Mathematics

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(Chapter – 14) (Math of Space: Surface Area and Volume) (Assignment 4)

(Class – 9)

Name _____ Date _____

Answer all 15 questions. Choose one option for each MCQ. Show your working. Use $\pi = 22/7$ unless specified otherwise. Leave answers in terms of π when asked.

Section A: Multiple Choice Questions

1. Find (i) the curved surface area and (ii) the total surface area of a hemisphere of radius 21 cm.

(a) 2772 cm^2, 4158 cm^2
(b) 1386 cm^2, 2772 cm^2
(c) 4158 cm^2, 5544 cm^2
(d) 2772 cm^2, 5544 cm^2

2. Given a cube with volume V, express its total surface area S in terms of V.

(a) $S = 6V^2$
(b) $S = 6(\sqrt[3]{V})^2$
(c) $S = (\sqrt[3]{V})^3$
(d) $S = V/6$

3. Given a cube with total surface area S, express its volume V in terms of S.

(a) $V = S^3$
(b) $V = S/6$
(c) $V = (S/6) \times \sqrt{(S/6)}$
(d) $V = 6\sqrt{S}$

4. Which unit is appropriate for the total surface area of a small box?

(a) cm
(b) cm^2
(c) cm^3
(d) litre

5. A solid sphere is cut into two hemispheres. The sum of their total surface areas, including the cut faces, is what fraction of the original sphere's area?

(a) 1/2
(b) 1
(c) 3/2
(d) 2

Section B: Very Short Answer Questions

6. What is the curved surface area of a cone?

Let its base radius be r and slant height be l.

Answer:

7. What is the volume of a cone?

Let its base radius be r and perpendicular height be h.

Answer:

8. A hemispherical bowl has a radius of 3.5 cm. What would be the volume of water it would contain?

Answer:

9. Can the slant height of a right circular cone be smaller than its perpendicular height? Explain for a cone with positive radius.

Answer:

10. What is the shape of a cross-section of a right circular cylinder made by a plane parallel to its circular base?

Answer:

Section C: Short and Long Answer Questions

11. The radius of a sphere is increased by 10%. Show that the volume increases by approximately 33.1%.

Answer:

12. A solid toy consists of a hemisphere fixed on top of a cylinder. Both have radius 3 cm, and the cylinder has height 5 cm. Find the total volume and the exposed surface area excluding the bottom circular base. Use $\pi = 3.14$.

Answer:

13. A cube of edge 12 cm is cut into three equal cuboids by two parallel cuts. Find the total surface area of all three cuboids and the increase over the cube's original surface area.

Answer:

14. What length of tarpaulin 3 m wide is required to make a conical tent of height 8 m and base radius 6 m? Assume that the extra length of material that is required for stitching margins and wastage in cutting is 20 cm.

Answer:

15. A school provides milk to its students in cylindrical glasses, each with a diameter of 7 cm. If each glass is filled with milk to a height of 12 cm, how many litres of milk are needed to serve 1600 students? Use 1000 cm^3 = 1 litre.

Answer: