Mensuration Exercise

1. The length and breadth of a rectangle are in the ratio 9:5. If its area is 720m^2, find its perimeter.
   (a) 112 meter (b) 115 meter
   (c) 110 meter (d) 118 meter
2. A circle and a rectangle have the same perimeter. The sides of the rectangle are 18 cm and 26 cm. What is the area of the circle?
   (a) 88 cm^2 (b) 154 cm^2
   (c) 1250 cm^2 (d) 616 cm^2
3. If the perimeter and diagonal of a rectangle are 14 and 5 cms respectively, find its area.
   (a) 12 cm^2 (b) 16 cm^2
   (c) 20 cm^2 (d) 24 cm^2
4. In an isosceles right angled triangle, the perimeter is 20 meter. Find its area.
   (a) $100(3-2\sqrt{2})m^2$ (b) $150(5-\sqrt{3})m^2$
   (c) 500 m^2 (d) None of these
5. If a parallelogram, the length of one diagonal and the perpendicular dropped on dial diagonal are 30 and 20 meters respectively. Find its area.
   (a) 600m^2 (b) 540 m^2
   (c) 680 m^2 (d) 574m^2
6. The diameter of a garden roller is 1.4 m and it is 2m long .How much area will it cover in 5 revolutions? $\left(use\ \pi = \frac{22}{7}\right)$
   (a) 40 m^2 (b) 44 m^2
   (c) 48m^2 (d) 36m^2
7. A horse is tethered to one corner of a rectangular grassy field 40 m by 24 m with a rope 14 m long. Over how much area of the field can it graze?
   (a) 154cm^2 (b) 308 m^2
   (c) 150m^2 (d) None of these
8. From a square piece of a paper having each side equal to 10cut, the largest possible circle is being cut out The ratio of the area of the circle to the area of the original square is
   (a) $\frac{4}{5}$ (b) $\frac{3}{5}$
   (c) $\frac{5}{6}$ (d) $\frac{6}{7}$
9. A square carpet with an area 169 m^2 must have 2 meters cut off one of its edges in order to be a perfect fit for a rectangular room. What is the area of rectangular room?
   (a) 180m^2 (b) 164 m^2
   (c) 152 m^2 (d) 143 m^2
10. A picture 30" × 20" has a frame $2^1/_2$" wide. The area of thepicture is approximately how many times the area of the frame?
    (a) 4 (b) $2\frac{1}{2}$
    (c) 2 (d) 5
11. A rectangular plot 15m × 10m, has a path of grass outside it. If the area of grassy pathway is 54 m^2, find the width of the path.
    (a) 4m (b) 3m
    (c) 2m (d) 1m
12. If the area of a circle decreases by 36%, then the radius of a circle decreases by
    (a) 20% (b) 18%
    (c) 36% (d) 64%
13. The floor of a rectangular room is 15 m long and 12 m wide. The room is surrounded by a verandah of width 2 m on all its sides. The area of the verandah is:
    (a) 124m^2 (b) 120 m^2
    (c) 108m^2 (d) 58m^2
14. A rectangular lawn 70 m × 30 m has two roads each 5 metres wide, running in the middle of it, one parallel to the length and the other parallel to the breadth. Find the cost of gravelling the road at the rate of ` 4 per square metre.
    (a) `2,000 (b) `1,800

(c) `1,900 (d) `1,700

15. A cylindrical bucket of height 36 cm and radius 21 cm is filled with sand. The bucket is emptied on the ground and a conical heap of sand is formed, the height of the heap being 12 cm. The radius of the heap at the base is:
(a) 63cm (b) 53cm
(c) 56cm (d) 66cm

16. The altitude drawn to the base of an isosceles triangle is 8cm and the perimeter is 32 cm. The area of the triangle is
(a) $72cm^2$ (b) $60cm^2$
(c) $66cm^2$ (d) None of these

17. The cross section of a canal is a trapezium in shape. If the canal is 7 metres wide at the top and 9 metres at the bottom and the area of cross-section is 1280 square metres, find the length of the canal.
(a) 160 metres (b) 172 metres
(c) 154 metres (d) None of these

18. It is required to fix a pipe such that water flowing through it at a speed of 7 metres per minute fills a tank of capacity 440 cubic metres in 10 minutes. The inner radius of die pipe should be:
(a) $\sqrt{2}m$ (b) 2 m
(c) $\frac{1}{2}m$ (d) $\frac{1}{\sqrt{2}}m$

19. The area of a rectangular field is 144 m^2. If the length had been 6 metres more, the area would have been 54 m^2 more. The original length of the field is
(a) 22 metres (b) 18 metres
(c) 16 metres (d) 24 metres

20. A rectangular parking space is marked out by painting three of its sides. If the length of die unpainted side is 9 feet, and the sum of the lengths of the painted sides is 37 feet, then what is the area of the parking space in square feet?
(a) 46 (b) 81
(c) 126 (d) 252

21. A rectangular paper, when folded into two congruent parts had a perimeter of 34 cm for each part folded along one set of sides and the same is 38 cm when folded along the other set of sides. What is the area of the paper?
(a) $140cm^2$ (b) $240cm^2$
(c) $560cm^2$ (d) None of these

22. The length and breadth of the floor of the room are 20 feet and 10 feet respectively. Square tiles of 2 feet length of different colours are to be laid on the floor. Black tiles are laid in the first row on all sides. If white tiles are laid in the one-third of the remaining and blue tiles in the rest, how many blue tiles will be there?
(a) 16 (b) 24
(c) 32 (d) 48

23. Four equal circles are described about the four comer of as quare so that each touches two of the others. If a side of square is 14 cm, then the area enclosed between the circumferences of the circles is:
(a) 24 cm^2 (b) 42 cm^2
(c) 154 cm^2 (d) $196cm^2$

24. The ratio between the length and the breadth of a rectangular 34 park is 3:2. If a man cycling along the boundary of the park at the speed of 12km/hr completes one round in8minutes, then the area of the park (in sq. m) is:
(a) 15360 (b) 153600
(c) 30720 (d) 307200

25. The water in a rectangular reservoir having a base 80 metres by 60 metres is 6.5 metres deep. In what time can the water be emptied by a pipe whose cross section is a square of side 20 cm, if the water runs through the pipe at the rate of 15 km per hour?
(a) 52 hrs (b) 26hrs
(c) 65 hrs (d) 42 hrs

