CHAPTER 11 Mensuration

1. An equilateral triangle of side 6 cm has its corners cut off to form a regular hexagon. Area (in cm^2) of this regular hexagon will be **(SSC CGL 1st Sit. 2010)**

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

2. The length (in metres) of the longest rod that can be put in a room of dimensions $10\,m \times 10\,m \times 5\,m$ is **(SSC CGL 1st Sit. 2010)**

(a) $15\sqrt{3}$ (b) 15 (c) $10\sqrt{2}$ (d) $5\sqrt{3}$

3. If the circumference of a circle is decreased by 50% then the percentage of decrease in its area is **(SSC CGL 1st Sit. 2010)**

(a) 25 (b) 50 (c) 60 (d) 75

4. If each side of a square is increased by 10%, its area will be increased by **(SSC CGL 2nd Sit. 2010)**

(a) 10% (b) 21% (c) 44% (d) 100%

5. A copper wire of length 36 m and diameter 2 mm is melted to form a sphere. The radius of the sphere (in cm) is **(SSC CGL 2nd Sit. 2010)**

(a) 2.5 (b) 3 (c) 3.5 (d) 4

6. The ratio of the radil of two wheels is 3 : 4. The ratio of their circumferences is **(SSC CGL 2nd Sit. 2010)**

(a) 4 : 3 (b) 3 : 4 (c) 2 : 3 (d) 3 : 2

7. If the length of a rectangle is increased by 10% and its breadth is decreased by 10%, the change in its area will be **(SSC CGL 2nd Sit. 2010)**

(a) 1% increase (b) 1% decrease
(c) 10% increase (d) No change

8. A copper wire is bent in the shape of a square of area 81 cm^2. If the same wire is bent form of a semicircle, the radius (in cm) of the semicircle is **(SSC CGL 1st Sit. 2011)**

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

(a) 16 (b) 14 (c) 10 (d) 7

9. The volume (in m^3) of rain water that can be collected from 1.5 hectares of ground in a rainfall of 5 cm is **(SSC CGL 1st Sit. 2011)**

(a) 75 (b) 750 (c) 7500 (d) 75000

10. A river 3 m deep and 40 m wide is flowing at the rate of 2 km per hour. How much water (in litres) will fall into the sea in a minute? **(SSC CGL 1st Sit. 2011)**

(a) 4,00,000 (b) 40,00,000
(c) 40,000 (d) 4,000

11. A bicycle wheel makes 5000 revolutions in moving 11 km. Then the radius of the wheel (in cm) is **(SSC CGL 1st Sit. 2011)**

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

(a) 70 (b) 35 (c) 17.5 (d) 140

12. The perimeter of a triangle is 40cm and its area is 60 cm^2. If the largest side measures 17cm, then the length (in cm) of the smallest side of the triangle is **(SSC CGL 1st Sit. 2011)**

(a) 4 (b) 6 (c) 8 (d) 15

13. A copper wire is bent in the form of square with an area of 121 cm^2. It the same wire is bent in the form of a circle, the radius (in cum) of the circle is (Take $\pi = \frac{22}{7}$) **(SSC CGL 2nd Sit. 2011)**

(a) 7 (b) 10 (c) 11 (d) 14

14. The areas of three consecutive faces of a cuboid are 12 cm^2, 20 cm^2 and 15 cm^2, then the volume (in cm^3) of the cuboid is **(SSC CGL 2nd Sit. 2011)**

(a) 3600 (b) 100 (c) 80 (d) 60

15. Water is flowing at the rate of 5 km/h through a pipe of diameter 14cm into a rectangular tank which is 50 m long, 44m wide. The time taken, in hours, for the rise in the level of water in the tank to be 7 cm is **(SSC CGL 2nd Sit. 2011)**

(a) 2 (b) $1\frac{1}{2}$ (c) 3 (d) $2\frac{1}{2}$

16. The wheel of a motor car makes 1000 revolutions in moving 440 m. The diameter (in metre) of the wheel is **(SSC CGL 2nd Sit. 2011)**

(a) 0.44 (b) 0.14 (c) 0.24 (d) 0.34

17. The sides of a triangles are in the ratio 2:3:4. the perimeter of the triangle is 18cm. The area (in cm^2) of the triangle is **(SSC CGL 2nd Sit. 2011)**

(a) 9 (b) 36 (c) $\sqrt{42}$ (d) $3\sqrt{15}$

18. The base of a triangle is 2 cm more than twice its altitude. If the area is 12 sq. cm, its altitude will be **(SSC Sub. Ins. 2012)**

(a) 6 cm (b) 5 cm (c) 4 cm (d) 3 cm

19. ABCDEF is a regular hexagon of side 2 feet. The area, in square feet of the rectangle BCEF is **(SSC Sub. Ins. 2012)**

(a) 4 (b) $4\sqrt{3}$ (c) 8 (d) $4 + 4\sqrt{3}$

20. The area of a semi-circular field is 308 sq. m; then taking $\pi = \frac{22}{7}$, the length of the railing to surround it has to be **(SSC Sub. Ins. 2012)**

(a) 44m (b) 72m (c) 88m (d) 80m

21. Volume of a right circular cone is numerically equal to its slant surface area. Then value of $\left(\frac{1}{h^2}+\frac{1}{r^2}\right)$, where h and r are height and radius of the cone respectively, is **(SSC Sub. Ins. 2012)**

(a) 9 units (b) $\frac{1}{9}$ unit (c) 4 units (d) $\frac{1}{4}$ unit

22. If the numerical value of the volume of a right circular cylinder and its curved surface area are equal, then its radius is **(SSC Sub. Ins. 2012)**

(a) 2 units (b) 4 units (c) 3 units (d) 6 units

23. The volume of a cubical box is 3.375 cubic meters. The length of edge of the box is: **(SSC CHSL 2012)**

(a) 75 cm (b) 1.5 m (c) 1.125 m (d) 2.5 m

24. The length of a minute hand of a clock is 7 cm. The area swept by the minute hand in 30 minutes is: **(SSC CHSL 2012)**

(a) 210 sq. cm (b) 154 sq. cm
(c) 77 sq. cm (d) 147 sq. cm

25. The circumference of the base of a 16 cm height solid cone is 33 cm. What is the volume of the cone in cm^3 ? **(SSC CHSL 2012)**

(a) 1028 (b) 616 (c) 462 (d) 828

26. Diagonal of a cube is $6\sqrt{3}$ cm. Ratio of its total surface area and volume (numerically) is: **(SSC CHSL 2012)**

(a) 2 : 1 (b) 1 : 6
(c) 1 : 1 (d) 1 : 2

27. The ratio of the edges of rectangular parallelopiped is 1 : 2 : 3 and its volume is 1296 cubic cm. The area of the whole surface in sq. cm is : **(SSC CHSL 2012)**

(a) 696 (b) 792 (c) 824 (d) 548

28. The perimeter of a semi-circular area is 18 cm, then the radius is : (using $\pi = \frac{22}{7}$) **(SSC CHSL 2012)**

(a) $5\frac{1}{3}$ cm (b) $3\frac{1}{2}$ cm (c) 6 cm (d) 4 cm

29. The capacities of two hemispherical vessels are 6.4 litres and 21.6 litres. The ratio of their inner radii is **(SSC CGL 1st Sit. 2012)**

(a) 4 : 9 (b) 16 : 81 (c) $\sqrt{2}:\sqrt{3}$ (d) 2 : 3

30. The area of the largest triangle that can be inscribed in a semicircle of radius x in square units is: **(SSC CGL 2nd Sit. 2012)**

(a) $4x^2$ (b) x^2 (c) $2x^2$ (d) $3x^2$

31. A rectangular garden is 100 m × 80 m. There is a path along the garden and just outside it. Width of path is 10 m. The area of the path is **(SSC CGL 1st Sit. 2012)**

(a) 1900 sq m (b) 2400 sq m
(c) 3660 sq m (d) 4000 sq m

32. A metal pipe of negligible thickness has radius 21 cm and length 90 cm. The outer curved surface area of the pipe in square cm is **(SSC CGL 2nd Sit. 2012)**

(a) 11880 (b) 11680 (c) 11480 (d) 10080

33. The length and breadth of a square are increased by 30% and 20% respectively. The area of the rectangle so formed exceeds the area of the square by: **(SSC CHSL 2012)**

(a) 46% (b) 66% (c) 42% (d) 56%

34. The ratio of inradius and circumradius of a square is : **(SSC CGL 1st Sit. 2013)**

(a) 1 : 2 (b) $1:\sqrt{2}$ (c) $\sqrt{2}:\sqrt{3}$ (d) 1 : 3

35. The perimeter of the base of a right circular cone is 8 cm. If the height of the cone is 21 cm, then its volume is : **(SSC CGL 1st Sit. 2013)**

(a) $\frac{108}{\pi}cm^3$ (b) $108\,\pi\,cm^3$
(c) $\frac{112}{\pi}cm^3$ (d) $112\,\pi\,cm^3$

36. A circular road runs around a circular ground. If the difference between the circumferences of the outer circle and the inner circle is 66 metres, the width of the road is : $\left(\text{Take } \pi = \frac{22}{7}\right)$ **(SSC CGL 1st Sit.2013)**

(a) 21 metres (b) 10.5 metres
(c) 7 metres (d) 5.25 metres

37. A circle is inscribed in an equilateral triangle and a square is inscribed in that circle. The ratio of the areas of the triangle and the square is **(SSC Multi-Tasking 2013)**

(a) $3\sqrt{3}:1$ (b) $\sqrt{3}:4$
(c) $\sqrt{3}:8$ (d) $3\sqrt{3}:2$

38. If the sum of the length, breadth and height of a rectangular parallelopiped is 24 cm and the length of its diagonal is 15 cm, then its total surface area is **(SSC Multi-Tasking 2013)**

(a) $351\ cm^2$ (b) $256\ cm^2$ (c) $265\ cm^2$ (d) $315\ cm^2$

39. A solid right circular cylinder and a solid hemisphere stand on equal bases and have the same height. The ratio of their whole surface areas is: **(SSC Sub. Ins. 2013)**

(a) 3:2 (b) 3:4 (c) 4:3 (d) 2:3

40. If area of an equilateral triangle is a and height b, then value of $\frac{b^2}{a}$ is: **(SSC Sub. Ins. 2013)**

(a) 3 (b) $\frac{1}{3}$ (c) $\sqrt{3}$ (d) $\frac{1}{\sqrt{3}}$

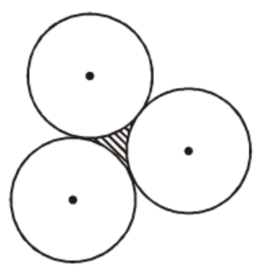
41. A copper sphere of diameter 18 cm is drawn into a wire of diameter 4 mm. The length of the wire, in metre, is : **(SSC Sub. Ins. 2013)**

(a) 2.43 (b) 243 (c) 2430 (d) 24.3

42. Water flows at the rate of 10 metres per minute from a cylindrical pipe 5 mm in diameter. How long it lake to fill up a conical vessel whose diameter at the base is 30 cm and depth 24 cm? **(SSC Sub. Ins. 2013)**

(a) 28 minutes 48 seconds
(b) 51 minutes 12 seconds
(c) 51 minutes 24 seconds
(d) 28 minutes 36 seconds

43. Three circles of equal radius 'a' cm touch each other. The area of the shaded region is : **(SSC Sub. Ins. 2013)**



(a) $\left(\frac{\sqrt{3}+\pi}{2}\right)a^2$sq.cm (b) $\left(\frac{6\sqrt{3}-\pi}{2}\right)a^2$sq.cm

(c) $(\sqrt{3}-\pi)a^2$sq.cm (d) $\left(\frac{2\sqrt{3}-\pi}{2}\right)a^2$sq.cm

44. A godown is 15 m long and 12 m broad. The sum of the areas of the floor and the ceiling is equal to the sum of areas of the four walls. The volume (in m^3) of the godown is: **(SSC Sub. Ins. 2013)**

(a) 900 (b) 1200 (c) 1800 (d) 720

45. If the volumes of two right cir-cular cones are in the ratio 4 : 1 and their diameters are in the ratio 5 : 4 then the ratio of their heights is : **(SSC Sub. Ins. 2013)**

(a) 25: 16 (b) 25: 64
(c) 64 : 25 (d) 16: 25

46. The base of a right pyramid is an equilateral triangle of side $10\sqrt{3}$ cm. If the total surface area of the pyramid is $270\sqrt{3}$ sq. cm, its height is **(SSC CHSL 2013)**

(a) 12 cm (b) $12\sqrt{3}$ cm
(c) 10 cm (d) $10\sqrt{3}$ cm

47. The volumes of a cylinder and a cone are in the ratio 3 : 1. Find their diameters and then compare them when their heights are equal. **(SSC CHSL 2013)**

(a) Diameter of cylinder < Diameter of cone
(b) Diameter of cylinder = 2 times of diameter of cone
(c) Diameter of cylinder = Diameter of cone
(d) Diameter of cylinder > Diameter of cone

