : $l = \sqrt{r^2 + h^2} = \sqrt{7^2 + 24^2} = \sqrt{49 + 576} = \sqrt{625}$ = 25 cm

CSA of cone = $\pi rl = \frac{22}{7} \times 7 \times 25 = 22 \times 25 = 550\ cm^2$

TSA of cone = $\pi r\ (r + l) = \frac{22}{7} \times 7\ (25 + 7) = 22 \times 32 = 704\ cm^2$

∴ The curved surface area and total surface area of the right circular cone is 550 cm^2 and 704 cm^2 respectively.

11. Question

If the vertical angle and the radius of a right circular cone are 60° and 15 cm respectively, then find its height and slant height.

Answer

Given : Radius of cone = r = 15 cm

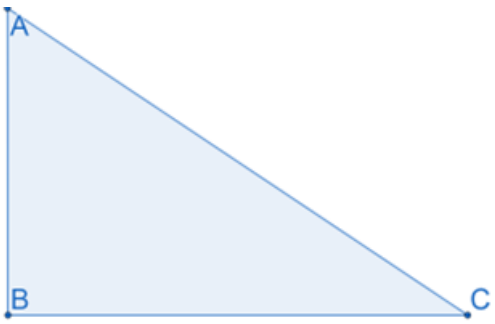
Vertical angle = θ = 60°

To find : height of cone = h = ?

Slant height of cone = l = ?

Formula : $l = \sqrt{r^2 + h^2}$

Solution :



Here, the vertical angle = ∠ A = 60°

AB = height

BC = radius = 15 cm

AC = slant height

In Δ ABC, AC is the hypotenuse.

$\tan\theta = \frac{BC}{AB}$

$\Rightarrow \tan 60° = \frac{15}{h}$

$\sqrt{3} = \frac{15}{h}$

$\therefore h = \frac{15}{\sqrt{3}} = 5\sqrt{3}$ cm

$l = \sqrt{r^2 + h^2} = \sqrt{15^2 + (5\sqrt{3})^2} = \sqrt{225 + 75}$ $l = \sqrt{300} = 10\sqrt{3}$ cm

∴ The height and slant height of the right circular cone are $5\sqrt{3}$ cm and $10\sqrt{3}$ cm respectively.

12. Question

If the circumference of the base of a solid right circular cone is 236 cm and its slant height is 12 cm, find its curved surface area.

Answer

Given : Circumference of base of cone = 236 cm

Slant height of cone = l = 12 cm

To find : CSA of cone = ?

Formula : Circumference = $2\pi r$

CSA of cone = πrl

Solution : Circumference = $2\pi r$

$\Rightarrow 2 \times \pi r = 236$

$\pi r = \frac{236}{2} = 118$

CSA of cone = $\pi rl = 118 \times 12 = 1416$ cm^2

∴ The curved surface area of the solid right circular cone is 1416 cm^2.

13. Question

A heap of paddy is in the form of a cone whose diameter is 4.2 m and height is 2.8 m. If the heap is to be covered exactly by a canvas to protect it from rain, then find the area of the canvas needed.

Answer

Given : Diameter of paddy = d = 4.2 m

Height of paddy = h = 2.8 m

To find : Area of canvas needed to cover paddy = ?

Formula : $l = \sqrt{r^2 + h^2}$

CSA of cone = πrl

Solution : radius of paddy = $r = \frac{d}{2} = \frac{4.2}{2} = 2.1$ m

$l = \sqrt{r^2 + h^2} = \sqrt{2.1^2 + 2.8^2} = \sqrt{4.41 + 7.84} = \sqrt{12.25} = 3.5$ m

Area of canvas needed = CSA of cone = $\pi rl = \frac{22}{7} \times 2.1 \times 3.5 = 23.1$ m^2

∴ Area of canvas needed to cover the paddy is 23.1 m^2.

14. Question

The central angle and radius of a sector of a circular disc are 180° and 21 cm respectively. If the edges of the sector are joined together to make a hollow cone, then find the radius of the cone.

Answer

Given : Radius of circular disc = r = 21 cm

Central angle of sector = θ = 180°

To find : Radius of cone = R = ?

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

CSA of cone = πrl

Solution : When the edges of the sector are joined to form a cone, the radius of the sector becomes the slant height of the cone.

The area of the sector = CSA of the cone

$\Rightarrow \frac{\theta}{360^\circ} \times \pi r^2 = \pi Rl$

$\frac{180}{360} \times \pi \times 21 \times 21 = \pi \times R \times 21$

$\frac{441}{2} = 21R$

$\Rightarrow R = \frac{441}{2 \times 21} = \frac{21}{2} = 10.5$ cm

∴ The radius of the hollow cone formed by the sector of the circular disc is 10.5 cm.

15. Question

Radius and slant height of a solid right circular cone are in the ratio 3 : 5. If the curved surface area is 60 πsq.cm, then find its total surface area.

Answer

Given : Ratio of radius and slant height of cone = r : l = 3 : 5

CSA of cone = 60π sq.cm

To find : TSA of cone = ?

Formula : CSA of cone = πrl

TSA of cone = πr (r + l)

Solution : Ratio of radius and slant height = 3 : 5

$\Rightarrow \left(\frac{r}{l}\right) = \frac{3}{5}$

$r = \frac{3l}{5}$

CSA of cone = πrl

$60\pi = \pi \times \frac{3l}{5} \times l$

$\Rightarrow l^2 = \frac{60\pi \times 5}{3\pi} = 100$

$\Rightarrow$ l = 10 cm

$\therefore r = \frac{3l}{5} = \frac{3\times10}{5} = 6$ cm

TSA of cone = $\pi r (r + l) = \frac{22}{7} \times 6 (6 + 10) = \frac{22\times6\times16}{7} = \frac{2112}{7} = 301\frac{5}{7}$ cm^2

$\therefore$ The total surface area of the solid right circular cone is $301\frac{5}{7}$ cm^2.

16. Question

If the curved surface area of a solid sphere is 98.56 cm^2, then find the radius of the sphere.

Answer

Given : CSA of sphere = 98.56 cm^2

To find : Radius of sphere = r = ?

Formula : CSA of sphere = $4\pi r^2$

Solution : CSA of sphere = $4\pi r^2$

$\Rightarrow 4\pi r^2 = 98.56$

$4 \times \frac{22}{7} \times r^2 = 98.56$

$r^2 = \frac{98.56\times7}{4\times22} = 7.84$

$\Rightarrow r = 2.8$ cm

$\therefore$ The radius of the solid sphere is 2.8 cm.

17. Question

If the curved surface area of a solid hemisphere is 2772 sq.cm, then find its total surface area.

Answer

Given : CSA of hemisphere = 2772 sq.cm

To find : TSA of hemisphere = ?

Formula : CSA of hemisphere = $2\pi r^2$

TSA of hemisphere = $3\pi r^2$

Solution : CSA of hemisphere = $2\pi r^2$

$\Rightarrow 2\pi r^2 = 2772$

$2 \times \frac{22}{7} \times r^2 = 2772$

$\Rightarrow r^2 = \frac{2772\times7}{2\times22} = 441$

$\Rightarrow r = 21$ cm

TSA of hemisphere = $3\pi r^2 = 3 \times \frac{22}{7} \times 21 \times 21 = 4158$ cm^2

$\therefore$ The total surface area of the solid hemisphere is 4158 cm^2.

18. Question

Radii of two solid hemispheres are in the ratio 3 : 5. Find the ratio of their curved surface areas and the ratio of their total surface areas.

Answer

Given : Ratio of radii of two hemispheres = $r_1 : r_2 = 3 : 5$

To find : Ratio of curved surface areas = $C_1 : C_2$ = ?

Ratio of total surface areas = $T_1 : T_2$ = ?

Formula : CSA of hemisphere = $2\pi r^2$

TSA of hemisphere = $3\pi r^2$

Solution : CSA of first hemisphere = $C_1 = 2\pi {r_1}^2$

CSA of second hemisphere = $C_2 = 2\pi {r_2}^2$

$$\Rightarrow \frac{C_1}{C_2} = \frac{2\pi r_1^2}{2\pi r_2^2} = \left(\frac{r_1}{r_2}\right)^2 = \left(\frac{3}{5}\right)^2 = \frac{9}{25}$$

TSA of first hemisphere = $T_1 = 3\pi {r_1}^2$

TSA of second hemisphere = $T_2 = 3\pi {r_2}^2$

$$\Rightarrow \frac{T_1}{T_2} = \frac{3\pi r_1^2}{3\pi r_2^2} = \left(\frac{r_1}{r_2}\right)^2 = \left(\frac{3}{5}\right)^2 = \frac{9}{25}$$

∴ The ratio of the curved surface areas and total surface areas of the two solid hemispheres is 9 : 25 and 9 : 25 respectively.

