

Father Agnel School, Vaishali

Self-Learning Worksheet

Class IX (Mathematics)

Topic: Surface Area and Volume

- Question 1)** A cube and cuboids have the same volume. The dimensions of cuboids are in ratio 1 : 2 : 4. If the difference between the cost of painting the cuboids and cube whole surface area at rate of Rs 5 per m² is Rs. 80. Find their volumes.
- Question 2)** A tent is in shape of right circular cylinder up to a height of 3m and a cone above it. The maximum height of tent above ground is 13.5m. Calculate the cost of painting the inner side of tent at rate of Rs. 3/sq m if radius of base is 14m.
- Question 3)** A school provides milk to students daily in cylindrical glasses of diameter 7cm. If glass is filled with milk up to a height of 12cm, find how many liters of milk is needed to serve 1600 students.
- Question 4)** Eight metallic spheres, each of radius 2 mm, are melted and cast into a single sphere. Calculate the radius of the new sphere
- Question 5)** The diameter of a sphere is decreased by 30%. By what percent its surface area decreases?
- Question 6)** In a cylinder radius is doubled and height is halved then find its curved surface area.
- Question 7)** A right- angled ABC with sides 3cm, 4cm & 5cm is revolved about fixed side of 4cm. find the volume of solid generated. Also total surface area of solid.
- Question 8)** If h, s and v are height, curved surface and volume of cone respectively, prove that $3v h^3 + 9v^2 = s^2 h^2$
- Question 9)** An edge of a cube measure r cm. If the largest possible right circular cone is cut out of this cube, then find the volume of cone?
- Question 10)** If p, x, y are height, curved surface area and volume of cone respectively, prove that- $3yp^3 - x^2p^2 + 9y^2 = 0$
- Question 11)** How many planks of dimensions 5m×25cm×10cm can be stored in a pit which is 20 m long, 6m wide and 80 cm deep?
- Question 12)** The surface area of a sphere of radius 5cm is 5 times the area of the curved surface area of cone of radius 4cm. Find the height and volume of cone. ($\pi = 22/7$)
- Question 13)** A sweet shop has one spherical ladoo of radius 5cm with the same amount of material, how many ladoos of radius 2.5cm can be made?
- Question 14)** A sphere and right circular cylinder of same radius have equal volumes by what percentage does diameters of cylinder exceeds its height?
- Question 15)** Curved surface area of an ice cream cone of slate height 12cm is 113.04m². Find the base radius and height of cone ($\pi = 3.14$)
- Question 16)** A semi circular sheet of metal of radius 14cm is to be bent to form an open conical cup. Find the capacity of cup?
- Question 17)** Two solid spheres made of same metal have weight 5920g and 740g respectively. Determine the radius of larger sphere, if the diameter of smaller one is 5cm.
- Question 18)** Each edge of cube is increased by 50%. Find the percentage increase in surface area of cube.
- Question 19)** Ramesh has build a cuboidal water tank with lid for his house with each outer edge 1.5m long. He gets the outer surface of tank excluding the base, covered with square tiles of side 25cm. Find how much he would spend for tiles, if cost of the tile is Rs 400 per dozen.
- Question 20)** The paint in a certain container is sufficient to point an area equal to 1.375m². How many bricks of dimensions 22.5cm x 10cm x 7.5cm can be painted out of this container.
- Question 21)** Bikanerwala sweets shop was planning an order for making cardboard boxes for packing their

sweets. Two sizes of boxes were required. The bigger of dimensions 25cm x 20cm x 5cm and smaller of dimensions 15cm x 12cm x 5cm. For all overlaps, 5% of total surface area is required extra. If cost of cardboard is Rs 4 for 1000cm^2 , find the cost of cardboard required for supplying 250 boxes of each kind.

Question 22) The dimensions of a roller are 84cm and its length is 120cm. It takes 500 complete revolutions to move once more over to level a playground. Find area of playground in m^2 ?

Question 23) In a hot water heating system, there is a cylindrical pipe of length 28m and diameter 5cm. Find the total radiating surface in system?

Question 24) Find

a) the lateral or C.S.A of a closed cylindrical petrol storage tank that is 4.2m in diameter and 4.5m in high

b) how much steel was actually used, if $\frac{1}{12}$ of steel actually used was wasted in making the tank.