26. The ratio of height of a room to its semi-perimeter is 2:5. It costs `260 to paper the

walls of the room with paper 50 cm wide at `2 per metre allowing an area of 15 sq. m for doors and windows. The height of the room is:
(a) 2.6m (b) 3.9m
(c) 4m (d) 4.2m

27. Wheels of diameters 7 cm and 14 cm start rolling simultaneously from X and Y, which are 1980 cm apart, towards each other in opposite directions. Both of them make the same number of revolutions per second. If both of them meet after 10 seconds, the speed of the smaller wheel is:
(a) 22 cm/sec (b) 44 cm/sec
(c) 66cm/sec (d) 132cm/sec

28. A metal cube of edge 12 cm is melted and formed into three smaller cubes. If the edges of two smaller cubes are 6 cm and 8 cm, then find the edge of the third smaller cube.
(a) 10 cm (b) 14 cm
(c) 12 cm (d) 16 cm

29. The length, breadth and height of a cuboid are in the ratio 1:2:3. The length, breadth and height of the cuboid are increased by 100%, 200% and 200%, respectively. Then, the increase in the volume of the cuboid will be:
(a) 5 times (b) 6 times
(c) 12 times (d) 17 times

30. The surface area of a cube is 150 m^2. The length of its, diagonal is
(a) $5\sqrt{3}m$ (b) 5m
(c) $\frac{10}{\sqrt{3}}m$ (d) 15m

31. A copper sphere of radius 3 cm is beaten and drawn into a wire of diametre 0.2 cm. The length of the wire is
(a) 9m (b) 12m
(c) 18m (d) 36m

32. A plot of land in the form of a rectangle has a dimension 240 m × 180 m. A drainlet 10m wide is dug all around it (outside) and the earth drug out is evenly spread over the plot, increasing its surface level by 25 cm. The depth of the drain let
(a) 1.225m (b) 1.229m
(c) 1.227m (d) 1.223m

33. The water from a roof 9 sq metres in are to a cylinder container of 900 cm2 base. To what height will the water rise in cylinder if there is a rainfall of 0.1 mm?
(a) 1 cm (b) 0.1 metre
(c) 0.11 cm (d) 10 cms

34. The length of a cold storage is double its breadth. Its height is 3 metres. The area of its four walls (including the doors) is108 m^2. Find its volume.
(a) 215m^3 (b) 216m^3
(c) 217m^3 (d) 218m^3

35. How many spherical bullets can be made out of a lead cylinder 28 cm high and with base radius 6 cm, each bullet being M cm in diameter?
(a) 1845 (b) 1824
(c) 1792 (d) 1752

36. A rectangular reservoir is 54 m × 44 m × 10m. An empty pipe of circular cross-section is of radius 3 ms, and the water runs through the pipe at 20 m section. Find the time the empty pipe will take to empty the reservoir full of water.
(a) 116.67 hours (b) 110.42 hours
(c) 120.37 hours (d) 112 hours

37. A spherical ball of lead, 3 cm in diameter, is melted and recast into three spherical balls. The diameter of two of these balls are 1.5 cm and 2 cm respectively. The diameter of the third ball is
(a) 2.5cm (b) 2.66cm
(c) 3cm (d) 3.5cm

38. A cube of 384 cm2 surface area is melt to make x number of small cubes each of 96 mm^2 surface area. The value of x is
(a) 80,000 (b)8
(c) 8,000 (d) 800

39. A conical vessel, whose internal radius is 12 cm and height 50 cm, is full of liquid. The contents are emptied into acylindrical vessel

with internal radius 10 cm. Find the heightto which the liquid rises in the cylindrical vessel.
(a) 18cm (b) 22cm
(c) 24cm (d) None of these

40. The trunk of a tree is a right cylinder 1.5 min radius and 10m high. The volume of the timber which remains when the trunk is trimmed just enough to reduce it to a rectangular parallelepiped on a square base is
(a) $44m^3$ (b) $46m^3$
(c) $45m^3$ (d) $47\ m^3$

41. The cost of the paint is `36.50 per kg. If 1 kg of paint covers 16 square feet, how much will it cost to paint outside of a cube having 8 feet each side?
(a) `692 (b) `768
(c) `876 (d) `972

42. A right circular cone and a right circular cylinder have equal base and equal height. If the radius of the base and the height are in the ratio 5:12, then the ratio of the total surface area of the cylinder to that of the cone is
(a) 3:1 (b)13:9
(c) 17:9 (d) 34:9

43. A reservoir is supplied from a pipe 6 cm in diameter. How many pipes of 3 cms diameter would discharge the same quantity, supposing the velocity of water is same 7
(a) 4 (b) 5
(c) 6 (d) 7

44. A conical cavity is drilled in a circular cylinder of 15 cm height and 16 cm base diameter. The height and the base diameter of the cone are same as those of the cylinder. Determine the total surface area of die remaining solid.
(a) $440\ \pi cm^2$ (b) $215\pi cm^2$
(c) $542\ \pi cm^2$ (d) $376\pi cm^2$

45. An ice-cream company makes a popular brand of ice-cream in rectangular shaped bar 6 cm long, 5 cm wide and 2 cm thick. To cut die cost, the company has decided to reduce the volume of the bar-by20%, the thickness remaining the same, but the length and width will be decreased by the same percentage amount The new length L will satisfy:
(a) 5.5<L<6 (b) 5<L<5.5
(c) 4.5 <L<5 (d) 4<L< 4.5

46. Water flows, through a cylindrical pipe of internal diameter 7cm at 2 m per second. If the pipe is always half full, then what is the volume of water (in litres) discharged in 10 minutes?
(a) 2310 (b) 3850
(c) 4620 (d) 9240

47. If the radius of a sphere is increased by 2 cm, then its surface area increases by$352\ cm^2$. The radius of the sphere before the increase was:
(a) 3 cm (b) 4 cm
(c) 5 cm (d) 6 cm

48. A semicircular sheet of paper of diameter 28 cm is bent to cover the exterior surface of an open conical ice-cream cup. the depth of the ice-cream cup is
(a) 10.12cm (b) 8.12cm
(c) 12.12cm (d) 14.12cm

49. The cost of painting the walls of a room at the rate of `1.35 per square metre is $346.20 and the cost of matting die floor at the rate of $ 0.85 $perm^2$ is `91.80. If the length of the room is 12 m, then the height of the room is:
(a) 6m (b) 12m
(c) 1.2m (d) 13.27m

50. A hollowsphere of internal and external diameters 4 cm and 8 cm respectively is melted into a cone of base diameter 8 cm. The height of the cone is:
(a) 12cm (b) 14cm
(c) 15cm (d) 18cm