19. Question

Find the curved surface area and total surface area of a hollow hemisphere whose outer and inner radii are 4.2 cm and 2.1 cm respectively.

Answer

Given : Inner radius of hollow hemisphere = r_{int} = 2.1 cm

Outer radius of hollow hemisphere = r_{ext} = 4.2 cm

To find : CSA of hollow hemisphere = ?

TSA of hollow hemisphere = ?

Formula : CSA of hemisphere = $2\pi r^2$

TSA of hemisphere = $3\pi r^2$

Solution : Outer surface area = $CSA_{ext} = 2\pi {r_{ext}}^2 = 2\pi \times 4.2 \times 4.2 = 35.28\pi$ cm^2

Inner surface area = $CSA_{int} = 2\pi {r_{int}}^2 = 2\pi \times 2.1 \times 2.1 = 8.82\pi$ cm^2

Area of the edges = $\pi ({r_{ext}}^2 - {r_{int}}^2) = \pi (4.2^2 - 2.1^2) = 13.23\pi$ cm^2

Curved surface area of hollow hemisphere = $CSA_{ext} + CSA_{int} = 35.28\pi + 8.82\pi = 44.1\pi$ cm^2

Total surface area of hollow hemisphere = CSA + Area of edges = $44.1\pi + 13.23\pi = 57.33\pi$ cm^2

∴ The curved surface area and total surface area of the hollow cylinder is 44.1π cm^2 and 57.33π cm^2 respectively.

20. Question

The inner curved surface area of a hemispherical dome of a building needs to be painted. If the circumference of the base is 17.6 m, find the cost of painting it at the rate of Rs 5 per sq. m.

Answer

Given : Circumference of base of dome = 17.6 m

Rate of painting = Rs 5 per sq.m

To find : Total cost of painting inside the dome = ?

Formula : Circumference = $2\pi r$

CSA of hemisphere = $2\pi r^2$

Solution : Circumference of the base = $2\pi r$

$\Rightarrow 2 \times \frac{22}{7} \times r = 17.6$

$r = \frac{17.6 \times 7}{2 \times 22} = 2.8$ m

The area to be painted = CSA of hemisphere = $2\pi r^2 = 2 \times \frac{22}{7} \times 2.8 \times 2.8 = 49.28$ m^2

Rate of painting = Rs 5 per sq.m

The total cost of painting = 49.28 × 5 = Rs 246.40

∴ The cost of painting the hemispherical dome on the inside is Rs 246.40.

Exercise 8.2

1. Question

Find the volume of a solid cylinder whose radius is 14 cm and height 30 cm.

Answer

GIVEN : radius of solid cylinder “r” = 14cm

height of solid cylinder “h” = 30cm

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

TO FIND : volume of a solid cylinder = ?

PROCEDURE :

As we know, that

Volume of a cylinder “V” = $\pi r^2 h$

So we now put the values of r and h in the above formula

So we get, $V = \pi \times (14)^2 \times (30)$

$= \pi \times 196 \times 30$

$= \frac{22}{7} \times 196 \times 30$

$= 22 \times 28 \times 30$

$= 18480$ cm^3

∴ The volume of the given cylinder is 18480 cm^3.

2. Question

A patient in a hospital is given soup daily in a cylindrical bowl of diameter 7 cm. If the bowl is filled with soup to a height of 4 cm, then find the quantity of soup to be prepared daily in the hospital to serve 250 patients?

Answer

GIVEN : diameter of cylindrical bowl = 7cm

Radius of cylinder “r” = 3.5cm

Height upto which the soup is filled “h” = 4cm

No. of patients daily = 250

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

TO FIND : quantity of soup to be prepared daily in the hospital to serve 250 patients = ?

PROCEDURE :

Volume of a cylindrical bowl “V” = $\pi r^2 h$

Putting the values in the above formula, we get

$V = \frac{22}{7} \times (3.5)^2 \times 4$

$V = \frac{22}{7} \times 3.5 \times 3.5 \times 4$

$= \frac{22}{2} \times 3.5 \times 4$

$= 22 \times 3.5 \times 2$

$= 154 cm^3$

∴ volume of 1 bowl = $154 cm^3$

⇒ volume of 250 bowls = $250 \times 154 cm^3 = 38500 cm^3$

Quantity of soup in the 250 bowls = $38500 \times \frac{1}{1000}$ litres

{∵ $1 litre = 1000 cm^3$)

Quantity of soup in the 250 bowls = $\frac{38500}{1000}$ litres = 38.5 litres.

∴ Quantity of soup in the 250 bowls is 38.5 litres.

3. Question

The sum of the base radius and the height of a solid right circular solid cylinder is 37 cm. If the total surface area of the cylinder is 1628 sq.cm, then find the volume of the cylinder.

Answer

GIVEN : radius of cylinder be “r” and its height be “h”

r + h = 37cm

TSA (total surface area) of the cylinder = 1628 sq.cm

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

TO FIND : volume of a solid cylinder = ?

PROCEDURE :

As we know that, TSA of a cylinder = $2\pi r(r + h)$

Now putting the values of “r + h” and “TSA” in the above formula,

We get,

$1628 = 2\pi r(37)$

$\frac{1628}{37} = 2\pi r$

$44 = 2\pi r$

$r = \frac{44}{2\pi} = \frac{44}{2\times\frac{22}{7}} = \frac{44}{\frac{44}{7}} = 44 \times \frac{7}{44} = 7cm$

∴ r = 7cm

Now we have, r + h = 37

So, we have, 7 + h = 37

So, h = 37-7 = 30cm

∴ h = 30cm

Now that we have values of radius and height of the cylinder, we can find the volume of the cylinder.

Volume of the cylinder “V” = $\pi r^2 h$

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

$= \frac{22}{7} \times 7 \times 7 \times 30$

$= 22 \times 7 \times 30$

$= 4620\ cm^3$

∴ The volume of the given cylinder is 4620 cm^3.

4. Question

Volume of a solid cylinder is 62.37 cu.cm. Find the radius if its height is 4.5 cm.

Answer

GIVEN : radius of solid cylinder = “r”

height of solid cylinder “h” = 4.5cm

volume of the cylinder “V” = $62.37cm^2$

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

TO FIND : radius of a solid cylinder = ?

PROCEDURE :

As we know, that

Volume of a cylinder “V” = $\pi r^2 h$

So we now put the values of V and h in the above formula

So we get, $62.37 = \pi \times (r)^2 \times (4.5)$

$\frac{62.37}{4.5} = \pi \times (r)^2$

$13.86 = \frac{22}{7} \times (r)^2$

$r^2 = \frac{13.86}{\frac{22}{7}} = \frac{13.86}{22} \times 7 = 0.63 \times 7 = 4.41cm^2$

∴ $r = \sqrt{4.41} = 2.1cm$

∴ radius of the given cylinder = 2.1cm.

5. Question

The radii of two right circular cylinders are in the ratio 2 : 3. Find the ratio of their volumes if their heights are in the ratio 5 : 3.

Answer

GIVEN :

For cylinder C1 : radius is r1

Height is h1

Volume is V1

For cylinder C2 : radius is r2

Height is h2

Volume is V2

So we have, $\frac{r1}{r2} = \frac{2}{3}$

$\frac{h1}{h2} = \frac{5}{3}$

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

TO FIND : $\frac{V1}{V2}$ = ?

PROCEDURE :

As we know, that

Volume of a cylinder “V” = $\pi r^2 h$

So, $\frac{V1}{V2} = \frac{\pi (r1)^2 (h1)}{\pi (r2)^2 (h2)} = \frac{(r1)^2}{(r2)^2} \times \frac{h1}{h2}$

$= \left(\frac{r1}{r2}\right)^2 \times \frac{h1}{h2}$

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

$= \frac{4}{9} \times \frac{5}{3}$

$= \frac{20}{27}$

∴ the ratio between the 2 cylinders ie. $\frac{V1}{V2} = \frac{20}{27}$

ie. $V_1 : V_2 = 20:27$

6. Question

The radius and height of a cylinder are in the ratio 5 : 7. If its volume is 4400 cu.cm, find the radius of the cylinder.

