13. Surface Areas and Volumes

Q 1 Find the area enclosed between two concentric circles of radii 4 cm and 3 cm.

Marks (2)

Q 2 The diameter of a garden roller is 1.4 m and it is 2 m long. How much area will it cover in 5 revolutions?

Marks (2)

Q 3 A cuboid has total surface area of 40 sq m and its lateral surface area is 26 sq m. Find the area of base.

Marks (2)

Q 4 Three metal cubes whose edges measure 3 cm, 4 cm and 5 cm respectively are melted to form a single cube. Find the edge of the new cube. Also find the surface area of the new cube.

Marks (2)

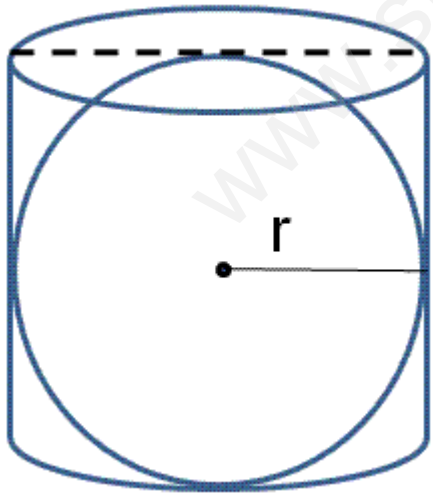
Q 5 An iron pipe 20 cm long has exterior diameter equal to 50 cm. If the thickness of the pipe is 1cm, find the whole surface area of the pipe.

Marks (2)

Q 6 The lateral surface of a cylinder is equal to the curved surface of a cone. If the radius is the same, find the ratio of the height of the cylinder and slant height of the cone.

Marks (2)

Q 7 A right circular cylinder just enclosed a sphere of radius r as shown in figure find the surface area of the sphere , curved surface area of the cylinder and also their ratio.



Marks (2)

Q 8 A godown is in the form of a cuboid measuring 60 m x 40 m x 20 m. How many cuboidal boxes can be stored in it if the volume of one box 0.8 m^3?

Marks (2)

Q 9 The diameter of a sphere is decreased by 50%. What is the ratio between initial and final curved surface areas?

Marks (3)

Q 10 Find the volume of the largest right circular cone that can be fitted in a cube whose edge is 14 cm.

Marks (3)

Q 11 The semi-circular sheet of metal of diameter 28 cm is bent into an open conical cup. Find the depth and the capacity of cup.

Marks (3)

Q 12 A well with 10 m inside diameter is dug 14 m deep. Earth taken out of it is spread all around to a width of 5 m to form an embankment. Find the height of embankment.

Marks (3)

Q 13 The radius and slant height of a cone are in the ratio 4 : 7. If its curved surface area is 792 sq cm, find its radius.

Marks (3)

Q 14 The diameter of 0.84 m long roller is 1.5 m. If it takes 100 complete revolutions to level a playground, find the cost of levelling it at the rate of 50 paise per square metre.

Marks (3)

Q 15 Three equal cubes are placed adjacently in a row. Find the ratio of total surface area of the new cuboid to that of sum of the surface areas of the three cubes.

Marks (3)

Q 16 The cost of papering four walls of a room at 90 paise per square metre is ₹157.50. The height of the room is 5 metres. Find the length and the breadth of the room if they are in the ratio 4:1.

Marks (3)

Q 17 A hollow cylinder is made of iron of height 1 m. Its inner diameter is 54 cm and thickness of iron sheet of cylinder is 9 cm. Find the weight of the hollow cylinder if 1 c.c. of iron weighs 8 gm.

Marks (3)

Q 18 A well with 8 m inner diameter is dug 21 m deep. Earth taken out of it is spread all around to a width of 3 m to form an embankment. Find the height of embankment.

Marks (3)

Q 19 A plastic box 1.25 m long,1.05 m wide and 75 cm deep is to be made. It is to be open at the top. Ignoring the thickness of the plastic sheet, determine the area of the sheet required for making the box and also find the cost of sheet for it, if a sheet measuring 1 sq m cost ₹20.

