CLASS IX – MATHEMATICS

Chapter Test: Math of Space: Surface Area and Volume

(Ganita Manjari, Grade 9, Part II – Chapter 14)

Time: 1½ Hours **M. M.: 40**

General Instructions:

1. This paper contains 21 questions. All questions are compulsory.
2. This paper is divided into 5 sections: **A, B, C, D** and **E**.
3. In **Section A**, Questions no. **1** to **10** are MCQs and questions no. **11** and **12** are Assertion-Reason based questions of 1 mark each.
4. In **Section B**, Questions no. **13** to **16** are Very Short Answer type questions carrying 2 marks each.
5. In **Section C**, Questions no. **17** and **18** are Short Answer type questions carrying 3 marks each.
6. In **Section D**, Questions no. **19** and **20** are Long Answer type questions carrying 5 marks each.
7. In **Section E**, Question no. **21** is a case based question carrying 4 marks. Internal choice is provided in the 2 marks part of the case study.
8. There is no overall choice. However, an internal choice has been provided in 2 questions in Section B, 2 questions in Section C, 2 questions in Section D and 1 part of Section E.
9. Figures are not drawn to scale. Give reasons for your steps wherever required.
10. Use of calculator is **not** allowed.

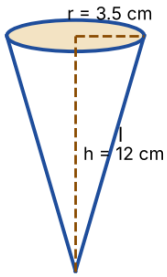
Q. No.	Section – A	Marks
1.	The volume of a cube is 343 cm^3. Its total surface area is (A) 49 cm^2 (B) 196 cm^2 (C) 294 cm^2 (D) 343 cm^2	**[1]**
2.	The total surface area of a cuboid of dimensions 8 cm × 5 cm × 3 cm is (A) 120 cm^2 (B) 158 cm^2 (C) 79 cm^2 (D) 316 cm^2	**[1]**
3.	The curved surface area of a cylinder of radius 7 cm and height 10 cm is (take π = 22/7) (A) 440 cm^2 (B) 220 cm^2 (C) 1540 cm^2 (D) 154 cm^2	**[1]**
4.	The volume of a cylinder of radius 3.5 cm and height 12 cm is (take π = 22/7) (A) 154 cm^3 (B) 231 cm^3 (C) 924 cm^3 (D) 462 cm^3	**[1]**
5.	A cone has base radius 6 cm and slant height 10 cm. Its height is (A) 8 cm (B) 4 cm (C) 16 cm (D) 64 cm	**[1]**
6.	The volume of a cone of base radius 3 cm and height 7 cm is (take π = 22/7) (A) 22 cm^3 (B) 198 cm^3 (C) 132 cm^3 (D) 66 cm^3	**[1]**
7.	The surface area of a sphere of radius 7 cm is (take π = 22/7) (A) 154 cm^2 (B) 616 cm^2 (C) 1437 cm^2 (D) 308 cm^2	**[1]**
8.	The volume of a hemisphere of radius 3 cm is (A) 12π cm^3 (B) 36π cm^3 (C) 18π cm^3 (D) 54π cm^3	**[1]**
9.	If the radius of a sphere is doubled, its surface area becomes (A) 4 times (B) 2 times (C) 6 times (D) 8 times	**[1]**
10.	A cone and a cylinder have the same base radius and the same height. The ratio of the volume of the cone to that of the cylinder is (A) 1 : 2 (B) 3 : 1 (C) 2 : 3 (D) 1 : 3	**[1]**

Q. No.	Section – A	Marks
	Questions number 11 and 12 are Assertion and Reason based questions. Two statements are given, one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer from the options (A), (B), (C) and (D) as given below. (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A). (B) Both Assertion (A) and Reason (R) are true and Reason (R) is not the correct explanation of Assertion (A). (C) Assertion (A) is true but Reason (R) is false. (D) Assertion (A) is false but Reason (R) is true.	
11.	**Assertion (A):** The curved surface area of a hemisphere of radius r is $2\pi r^2$. **Reason (R):** The volume of a sphere of radius r is $(4/3)\pi r^3$.	**[1]**
12.	**Assertion (A):** When a cube of side 4 cm is cut into 64 cubes of side 1 cm, the total surface area increases. **Reason (R):** Cutting a solid into smaller pieces increases its volume.	**[1]**

