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Surface Areas and Volumes — CBSE Class 10 Mathematics Chapter Test

FREE CHAPTER TEST · CLASS X · MATHEMATICS (041) · PATTERN OF THE CBSE SAMPLE QUESTION PAPER 2026-27

TIME ALLOWED	MAXIMUM MARKS	QUESTIONS	NAME / ROLL NO.
1½ hours	40	19 (A 10 · B 3 · C 2 · D 2 · E 2)	

GENERAL INSTRUCTIONS

Read the following instructions very carefully and strictly follow them:

1. This question paper contains 19 questions. All questions are compulsory.
2. This question paper is divided into five sections: A, B, C, D and E.
3. In Section A, Questions 1 to 8 are multiple choice questions (MCQs) and Questions 9 and 10 are assertion-reason based questions of 1 mark each.
4. In Section B, Q11–13 are very short answer (VSA) type questions, carrying 2 marks each.
5. In Section C, Q14–15 are short answer (SA) type questions, carrying 3 marks each.
6. In Section D, Q16–17 are long answer (LA) type questions, carrying 5 marks each.
7. In Section E, Q18–19 are case study based questions, carrying 4 marks each, with sub-parts of the values of 1, 1 and 2 marks.
8. There is no overall choice. However, an internal choice has been provided in 1 question of Section B, 1 question of Section C, 1 question of Section D and in the 2-mark sub-part of each question of Section E.
9. Use of calculators is not allowed.
10. This chapter test follows the section structure, question types and marks per question of the CBSE Class X Mathematics (Standard, 041) Sample Question Paper 2026-27, at half the length of the 80-mark board paper: 40 marks in 1½ hours.
11. The answer key and the marking scheme are at the end of this booklet. Attempt the paper in 1½ hours before you look at them.

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Chapter: Surface Areas and Volumes · **Topics:** Volume and surface of a single solid · Combinations of two solids: surface area · Combinations of two solids: volume · Solids with hollows · Tents, toys, silos and capsules

SECTION A

This section comprises 10 questions of 1 mark each: 8 multiple choice questions (MCQs) and 2 assertion-reason based questions.

1. The volume of a cone of radius 3 cm and height 4 cm is 1

(A) 12π cm^3 (B) 36π cm^3

(C) 48π cm^3 (D) 4π cm^3

2. The total surface area of a solid hemisphere of radius r is 1

(A) $2\pi r^2$ (B) $3\pi r^2$

(C) $4\pi r^2$ (D) πr^2

3. A cylinder and a cone have the same base and the same height. The ratio of their volumes is 1

(A) 1 : 3 (B) 1 : 1

(C) 3 : 1 (D) 2 : 1

4. Two cubes, each of volume 125 cm³, are joined end to end. The surface area of the resulting cuboid is 1

(A) 300 cm^2 (B) 200 cm^2

(C) 125 cm^2 (D) 250 cm^2

5. The curved surface area of a hemisphere of radius 7 cm is ($\pi = \frac{22}{7}$) 1

(A) 154 cm^2 (B) 308 cm^2

(C) 462 cm^2 (D) 616 cm^2

6. The volume of a sphere of radius 3 cm is 1

(A) 12π cm^3 (B) 27π cm^3

(C) 36π cm^3 (D) 108π cm^3

7. The slant height of a cone of radius 5 cm and height 12 cm is 1

(A) 13 cm (B) 17 cm

(C) 7 cm (D) $\sqrt{119}$ cm

8. A toy is a cone of radius 4.2 cm mounted on a hemisphere of the same radius. The total height of the toy is 14.2 cm. The height of the cone is 1

(A) 14.2 cm (B) 4.2 cm

(C) 18.4 cm (D) 10 cm

9. **Assertion (A):** The total surface area of a solid hemisphere of radius r is $3\pi r^2$. 1

Reason (R): A solid hemisphere has a curved surface of area $2\pi r^2$ and a flat circular face of area πr^2.

(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.

10. **Assertion (A):** When a cube of edge a is placed on another identical cube, the surface area of the solid formed is $12a^2$. 1

Reason (R): The surface area of a cube of edge a is $6a^2$.

(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

This section comprises 3 very short answer (VSA) type questions of 2 marks each.

11. (a) A solid is in the shape of a cone standing on a hemisphere, both of radius 2 cm, the height of the cone being 3 cm. Find the volume of the solid in terms of π. 2

OR

(b) A medicine capsule is a cylinder with two hemispheres stuck to its ends. Its total length is 16 mm and its diameter 7 mm. Find its surface area. ($\pi = \frac{22}{7}$)

12. Find the volume of a cone of height 24 cm and base radius 6 cm, in terms of π. 2

13. A tent is a cylinder of height 3 m and diameter 7 m, surmounted by a cone of the same diameter and slant height 5 m. Find the area of the canvas used (no floor). ($\pi = \frac{22}{7}$) 2

SECTION C

This section comprises 2 short answer (SA) type questions of 3 marks each.

14. (a) A wooden article is made by scooping out a hemisphere from each end of a solid cylinder of height 12 cm and radius 2.8 cm. Find its total surface area. ($\pi = \frac{22}{7}$) 3

OR

(b) A juice glass is a cylinder of inner diameter 6 cm and height 12 cm, but its bottom has a raised hemispherical portion of the same diameter. Find its apparent and actual capacities. (π = 3.14)

15. A solid is a cylinder with hemispherical ends. Its total length is 19 cm and its diameter 7 cm. Find its volume. ($\pi = \frac{22}{7}$) 3

SECTION D

This section comprises 2 long answer (LA) type questions of 5 marks each.

16. (a) A toy is a cone of radius 7 cm mounted on a hemisphere of the same radius. The total height of the toy is 31 cm. Find its total surface area and its volume. ($\pi = \frac{22}{7}$) 5

OR

(b) A pen stand is a cuboid 12 cm × 8 cm × 4 cm with three conical depressions to hold pens, each of radius 0.7 cm and depth 1.5 cm. Find the volume of wood in the stand. ($\pi = \frac{22}{7}$)

17. A tent is a cylinder of diameter 5.6 m and height 3.5 m, with a conical top of the same base and height 2.1 m. Find the area of canvas used (no floor) and its cost at ₹ 120 per m². ($\pi = \frac{22}{7}$) 5

SECTION E

This section comprises 2 case study based questions of 4 marks each, with sub-parts of 1, 1 and 2 marks.

18. An ice-cream cone is a cone of radius 3.5 cm and height 12 cm, completely filled with ice-cream and with a hemisphere of ice-cream of the same radius on top. ($\pi = \frac{22}{7}$)

(i) Find the volume of the cone. [1]

(ii) Find the volume of the hemisphere of ice-cream. [1]

(iii) Find the total volume of ice-cream. [2]

OR

(iii) Find the curved surface area of the cone. [2]

19. A grain silo is a cylinder of radius 2 m and height 7 m, with a conical top of the same radius and height 1.5 m. ($\pi = \frac{22}{7}$)

(i) Find the volume of the cylindrical part. [1]

(ii) Find the slant height of the conical top. [1]

(iii) Find the total volume of the silo. [2]

OR

(iii) Find the curved surface area of the conical top. [2]

END OF THE QUESTION PAPER

ANSWER KEY — SECTION A

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
(A)	(B)	(C)	(D)	(B)	(C)	(A)	(D)	(A)	(D)

MARKING SCHEME AND WORKED SOLUTIONS

Marks for each step are shown in brackets, as in the CBSE marking scheme. Any correct alternative method earns full marks.

Q1. Answer (A). $\frac{1}{3} \times \pi \times 9 \times 4 = 12\pi$.

Q2. Answer (B). Curved $2\pi r^2$ + base πr^2.

Q3. Answer (C). $\pi r^2 h : \frac{1}{3}\pi r^2 h$.

Q4. Answer (D). Edge 5 cm; cuboid $10 \times 5 \times 5$: $2(50 + 50 + 25) = 250$ cm².

Q5. Answer (B). $2 \times (22/7) \times 49 = 308$.

Q6. Answer (C). $4/3 \times \pi \times 27 = 36\pi$.

Q7. Answer (A). $\sqrt{(25 + 144)} = 13$.

Q8. Answer (D). $14.2 - 4.2 = 10$ cm.

Q9. Answer (A). R gives $2\pi r^2 + \pi r^2 = 3\pi r^2$. Answer (A).

Q10. Answer (D). Two faces are hidden: $12a^2 - 2a^2 = 10a^2$. A is false, R is true. Answer (D).

