Mathematics

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(Chapter – 14) (Math of Space: Surface Area and Volume) (Assignment 5)

(Class – 9)

Name _____ Date _____

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

Section A: Multiple Choice Questions

1. What is the change in volume when the length of a cuboid with dimensions l, w, h is increased by 1 unit?

(a) 1 cubic unit
(b) wh cubic units
(c) lw cubic units
(d) lh cubic units

2. What is the change in volume when the radius of a cylinder with dimensions r, h is increased by 1 unit?

(a) πh cubic units
(b) 2πrh cubic units
(c) 2πrh + πh cubic units
(d) 2πrh + 2πh cubic units

3. The radius of the base of a cylinder is increased by 10%. At the same time, the height of the cylinder is decreased by x%. Given that the volume of the cylinder remains unchanged, find the value of x.

(a) 10%
(b) 20%
(c) About 17.36%
(d) About 9.09%

4. All linear dimensions of a solid are multiplied by 4. By what factors are its surface area and volume multiplied, respectively?

(a) 4 and 4
(b) 8 and 16
(c) 16 and 64
(d) 64 and 16

5. Why does dividing a room's volume by the volume of one ball not usually give the number of balls that actually fit?

(a) Balls have no volume.
(b) Balls leave gaps when packed.
(c) Room volume is an area.
(d) Every ball changes its radius.

Section B: Very Short Answer Questions

6. What is the total surface area of a cuboid?

Use length l, width w and height h.

Answer:

7. A right triangle with sides 6 cm, 8 cm and 10 cm is rotated through 360° about the side of 8 cm. Find the volume and the curved surface area of the solid so formed.

Leave the answers in terms of π.

Answer:

8. Find the volume of ink in a new ball point pen. Take the necessary measurements and make approximations, as needed.

Answer:

9. Find the volume of a pyramid with base area 60 cm^2 and perpendicular height 15 cm.

Answer:

10. For a cone of radius r, what does its total surface area minus its curved surface area represent? Give the expression.

Answer:

Section C: Short and Long Answer Questions

11. The surface area of a sphere of radius 5 cm is five times the area of the curved surface of a cone of radius 4 cm. Find the height and the volume of the cone.

Answer:

12. A solid cylinder of radius 4 cm and height 6 cm is melted and recast into a cone of the same radius. Find the cone's height, assuming no loss of material.

Answer:

13. Two closed cylindrical tanks have dimensions A: radius 7 cm, height 20 cm; B: radius 14 cm, height 5 cm. Compare their capacities and total surface areas. Which uses less sheet material if thickness and wastage are ignored?

Answer:

14. Show that the volume of a sphere is equal to $\frac{2}{3}$ of the volume of the smallest cylinder which encloses it.

Answer:

15. A cylindrical glass of height 25 cm and radius 4 cm has water up to a height of 16 cm. A crow wants to drink water from this glass. The water must be at a height of 20 cm for the crow to reach it. There are some marbles lying around. How many marbles of radius 1 cm should the crow drop into the glass to make the water reach the required height?

Answer: