Applied Academy

H-76 Sec 22

AREA TELATE TO CIRCLES AND SURFACE AREA VOLUME

Class 10 - Mathematics

1. The hour hand of a clock is 6 cm long. The area swept by it between 11.20 am and 11.55 am is **[1]**

   a) $10\ cm^2$ b) $11\ cm^2$

   c) $5.5\ cm^2$ d) $2.75\ cm^2$

2. The length of a minute hand of a wall clock is 7 cm. What is the area swept by it in 30 minutes is **[1]**

   a) $35\ cm^2$ b) $63\ cm^2$

   c) $50\ cm^2$ d) $77\ cm^2$

3. If θ is the angle (in degrees) of a sector of a circle of radius r, then area of the sector is **[1]**

   a) $\frac{\pi r^2\theta}{360}$ b) $\frac{2\pi r\theta}{360}$

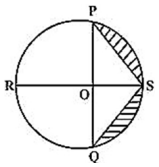
   c) $\frac{\pi r^2\theta}{180}$ d) $\frac{2\pi r\theta}{180}$

4. If the area of a sector of a circle is $\frac{1}{8}$ of the area of the circle, then the central angle of the sector is: **[1]**

   a) 45^o b) 90^o

   c) 60^o d) 30^o

5. In the given figure PQ and RS are the perpendicular diameters of the circle whose centre is O and radius = 14 cm. the area of the shaded region is **[1]**



   a) $28\ cm^2$ b) $35\ cm^2$

   c) $60\ cm^2$ d) $112\ cm^2$

6. The minute hand of a clock is 12 cm long. Find the area of the face of the clock described by the minute hand in 35 minutes. **[1]**

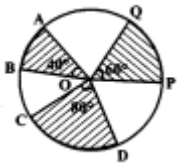
7. Find the area of a sector of circle of radius 21 cm and central angle 120°. **[1]**

8. A chord of a circle of radius 10 cm subtends a right angle at the centre of the circle. Find the area of the corresponding **[1]**

   i. minor sector

   ii. major sector. (Use $\pi = 3.14$)

9. In the adjoining figure, the radius of the circle with centre O is 7 cm, $\angle POQ = 60°$, $\angle AOB = 40°$ and $\angle COD = 80°$. Find the area of the shaded region (in sq cm). (Use $\pi = \frac{22}{7}$) **[1]**



10. The perimeter of a sector of a circle of radius 6.5 cm is 31 cm. Find the area of the sector. **[1]**

11. Find the area of a sector of a circle with radius 6 cm, if the angle of the sector is 60^o. **[2]**

12. The minute hand of a clock is 15 cm long. Calculate the area swept by it in 20 minutes. [Take $\pi = 3.14$.] **[2]**

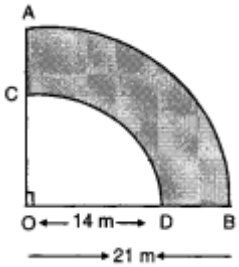
13. A horse is tied with a 14 m long rope at one corner of an equilateral triangular field having side 20 m. Find the area of the field where the horse cannot graze. **[2]**

14. Find the area of a quadrant of a circle , whose circumference is 22 cm . **[2]**

15. A chord of a circle of radius 10 cm subtends a right angle at the centre. Find the area of the minor segment. [Use $\pi = 3.14$.] **[2]**

16. What is the length (in terms of π) of the arc that subtends an angle of 36° at the centre of a circle of radius 5 cm? **[2]**

17. ABCD is a flower bed. If OA =21 m and OC = 14 m, find the area of the bed. **[2]**



18. A horse is tethered to one corner of a rectangular field of dimensions 70 m $\times$ 52 m, by a rope of length 21 m. How much area of the field can it graze? **[2]**

19. Find the length of the arc of a circle of diameter 42 cm which subtends an angle of 60° at the centre. **[2]**

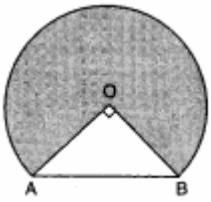
20. Find the area of a quadrant of a circle whose circumference is 22 cm. **[2]**

21. Below figure shows the cross-section of railway tunnel. The radius OA of the circular part is 2 m. If $\angle AOB = 90°$, calculate **[3]**

    i. the height of the tunnel

    ii. the perimeter of the cross-section

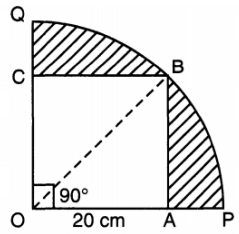
    iii. the area of the cross-section



22. Find the area of the corresponding major sector of a circle of radius 28 cm and the central angle 45^o. **[3]**

23. The length of an arc of a circle, subtending an angle of 54° at the centre is 16.5 cm. Calculate the radius, circumference and area of the circle. **[3]**