51. A cone of height 9 cm with diameter of its base 18 cm it carved out from a wooden solid sphere of radius 9 cm. The percentage of the wood wasted is:

(a) 25% (b) 30%
(c) 50% (d) 75%

52. A hemispherical bowl is filled lo the brim with a beverage. The contents of the bowl are transfered into a cylindrical vessel whose radiusis 50% more than its height. If the diameter is same for both the bowl and the cylinder, the volume of the beverage in the cylindrical vessel is:
(a) $66\frac{2}{3}\%$ (b) $78\frac{1}{2}\%$
(c) 100% (d) More than 100%

53. A cylindrical container of radius 6 cm and height 15 cm isfilled with ice-cream. The whole ice-cream has to be distributed to 10 children in equal cones with hemispherical tops. If the height of the conical portion is four times the radius of its base, then find the radius of the ice-cream cone.
(a) 2cm (b) 3 cm
(c) 4cm (d) 3cm

54. A cylinder is filled to 4/5th its volume. It is then filled so that the level of water coincides with one edge of its bottom and top edge of the opposite side, In the process, 30 cc of the water is spilled. What is the volume of die cylinder?
(a) 75 cc (b) 96 cc
(c) Data insufficient (d) 100 cc

55. There are two concentric circular tracks of radii 100 m and 102 m, respectively. A runs on the inner track and goes once round on the inner track in 1 min 30 sec, while B runs on the outer track in 1 min 32 sec. Who runs faster?
(a) Both A and Bare equal (b) A
(c) B (d) None of these

56. A monument has 50 cylindrical pillars each of diameter 50 cm and height 4 m. What will be the labour charges for getting these pillars cleaned at the rate of 50 paise per sq. m? (use $\pi = 3.14$)
(a) `237 (b) `157
(c) `257 (d) `353

57. Four sheets 50 cm × 5 cm are arranged without overlapping to form a Square having side 55 cm. What is the area of Inner Square so formed?
(a) $2500cm^2$ (b) $2025\ cm^2$
(c) $1600\ cm^2$ (d) None of these

58. A conical vessel of base radius 2 cm and height 3 cm is filled with kerosene. This liquid leaks through a hole in the bottom and collects in a cylindrical jar of radius 2 cm. The kerosene level in the jar is
(a) πcm (b) 1.5cm
(c) 1 cm (d) 3cm

59. A garden is 24m long and 14m wide. There is a path 1m wide outside the garden along its sides. If the path is to constructed with square marble tiles 20 cm × 20 cm. number of tiles required to cover the path is
(a) 1800 (b) 200
(c) 2000 (d) 2150

60. 2 cm of rain has fallen on a sq. km of land. Assuming that 50% of the raindrops could have been collected and contained in a pool having a 100 m × 10 m base, by what level would the water level in the pool have increased?
(a) 15m (b) 20m
(c) 10m (d) 25m

61. In a swimming pool measuring 90 m by 40 m, 150 men take a dip. If the average displacement of water by a man is 8 cubicmetres, what will be the rise in water level?
(a) 33.33 cm (b) 30 cm
(c) 20cm (d) 25cm

62. A square is inscribed in a circle of radius 8 cm. The area of the square is
(a) $16cm^2$ (b) $64cm^2$
(c) $128cm^2$ (d $148cm^2$

63. The biggest possible circle is inscribed in a rectangle of length 16 cm and breadth 6 cm. Then its Urea is
(a) $3\pi cm^2$ (b) 4π cm^2
(c) 5π cm^2 (d) $9\pi cm^2$

64. If the diagonal of a square is doubled, then its area will be
(a) three times (b) four times
(c) same (d) none of these

65. A metal pipe of negligible thickness has radius 21 cm and length 90 cm. The outer curved surface area of the pipe insquare cm is
(a) 11880 (b) 11680
(c) 11480 (d) 10080

66. 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
(a) $\frac{4\sqrt{8}}{3} cm^2$ (b) $\frac{4\sqrt{60}}{3} cm^2$
(c) $\frac{4\sqrt{59}}{3} cm^2$ (d) $\frac{4\sqrt{61}}{3} cm^2$

67. There are two cones. The curved surface in a 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
(a) 4:1 (b) 4:3
(c) 3:4 (d) 1:4

68. A wire is bent into the form of a circle, whose area 154 cm^2. If the same wire is bent into the form of an equilateral triangle, the approximate area of the equilateral triangle is
(a) $93.14cm^2$ (b) $90.14cm^2$
(c) $83.14cm^2$ (d) $39.14cm^2$

69. The radius of a right circular cone is 3 cm and its height is 4cm. The total surface area of the cone is
(a) 48.4 sq.cm (b) 64.4 sq.cm
(c) 96.4 sq.cm (d) 75.4 sq.cm

70. A wooden box of dimension 8 metre × 7 metre ×6 metre is tocarry rectangular boxes of dimensions 8 cm × 7 cm × 6 cm. The maximum number of boxes that can be carried in 1 wooden box is
(a) 7500000 (b) 9800000
(c) 1200000 (d) 1000000

71. Two circular cylinders of equal volume have their heights in the ratio 1:2; Ratio of their radii is (Take $\pi = \frac{22}{7}$)
(a) 1:4 (b) $1:\sqrt{2}$
(c) $\sqrt{2}:1$ (d) 1:2

72. A rectangular piece of paper of dimensions 22 cm by 12 cm rolled along its length to form a cylinder. The volume (in cm^3) of the cylinder so formed Is (use $\pi = \frac{22}{7}$)
(a) 562 (b) 412
(c) 462 (d) 362

73. 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
(a) $2\pi R^3$ (b) $4\pi R^3$
(c) $8\pi R^3$ (d) $\frac{8}{3}\pi R^3$

ANSWER KEY

1. (a)	2. (d)	3. (a)	4. (a)	5. (a)
6. (b)	7. (a)	8. (a)	9. (d)	10. (a)
11. (d)	12. (a)	13. (a)	14. (c)	15. (a)
16. (b)	17. (a)	18. (a)	19. (c)	20. (c)
21. (a)	22. (a)	23. (b)	24. (b)	25. (a)
26. (c)	27. (a)	28. (a)	29. (d)	30. (a)
31. (d)	32. (c)	33. (a)	34. (b)	35. (c)
36. (a)	37. (a)	38. (c)	39. (c)	40. (c)
41. (c)	42. (c)	43. (a)	44. (a)	45. (b)
46. (c)	47. (d)	48. (d)	49. (a)	50. (b)
51. (d)	52. (c)	53. (b)	54. (d)	55. (b)
56. (b)	57. (b)	58. (c)	59. (c)	60. (c)
61. (a)	62. (c)	63. (d)	64. (b)	65. (a)

