RG CLASSES

EDUCATING FOR BETTER FUTURE...

GRADE X
Question Bank (MATHEMATICS)
Chapter-12 SURFACE AREA AND VOLUMES

1 marks:

1. A solid sphere is cut into two hemispheres. The ratio of the surface areas of sphere to that of two hemispheres taken together, is **[BOARD 2024]**

   a) $1:1$ b) $1:4$ c) $2:3$ d) $3:2$

2. The volume of the largest right circular cone that can be carved out from a solid cube of edge 2 cm is **[BOARD 2024]**

   a) $\frac{4\pi}{3}cm^3$ b) $\frac{5\pi}{3}\ cm^3$ c) $\frac{8\pi}{3}\ cm^3$ d) $\frac{2\pi}{3}\ cm^3$

3. The ratio of total surface area of a solid hemisphere to the square of its radius is **[BOARD 2024]**

   a) $2\pi:1$ b) $4\pi:1$ c) $3\pi:1$ d)$1:4\pi$

4. Two identical solid cubes of side 'a' are joined end to end. The total surface area of the resulting cuboid is **[BOARD 2024]**

   a) $6a^2$ b) $10a^2$ c) $5a^2$ d) $4a^2$

5. Curved surface area of a cylinder of height 5 cm is $94.2\ cm^2$. Radius of the cylinder is (Take $\pi = 3.14$) **[BOARD 2023]**

   a) 2 cm b) 3 cm c) 2.9 cm d) 6 cm

6. The curved surface area of a cone having height 24 cm and radius 7 cm, is **[BOARD 2023]**

   a) $528\ cm^2$ b) $1056\ cm^2$ c) $550\ cm^2$ d) $500\ cm^2$

7. The area of metal sheet required to make a closed hollow cylinder of height 2.4 m and base radius 0.7 m, is **[BOARD 2023]**

   a) $10.56\ m^2$ b) $13.52\ m^2$ c) $13.64\ m^2$ d) $14.08\ m^2$

8. What is the total surface area of a solid hemisphere of diameter 'd'? **[BOARD 2023]**

   a) $3\pi d^2$ b) $2\pi d^2$ c) $\frac{1}{2}\pi d^2$ d) $\frac{3}{4}\pi d^2$

9. What is the area of a semi circle of diameter 'd'? **[BOARD 2023]**

   a) $\frac{1}{16}\pi d^2$ b) $\frac{1}{4}\pi d^2$ c) $\frac{1}{8}\pi d^2$ d) $\frac{1}{2}\pi d^2$

10. If the area of the base of a cone is $51\ cm^2$ and its volume is $85\ cm^3$ then the vertical height of the cone is given as **[BOARD 2023]**

    a) $\frac{5}{6}\ cm$ b) $\frac{5}{3}\ cm$ c) $\frac{5}{2}\ cm$ d) $5\ cm$

11. Water in a river which is 3 m deep and 40 m wide is flowing at the rate of 2 km/hr. How much water will fall into the sea in 2 minutes? **[BOARD 2023]**

a) 800 m^3 b) 4000 m^3 c) 8000 m^3 d) 2000 m^3

12. The volume of right circular cone whose area of the base is 156 cm^2 and the vertical height is 8 cm, is **[BOARD 2023]**

a) 2496 cm^3 b) 1248 cm^3 c) 1664 cm^3 d) 416 cm^3

13. If the radius of the sphere is increased by 100% the volume of the corresponding sphere is increased by

a) 200% b) 500% c) 700% d) 800%

14. If the radius of a circle is diminished by 10% then its area is diminished by

a) 10% b) 19% c) 36% d) 20%

15. The base radii of a cone and a cylinder are equal. If their CSA are also equal, thyen the ratio of the slant height of the cone to the height of the cylinder is

a) 2:1 b) 1:2 c) 1:3 d) 3:1

Options for Assertion and Reasoning Questions:

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

16. ***Assertion (A):*** Two cubes each of edge length 10 cm are joined together. The total surface area of newly formed cuboid is 1200 cm^2.

Reason (R): Area of each surface of a cube of side 10 cm is 100 cm^2. **[BOARD 2024]**

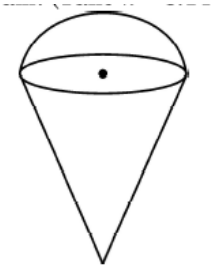
17. ***Assertion (A):*** Total surface area of the top is the sum of the curved surface area of the hemisphere and the curved surface area of the cone.

Reason (R): Top is obtained by fixing the plane surfaces of the hemisphere and cone together. **[BOARD 2023]**

3 marks:

1. The difference between the outer and inner radii of a hollow right circular cylinder of length 14 cm is 1 cm. If the volume of the metal used in making the cylinder is 176 cm^3, find the outer and inner radii of the cylinder. **[BOARD 2024]**
2. A wooden toy is made by scooping out a hemisphere of same radius as of cylinder, from each end of a wooden solid cylinder. If the height of the cylinder is 20 cm and its base is of radius 7 cm, find the total surface area of the toy. **[BOARD 2024]**
3. The inner and outer radii of a hollow cylinder surmounted on a hollow hemisphere of same radii are 3 cm and 4 cm respectively. If height of the cylinder is 14 cm, then find its total surface area (inner and outer). **[BOARD 2024]**
4. A room is in the form of cylinder surmounted by a hemispherical dome. The base radius of hemisphere is one half the height of cylindrical part. Find the total height of the room if it contains $\left(\frac{1408}{21}\right) m^3$ of air. $\left(\text{Take } \pi = \frac{22}{7}\right)$ **[BOARD 2023]**
5. An empty cone of its radius 3 cm and height 12 cm. Ice cream is filled in it so that lower part of the cone which is $\left(\frac{1}{6}\right)^{th}$ of the volume of the cone is unfilled but hemisphere is formed on the top. Find the volume of the ice cream. (Take $\pi = 3.14$)

[BOARD 2023]

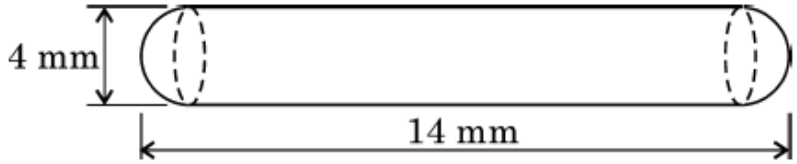


5 marks:

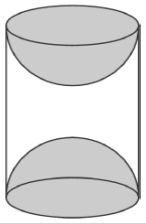
1. A vessel is in the form of hollow hemisphere mounted by a hollow cylinder. The diameter of the hemisphere is 14 cm and the total height of the vessel is 13 cm. Find the inner surface area and the volume of the vessel. **[BOARD 2024]**
2. A solid iron pole consists of a solid cylinder of height 200 cm and base diameter 28 cm, which surmounted by another cylinder of height 50 cm and radius 7 cm. Find the mass of the pole, given that 1 cm^3 of iron pole has approximately 8 g mass.

[BOARD 2024]

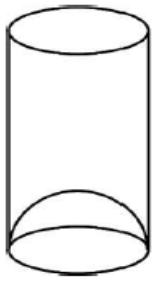
3. A medicine capsule is in the shape of cylinder with two hemispheres stuck to each of its ends. The length of the entire capsule is 14 mm and the diameter of the capsule is 4 mm, find its surface area. Also find its volume. **[BOARD 2024]**



4. A wooden article was made by scooping out a hemisphere from each end of a solid cylinder, as shown in the figure. If the height of the cylinder is 5.8 cm and its base is of radius 2.1 cm, find the total surface area of the article. **[BOARD 2023 & BOARD 2024]**

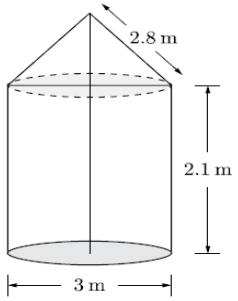


5. A tent is in the shape of a cylinder, surmounted by a conical top. If the height and diameter of the cylindrical part are 3.5 m and 6 m, and slant height of the top is 4.2 m, find the area of canvas used for making the tent. Also, find the cost of canvas of the tent at the rate of Rs 500 per m^2. **[BOARD 2024]**
6. A juice seller was serving his customers using glasses as shown in the figure. The inner diameter of the cylindrical glass was 5.6 cm, but the bottom of the glass had a hemispherical raised portion which reduced the capacity of the glass. If the height of the glass was 10 cm, find the apparent capacity and the actual capacity of the glass. **[BOARD 2024]**