Q. No.	Section – B	Marks
13.	The side of a cube is 9 cm. Find its volume and its total surface area.	**[2]**
14.	(A) Find the total surface area of a closed cylinder of radius 7 cm and height 15 cm. (Take $\pi = 22/7$.) **OR** (B) A conical cap has base radius 3.5 cm and slant height 12 cm. Find the area of the sheet needed to make the cap. (Take $\pi = 22/7$.)	**[2]**
15.	A metal sphere has radius 6 cm. Find its volume and its surface area, in terms of π.	**[2]**
16.	(A) The radii of two cylinders are in the ratio 3 : 4 and their heights are in the ratio 5 : 2. Find the ratio of (i) their volumes and (ii) their curved surface areas. **OR** (B) A cube of side 6 cm is cut into cubes of side 2 cm. How many small cubes are obtained? Find the ratio of the surface area of the original cube to the total surface area of all the small cubes.	**[2]**

Q. No.	Section – C	Marks
17.	(A) A godown measures 30 m × 20 m × 12 m. How many cuboidal boxes, each of dimensions 2 m × 1.5 m × 1 m, can be stored in it? **OR** (B) A cuboidal water tank is 6 m long, 5 m wide and 4.5 m deep. How many litres of water can it hold? If it is filled by a pump at 900 litres per minute, how long will it take to fill? ($1\ m^3 = 1000$ litres)	**[3]**
18.	(A) A cone has base radius 7 cm and height 24 cm. Find its slant height, curved surface area and total surface area. (Take $\pi = 22/7$.) **OR** (B) A right triangle with sides 9 cm, 12 cm and 15 cm is rotated through 360° about the side of 12 cm. Name the solid formed, and find its volume and curved surface area in terms of π.	**[3]**

Q. No.	Section – D	Marks
19.	(A) A solid metal cylinder of radius 6 cm and height 28 cm is melted and recast into solid spheres of radius 3 cm. (i) Find the volume of the cylinder in terms of π. [1] (ii) Find the volume of one sphere in terms of π. [1] (iii) How many spheres are formed? [2] (iv) Is the total surface area of all the spheres more or less than the total surface area of the cylinder? Show your working. [1] **OR** (B) A hemispherical bowl has inner radius 10.5 cm. (Take π = 22/7.) (i) Find the volume of liquid it can hold. [2] (ii) Find the area of its inner curved surface. [2] (iii) Find the cost of polishing the inner surface at ₹0.50 per cm^2. [1]	**[5]**
20.	(A) A conical tent has base radius 3.5 m and height 12 m. (Take π = 22/7.) (i) Find its slant height. [1] (ii) Find the area of canvas needed to make the tent. [1] (iii) The canvas is 2.5 m wide. Find the length of canvas needed. [1] (iv) Find the volume of air inside the tent. [1] (v) Find the cost of the canvas at ₹120 per m^2. [1] **OR** (B) A swimming pool is 25 m long, 10 m wide and 2 m deep. (i) Find the volume of water it holds when full. [1] (ii) Express this in litres. [1] (iii) The floor and the four walls are to be tiled. Find the area to be tiled. [2] (iv) Find the cost of tiling at ₹150 per m^2. [1]	**[5]**

Q. No.	Section – E	Marks
21.	**Case Study:** An ice-cream shop serves ice cream in wafer cones. Each cone is a right circular cone of base radius 3.5 cm and height 12 cm, as shown. The shop stores ice cream in a cylindrical tub of the same base radius (3.5 cm) and the same height (12 cm). (Take π = 22/7.)  (i) Find the slant height of the cone. **[1]** (ii) Find the area of wafer needed to make one cone (curved surface). **[1]** (iii) (A) Find the volume of one cone. How many cones can be filled exactly from one full tub? **[2]** **OR** (iii) (B) A larger cone of base radius 7 cm and height 24 cm is also made. Find its volume. How many times is it as large as the small cone? **[2]**	**[4]**