48. A square of side 3 cm is cut off from each corner of a rectangular sheet of length 24 cm and breadth 18 cm and the remaining sheet is folded to form an open rectangular box. The surface area of the box is **(SSC CHSL 2013)**

(a) 423 cm^2 (b) 468 cm^2
(c) 396 cm^2 (d) 612 cm^2

49. The sides of a triangle are 16 cm, 12 cm and 20 cm. Find the area **(SSC CHSL 2013)**

(a) 81 cm^2 (b) 64 cm^2
(c) 112 cm^2 (d) 96 cm^2

50. What is the height of a cylinder that has the same volume and radius as a sphere of diameter 12 cm? **(SSC CHSL 2013)**

(a) 8 cm (b) 7 cm (c) 10 cm (d) 9 cm

51. The volume of air in a room is 204 m^3 . The height of the room is 6 m. What is the floor area of the room? **(SSC CHSL 2013)**

(a) 34 m^2 (b) 32 m^2 (c) 46 m^2 (d) 44 m^2

52. If the total surface area of a cube is 96 cm^2 , its volume is **(SSC CHSL 2013)**

(a) 36 cm^3 (b) 56 cm^3 (c) 16 cm^3 (d) 64 cm^3

53. The length and breadth of a rectangle are doubled. Percentage increase in area is **(SSC CHSL 2013)**

(a) 400% (b) 150% (c) 200% (d) 300%

54. The base of a right prism is a triangle whose perimeter is 28 cm and the inradius of the triangle is 4 cm. If the volume of the prism is 366 cc, then its height is **(SSC CHSL 2013)**

(a) 4 cm (b) 8 cm
(c) 6 cm (d) None of these

55. A square ABCD is inscribed in a circle of unit radius. Semicircles are described on each side as a diameter. The area of the region bounded by the four semicircles and the circle is **(SSC CGL 2nd Sit. 2013)**

(a) 1 sq. unit (b) 2 sq. unit
(c) 1.5 sq. unit (d) 2.5 sq. unit

56. If the perimeters of a rectangle and a square are equal and the ratio of two adjacent sides of the rectangle is 1 : 2 then the ratio of area of the rectangle and that of the square is **(SSC CGL 2nd Sit. 2013)**

(a) 1 : 1 (b) 1 : 2
(c) 2 : 3 (d) 8 : 9

57. A horse is tied to a post by a rope. If the horse moves along a circular path always keeping the rope stretched and describes 88 metres when it has traced out 72° at the centre the length of the rope is $\left(\text{Take } \pi = \frac{22}{7}\right)$ **(SSC CGL 2nd Sit. 2013)**

(a) 70 m (b) 75 m (c) 80 m (d) 65 m

58. The diameters of two circles are the side of a square and the diagonal of the square. The ratio of the areas of the smaller circle and the larger circle is **(SSC CGL 1st Sit. 2013)**

(a) $\sqrt{2}:\sqrt{3}$ (b) $1:\sqrt{2}$
(c) 1 : 2 (d) 1 : 4

59. The total surface area of a sphere is 8 p square unit. The volume of the sphere is **(SSC CGL 1st Sit. 2013)**

(a) $8\sqrt{3}\pi$ cubic unit (b) $\frac{8\sqrt{3}}{5}\pi$ cubic unit

(c) $\frac{8\sqrt{2}}{3}\pi$ cubic unit (d) $\frac{8}{3}\pi$ cubic unit

60. A conical flask is full of water. The flask has base radius r and height h. This water is poured into a cylindrical flask of base radius mr. The height of water in the cylindrical flask is **(SSC CGL 1st Sit. 2013)**

(a) $\frac{2h}{m}$ (b) $\frac{h}{3m^2}$ (c) $\frac{m}{2h}$ (d) $\frac{h}{2}m^2$

61. A square is inscribed in a circle of radius 8 cm. The area of the square is **(SSC CGL 1st Sit. 2013)**

(a) 16 square cm (b) 64 square cm
(c) 128 square cm (d) 148 square cm

62. The biggest possible circle is inscribed in a rectangle of length 16 cm and breadth 6 cm. Then its area is **(SSC CGL 1st Sit. 2013)**

(a) 3p cm^2 (b) 4p cm^2
(c) 5p cm^2 (d) 9p cm^2

63. If the diagonal of a square is doubled, then its area will be **(SSC CGL 1st Sit. 2013)**

(a) three times (b) four times
(c) same (d) none of these

64. The difference of perimeter and diameter of a circle is X unit. The diameter of the circle is **(SSC CGL 1st Sit. 2013)**

(a) $\frac{X}{\pi-1}$ unit (b) $\frac{X}{\pi+1}$ unit

(c) $\frac{X}{\pi}$ unit (d) $\left(\frac{X}{\pi}-1\right)$ unit

65. The perimeter of the base of a right circular cylinder is 'a' unit. if the volume of the cylinder is V cubic unit. then the height of the cylinder is **(SSC CGL 1st Sit. 2013)**

(a) $\frac{4a^2V}{\pi}$ unit (b) $\frac{4\pi a^2}{V}$ unit

(c) $\frac{\pi a^2 V}{4}$ unit (d) $\frac{4\pi V}{a^2}$ unit

66. A sphere of diameter 6 cm is dropped in a right circular cycindrical vessel partly filled with water. The diameter of the Cylindrical vessel is 12 cm. If the sphere is just completely submerged in water, then the rise of water level in the cylindrical vessel is **(SSC CGL 1st Sit. 2013)**

(a) 2 cm (b) 1 cm
(c) 3 cm (d) 4 cm

67. The length and breadth of a rectangle are 20 m and 15 m respectively. If length is increased by 20% and the breadth by 30%, the percentage increase in its area is **(SSC Multitasking 2014)**

(a) 54% (b) 56% (c) 50% (d) 52%

68. Length of each equal side of an isosceles triangle is 10 cm and the included angle between those two sides is 45°. Find the area of the triangle. **(SSC Multi-Tasking 2014)**

(a) $25\sqrt{2}cm^2$ (b) $35\sqrt{2}cm^2$

(c) $5\sqrt{2}cm^2$ (d) $15\sqrt{2}\,cm^2$

69. A spherical ball of lead of radius 14 cm is melted and recast into spheres of radius 2 cm. The number of the small spheres is **(SSC Multi-Tasking 2014)**

(a) 300 (b) 525 (c) 343 (d) 450

70. The radius of a right circular cone is 3 cm and its height is 4 cm. The total surface area of the cone is **(SSC Sub. Ins. 2014)**

(a) 48.4 sq.cm (b) 64.4 sq.cm
(c) 96.4 sq.cm (d) 75.4 sq.cm

71. A wooden box of dimension 8 metre × 7 metre × 6 metre is to carry rectangular boxes of dimensions 8 cm × 7 cm × 6 cm. The maximum number of boxes that can be carried in 1 wooden box is **(SSC Sub. Ins. 2014)**

(a) 7500000 (b) 9800000 (c) 1200000 (d) 1000000

72. Two circular cylinders of equal volume have their heights in the ratio 1 : 2; Ratio of their radii is (Take $\pi = \frac{22}{7}$) **(SSC Sub. Ins. 2014)**

(a) $1:4$ (b) $1:\sqrt{2}$ (c) $\sqrt{2}:1$ (d) $1:2$

73. A rectangular piece of paper of dimensions 22 cm by 12 cm is rolled along its length to form a cylinder. The volume (in cm^3) of the cylinder so formed is (use $\pi = \frac{22}{7}$) **(SSC Sub. Ins. 2014)**

(a) 562 (b) 412
(c) 462 (d) 362

74. A sphere is placed inside a right circular cylinder so as to touch the top, base and the lateral surface of the cylinder. If the radius of the sphere is R, the volume of the cylinder is **(SSC Sub. Ins. 2014)**

(a) $2pR^3$ (b) $4pr^3$ (c) $8pR^3$ (d) $\frac{8}{3}\pi R^3$

75. Area of a regular hexagon with side 'a' is **(SSC CHSL 2014)**

(a) $\frac{3\sqrt{3}}{4}a^2$ sq. unit (b) $\frac{12}{2\sqrt{3}}a^2$ sq. unit

(c) $\frac{9}{2\sqrt{3}}a^2$ sq. unit (d) $\frac{6}{\sqrt{2}}a^2$ sq. unit

76. If the sum of the dimensions of a rectangular parallelepiped is 24 cm and the length of the diagonal is 15 cm, then the total surface area of it is **(SSC CHSL 2014)**

(a) 420 cm^2 (b) 275 cm^2
(c) 351 cm^2 (d) 378 cm^2

77. A flask in the shape of a right circular cone of height 24 cm is filled with water. The water is poured in a right circular cylindrical flask whose radius is $\frac{1}{3}^{rd}$ of the radius of the base of the circular cone. Then the height of the water in the cylindrical flask is **(SSC CHSL 2014)**

(a) 32 cm (b) 24 cm (c) 48 cm (d) 72 cm

78. The area of a square park is 25 sq. km. The time taken to complete a round of the field once, at a speed of 3 km/hour is **(SSC CHSL 2014)**

(a) 4 hours 60 minutes (b) 4 hours 50 minutes
(c) 6 hours 40 minutes (d) 5 hours 40 minutes

79. The external fencing of a circular path around a circular plot of land is 33 m more than its interior fencing. The width of the path around the plot is **(SSC CHSL 2014)**

(a) 5.52m (b) 5.25m (c) 2.55m (d) 2.25m

80. The base of a right pyramid is an equilateral triangle of side 4 cm each. Each slant edge is 5 cm long. The volume of the pyramid is **(SSC CGL 2014)**

(a) $\frac{4\sqrt{8}}{3}$ cm³ (b) $\frac{4\sqrt{60}}{3}$ cm³
(c) $\frac{4\sqrt{59}}{3}$ cm³ (d) $\frac{4\sqrt{61}}{3}$ cm³

81. 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. The ratio of their radii is **(SSC CGL 2014)**

(a) 4 : 1 (b) 4 : 3 (c) 3 : 4 (d) 1 : 4

82. A wire is bent into the form of a circle, whose area is 154 cm². If the same wire is bent into the form of an equilateral triangle, the approximate area of the equilateral triangle is **(SSC CGL 2014)**

(a) 93.14 cm² (b) 90.14 cm²
(c) 83.14 cm² (d) 39.14 cm²

83. A vessel full of pure acid contains 10 litres of it, of which 2 litres are withdrawn. The vessel is then filled with water. Next 2 litres of the mixture are withdrawn, and again the vessel is filled up with water. The ratio of the acid left in the vessel with that of the original quantity is **(SSC CGL 2014)**

(a) 1 : 5 (b) 4 : 5 (c) 4 : 25 (d) 16 : 25

84. The total surface area of a regular triangular pyramid with each edges of length 1cm is: **(SSC Sub. Ins. 2015)**

(a) $\sqrt{3}$ sq.cm (b) $\frac{4}{3}\sqrt{3}$ sq.cm
(c) 4sq.cm (d) $4\sqrt{3}$ sq.cm

85. The perimeter of a sheet of paper in the shape of a quadrant of a circle is 75 cm. Its area would be $\left(\pi = \frac{22}{7}\right)$: **(SSC Sub. Ins. 2015)**

(a) 346.5 cm² (b) 100 cm²
(c) 693 cm² (d) 512.25 cm²

86. If the base of right prism remains same and the measures of the lateral edges are halved, then its volume will be reduced by: **(SSC Sub. Ins. 2015)**

(a) 50% (b) 25% (c) 66% (d) 33.33%

87. The length of two parallel sides of a trapezium are 15 cm and 20 cm. If its area is 175 sq. cm, then its height is : **(SSC CHSL 2015)**

(a) 10 cm (b) 15 cm (c) 25 cm (d) 20 cm

88. A hemispherical bowl has internal radius of 6 cm. The internal surface area would be : (take p = 3.14) **(SSC CHSL 2015)**

(a) 400 cm² (b) 289.75 cm²
(c) 225 cm² (d) 226.08 cm²

89. If water is freezed to become ice, its volume is increased by 10%, then if the ice is melted to water again, its volume will be decreased by : **(SSC CHSL 2015)**

(a) 8% (b) $9\frac{1}{2}$% (c) 9% (d) $9\frac{1}{11}$%

90. The volume of the largest right circular cone that can be cut out of a cube of edge 7 cm? $\left(\text{use } \Pi = \frac{22}{7}\right)$ **(SSC CHSL 2015)**

(a) 13.6 cm³ (b) 121 cm³
(c) 147.68 cm³ (d) 89.8 cm³

91. The outer circumference of a circular race–track is 528 metre. The track is everywhere 14 metre wide. Cost of levelling the track at the rate of ` 10 per sq. metre is: **(SSC CHSL 2015)**

