SURFACE AREA AND VOLUME -PRACTICE WORKSHEET

SHORT ANSWER QUESTIONS
2 MARKS

Q1. A toy is in the shape of a right circular cylinder with hemisphere at one end and a cone at the other. The radius and height of the cylindrical part are 5 cm and 13 cm respectively. The radii of the hemispherical and conical parts are the same as that of the cylindrical part.If the total height of the toy is 30 cm, find the total surface area of the toy.

Q2. Three cubes of a metal whose edges are in the ratio 3:4:5 are melted and converted into a single cube whose diagonal is $12\sqrt{3}$ cm.Find the edges of the cubes.

Q3. A cone of maximum size is carved out from a cube of edge 14 cm. Find the surface area of the cone and the remaining solid left after the cone carved out.

Q4. A vessel is in the form of a hemispherical bowl mounted by a hollow cylinder.The diameter of the hemisphere is 14 cm and the total height of the vessel is 13cm. Find the capacity of the vessel.

Q5.Two identical cubes each of volume 64 cm^3 are joined together end to end.What is the surface area of the resulting cuboid?

Q6.From a solid cube of side 7cm, a conical cavity of height 7cm and radius 3cm is hollowed out. Find the volume of the remaining solid.

Q7. Marbles of diameter 1.4 cm are dropped into a cylindrical beaker of diameter 7cm containing some water. Find the numberof marbles that should be dropped into the beaker so that the water level rises by 5.6 cm.

Q8.Two cones with same base radius 8 cm and height 15 cm are joined together along their bases. Find the surface area of the shape so formed.

Q9. A hemispherical bowl of internal diameter 36 cm. contains liquid. This liquid is to be filledin the cylindrical bottles of radius 3cm and height 6 cm. Find the number of bottles required to empty the bowl.

Q10. An ice cream cone of radius 5 cm and height 10cm is full of ice cream. Calculate the volume of ice cream , provided that 1/6 part is left unfilled with ice cream.

3 MARK QUESTIONS

Q 1. A sphere of diameter 18 cm is dropped into a cylindrical vessel of diameter 36 cm, partly filled with water. If the sphere is completely submerged, then calculate the rise of water level in cm

Q 2. Find the number of solid spheres, each of diameter 6 cm that can be made by melting a solid metal cylinder of height 45 cm and diameter 4 cm.

Q 3. A solid right circular cone is cut into two parts at the middle of its height by a plane parallel to its base. Find the ratio of the volume of the smaller cone to the whole cone.

Q 4. Volume and surface area of a solid hemisphere are numerically equal. What is the diameter of hemisphere?

Q 5. Two cubes each of side 4 cm are joined end to end. Find the surface area of the resulting cuboid.
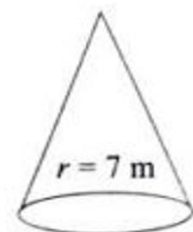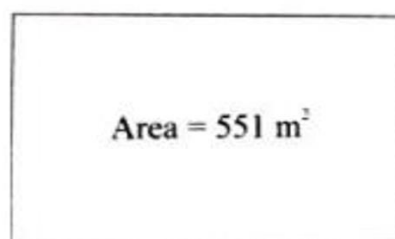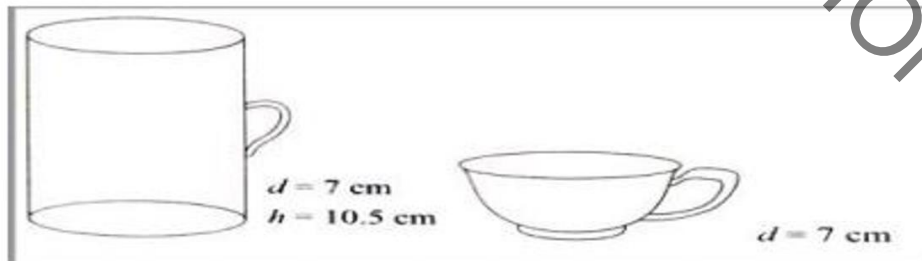
Q 6. If the total surface area of a solid hemisphere is 462 cm^2. Find its volume.