66. (c)	67. (c)	68. (b)	69. (d)	70. (d)
71. (c)	72. (c)	73. (a)		

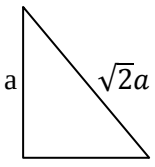
HINTS & EXPLANATIONS

1. (a) Let the length and breadth of a rectangle are 9 xm and 5 xm respectively.
In a rectangle, ares = length × breadth
$$\therefore 720 = 9x \times 5x$$
or $x^2 = 16 \Rightarrow x = 4$
Thus, length = 9 × 4 = 36 m
and breadth = 5 × 4 = 20 m
Therefore, perimeter of rectangle = 2(36+ 20) = 112m

2. (d) Perimeter of the circle – perimeter of rectangle $2\pi r = 2(18 + 26)$
$$\Rightarrow 2 \times \frac{22}{7} \times r = 88 \Rightarrow r = 14$$
∴Area of the circle
$$= \pi r^2 = \frac{22}{7} \times 14 \times = 616\ cm^2$$

3. (a) In a rectangle,
$$\frac{(Perimeter)^2}{4} = (diagonal)^2 + 2 \times area$$
$$\Rightarrow \frac{(14)^2}{4} = 5^2 + 2 \times area$$
$$49 = 25 + 2 \times area$$
$$\therefore Area = \frac{49 - 25}{2} = \frac{24}{2} = 12cm^2$$

4. (a)



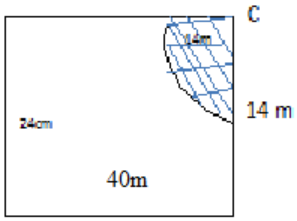
Perimeter of triangle $= a + a + \sqrt{2}a = 20m$
$$a(2 + \sqrt{2}) = 20$$
$$a = \frac{20}{2 + \sqrt{2}} \times \frac{(2 - \sqrt{2})}{(2 - \sqrt{2})} = 10(2 - \sqrt{2})m$$
Area of triangle $= \frac{1}{2} \times a \times a$
$$= \frac{1}{2} \times 10(2 - \sqrt{2}) \times 10(2 - \sqrt{2})$$
$$= 50(4 + 2 - 4\sqrt{2})$$
$$= 100(3 - 2\sqrt{2})m^2$$

5. (a) In a parallelogram.
Area = Diagonal × length of perpendicular on it.
$$= 30 \times 20 = 600\ m^2$$

6. (b) Required area covered in 5 revolutions
$$= 5 \times 2\pi rh = 5 \times 2 \times \frac{22}{7} \times 0.7 \times 2$$
$$= 44\ m^2$$

7. (a)

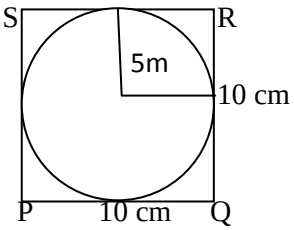
D



A B

Area of the shaded portion
$$= \frac{1}{4} \times \pi(14)^2 = 154\ m^2$$

8. (a) Area of foe square $= (10)^2 = 100\ cm^2$
The largest possible circle would be as shown in the figure below:



Area of the circle$= \frac{22}{7} \times (5)^2 = \frac{22 \times 25}{7}$

Required ratio$= \frac{22\times25}{7\times100} = \frac{22}{28} = \frac{11}{14}$

$= 0.785 \approx 0.8 = \frac{4}{5}$

9. (a) Side of square carpet $= \sqrt{\text{Area}} = \sqrt{169} = 13m$

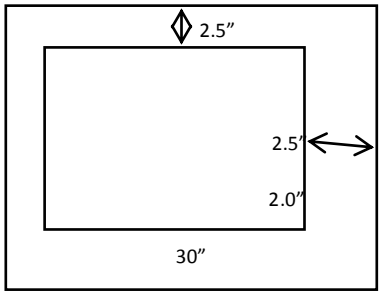
After cutting of one side,

Measure of one side = 13 – 2 = 11 m

and other side = 13 m (remain same)

∴ Area of rectangular room =13 × 11 = 143 m^2

10. (a)



Length of frame = 30+2.5 × 2 = 35 inch

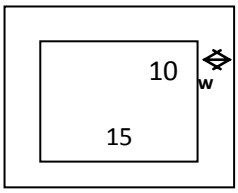
Breadth of frame = 20+ 2.5 × 2 = 25 inch

Now, area of picture = 30 × 20 = 600 sq. inch

Areaof frame = (35 × 2.5)+ (25 × 2.5) = 150

$$x = \frac{600}{150} = 4\ times$$

11. (d)



Let the width of the path = W m

then, length of plot with path = (l5 + 2W)m

and breadth of plot with path = (10 + 2 W) m

Therefore, Area of rectangular plot (wihout path)

$= 15 \times 10 = 150\ m^2$

and Area of rectangular plot (with path)

$= 150 + 54 = 204\ m^2$

Hence, $(15 + 2W) \times (10 + 2W) = 204$

$\Rightarrow 4W^2 + 50\ W - 54 = 0$

$\Rightarrow 2W^2 + 25\ W - 27 = 0$

$\Rightarrow (W - 1)(2W + 27) = 0$

Thus $W = 1\ or\ -\frac{27}{2}$

with of the path = 1 m

12. (a) If area of a circle decreased by x% then the radius of acircle decreases by

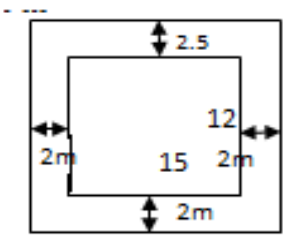
$\left(100 - 10\sqrt{100 - x}\right)\%$

$= \left(100 - 10\sqrt{100 - 36}\right)\%$

$= \left(100 - 10\sqrt{64}\right)\%$

$= 100 - 80 = 20\%$

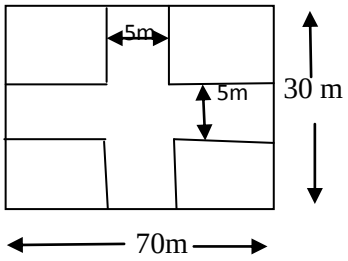
13. (a) Area of the outer rectangle = 19 × 16 = 304 m^2