7. A stduents was asked to make a model shaped like a cylinder with two cones attached to its ends by using a thin aluminium sheet. The diameter of the model is 3 cm and its total length is 12 cm. If each cone has a slant height of 2 cm, find the volume of air contained in the model. **[BOARD 2023]**
8. From a solid cylinder of height 20 cm and diameter 12 cm, a conical cavity of height 8 cm and radius 6 cm is hollowed out. Find the total surface area of the remaining solid. **[BOARD 2023]**
9. A solid is in the shape of a right circular cone surmounted on a hemisphere, the radius of each of them being 7 cm and the height of the cone is equal to its diameter. Find the volume of the solid. **[BOARD 2023]**

10. Water is flowing at the rate of 15 km/hr through a pipe of diameter 14 cm into a cuboidal pond which is 50 m long and 44 m wide. In what time will the level of water in pond rise by 21 cm? What should be the speed of water if the rise in water level is to be attained in 1 hour?
11. A solid is in the shape of a cone mounted on a hemisphere of same base radius. If CSA of the hemispherical part and the conical part are equal, then find the ratio of the radius and the height of the conical part.
12. Water in a canal, 6 m wide and 1.5 m deep, is flowing with a speed of 10 km/hr. How much area will it irrigate in 30 minutes, if 8 cm standing water is needed?
13. A right triangle whose sides are 20 cm and 15 cm is made to revolve about its hypotenuse. Find the volume and surface area of the double cone so formed. (Use $\pi = 3.14$).
14. A tent is in shape of cylinder surmounted by a conical top of same diameter. If the height and diameter of cylindrical part are 2.1 m and 3 m respectively and the slant height of conical part is 2.8 m, find the cost of canvas needed to make the tent if the canvas is available at the rate of Rs 500 per square meter.



Case Based Questions:

1. The word 'circus' has the same root as 'circle'. In a closed circular area, various entertainment acts including human skill and animal training are presented before the crowd. A circus tent is cylindrical up to a height of 8 m and conical above it. The diameter of the base is 28 m and total height of tent is 18.5 m. **[BOARD 2024]**

Based on the above information, answer the following questions:

(i) Find the slant height of the conical part. **1**

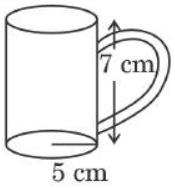
(ii) (a) Find area of the cloth used for making tent. **2**

OR

(b) Find total volume of air inside an empty tent. **2**

(iii) Determine the floor area of the tent. **1**

2. Tamper proof tetra packed milk guarantees both freshness and security. This milk ensures uncompromised quality, preserving the nutritional values within and making it a reliable choice for health conscious individuals. **[BOARD 2024]**



500 ml milk is packed in a cuboidal container of dimensions $15\ cm \times 8\ cm \times 5\ cm$. These milk packets are then packed in cuboidal cartons of dimensions $30\ cm \times 32\ cm \times 15\ cm$.

Based on the above given information, answer the following questions:

(i) Find the volume of the cuboidal cartion. **1**

(ii) (a) Find the total surface area of a milk packet. **2**

OR

(b) How many milk packets can be filled in a carton? **2**

(iii) How much milk can the cup (as shown in the figure) hold? **1**

3. In a coffee shop, coffee is served in two types of cups. One is cylindrical in shape with diameter 7 cm and height 14 cm and other is hemispherical with diameter 21 cm. **[BOARD 2023]**

Based on the above information answer the following:

(i) Find the area of the base of the cylindrical cup. **1**

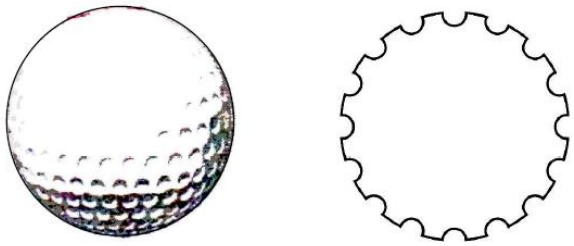
(ii) What is the capacity of the hemispherical cup? **2**

OR

Find the capacity of cylindrical cup? **2**

(iii) What is the curved surface area of the cylindrical cup? **1**

4. A golf ball is spherical with about 300-500 dimples that help increase its velocity while in play. Golf balls are traditionally while but available in colours also. In the given figure, a golf ball has diameter 4.2 cm and the surface has 315 dimples (hemi-spherical) of radius 2 mm. **[BOARD 2023]**



Based on the above, answer the following questions:

(i) Find the surface area of one such dimple. **1**

(ii) Find the volume of the material dug out to make one dimple. **1**

(iii) (a) Find the total surface area exposed to the surroundings. **2**

(OR)

(b) Find the volume of the gold ball. **2**