LONG ANSWER QUESTIONS

4 MARKS

CASE STUDY 1:
Q1. Adventure camps are the perfect place for the children to practice decision making for themselves without parents and teachers guiding their every move. Some students of a school reached for adventure at Sakleshpur. At the camp, the waiters served some students with a welcome drink in a cylindrical glass and some students in a hemispherical cup whose dimensions are shown below. After that they went for a jungle trek. The jungle trek was enjoyable but tiring. As dusk fell, it was time to take shelter. Each group of four students was given a canvas of area 551m^2 . Each group had to make a conical tent to accommodate all the four students. Assuming that all the stitching and wasting incurred while cutting, would amount to 1m^2 , the students put the tents. The radius of the tent is 7m.

d = 7 cm
h = 10.5 cm

d = 7 cm

Area = 551 m^2

r = 7 m

(i) The volume of cylindrical cup is
a) 295.75 cm^3 b) 7415.5 cm^3 c) 384.88 cm^3 d) 404.25 cm^3

(ii) The volume of hemispherical cup is
a) 179.67 cm^3 b) 89.83 cm^3 c) 172.25 cm^3 d) 210.60 cm^3

iii) Which container had more juice and by how much?
a) Hemispherical cup, 195 cm^3 b) Cylindrical glass, 207 cm^3
c) Hemispherical cup, 280.85 cm^3 d) Cylindrical glass, 314.42 cm^3

iv) The height of the conical tent prepared to accommodate four students is
a) 18m   b) 10m   c) 24m   d) 14m

v) How much space on the ground is occupied by each student in the conical tent
a) 54 m^2 b) 38.5 m^2 c) 86 m^2 d) 24 m^2

CASE STUDY 2:

Q2. The Great Stupa at Sanchi is one of the oldest stone structures in India, and an important monument of Indian Architecture. It was originally commissioned by the emperor Ashoka in the 3rd century BCE. Its nucleus was a simple hemispherical brick structure built over the relics of the Buddha. It is a perfect example of combination of solid figures.

A big hemispherical dome with a cuboidal structure mounted on it. (Take $\pi = 22/7$)

(i) Calculate the volume of the hemispherical dome if the height of the dome is 21 m –
a) 19404 cu. m   b) 2000 cu .m   c) 15000 cu. m   d) 19000 cu. m

(ii) The formula to find the Volume of Sphere is -
a) 2/3 πr^3 b) 4/3 πr^3 c) 4 πr^2 d) 2 πr^2

(iii) The cloth require to cover the hemispherical dome if the radius of its base is 14m is
a) 1222 sq.m   b) 1232 sq.m   c) 1200 sq.m   d) 1400 sq.

(iv) The total surface area of the combined figure i.e. hemispherical dome with radius 14m and cuboidal shaped top with dimensions 8m, 6m and 4m is

a)1200 sq.m   b) 1232 sq.m   c) 1392 sq.m   d) 1932 sq.m

(v) The volume of the cuboidal shaped top is with dimensions mentioned in question (iv)

a) 182.45 m^3 b) 282.45 m^3 c) 292 m^3 d) 192 m^3

CASE STUDY 3:
Q3. On a Sunday, your parents took you to a fair. You could see lot of toys displayed, and you wanted them to buy a RUBIC's cube and strawberry ice-cream for you. Observe the figures and answer the questions: -
(i) The length of the diagonal if each edge measures 6cm is
a) 3√3   b) 3√6   c) √12   d) 6√3