Are of the inner rectangle = 15 × 12 = 180 m^2

Required area = (304 – 180) = 124 m^2

14. (c)



Total area of road

= Area of road which parallel to length+Area of road which parallel to breadth – overlapped road

$= 70 \times 5 + 30 \times 5 - 5 \times 5$

$= 350 + 150 - 25$

$= 500 - 25 = 475\ m^2$

∴ Cost of gravelling the road

$= 475 \times 4 = \$1900$

15. (a) Volume of the bucket - volume of the sand emptied

Volumeof sand = $\pi\ (21)^2 \times 36$

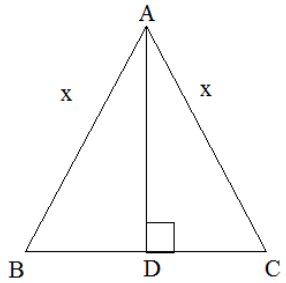
Let r be the radius of the conical heap.

Then, $\frac{1}{3}\pi r^2 \times 12 = \pi(21)^2 \times 36$

or $r^2 = (21)^2 \times 9 \; or \; r = 21 \times 3 = 63$

16. (b) Let ABC be the isosceles triangle and AD be the altitude.

Let AB = AC = x. Then, BC = (32 – 2x).



Since, in an isosceles triangle, the altitude bisects the base. So, BD = DC = (16 – x)

In ΔADC, $AC^2 – AD^2 + DC^2$

$$\Rightarrow x^2 = (8)^2 + (16 - x)^2$$

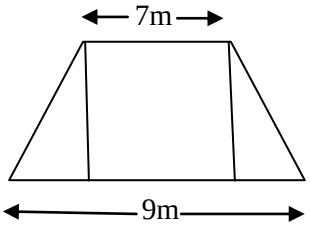
$$\Rightarrow 32x = 320 \Rightarrow x = 10.$$

$$\therefore BC = (32 - 2x) = (32 - 20)cm = 12 \; cm.$$

Hence, required area $= \left(\frac{1}{2} \times BC \times AD\right)$

$$= \left(\frac{1}{2} \times 12 \times 10\right) cm^2 = 60 \; cm^2$$

17. (a)



Let the length of canal - h m.

Then,

area of canal $= \frac{1}{2} \times h(9 + 7)$

or $1280 = \frac{1}{2}h(16)$

$$\therefore h = \frac{1280 \times 2}{16} = 160 \; m$$

18. (a) Let inner radius of the pipe be r.

Then, $440 = \frac{22}{7} \times r^2 \times 7 \times 10$

or $r^2 = \frac{440}{22 \times 10} = 2$

or $r = \sqrt{2} \; m$

19. (c) Let the length and breadth of the original rectangular field be x m and ym respectively.

Area of the original field $= x \times y = 144 \; m^2$

$\therefore x = \frac{144}{y}$ … (i)

If the length had been 6 m more, then area will be

$$(x + 6)y = 144 + 54$$

$\Rightarrow (x + 6)y = 198$ … (ii)

Putting the value of x from eq (i) in eq (ii), we get

$$\left(\frac{144}{y} + 6\right) y = 198$$

$$\Rightarrow 144 + 6y = 198$$

$$\Rightarrow 6y = 54 \Rightarrow y = 9m$$

Putting the value of y in eq (i) we get x = 16m

20. (c) Clearly, we have: l = 9 and l + 2b = 37 or b = 14.

Area = (l × b) = (9 × 14) sq. ft. = 126 sq. ft.

21. (a) When folded along breadth, we have:

$2\left(\frac{l}{2} + b\right) = 34 \; or \; l + 2b = 34$ … (i)

When folded along length, we have:

$2\left(l + \frac{b}{2}\right) = 38 \; or \; 2l + b = 38$ … (ii)

Solving (i) and (ii), we get:

l = 14 and b = 10.

∴ Area of the paper = (14 × 10) cm^2 = 140 cm^2.

22. (a) Area left after laying black tiles

$= [(20 - 4) \times (10 - 4)] \; sq.ft. = 96 \; sq.ft$

Area under white tiles = $= \left(\frac{1}{3} \times 96\right) sq.ft =$

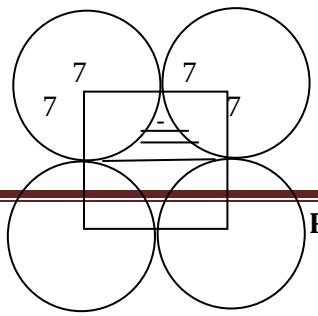
$32 \; sq.ft$

Area under blue tiles $= (96 - 32) sq.ft =$

$64 \; sq.ft$

Number of blue tiles $= \frac{64}{(2 \times 2)} = 16.$

23. (b)



7 7

The shaded area gives the required region.
Area of the shaded region – Area of the square – area of four quadrants of the circles

$$= (14)^2 - 4 \times \frac{1}{4}\pi(7)^2$$

$$= 196 - \frac{22}{7} \times 49 = 196 - 154 = 42\ cm^2$$

24. (b) Perimeter – Distance covered in 8 min.
$= \left(\frac{12000}{60} \times 8\right) m = 1600\ m.$
Let length = 3x metres and breadth = 2x metres.
Then, 2(3x+2x) = 1600 or x = 160.
∴ Length = 480m and Breadth = 320 m.
∴ Area = (480 × 320) m^2 = 153600 m^2.

25. (a) Volume of the water running through pipe per hour
$= \frac{20}{100} \times \frac{20}{100} \times 15000 = 600\ cubic\ metre.$
Required time $= \frac{60 \times 6.5 \times 80}{600} = 52\ hours$

26. (c) Let h = 2x metres and (l + b) = 5x metres.
Length of the paper $= \frac{Total\ cost}{Rate\ per\ m} = \frac{260}{2} m = 130\ m.$
Area of the paper $= \left(130 \times \frac{50}{100}\right) m^2 = 65\ m^2$
Total area of 4 walls = (65 + 16) m^2 = 80 m^2.
$\therefore 2(l + b) \times h = 80 \Rightarrow 2 \times 5x \times 2x = 80$
$\Rightarrow x^2 = 4 \Rightarrow x = 2.$
Height of the room = 4 m.

