Mathematics — Ganita Manjari

Chapter 14 Test 9

Math of Space: Surface Area and Volume

Class IX | 2026–27

Time Allowed: 45 Minutes | Maximum Marks: 25

General Instructions

1. All 13 questions are compulsory. Choose one option in A; show working in B–D.
2. No calculators. Leave π exact unless stated. Ignore thickness unless specified.
3. Figures are not to scale; cones and cylinders are right circular.

SECTION A

(5 questions × 1 mark = 5 marks)

1. A box's volume divided by one ball's volume is 50. What does this establish about its ball capacity?

(A) Exactly 50 balls
(B) At most 50 balls
(C) At least 50 balls
(D) Exactly 51 balls

2. A volume calculation gives 78.9 identical complete casts. What is the maximum whole-number yield?

(A) 79
(B) 78.9
(C) 80
(D) 78

3. Cubes of edge 2 cm form one gap-free layer on a 12 × 8 cm rectangle. How many cubes are in the layer?

(A) 24
(B) 48
(C) 12
(D) 96

4. A thick cylindrical glass has inner diameter 6 cm and outer diameter 8 cm. Which radius determines its liquid capacity?

(A) 6 cm
(B) 8 cm
(C) 3 cm
(D) 4 cm

5. Which conversion is correct when estimating a room's volume?

(A) $1\ \text{m}^3 = 100\ \text{cm}^3$
(B) $1\ \text{m}^3 = 1000000\ \text{cm}^3$
(C) $1\ \text{m}^3 = 1000\ \text{cm}^3$
(D) $1\ \text{m}^3 = 10000\ \text{cm}^3$

SECTION B

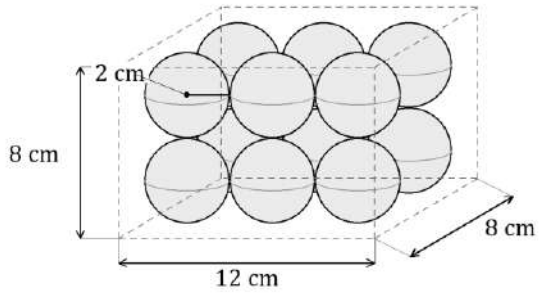
(4 questions × 2 marks = 8 marks)

6. A 3 cm stack contains 250 equal sheets, each 20 × 16 cm. Estimate the volume of 50 sheets, ignoring air gaps.

7. A wall measures $2 \times 3 \times 0.1$ m. Mortar occupies 10% of its volume. Estimate the number of $20 \times 10 \times 5$ cm bricks needed.

8. Model a pen's ink as a cylinder of radius 0.5 mm and length 8 cm. Estimate its volume in millilitres.

9. The spheres in figure occupy a rectangular grid, touching neighbours and box walls. Find their number and the volume of empty space.



SECTION C

(3 questions × 3 marks = 9 marks)

10. A cylindrical can has radius 3 cm and height 10 cm. Can it stand upright inside a $5 \times 6 \times 10$ cm box? Explain why volume alone is insufficient.

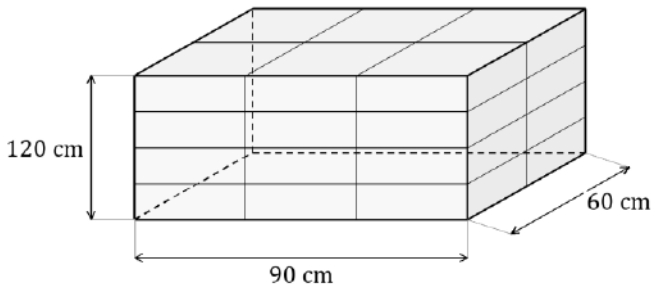
11. For a crowd estimate, allocate 0.08 m^3 per person. Find the smallest integer edge in metres of a cube accommodating 1000 people under this volume model.

12. From 72π cm^3 of liquid, estimate servings using spherical cups: A has radius 1 cm, filled 75%; B has radius 1.5 cm, filled $\frac{4}{9}$.

SECTION D

(1 application question × 3 marks = 3 marks)

13. Cubical cartons of edge 30 cm fill the marked cells in figure. A store must transport 60 cartons using this loading bay.



(i) How many cartons fit in one full load?
(ii) Find the minimum number of trips.
(iii) Find the unused volume on the last trip in m^3.