

VISWABHARATHI WISEWOODS

SURFACE AREAS AND VOLUMES - PRACTICE SHEET

GRADE : VIII – IX

SUBJECT : MATHEMATICS

Key points :

- ✚ Surface Area of a Cuboid and a Cube
- ✚ Surface Area of a Right Circular Cylinder
- ✚ Surface Area of a Right Circular Cone
- ✚ Surface Area of a Sphere
- ✚ Volume of a Cuboid
- ✚ Volume of a Cylinder
- ✚ Volume of a Right Circular Cone
- ✚ Volume of a Sphere

Cuboid – with Length l , breadth b and height h :

- ✚ Perimeter of Cuboid = $4(l + b + h)$
- ✚ Length of diagonal = $\sqrt{l^2 + b^2 + h^2}$
- ✚ Lateral surface area = $2h(l + b)$
- ✚ Total surface area = $2(lb + bh + hl)$
- ✚ Volume = lbh

Cube – with side a :

- ✚ Perimeter of cube = $12 \times \text{edge}$
- ✚ Lateral surface area = $4a^2$
- ✚ Total surface area = $6a^2$
- ✚ Volume = a^3

Right Prism :

- ✚ Lateral Surface area = Perimeter of base \times Height.
- ✚ Total surface area = Lateral surface area + 2 (Area of one end)
- ✚ Volume = Area of base \times Height

Right Circular Cylinder – with radius r and height h :

- ✚ Curved Surface area = $2\pi rh$
- ✚ Total surface area = $2\pi r(r + h)$
- ✚ Volume = $\pi r^2 h$

Hollow Cylinder :

- ✚ Each base surface area $\pi (R^2 - r^2)$
- ✚ Curved surface area $= 2\pi h(R + r)$
- ✚ Total surface area $= 2\pi(R + r)(h + R - r)$
- ✚ Volume $= \pi h(R^2 - r^2)$

Right Pyramid :

- ✚ Lateral surface area $= \frac{1}{2} \times \text{Perimeter of base} \times \text{Slant Height}$
- ✚ Total Surface area $= \text{Lateral Surface area} + \text{Area of base}$
- ✚ Volume $= \frac{1}{3} \times \text{Area of base} \times \text{Height}$

Right Circular Cone – with radius r , height h and slant height l :

A right circular cone is a solid generated by revolving a line segment which passes through a fixed point and which makes a constant angle with a fixed line. The fixed point is called the vertex of the cone, the fixed line is called the axis of the cone.

- ✚ Curved Surface area $= \pi r l$
- ✚ Total surface area $= \pi r(l + r)$
- ✚ Volume $= \frac{1}{3} \pi r^2 h$
- ✚ Volume $= \frac{1}{3} \times \text{Area of the base} \times \text{Height}$

Sphere (Solid) – with radius r :

The set of all points in space which are equidistant from a fixed point is called a sphere. The fixed point is called the center of the sphere and the constant distance is called its radius.

- ✚ Curved Surface Area $= 4\pi r^2$
- ✚ Total surface area $= 4\pi r^2$
- ✚ Volume $= \frac{4}{3} \pi r^3$

Hemisphere – with radius r

- ✚ Curved surface area $= 2\pi r^2$
- ✚ Total surface area $= 3\pi r^2$
- ✚ Volume $= \frac{2}{3} \pi r^3$