(a) ` 77660 (b) ` 76760
(c) ` 66760 (d) `67760

92. The surface area of a sphere is 616 cm². The volume of the sphere would be : **(SSC CHSL 2015)**

(a) 2100 cm³ (b) 2500 cm³
(c) $1437\frac{1}{3}$ cm³ (d) $1225\frac{3}{5}$ cm³

93. The perimeter of one face of a cube is 20 cm. Its volume will be **(SSC CGL 1st Sit. 2015)**

(a) 100 cm³ (b) 125 cm³ (c) 400 cm³ (d) 625 cm³

94. If the area of a circle is A, radius of the circle is r and circumference of it is C, then **(SSC CGL 1st Sit. 2015)**

(a) rC = 2A (b) $\frac{C}{A} = \frac{r}{2}$ (c) $AC = \frac{r^2}{4}$ (d) $\frac{A}{r} = C$

95. A square is inscribed in a quarter–circle in such a manner that two of its adjacent vertices lie on the two radii at an equal distance from the centre, while the other two vertices lie on the circular arc. If the square has sides of length x, then the radius of the circle is **(SSC CGL 1st Sit. 2015)**

(a) $\frac{16x}{\pi + 4}$ (b) $\frac{2x}{\sqrt{\pi}}$ (c) $\frac{\sqrt{5}x}{\sqrt{2}}$ (d) $\sqrt{2}x$

96. If the volume of a sphere is numerically equal to its surface area then its diameter is : **(SSC CGL 1st Sit. 2015)**

(a) 4 cm (b) 2 cm (c) 3 cm (d) 6 cm

97. 5 persons will live in a tent. If each person requires $16m^2$ of floor area and $100\ m^3$ space for air then the height of the cone of smallest size to accomodate these persons would be ? **(SSC CGL 1st Sit. 2015)**
(a) 18.75 m (b) 16 m (c) 10.25 m (d) 20 m

98. The area of the largest sphere (in cm^2) that can be drawn inside a square of side 18 cm is **(SSC CGL 1st Sit. 2016)**
(a) 972π (b) 11664π (c) 36π (d) 288π

99. The base area of a right pyramid is 57 sq. units and height is 10 units. Then the volume of the pyramid is **(SSC CGL 1st Sit. 2016)**
(a) 190 c. units (b) 380 c.units
(c) 540 c.units (d) 570 c.units

100. A solid sphere of radius 9 cm is melted to form a sphere of radius 6 cm and a right circular cylinder of same radius. The height of the cylinder so formed is **(SSC CGL 1st Sit. 2016)**
(a) 19 cm (b) 21 cm (c) 23 cm (d) 25 cm

101. The radius and the height of a cone are each increased by 20%. Then the volume of the cone increases by **(SSC CGL 1st Sit. 2016)**
(a) 20% (b) 20.5% (c) 62% (d) 72.8%

102. The curved surface area of a cylinder with its height equal to the radius, is equal to the curved surface area of a sphere. The ratio of volume of the cylinder to that of the sphere is **(SSC Sub. Ins. 1st Sit. 2015)**
(a) $\sqrt{2}:3$ (b) $2\sqrt{2}:3$ (c) $3:2\sqrt{2}$ (d) $3:\sqrt{2}$

103. The radii of the base of a cylinder and a cone are equal and their volumes are also equal. Then the ratio of their heights is **(SSC Sub. Ins. 1st Sit. 2015)**
(a) 2 : 1 (b) 1 : 2 (c) 1 : 3 (d) 1 : 4

104. A cylindrical rod of radius 30 cm and length 40 cm is melted and made into spherical balls of radius 1 cm. The number of spherical balls is **(SSC Sub. Ins. 1st Sit. 2015)**
(a) 36000 (b) 27000 (c) 90000 (d) 40000

105. A solid sphere of diameter 17.5 cm is cut into two equal. halves. What will be the increase (in cm^2) in the total surface area? **(SSC CGL 2017)**
(a) 289 (b) 361.5
(c) 481.25 (d) 962.5

106. If the diameter of a sphere is 14 cm, then what is the surface area (in cm^2) of the sphere? **(SSC CGL 2017)**
(a) 616 (b) 308
(c) 462 (d) 636

107. Three solid spheres of radius 3 cm, 4 cm, and 5 cm are melted and recasted into a solid sphere. What will be the percentage decrease in the surface area? **(SSC CGL 2017)**
(a) 12 (b) 14 (c) 16 (d) 28

108. If the radius of the cylinder is increased by 25%, then by how much percent the height must be reduced, so that the volume of the cylinder remains same? **(SSC CGL 2017)**
(a) 36 (b) 56 (c) 64 (d) 46

109. The total surface area of a hemisphere is 166.32 sq cm, find its radius? **(SSC CHSL 2017)**
(a) 4.2 cm (b) 8.4 cm (c) 1.4 cm (d) 2.1 cm

110. A sphere has a total surface area $9\pi\ cm^2$. Its volume is: **(SSC MTS 2017)**
(a) $36\pi\ cm^3$ (b) $18\pi\ cm^3$
(c) $\frac{4}{3}\pi\ cm^3$ (d) $\frac{9}{2}\pi\ cm^3$

111. If diagonals of a rhombus are 16 cm and 30 cm. then what is the perimeter (in cm) of the rhombus? **(SSC Sub. Ins. 2017)**
(a) 32 (b) 64 (c) 34 (d) 68

112. The ratio of curved surface area of two cones is 1 : 4 and the ratio of slant height of the two cones is 2 : 1. What is the ratio of the radius of the two cones? **(SSC Sub. Ins. 2017)**
(a) 1 : 2 (b) 1 : 4 (c) 1 : 8 (d) 1 : 1

113. Radius of hemisphere is twice that of a sphere. What is the ratio of total surface area of hemisphere and sphere? **(SSC Sub. Ins. 2017)**
(a) 3 : 1 (b) 12 : 1 (c) 4 : 1 (d) 6 : 1

114. A solid cylinder having radius of base as 7 cm and length as 20 cm is bisected from its height to get two identical cylinders. What will be the percentage increase in the total surface area? **(SSC Sub. Ins. 2017)**
(a) 29.78 (b) 25.93 (c) 27.62 (d) 32.83

115. If the perimeter of a rhombus is 80 cm and one of its diagonal is 24 cm, then what is the area (in cm^2) of the rhombus? **(SSC Sub. Ins. 2017)**
(a) 218 (b) 192 (c) 384 (d) 768

116. 6 cubes, each of edge 4 cm, are joined end to end. What is the total surface area of the resulting cuboid? **(SSC Sub. Ins. 2018)**
(a) $496\ cm^2$ (b) $416\ cm^2$ (c) $576\ cm^2$ (d) $208\ cm^2$

117. A sphere of radius 5 cm is melted and recast into spheres of radius 2 cm each. How many such spheres can be made? **(SSC Sub. Ins. 2018)**
(a) 15 (b) 16 (c) 17 (d) 18

118. The sides of a triangle are 8 cm, 15 cm and 17 cm respectively. At each of its vertices, circles of radius 3.5 cm are drawn. What is the area of the triangle excluding the portion covered by the sectors of the circles $\left(\pi = \frac{22}{7}\right)$? **(SSC Sub. Ins. 2018)**
(a) $47\ cm^2$ (b) $23.5\ cm^2$
(c) $21.5\ cm^2$ (d) $40.75\ cm^2$

119. One side of a rhombus is 13 cm and one of its diagonals is 24 cm. What is the area of the rhombus? **(SSC Sub. Ins. 2018)**
(a) $156\ cm^2$ (b) $120\ cm^2$
(c) $130\ cm^2$ (d) $312\ cm^2$

120. The radius of a cylinder is increased by 120% and its height is decreased by 40%. What is the percentage increase in its volume? **(SSC Sub. Ins. 2018)**
(a) 190.4% (b) 175.4%
(c) 180.6% (d) 212.8%

121. The area of a sector of a circle with central angle 60º is A. The circumference of the circle is C. Then A is equal to : **(SSC CHSL 2018)**

(a) $\frac{c^2}{6\pi}$ (b) $\frac{c^2}{18\pi}$ (c) $\frac{c^2}{24\pi}$ (d) $\frac{c^2}{4\pi}$

122. A rectangular portion of an airpot runway was geting repaired for which an estimate was made on the basis of a rate ` R per square unit. But while doing the work, the length of the portion got increased by 10% and the breadth by 8%. Over and above this, there was an increase in the cost of the repair work to the extent of 15%. What was the overall percentage increase in the cost of repair over the estimate? **(SSC CHSL 2018)**

(a) 36.62 % (b) 34.58 %
(c) 33 % (d) 35.24 %

123. The radius of a sphere is reduced by 40%. By what percent will its volume decrease? **(SSC CGL 2018)**

(a) 60% (b) 64% (c) 72.5% (d) 78.4%

124. Five cubes, each of edge 3 cm are joined end to end. What is the total surface area of the resulting cuboid, in cm^2? **(SSC CGL 2018)**

(a) 244 (b) 280 (c) 270 (d) 198

125. What is the circumference of the largest circle which can be inscribed in a square of side 14 cm? **(SSC MTS 2018)**

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

(a) 66 cm (b) 88 cm (c) 22 cm (d) 44 cm

126. The edge of a cube is 8 cm. What is the total surface area of the cube? **(SSC MTS 2018)**

(a) 128 cm^2 (b) 256 cm^2
(c) 384 cm^2 (d) 484 cm^2

127. The length of one of the diagonals of a rhombus is 48 cm. If the side of the rhombus is 26 cm, then what is the area of the rhombus? **(SSC MTS 2018)**

(a) 540 cm^2 (b) 420 cm^2 (c) 360 cm^2 (d) 480 cm^2

128. The radius of a circular garden is 42 m. The distance (in m) covered by running 8 rounds around it, is : **(SSC CGL 2019-20)**

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

(a) 1124 (b) 2112 (c) 3248 (d) 4262

129. If the base radius of 2 cylinders are in the ratio 3 : 4 and their heights are in the ratio 4 : 9, then the ratio of their volumes is : **(SSC CGL 2019-20)**

(a) 1 : 2 (b) 2 : 1 (c) 4 : 1 (d) 1 : 4

130. 0.1 percent of 1.728×10^6 spherical droplets of water, each of diameter 2 mm, coalesce to from a spherical bubble. What is the diameter (in cm) of the bubble? **(SSC MTS 2019-20)**

(a) 1.2 (b) 1.6 (c) 1.8 (d) 2.4

131. If the volumes of two cubes are in the ratio of 64 : 125, then what is the ratio of their total surface areas? **(SSC MTS 2019-20)**

(a) 9 : 16 (b) 4 : 5 (c) 16 : 25 (d) 64 : 125

132. Radius of base of a right circular cone and a sphere is each equal to *r*. If the sphere and the cone have the same volume, then what is the height of the cone? **(SSC MTS 2019-20)**

(a) 7*r* (b) 4*r* (c) 2*r* (d) 3*r*

133. Length and breadth of rectangular field are in the ratio 5 : 2. If the perimeter of the field is 238 m. Find the length of the field. **(SSC CHSL 2019-20)**

(a) 84m (b) 85m (c) 82m (d) 83m

134. XYZ is a triangle. If the medians ZL and YM intersect each other at G, then (Area of ΔGLM : Area of ΔXYZ) is: **(SSC CHSL 2019-20)**

(a) 1 : 12 (b) 1 : 14 (c) 1 : 11 (d) 1 : 10

135. PQR is an isosceles triangle such that PQ = QR = 10 cm and ΔPQR = 90°. What is the length of the perpendiculate drawn from Q on PR? **(SSC CHSL 2019-20)**

(a) $6\sqrt{2}$ cm (b) $7\sqrt{2}$ cm
(c) $5\sqrt{2}$ cm (d) $4\sqrt{2}$ cm

136. The area of a circular park is 12474 m^2. There is 3.5 m wide path around the park. What is the area (in m^2) of the path?

(Take $\pi = \frac{22}{7}$) **(SSC CGL-2020-21)**

(a) 1424.5 (b) 1435.5 (c) 440.5 (d) 1380.5

137. A rectangle with perimeter 50 cm has its sides in the ratio 1 : 4. What is the perimeter of a square whose area is the same as that of the rectangle? **(SSC CHSL-2020-21)**

(a) 45 cm (b) 36 cm (c) 40 cm (d) 50 cm

138. The area of the curved surface of a right circular cylinder is 19.5 m^2 and its volume is 39 m^3. What is the radius (in cm) of its base? **(SSC MTS 2020-21)**

(a) 6 (b) 3 (c) 5 (d) 4

139. What is the area (in cm^2) of a trapezium whose parallel sides are 25 cm and 19 cm long, and the distance between them is 15 cm? **(SSC MTS 2020-21)**

(a) 330 (b) 345 (c) 275 (d) 410

140. The radius of the base of a cylinder is 14 cm and its curved surface area is 880 cm^2. Its volume (in cm^3) is :

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

(SSC Sub-Inspector 2020-21)

(a) 3080 (b) 1078 (c) 6160 (d) 9240

141. The perimeter of a square is the same as the perimeter of a rectangle. The perimeter of the square is 40 m. If its breadth is two-thirds of its length, then the area (in m^2) of the rectangle is : **(SSC Sub-Inspector 2020-21)**

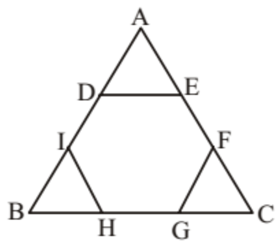
(a) 121 (b) 96 (c) 100 (d) 84

142. One side of a rhoinbus is 13 cm and one of its diagonals is 10 cm. What is the area of the rhombus (in cm^2)? **(SSC Sub-Inspector 2020-21)**

(a) 60 (b) 90 (c) 30 (d) 120

HINTS & EXPLANATIONS

1. **(c)**



Side of the regular hexagon $= \frac{1}{3} \times 6 = 2$ cm

$\therefore$ Area of the hexagon $= \frac{3\sqrt{3}}{2}a^2 = \frac{3\sqrt{3}}{2} \times 2 \times 2$

$= 6\sqrt{3}$ sq. cm.