Answer

GIVEN : radius of solid cylinder = “r”

height of solid cylinder = “h”

$\frac{r}{h} = \frac{5}{7}$

volume of the cylinder “V” = $4400 cm^2$

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

TO FIND : radius of a solid cylinder = ?

PROCEDURE :

As we know, that

Volume of a cylinder “V” = $\pi r^2 h$

Also, we have, $\frac{r}{h} = \frac{5}{7}$

$\Rightarrow \frac{h}{r} = \frac{7}{5} \Rightarrow h = r \times \frac{7}{5}$

So we now put the values of V and h in the above formula for V,

So we get, $4400 = \pi \times (r)^2 \times (r \times \frac{7}{5})$

$4400 = \frac{22}{7} \times r^3 \times \frac{7}{5}$

$4400 \times \frac{7}{22} \times \frac{5}{7} = r^3$

$200 \times 5 = r^3$

$1000 = r^3$

So, $r = \sqrt[3]{1000} = 10$

∴ radius of the given cylinder = 10cm.

7. Question

A rectangular sheet of metal foil with dimension 66 cm x 12 cm is rolled to form a cylinder of height 12 cm. Find the volume of the cylinder.

Answer

GIVEN : rectangular sheet of metal foil with dimension :

66 cm x 12cm ie. l × b

Height of the cylinder = 12cm

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

TO FIND : volume of the cylinder = ?

PROCEDURE :

As the cylinder if formed from the rectangular foil, we can say that length of the rectangle is now the circumference of the base of the cylinder.

$\Rightarrow 66 = 2\pi r$

So, $r = \frac{66}{2\pi} = \frac{66}{2 \times \frac{22}{7}} = \frac{66 \times 7}{2 \times 22} = \frac{3 \times 7}{2} = \frac{21}{2} = 10.5\text{cm}$

∴ r = 10.5cm

Now, As we know, that

Volume of a cylinder “V” = $\pi r^2 h$

We put the values of r and h in the above formula, we get,

$V = \frac{22}{7} \times (10.5)^2 \times 12$

$= \frac{22}{7} \times 110.25 \times 12$

$= 4158\ \text{cm}^3$

∴ volume of the cylinder is $4158\ \text{cm}^3$

8. Question

A lead pencil is in the shape of right circular cylinder. The pencil is 28 cm long and its radius is 3 mm. If the lead is of radius 1 mm, then find the volume of the wood used in the pencil.

Answer

GIVEN :

inner diameter of the cylinder of lead “r” = 1mm = 0.1cm

height of the pencil “h” = 28cm

outer radius of the pencil “R” = 3mm = 0.3cm

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

TO FIND : volume of the wood used in the pencil “V” = ?

PROCEDURE :

Here, we will use the concept of hollow cylinder.

So, volume of the wood used in the pencil,

“V” = π × h× (R + r)× (R – r)

So, we put all the values in the above formula, and get

$V = \frac{22}{7} \times 28 \times (0.3 + 0.1) \times (0.3 - 0.1)$

$= 22 \times 4 \times (0.4) \times (0.2)$

$= 22 \times 4 \times 4 \times 2 \times 10^{2}$

$= 704 \times 10^{-2}$

$= 7.04\ cm^3$

∴ volume of the wood used in the pencil is $7.04\ cm^3$

9. Question

Radius and slant height of a cone are 20 cm and 29 cm respectively. Find its volume.

Answer

GIVEN : radius of cone “r” = 20cm

Slant height of cone “l” = 29cm

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

TO FIND : volume of the cylinder “V” = ?

PROCEDURE :

As we know that, volume of cone “V” $= \frac{1}{3} \times \pi r^2 h$

As we are not given the value of h, we have to find it.

As it is a right cone, $l^2 = r^2 + h^2$

$h^2 = l^2 - r^2$

$= (29)^2 - (20)^2$

$= 841 - 400$

$= 441$

$h^2 = 441$

h = √ 441 = 21cm

So now, we put the values of r and h in the above formula

We get, V = $\frac{1}{3}$ × π r^2h

= $\frac{1}{3}$ × π × $(20)^2$× (21)

= $\frac{1}{3}$ × $\frac{22}{7}$ × 400 × 21

= 8800

∴ volume of the given cone = 8800cm^3

10. Question

The circumference of the base of a 12 m high wooden solid cone is 44 m. Find the volume.

Answer

GIVEN:

Height of the cone = 12mcircumference of the base = 44m

we take π = $\frac{22}{7}$

TO FIND : volume of the cone = ?

PROCEDURE :

As we know the circumference of the cone = 2π r

2π r = 44

r = $\frac{44}{2\times\pi}$ = $\frac{22}{\pi}$ = $\frac{22}{\frac{22}{7}}$ = $\frac{22\times7}{22}$ = 7cm

now, as we know that, volume of cone “V” = $\frac{1}{3}$ × π r^2h

putting all the values in the above formula, we get

V = $\frac{1}{3}$ × π × $(7)^2$× (12)

= $\frac{1}{3}$ × $\frac{22}{7}$ × 49 × 12

= $\frac{1}{3}$ × 22 × 7 × 12

= 22 × 7× 4

= 616 cm^3

∴ volume of the given cone is 616 cm^3

11. Question

A vessel is in the form of a frustum of a cone. Its radius at one end and the height are 8 cm and 14 cm respectively. If its volume is $\frac{5676}{3}cm^3$, then find the radius at the other end.

Answer

GIVEN :

Volume of the frustum cone “V” = $\frac{5676}{3}cm^3$

Radius of another end = “r”

Radius (R) = 8 cm

height (h) = 14 cm

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

TO FIND : Radius of another end = ?

PRODEDURE :

As we know, the volume of frustum of cone,

$\frac{1}{3} \times \pi \times h \times (R^2 + r^2 + R \times r) = \frac{5676}{3}$

$\frac{1}{3} \times \frac{22}{7} \times (14) \times (8^2 + r^2 + 8 \times r) = \frac{5676}{3}$

$(8^2 + r^2 + 8 \times r) = \frac{5676}{3} \times 3 \times \frac{7}{22} \times \frac{1}{14}$

$(64 + r^2 + 8r) = 258 \times 7 \times \frac{1}{14}$

$(64 + r^2 + 8r) = \frac{258}{2}$

$r^2 + 8r + 64 = 129$

$r^2 + 8r + 64 - 129 = 0$

$r^2 + 8r - 65 = 0$

$(r + 13)(r - 5) = 0$

$r + 13 = 0$ or $r - 5 = 0$

$r = -13$ or $r = 5$ cm

as the radius cannot be negative,

∴ the required radius = 5cm.

12. Question

The perimeter of the ends of a frustum of a cone are 44 cm and 8.4πcm. If the depth is 14 cm., then find its volume.

Answer

GIVEN :

Perimeter of the upper end of frustum of a cone = 44cm

Perimeter of the lower end of frustum of a cone = 8.4πcm

Height of the frustum of the cone is 14 cm

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

TO FIND : volume of the frustum “V” = ?

PROCEDURE :

As we know, the volume of frustum of cone,

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

Now first, for upper end,

$2\pi R = 44$

$R = \frac{44}{2\pi} = \frac{44}{2 \times \frac{22}{7}} = \frac{44 \times 7}{2 \times 22} = 7cm$

For the lower end,

$2\pi r = 8.4\pi$

$2r = 8.4$

$r = 4.2cm$

now that we have all the values, we will find the volumeof frustum.

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

$= \frac{1}{3} \times \frac{22}{7} \times 14 \times (7^2 + (4.2)^2 + 7 \times 4.2)$

$= \frac{1}{3} \times 22 \times 2 \times (49 + 29.4 + 17.64)$

$= \frac{44}{3} \times 96.04$

$= 44 \times 32.013$

$= 1408.57cm^3$

$\therefore$ volume of frustum is $1408.57cm^3$

13. Question

A right angled ΔABC with sides 5 cm, 12 cm and 13 cm is revolved about the fixed side of 12 cm. Find the volume of the solid generated.

Answer

GIVEN : Δ ABC with right angle at B

AC will be the hypotenuse = 13cm

AB = 12cm

BC = 5cm

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

TO FIND : volume of the solid generated = ?

