QB365 Question Bank Software Study Materials

Mensuration Important 2 Marks Questions With Answers (Book Back and Creative)

10th Standard

Maths

Total Marks : 60

2 Marks

30 x 2 = 60

1) 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

2) 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

3) 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

4) 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.

5) 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

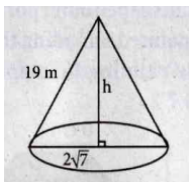
$\frac{22}{7} \times (4 + 1) \times 5$

$= \frac{550}{7}$

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

6) 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

$\pi r^2 = 88$

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

$r = 2\sqrt{7}$ m

slant height = 19 m

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

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

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

Height of the tent = 18.25 m

7) The ratio of the radii of two right circular cones of same height is 1 : 3. Find the ratio of their curved surface area when the height of each cone is 3 times the radius of the smaller cone.

Answer : Let the radii of two cones be r_1 and r_2 and heights be h_1 and h_2

Given ratio of their radii = $\frac{r_1}{r_2} = \frac{1}{3}$

$r_1 = \frac{r_2}{3}$

$h_1 = 3r_1, h_2 = 3r_1$

[r_1 is the radius of smaller cone]

Slant heights $l_1 = \sqrt{h_1^2 + r_1^2}$

$= \sqrt{9r_1^2 + r_1^2} = \sqrt{10}r_1$

$l_2 = \sqrt{h_2^2 + r_2^2}$

$= \sqrt{9r_1^2 + 9r_1^2} = \sqrt{18r_1^2} = 3\sqrt{2}r_1$

Ratio of curved surface areas

$= \frac{\text{CSA of I cone}}{\text{CSA of II cone}}$

$= \frac{\pi r_1 l_1}{\pi r_2 l_2} = \frac{r_1(\sqrt{10}r_1)}{(3r_1)(3\sqrt{2}r_1)}$

$= \frac{\sqrt{10}}{9\sqrt{2}} = \frac{\sqrt{5}\sqrt{2}}{9\sqrt{2}} = \frac{\sqrt{5}}{9}$

Ratio of C.S.A = $\sqrt{5} : 9$

8) The radius of a sphere increases by 25%. Find the percentage increase in its surface area.

Answer : Let the radius of the sphere be 'r' cm

Surface area = $4\pi r^2$

when radius is increased by 25% ,then new diameter = r + 25% + r

$= r + \frac{25r}{100} = \frac{5r}{4}$

Surface area of new sphere

$= 4\pi\left(\frac{5r}{4}\right)^2$

$= 4\pi\left(\frac{25r^2}{16}\right)$

$= \frac{25\pi r^2}{4}$

lncrease in surface area = $\frac{25\pi r^2}{4} - 4\pi r^2$

$= \frac{25\pi r^2 - 16\pi r^2}{4}$

$= \frac{9\pi r^2}{4}$

Percentage increase in surface area

$= \frac{9\pi r^2/4}{4\pi r^2} \times 100\%$

$= \frac{900}{16}\% = 56.25\%$

9) The ratio of the volumes of two cones is 2 : 3. Find the ratio of their radii if the height of second cone is double the height of the first.

Answer : Let r_1 and h_1 be the radius and height of the cone - I and let r_2 and h_2 be the radius and height of the cone-II.

Given $h_2 = 2h_1 = 2$ and $\frac{Volume\ of\ the\ cone\ I}{Volume\ of\ the\ cone\ II} = \frac{2}{3}$

$\frac{\frac{1}{3}\pi r_1^2 h_1}{\frac{1}{3}\pi r_2^2 h_2} = \frac{2}{3}$

$\frac{r_1^2}{r_2^2} \times \frac{h_1}{2h_2} = \frac{2}{3}$

$\frac{r_1^2}{r_2^2} = \frac{4}{3} \text{gives} \frac{r_1}{r_2} = \frac{2}{\sqrt{3}}$

Therefore, ratio of their radii = $2 : \sqrt{3}$

10) 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 = $\pi h \left(R^2 - r^2\right)$

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

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

height of the embankment

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

11) If the circumference of a conical wooden piece is 484 cm then find its volume when its height is 105 cm.

Answer : Given circumference = 484 cm

$2\pi r = 484$

$2 \times \frac{22}{7} \times r = 484$

$r = \frac{484 \times 7}{44} = 77$ cm

height h = 105 cm

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

$= \frac{1}{3} \times \frac{22}{7} \times 77 \times 77 \times 105$

= 652190 cm^3

12) 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

Given $\frac{r_1}{r_2} = \frac{4}{7} \Rightarrow r_1 = \frac{4r_2}{7}$

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 $V_1 : V_2 = 64 : 343 = \frac{64}{343}$

13) 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

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

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

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

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

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

14) A hemi-spherical tank of radius 1.75 m is full of water. It is connected with a pipe which empties the tank at the rate of 7 litre per second. How much time will it take to empty the tank completely?

Answer : Radius of hemispherical tank 'r' = 1.75 m

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

$= \frac{2}{3} \times \frac{22}{7} \times (1.75)^3$

= 11.225 m^3

= 11225 litre

Given that cylindrical pipe empties the tank at the rate of 7 litre per second.

Time Required to empty the tank completely

$= \frac{\text{Volume}}{\text{Rate}}$

$= \frac{11225}{7} = 1604 \sec(\text{app})$

= 27 min (app)

15) Give practical example of solid cone.

Answer : Ice cream Cone

16) Find surface area of a cone in terms of its radius when height is equal to radius

Answer : h = r,

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

$\text{Surface Area } = \pi r(l + r)$

$= \pi r(\sqrt{2}r + r)$

$= \pi r^2(\sqrt{2} + 1)$

17) Compare the above surface area with the area of the base of the cone

Answer : Area of base of cone = πr^2

Surface area of the cone obtained in (5)

$= (\sqrt{2} + 1)\pi r^2 = (\sqrt{2} + 1)$ times more

18) Find the surface area of the earth whose diameter is 12756 kms.

Answer : Diameter of earth = 12756 kms

Radius $r = \frac{12756}{2} = 6378\text{kms}$

Surface Area $= 4\pi r^2 = 4 \times \frac{22}{7} \times (6378)^2$

$= \frac{3579741792}{7}$

= 511391584.571 sq. km

19) Shall we get a hemisphere when a sphere is cut along the small circle?

Answer : No, it is not possible to get the hemisphere, when a sphere is cut along the small circle.

20) T.S.A of a hemisphere is equal to how many times the area of its base?

Answer : 3 times.

21) Give two real life examples for a frustum of a cone.

Answer : Bucket, Table lamp.

22) Can a hemisphere be considered as a frustum of a sphere

Answer : No

23) Is it possible to find a right circular cone with equal

(a) height and slant height

(b) radius and slant height

(c) height and radius.

Answer : (i) height = Slant height

i.e., h = l = cone is not possible

(b) r = l = cone is not possible

(c) h = r = cone is possible.

24) A cone, a hemisphere and a cylinder have equal bases. The heights of the cone and cylinder are equal and are same as the common radius. Are they equal in volume?

Answer : No

25) Is it possible to obtain the volume of the full cone when the volume of the frustum is known?

Answer : Not possible

26) If the radii of the circular ends of a conical bucket which is 45 cm high are 28 cm and 7 cm, find the capacity of the bucket. (Use π = $\frac{22}{7}$)

Answer : Clearly bucket forms frustum of a cone such that theradii of its circular ends are r_1 = 28 cm, r_2 = 7 cm, h = 45 cm

Capacity of the bucket = volume of the frustum

$\Rightarrow \frac{1}{3} \times \pi h[r_1^2 + r_2^2 + r_1 r_2]$

$\Rightarrow \frac{1}{3} \times \frac{22}{7} \times 45[28^2 + 7^2 + 28 \times 7)]$

= 22 x 15 x (28 x 4 + 7 + 28)

$\Rightarrow 330 \times 147 cm^2 \Rightarrow 48510 cm^2$

27) A conical tent of 56m base diameter requires 3080m^2 of canvas for the curved surface area. Find it height.

Answer : 21m

28) Find the radius bf a sphere whose surface area is 154 cm^2

Answer : $\text{Total surface area } = 4\pi r^2$

$4\pi r^2 = 154$

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

$r^2 = \frac{154 \times 7}{4 \times 22} = 12.25$

$r = \sqrt{12.25} = 3.5$

$\text{Radius } = 3.5 \text{ cm}$

29) Find the amount of water displaced by a solid spherical ball of diameter 0.21 cm.

Answer : Diameter = 0.21 cm;

$\text{Radius } = \frac{0.21}{2}$

= 0.105 cm

Amount of water displaced = Volume of the ball

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

$= \frac{4}{3} \times \frac{22}{7} \times (0.105)^3$

$= 0.004851 \text{ cm}^3$

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

Answer : $h_1 : h_2 = 5 : 7$