27. (a) Let each wheel make x revolutions per sec.
Then,

$$\left[\left(2\pi \times \frac{7}{2} \times x\right) + (2\pi \times 7 \times x)\right] \times 10 = 1980$$

$$\Rightarrow \left(2\pi \times \frac{7}{2} \times x\right) + \left(2\pi \times \frac{7}{2} \times x\right) = 198$$

$\Rightarrow 66x = 198 \Rightarrow x = 3.$
Distance moved by smaller wheel in 3 revolutions
$= \left(2\pi \times \frac{7}{2} \times 3\right) cm = 66cm.$
∴Speed of smaller wheel $= \frac{\frac{66}{3} cm}{s} = 22\frac{cm}{s}$

28. (a) Let the edge of the third cube be x cm.
Then, $x^3 + 6^3 + 8^3 = 12^3$
$\Rightarrow x^3 + 216 + 512 = 1728$
$\Rightarrow x^3 = 1000 \Rightarrow x = 10.$
Thus the edge of third cube = 10 cm.

29. (d) Let the length, breadth and height of the cuboid be x,2x and 3x, respectively.
Therefore, volume = x × 2x × 3x = $6x^3$
New length, breadth and height = 2x, 6x and 9x,respectively.
New volume = $108x^3$
Thus, increase in volume $= (108 - 6)x^3 = 102x^3$

$$\frac{\text{Increase in volume}}{\text{Original volume}} = \frac{102x^3}{6x^3} = 17$$

30. (a) In a cube,
Area = 6 $(side)^2$
or 150 = 6 $(side)^2$
∴ side $= \sqrt{25} = 5m$
Length of diagonal $= \sqrt{3} \times side = 5\sqrt{3}\ m$

31. (d) Let the length of the wire be h cm. and radius of sphere and wire are R and r respectively.
Then, volume of sphere - volume of wire (cylinder)
or $\frac{4}{3}\pi R^3 = \pi r^2 h$
or $\frac{4}{3}R^3 = r^2 h$
or $\frac{4}{3}(3)^3 = (0.1)^2 h$

$$\therefore h = \frac{4(3)^3}{3 \times (0.1)^2} = \frac{108}{0.03} = 3600\ cm = 36\ m$$

32. (c) Let the depth of the drainlet be h metres.
Volume of the earth dug from the drainlet 10 m wide = h [260 × 200 – 240 × 180] = 8800 h cu. m.
Now this is spread over the plot raising its height by 25 cm,
i.e., $\frac{1}{4}m.$

$\therefore$ 8800 h = 240 × 180 × $\frac{1}{4}$

$$\Rightarrow h = \frac{60 \times 180}{8800} = \frac{27}{22}$$

$\therefore h = 1.227\ m.$

33. (a) Let height will be h cm.

Volume of water in roof – Volume of water in cylinder

$$\Rightarrow \frac{9 \times 10000 \times 0.1}{900 \times 10} = h$$

$\therefore$ h = 1 cm

34. (b) Let l be the length and b be the breadth of cold storage.

L = 2B, H = 3 metres

Area of four walls $= 2[L \times H + B \times H] =$ 108

$\Rightarrow$ 6BH = 108 $\Rightarrow$ B = 6

$\therefore$ L = 12, B = 6, H = 3

Volume = 12 × 6 × 3 = 216 m^3

35. (c) Volume of cylinder $= (\pi \times 6 \times 6 \times$ *28cm3=36×28π cm3.*

Volume of each bullet $= \left(\frac{4}{3}\pi \times \frac{3}{4} \times \frac{3}{4} \times\right.$ *34cm3*

$$= \frac{9\pi}{16} cm^3$$

Number of bullets $= \frac{\text{Volume of cylinder}}{Volume\ of\ eac\ h\ bullet}$

$= \left[(36 \times 28)\pi \times \frac{16}{9\pi}\right] = 1792.$

36. (a) Volume of water in the reservoir = area of empty pipe ×Empty rate x time to empty

or $54 \times 44 \times 10 = \pi \times \left(3 \times \frac{1}{100}\right)^2 \times 20 \times$ *empty time*

or Empty time $= \frac{54 \times 44 \times 10 \times 100 \times 100 \times 7}{22 \times 20 \times 9}$ sec.

$= \frac{54 \times 44 \times 10 \times 100 \times 100 \times 7}{22 \times 20 \times 9 \times 3600} hrs = 116.67\ hours.$

37. (a) Let radius of the 3rd spherical ball be R,

$$\therefore \frac{4}{3}\pi\left(\frac{3}{2}\right)^3 = \frac{4}{3}\pi\left(\frac{3}{4}\right)^3 + \frac{4}{3}\pi(1)^3 + \frac{4}{3}\pi R^3$$

$$\Rightarrow R^3 = \left[\left(\frac{3}{2}\right)^3 - \left(\frac{3}{4}\right)^3\right] - 1^3$$

$$= \frac{27}{8} - \frac{27}{64} - 1 = \frac{125}{64} = \left(\frac{5}{4}\right)^3 \Rightarrow R = \frac{5}{4}$$

$$= 1.25$$

$\therefore$ Diameter of the third spherical ball

$= 1.25 \times 2 = 2.5cm.$

38. (c) Let 'A' be the side of bigger cube and 'a' be the side of smaller cube

Surface area of bigger cube = 6 A^2

or 384 = 6A^2

$\therefore$ A = 8 cm.

Surface area of smaller cube = 6 a^2

96 = 6a^2

$\therefore$ a = 4 mm = 0.4 cm

So, Number of small cube $= \frac{\text{Volume of bigger cube}}{Volume\ of\ smaller\ cube}$

$$= \frac{(8)^3}{(0.4)^3} = \frac{512}{0.064} = 8{,}000$$

39. (c) Volume of the liquid in the cylindrical vessel = Volume of the conical vessel

$$= \left(\frac{1}{3} \times \frac{22}{7} \times 12 \times 12 \times 50\right) cm^3$$

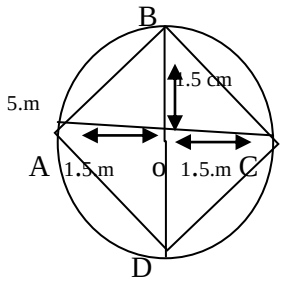
$= \left(\frac{22 \times 4 \times 12 \times 50}{7}\right) cm^3.$

Let the height of the liquid in the vessel be h.