PROCEDURE :

The solid formed on rotating the ΔABC about AB is a cone with radius “r” = 5cm

And height “h” = 12cm

$\therefore$ volume of the cone “V” $= \frac{1}{3} \times \pi r^2 h$

$= \frac{1}{3} \times \frac{22}{7} \times (5)^2 \times 12$

$= \frac{22}{7} \times 25 \times 4$

$= 314\frac{2}{7} cm^3$

∴ volume of the solid generated ie. Cone is $314\frac{2}{7} cm^3$

14. Question

The radius and height of a right circular cone are in the ratio 2 : 3. Find the slant height if its volume is 100.48 cu.cm. (Take π = 3.14)

Answer

GIVEN : radius of cone = ”r”

Height of cone = “h”

$\frac{r}{h} = \frac{2}{3}$

Volume of the cone = 100.48 cu.cm

We take π = 3.14

TO FIND : slant height “l” = ?

PROCEDURE :

We know that volume of the cone “V” $= \frac{1}{3} \times \pi r^2 h$

Now $\frac{r}{h} = \frac{2}{3}$

$\Rightarrow r = \frac{2}{3}h$

Now putting the values in the formula of volume, we get

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

$100.48 = \frac{1}{3} \times 3.14 \times (\frac{2}{3}h)^2 \times h$

$100.48 = \frac{1}{3} \times 3.14 \times \frac{4}{9} \times h^3$

$h^3 = 100.48 \times 3 \times \frac{1}{3.14} \times \frac{9}{4}$

$h^3 = 32 \times 3 \times \frac{9}{4} = 8 \times 27$

$h = \sqrt[3]{8 \times 27} = \sqrt[3]{2 \times 2 \times 2 \times 3 \times 3 \times 3}$

$h = 2 \times 3 = 6cm$

now, $r = \frac{2}{3}h = \frac{2}{3} \times 6 = 4cm$

now, slant height “l” can be found using :

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

$= 4^2 + 6^2 = 16 + 36 = 52$

$L = \sqrt{52} = 2\sqrt{13}cm$

∴ slant height of the given cone is $2\sqrt{13}cm$.

15. Question

The volume of a cone with circular base is 216 π cu.cm. If the base radius is 9 cm, then find the height of the cone.

Answer

GIVEN : volume of the cone “V” = 216π cu.cm

Base radius of cone “r” = 9cm

we take π = $\frac{22}{7}$

TO FIND : height of the cone “h” = ?

PROCEDURE :

We know that volume of the cone “V” = $\frac{1}{3}$ × π r^2h

Now putting all the values in the above formula, we get

V = $\frac{1}{3}$ × π r^2h

216π = $\frac{1}{3}$ × π × $(9)^2$ × h

h = 216 × 3 × $\frac{1}{81}$ = 216 × $\frac{1}{27}$ = 8cm

∴ height of the cone “h” is 8cm.

16. Question

Find the mass of 200 steel spherical ball bearings, each of which has radius 0.7 cm, given that the density of steel is 7.95 g/cm^3. (Mass = Volume × Density)

Answer

GIVEN : no. of steel balls “n” = 200

Radius of each ball “r” = 0.7cm

we take π = $\frac{22}{7}$

Density of steel = 7.95 g/cm^3

TO FIND : Mass of 200 balls = ?

PROCEDURE :

We know that, volume of sphere "V” = $\frac{4}{3}$× π r^3

Putting the values in the above formula, we get

V = $\frac{4}{3}$× $\frac{22}{7}$ × $(0.7)^3$

= $\frac{4}{3}$× $\frac{22}{7}$ × 0.343

= 1.437cm^3

This was the volume of one ball.

Now volume of 200 balls “V’ ” = n× V = 200 × 1.437cm^3

V’ = 287.466 cm^3

Now, it is given that, Density of steel = 7.95 g/cm^3

So, mass of the balls = volume × density

Mass of 200 balls = volume of 200 balls × density

= 287.466 cm^3 × 7.95 g/cm^3

= 2285.46g

= 2.285 Kg

∴ Mass of 200 balls bearings is 2.285 Kg.

17. Question

The outer and the inner radii of a hollow sphere are 12 cm and 10 cm. Find its volume.

Answer

GIVEN : outer radius of hollow the sphere “R” = 12cm

inner radius of hollow the sphere “r” = 10cm

we take π = $\frac{22}{7}$

TO FIND : volume of the hollow sphere = ?

PROCEDURE :

We know that volume of the hollow sphere “V” = $\frac{4}{3}$× π × (R^3 – r^3)

Putting all the values in the above formula, we get

V = $\frac{4}{3}$×$\frac{22}{7}$× (12^3 – 10^3)

= $\frac{4}{3}$×$\frac{22}{7}$×(1728-1000)

= $\frac{4}{3}$×$\frac{22}{7}$×728

= 3050.66 cm^3

∴ volume of the hollow sphere is 3050.66 cm^3

18. Question

The volume of a solid hemisphere is 1152 πcu.cm. Find its curved surface area.

Answer

GIVEN : volume of a solid hemisphere “V” = 1152π cu.cm

we take π = $\frac{22}{7}$

TO FIND : curved surface area (CSA) = ?

PROCEDURE :

As we know that volume of a hemisphere “V” = $\frac{1}{2}$× $\frac{4}{3}$× π ×r^3

So, putting all the values in the above formula, we get

V = $\frac{1}{2}$× $\frac{4}{3}$× π ×r^3

1152π = $\frac{1}{2}$× $\frac{4}{3}$× π ×r^3

1152 = $\frac{1}{2}$× $\frac{4}{3}$× r^3

r^3 = 1152 × 2 × $\frac{3}{4}$ = 1152 × $\frac{3}{2}$ = 576×3 = 1728

$r = \sqrt[3]{1728} = 12cm$

so, now that we have radius, we can find the curved surface area of the hemisphere.

Now, CSA = $2\times \pi \times r^2$

$= 2\times\pi \times (12)^2$

$= 2\times\pi \times 144$

$= 288\pi\ cm^2$

∴ curved surface area of the hemisphere is $288\pi\ cm^2$

19. Question

Find the volume of the largest right circular cone that can be cut out of a cube whose edge is 14 cm.

Answer

GIVEN : side of cube ”s” = 14cm

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

TO FIND : volume of the largest right circular cone that can be cut out of a cube = ?

PROCEDURE :

For the cone to largest, its diameter should be equal to side of the cube ie. d = 14cm

And, height of the cone should also be equal to the side of the cube ie. h = 14cm

Now, radius of the cone “r” = 7cm

Now, volume of cone “V” = $\frac{1}{3} \times \pi\ r^2h$

Now putting all the values in the above formula, we get

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

$= \frac{1}{3} \times \frac{22}{7} \times 7 \times 7 \times 14$

$= \frac{1}{3} \times 22 \times 7\times 14$

$= 718.666cm^3$

∴ volume of the largest right circular cone that can be cut out of a cube is $718.666cm^3$.

20. Question

The radius of a spherical balloon increases from 7 cm to 14 cm as air is being pumped into it. Find the ratio of volumes of the balloon in the two cases.

Answer

GIVEN : radius of balloon before the increase “r” = 7cm

radius of balloon after the increase “R” = 14cm

TO FIND : ratio of volumes of the balloon in both cases

PROCEDURE :

Volume of balloon before the increase “V1” = $\frac{4}{3}\times\pi \times r^3$

Volume of balloon after the increase “V2” = $\frac{4}{3}\times\pi \times R^3$

Ratio of the volumes in the 2 cases $= \frac{V_1}{V_2}$

$$\frac{V_1}{V_2} = \frac{\frac{4}{3}\times\pi\times r^3}{\frac{4}{3}\times\pi\times R^3} = \frac{r^3}{R^3} = \left(\frac{r}{R}\right)^3 = \left(\frac{7}{14}\right)^3 = \left(\frac{1}{2}\right)^3 = \frac{1}{8}$$

$\therefore$ the ratio of volumes of the balloon in the two cases is $\frac{V_1}{V_2} = \frac{1}{8}$ ie. 1 : 8.

Exercise 8.3

1. Question

A play-top is in the form of a hemisphere surmounted on a cone. The diameter of the hemisphere is 3.6 cm. The total height of the play-top is 4.2 cm. Find its total surface area.

Answer

A play-top is made up of a hemisphere (at the top) and cone(at the bottom).