Marks (3)

Q 20 A reservoir is in the form of rectangular parallelepiped. Its length is 20 m. If 18 kl of water is removed from the reservoir, the water level goes down by 15 cm. Find the width of the reservoir. Marks (3)

Q 21 If v is the volume of a cuboid of dimension a, b, c and s is its surface area, then prove that

$$\frac{1}{V}=\frac{2}{S}\times\left(\frac{1}{a}+\frac{1}{b}+\frac{1}{c}\right)$$

Marks (3)

Q 22 The area of three adjacent faces of a cuboid are x, y and z. If the volume is V, prove that $V^2 = xyz$.

Marks (3)

Q 23 A wall of the length 10 m was to be built across an open ground. The height of the wall is 4 m and thickness of the wall is 24 cm. If this wall is to be built up with bricks whose dimensions are 24 cm x 12 cm x 8 cm, how many bricks would be required?

Marks (3)

Q 24 How many litres of water flow out of a pipe having an area of cross-section of 5 sq cm. in one minute if the speed of the water in the pipe is 30 cm/sec?

Marks (3)

Q 25 A circular tent is cylindrical to a height of 3 metres and conical above it. If its diameter is 105 m and the slant height of the conical portion is 53 m, calculate the length of canvas 5 m wide to make the required tent.

Marks (3)

Q 26 The radius and slant height of a cone are in the ratio 4:7. If its curved surface area is 792 sq cm, find its radius.

Marks (3)

Q 27 A powder tin is in cylindrical shape, whose base has a diameter of 14 cm and height 20 cm. A label is wrapped around the surface of the container. If the label is pasted leaving 2 cm from the top and the bottom. What is the area of the label?

Marks (3)

Q 28 A sphere of diameter 7 cm is dropped in a right circular cylinder vessel partly filled with water. The diameter of the cylindrical vessel is 14 cm. If the sphere is completely submerged in water, by how much will the level of water rise in the cylindrical vessel?

Marks (3)

Q 29 The diameter of a sphere is decreased by 50%. By what percent will its curved surface area decrease?

Marks (3)

Q 30 Three equal cubes are placed adjacently in a row. Find the ratio of total surface area of the new cuboid to that of sum of the surface areas of the three cubes.

Marks (3)

Q 31 How many bricks will be required for a wall 8 m long, 6 m high and 22.5 cm thick if each brick measures 25 cm x 11.25 cm x 6 cm?

Marks (3)

Q 32 The internal measurements of a cuboidal room are 10 m $\times$ 4 m $\times$ 6 m. Find the cost of white washing of the walls at the rate of ₹5 per square metre.

Marks (3)

Q 33 A cylinder is within the cube touching all the vertical faces. A cone is inside the cylinder. If the height and base of the cone is same as cylinder, find the ratio of their volumes.

Marks (4)

Q 34 The external length, breadth and height of a closed rectangular wooden box are 18 cm, 10 cm and 6 cm respectively and thickness of wood is ½ cm. When the box is empty, it weighs 15 kg and when filled with sand it weighs 100 kg. Find the weight of one cubic cm of wood and one cubic cm of sand.

Marks (4)

Q 35 How many litres of water flows out of a pipe having an area of cross-section of 5 sq. cm in one minute, if the speed of water in the pipe is 30 cm/sec?

Marks (4)

Q 36 A hemispherical bowl of internal diameter 40 cm contains a liquid. This liquid is to be filled in cylindrical bottles of radius 2 cm and height 8 cm. How many bottles are required to empty the bowl?

Marks (4)

Q 37 An open box is made of wood 3 cm thick. Its external length, breadth and height are 1.48 m,1.16 m and 8.3 dm. Find the cost of painting the inner surface of ₹1000 per 10 sq metres.

Marks (4)

Q 38 The ratio of radii of two right circular cylinders is 2:5 and that of their heights is 1:4, find the ratio of their Volumes.