(ii) Volume of the solid figure if the length of the edge is 7cm is

a)256 cm^3 b) 196 cm^3 c) 343 cm^3 d) 434 cm^3
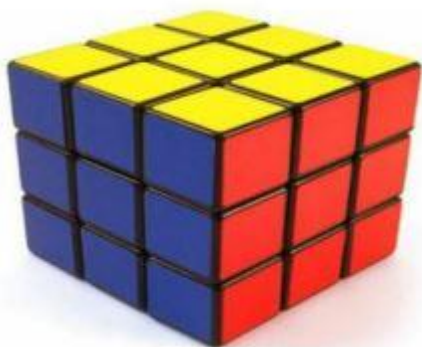
3. What is the curved surface area of hemisphere (ice cream) if the base radius is 7cm?
a) 309 cm^2 b) 308 cm^2 c) 803 cm^2 d) 903 cm^2

4. Slant height of a cone if the radius is 7cm and the height is 24 cm___
a) 26cm   b) 25 cm   c) 52 cm   d) 62cm

5. The total surface area of cone with hemispherical ice cream is
a) 858 cm^2 b) 885 cm^2 c) 588 cm^2 d) 855 cm^2

Q4. The surface area of a solid metallic sphere is 616 cm^2 . It is melted and recast into a cone of height 28 cm. Find the diameter of the base of the cone so formed

Q5. Water in a canal 6m 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 8cm of standing water is needed?

Q6.A building is in the form of a cylinder surmounted by a hemispherical dome.The base of the dome is equal to 2/3 of the total height of the building .Find the height of the building if it contains $67\frac{1}{21}m^3$ of air.

Q7.A toy is in the form of a hemisphere surrmounted by a right circular cone of the same base radius as that of the hemisphere. If the radius of the base of the cone is 21cm and its volume is 2/3 of the volume of the hemisphere , calculate the height of the cone and the surface area of the toy.

Q8. A cylindrical vessel with internal diameter 10 cm and height 10.5 cm is full of water. A solid cone of base diameter 7cm and height 6cm is completely immersed in water .Find the volume(in litres)of

- (i) water displaced out of the cylindrical vessel
- (ii) water left in the cylindrical vessel.

Q9. A solid is in the form of a hemisphere surmounted by a right circular cone. The height of the cone is 4cm and the diameter of the base is 8cm. Determine the volume of the toy. If a cube circumscribes the toy, then the difference of the volumes of cube and toy. Also, find the total surface area of the toy.

Q10. A juice seller serves his customers using a glass with bottom(base) as hemispherical portion raised which reduces the capacity of the glass. If the inner diameter of cylindrical glass is 5cm amd height is 10cm, find the apparent capacity of the glass and its actual capacity.(Use π =3.14)

ANSWER KEY

SHORT ANSWER QUESTIONS

Q1.770 cm²   **Q2.** 6cm,8cm,10cm   **Q3.** $154(1 + \sqrt{5})cm^2, (1022 + 154\sqrt{5})cm^2$

Q4. 1642.66cm³   **Q5.** 160 cm²   **Q6.** 277.60 cm³   **Q7.** 150

Q8. 855 cm²   **Q9.** 72 bottles   **Q10.** 327.375 cm³

LONG ANSWER QUESTIONS

CASE STUDY 1:
Q1. (i)d) 404.25 cm³   (ii) b) 89.83 cm³   (iii)d) Cylindrical glass, 314.42 cm³
(iv) c) 24m   (v) b) 38.5 m²

CASE STUDY 2:

Q2. (i) a) 19404 cu.m   (ii) b) 4/3 πr^3 (iii) b) 1232 sq.m   (iv) c) 1392 sq.m   (v) d) 192 m³

CASE STUDY 3:
Q3.(i) d) 6√3   (ii) c) 343 cm³   (iii) b) 308 cm²   (iv) b) 25 cm
(v) a) 858 cm²

Q4. 14 cm   **Q5. 562500 m²**   **Q6.** Height = 6 m   **Q7. 5082 cm²**

Q8. 0.77 litre , 0.748 litre   **Q9. 1408/7 cm³, 310.86 cm³, 171.68 cm²**

Q10. 32.71cm³, 163.54 cm³