Given, Diameter of the hemisphere = 3.6 cm

$\therefore$ Radius of the hemisphere $= \frac{3.6}{2}$

= 1.8 cm

Total height of the play-top = 4.2 cm

$\therefore$Height of cone = (Total height of the play-top)-(Radius of the hemisphere)

$\Rightarrow$ Height of cone = 4.2-1.8

= 2.4 cm

Now, Total surface area of play-top = Lateral surface area of hemisphere+ Lateral surface area of cone

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

= $2\times1.8\times1.8\times\pi$

= 6.48π

Lateral surface area of cone = πrl ,

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

$\Rightarrow$ l = $\sqrt{1.8^2+2.4^2}$

$\Rightarrow$ l = $\sqrt{3.24+5.76}$

$\Rightarrow$ l = $\sqrt{9}$

$\Rightarrow$ l = 3

So, Lateral surface area of cone = $\pi\times1.8\times3$

= 5.4π

$\therefore$ Total surface area of play-top = $6.48\pi+5.4\pi$

= 11.88π cm^2

Total surface area is 11.88π cm^2.

2. Question

A solid is in the shape of a cylinder surmounted on a hemisphere. If the diameter and the total height of the solid are 21 cm, 25.5 cm respectively, then find its volume.

Answer

Given, Diameter = 21 cm

Total height of the solid = 25.5 cm

$\therefore$Radius = $\frac{21}{2}$

= 10.5 cm

$\therefore$Height of cylinder = 25.5-10.5

= 15 cm

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

= $\pi \times 10.5 \times 10.5 \times 15$

= 1653.75π

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

= $\frac{2}{3} \times 10.5 \times 10.5 \times 10.5 \times \pi$

= $771.75\ \pi$

$\therefore$ Volume of solid = Volume of cylinder+ Volume of hemisphere

= 1653.75π +$771.75\ \pi$

= $2425.5\ \pi$

= 7616.07 cm^3

Volume of solid is 7616.07 cm^3

3. Question

A capsule is in the shape of a cylinder with two hemispheres stuck to each of its ends. If the length of the entire capsule is 14 mm and the diameter of the capsule is 5 mm, find its surface area.

Answer

Given, Diameter of the capsule = 5 mm

Length of the entire capsule = 14 mm

$\therefore$Radius of the capsule = $\frac{5}{2}$ mm

= 2.5 mm

$\therefore$ Height of cylinder = 14-5

= 9 mm

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

= $2 \times 2.5 \times 9 \times \pi$

= 45π mm^2

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

= $2 \times 2.5 \times 2.5 \times \pi$

= 12.5π mm^2

Surface area of the solid = $12.5\pi + 45\pi + 12.5\pi$

$= 70\pi$

$= 70 \times \frac{22}{7}$

$= 220\ mm^2$

Surface area of capsule is 220 mm^2.

4. Question

A tent is in the shape of a right circular cylinder surmounted by a cone. The total height and the diameter of the base are 13.5 m and 28 m. If the height of the cylindrical portion is 3 m, find the total surface area of the tent.

Answer

Given, Total height = 13.5 m

Diameter of the base = 28 m

Height of the cylindrical portion = 3 m

$\therefore$ Height of cone = 13.5-3

= 10.5 m

$\therefore$ Radius of the base = $\frac{28}{2}$

= 14 m

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

$= 2 \times 14 \times 3 \times \pi$

$= 84\pi\ m^2$

Lateral surface area of cone = πrl ,

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

$\Rightarrow l = \sqrt{14^2 + 10.5^2}$

$\Rightarrow l = \sqrt{196 + 110.25}$

$\Rightarrow l = \sqrt{306.25}$

$\Rightarrow l = 17.5$

So, Lateral surface area of cone = $\pi \times 14 \times 17.5$

$= 245\pi\ m^2$

$\therefore$Total surface area = Lateral surface area of cylinder+ Lateral surface area of cone

Total surface area = $84\pi + 245\pi$

$= 329\pi$

$= 329 \times \frac{22}{7}$

$= 1034\ m^2$

Total surface area of the tent is 1034 m^2.

5. Question

Using clay, a student made a right circular cone of height 48 cm and base radius 12 cm. Another student reshapes it in the form of a sphere. Find the radius of the sphere.

Answer

Given, height of cone(h) = 48 cm

Base radius(r) = 12 cm

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

$= \frac{1}{3} \times \pi \times 12 \times 12 \times 48$

$= 2304\pi$

We know,

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

To find radius of sphere,

$\frac{4}{3}\pi r^3 = 2304\pi$

$\Rightarrow r^3 = 2304 \times \frac{3}{4}$

$\Rightarrow r^3 = 576 \times 3$

$\Rightarrow r^3 = 1728$

$\Rightarrow r = 12$ cm

Radius of the sphere is 12 cm.

6. Question

The radius of a solid sphere is 24 cm. It is melted and drawn into a long wire of uniform cross section. Find the length of the wire if its radius is 1.2 mm.

Answer

Given, Radius of a solid sphere(r) = 24 cm

Radius of wire (R) = 1.2 mm = 0.12 cm

length of the wire(l) = ?

Solid sphere is melted and drawn into a long wire of uniform cross section. Thus,

Volume of sphere = Volume of wire(cylinder)

$\Rightarrow \frac{4}{3}\pi r^3 = \pi r^2 l$

$\Rightarrow \frac{4}{3}\pi (24)^3 = \pi (0.12)^2 \times l$

$\Rightarrow \frac{4}{3} \times (24)^3 = (0.12)^2 \times l$

$\Rightarrow l = \frac{4 \times 24 \times 24 \times 24}{3 \times 0.12 \times 0.12}$

$\Rightarrow l = \frac{4 \times 24 \times 24 \times 24 \times 100 \times 100}{3 \times 12 \times 12}$

$\Rightarrow l = 128 \times 100 \times 100$

$\Rightarrow l = 12.8$ km

The length of the wire is 12.8 km.

7. Question

A right circular conical vessel whose internal radius is 5 cm and height is 24 cm is full of water. The water is emptied into an empty cylindrical vessel with internal radius 10 cm. Find the height of the water level in the cylindrical vessel.

Answer

Given, Radius of right circular conical vessel(r) = 5 cm

Height of right circular conical vessel(h) = 24 cm

Radius of cylinder(R) = 10 cm

Height of cylinder(H) = ?

As water is emptied into an empty cylindrical vessel,

Volume of right circular cone = Volume of cylinder

$\Rightarrow \frac{1}{3}\pi r^2 h = \pi R^2 H$

$\Rightarrow \frac{1}{3}\pi(5)^2 \times 24 = \pi(10)^2 H$

$\Rightarrow H = \frac{5\times5\times24}{3\times10\times10}$

$\Rightarrow H = 2$ cm

Height of the water level in the cylindrical vessel is 2 cm.

8. Question

A solid sphere of diameter 6 cm is dropped into a right circular cylindrical vessel with diameter 12 cm, which is partly filled with water. If the sphere is completely submerged in water, how much does the water level in the cylindrical vessel increase?

Answer

Given, Diameter of the sphere(d) = 6cm

Radius of the sphere (r) $= \frac{6}{2} = 3$cm

Diameter of the cylindrical vessel(D) = 12 cm

radius of the cylindrical vessel (R) $= \frac{12}{2} = 6$ cm

Let level of water raised be h cm.

Volume of the water raised in the vessel = Volume of the sphere

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

$\Rightarrow h = \frac{4r^3}{3R^3}$

$\Rightarrow h = \frac{4\times3\times3}{3\times6\times6\times6}$

$\Rightarrow h = 1$ cm

Level of water raised in the vessel is 1 cm

9. Question

Through a cylindrical pipe of internal radius 7 cm, water flows out at the rate of 5 cm/sec. Calculate the volume of water (in litres) discharged through the pipe in half an hour.

Answer

We need to find volume of water (in liters) discharged through the pipe in half an hour.

Half an hour = 30 minutes

Let us change minutes into seconds. For that we have to multiply 30 by 60. Because 60 seconds = 1 minute.

$\Rightarrow 30 \times 60 = 1800$ seconds.

Volume of water discharged in half an hour $= \pi r^2 \times 5 \times 1800$

$= \frac{22}{7} \times (7)^2 \times 5 \times 1800$

$= \frac{22}{7} \times 7 \times 7 \times 5 \times 1800$

$= 22 \times 7 \times 5 \times 1800$

= 1386000 cubic cm ()

$= \frac{1386000}{1000}$ ($1000\ cm^3 = 1$ liter)

= 1386 liters

Volume of water discharged through the pipe in half an hour is 1386 liters.