Spherical shell – with inner with radius r and outer radius R

- ✚ Volume $= \frac{4}{3} \pi (R^3 - r^3)$

I. One Mark Questions :

1. If the perimeter of one of the faces of a cube is 40 cm, then its volume is ()
A) 6000 cu cm B) 1600 cu cm C) 1000 cu cm D) 600 cu cm
2. A cuboid having surface areas of 3 adjacent faces as a, b and c has the volume ()
A) $3\sqrt{abc}$ B) \sqrt{abc} C) abc D) $a^3b^3c^3$
3. The diameter of a right circular cylinder is 21 cm and its height is 8 cm. The volume of the cylinder is : ()
A) 528 cu cm B) 1056 cu cm C) 1386 cu cm D) 2772 cu cm
4. Each edge of a cube is increased by 40%. The % increase in the surface area is : ()
A) 40 B) 96 C) 160 D) 240
5. Find the curved (lateral) surface area of each of the following right circular cylinders : ()
A) $2\pi rh$ B) πrh C) $2\pi r(r + h)$ D) None of these
6. The radius and height of a right circular cylinder are each increased by 20%. The volume of cylinder is increased by ()
A) 20% B) 40% C) 54% D) 72.8%
7. A well of diameter 8 meters has been dug to the depth of 21 m. The volume of the earth dug out is
A) 1056 cu m B) 352 cu m C) 1408 cu m D) 4224 cu m ()
8. The radius of a cylinder is doubled and the height remains the same. The ratio between the volumes of the new cylinder and the original cylinder is ()
A) 1 : 2 B) 1 : 3 C) 1 : 4 D) 1 : 8
9. Length of diagonals of a cube of side a cm is : ()
A) $\sqrt{2}a$ cm B) $\sqrt{3}a$ cm C) $\sqrt{3}a$ cm D) 1 cm
10. Surface area of sphere of diameter 14 cm is : ()
A) 616 cm^2 B) 516 cm^2 C) 400 cm^2 D) 2244 cm^2

II. Fill in the Blanks :

11. The sum of the areas of the plane and curved surfaces (faces) of a solid is called its _____ surface area.
12. Volume of a cylinder is three times the volume of a _____ on the same base and of the same height.
13. The volume of a rectangular solid measuring 1 m by 50 cm by 0.5 m is cm^3 .

III. True of False :

14. If the line joining the centres of circular ends of a cylinder is not perpendicular to the circular ends, then the cylinder is not a right circular cylinder. []
15. In a sphere the number of faces is 2. []
16. The curved surface area of a cone is also called the lateral surface area. []

IV. Match the following :

17. Match the lists correctly :

Column – I		Column – II	
(P)	A cone and a hemisphere have equal base radius and equal volumes, then the ratio of height to radius is	(1)	1 : 9
(Q)	A cone and a cylinder are of the same height. Their radii of the bases are in ratio 2 : 1, then the ratio of their volumes is	(2)	1 : 1
(R)	A right circular cylinder just encloses a sphere of radius r , then the ratio of their curved surface areas is	(3)	4 : 3
(S)	Twenty seven solid iron spheres each of radius r and surface area S are melted to form a sphere with surface area S' , then ratio of S and S' is	(4)	2 : 1

18. Match the description given in Column-I with their corresponding solid figure in Column-II.

Column – I		Column – II	
(P)	Rectangle rotating about axis	(1)	Cone
(Q)	Semicircle rotating about diameter	(2)	Cube
(R)	Right angled triangle rotating about base	(3)	Cylinder
(S)	Six square sheet	(4)	Sphere

DIRECTION (19 – 20) : In each of the following questions, a statement of Assertion is given followed by a corresponding statement of Reason just below it. Of the statements, mark the correct answer as :

- (a) Both assertion and reason are true and reason is the correct explanation of assertion.
- (b) Both assertion and reason are true but reason is not the correct explanation of assertion.
- (c) Assertion is true but reason is false.
- (d) Assertion is false but reason is true.

19. **Assertion :** If diameter of a sphere is decreased by 25%, then its curved surface area is decreased by 43.75%. ()

Reason : Curved surface area is increased when diameter decreases.

20. **Assertion :** If the inner dimensions of a cuboidal box are 50 cm × 40 cm × 30 cm, then the length of the longest rod that can be placed in the box is $50\sqrt{2}$ cm. ()

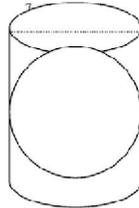
Reason : The line joining opposite corners of a cuboid is called its diagonal. Also, length of longest rod = length of diagonal = $\sqrt{l^2 + b^2 + h^2}$.