2. **(b)** Length of the longest rod

$= \sqrt{a^2 + b^2 + c^2} = \sqrt{10^2 + 10^2 + 5^2}$

$= \sqrt{225} = 15$ metre

3. **(d)** Circumference $= 2\pi r$ (one variable)

$\therefore$ The decrease in area $= \left(-50 - 50 + \frac{50 \times 50}{100}\right)\%$

$= -75\%$

4. **(b)** Increase percent in area

$= \left(10 + 10 + \frac{10 \times 10}{100}\right)\% = 21\%$

5. **(b)** Volume of the wire $= \pi r^2 h$

$= \pi \times 0.1 \times 0.1 \times 3600\ cm^3 = 36\pi\ cm^3$

Volume of wire = vol. of sphere

$36\pi = \frac{4}{3}\pi R^3 \Rightarrow R^3 = \frac{36 \times 3}{4} = 27$

$\therefore R = \sqrt[3]{27} = 3$ cm

6. **(b)** Ratio of the circumferences

= Ratio of radii = 3 : 4

$\frac{R_1}{R_2} = \frac{3}{4} \Rightarrow \frac{C_1}{C_2} = \frac{2\pi r_1}{2\pi r_2} = \frac{r_1}{r_2} = \frac{3}{4}$

7. **(b)** Required change in area

$= \left(10 - 10 + \frac{-10 \times 10}{100}\right) = -1\%$

Negative sign shows a decrease.

8. **(d)** Side of a square $= \sqrt{81} = 9$ cm

$\therefore$ Length of the wire $= 4 \times 9 = 36$ cm.

$\therefore$ Perimeter of semi-circle = Length of wire

where r = radius

$\Rightarrow (\pi + 2)r = 36$

$\Rightarrow \left(\frac{22}{7} + 2\right)r = 36 \Rightarrow \frac{36}{7}r = 36$

$\Rightarrow r = \frac{36 \times 7}{36} = 7$ cm.

9. **(b)** 1 hectare = 10000 sq. metre

$\therefore$ Area of the ground = 15000 sq. metre

$\therefore$ Required volume $= 15000 \times \frac{5}{100} = 750\ m^3$

10. **(b)** Volume of water flowed in an hour

$= 2000 \times 40 \times 3\ m^3 = 240000\ m^3$

$\therefore$ Volume of water flowed in 1 minute.

$= \frac{240000}{60} = 4000\ m^3 = 4000000$ litre

11. **(b)** Distance covered by wheel in one revolution

= Circumference of wheel

$= \frac{11000}{5000} = \frac{11}{5}\ m = \frac{11}{5} \times 100\ cm = 220$ cm

$\therefore 2\pi r = 220$

$\Rightarrow 2 \times \frac{22}{7} \times r = 220 \Rightarrow r = \frac{220 \times 7}{2 \times 22} = 35$ cm

12. **(c)** Smallest side of the triangle = x cm (let)

$\therefore$ Second side of triangle

$= 40 - 17 - x = 23 - x$

Semi-perimeter, $= s = \frac{40}{2} = 20$

$\therefore \sqrt{s(s-a)(s-b)(s-c)} = 60$

$\Rightarrow \sqrt{20(20-17)(20-x)(20-23+x)} = 60$

$\Rightarrow (20 - x)(x - 3) = 60$

$\Rightarrow 20x - 60 - x^2 + 3x = 60$

$\Rightarrow x^2 - 23x + 120 = 0$

$\Rightarrow x^2 - 15x - 8x + 120 = 0$

$\Rightarrow x(x - 15) - 8(x - 15) = 0$

$\Rightarrow (x - 8)(x - 15) = 0$

$\Rightarrow x = 8$ or 15

Since, x is the smallest side

Then, $x < 23 - x$. Hence, $x = 8$ and $x \neq 15$

13. **(a)** Side of square $= \sqrt{121} = 11$ cm

$\therefore$ Length of wire $= 4 \times 11 = 44$ cm

Circumference of circle = Length of wire

$\therefore 2\pi r = 44$

$\Rightarrow 2 \times \frac{22}{7} \times r = 44 \Rightarrow v = \frac{44 \times 7}{2 \times 22} = 7$ cm

14. **(d)** If the length, breadth and height of the cuboid be x, y and z cm respectively, then

$xy = 12;\ yz = 20;\ zx = 15$

$\therefore x^2y^2z^2 = 12 \times 20 \times 15 = 3600\ cm^6$

$\therefore v = xyz = \sqrt{3600} = 60\ cm^3$

15. **(a)** Water flowed by the pipe in 1 hr. $= \pi r^2 h$

$= \frac{22}{7} \times \frac{7 \times 7}{100 \times 100} \times 5000\ metre^3 = 77\ m^3$

Volume of expected water in the tank

$= \frac{50 \times 44 \times 7}{100} = 154\ m^3$ $\therefore$ Required time $= \frac{154}{77} = 2$ hr.

16. (b) Distance covered by wheel in one revolution
= Circumference of wheel

$\therefore \pi \times \text{diameter} = \frac{440}{1000} \quad \Rightarrow \frac{22}{7} \times \text{diameter} = \frac{440}{1000}$

$\Rightarrow \text{Diameter} = \frac{440}{1000} \times \frac{7}{22} = 0.14 \text{ cm}$

17. (d) Ratio = 2 : 3 : 4 = 4 : 6 : 8
Perimeter = 18 cm

$\therefore \text{Semi-perimeter(s)} = \frac{4+6+8}{2} = 9$

$\therefore$ Area of triangle

$= \sqrt{s(s-a)(s-b)(s-c)} = \sqrt{9(9-4)(9-6)(9-8)}$

$= \sqrt{9 \times 5 \times 3 \times 1} = 3\sqrt{15}$ sq. cm.

18. (d) Base = 2 + 2 × altitude
Let altitude be A

$\text{Area of } \Delta = \frac{1}{2} \times \text{Base} \times \text{Altitude}$

$12 = \frac{1}{2} \times (2+2A) \times \mathbf{A}$

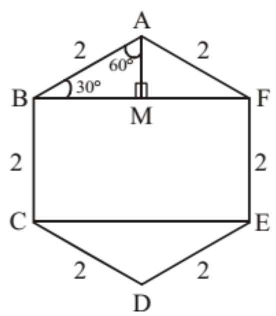
$12 = A \times (1+A)\,;\ 12 = A + A^2$

$A^2 + A - 12 = 0\,;\ (A-3)(A+4) = 0$

$A = 3, A = -4$

Altitude = 3 cm

19. (b)



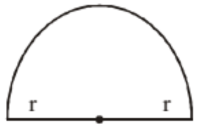
Given BC & EF are each 2 feet. Since area of rectangle is length × width.
To find out BF or CE, Take ΔABF. It has two equal sides (AB = AF), so the perpendicular from A to line BF divides ABF into two congruent Δs.
So, each of the two triangles is 30°-60°-90° right angle Δ with hypotenuse 2.

$\text{In } \Delta ABM \cos 30° = \frac{BM}{AB} \Rightarrow \frac{\sqrt{3}}{2} = \frac{BM}{2} \Rightarrow BM = \sqrt{3}$

So, $BF = 2 \times BM = 2\sqrt{3}$

Area of rectangle = $2\sqrt{3} \times 2 = 4\sqrt{3}$

20. (b)



Length of railing to surround
= Length of Are + Length of diameter
Area of semicircular = 308

$308 = \frac{\pi r^2}{2}\,;\ 308 = \frac{22}{7} \times r^2 \times \frac{1}{2}$

$\frac{308 \times 7}{22} = r^2 \times \frac{1}{2}\,;\ r = 14 \text{ m}$

Length of railing = $\pi r + 2r$

$= \frac{22}{7} \times 14 + 2 \times 14 = 44 + 28 = 72 \text{ m}$

21. (b) According to condition given
Volume of right circular cone = Slant surface area

$\frac{1}{3}\pi r^2 h = \pi r l$ [where, $r \to$ radius; $h \to$ height; $l \to$ slant height]

$\frac{1}{3} r h = l$

$\frac{1}{3} rh = \sqrt{h^2 + r^2} \left[\because l^2 = h^2 + r^2\right]$

Squaring on both sides

$\frac{1}{9} r^2 h^2 = h^2 + r^2$

Dividing equation by r^2h^2 on both sides

$\frac{1}{9} = \frac{h^2}{r^2h^2} + \frac{r^2}{r^2h^2},\ \frac{1}{r^2} + \frac{1}{h^2} = \frac{1}{9}$ units

22. (a) Volume of right circular cylinder = Curved surface area of cylinder

$\Rightarrow \pi r^2 h = 2\pi rh$ [where, r → radius; h → height] :

$\Rightarrow r = 2$ units

23. (b) Volume of cubical box = 3.375 m^3

Length of edge of the box = $\sqrt[3]{3.375} = 1.5$ m

24. (c) Angle made by clock in 30 minutes = 180°

$\therefore$ Area of sector covered by minute hand = $\frac{\theta}{360°} \times \pi r^2$

$= \frac{180°}{360°} \times \frac{22}{7} \times 7 \times 7 = 77$ sq.cm

25. (c) Circumference = 33 cm

$2\pi r = 33$

$\therefore r = \frac{33 \times 7}{2 \times 22} = \frac{21}{4}$

$\text{Volume} = \frac{1}{3}\pi r^2 h = \frac{1}{3} \times \frac{22}{7} \times \frac{21}{4} \times \frac{21}{4} \times 16 = 462$

26. (c) Diagonal of a cube = $6\sqrt{3}$

$\sqrt{3} \times \text{side} = 6\sqrt{3}$

$\therefore$ Side of a cube = 6

Surface area of cube = $6 \times (\text{side})^2 = 6 \times 6^2$

Volume of cube = $(\text{side})^3 = (6)^3$

$\text{Required ratio} = \frac{6 \times 6^2}{6^3} = \frac{1}{1}$ or 1 : 1

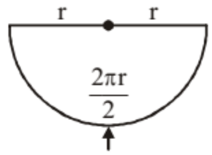
27. (b) Volume of rectangular parallelopiped = 1296
Ratio of edges = 1 : 2 : 3
$\therefore$ x, 2x and 3x are length, breadth and height of parallelopiped respectively.

$x \times 2x \times 3x = 1296$

$\Rightarrow 6x^3 = 1296 \Rightarrow x^3 = 216 \Rightarrow x = \sqrt[3]{216} = 6$

Length = 6, Breadth = 12, Height = 18
Required surface area = 2 (lb + bh + hl)
$= 2(6 \times 12 + 12 \times 18 + 18 \times 6) = 792$ sq.cm

28. (b) Perimeter of a semicircular area = 18 cm



$\Rightarrow \frac{2\pi r}{2} + 2r = 18$

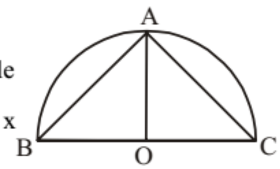
$\Rightarrow r(\pi + 2) = 18$

$r = \frac{18}{\frac{22}{7} + 2} = \frac{18 \times 7}{22 + 14} = 3\frac{1}{2}$ cm

29. (d) $\frac{\frac{2}{3}\pi r_1^3}{\frac{2}{3}\pi r_2^3} = \frac{6.4}{21.6}$

$\Rightarrow \frac{r_1^3}{r_2^3} = \frac{64}{216} = \left(\frac{4}{6}\right)^3 = \left(\frac{2}{3}\right)^3 \Rightarrow \frac{r_1}{r_2} = \frac{2}{3}$

30. (b) $OA = \frac{1}{2}BC$ = radius

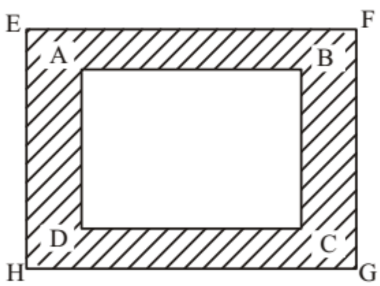


Area of the largest triangle

$= \frac{1}{2} \times BC \times OA = \frac{1}{2} \times 2x \times x$

$= x^2$

31. (d)



Area of the shaded region
$= (100 + 2 \times 10)(80 + 2 \times 10) - 100 \times 80$
$= 120 \times 100 - 8000$
$= 4000$ sq. metre

32. (a) Curved surface area of cylinder = $2\pi rh$

$= 2 \times \frac{22}{7} \times 21 \times 90 = 11880$ sq.cm

33. (d) Increased area of rectangle $= \left[l + b + \frac{lb}{100}\right]\%$

$= \left[30 + 20 + \frac{30 \times 20}{100}\right]\%$

$= 56\%$

Therefore, area of rectangle exceeds the area of square by 56%

34. (b) Radius of circum-circle

$= \frac{\text{Diagonal}}{2} = \frac{\sqrt{2} \times \text{Side}}{2} = \frac{\text{Side}}{\sqrt{2}}$

Radius of in-circle $= \frac{\text{Side}}{2}$

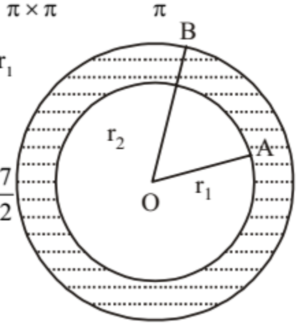
$\therefore$ Ratio $= \frac{\text{Side}}{2} : \frac{\text{Side}}{\sqrt{2}} = 1 : \sqrt{2}$

35. (c) $2\pi r = 8 \Rightarrow \pi r = 4$

$\Rightarrow r = \frac{4}{\pi}$

$\therefore V = \frac{1}{3}\pi r^2 h = \frac{1}{3}\pi \times \frac{4 \times 4}{\pi \times \pi} \times 21 = \frac{112}{\pi}$ cu.cm.