24. A square OABC is inscribed in a quadrant OPBQ of a circle. If OA = 20 cm, find the area of the shaded region. [Use $\pi = 3.14$] **[3]**



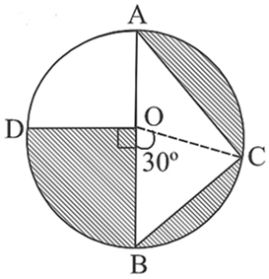
25. Find the area of the minor segment of circle of radius 14 cm, when the angle of corresponding sector is 60°. **[3]**

26. A chord 10 cm long is drawn in a circle whose radius is $5\sqrt{2}$ cm. Find the area of both segments. (Take π = 3.14). **[3]**

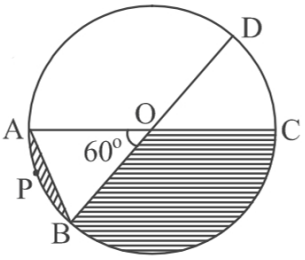
27. Area of a sector of a circle of radius 36 cm is $54\pi\ cm^2$.Find the length of the corresponding arc of sector. **[3]**

28. A calf is tied with a rope of length 6 m at the corner of a square grassy lawn of side 20 m. If the length of the rope is increased by 5.5 m, find the increase in area of the grassy lawn in which the calf can graze. **[3]**

29. O is the centre of the circle. If AC = 28 cm, BC = 21 cm, $\angle$BOD = 90^o and $\angle$BOC = 30^o, then find the area of the shaded region given in the figure. **[5]**



30. In the given figure, diameters AC and BD of the circle intersect at O. If $\angle AOB = 60^\circ$ and OA = 10 cm, then: **[5]**



i. find the length of the chord AB.

ii. find the area of shaded region.

(Take $\pi = 3.14$ and $\sqrt{3} = 1.73$)

31. Find the area of the segment of a circle of radius 12 cm whose corresponding sector central angle 60°. (Use π = 3.14). **[5]**

32. **Assertion (A):** A wire is looped in the form of a circle of radius 28 cm. It is bent into a square. Then the area of the square is 1946cm^2. **[1]**

Reason (: Angle described by a minute hand in 60 minutes = 360^o.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

33. A solid is hemispherical at the bottom and conical above. If the surface areas of the two parts are equal, then the ratio of its radius and the height of its conical part is **[1]**

a) 1 : 1

b) 1 : $\sqrt{3}$

c) $\sqrt{3}$: 1

d) 1 : 3

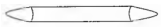
34. A solid is hemispherical at the bottom and conical (of same radius) above it. If the surface areas of the two parts **[1]**

are equal then the ratio of its radius and the slant height of the conical part is

a) 4 : 1 b) 1 : 4

c) 1 : 2 d) 2 : 1

35. The shape of a gilli in the gilli-danda game is a combination of **[1]**



a) two cylinders b) a cone and a cylinder

c) two cylinders and a cone d) two cones and a cylinder

36. The radius and height of a right circular cone and that of a right circular cylinder are respectively equal. If the volume of the cylinder is 300 cu.cm, then the volume of the cone is **[1]**

a) 900 cu.cm b) 600 cu.cm

c) 100 cu.cm d) 300 cu.cm

37. How many bricks each measuring (25 cm $\times$ 11.25 cm $\times$ 6 cm) will be required to construct a wall (8 m $\times$ 6 m $\times$ 22.5 cm)? **[1]**

a) 7200 b) 4800

c) 8000 d) 6400

38. A hollow cube of internal edge 22 cm is filled with spherical marbles of diameter 0.5 cm and $\frac{1}{8}$ space of the cube remains unfilled. Number of marbles required is **[1]**

a) 142296 b) 142596

c) 142496 d) 142396

39. A juice glass is cylindrical in shape with hemi-spherical raised up portion at the bottom. The inner diameter of glass is 10 cm and its height is 14 cm. Find the capacity of the glass.(use π = 3.14) **[2]**

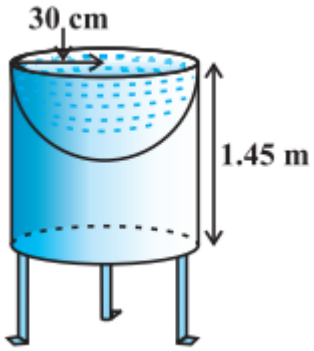
40. A cylindrical tub of radius 12 cm contains water to a depth of 20 cm. A spherical form ball of radius 9 cm is dropped into the tub and thus the level of water is raised by h cm. What is the value of h? **[2]**

41. The barrel of a fountain-pen, cylindrical in shape, is 7 cm long and 5 mm in diameter. A full barrel of ink in the pen will be used up on writing 330 words on an average. How many words would use up a bottle of ink containing one fifth of a litre? **[2]**

42. If a sphere of radius 2r has the same volume as that of a cone with circular base of radius r, then find the height of the cone. **[2]**

43. Mayank made a bird-bath for his garden in the shape of a cylinder with a hemispherical depression at one end (see Fig.). The height of the cylinder is 1.45 m and its radius is 30 cm. Find the total surface area of the bird-bath. **[2]**

(Take $\pi = \frac{22}{7}$)



44. 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). **[2]**

45. A solid iron pole consists of a cylinder of height 220 cm and base diameter 24 cm is surmounted by another cylinder of height 60 cm and radius 8 cm. Find the mass of the pole, given that 1 cm^3 of iron has approximately 8 g mass. (Use $\pi = 3.14$) **[2]**

46. The largest sphere is to be carved out of a right circular cylinder of radius 7 cm. and height 14 cm. Find the volume of the sphere. **[2]**

47. The largest sphere is carved out of a cube of a side 7 cm. Find the volume of the sphere. **[2]**

48. The radii of two cylinders are in the ratio 3 : 5 and their heights are in the ratio 2 : 3. What is the ratio of their curved surface areas? **[2]**

49. A right circular cone and a right circular cylinder have equal base and equal height. If the radius of the base and height are in the ratio 5 : 12, write the ratio of the total surface area of the cylinder to that of the cone. **[3]**

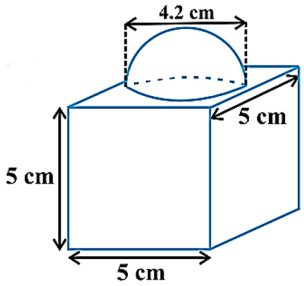
50. A cubical block of side 7 cm is surrounded by a hemisphere. What is the greatest diameter the hemisphere can have? Find the total surface area of the solid. **[3]**

51. A cone of maximum size is carved out from a cube edge 14 cm. Find the surface area of remaining solid after the cone is carved out. **[3]**

52. The interior of a building is in the form of a cylinder of base radius 12 m and height 3.5 m, surmounted by a cone of equal base and slant height 12.5 m. Find the internal curved surface area and the capacity of the building. **[3]**

53. A solid is composed of a cylinder with hemispherical ends. If the whole length of the solid is 108 cm and the diameter of the hemispherical ends is 36 cm, find the cost of polishing the surface of the solid at the rate of 7 paise per sq. cm. (Use $\pi = \frac{22}{7}$). **[3]**

54. A decorative block shown in Figure is made of two solids - a cube and a hemisphere. The base of the block is a cube with edge 5 cm, and the hemisphere fixed on the top has a diameter 4.2 cm. Find the total surface area of the block. (Take$\pi = \frac{22}{7}$). **[3]**



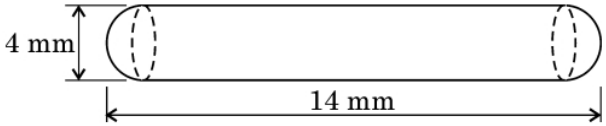
55. A solid is in the form of a cylinder with hemispherical ends. The total height of the solid is 20 cm and the diameter of the cylinder is 7 cm. Find the total volume of the solid. (Use $\pi = \frac{22}{7}$) **[3]**

56. From a solid cylinder whose height is 8 cm and radius 6 cm, a Conical cavity of height 8 cm and of base radius 6 cm, is hollowed out. Find the volume of the remaining solid correct to two places of decimal. Also find the total surface area of the remaining solid. **[3]**

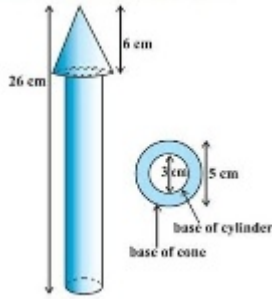
57. A hemispherical tank of radius 1.75 m is full of water. It is connected with a pipe which empties it at the rate of 7 litres per second. How much time will it take to empty the tank completely? **[3]**

58. A sphere of diameter 6 cm is dropped in a right circular cylindrical vessel partly filled with water. If the diameter of the cylindrical vessel is 12 cm and the sphere is completely submerged in water, by how much will the level of water rise in the cylindrical vessel? **[3]**