II. Answer the following questions :

21. The curved surface area of a cylinder of height 21 cm is 660 cm^2 , find its radius.
22. The volume of a cylinder is $448 \pi \text{ cm}^3$ and height 7 cm. Find its total surface area.
23. The volume of a sphere is $905 \frac{1}{7} \text{ cm}^3$. Determine its diameter.
24. If the volume of a sphere is $36 \pi \text{ cm}^3$, then find its radius.
25. The outer diameter of a spherical shell is 10 cm and inner diameter is 9 cm. Find the volume of the metal contained the shell.
26. The length, breadth and height of a room are 5m, 4m and 3m. Find the cost of colour washing its four walls and ceiling at the rate for Rs. 7.50 per square meter.
27. Three cubes each of 5 cm edge are joined end to end. Find the surface area of the resulting Cuboid.
28. Two cubes of side 6 cm each joined end to end. Find the surface area of the resulting Cuboid.
29. The radii of two right circular cylinders are in the ratio 2:3 and their heights in the ratio 5:4. Calculate the ratio of their curved surface area.
30. How many meters of cloth 5m wide will be required to make a conical tent, the radius of whose base 7m and height 24m?
31. The outer and inner diameters of a hemispherical bowl are 17 cm and 15 cm find the cost of polishing it over at 25 paise per cm^2 ?
32. A river 2m deep and 30m wide is flowing at the rate of 2km per hour. How much water will fall into the sea in a minute?
33. The volume of a cube is 125 cm^3 . Find its surface area.
34. Find the length of the longest pole that can be put in a room of dimensions 6m x 6m x 3m.
35. The surface area of a sphere is 5544 cm^2 , find its diameter.
36. The sum of the radius of the base and height of a cylinder is 37m. If the total surface area of the Solid cylinder is 1628 m^2 , find the volume of cylinder.
37. A hemispherical bowl is made of steel 0.25cm thick .The inner radius of the bowl is 5 cm. Find the outer curved surface area of the bowl.
38. The ratio of the CSA to the TSA of a right circular cylinder is 1: 3. Find the volume of the cylinder If its T S A is 1848 cm^2 .
39. The diameter of a roller, 120cm long is 84cm. It takes 500 complete revolutions to level a Playground. Find the cost of leveling it at the rate of Rs 25 per sq metre.
40. The height of a cone is 15cm. If its volume is 1570 cm^3 , find the radius of the base. ($\pi = 3.14$)
41. Find the surface area of a sphere whose volume is $99/7 \text{ cm}^3$.
42. The total surface area of a solid hemisphere is 1848 cm^2 . Find the volume of the hemisphere.
43. Curved surface area of a cylinder is 4400 cm^2 the circumference of its base is 110 cm. Find the height of the cylinder.
44. Base circumference of a cylinder is 132 m and its height is 2m. Find its curved surface area.
45. Three solid spheres of iron whose diameters are 2cm, 12cm and 16cm respectively are melted Into sphere. Find the radius of the new sphere.
46. The radius and height of a cylinder are in the ratio 2:3. If the volume of a cylinder is 1617 cm^3 Find its radius and height.
47. A solid cube of side 12 cm is cut into 8 cubes of equal volumes. Find the side of new cube.
48. The paint in a certain container is sufficient to paint an area equal to 9.375 sq. m . How many bricks of dimensions 22.5cm x 10cm x 7.5 cm containers can be painted out of this?
49. Find the total surface area of the cone whose base radius is 8cm and sum of base radius and slant height is 21cm.