Question 25) You see the frame of lamp shade. It is to be covered with decorative cloth. The frame has a base diameter of 20cm and height of 30cm. A margin of 2.5cm is total given for folding it over top and bottom of frame How much cloth is required for covering the lamp shade?

Question 26) What length of tarpaulin 3m wide will be required to make a conical tank of height 8m and base radius 6m. Assume that the extra length margins and wastage in cutting is approximately 20cm. (Use = 3.14)

Question 27) A Birthday cap is in form of right circular cone of radius 7cm and height 24cm. Find area of sheet required to make 10 such caps?

Question 28) A bus stop is barricaded from remaining part of road, by using 50 hollow cones made of recycled cardboard. Each cone has a base diameter of 4cm and height 1m. If outer side of each cone is to be painted and cost of painting is Rs $12/\text{m}^2$. What will be the cost? ($\pi = 3.14$ and take $1.04 = 1.02$)

Question 29) A hemispherical dome of a building needs to be painted. If circumference of base of dome is 17.6m, find the cost of painting it, given cost of painting is Rs. 5 per 200cm^2 .

Question 30) The diameter of moon is approximately one – fourth diameter of earth. Find the ratio of their surface areas. and What fraction of the volume of the earth is the volume of the moon?

Question 31) A right circular cone just enclosed a sphere of radius r. Find –

a) surface area of sphere

b) curved surface area of cylinder

c) ratio of areas obtained in (i) and (ii)

Question 32) A wall of length 10m was to be built across an open ground. The height is 4m and thickness is 24cm. If this wall is to be build up with bricks whose dimensions are 24cm x 12cm x 8cm, how many bricks would be required?

Question 33) Three cubes of each side 4cm are joining end to end. Find the surface area of resulting cuboid

Question 34) A village having a population of 4000 requires 150 litres of water per head per day. It has a tank measuring 20m x 15m x 6m for how many days will the water of this tank last?

Question 36) A tent is in shape of right circular cylinder up to a height of 3m and a cone above it. The maximum height of tent above ground is 13.5m. Calculate the cost of painting the inner side of tent at rate of Rs. 3/sq m if radius of base is 14m.

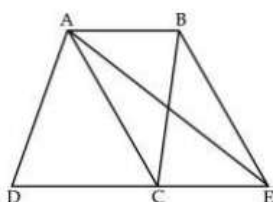
Question 37) A school provides milk to students daily in cylindrical glasses of diameter 7cm. If glass is filled with milk up to a height of 12cm, find how many liters of milk is needed to serve 1600 students?

- 1) Metal spheres, each of radius 2 cm, are packed into a rectangular box of internal dimensions 16 cm \times 8 cm \times 8 cm. When 16 spheres are packed the box is filled with preservative liquid. Find the volume of this liquid. Give your answer to the nearest integer. [Use $\pi=3.14$]
- 2) A storage tank is in the form of a cube. When it is full of water, the volume of water is 15.625 m³. If the present depth of water is 1.3 m, find the volume of water already used from the tank.
- 3) Find the amount of water displaced by a solid spherical ball of diameter 4.2 cm, when it is completely immersed in water.
- 4) How many square metres of canvas is required for a conical tent whose height is 3.5 m and the radius of the base is 12 m?
- 5) Two solid spheres made of the same metal have weights 5920 g and 740 g, respectively. Determine the radius of the larger sphere, if the diameter of the smaller one is 5 cm.
- 6) A school provides milk to the students daily in a cylindrical glasses of diameter 7 cm. If the glass is filled with milk upto an height of 12 cm, find how many litres of milk is needed to serve 1600 students.
- 7) A cylindrical roller 2.5 m in length, 1.75 m in radius when rolled on a road was found to cover the area of 5500 m². How many revolutions did it make?
- 8) A small village, having a population of 5000, requires 75 litres of water per head per day. The village has got an overhead tank of measurement 40 m \times 25 m \times 15 m. For how many days will the water of this tank last?
- 9) A shopkeeper has one spherical laddoo of radius 5cm. With the same amount of material, how many laddoos of radius 2.5 cm can be made?
- 10) A right triangle with sides 6 cm, 8 cm and 10 cm is revolved about the side 8 cm. Find the volume and the curved surface of the solid so formed.
- 11) A cylindrical tube opened at both the ends is made of iron sheet which is 2 cm thick. If the outer diameter is 16 cm and its length is 100 cm, find how many cubic centimeters of iron has been used in making the tube ?
- 12) A semi-circular sheet of metal of diameter 28cm is bent to form an open conical cup. Find the capacity of the cup.
- 13) A cloth having an area of 165 m² is shaped into the form of a conical tent of radius 5 m
 - (i) How many students can sit in the tent if a student, on an average, occupies $\frac{5}{7}m^2$ on the ground?
 - (ii) Find the volume of the cone.

- 14) The water for a factory is stored in a hemispherical tank whose internal diameter is 14 m. The tank contains 50 kilolitres of water. Water is pumped into the tank to fill to its capacity. Calculate the volume of water pumped into the tank.
- 15) The volumes of the two spheres are in the ratio 64 : 27. Find the ratio of their surface areas.
- 16) A cube of side 4 cm contains a sphere touching its sides. Find the volume of the gap in between.
- 17) A sphere and a right circular cylinder of the same radius have equal volumes. By what percentage does the diameter of the cylinder exceed its height ?
- 18) 30 circular plates, each of radius 14 cm and thickness 3cm are placed one above the another to form a cylindrical solid. Find :
 - (i) the total surface area
 - (ii) volume of the cylinder so formed.

Topic: Surface Area and Volume

- Q1. The area of parallelogram ABCD is 40 cm². If X be the midpoint of AD then find the area of $\triangle AXB$.
- Q2. AD is a median of triangle ABC and E is the midpoint of AD. BE produced meets AC in F. Prove that $AF = \frac{1}{3} AC$ {Construction: draw DG parallel to BF}.
- Q3. ABCD is a parallelogram and line segment AX and CY bisect angles A and C respectively where X is a point on AB. To prove $AX \parallel CY$.
- Q4. $\triangle ABC$ and $\triangle ABD$ are two triangles on the same base AB. If line segment CD is bisected by AB at O. Show that $\text{ar}(\triangle ABC) = \text{ar}(\triangle ABD)$
- Q5. In the figure, ABCD is a quadrilateral and $BE \parallel AC$, also BE meets DC produced at E. Show that $\text{ar}(\triangle ADE) = \text{ar}(ABCD)$



- Q6. The diagonals of a quadrilateral are perpendicular to each other. Show that the quadrilateral formed by joining the mid points of its sides is a rectangle.
- Q7. The side AB of parallelogram ABCD is produced to any point P. A line through A and parallel to CP meets CB produced at Q and then parallelogram PBQR is completed. Show that $\text{ar}(\triangle ABCD) = \text{ar}(\triangle PBQR)$
- Q8. AB and CD are parallel sides of trapezium ABCD. Diagonals AC and BD intersect at O. prove that $\text{ar}(\triangle AOD) = \text{ar}(\triangle BOC)$.
- Q9. If D is the mid .point of side of side BC of a $\triangle ABC$, P and Q are two points lying respectively on the sides AB and BC such that DP is parallel to QA. Prove that $\text{ar}(\triangle CQP) = \frac{1}{2} \text{ar}(\triangle ABC)$.

Q10. A rectangle is formed by joining the mid-points of the sides of a rhombus. Show that the area of rectangle is half the area of rhombus.

Q11. In a parallelogram ABCD, AE is perpendicular to DC and CF is perpendicular to AD. If AB = 10 cm, AE = 6 cm and CF = 8 cm, then find AD.

Q12. The adjacent sides of a rectangle are 16 cm and 8 cm. Find the area of the rectangle.

Q13. PQRS is a square. T and U are the mid-points of sides PS and QR respectively. Find the area of ΔOTS , if PQ = 8 cm, where O is the point of intersection of TU and OS.

Q14. If two sides of one triangle are equal to two sides of another triangle and the contained angles are supplementary, show that the two sides are equal in area.

Q15. In a trapezium ABCD where AB is parallel to CD, E is the mid-point of BC, prove that $\Delta AED = \frac{1}{2}$ trapezium ABCD.

Q16. The area of triangle ABC is 15 cm sq. If ΔABC and a parallelogram ABPD are on the same base and between the same parallel lines then what is the area of parallelogram ABPD.

Q17. The area of parallelogram PQRS is 88 cm sq. A perpendicular from S is drawn to intersect PQ at M. If SM = 8 cm, then find the length of PQ.

Q18. ABCD is a trapezium with parallel sides AB = a cm and DC = b cm. E and F are the mid-points of the non-parallel sides. Find the ratio of ar(ABFE) and ar(EFCD)

