

ASSIGNMENT CLASS X
SURFACE AREAS AND VOLUMES

1. A tent is of the shape of a right circular cylinder upto a height of 3 metres and then becomes a right circular cone with a maximum height of 13.5 m above the ground. Calculate cost of painting the inner side of the tent at the rate of Rs. 2 per square metre, if radius of base is 14 m.
2. A circus tent is cylindrical upto a height of 3 m and conical above it. If the diameter of the base is 105 m and the slant height of the conical part is 53 m, find the total canvas used in making the tent.
3. A solid is in the form of a cylinder with hemispherical ends. The total height of the solid is 19 cm and the diameter of the cylinder is 7 cm. Find volume and total surface area of the solid.
4. A solid toy is in the form of a right circular cylinder with a hemispherical shape at one end and a cone at the other end. Their common diameter is 4.2 cm and the height of the cylindrical and conical portions are 12 cm and 7 cm respectively. Find the volume of the solid toy.
5. A solid is composed of a cylinder with hemispherical ends. If the whole length of the solid is 104 cm and the radius of each of the hemispherical ends is 7 cm, find the cost of polishing its surface at the rate of Rs. 10 per dm^2 .
6. A cylindrical tub of radius 5 cm and length 9.8 cm is full of water. A solid in the form of a right circular cone mounted on a hemisphere is 3.5 cm and height of the cone outside the hemisphere is 5 cm, find the volume of the water left in the tub.
7. A toy is in the shape of a right circular cylinder with a hemisphere on one end and a cone on the other. The radius and height of the cylindrical part are 5 cm and 13 cm respectively. The radii of the hemispherical and conical parts are the same as that of the cylindrical parts. Find the surface area of the toy if the total height of the toy is 30 cm.
8. A cylindrical container of radius 6 cm and height 15 cm is filled with ice-cream. The whole ice-cream has to be distributed to 10 children in equal cones with hemispherical tops. If the height of the conical portion is four times the radius of its base, find the radius of the ice-cream cone.
9. A building is in the form of a cylinder surmounted by a hemispherical vaulted dome and contains $41\frac{19}{21}$ cm^3 of air. If the internal diameter of the building is equal to the total height above the floor, find the height of the building.
10. An iron pillar has some part in the form of a right circular cylinder and the remaining in the form of a right circular cone. The radius of the base of each of the cone and the cylinder is 8 cm, the cylindrical part is 240 cm high and conical part is 36 cm high. Find the weight of the pillar, if 1 cm^3 of iron weighs 10 grams.

11. A hemispherical bowl of internal diameter 36 cm contains a liquid. This liquid is to be filled in cylindrical bottles of radius 3 cm and height 6 cm. How many bottles are required to empty the bowl?
12. The radii of the internal and external surfaces of a metallic spherical shell are 3 cm and 5 cm respectively. It is melted and recast into a solid right circular cylinder of height $10\frac{2}{3}$ cm. Find the radius of the base of the cylinder.
13. A sphere of diameter 6 cm is dropped in a right circular cylindrical vessel partly filled with water. The diameter of the cylindrical vessel is 12 cm. If the sphere is completely submerged in water, by how much will the level of water rise in the cylindrical vessel?
14. Lead spheres of diameter 6 cm are dropped into beaker containing some water and are fully submerged. The diameter of the beaker is 18 cm. Find how many lead spheres have been dropped in it if the water rises by 40 cm?
15. A hemispherical bowl of internal radius 9 cm is full of liquid. This liquid is to be filled into cylindrical shaped small bottles each of diameter 3 cm and height 4 cm, How many bottles are necessary to empty the bowl?
16. The diameters of the internal and external surfaces of a hollow spherical shell are 6 cm and 10 cm respectively. If it is melted and recast into a solid cylinder of diameter 14 cm, find the height of the cylinder.
17. Four right circular cylindrical vessels each having diameter 21 cm and height 38 cm are full of ice-cream. The ice-cream is to be filled in cones of height 12 cm and diameter 7 cm having a hemispherical shape at the top. Find the total number of such cones which can be filled with ice-cream.
18. The base radius and height of a right circular solid cone are 2 cm and 8 cm respectively. It is melted and recast into spheres of diameter 2 cm each. Find the number of spheres so formed.
19. Water is flowing at the rate of 0.7 metres per second through a circular pipe whose internal diameter is 2 cm into a cylindrical tank, the radius of whose base is 40 cm. Determine the increase in the water level in half an hour.
20. Water is being pumped out through a circular pipe whose internal diameter is 7 cm. If the flow of water is 72 cm per second, how many litres of water are being pumped out in one hour?
21. The radii of the circular ends of a solid frustum of a cone are 33 cm and 27 cm and its slant height is 10 cm. Find its total surface area.
22. A bucket made of aluminium sheet is of height 20 cm and its upper and lower ends are of radius 25 cm and 10 cm respectively. Find the cost of making the bucket, if the aluminium sheet costs Rs.70 per 100 cm^2 . (use $\pi = 3.14$)