50. The height of a rectangular room is 2.5m. The cost of painting its four walls at the rate of Rs. 20/m² is Rs.2500. Find the perimeter of the room.
51. The radius of sphere is 5cm. If the radius is increased by 20%. Find how much percent volume is increased
52. The radius of a spherical balloon is inflated from 1.5 cm to 2.5 cm by pumping more air in it. Find the ratio of surface Area of resulting balloon to the original balloon.
53. The curved surface area and volume of a cylindrical pillar are 264cm³ and 396c m³. Find the diameter and height of the pillar.
54. A right circular cone is 5.4cm high and radius of its base is 2cm. It is melted and recast into another right circular cone with radius of base as 1.5 cm. Find the height of the new cone formed.
55. If the volume of a sphere is divided by its surface area then the result is 27. Find the radius of sphere
56. Total cost of making a cylindrical pipe is Rs 7040 at the rate of Rs 5 per cubic meter, if the height of cylindrical pipe is 7m then find its radius (8m)
57. A well of diameter 8 m is dug out up to 7 m. Calculate the volume of the earth dug out.
58. The dimensions of a cuboid are in the ratio 3:2:2 and the lateral surface area of cuboid is 2000m². The outer surface of the cuboid is painted with coloured enamel at the rate of Rs 8 per m². Find the total cost of painting the outer surface of the cuboid.
59. The floor of a cuboidal hall has perimeter equal to 250 m and height 6m. Find the cost of painting its four walls (including doors etc) at the rate of Rs 8 per m².
60. Gopal sweets placed an order of making 30cm x 20cm x 6cm cardboard boxes for packing their sweets. For all overlaps, 4% of total area is required extra. If cost of the cardboard is 25p for 100 cm², find the cost of the cardboard used for making 1000 boxes.
61. Food Corporation of India stacks bags containing wheat in the shape of cuboidal blocks in an open field on wooden platform and these blocks are covered with tarpaulin. If there be 10 blocks, each having dimensions 10m x 5m x 3m, then find the cost of the tarpaulin used to cover these blocks at the rate of Rs 12.5 per m². Assuming that there is negligible wastage of tarpaulin in folds.
62. The diameter of a road roller is 140 cm and its length is 2.2 m. It takes 400 complete revolutions to move once over to level a stretch of road 2.2 m wide. Find the surface area of the stretch of road leveled in m². (Take $\pi = \frac{22}{7}$).
63. There are 50 students in class X of a school. Class teacher asks all the students to prepare cylindrical container with a base at the bottom but open at the top, using cardboard. Each student has to make one container of radius of 4.2cm and height 11.2 cm. the class teacher will provide the cardboard to all the students. The cardboard is purchased by the teacher from the market at the rate of Rs 10 per 100 cm². Find the amount spent by the class teacher for the purchase of the cardboard.
64. The radius of the base of a conical tent is 12m the tent is 9m high. Find the cost of canvas required to make the tent, if one square meter of canvas costs Rs 120. (Take $\pi = \frac{22}{7}$)
65. A conical tent is made of tarpaulin 1.5m wide. Vertical height of the conical tent is 4m and base diameter is 6m. Find the length of the tarpaulin used, assuming that 10% extra material is required for stitching margins and wastage in cutting. (Take $\pi = 3.14$).
66. Along a highway 50conical pillars are constructed. Each pillar has base diameter 28 cm and vertical height 18cm. find the total cost of painting these pillars at the rate of Rs. 120 per m². (Take $\pi = \frac{22}{7}$)

67. The hollow sphere, in which the circus motorcyclist performs his stunts, has a diameter of 7m. Find the area available to the motorcyclist for riding. (Take $\pi = \frac{22}{7}$).
68. A hemispherical bowl made of brass, 0.2cm thick. The inner radius of the bowl is 4cm. find the outer curved surface area of the bowl. Also find the cost of carving its outer surface at the rate of Rs 2 per cm^2 . (Take $\pi = \frac{22}{7}$)
69. A right circular cylinder just encloses a sphere (see figure). If the height of the cylinder is 21cm, then find the surface area of cylinder. (Take $\pi = \frac{22}{7}$)