36. (b)

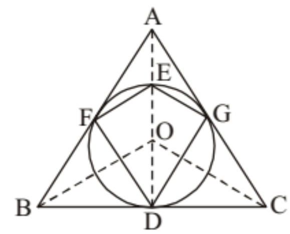


Breadth of road = $r_2 - r_1$
$C_2 - C_1 = 66$
$\therefore 2\pi r_2 - 2\pi r_1 = 66$
$\Rightarrow 2\pi(r_2 - r_1) = 66$

$\Rightarrow r_2 - r_1 = \frac{66}{2\pi} = \frac{66 \times 7}{2 \times 22}$

= 10.5 metre

37. (d)



In the given figure ABC is an equilateral Δ of side a with a circle inscribed in it and a square inscribed in the circle.
AD, BO and CO are the angle bisectors of $\angle A$, $\angle B$ and $\angle C$ and O is the centre of the circle.
We know that the angle bisector from the vertex of an equilateral triangle is the perpendicular bisector of the opposite side.
AD is the perpendicular bisector of BC.

$\Rightarrow BD = \frac{a}{2}$ and $\angle DOB = \frac{1}{2}\angle B = \frac{1}{2} \times 60° = 30°$

Now in ΔBOD

$\tan 30° = \frac{OD}{BD} = \frac{\text{Radius of circle}}{\frac{a}{2}}$

$\Rightarrow$ Radius of circle $= \frac{1}{\sqrt{3}} \times \frac{a}{2} = \frac{a}{2\sqrt{3}}$

Now in right ΔEDG

$EG^2 + GD^2 = ED^2$ (Pythagoras theorem)

$2(EG)^2 = 2(OD)^2 = \left(\frac{a}{\sqrt{3}}\right)^2 = \frac{a^2}{3}$

Side of the square $= \sqrt{\frac{a^2}{6}} = \frac{a}{\sqrt{6}}$

Now ar (ΔABC) : ar (ΔEFG)

$= \frac{\frac{\sqrt{3}}{4}a^2}{\frac{a}{\sqrt{6}} \times \frac{a}{\sqrt{6}}} = \frac{\frac{\sqrt{3}}{4}}{\frac{1}{6}} = 3\sqrt{3} : 2$

38. (a) Let length = l, breadth = b, height = h.
$l + b + h = 24$ (given) ... (*i*)
Diagonal of parallellopiped = 15 cm

$\sqrt{l^2 + b^2 + h^2} = 15$ or $l^2 + b^2 + h^2 = 225$

Squaring eqn. (*i*) on both sides

$l^2 + b^2 + h^2 + 2\,lb + 2bh + 2hl = 576$

$2(lb + bh + hl) = 576 - 225 = 351$

[$\because$ Surface area of parallellopiped = $2(lb + bh + hl)$]

39. (c) Radius of cylinder = r units and height = r units

$\therefore$ Surface area of cylinder $= 2\pi r^2 + 2\pi r^2 = 4\pi r^2$

Surface area of hemisphere $= 2\pi r^2 + \pi r^2 = 3\pi r^2$

$= 4 : 3$

40. (c) Let side of triangle = x

$\therefore \frac{\sqrt{3}}{4}x^2 = a$ ...(i)

and $\frac{\sqrt{3}}{2}x = b$

$x = \frac{2b}{\sqrt{3}}$ ...(ii)

Putting x in equation (i)

$\frac{\sqrt{3}}{4}\left(\frac{2b}{\sqrt{3}}\right)^2 = a \Rightarrow \frac{\sqrt{3}}{4} \times \frac{4b^2}{3} = a$

$\frac{b^2}{a} = \frac{3}{\sqrt{3}} = \frac{\sqrt{3}}{1}$

41. (b) Volume of sphere $= \frac{4}{3}\pi r^3 = \frac{4}{3}\pi \times 9 \times 9 \times 9$

$= 972\,\pi$ cubic.cm.

If the length of wire be h cm., then

$\pi \times (0.2)^2 \times h = 972\,\pi$

$\Rightarrow h = \frac{972}{0.2 \times 0.2} = 24300$ cm = 243 metre

42. (a) Volume of water flowing from the pipe in 1 minute

$= \pi \times 0.25 \times 0.25 \times 1000$ cu.cm.

Volume of conical vessel $= \frac{1}{3}\pi \times 15 \times 15 \times 24$ cu.cm.

$\therefore$ Required time $= \frac{\pi \times 15 \times 15 \times 24}{3\pi \times 0.25 \times 0.25 \times 1000}$

= 28 minutes 48 seconds

43. (d) AB = BC = CA = 2*a* cm.

$\angle BAC = \angle ACB = \angle ABC = 60°$

Area of $\Delta ABC = \frac{\sqrt{3}}{4} \times (\text{side})^2$

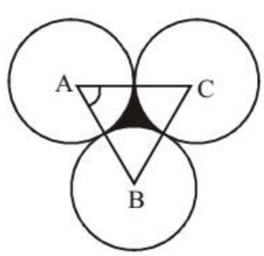
$= \frac{\sqrt{3}}{4} \times 4a^2 = \sqrt{3}a^2$ sq.cm.

Area of three sectors

$= 3 \times \frac{60}{360} \times \pi \times a^2$

$= \frac{\pi a^2}{2}$ sq.cm.

Area of the shaded region



$= \sqrt{3}a^2 - \frac{\pi}{2}a^2 = \left(\frac{2\sqrt{3} - \pi}{2}\right)a^2$ sq.cm.

44. (b) If the height of the godown be h meter, then

$2(15 \times 12) = 2 \times h(15 + 12)$

$\Rightarrow 27h = 15 \times 12$

$\Rightarrow h = \frac{15 \times 12}{27} = \frac{20}{3}$ meter

$\therefore$ Volume of the godown

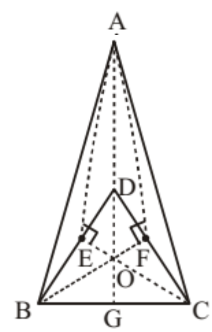
$= \frac{15 \times 12 \times 20}{3} = 1200$ cu.meter

45. (c) $\frac{V_1}{V_2} = \frac{r_1^2 h_1}{r_2^2 h_2}$

$\Rightarrow \frac{4}{1} = \frac{25}{16} \times \frac{h_1}{h_2} \Rightarrow \frac{h_1}{h_2} = \frac{16 \times 4}{25} = \frac{64}{25}$

46. (a) Now, T.S.A of pyramid = ar (ΔABD) + ar (ΔADC) + ar (ΔABC) + ar (ΔBDC)

$\therefore$ T.S.A of pyramid $= \frac{1}{2} \times BD \times AE + \frac{1}{2} \times DC \times AF + \frac{1}{2} \times BC \times AG + \frac{\sqrt{3}}{4} \times (side)^2$



($\therefore AE = AF = AG$ = height of isosceles Δ (h))

$\Rightarrow 270\sqrt{3} = \frac{1}{2} \times h[BD + DC + BC] + \frac{\sqrt{3}}{4}(side)^2$

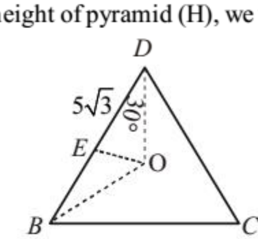
$\Rightarrow 270\sqrt{3} = \frac{1}{2} \times h[10\sqrt{3} + 10\sqrt{3} + 10\sqrt{3}] + \frac{\sqrt{3}}{4}(10\sqrt{3})^2$

$\Rightarrow 270\sqrt{3} = 15\sqrt{3}h + 75\sqrt{3}$

$\Rightarrow 195\sqrt{3} = 15\sqrt{3}h$

$\Rightarrow$ h = 13 cm ...(1)

Now to find height of pyramid (H), we use



In ΔODE, $\tan 30° = \frac{OE}{ED} = \frac{OE}{5\sqrt{3}}$

$$\frac{1}{\sqrt{3}} = \frac{OE}{5\sqrt{3}} \Rightarrow OE = 5cm \quad ...(2)$$

From (1) & (2), we use pythagoral theorem, in Δ AEO

$(AE)^2 = (EO)^2 + (AO)^2$ or $h^2 = (OE)^2 + H^2$

$\Rightarrow (13)^2 - (5)^2 = H^2 \Rightarrow H^2 = 144$

$\Rightarrow H = 12$ cm

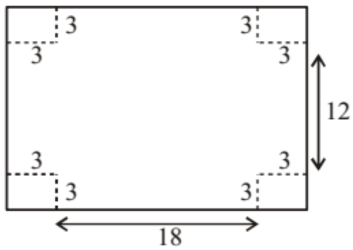
47. (c) Volume of cylinder = 3 × volume of cone

$\pi r_1^2 h = 3 \times \frac{1}{3} \pi r_2^2 h$ (heights are equal)

$r_1 = r_2$

$d_1 = d_2$

48. (c)



$\ell = 18$ cm, $b = 12$ cm, $h = 3$ cm

$S = 2(\ell h + bh) + \ell b$ {Box is open from upper side}

$= 2(54 + 36) + 216 = 396 \text{ cm}^2$

49. (d) $(16)^2 + (12)^2 = 400 = (20)^2$

$A = \frac{1}{2} \times 16 \times 12 = 96 \text{ cm}^2$

50. (a) Volume of cylinder = volume of sphere (Given)

$\pi r^2 h = \frac{4}{3} \pi r^3$; $h = \frac{4}{3} r$; $h = \frac{4}{3} \times 6 \text{cm} = 8$ cm

51. (a) Volume of air in room = 204 m^3

Area of floor × height of room = 204 m^3

Area of floor ×6 = 204 m^3

$\therefore$ Area of floor $= \frac{204}{6} = 34 \text{ m}^2$

52. (d) Total surface area of cube = 96 cm^2

$6a^2 = 96 \text{ cm}^2$

$a^2 = 16 \text{ cm}^2 \Rightarrow a = 4$ *cm*

Now, volume of cube = $a^3 = (4)^3 = 64 \text{ cm}^3$

53. (d) $A = \ell b$

$A' = (2\ell)(2b) = 4\ell b = 4A$

$\% \text{ Change} = \left(\frac{4A - A}{A} \times 100\right)\% = 300\%$

54. (d) Area of base $= \frac{1}{2} \times r \times a + \frac{1}{2} \times r \times b + \frac{1}{2} \times r \times c$

$= \frac{1}{2} r(a + b + c)$

$= r \times s = 4 \times 14 = 56 \; cm^2$

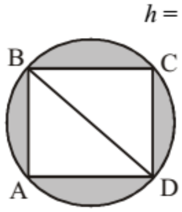
[Where r = inradius, s = semi-perimeter]

volume of prism = area of base × height

$366 = 56 \times h$

$h = 6.5$ cm [approx]

55. (b)



BD = 2 units

AB = $\sqrt{2}$ units

Area of square = 2 square units

Area of four semicircles

$= 4 \times \frac{\pi r^2}{2} = \frac{4 \times \pi \times \frac{1}{2}}{2} = \pi$ sq. units

$\therefore$ Required area = $2 + \pi - \pi = 2$ sq. units.

56. (d) Sides of rectangle are 2x and x units.