Q11. (2 marks) Answer: (a) $28\pi/3$ cm³; (b) 352 mm².
(a) Hemisphere = $\frac{2}{3}\pi(2)^3 = 16\pi/3$; cone = $\frac{1}{3}\pi(2)^2(3) = 4\pi$. [1] Total = $16\pi/3 + 4\pi = 28\pi/3$ cm³. [1]
OR (b) r = 3.5 mm; cylinder length = $16 - 7 = 9$ mm. [½] Area = $2\pi rh + 4\pi r^2 = 63\pi + 49\pi = 112\pi$ [1] = 352 mm². [½]

Q12. (2 marks) Answer: 288π cm³.
$V = \frac{1}{3}\pi r^2 h = \frac{1}{3} \times \pi \times 36 \times 24$ [1] = 288π cm³. [1]

Q13. (2 marks) Answer: 121 m².
Cylinder $2\pi rh = 2\pi(3.5)(3) = 21\pi$; cone $\pi rl = \pi(3.5)(5) = 17.5\pi$. [1] Total = 38.5π = 121 m². [1]

Q14. (3 marks) Answer: (a) 309.76 cm²; (b) 339.12 cm³ and 282.6 cm³.
(a) Curved surface of the cylinder = $2\pi rh = 67.2\pi$. [1] Two hemispherical hollows = $2 \times 2\pi r^2 = 31.36\pi$. [1] Total = 98.56π = 309.76 cm². [1]
OR (b) Apparent capacity = $\pi r^2 h = 3.14 \times 9 \times 12 = 339.12$ cm³. [1] Hemisphere = $\frac{2}{3} \times 3.14 \times 27 = 56.52$ cm³. [1] Actual capacity = $339.12 - 56.52 = 282.6$ cm³. [1]

Q15. (3 marks) Answer: $1925/3 \approx 641.67$ cm³.
r = 3.5 cm, cylinder length = $19 - 7 = 12$ cm. [½] Cylinder = $(22/7) \times 12.25 \times 12 = 462$ cm³. [1] Two hemispheres = a sphere = $(4/3) \times (22/7) \times 42.875 = 539/3 \approx 179.67$ cm³. [1] Total = $1925/3 \approx 641.67$ cm³. [½]

Q16. (5 marks) Answer: (a) 858 cm², 1950.67 cm³; (b) 381.69 cm³.
(a) Cone height = $31 - 7 = 24$ cm; slant = $\sqrt{(576 + 49)} = 25$ cm. [1] Surface = $\pi rl + 2\pi r^2 = (22/7)(7)(25) + 2(22/7)(49) = 550 + 308 = 858$ cm². [2] Volume = $\frac{1}{3}\pi r^2 h + \frac{2}{3}\pi r^3 = 1232 + 2156/3 = 5852/3 \approx 1950.67$ cm³. [2]
OR (b) Cuboid = $12 \times 8 \times 4 = 384$ cm³. [1] Each depression = $\frac{1}{3} \times (22/7) \times 0.49 \times 1.5 = 0.77$ cm³; three = 2.31 cm³. [3] Wood = $384 - 2.31 = 381.69$ cm³. [1]

Q17. (5 marks) Answer: 92.4 m², ₹ 11088.
r = 2.8 m; slant height of the cone = $\sqrt{(2.1^2 + 2.8^2)} = 3.5$ m. [1] Cylinder $2\pi rh = 2 \times (22/7) \times 2.8 \times 3.5 = 61.6$ m²; cone $\pi rl = (22/7) \times 2.8 \times 3.5 = 30.8$ m². [2] Canvas = 92.4 m². [1] Cost = 92.4×120 = ₹ 11088. [1]

Q18. (4 marks) Answer: (i) 154 cm³; (ii) 89.83 cm³; (iii) 243.83 cm³, or 137.5 cm².

(i) ⅓ × (22/7) × 12.25 × 12 = 154 cm³. [1]

(ii) ⅔ × (22/7) × 42.875 = 539/6 ≈ 89.83 cm³. [1]

(iii)(a) 154 + 89.83 [1] ≈ 243.83 cm³. [1]

OR (iii)(b) Slant = √(144 + 12.25) = 12.5 cm [1]; πrl = (22/7) × 3.5 × 12.5 = 137.5 cm². [1]

Q19. (4 marks) Answer: (i) 88 m³; (ii) 2.5 m; (iii) 660/7 m³, or 110/7 m².

(i) (22/7) × 4 × 7 = 88 m³. [1]

(ii) √(1.5² + 2²) = 2.5 m. [1]

(iii)(a) Cone = ⅓ × (22/7) × 4 × 1.5 = 44/7 m³ [1]; total = 88 + 44/7 = 660/7 ≈ 94.29 m³. [1]

OR (iii)(b) πrl = (22/7) × 2 × 2.5 [1] = 110/7 ≈ 15.71 m². [1]

All questions are original and © Master Testing Agency. Free to download and use for personal practice; not for resale. Every answer in this paper was checked independently by computer in exact fractions with the stated value of π, and the volume formulas themselves by summing thin discs.