70. A hemispherical dome, open at base, is made from a sheet of fiber, if radius of hemispherical dome is 40cm and $\frac{13}{170}$ of fiber sheet actually used was wasted in making the dome, then find cost of the dome at the rate of Rs. 35 per 100 cm^2 . (Take $\pi = 3.14$)
71. A cuboidal water tank is 5.6 m long, 3.5 m wide and 4m deep. All these dimensions are of the interior of the tank. Find in litres, the capacity of the tank. (Take 1m^3 capacity = 1000 l of water).
72. A cuboidal water tank is filled by tap water at the rate of 1.2 litres per second. Find the length of an edge of the tank in centimeters if the tank is completely filled in 24 minutes.
73. A godown measures 30m x 20m x 8m. Find the maximum number of wooden boxes each measuring 1.2m x 0.8m x 0.5m that can be stored in the godown.
74. A village has a population of 5400. 60 litres of water is required per person per day. The village has water tank measuring 48m x 27 m x 5m completely filled with water. For how many days the water of this is sufficient?
75. A river 3.5 m deep and 28m wide is flowing at the rate of 2.4 km per hour. How many litres of water will flow into the sea in 10minutes? ($1\text{m}^3 = 1000$ litres of water).
76. Coins of same size are placed one above the other and a cylindrical block is formed. The volume of the block is 49.28 cm^3 . If diameter of each coin be 2.8cm and thickness 0.2m, then find the number of coins arranged in block. (Take $\pi = \frac{22}{7}$)
77. At a mela a stall keeper in one of the food stalls has a large cylindrical vessel of base radius 15cm filled to the height of 32 cm with orange juice. The juice is filled in small cylindrical glasses of radius 3cm upto a height of 8 cm and sold for Rs 3 each. How much money the stall keeper receives after selling the juice completely?
78. A cylindrical reservoir 12 m deep is plastered from inside the lateral surface with concrete mixture. The finished inside surface is measured and the payment is made at the rate of Rs. 15 m^2 . if the total payment made is of Rs. 5652, then find the capacity of this reservoir in kilolitres. (Take $\pi = 3.14$).
79. The capacity of a closed cylindrical vessel of height 84 cm is 26.4 litres. How many square metres of metal is required to make seven such vessels. (Take $\pi = \frac{22}{7}$)
80. A cylindrical groove is made in a cylindrical 21 cm long solid piece of wood. The groove is filled with lead and this cylindrical lead block is of same length as that of the wooden cylinder is 3 cm and the outer diameter of the wooden cylinder is 12 cm, find the volume of the wood and that of the lead. (Take $\pi = \frac{22}{7}$)

81. Some soft drink is served to 40 guests in a party. Each guest is served drink, one and only one time in same size of conical glass and the same quantity to each. $AB = 6\text{cm}$ is the diameter of the base of the soft drink cone in the conical glass and the depth of this cone is 5cm . find the quantity of the soft drink in litres which is just sufficient for 40 guests. (Take $\pi = 3.14$)
82. The diameter of the top of a conical reservoir is 4.5m and depth 14m . Find the capacity of the reservoir in kl . (Take $\pi = \frac{22}{7}$)
83. The volume of the space inside a right circular conical tent is 22 m^3 and its vertical height is 3m . Find the curved surface area of the conical tent. (Take $\pi = \frac{22}{7}$)
84. A heap of wheat is in the form of a cone of vertical height 3m and volume 86.625 m^3 . The heap is to be covered by a sheet of canvas. Find the area of the canvas which is just sufficient to cover the heap. (Take $\pi = \frac{22}{7}$)
85. A shot put is a metallic sphere of radius 4.9 cm . if the density of the metal is 7.8g per cm^3 , find the mass of the shot put. (Take $\pi = \frac{22}{7}$)
86. There are 42 hemispherical bowls, each of radius 3.5 cm . find the quantity of water in litres which is just sufficient to fill these 42 bowls. (Take $\pi = \frac{22}{7}$)
87. Find the volume of a sphere whose surface area is 55.44 cm^2 . (Take $\pi = \frac{22}{7}$)
88. If the solid sphere of diameter 8.4 cm be immersed in a tub full of water, find the amount of water displaced by the solid sphere.
89. A hemispherical dome is constructed of a metallic sheet 1cm thick, if the inner radius is 99 cm , then find the volume of the metal sheet used. (Take $\pi = \frac{22}{7}$)
90. 64 solid metallic spheres, each of radius 0.15cm are melted to form a single bigger sphere. Find radius of the bigger sphere.