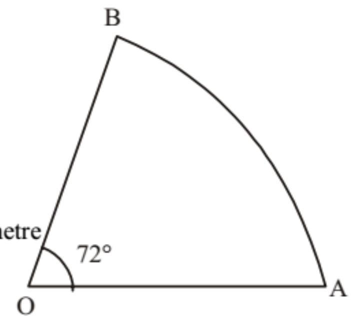
Side of square = y units

$\therefore 4y = 6x$

$\Rightarrow \frac{x}{y} = \frac{4}{6} = \frac{2}{3} \therefore \frac{2x \times x}{y^2} = \frac{2x^2}{y^2} = \frac{2 \times 4}{9}$

$= 8 : 9$

57. (a)



$\theta = 72°$

$\because 180° = \pi$ radius

$\therefore 72° = \frac{\pi}{180} \times 72$

$= \frac{2\pi}{5}$ radians

Arc AB = s = 88 metre

$\therefore \theta = \frac{s}{r}$

$\Rightarrow \frac{2\pi}{5} = \frac{88}{r} \Rightarrow 2\pi r = 88 \times 5$

$\Rightarrow r = \frac{88 \times 5}{2\pi} = \frac{88 \times 5 \times 7}{2 \times 22} = 70$ metre

58. (c) Side of square = x units

Diagonal of square = $\sqrt{2}$x units

Radius of smaller circle = $\frac{x}{2}$ units

Radius of larger circle $= \frac{\sqrt{2}x}{2} = \frac{x}{\sqrt{2}}$ units

$\therefore$ Required ratio of areas

$= \pi \frac{x^2}{4} : \frac{\pi x^2}{2} = 2 : 4 = 1 : 2$

59. (c) Surface area of sphere = $4\pi r^2$

$\Rightarrow 4\pi r^2 = 8\pi$

$\Rightarrow r^2 = 2 \Rightarrow r \Rightarrow \sqrt{2}$ units

$\therefore$ Volume of sphere

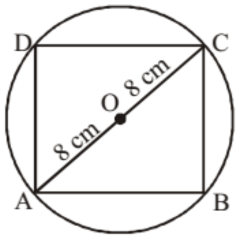
$= \frac{4}{3} \pi r^3 = \frac{4}{3} \pi \times (\sqrt{2})^3 = \frac{8\sqrt{2}}{3} \pi$ cubic units

60. (b) Volume of water in conical flask $= \frac{1}{3} \pi r^2 h$

If the height of water level in cylindrical flask be H units, then

$\pi m^2 r^2 H = \frac{1}{3} \pi r^2 h \Rightarrow H = \frac{1}{3} \cdot \frac{\pi r^2 h}{\pi m^2 r^2} = \frac{h}{3m^2}$

61. (c)



Diagonal of square = Diameter of circle

$\sqrt{2} \times$ side of square = 16 cm

Squaring on both sides

$(\sqrt{2} \times \text{sides of square})^2 = 16^2$

$\Rightarrow (\text{side of square})^2 = \frac{16 \times 16}{2}$

$\Rightarrow$ Area of square = 128 sq. cm

62. (d) Radius of square = $\frac{1}{2} \times$ breadth of rectangle

$= \frac{6}{2} = 3$ cm

$\therefore$ The area of circle $= \pi r^2 = 9\pi$ cm^2.

63. (b) Diagonal of a square (d) = $\sqrt{2} \times$ side of square (a).

$d = \sqrt{2}a \Rightarrow a = \frac{d}{\sqrt{2}}$

Area of square $= a^2 = \frac{d^2}{2}$

Now, diagonal gests doubled, then side

$a = \frac{(2d)}{\sqrt{2}}$

Area of square $= \left(\frac{2d}{\sqrt{2}}\right)^2 = 4\left(\frac{d^2}{2}\right)$

$\therefore \frac{d^2}{2}$ is area of square

Therefore, area will he four times.

64. (a) If the diameter of the circle be d units, then

$\pi d - d = X$

$\Rightarrow d(\pi - 1) = X$

$\Rightarrow d = \frac{X}{\pi - 1}$ units

65. (d) If the radius of base of cylinder be r units and its height be h units, then

$2\pi r = a \Rightarrow r = \frac{a}{2\pi}$ units

$\therefore$ Volume of cylinder $= \pi r^2 h$

$\Rightarrow V = \pi \times \frac{a^2}{4\pi^2} \times h \Rightarrow h = \frac{4\pi V}{a^2}$ units

66. (b) Volume of sphere

$= \frac{4}{3}\pi r^3 = \frac{4}{3}\pi \times 3 \times 3 \times 3 = 36\pi$ cu. cm.

If the water level rises by h cm, then

$\pi R^2 h = 36\pi$

$\Rightarrow 6 \times 6 \times h = 36$

$\Rightarrow h = 1$ cm

67. (b) Area of rectangle, A = 20 m × 15 m = 300m^2.

increased area, $A' = \left(20 + \frac{20}{100} \times 20\right)\left(15 + \frac{30}{100} \times 15\right)$

$= 24 \times 19.5 = 468$ m^2.

% increase in area $= \left(\frac{468 - 300}{300} \times 100\right)\% = 56\%$

68. (a) Area of triangle $= \frac{1}{2} \times a \times a \times \sin 45°$

$= \frac{1}{2} \times 10 \times 10 \times \frac{1}{\sqrt{2}} \text{cm}^2 = \frac{50}{\sqrt{2}} \text{cm}^2 = 25\sqrt{2}\text{cm}^2$

69. (c) Numebr of small spheres,

$n = \frac{\frac{4}{3}\pi(14\,\text{cm})^3}{\frac{4}{3}\pi(2\,\text{cm})^3}$

$n = \frac{2^3 \times 7^3}{2^3} = 343$

70. (d) Total surface are of cone $= \pi r(l + r)$

$S = \frac{22}{7} \times 3 \times \left(\sqrt{3^2 + 4^2} + 3\right)$

$= \frac{22}{7} \times 3 \times 8 = \frac{528}{7}$

S = 75.4 sq. cm

71. (d) Maximum number of boxes $= \frac{800 \times 700 \times 600 \text{ cm}^3}{8 \times 7 \times 6 \text{ cm}^3}$

$= 1000000$

72. (c) $\pi r_1^2 h_1 = \pi r_2^2 h_2$

$\frac{r_1}{r_2} = \sqrt{\frac{h_2}{h_1}} = \sqrt{\frac{2}{1}}$

$r_1 : r_2 = \sqrt{2} : 1$

73. (c) $2\pi r = 22$ cm

$r = \frac{22 \times 7}{2 \times 22} = \frac{7}{2}$ cm

Height, h = 12 cm

Volume of cylinder $= \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times 12 = 462$ cm^3

74. (a) Radius of cylinder = Radius of sphere = R

Height of cylinder = 2R

Volume of cylinder $= \pi R^2 \times (2R) = 2\pi R^3$

75. (c) Area of hexagon $= 6 \times \frac{\sqrt{3}}{4}a^2 = \frac{3\sqrt{3}}{2}a^2$ or $\frac{9}{2\sqrt{3}}a^2$

76. (c) Let length, breadth and height of parallelopiped be l, b and h respectively.

$l + b + h = 24$ cm

$\sqrt{l^2 + b^2 + h^2} = 15\text{cm} \Rightarrow l^2 + b^2 + h^2 = 225$ cm^2

$(l+b+h)^2 - 2(lb+hb+lh) = 225$
$(24)^2 - 225 = 2(lb+bh+hl)$
$351 = 2(lb+bh+hl)$
Total surface area is 351 cm^2.

77. (d) Let radius of base of cone be r and height of cylinder be h.
Vol. of cone = Vol. of cylinder

$$\frac{1}{3}\pi r^2 \times 24 = \pi\left(\frac{r}{3}\right)^2 \times h$$

h = 72 cm

78. (c) Side of square park = $\sqrt{25}$ km = 5 km
Perimeter of park = 4 × 5 = 20 km

$$\text{Time taken} = \frac{20\text{km}}{3\text{ km/h}} = 6 \text{ hours } 40 \text{ minutes}$$

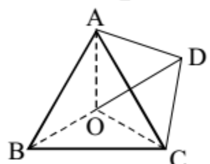
79. (b) Let radius of internal and external circular Plot be r and R respectively.
$2\pi R - 2\pi r = 33$ m

$$\text{Width of path, } (R-r) = \frac{33\times 7}{2\times 22} = \frac{21}{4} = 5.25\text{m}$$

80. (c) Height of base = $\frac{\sqrt{3}}{2}a$ where a = 4

$$= \frac{\sqrt{3}}{2}\times 4 = 2\sqrt{3}$$

$$AO = \frac{2}{3}\times\frac{\sqrt{3}}{2}\times 4 = \frac{4}{\sqrt{3}} \text{ cm}$$



Slant edge BD = 5cm

$$\text{Verticle height } DO^2 = (5)^2 - \left(\frac{4}{\sqrt{3}}\right)^2 = 25 - \frac{16}{3}$$

$$= \frac{75-16}{3} \Rightarrow DO = \frac{\sqrt{59}}{\sqrt{3}}$$

$$\text{Volume of Pyramid} = \frac{1}{3} \text{ ar of base} \times \text{height}$$

$$= \frac{1}{3}\times\frac{\sqrt{3}}{4}\times 4\times 4\times\frac{\sqrt{59}}{\sqrt{3}} = \frac{4\sqrt{59}}{\sqrt{3}}$$

81. (a) $C_1 = 2C_2$
$\pi r_1 l_1 = 2\pi r_2 l_2$
also, $l_2 = 2l_1$
$\pi r_1 l_1 = 2\times 2\pi r_2 l_1$

$$\frac{r_1}{r_2} = \frac{4}{1}$$

82. (a) Let r be the radius of circle.
Area of the wire = 154 cm^2
$\pi r^2 = 154$ cm^2

$$r^2 = \frac{154}{22}\times 7 = 49$$

r = 7 cm
length of wire = circumference of circle

$$= 2\times\frac{22}{7}\times 7 = 44 \text{ cm}$$

Now, perimeter of equilateral triangle = 44 cm

$$\text{side} = \frac{44}{3} \text{ cm}$$

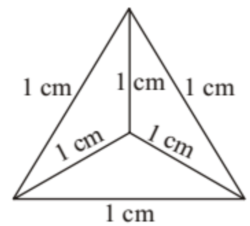
$$\text{Area of equilateral triangle} = \frac{\sqrt{3}}{4}\times\left(\frac{44}{3}\right)^2$$

$$= \frac{484\sqrt{3}}{9} = 93.4 \text{ cm}^2$$

83. (d) Quantity of acid left = $10\left(1-\frac{2}{10}\right)^2 = \frac{32}{5}$

$$\text{Required ratio} = \frac{32}{5\times 10} = \frac{16}{25} = 16:25$$

84. (a)



Regular equilateral triangular pyramid
Total surface area of pyramid
= 4 × Area of Equilateral triangle

$$= 4\times\frac{\sqrt{3}}{4}(1) = \sqrt{3} \text{ sq. cm}$$

85. (a) Perimeter of quadrant of a circle = 75 cm

$$\frac{1}{4}(2\pi r) + 2r = 75;\ 2r\left(\frac{\pi}{4}+1\right) = 75$$

$$2r = \frac{75(4)}{\pi+4} = \frac{300}{\pi+4};\ r = \frac{300}{\pi+4}\times\frac{1}{2} = 21 \text{ cm}$$

$$\text{Area of quadrant of circle} = \frac{1}{4}\pi r^2$$

$$= \frac{1}{4}\times\frac{22}{7}\times 21\times 21 = 346.5$$

86. (a) Volume of prism = base area × height
= A × h

$$\text{New volume} = A\times\frac{h}{2}$$

$$\therefore \text{ \% decrease in volume} = \frac{Ah - \frac{Ah}{2}}{Ah}\times 100$$

$$= \frac{1}{2}\times 100 = 50\%$$

87. (a) Area of trapezium

$$= \frac{\text{Sum of length of parallel sides}}{2}\times \text{Height (H)}$$

$$175 = \frac{15+20}{2}\times H$$

$$H = \frac{175\times 2}{35} = 10 \text{ cm.}$$

88. (d) Internal Radius of hemisphere = 6 cm
Internal surface area $= 2\pi r^2$
$= 2 \times 3.14 \times (6)^2$
$= 226.08\ cm^2$.

89. (d) Let initial volume = 100

Volume after increase $= 100 \times \frac{110}{100} = 110$

So, decrease $= \frac{110-100}{110} \times 100$

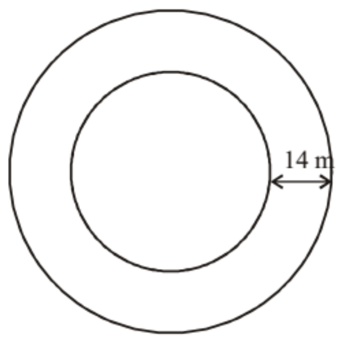
$= \frac{10}{110} \times 100 = 9\frac{1}{11}\%$

90. (d) Volume of right circular cone $= \frac{1}{3}\pi r^2 h$

Radius of cone = 3.5 cm
Height of cone = 7c m

So, Volume of cone $= \frac{1}{3} \times \frac{22}{7} \times 3.5 \times 3.5 \times 7 = 89.8\ cm^3$.