Then, $\frac{22}{7} \times 10 \times 10 \times h = \frac{22 \times 4 \times 12 \times 50}{7}$

or, $h = \left(\frac{4 \times 12 \times 50}{10 \times 10}\right) = 24\ cm.$

40. (c)



From ΔAOB,

$AB = \sqrt{1.5^2 + 1.5^2} = \sqrt{2.25 + 2.25} = \sqrt{4.50}$

∴ Area of the square base of the trunk of the tree= $\sqrt{4.50} \times \sqrt{4.50} = 4.50\ m^2$

∴ Volume of the timber × Area of base × height = 4.50 × 10 = 45 m^3

41. (c) Surface area of the cube - (6 × 8^2) sq. ft = 384 sq. ft.

Quantity of paint required $= \left(\frac{384}{16}\right) kg = 24\ kg.$

∴Cost of painting =` (36.50 × 24)=`876.

42. (c) Let the radius of the base are 5k and 12k respectively

$$\therefore \frac{\text{Total surface area of the cylinder}}{\text{Total surface area of the cone}}$$

$$= \frac{2\pi \times h + 2\pi r^2}{\pi r\sqrt{r^2 + h^2} + \pi r^2}$$

$$= \frac{2h + 2r}{\sqrt{r^2 + h^2} + r} + \frac{24k + 10k}{\sqrt{25k^2 + 144k^2} + 5k}$$

$$= \frac{34k}{13k + 5k} = \frac{34k}{18k} = \frac{17}{9}$$

43. (a) Number of discharge pipe

$$= \frac{\text{Volume of water supply pipe}}{Volume\ of\ water\ in\ each\ discharge\ pipe}$$

$= \frac{\pi \times (3)^2 \times 1}{\pi \times \left(\frac{3}{2}\right)^2 \times 1} = 4$ [Since the velocity of water is same]

44. (a) Total surface area of the remaining solid = Curved surface area of the cylinder+ Area of the base + Curved surface area of the cone

$$= 2\pi rh + \pi r^2 + \pi r\ l$$

$$= 2\pi \times 8 \times 15 + \pi \times (8)^2 + \pi \times 8 \times 17$$

$$= 240\pi + 64\pi + 136\pi$$

$$= 440\pi\ cm^2$$

45. (b) L ×B × 2 = 48

⇒ L × B = 24

Now, 6 – 6 × 10% = 5.4,

5 – 5 × 10% and

Therefore, 5.4 × 4.5 = 24.3

Clearly, 5 <L< 5.5

46. (c) Volume of the coin= $\left(\frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times 200\right) cm^3 = 7700\ cm^3.$

Volume of water flown in 10 min. = $(7700 \times 60 \times 10) cm^3$

$= \left(\frac{7700 \times 60 \times 10}{1000}\right) litres.$

= 4620 litres.

47. (d) $4\pi(r+2)^2 - 4\pi r^2 = 352$

$\Rightarrow (r+2)^2 - r^2 = \left(352 \times \frac{7}{22} \times \frac{1}{4}\right) = 28.$

$\Rightarrow (r + 2 + r)(r + 2 - r) = 28$

$\Rightarrow 2r + 2 = \frac{28}{2} \Rightarrow 2r + 2 = 14 \Rightarrow r = 6\ cm$

48. (d) Circumference of the base of ice-cream cup – Diameter of the sheet = 28 cm

$$2\pi r = 28$$

$$r = \frac{14}{\pi} cm = 4.45\ cm$$

Slant height of cone = radius of the sheet = 14 cm

$$\therefore 14^2 = (4.45)^2 + h^2$$

or $h^2 = 196 - 19.80 = 176.20$

$$\therefore h = 13.27\ cm$$

49. (a) Let length, breadth and height of the room be f, b and h, respectively.

Then, area of four walls of the room

$$= 2(l + b)h = \frac{340.20}{1.35} = 252m^2$$

$\Rightarrow (l + b)h = 126$ … (i)

And $l \times b = \frac{91.8}{0.85} = 108$

$12 \times b = 108$ $(\because l = 12m)$

$\Rightarrow b = 9\ m$

Using (i), we get, $h = \frac{126}{21} = 6\ m$

50. (b) Volume of material in the sphere

$= \left[\frac{4}{3}\pi \times \{(4)^3 - (2)^3\}\right] cm^3 = \left(\frac{4}{3}\pi \times 56cm3.\right.$

Let the height of the cone be h cm.

Then, $\frac{1}{3}\pi \times 4 \times 4 \times h = \left(\frac{4}{3}\pi \times 56\right)$

$\Rightarrow h = \left(\frac{4 \times 56}{4 \times 4}\right) = 14cm.$

51. (d) Volume of sphere $= \left(\frac{4}{3}\pi \times 9 \times 9 \times 9cm3\right.$

Volume of cone $= \left(\frac{1}{3}\pi \times 9 \times 9 \times 9\right) cm^3$

Volume of wood wasted $= \left[\left(\frac{4}{3}\pi \times 9 \times 9 \times 9 - 13\pi \times 9 \times 9 \times 9cm3.\right.\right.$

$= (\pi \times 9 \times 9 \times 9)cm^3$

$\therefore$ Required percentage $= \left(\frac{\pi \times 9 \times 9 \times 9}{\frac{4}{3} \times \pi \times 9 \times 9 \times 9} \times 100\%\right.$

$= \left(\frac{3}{4} \times 100\right)\% = 75\%.$

52. (c) Let the height of the vessel be x.
Then, radius of foe bowl = radius of the vessel = x/2.

Volume of the bowl, $V_1 = \frac{2}{3}\pi\left(\frac{x}{2}\right)^3 = \frac{1}{12}\pi x^3.$

Volume of the vessel, $V_2 = \pi\left(\frac{x}{2}\right)^2 x = \frac{1}{4}\pi x^3.$

Since $V_2 > V_1$, so the vessel can contain 100% of the beverage filled in the bowl.

53. (b) Volume of the cylinder container

$= \pi = 6^2 \times 15\ cu.cm$ … (1)

Let the radius of the base of the cone be r cm, then, height of the cone = 4r cm

$\therefore$Volume of the 10 cylindrical cones of icecream with hemispherical tops

$$= 10 \times \left[\frac{1}{3} \times \pi \times r^2 \times 4r\right] + 10 \times \frac{2}{3}\pi r^3$$

$= \frac{40}{3}\pi r^3 + \frac{20}{3}\pi r^3 = 20\ \pi r^3 cu.cm$ … (2)

Since the whole ice-cream in the cylindrical container is distributed among 10 children in cones with hemispherical tops,

(1) and (2) gives

$$\Rightarrow \pi \times 6^2 \times 15 = 20\pi r^3$$

$$\Rightarrow r^3 = \frac{36 \times 15}{20} = 27 \Rightarrow r = 3\ cm$$

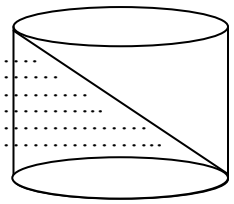
54. (d) Let the original volume of cylinder be V.