10. Question

Water in a cylindrical tank of diameter 4 m and height 10 m is released through a cylindrical pipe of diameter 10 cm at the rate of 2.5 Km/hr. How much time will it take to empty the half of the tank? Assume that the tank is full of water to begin with.

Answer

Given,

Diameter of the cylindrical tank = 4 m

Radius of the cylindrical tank = 2 m

Height of the tank = 10 m

Diameter of the cylindrical pipe = 10 cm

Radius of the cylindrical pipe $= \frac{10}{2} = 5$ cm

= 0.05 m

speed of water = 2.5 km/hr

= 2.5 x 1000 (1000 m = 1 km)

= 2500 m/hr

$\Rightarrow$ Volume of water discharged from the cylindrical pipe $= \frac{1}{2} \times$ Volume of cylindrical tank

$\Rightarrow$ Area of cross section $\times$ time $\times$ speed $= \frac{1}{2} \pi r^2 h$

$\Rightarrow \pi r^2 \times$ time $\times$ speed $= \frac{1}{2} \pi r^2 h$

$\Rightarrow (\frac{5}{100})^2 \times$ time $\times 2500 = \frac{1}{2} \times (2)^2 \times (10)$

$\Rightarrow (\frac{5}{100}) \times (\frac{5}{100}) \times$ time $\times 2500 = \frac{1}{2} \times (2) \times 2 \times (10)$

$\Rightarrow$ Time = $2 \times 10 \times (\frac{100}{5}) \times (\frac{100}{5}) \times (\frac{1}{2500})$

$\Rightarrow$ Time = $\frac{80}{25}$

= 3.2 hour

= 3 hours 0.2×60 mins(1 hour = 60 minute)

= 3 hour 12 minute

Time taken to empty the half of the tank is 3 hour 12 minutes.

11. Question

A spherical solid material of radius 18 cm is melted and recast into three small solid spherical spheres of different sizes. If the radii of two spheres are 2cm and 12 cm, find the radius of the third sphere.

Answer

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

$\Rightarrow \frac{4}{3}\pi(18)^3 = \frac{4}{3}\pi (2)^3 + \frac{4}{3}\pi (12)^3 + \frac{4}{3}\pi r^3$

$\Rightarrow \frac{4}{3}\pi (18)^3 = \frac{4}{3}\pi [(2)^3 + (12)^3 + r^3]$

$\Rightarrow (18)^3 = [(2)^3 + (12)^3 + r^3]$

$\Rightarrow 5832 = 8 + 1728 + r^3$

$\Rightarrow 5832 = 1736 + r^3$

$\Rightarrow 5832\text{-}1736 = r^3$

$\Rightarrow 4096 = r^3$

$\Rightarrow r = \sqrt[3]{4096}$

$\Rightarrow$ r = 16 cm

Radius of the third sphere is 16 cm.

12. Question

A hollow cylindrical pipe is of length 40 cm. Its internal and external radii are 4 cm and 12 cm respectively. It is melted and cast into a solid cylinder of length 20 cm. Find the radius of the new solid.

Answer

Given, Length of cylindrical pipe (h) = 40 cm

Internal radius of the pipe (r) = 4 cm

External radius of the pipe (R) = 12 cm

Height of cylinder = 20 cm

Volume of hollow cylindrical pipe = Volume of cylinder

$\Rightarrow \pi h (R^2 - r^2) = \pi r^2 h$

$\Rightarrow h (R^2 - r^2) = r^2 h$

$\Rightarrow (40) \times (12^2 - 4^2) = r^2 \times (20)$

$\Rightarrow (40) \times (144 - 16) = r^2 \times (20)$

$\Rightarrow (40) \times \frac{128}{20} = r^2$

$\Rightarrow r^2 = (40) \times \frac{128}{20}$

$\Rightarrow r^2 = 2 \times 128$

$\Rightarrow r^2 = 256$

$\Rightarrow r = \sqrt[2]{256}$

$\Rightarrow r = 16$ cm

Therefore radius of cylinder = 16 cm

13. Question

An iron right circular cone of diameter 8 cm and height 12 cm is melted and recast into spherical lead shots each of radius 4 mm. How many lead shots can be made?

Answer

Let the number of lead shots be n.

Given,

Diameter of right circular cone = 8 cm

Radius of right circular cone (r) = 4 cm

Height of right circular cone (h) = 12 cm

Radius of spherical lead shot (r) = 4 mm

$= \frac{4}{10}$ cm (10 mm = 1 cm)

Volume of right circular cone = n$\times$Number of spherical lead shots

$\therefore n = \frac{\text{Volume of right circular cone}}{\text{Number of spherical lead shots}}$

$\Rightarrow n = \frac{1/3\ \pi r^2 h}{\frac{4}{3}\pi r^3}$

$\Rightarrow n = \frac{1}{3} \times (4)^2 \times (12) \times \frac{3}{4} \times (\frac{10}{4})^3$

$\Rightarrow n = \frac{1}{3} \times 4 \times 4 \times 12 \times \frac{3}{4} \times \frac{10}{4} \times \frac{10}{4} \times \frac{10}{4}$

$\Rightarrow n = 3 \times 5 \times 5 \times 10$

$\Rightarrow n = 750$ lead shots

Therefore 750 lead shots can be made.

14. Question

A right circular cylinder having diameter 12 cm and height 15 cm is full of ice cream. The ice cream is to be filled in cones of height 12 cm and diameter 6 cm, having a hemispherical shape on top. Find the number of such cones which can be filled with the ice cream available.

Answer

Given, Diameter of right circular cylinder = 12 cm

Radius of right circular cylinder (r_1) $= \frac{12}{2}$

= 6 cm

Height of right circular cylinder (h_1) = 15 cm

Volume of Cylindrical ice-cream container = $\pi r_1^2 h_1$

$= \frac{22}{7} \times 6 \times 6 \times 15$

$= \frac{11880}{7}\ cm^3$

Diameter of cone = 6 cm

Radius of cone $(r_2) = \frac{6}{2}$

= 3 cm

Height of cone (h_2) = 12 cm

Radius of hemisphere = radius of cone = 3 cm

⇒ Volume of cone full of ice-cream = volume of cone + volume of hemisphere

$= \frac{1}{3}\pi r_2^2 h_2 + \frac{2}{3}\pi r_2^3$

$= \frac{1}{3}\pi\ (\ r_2^2 h_2 + 2r_2^3)$

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

$= \frac{1}{3} \times \frac{22}{7} (9 \times 12 + 2 \times 27)$

$= \frac{22}{21} \times (108 + 54)$

$= \frac{22}{21} \times 162$

$= \frac{1188}{7}\ cm^3$

Let n be the number of cones full of ice cream.

⇒ Volume of Cylindrical ice-cream container = n × Volume of one cone full with ice cream

$\frac{11880}{7} = n \times \frac{1188}{7}$

$\Rightarrow N = \frac{11880 \times 7}{7 \times 1188}$

⇒ n = 10

Hence, the required number of cones = 10

15. Question

A container with a rectangular base of length 4.4 m and breadth 2 m is used to collect rain water. The height of the water level in the container is 4 cm and the water is transferred into a cylindrical vessel with radius 40 cm. What will be the height of the water level in the cylinder?

Answer

Given,

Length of container(l) = 4.4 m

Breadth of container(b) = 2 m

Height of container(h) = 4 m

Radius of cylindrical vessel(r) = 40 cm

⇒ Volume of container = Volume of cylindrical vessel

$\Rightarrow l \times b \times h = \pi r^2 h$

$\Rightarrow 4.4 \times 2 \times 4 = \frac{22}{7} \times (40)^2 \times h$

$\Rightarrow H = \frac{4.4 \times 2 \times 4 \times 7}{22 \times 40 \times 40}$

$\Rightarrow H = 70$ cm

The height of the water level in the cylinder is 70 cm.

16. Question

A cylindrical bucket of height 32 cm and radius 18 cm is filled with sand. The bucket is emptied on the ground and a conical heap of sand is formed. If the height of the conical heap is 24 cm, find the radius and slant height of the heap.

