

CHAPTER -13 SURFACE AREAS AND VOLUMES

SUBJECT: MATHEMATICS

MAX. MARKS : 40

CLASS : IX

DURATION : 1½ hrs

General Instructions:

- All questions are compulsory.
- This question paper contains 20 questions divided into five Sections A, B, C, D and E.
- Section A** comprises of 10 MCQs of 1 mark each. **Section B** comprises of 4 questions of 2 marks each. **Section C** comprises of 3 questions of 3 marks each. **Section D** comprises of 1 question of 5 marks each and **Section E** comprises of 2 Case Study Based Questions of 4 marks each.
- There is no overall choice.
- Use of Calculators is not permitted

SECTION – A

Questions 1 to 10 carry 1 mark each.

- The ratio of the radii of two spheres is 4 : 5. The ratio of their surface areas is
(a) 4 : 5 (b) 2 : $\sqrt{5}$ (c) 5 : 4 (d) 16 : 25
- A cone, a hemisphere and a cylinder stand on equal bases and have the same height. The ratio of their volumes is
(a) 1 : 2 : 3 (b) 2 : 1 : 3 (c) 2 : 3 : 1 (d) 3 : 2 : 1
- Volume of a hemisphere is 19404 cubic cm. The total surface area is
(a) 2772 sq. cm (b) 4158 sq. cm (c) 5544 sq. cm (d) 1386 sq. cm
- The radius of a spherical balloon increases from 7 cm to 14 cm as air is being pumped into it. The ratio of the surface areas of the balloon in the two cases is
(a) 1 : 4 (b) 1 : 3 (c) 2 : 3 (d) 2 : 1
- If the radius and height of a cone are both increased by 10%, then the volume of the cone is approximately increased by
(a) 10% (b) 21% (c) 33% (d) 100%
- The curved surface area of the cone of slant height $x/2$ is $2\pi x$. Then area of its base is
(a) 4π sq. units (b) $4\pi x^2$ sq. units (c) πx^2 sq. units (d) 16π sq. units
- The diameters of two cones are equal. If their slant heights are in the ratio 5 : 4, then the ratio of their curved surface areas is
(a) 4 : 5 (b) 25 : 16 (c) 16 : 25 (d) 5 : 4
- If h , S and V denote respectively the height, curved surface area and volume of a right circular cone, then $3\pi Vh^3 - S^2h^2 + 9V^2$ is equal to
(a) 8 (b) 0 (c) 4π (d) $32\pi^2$

In the following questions 9 and 10, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.

- Both A and R are true and R is the correct explanation of A.
 - Both A and R are true but R is not the correct explanation of A.
 - A is true but R is false.
 - A is false but R is true.
- 9. Assertion (A):** If the radius of a sphere is tripled, then the ratio of the volume of the original sphere to that of the new is 1 : 27.
Reason (R): Volume of a sphere with radius r is $4\pi r^3$.

- 10. Assertion (A):** If a cone and a hemisphere have equal base and volume, then the ratio of their heights is 2 : 1.

Reason (R): Volume of a cylinder of height h and base radius r is $\pi r^2 h$.

SECTION – B

Questions 11 to 14 carry 2 marks each.

11. The diameter of a sphere is 42 cm. It is melted and drawn into a cylindrical wire of 28 cm diameter. Find the length of the wire.
12. There are two cones. The curved surface area of one is twice that of the other. The slant height of the latter is twice that of the former. Find the ratio of their radii.
13. The diameters of two cones are equal. If their slant heights are in the ratio 7:4, find the ratio of their curved surface area.
14. A solid sphere of radius 3 cm is melted and then recast into small spherical balls each of diameter 0.6 cm. Find the number of small balls thus obtained.

SECTION – C

Questions 15 to 17 carry 3 marks each.

15. The outer curved surface areas of hemisphere and sphere are in the ratio 2 : 9. Find the ratio of their
16. A hemispherical dome of a building needs to be painted. If the circumference of the base of the dome is 17.6 m, find the cost of painting it, given the cost of painting is ₹ 5 per 100 cm².
17. A corn cob, shaped somewhat like a cone, has the radius of its broadest end as 2.1 cm and length (height) as 20 cm. If each 1 cm² of the surface of the cob carries an average of four grains, find how many grains you would find on the entire cob.

SECTION – D

Questions 18 carry 5 marks.

18. (a) The circumference of the base of 10 m high conical tent is 44 m. Calculate the length of canvas used in making the tent, if width of canvas is 2 m. (3)
- (b) Into a conical tent of radius 8.4 m and vertical height 3.5 m, how many full bags of wheat can be emptied, if space for the wheat in each bag is 1.96 m³? (2)

SECTION – E (Case Study Based Questions)

Questions 19 to 20 carry 4 marks each.

19. Aditya was doing an experiment to find the radius r of a ball. For this he took a cylindrical container with radius $R = 7$ cm and height 10 cm. He filled the container almost half by water as shown in the figure-1. Now he dropped the ball into the container as in figure-2. He observed that in figure-2, the water level in the container raised from P to Q i.e, to 3.4 cm.

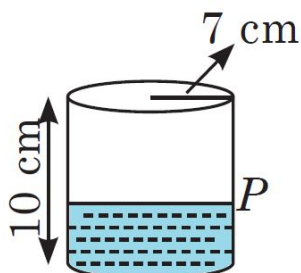


Figure - 1

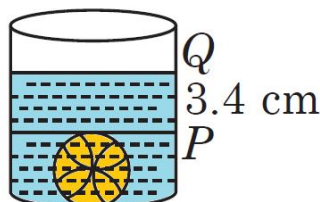
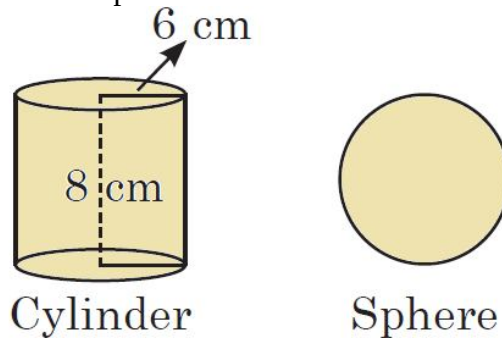


Figure - 2

Read the above passage and answer the questions

- (a) What is the approximate radius of the ball? (2)
- (b) What is the volume of the cylinder? (1)
- (c) What is the volume of the spherical ball? (1)

20. In Class IX-B, a Maths teacher is teaching conversion concepts. He brings some clay in the classroom to teach the topic mensuration. First he forms a cylinder of radius 6 cm and height 8 cm and then he moulds that cylinder into sphere.



Read the above passage and answer the questions

- (a) Find the volume of the cylindrical shape in terms of π . (1)
- (b) Find the radius of the sphere (2)
- (c) Find the volume of sphere, the teacher made. (1)