59. A medicine capsule is in the shape of a 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. **[5]**



60. A wooden toy rocket is in the shape of a cone mounted on a cylinder as shown in given below figure. The height of the entire rocket is 26 cm, while the height of the conical part is 6 cm. The base of the conical portion has a diameter of 5 cm, while the base diameter of the cylindrical portion is 3 cm. If the conical portion is to be painted orange and the cylindrical portion yellow, find the area of the rocket painted with each of these colours. (Take π =3.14) **[5]**

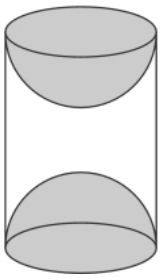


61. An iron pillar has some part in the form of a right circular cylinder and remaining in the form of a right circular cone. The radius of the base of each of cone and cylinder is 8 cm. The cylindrical part is 240 cm high and the conical part is 36 cm high. Find the weight of the pillar if one cubic cm of iron weighs 7.8 grams. **[5]**

62. A spherical glass vessel has a cylindrical neck 8 cm long and 1 cm in radius. The radius of the spherical part is 9 cm. Find the amount of water (in litres) it can hold, when filled completely. **[5]**

63. An iron pillar has some part in the form of a right circular cylinder and remaining in the form of a right circular cone. The radius of base of each of cone and cylinder is 8 cm. The cylindrical part is 240 cm high and the conical part is 36 cm high. Find the weight of the pillar, if one cubic cm of iron weighs 10 g. **[5]**

64. 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. **[5]**

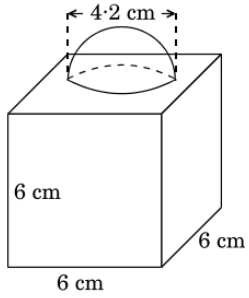


65. A solid right circular cone of height 120 cm and radius 60 cm is placed in a right circular cylinder full of water of height 180 cm such that it touches the bottom. Find the volume of water left in the cylinder, if the radius of the cylinder is equal to the radius of the cone. **[5]**

66. In Figure, a decorative block is shown which is made of two solids, a cube and a hemisphere. The base of the block is a cube with edge 6 cm and the hemisphere fixed on the top has a diameter of 4·2 cm. Find **[5]**

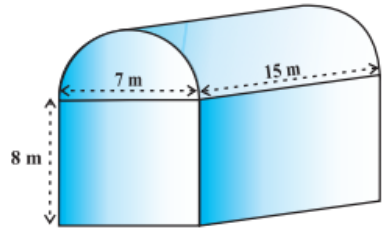
a. the total surface area of the block.

b. the volume of the block formed. (Take $\pi = \frac{22}{7}$)



67. A cylindrical tub of radius 12 cm contains water to a depth of 20 cm. A spherical ball is dropped into the tub and the level of the water is raised by 6.75 cm. Find the radius of the ball. **[5]**

68. Shanta runs an industry in a shed which is in the shape of a cuboid surmounted by a half cylinder. If the base of the shed is of dimension 7 m $\times$ 15 m and the height of the cuboidal portion is 8 m, find the volume of air that the shed can hold. Further, suppose the machinery in the shed occupies a total space of 300 m3, and there are 20 workers, each of whom occupy about 0.08 m3 space on an average. Then, how much air is in the shed? (Take $\pi = \frac{22}{7}$) **[5]**



69. **Assertion (A):** In a solid hemisphere of radius 10 cm, a right cone of same radius is removed out. The volume of the remaining solid is 523.33 cm^3 [Take π = 3.14 and $\sqrt{2}$ = 1.4] **[1]**

Reason (R): Expression used here to calculate volume of remaining solid = Volume of hemisphere - Volume of cone

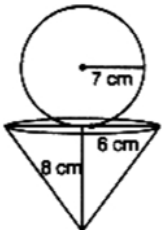
a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

70. **Assertion (A):** In a solid hemisphere of radius 10 cm, a right cone of same radius is removed out. The surface area of the remaining solid is 570.74 cm^2 [Take π = 3.14 and $\sqrt{2}$ = 1.4] **[1]**

Reason (R): **Reason (R):** Expression used here to calculate Surface area of remaining solid = Curved surface area of hemisphere + Curved surface area of cone

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

71. **Assertion (A):** A sphere of radius 7 cm is m ounted on the solid cone of radius 6 cm and height 8 cm. the volume of the combined solid is 1737.47 cm^3. [Take π = 3.14] **[1]**



Reason (R): Volume of sphere and surface area of cone is given by $\frac{4}{3}\pi r^3$ and $\frac{1}{3}\pi r^2 h$ respectively.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.