Answer

Given, Height of cylindrical bucket(h) = 32 cm

Radius of cylindrical bucket(r) = 18 cm

Height of conical heap (H) = 24 cm

Radius of conical heap (R) = ?

$\Rightarrow$ Volume of cylindrical bucket = Volume of conical heap

$\Rightarrow \pi r^2 h = \frac{1}{3}\pi R^2 H$

$\Rightarrow 18 \times 18 \times 32 = \frac{1}{3} \times R^2 \times 24$

$\Rightarrow 18 \times 18 \times 32 = R^2 \times 8$

$\Rightarrow R^2 = \frac{18 \times 18 \times 32}{8}$

$\Rightarrow R^2 = 18 \times 18 \times 4$

$\Rightarrow R = \sqrt[2]{18 \times 18 \times 4}$

$\Rightarrow R = 18 \times 2$

$\Rightarrow R = 36$ cm

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

$L = \sqrt{36^2 + 24^2}$

$L = \sqrt{1296 + 576}$

$L = \sqrt{1872}$

$L = 12\sqrt{13}$ cm

Slant height = $12\sqrt{13}$ cm

Radius of conical heap = 36 cm

17. Question

A cylindrical shaped well of depth 20 m and diameter 14 m is dug. The dug out soil is evenly spread to form a cuboid-platform with base dimension 20 m x 14 m. Find the height of the platform.

Answer

Given, Depth of well = Height of well = 20 m

Diameter of well = 14 m

$\therefore$ Radius of well = $\frac{14}{2}$

= 7 m

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

= $\frac{22}{7} \times 7 \times 7 \times 20$

= 3080 m^3

⇒ Volume of platform = Volume of well

⇒ $l \times b \times h = 3080$

⇒ $20 \times 14 \times h = 3080$

⇒ $H = \frac{3080}{20 \times 14}$

⇒ H = 11 m

The height of the platform is 11 m.

Exercise 8.4

1. Question

The curved surface area of a right circular cylinder of radius 1 cm and height 1 cm is equal to

A. πcm^2

B. $2\pi cm^2$

C. $3\pi\ cm^3$

D. 2 cm^2

Answer

Radius (R) = 1 cm

Height (H) = 1 cm

Curved Surface Area = ($2\pi RH$) = $2\pi\ cm^2$

Out of all the four Options,

Correct Option: B

2. Question

The total surface area of a solid right circular cylinder whose radius is half of its height h is equal to

A. $\frac{3}{2}\pi h$ sq. units

B. $\frac{2}{3}\pi h^2$ sq. units

C. $\frac{3}{2}\pi h^2$ sq. units

D. $\frac{2}{3}\pi h$ sq. units

Answer

Total Surface Area = $2\pi rh + 2\pi r^2$

where r is the radius and h is the height

According to the problem $r = \frac{h}{2}$

Total surface area $= 2\pi \times \frac{h}{2} \times h + 2\pi\left(\frac{h}{2}\right)^2$

⇒ Total surface area $= \pi h^2 + \frac{\pi h^2}{2}$

⇒ Total surface area $= \frac{3\pi h^2}{2} \text{sq. units}$

Out of all the four Options,

Correct Option : C

3. Question

Base area of a right circular cylinder is 80 cm^2. If its height is 5 cm, then the volume is equal to

A. 400 cm^3

B. 16 cm^3

C. 200 cm^3

D. $\frac{400}{3} cm^3$

Answer

Base Area (A) = 80 cm^2

Height (H) = 5 cm

Volume = (A×H) = 400 cm^3

Out of all the four Options,

Correct Option : A

4. Question

If the total surface area a solid right circular cylinder is 200 π$cm^2$and its radius is 5 cm, then the sum of its height and radius is

A. 20 cm

B. 25 cm

C. 30 cm

D. 15 cm

Answer

Total Surface Area = 2πrh + 2πr^2

where r is the radius and h is the height

Total Surface Area = 200π cm^2 (Given)

Radius (r) = 5 cm

Equating the Total Surface Area we can say

2πrh + 2πr^2 = 200π

⇒ rh + r^2 = 100

⇒ r(r + h) = 100

⇒ r + h = 20 cm

Out of all the four Options,

Correct Option : A

5. Question

The curved surface area of a right circular cylinder whose radius is a units and height is b units, is equal to

A. $\pi a^2 b$ sq.cm

B. $2\pi ab$

C. 2π sq.cm

D. 2 sq.cm

Answer

Radius (R) = a units

Height (H) = b units

Curved Surface Area = $(2\pi RH) = 2\pi ab$ sq. units

Out of all the four Options,

Correct Option: B

6. Question

Radius and height of a right circular cone and that of a right circular cylinder are respectively, equal. If the volume of the cylinder is 120 cm^3, then the volume of the cone is equal to

A. 1200 cm^3

B. 360 cm^3

C. 40 cm^3

D. 90 cm^3

Answer

Volume of Cylinder = 3 × Volume of Cone

Volume of the cylinder = 120 cm^3 (Given)

⇒ Volume of Cone $= \frac{1}{3} \times$ Volume of Cylinder

⇒ Volume of Cone = 40 cm^3

Out of all the four Options,

Correct Option : C

7. Question

If the diameter and height of a right circular cone are 12 cm and 8 cm respectively, then the slant height is

A. 10 cm

B. 20 cm

C. 30 cm

D. 96 cm

Answer

Diameter = 12 cm.

⇒ Radius (R) = 6 cm.

Height (H) = 8 cm

Slant height (l) = $\sqrt{(R^2 + H^2)} = \sqrt{(6^2 + 8^2)}$

⇒ Slant height (l) = $\sqrt{100}$ = 10 cm

Out of all the four Options,

Correct Option : A

8. Question

If the circumference at the base of a right circular cone and the slant height are 120 πcm and 10 cm respectively, then the curved surface area of the cone is equal to

A. $1200\pi cm^2$

B. $600\pi cm^2$

C. $300\pi cm^2$

D. 600 cm^2

Answer

Base Circumference = 120π cm

Let radius be r

Base Circumference = 2πr

2πr = 120π

⇒ r = 60 cm

Slant Height (l) = 10 cm

Curved Surface Area = π×r×l

Curved Surface Area = 600π cm^2

Out of all the four Options,

Correct Option :B

9. Question

If the volume and the base area of a right circular cone are $48\pi cm^3$ and $12\pi cm^2$respectively, then the height of the cone is equal to

A. 6 cm

B. 8 cm

C. 10 cm

D. 12 cm

Answer

Volume of cone = 48π cm^3

Base Area = 12π cm^2

Volume of cone = $\frac{1}{3} \times \text{Base Area} \times \text{Height}$

Height = $\frac{3 \times \text{Volume}}{\text{Base Area}}$

⇒ Height $= \frac{3\times48\pi}{12\pi}$

⇒ Height = 12 cm.

Out of all the four Options,

Correct Option :D

10. Question

If the height and the base area of a right circular cone are 5 cm and 48 sq. cm respectively, then the volume of the cone is equal to

A. 240 cm^3

B. 120 cm^3

C. 80 cm^3

D. 480 cm^3

Answer

Base Area (A) = 48 cm^2

Height (H) = 5 cm

Volume $= \frac{1}{3}\times A\times H$

⇒ Volume $= \frac{1}{3}\times 48\times 5$

⇒ Volume = 80 cm^3

Out of all the four Options,

Correct Option : C

11. Question

The ratios of the respective heights and the respective radii of two cylinders are 1:2 and 2:1 respectively. Then their respective volumes are in the ratio

A. 4 : 1

B. 1 : 4

C. 2 : 1

D. 1 : 2

Answer

Let R_1,R_2 be the radius and H_1,H_2 be the height V_1,V_2 of the two cylinders

Volume Of Cylinder = πR^2H

So we can say,

$$\frac{V_1}{V_2} = \frac{\pi {R_1}^2 H_1}{\pi {R_2}^2 H_2}$$

$$\Rightarrow \frac{V_1}{V_2} = \frac{{R_1}^2 H_1}{{R_2}^2 H_2}$$

$$\Rightarrow \frac{V_1}{V_2} = \left(\frac{R_1}{R_2}\right)^2 \times \frac{H_1}{H_2}$$

$$\Rightarrow \frac{V_1}{V_2} = \left(\frac{2}{1}\right)^2 \times \frac{1}{2}$$

$$\Rightarrow \frac{V_1}{V_2} = \frac{2}{1}$$

Out of all the four Options,

Correct Option : C

12. Question

If the radius of a sphere is 2 cm, then the curved surface area of the sphere is equal to

