

CLASS 10 — MATHEMATICS

Chapter: Surface Areas and Volumes

Practice Worksheet | CBSE Pattern

Maximum Marks: 40

Time Allowed: 1 hour 30 minutes

Name: _____

Class/Section: _____ Date: _____

General Instructions:

1. All questions are compulsory.
2. Read each question carefully before answering.
3. Show complete working for questions requiring calculations or proofs.
4. Select only one option for each MCQ.
5. Marks for each question are indicated alongside the question.
6. Write mathematical steps clearly and use appropriate notation.

This paper has 21 questions in five sections: A (Q1–Q10, 1 mark each), B (Q11–Q15, 2 marks each), C (Q16–Q19, 3 marks each), D (Q20, 4 marks) and E (Q21, case study, 4 marks). Use $\pi = \frac{22}{7}$ unless stated otherwise. Figures are not drawn to scale.

SECTION A

Multiple Choice Questions — Q1 to Q10 carry 1 mark each.

- Q1.** Two solid hemispheres, each of radius r , are joined along their bases. The curved surface area of the new solid is **[1 mark]**
(A) $4\pi r^2$ (B) $6\pi r^2$
(C) $3\pi r^2$ (D) $8\pi r^2$
- Q2.** The total surface area of a solid hemisphere of radius 7 cm is **[1 mark]**
(A) 308 cm^2 (B) 462 cm^2
(C) 154 cm^2 (D) 616 cm^2
- Q3.** A solid is made of a cone of height h mounted on a hemisphere of radius r , both having the same radius. Its volume is **[1 mark]**
(A) $\frac{1}{3}\pi r^2 h + \frac{2}{3}\pi r^3$ (B) $\frac{1}{3}\pi r^2 h + \frac{4}{3}\pi r^3$
(C) $\pi r^2 h + \frac{2}{3}\pi r^3$ (D) $\frac{1}{3}\pi r^2(h + r)$
- Q4.** A capsule is a cylinder of radius r and length h with a hemisphere of radius r at each end. Its total surface area is **[1 mark]**
(A) $2\pi r h + 2\pi r^2$ (B) $2\pi r h + 4\pi r^2$
(C) $\pi r h + 4\pi r^2$ (D) $2\pi r h + 6\pi r^2$

- Q5.** A cone and a hemisphere have equal bases and equal heights. The ratio of their volumes is **[1 mark]**
 (A) 1 : 2 (B) 2 : 1
 (C) 1 : 3 (D) 1 : 1
- Q6.** A pencil sharpened at one end is a combination of **[1 mark]**
 (A) a cylinder and a hemisphere (B) a cone and a cylinder
 (C) a cone and a hemisphere (D) two cylinders
- Q7.** From a solid cylinder of radius 3 cm and height 10 cm, a cone of the same base radius and height is scooped out. The volume of the remaining solid is **[1 mark]**
 (A) $60\pi \text{ cm}^3$ (B) $30\pi \text{ cm}^3$
 (C) $90\pi \text{ cm}^3$ (D) $120\pi \text{ cm}^3$
- Q8.** A solid is a hemisphere surmounted by a cone of the same radius. If the curved surface areas of the hemisphere and the cone are equal, then the ratio of the radius to the height of the cone is **[1 mark]**
 (A) $1 : \sqrt{3}$ (B) $\sqrt{3} : 1$
 (C) 1 : 2 (D) 2 : 1

In Q9 and Q10, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option.

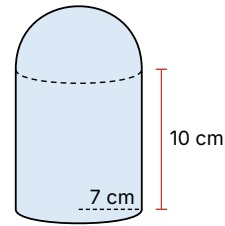
- Q9. Assertion (A):** The total surface area of a solid formed by joining two solids is equal to the sum of the total surface areas of the two solids. **[1 mark]**
Reason (R): When two solids are joined, the surfaces in contact are hidden and do not form part of the outer surface.
 (A) Both Assertion (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, but 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.
- Q10. Assertion (A):** The volume of a solid formed by joining two solids is equal to the sum of their volumes. **[1 mark]**
Reason (R): Volume measures the space occupied, and joining two solids neither adds nor removes any material.
 (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, but 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.

SECTION B

Very Short Answer Questions — Q11 to Q15 carry 2 marks each.