23. A bucket is in the form of a frustum of a cone with a capacity of 12308.8 cm^3 of water. The radii of the top and bottom circular ends are 20 cm and 12 cm respectively. Find the height of the bucket and the area of the metal sheet used in its making. (use $\pi = 3.14$)
24. The radii of the ends of a bucket 30 cm high are 21 cm and 7 cm. Find its capacity in litres and the amount of sheet required to make this bucket and its cost at Rs. 2 per sq. dm of sheet.
25. A milk container is made of metal sheet in the form of a frustum of a cone and is of height 16 cm with radii of its lower and upper ends as 8 cm and 20 cm respectively. Find the cost of milk which the container can hold when fully filled at Rs 16 per litre and, the cost of the metal sheet used in making the container, at Rs 5 per sq. dm. (use $\pi = 3.14$)
26. A right circular cone is divided by a plane parallel to its base in two equal volumes. In what ratio will the plane divide the axis of the cone?
27. The height of a cone is 30 cm. A small cone is cut off at the top by a plane parallel to the base. If its volume be $\frac{1}{27}$ of the volume of given cone, at what height above the base is section made?
28. A hollow cone is cut by a plane parallel to the base and the upper partion is removed. If the curved surface of the remainder is $\frac{8}{9}$ of the curved surface of the whole cone, find the ratio of the line-segment into which the cones altitude is divided by the plane.
29. If a cone of radius 10 cm is divided into two parts by drawing a plane through the mid-point of its axis, parallel to its base. Compare the volumes of the two parts.
30. A bucket of height 8 cm and made up of copper sheet is in the form of a frustum of a right circular cone with radii of its lower and upper ends as 3 cm and 9 cm respectively. Calculate :
- (i) the height of the cone of which the bucket is a part.
(ii) the volume of water which can be filled in the bucket.
(iii) the area of copper sheet required to make the bucket. (Leave the answer in terms of π)

ANSWERS

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| 1. Rs 2068 | 2. 9735 m^2 | 3. $641.66 \text{ cm}^3, 418 \text{ cm}^2$ | 4. 218.064 cm^3 | 5. Rs. 457.60 |
| 6. 616 cm^3 | 7. 770 cm^2 | 8. 3 cm | 9. 4 m | 10. 506.88 kg |
| 11. 72 | 12. 3.5 cm | 13. 1 cm | 14. 90 | 15. 54 |
| 16. $\frac{8}{3} \text{ cm}$ | 17. 216 | 18. 8 | 19. 78.75 cm | 20. 9979.2 l |
| 21. 7599.42 cm^2 | 22. Rs. 2143.05 | 23. height = 15 cm, Area = 2160.32 cm^2 | | |
| 24. capacity = 20.02 l , amount of sheet required = 3068.8 cm^2 , Total cost = Rs. 61.34 | | | | |
| 25. cost of milk = Rs. 167.20, cost = Rs. 97.97 | 26. $1 : 2^{1/3} - 1$ | 27. 20 cm | | |
| 28. $1 : 2$ | 29. $1 : 7$ | 30. (i) 12 cm (ii) $312 \pi \text{ cm}^3$ (iii) $129 \pi \text{ cm}^2$ | | |