Marks (4)

Q 39 A wooden toy is in the form of a cone. The diameter of the base of the cone is 6 cm and the height of the cone is 4 cm. Find the cost of painting the toy at the rate of Rs. 5 per 100 cm^2.

Marks (4)

Q 40 An open cuboidal box is made of 3 cm thick wood. Its external length, breadth and height are 1.48 m, 1.16 m and 8.3 dm respectively. Find the cost of painting the inner surface at the rate of Rs. 50 per square metre.

Marks (4)

Q 41 A conical vessel having internal radius 3 cm and height 25 cm is full of water. The water is emptied into a cylindrical vessel with internal radius of 10 cm. Find the height to which the water rises.

Marks (4)

Q 1 A small indoor greenhouse is made of entirely glass planes (including) bases together with tape. It is 30 cm long, 25 cm wide and 25 cm high.
What is the area of the glass?
How much tape is needed for all the 12 edges?

Q 2 Find the surface area of a cube whose edge is 11 cm.

Q 3 The dimensions of a cuboid are in the ratio 1:2:3 and its total surface area is 88 m^2. Find the dimensions of the cuboid.

Q 4 Three cubes each of side 5 cm are joined end to end. Find the surface area of the resulting cuboid.

Q 5 cuboidal oil tin is 30 cm by 40 cm by 50 cm. Find the cost of the tin required for making 20 such tins if the cost of tin sheet is Rs 20 per square meter.

Q 6 The floor of a rectangular hall has a perimeter of 250 m. Its height is 6 m. Find the cost of painting its four walls at the rate of Rs. 6 per square meter.

Q 7 Agrawal sweets was placing an order for making cardboard boxes for packing their sweets. Two sizes of the boxes were required. The bigger of dimension 25 cm x 20 cm x 5 cm and the smaller of dimension 15 cm x 12 cm x 5 cm. 5 % of the total surface is required extra, for all the overlaps. If the cost of cardboard is Rs. 4 for 1000 cm^3, find the cost of cardboard required for supplying 250 boxes of each kind.

Q 8 The curved surface area of a right circular cylinder of height 14 cm is 88 cm^2 find the diameter of the base.

Q 9 The diameter of a garden roller is 1.4 m and it is 2 m long. How much area will it cover in 5 revolutions?

Q 10 A metal pipe is 77 cm long. The inner diameter of a cross section is 4 cm , the outer diameter is 4.4 cm .Find

a) Inner curved surface area

b) Outer curved surface area

c) Total surface area

Q 11 A cylindrical vessel without lid, has to be tin coated on both the sides. If the radius of the base is 70 cm and its height is 1.4 m, calculate the cost of tin- coating at the rate of Rs. 3.50 per 1000 cm^2.

Q 12 A lampshade is cylindrical in shape, it has to be covered with a decorative cloth, the frame has the base diameter of 20 cm and height of 30 cm. A margin of 2.5 cm is to given to it for folding it over the top and the bottom of the frame. Find out how much cloth is needed for covering the lamp- shade.

Q 13 The diameter of a cone is 14 cm and its slant height is 9 cm. Find the area of its curved surface.

Q 14 The radius and the slant height are in the ratio 4:7. If its curved surface area is 792 cm^2, find its radius.

Q 15 The radius of the cone is 7 cm and its curved surface area is 176 cm^2.

Q 16 A jokers cap is in the form of a right circular cone of base radius 7 cm and height 24 cm. Find the area of the sheet needed to make 10 such caps.

Q 17 A circus tent is cylindrical to a height of 3 m and conical above it, if its diameter is 105 m and the slant height of the conical portion is 53 m, calculate the length of the canvas 5 m wide required to make the tent.

Q 18 There are two cones, the surface area of one cone is twice the surface area of the other cone. The slant height of the latter is twice that of the former. Find the ratio of their radii.

Q 19 Find the surface area of a sphere of radius 7 cm.