- Q11.** Three cubes, each of volume 64 cm^3 , are joined end to end. Find the surface area of the resulting cuboid. **[2 marks]**

- Q12.** A solid is in the shape of a cylinder of radius 7 cm and height 10 cm, with a hemisphere of the same radius on top. Find the total surface area of the solid. **[2 marks]**



- Q13.** From a solid cylinder of height 10 cm and radius 3 cm, a hemisphere of radius 3 cm is scooped out from one end. Find the volume of the remaining solid. (Use $\pi = 3.14$) **[2 marks]**

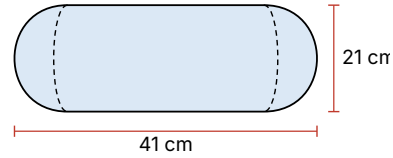
- Q14.** A hemispherical depression of diameter 14 cm is cut out from one face of a cubical wooden block of edge 14 cm. Find the surface area of the remaining solid. **[2 marks]**

- Q15.** A wooden toy is a cone of radius 3.5 cm and height 12 cm mounted on a hemisphere of the same radius. Find the cost of painting the toy at ₹ 5 per cm^2 . **[2 marks]**

SECTION C

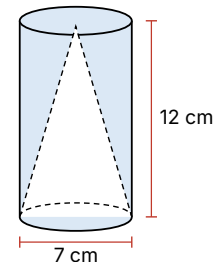
Short Answer Questions — Q16 to Q19 carry 3 marks each.

- Q16.** A solid is made of a cylinder with a hemisphere at each end. The diameter of the solid is 21 cm and its total length is 41 cm. Find its volume and total surface area. **[3 marks]**

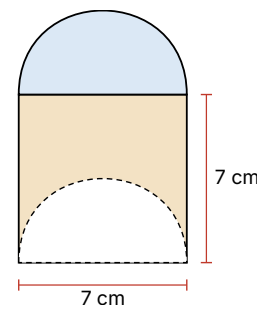


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- Q17.** A tent is in the shape of a cylinder of radius 7 m and height 4 m, surmounted by a cone of the same radius and height 24 m. Find the area of canvas used to make the tent (excluding the floor) and the volume of air inside it. **[3 marks]**
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- Q18.** From a solid cylinder of height 12 cm and base diameter 7 cm, a cone of the same height and same base diameter is hollowed out, as shown. Find the total surface area and the volume of the remaining solid. **[3 marks]**



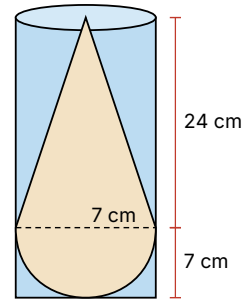
- Q19.** A cube of edge 7 cm is surmounted by a hemisphere of diameter 7 cm. A hemisphere of the same diameter is scooped out from the opposite face of the cube, as shown. Find the total surface area and the volume of the solid. **[3 marks]**



SECTION D

Long Answer Question — Q20 carries 4 marks.

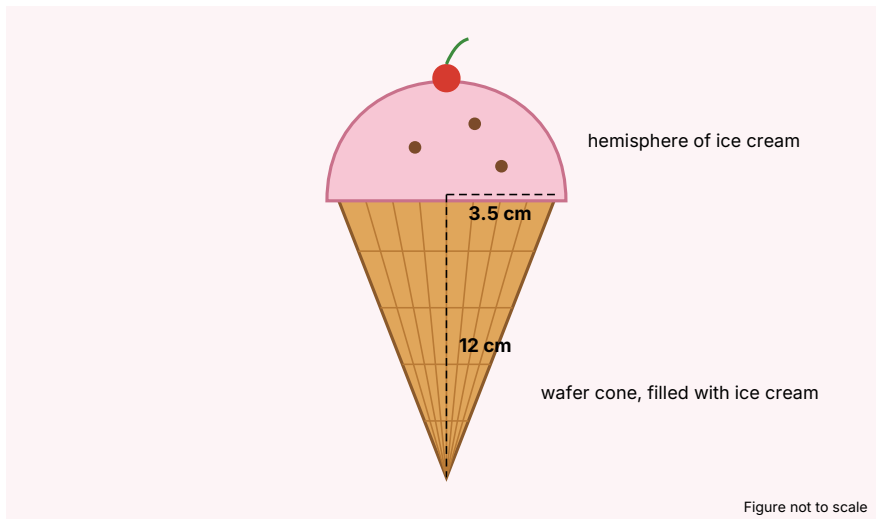
- Q20.** A solid toy is a cone of radius 7 cm and height 24 cm standing on a hemisphere of the same radius. It is placed upright in a right circular cylinder full of water, touching the bottom. The cylinder has radius 7 cm and height 31 cm. Find: **[4 marks]**
- (i) the volume of the toy,
 - (ii) the volume of water left in the cylinder,
 - (iii) the total surface area of the toy.



SECTION E

Case Study Based Question — Q21 carries 4 marks.

- Q21.** An ice cream cone is a wafer cone of radius 3.5 cm and height 12 cm. The cone is completely filled with ice cream, and a hemisphere of ice cream of the same radius sits on top, as shown. **[4 marks]**



Based on the above information, answer the following questions:

- (i) Find the slant height of the wafer cone. **[1 mark]**
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- (ii) Find the area of wafer used to make the cone (its curved surface area). **[1 mark]**
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- (iii) Find the total volume of ice cream in one cone. How many such full cones can be made from a tub containing 5 litres of ice cream? (1 litre = 1000 cm³) **[2 marks]**
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— End of Question Paper —