When it is filled $\frac{4}{5}$, then it's volume $= \frac{4}{5}V$

When cylinder is filled, the level of water coincides with opposite sides of bottom and top edges then

Volume become$= \frac{1}{2}V$

Since, in this process 30 cc of die water is spilled, therefore



$$\frac{4}{5}V - 30 = \frac{1}{2}V$$

$$\Rightarrow \frac{4}{5}V - \frac{1}{2}V = 30$$

$$\Rightarrow V(3/10) = 30$$

$$\Rightarrow V = 100\ cc$$

55. (b) Radius of the inner track = 100 m
and time = 1 min 30 sec m ≡90 sec.
Also, Radius of the outer track = 102 m
and time=1 min 32 sec ≡ 92 sec.
Now, speed of A who runs on die inner track

$$= \frac{2\pi(100)}{90} = \frac{20\pi}{9} = 6.98\ m/s$$

And speed of B who runs on the outer track

$$= \frac{2\pi(102)}{90} = \frac{51\pi}{23} = 6.96\ m/s$$

Since, speed of A> speed of B
$\therefore$ A runs faster than B.

56. (b) Curved surface area of cylinder = 2nrh
$\therefore$ Surface area of 50 cylindrical pillars = 50 × 2πrh
Now, Diameter of each cylindrical pillar = 50 cm
$\therefore$ Radius $= \frac{50}{2} = 25\ cm = 0.25\ m$
Also, height = 4m
$\therefore$ Surface area $= 50 \times 2 \times 3.14 \times 0.25 \times 4$

$= 314 \times 1\ sq\ m.$

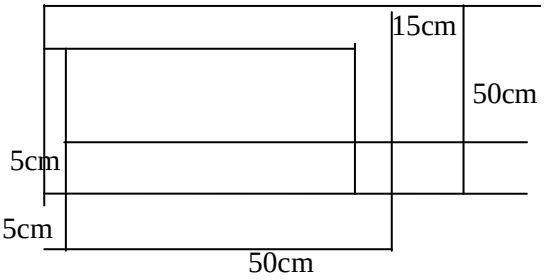
$= 314\ sq.m.$

Now, labour charges at the rate of 50 paise

per sq. m $= 314 \times 0.5 = 157.0$

= `157

57. (b)



Side of the inner square = 55 – 10 = 45

∴Area of inner square = 43 × 45=2025 sq. m.

58. (c) Let the kerosene level of cylindrical jar be h.

Now, Volume of conical vessel $= \frac{1}{3}\pi r^2 h$

Since, radius (r) = 2 cm and height (h) = 3cm of conical vessel.

∴ Volume $= \frac{1}{3}\pi \times 4 \times 3 = 4\pi$

Now, Volume of cylinderical jar $= \pi r^2 h$

$$= \pi(2)^2 h$$

$$= 4\pi h$$

Now, Volume of conical vessel – Volume of cylindrical Jar

⇒ 4 π = 4 πh

h = 1cm

Hence, kerosene level in Jar is 1 cm.

59. (c) Given, length of garden = 24 m and breadth of garden = 14 m

∴ Area of the garden = 24 × 14 m^2 = 336 m^2.

Since, there is 1 m wide path outside the garden

∴Area of Garden (including path)

$$= (24 + 2) \times (14 + 2) = 26 \times 16\ m^2$$

$$= 336 m^2$$

Now, Area of Path = Area of garden (including path) – Area of Garden

$$= 416 - 336 = 80\ m^2$$

Now, Area of Marbles $= 20 \times 20 = 400\ cm^2$

∴ Marbles, required $= \frac{Area\ of\ Path}{Area\ of\ Marbles}$

$$= \frac{80,0000}{400} = 2000$$

60. (d) Volume of rain that is to be collectedin a pool $= 2 \times 1 \times 10^{10} \times \frac{1}{2}$

$$= 10^{10}\ cm^3 = 10^4\ meter^3$$

Volume of Pool = L × B × h

10^4 = 100 × 10 × h

$h = \frac{10^4}{100 \times 10} = 10\ m.$

61. (a) Let the rise in water level = x m

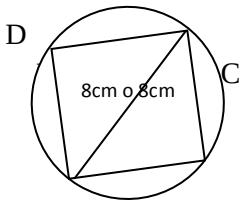
Now, volume of pool =40×90×x=3600x

When 150 men take a dip, then displacement of water = 8m^3

$$\therefore \frac{3600x}{150} = 8 \Rightarrow \frac{900}{150}x = 2 \Rightarrow x = 0.33m$$

$$\Rightarrow x = 33.33\ cm$$

62. (c)



Diagonal of square = Diameter of circle

$\sqrt{2}$ × side of square - 16 cm

Squaring on both sides

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

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

⇒ Area of square = 128 sq.cm

63. (d) The area of circle is 9π cm^2.

64. (b) Diagonal of a square (d) =$\sqrt{2}$ × 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

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

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

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

Therefore, Area will be four temes.

65. (a) Curved Surface area of cylinder = $2\pi rh$

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

66. (a) $C_1 = 2C_2$

$\pi r_1 l_1 = 2\pi r_2 l_2$

also, $l_2 = 2l_1$

$\pi r_1 l_1 = 2 \times 2_6 \times r_2 l_1$

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

67. (b) Let r be the radius of circle.

$$\pi r^2 = 154\ cm^2$$

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

$$r = 7\ cm$$

length of wire = circumference of circle

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

Now, Perimeter of equilateral triangle=44 cm

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

$$= \frac{484\sqrt{3}}{9} = 91.42\ cm^2$$

Area of equilateral triangle is nearly equal to 90.14 cm^2

Hence, option (b) is correct.

68. (d) Total surface area of cone $= \pi\, r(l + r)$

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

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

$$S = 75.4\ sq.cm$$

69. (d) Maximum number of boxes $= \frac{800 \times 700 \times 600\, cm^3}{8 \times 7 \times 6\, cm^3} = 1000000$

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

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

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

71. (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= $\frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times 12 = 462\ cm^3$

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

Height of cylinder=2 R

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