Q 20 The radius of a hemi-spherical balloon increases from 7 cm to 14 cm as air is being pumped into it. Find the ratio of the surface areas of the balloon in the two cases.

Q 21 The internal and the external diameters of a hollow hemi-spherical vessel are 24 cm and 25 cm respectively. The cost of painting one square meter of the surface is 7 paise. Find the total cost of painting the vessel all over.

Q 22 A storage tank consists of a circular cylinder, with a hemisphere adjoined at either ends. If the external diameter of the cylinder be 1.4 cm and its length be 5 m, what will be the cost of painting it on the outside at the rate of Rs. 10 per square meter?

Q 23 A wooden toy is in the form of a cone surmounted on a hemisphere. The diameter of the base of the cone is 6 cm and its slant height is 5 cm. Find the cost of painting the toy at the rate of Rs 5 per 1000 cm^2.

Q 24 A matchbox measures 4 cm x 2.5 cm x 1.5 cm. What will be the volume of a packet containing 12 such boxes?

Q 25 The capacity of a tank, which is cuboidal in shape, is 50,000 l. Find the breadth of the tank if its length and depth are respectively 2.5 m and 10 m.

Q 26 A cube of 9 cm edge is immersed completely in a rectangular vessel containing water. If the dimensions of the base are 15 cm and 12 cm. Find the rise in water level in the vessel.

Q 27 A solid cube of side 12 cm is cut into 8 cubes of equal volume. What will be the side of the new cube? Also find the ratio between their surface areas.

Q 28 How many cubic centimeters of iron are there in an open box whose external dimensions are 36 cm, 25 cm and 16.5 cm, the iron being 1.5 cm thick throughout? If one cubic cm of iron weighs 15 g, find the weight of the empty box in kg.

Q 29 A well with 10 m inside diameter is dug 14 m deep. Earth taken out of it is spread all around to a width of 5 m to form an embankment. Find the height of the embankment.

Q 30 How many liters of water can flow out of a pipe having an area of cross-section of 5 cm^2 in one minute, if the speed of water in the pipe is 30 cm/sec?

Q 31 The ratio between the radii of the base and the height of the cylinder is 2 : 3 what is the Total surface area if the volume of the cylinder is 1617 cm^3.

Q 32 The trunk of a tree is cylindrical in shape and its circumference is 176 c m. If the length of the trunk is 3 m. Find the volume of timber that can be obtained from the trunk.

Q 33 Find the length of 13.2 kg of copper wire of diameter 4 mm, when 1 cubic cm of copper weighs 8.4 gm.

Q 34 The diameter of a right circular cone is 8 cm and its volume is 48π cm^3. What is the height of the cone?

Q 35 The volume of a cone is 18480 cm^3. If the height of the cone is 40 cm. Find the radius of the base.

Q 36 A right triangle ABC with its sides 5 cm, 12 cm and 13 cm is revolved about its side of 12 cm. Find the volume of the right circular cone so formed.

Q 37 A cone of radius 5 cm is filled with water. If the water is poured in a cylinder of radius 10 cm, the height of the water rises by 2 cm , find the height of the cone.

Q 38 A solid cube of side 7 cm is melted to make a cone of height 5 cm, find the radius of the base of the cone.

Q 39 Find the volume of the largest right circular cone that can be fitted in a cube of edge 14 cm.

Q 40 A solid lead ball of radius 7 cm was melted and then drawn into a wire of diameter 0.2 cm. Find the length of the wire.

Q 41 How many spherical bullets can be made out of a solid cube of lead whose edge measures 44 cm, each bullet being 4 cm in diameter.

Q 42 Twenty seven solid iron spheres, each of radius r and surface area S are melted to form a sphere with surface area S'. Find the radius r' of the new sphere ratio of S and S'

Q 43 A dome of a building is in the form of hemisphere. From inside, it was white washed at the cost of Rs.498.96. If the cost of whitewashing it, is Rs.2.00 per square meter, find the inside surface area of the dome and the volume of air inside the dome.