91. (d)



Outer circumference = 528 m

$\therefore$ Outer radius $= \frac{528 \times 7}{2 \times 22} = 84$ m
$\therefore$ Inner radius = 84 – 14 = 70 m

Outer area of circular race – track $= \frac{22}{7} \times 84 \times 84$
$= 22176\ m^2$

Inner area of circular race – track $= \frac{22}{7} \times 70 \times 70$
$= 15400\ m^2$.

So area of track = 22176 – 15400 = 6776 m^2
Cost of levelling the circular track = 6776 × 10 = ` 67760

92. (c) Surface area of sphere = 616 cm^2
$4\pi r^2 = 616$

$r = \sqrt{\frac{616 \times 7}{4 \times 22}} = 7cm$

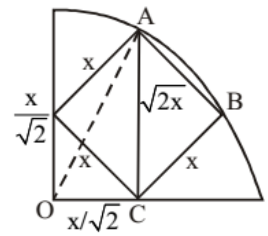
So, volume of sphere $= \frac{4}{3}\pi(7)^3$

$= \frac{4}{3} \times \frac{22}{7} \times 7 \times 7 \times 7 = 1437\frac{1}{3}\ cm^3$

93. (b) Perimeter of one face, 4a = 20 cm
Therefore, side of cube, a = 5 cm
Volume of cube= $a^3 = 5^3 = 125\ cm^3$

94. (a) Area of circle, $A = \pi r^2$ ...(i)
Circumference of circle, $C = 2\pi r$ ...(ii)
Multiplying eq. (i) by 2, we get, $2A = 2\pi r^2$
Multiplying eq. (ii), by 'r', we get $rC = 2\pi r^2$
$\therefore rC = 2A$

95. (c) $OA^2 = OC^2 + AC^2$



$OA^2 = \left(\frac{x}{\sqrt{2}}\right)^2 + \left(\sqrt{2}x\right)^2$

$OA^2 = \frac{x^2}{2} + 2x^2$

$OA^2 = \frac{5x^2}{2}$; $OA = \frac{\sqrt{5}}{\sqrt{2}}x$

96. (d) According to question
Volume of sphere= surfae area of shpere

$\Rightarrow \frac{4}{3}\pi r^3 = 4\pi r^2 \Rightarrow r = 3cm$

Diameter = 6 cm

97. (a) For surface Area of 5 persen

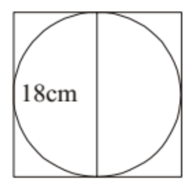
$\pi r^2 = 5 \times 16$; $r^2 = \frac{80}{\pi}$

Now, volume of cone = volume of air space of 5 person

$\Rightarrow \frac{1}{3}\pi r^2 h = 5 \times 100 \Rightarrow \frac{1}{3}\pi \times \frac{80}{\pi} \times h = 5 \times 100$

$\therefore\ h = \frac{75}{4} = 18.75$

98. (a)



Side of square = Diameter of sphere

Radius of sphere $\frac{18}{2} = 9$ cm

Area of sphere $= \frac{4}{3} \times \pi \times 9 \times 9 \times 9 = 972\pi$

99. (a) Volume of Pyramid

$= \frac{1}{3}$ area of base × height $= \frac{1}{3} \times 57 \times 10$
= 190 c. units

100. (a) Radius of large sphere = 9 cm
Radius of smaller sphere = 6 cm
Radius of cylinder = 6 cm
Height of cylinder = h

$\frac{4}{3}\pi 9^3 = \frac{4}{3}\pi 6^3 + \pi(6)^2 h$; $\frac{4}{3}(9^3 - 6^3) = 6^2 h$

$\Rightarrow h = \frac{4}{3}\frac{[9^3 - 6^3]}{6^2} \Rightarrow h = \frac{4}{3}\frac{[729 - 216]}{6 \times 6}$

$\Rightarrow h = \frac{4 \times 513}{3 \times 6 \times 6} = 19$ cm

101. (d) Volume of the cone, $V = \frac{1}{3}\pi r^2 h$

New radius, $r' = \frac{6}{5}r$

New height, $h' = \frac{6}{5}h$

New volume of cone, $V' = \frac{1}{3}\pi\left(\frac{6}{5}r\right)^2\left(\frac{6}{5}h\right) = \frac{216}{125}V$

Increase in volume $= \frac{\frac{216}{125}V - V}{V} \times 100 = \frac{91}{125} \times 100$
$= 72.8\%$

102. (d) Ler r be the radius of cylinder and r' be the radius of the sphere.
CSA of cylinder $= 2\pi rh$
$2\pi r^2 (\because r = h)$
CSA of sphere $= 4\pi r^2$
ATQ
CSA of cylinder = CSA of sphere
$= 2\pi r^2 = 4\pi r'^2$
$\Rightarrow r^2 = 2r'^2$
Now,

$$\frac{\text{Volume of cylinder}}{\text{Volume of sphere}} = \frac{\pi r^2 h}{\frac{4}{3}\pi r'^3}$$

$$= \frac{3}{4}\frac{r^3}{r'^3} \quad (\because r = h)$$

$$= \frac{3}{4} \times 2\sqrt{2} \quad \left(\because \frac{r}{r'} = \sqrt{2}\right)$$

$$= \frac{3}{\sqrt{2}}$$

103. (c) Vol. of cylinder = Vol. of cone

$\pi r^2 h = \frac{1}{3}\pi r^2 H$; r = R (Given)

$\pi R^2 h = \frac{1}{3}\pi R^2 H$; $\frac{h}{H} = \frac{1}{3} \Rightarrow 1:3$

104. (b) Total number of spherical balls

$$= \frac{\text{vol. of cylindrical rod}}{\text{vol. of spherical balls}}$$

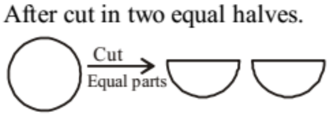
$$= \frac{\pi \times (30)^2 \times 40}{\frac{4}{3} \times \pi \times (1)^3} = \frac{30 \times 30 \times 40}{4} \times 3 = 27000$$

105. (c) Here,

Radius of sphere $= \frac{17.5}{2}$ cm $= 8.75$ cm

$\therefore$ Total surface Area of sphere $= 4\pi r^2$

$= 4 \times \frac{22}{7} \times 8.75 \times 8.75$
$= 962.5 \text{ cm}^2$
After cut in two equal halves.



$\therefore$ Total surface of both hemisphere $= 2 \times 3\pi r^2$

$\Rightarrow 2 \times 3 \times \frac{22}{7} \times 8.75 \times 8.75$

$\Rightarrow 1443.75 \text{ cm}^2$
$\therefore$ Required increased area $= (1443.75 - 962.5)$
$= 481.25 \text{ cm}^2$

106. (a) Diameter of sphere = 14 cm

$\therefore$ radius $= \frac{14}{2} = 7$ cm

$\therefore$ Surface area of sphere $= 4\pi r^2$

$= 4 \times \frac{22}{7} \times 7 \times 7 = 616 \text{ cm}^2$.

107. (d) Total surface area of three solid spheres

$= 4 \times \frac{22}{7} \times (3^2 + 4^2 + 5^2) = 4 \times \frac{22}{7} \times 50 = 628.57 \text{ cm}^2$

Now,
Volume of new sphere

$= \frac{4}{3} \times \frac{22}{7} \times (3^3 + 4^3 + 5^3)$

$\therefore \frac{4}{3} \times \frac{22}{7} \times R^3 = \frac{4}{3} \times \frac{22}{7} \times 216$
$R^3 = 216$

$\therefore R = \sqrt[3]{216} = 6$ cm
$\therefore$ Surface Area of new solid sphere

$= 4 \times \frac{22}{7} \times (6)^2 = 4 \times \frac{22}{7} \times 36 = 452.5 \text{ cm}^2$

$\therefore$ Required percentage

$= \frac{(628.57 - 452.5)}{628.57} \times 100 = 28\%$.

108. (a) Volume of the cylinder $= \pi r^2 h$
Since, radius is increased by 25%

Then, increased radius $= r + \frac{25}{100}r = \frac{125}{100}r = \frac{5}{4}r$
Let h_1 be the height of cylinder whose radius is increased.
Since, volume remains same

$\pi r^2 h = \pi\left(\frac{5}{4}r\right)^2 h_1$

$\Rightarrow h = \frac{25}{16}h_1 \Rightarrow \frac{h}{h_1} = \frac{25}{16} \Rightarrow h_1 = \frac{16}{25}h$

$\therefore$ Required percent of reduced height
$= (h - h_1) \times 100\%$

$= \left(h - \frac{16}{25}h\right) \times 100\% = \frac{9h}{25} \times 100\% = 36\%$ of h

So, height must be reduced by 36%.

109. (a) Here,
Total surface area of hemisphere = 166.32 sq cm.
r = ?

$\because 3\pi r^2 = 166.32$

$3 \times \frac{22}{7} \times r^2 = 166.32$

$\therefore \quad r^2 = \frac{166.32 \times 7}{3 \times 22} = 17.64$

$\therefore \quad r = 4.2$ cm.

110. (d) Total surface area of sphere = 9π cm²

$\because \quad 4\pi r^2 = 9\pi\ cm^2$

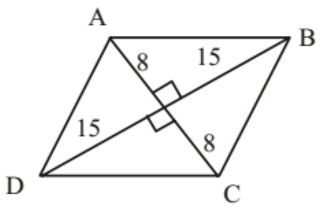
$r^2 = \frac{9\pi}{4\pi} = \frac{9}{4}$

$\therefore \quad r = \sqrt{\frac{9}{4}} = \frac{3}{2}$

$\therefore$ Volume of sphere $= \frac{4}{3}\pi r^3$

$= \frac{4}{3} \times \pi \times \left(\frac{3}{2}\right)^3 = \frac{4}{3} \times \pi \times \frac{27}{8} = \frac{9}{2}\pi\ cm^3$

111. (d) Let side of rhombus be x



By pythagorean theorem,

$x^2 = (15)^2 + (8)^2$

$x^2 = 225 + 64 = 289$

$\therefore \quad x = \sqrt{289} = 17$ cm

$\therefore$ Perimeter of rhombus = 4 × side

= 4 × 17 = 68 cm

112. (c) Here,

The ratio of curved surface area of two cones = 1 : 4

Let curved surface area of first cone be x and curved surface area of second cone be 4x.

Let slant height of first cone be 2x and slant height of second cone be x.

According to question,

$\frac{x}{4x} = \frac{\pi \times r_1 \times 2x}{\pi \times r_2 \times x}$

$\therefore \quad \frac{r_1}{r_2} = \frac{x \times x}{4x \times 2x} = \frac{1}{8}$

$\therefore$ The ratio of the radius of the two cones = 1 : 8

113. (a) Let radius of hemisphere = 2x

Radius of sphere = x

$\therefore$ Ratio of total surface area of hemisphere and sphere

$= \frac{3\pi r^2}{4\pi r^2} = \frac{3 \times \pi \times (2x)^2}{4 \times \pi \times x^2} = \frac{3 \times 4x^2}{4x^2} = \frac{3}{1} = 3:1$

114. (b) Here,

Radius of cylinder = 7 cm

Height of cylinder = 20 cm

$\because$ Total surface area of cylinder = $2\pi rh + 2\pi r^2$

$= 2 \times \frac{22}{7} \times 7 \times 20 + 2 \times \frac{22}{7} \times 7 \times 7$

= 880 + 308 = 1188 cm²

When cylinder is cuting along height, two new cylinders are generated–radius of new cylinder = 7cm

height of new cylinder = 10cm

$\because$ Total surface area of new cylinder = $2\pi rh + 2\pi r^2$

$\Rightarrow 2 \times \frac{22}{7} \times 7 \times 10 + 2 \times \frac{22}{7} \times 7 \times 7$

$\Rightarrow$ 440 + 308 = 748 cm²

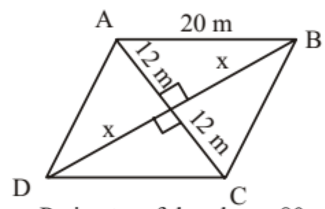
$\therefore$ Total surface area of two new cylinders

= 748 × 2 = 1496 cm²

$\therefore$ Percentage increase in surface area

$= \left(\frac{(1496 - 1188)}{1188} \times 100\right)\% = 25.93\%$

115. (c)



$\because$ Perimeter of rhombus = 80 cm

$\therefore$ Side of rhombus $= \frac{80}{4} = 20$cm

By pythagorean theorem,

$(20)^2 = (12)^2 + (x^2)$

$\therefore \quad x^2 = 400 - 144 = 256$

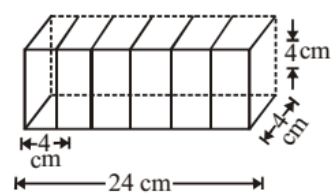
$\therefore \quad x = \sqrt{256} = 16$ cm

$\therefore$ Diagonal of rhombus = 2x = 2 × 16 = 32 cm and other diagonal = 24 cm

$\therefore$ Area of rhombus $= \frac{1}{2} \times d_1 \times d_2$

$= \frac{1}{2} \times 24 \times 32 = 384\ cm^2$

116. (b) After joining 6 cubes of edge length 4 cm each, Length of resulting cuboid = 6 × 4 = 24 cm



Breadth = 4 cm

Height = 4 cm

Surface Area of the cuboid

= 2(lb + bh + hl)

= 2(24 × 4 + 4 × 4 + 4 × 24) = 416 cm²

117. (a) Number of sphere of radius 2 cm

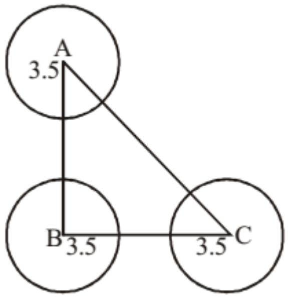
$= \frac{\frac{4}{3}\pi(5)^3}{\frac{4}{3}\pi(2)^3} = \frac{125}{8} \approx 15$

118. (d) As, $(8)^2 + (15)^2 = 64 + 225 = 289 = (17)^2$

Hence, triangle is right angle triangle.