A. 8π cm^2

B. 16 cm^2

C. 12π cm^2

D. 16π cm^2

Answer

Radius of sphere (r) = 2 cm

Surface Area of Sphere = $4\pi r^2$

$\Rightarrow$ Surface Area of Sphere = $4\pi \times 2^2$

$\Rightarrow$ Surface Area of Sphere = 16π cm^2

Out of all the four Options,

Correct Option :D

13. Question

The total surface area of a solid hemisphere of diameter 2 cm is equal to

A. 12 cm^2

B. 12π cm^2

C. 4π cm^2

D. 3π cm^2

Answer

Diameter = 2 cm

Radius (r) = 1 cm

Total surface Area = Curved surface Area + Base Area

$\Rightarrow$ Total surface Area = $2\pi r^2 + \pi r^2 = 3\pi r^2$

$\Rightarrow$ Total surface Area = $3\pi \times 1^2 = 3\pi$ cm^2

Out of all the four Options,

Correct Option : D

14. Question

If the volume of a sphere is $\frac{9}{6}\pi$ cu. cm, then its radius is

A. $\frac{4}{3}$cm

B. $\frac{3}{4}$cm

C. $\frac{3}{2}$cm

D. $\frac{2}{3}$cm

Answer

Let radius of sphere be r cm

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

Volume of Sphere $= \frac{9}{16}\pi\ cm^3$

So we can say that

$$\frac{4}{3}\pi r^3 = \frac{9}{16}\pi$$

$$\Rightarrow r^3 = \frac{9}{16} \times \frac{3}{4}$$

$$\Rightarrow r^3 = \frac{27}{64}$$

$$\Rightarrow r = \frac{3}{4}\ cm.$$

Out of all the four Options,

Correct Option : B

15. Question

The surface areas of two spheres are in the ratio of 9 : 25. Then their volumes are in the ratio

A. 81 : 625

B. 729 : 15625

C. 27 : 75

D. 27 : 125

Answer

Let R_1,R_2 be the radius of the two spheres and V_1,V_2 be the Volume of this two spheres, A_1,A_2 be the area of two spheres

Surface Area of Sphere = $4\pi r^2$

So we can say,

$$\frac{A_1}{A_2} = \frac{4\pi {R_1}^2}{4\pi {R_2}^2}$$

$$\Rightarrow \left(\frac{R_1}{R_2}\right)^2 = \frac{A_1}{A_2}$$

$$\Rightarrow \left(\frac{R_1}{R_2}\right)^2 = \frac{9}{25}$$

$$\Rightarrow \frac{R_1}{R_2} = \sqrt{\frac{9}{25}}$$

$\Rightarrow \frac{R_1}{R_2} = \frac{3}{5}$ ...Equation (i)

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

$$\frac{V_1}{V_2} = \frac{\frac{4}{3}\pi {R_1}^3}{\frac{4}{3}\pi {R_2}^3}$$

$$\Rightarrow \frac{V_1}{V_2} = \frac{{R_1}^3}{{R_2}^3}$$

Putting the values from Equation (i) we get

$$\Rightarrow \frac{V_1}{V_2} = \left(\frac{3}{5}\right)^3$$

$$\Rightarrow \frac{V_1}{V_2} = \frac{27}{125}$$

Out of all the four Options,

Correct Option : D

16. Question

The total surface area of a solid hemisphere whose radius is a units, is equal to

A. $2\pi a^2$sq. units

B. $3\pi a^2$ sq. units

C. $3\pi a$ sq. units

D. $3a^2$ sq.units

Answer

Radius = a units

Total surface Area = Curved surface Area + Base Area

$\Rightarrow$ Total surface Area = $2\pi a^2 + \pi a^2 = 3\pi a^2$ sq. units

Out of all the four Options,

Correct Option : B

17. Question

If the surface area of a sphere is 100π cm^2, then its radius is equal to

A. 25 cm

B. 100 cm

C. 5 cm

D. 10 cm

Answer

Let radius of sphere be r cm

Surface Area of Sphere = $4\pi r^2$

Surface Area of Sphere = 100π cm^2

So we can say,

$4\pi r^2 = 100\pi$

$\Rightarrow r^2 = 25$

$\Rightarrow r = 5$ cm

Out of all the four Options,

Correct Option: C

18. Question

If the surface area of a sphere is 36π cm^2, then the volume of the sphere is equal to

A. 12π cm^3

B. 36π cm^3

C. 72π cm^3

D. 108π cm^3

Answer

Let radius of sphere be r cm

Surface Area of Sphere = $4\pi r^2$

Surface Area of Sphere = 36π cm^2

So we can say,

$4\pi r^2 = 36\pi$

$\Rightarrow r^2 = 9$

$\Rightarrow r = 3$ cm

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

$\Rightarrow$ Volume of Sphere $= \frac{4}{3}\pi \times 3^3$

$\Rightarrow$ Volume of Sphere = $4\pi \times 3^2$

$\Rightarrow$ Volume of Sphere = 36π cm^3

Out of all the four Options,

Correct Option : B

19. Question

If the total surface area of a solid hemisphere is 12π cm^2 then its curved surface area is equal to

A. 6π cm^2

B. 24π cm^2

C. 36π cm^2

D. 8π cm^2

Answer

Total surface Area = Curved surface Area + Base Area

⇒ Total surface Area = $2\pi r^2 + \pi r^2 = 3\pi r^2$

Total surface area of a solid hemisphere = 12π cm^2(Given)

$3\pi r^2 = 12\pi$

$\Rightarrow r^2 = 4$

$\Rightarrow r = 2cm$

Curved surface Area = $2\pi r^2$

Curved surface Area = $2\pi \times 2^2$

Curved surface Area = 8π cm^3

Out of all the four Options,

Correct Option : D

20. Question

If the radius of a sphere is half of the radius of another sphere, then their respective volumes are in the ratio

A. 1 : 8

B. 2: 1

C. 1 : 2

D. 8 : 1

Answer

Let R_1,R_2 be the radius of the two spheres and V_1,V_2 be the Volume of this two spheres

Volume of Sphere $= \frac{4}{3}\pi R^3$

$R_2 = 2R_1$

So we can say,

$$\frac{V_1}{V_2} = \frac{\frac{4}{3}\pi {R_1}^3}{\frac{4}{3}\pi {R_2}^3}$$

$$\Rightarrow \frac{V_1}{V_2} = \frac{{R_1}^3}{{R_2}^3}$$

$$\Rightarrow \frac{V_1}{V_2} = \frac{R^3}{(2R)^3}$$

$$\Rightarrow \frac{V_1}{V_2} = \frac{1}{8}$$

Out of all the four Options,

Correct Option :A

21. Question

Curved surface area of solid sphere is 24 cm^2. If the sphere is divided into two hemispheres, then the total surface area of one of the hemispheres is

A. 12 cm^2

B. 8 cm^2

C. 16 cm^2

D. 18 cm^2

Answer

Curved Surface Area = 24 cm^2

Let radius be r

Curved Surface Area of solid sphere = $4\pi r^2$

$4\pi r^2 = 24$

$$\Rightarrow r^2 = \frac{6}{\pi}$$

$$\Rightarrow r = \sqrt{\frac{6}{\pi}}\ cm.$$

Total surface Area of hemisphere = $2\pi r^2 + \pi r^2 = 3\pi r^2$

Total surface Area of hemisphere $= 3\pi\left(\sqrt{\frac{6}{\pi}}\right)^2$

Total surface Area of hemisphere = 18 cm^2

Out of all the four Options,

Correct Option :D

22. Question

Two right circular cones have equal radii. If their slant heights are in the ratio 4 : 3, then their respective curved surface areas are in the ratio

A. 16 : 9

B. 2 : 3

C. 4 : 3

D. 3 : 4

Answer

Curved Surface Area = πRL

where R is the radius and L is the slant height

Let L_1,L_2 be the slant heights of the two cone and A_1,A_2 be the area of this two cones

So we can say,

$$\frac{A_1}{A_2} = \frac{\pi RL_1}{\pi RL_2}$$

$$\Rightarrow \frac{A_1}{A_2} = \frac{L_1}{L_2}$$

$$\Rightarrow \frac{A_1}{A_2} = \frac{4}{3}$$

Out of all the four Options,

Correct Option : C