Sum of angle of any triangle is 180°.

Sum of area of all the three sectors



$= \frac{180°}{360} \times \pi \times (3.5)^2$

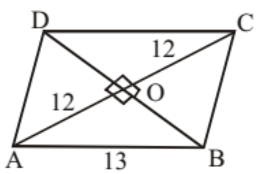
$= \frac{1}{2} \times \frac{22}{7} \times 3.5 \times 3.5 = 19.25 \text{ cm}^2$

And area of the triangle $= \frac{1}{2} \times AB \times BC$

$= \frac{1}{2} \times 15 \times 8 = 60 \text{ cm}^2$

So, remaining area $= 60 - 19.25 = 40.75 \text{ cm}^2$

119. (b) We know that diagonal of rhombus bisect perpendicularly. Let ABCD is rhombus and diagonal bisect at point 'O'.



From ΔAOB,

$OB = \sqrt{(AB)^2 - (AO)^2} = \sqrt{(13)^2 - (12)^2} = 5$

So, diagonal $BD = 2 \times OB = 2 \times 5 = 10$ cm

Area of rhombus $= \frac{1}{2} \times$ product of diagonals.

$= \frac{1}{2} \times 10 \times 24 = 120 \text{ cm}^2$

120. (a) Volume of cylinder $(V) = \pi r^2.h$, where r = radius
h = height

ATQ, new radius $r' = r + \frac{120\,r}{100} = 2.2\,r$

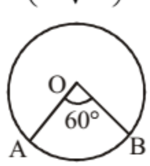
New height $h' = h - \frac{40\,h}{100} = 0.6\,h$

New volume $= \pi(r')^2.h' = \pi(2.2r)^2.(0.6h)$
$= 2.904 \times \pi r^2 h = 2.904\,V.$

Percentage increase in volume

$= \left(\frac{V' - V}{V}\right) \times 100 = \left(\frac{2.904\,V - V}{V}\right) \times 100 = 190.4\%$

121. (c)



Area of the sector with central angle $\theta = \frac{\theta}{360°} \times \pi r^2$

Area, $A = \frac{60°}{360°} \times \pi r^2 = \frac{\pi r^2}{6}$ ...(i)

circumference of the circle $C = 2\pi r$ ...(ii)

From (i), $A = \frac{\pi r^2}{6} = \frac{4\pi.\pi r^2}{6.4\pi}$

$A = \frac{(2\pi r)^2}{24\pi} = \frac{C^2}{24\pi}$

122. (a) Let *initialy* length was ℓ and breadth was b.
Area $(A) = \ell \times b$.

New length $\ell' = \ell + \frac{10 \times \ell}{100} = 1.1\,\ell$.

breadth $b' = b + \frac{8 \times b}{100} = 1.08b$.

New Area $(A') = \ell' \times b' = 1.1\,\ell \times 1.08\,b = 1.188\,\ell b$
$= 1.188A$.

New cost of repairing

$R' = R + \frac{15}{100}R = 1.15R$.

Total cost of repairing $= 1.15R \times 1.188A$
$= 1.3662\,R.A$

Percentage increase in cost

$= \left(\frac{1.3662\,R.A - R.A}{R.A}\right) \times 100$

$= 36.62\%$

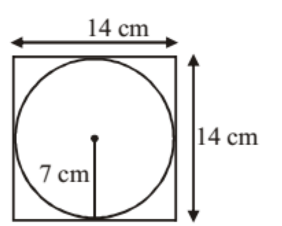
123. (d) New Radius $r' = r - r \times \frac{40}{100} = 0.6r$

% change in volume $= \left(\frac{r^3 - (r')^3}{r^3}\right) \times 100$

$= \left(\frac{r^3 - (0.6r)^3}{r^3}\right) \times 100 = \frac{1 - (0.6)^3}{1} \times 100 = 78.4\%$

124. (d) When we join 5 cubes by end to end
Then langth $= 5 \times 3 = 15$ cm
breadth = 3 cm
height = 3 cm
total surface Area $= 2(15 \times 3 + 15 \times 3 + 3 \times 3)$
$= 198 \text{ cm}^2$

125. (d)

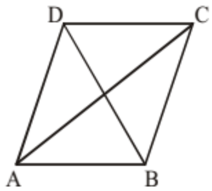


Hence the radius of circle is = 7 cm
Circumference of the circle is $= 2\pi r$

$= 2 \times \frac{22}{7} \times 7 = 44$ cm

126. (c) Edge of cube = 8 cm
The total surface are a of cube is = $6a^2$
$a = 8$ cm
S.A. = $6 \times 8 \times 8 = 64 \times 6 = 384$ cm^2

127. (d) Given, Diagonal of a rhombus is 48 cm



Side of rhombus is 26 cm

Area of rhombus = $\frac{1}{2} \times d_1 \times d_2$

The diagonal in a rhombus are perpendicular and bisect of other diagonal.
Given length side 26 cm
One diagonal = 48 cm = DB
Now, OB = OD = 24 cm
Now consider triangle AOB this is a right angled triangle and we know AB = 26 cm and OB = 24 cm
Now using the pythagorus theorem we can find out length of OA as
$OA^2 = AB^2 - OB^2$
$= 676 - 576$
$OA^2 = 100$
OA = 10 cm
So the length of diagonal AC is $2 \times 10 = 20$ cm.

Area of Rhombus is $\frac{1}{2} \times 20 \times 48 = 480$ cm^2.

128. (b) Radius of circular garden = 42 m
∴ Perimeter of garden = $2\pi r$

$= 2 \times \frac{22}{7} \times 42 = 264$ m

∴ Distance covered by running in 1 round
= 264 m
∴ Distance covered by running in 8 rounds
= $264 \times 8 = 2112$ m

129. (d) Ratio of radius of two cylinders = 3 : 4
Ratio of height of two cylinders = 4 : 9
∴ Ratio of volume of two cylinders

$$= \frac{\pi \times (3)^2 \times 4}{\pi \times (4)^2 \times 9} = \frac{1}{4} = 1 : 4171171$$

130. (d) $\frac{0.1}{100} \times 1.728 \times 10^6 \times \frac{4}{3} \times \pi \times 1^3$

$= \frac{4}{3} \times \pi \times r^3$

$\Rightarrow 1728 = r^3$
$\Rightarrow x = 12$ mm
Diameter = $2 \times 12 = 24$ mm = 2.4 cm

131. (c) $\frac{a_1}{a_2} = \frac{4}{5}$, where a is side of cube

Ratio of total surface area
$= 4^2 : 5^2 = 16 : 25$

132. (b) $\frac{4}{3} \times \pi r^3 = \frac{1}{3} \pi r^2 h$

Height of Cone (h) = $4r$

133. (b) Let length (l) and breadth (b) of rectangular field is $5x$ and $2x$ respectively.
Perimeter of the field $= 2(l + b)$

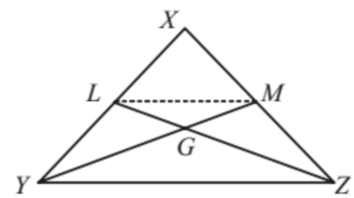
$\Rightarrow 238 = 2(5x + 2x) \Rightarrow 14x = 238 \Rightarrow x = 17.$

∴ Length of the field = $5 \times 17 = 85$ m.

134. (a) Let base of ΔXYZ is $YZ = b$.

Then, $LM = \frac{b}{2}$

($\because LM \parallel YZ$ and point L and M are mid point of XY and XZ)



Also, point G is the in-centre of the ΔXYZ.

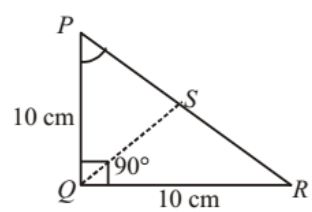
Then height of $\Delta LMG(h) = \frac{1}{6} \times$ Height of ΔXYZ

$$\frac{\text{Area of } \Delta GLM}{\text{Area of } \Delta XYZ} = \frac{\frac{1}{2} \times h \times \frac{b}{2}}{\frac{1}{2} \times 6h \times b} = \frac{1}{12}.$$

135. (c) Let $QS \perp PR$

then, from ΔPQR,

$$PR = \sqrt{(PQ)^2 + (QR)^2} = \sqrt{(10)^2 + (10)^2} = 10\sqrt{2}$$

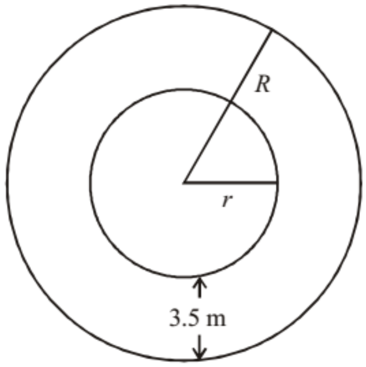


Now from area of ΔPQR

$$\Rightarrow \frac{1}{2} \times PQ \times QR = \frac{1}{2} \times QS \times PR \Rightarrow 10 \times 10 = QS \times 10\sqrt{2}$$

$$\therefore QS = \frac{10 \times 10}{10\sqrt{2}} = 5\sqrt{2} \text{ cm.}$$

136. (a)



Area of circular park = 12474 m^2

$\pi r^2 = 12474$

$\Rightarrow r^2 = \frac{12474}{22} \times 7$

$\Rightarrow r^2 = 81 \times 49$

$\Rightarrow r = 63$ m.

Let radius of circle with path is R m.

Area of circle with path = πR^2

$= \frac{22}{7} \times 66.5 \times 66.5 = 13898.5 \, m^2$

$\therefore$ Area of path = 13898.5 – 12474 = 1424.5 m^2

137. (*) Given,

Perimeter of the rectangle = 50 cm

So, length of rectangle = $50 \times \frac{4}{5} = 40$ cm

Breadth of rectangle = $50 \times \frac{1}{5} = 10$ cm

$\therefore$ Area of rectangle = $l \times b = 40 \times 10 = 400 \, cm^2$

According to question,

Area of square = Area of rectangle = 400 cm^2

$\therefore$ Side of square = $\sqrt{400} = 20$ cm

Hence, perimeter of square = 4 × 20 = 80 cm

Note : None of the option match.

138. (d) Curved surface area of cylider = 19.5 m^2

$2\pi rh = 19.5$

Volume of cylinder = 39 m^2

$\pi r^2 h = 39$

$\Rightarrow \frac{2\pi rh}{\pi r^2 h} = \frac{19.5}{39} \Rightarrow \frac{2}{r} = \frac{195}{390} \Rightarrow r = 4m$

139. (a) Area of a trapezium

$= \frac{1}{2} \times$ (Sum of parallel sides) × distance between them

$= \frac{1}{2} \times (25 + 19) \times 15 = \frac{1}{2} \times 44 \times 15 = 330 \, cm^2$

140. (c) $2\pi rh = 880 \, cm^2$

$2 \times \frac{22}{7} \times 14 \times h = 880$

$h = 10$ cm

Volume = $\pi r^2 h$

$= \frac{22}{7} \times 14 \times 14 \times 10 = 6160$

141. (b) $4a = 2(l + b)$

$40 = 2(l + b)$

$l + b = 20$

$b = \frac{2}{3} l$

$\Rightarrow l + \frac{2}{3} l = 20$

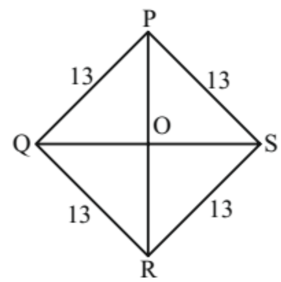
$\Rightarrow 5l = 20 \times 3$

$\Rightarrow l = 12$ m

$b = 8$ m

Area = 12 × 8 = 96 m^2

142. (d) $d_1 = 10$ cm



$\Delta QOR, QR^2 = QO^2 + OR^2$

$13^2 = 5^2 + OR^2$

$\boxed{OR = 12 \text{ cm}}$

$d_2 = 2 \times 12 = 24$ cm

Area of Rhombus = $\frac{1}{2} \times d_1 d_2$

$= \frac{1}{2} \times 10 \times 24 = 120 \, cm^2$