61.(B) Side of the square $= \sqrt{9 \times 10000}$ m
$= 300$ meters

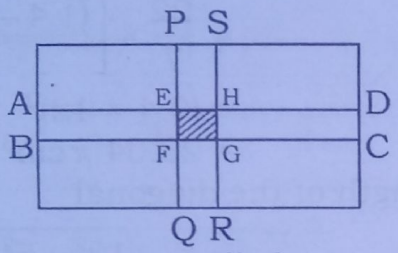
$\therefore$ Boundary $= 4 \times 300$ m

$\therefore$ Time required $= \dfrac{4 \times 300}{6 \times 1000}$ hr
$= 12$ minutes

62.(A) Area of square $= 2 \times 100 \times 100 \times 100$
$= 2000000$ sq m

Diagonal $= \sqrt{2 \times 2000000}$ m
$= 2000$ m
$= 2$ km

63.(D)



Area to be gravelled
= ar (ABCD) + ar (PQRS) – ar(EFGH)
= $[(80 \times 10) + (60 \times 10) - (10 \times 100)]m^2$
= $(800 + 600 - 100)m^2 = 1300\ m^2$
Cost of gravelling = ₹ (1300×30)
= ₹ 39000

64.(B) $\Delta ABC \cong \Delta DEF$

$$\frac{\text{Area of } \Delta DDF}{\text{Area of } \Delta ABC} = \left(\frac{EF}{BC}\right)^2$$

$$\text{Area of } \Delta DEF = \left(\frac{5}{4}\right)^2 \times 64$$
$= 100\ cm^2$

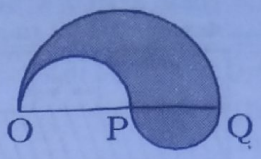
65.(C) Required of the shaded region

$$= \left[(21)^2 - \frac{22}{7} \times \left(\frac{21}{2}\right)^2\right]$$
$= 94.5\ cm^2$

66.(A) Required area
= (Area of the square) – 4 × (quadrant of a circle with $r = 14$ m)
= (100 × 100) – (Area of a circle in which $r = 14$ m)

$$= \left(10000 - \frac{22}{7} \times 14 \times 14\right) m^2$$
$= (10000 - 616)\ m^2 = 9384\ m^2$

67.(A)



Required perimeter
$= (\pi \times 7 + \pi \times 7 + \pi \times 14)$
$= \pi \times (7 + 7 + 14)$ cm

$$= \left(\frac{22}{7} \times 28\right) \text{ cm} = 88 \text{ cm}$$

68.(B) Let the length of parallel side be $3x$ cm and $5x$ cm. Then,

$$\frac{1}{2}(3x + 5x) \times 12 = 384$$

$\Rightarrow$ $x = 8$

Smaller side $= (3 \times 8)$cm
$= 24$ cm

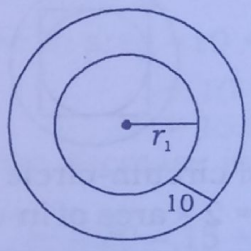
69.(B) Let the length of cross-section be x metres. Then,

$$\frac{1}{2}(10 + 6) \times x = 640$$

$\Rightarrow$ $8x = 640$

$\Rightarrow$ $x = 80$ m

70.(B)



Let r be the radius of circular field

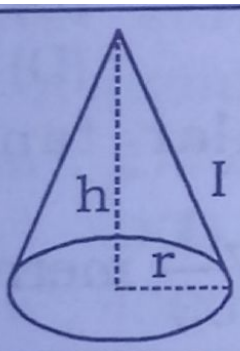
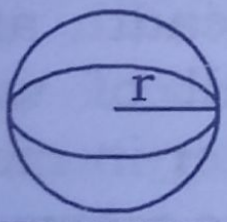
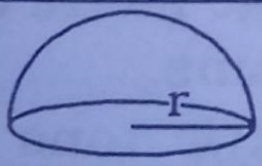
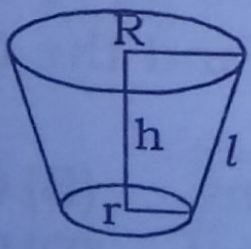
$\therefore$ $2\pi r = 440$ m

$$r = \frac{440 \times 7}{2 \times 22}$$

Area of path = Area of outer circle – Area of inner circle
$= \pi(80^2 - 70^2)$

$$= \frac{22}{7} \times 150 \times 10\ m^2$$

$$\text{Cost of path} = \frac{22}{7} \times 150 \times 10 \times \frac{70}{100}$$
= ₹ 3300

6.	Right pyramid		$\pi r l$	$\pi r(l + r)$
7.	Sphere		—	$4\pi r^2$
8.	Hemisphere		$2\pi r^2$	$3\pi r^2$
9.	Spherical shell			$4\pi(R^2 + r^2)$
10.	Frustum		$\pi (r + R)\ l$	$\pi(R^2 + r^2 + Rl + rl)$

1. A right circular cylindrical tank has the storage capacity of 38808 ml. If the radius of the base of the cylinder is three-fourth of the height, what is the diameter of the base?
(A) 28 cm (B) 56 cm
(C) 21 cm (D) 42 cm

2. A room 8 metres long, 6 metres broad and 3 metres high has two windows $1\frac{1}{2}$ m × 1m and a door 2 m × $1\frac{1}{2}$ m. Find the cost of papering the walls with paper 50 cm wide at 25 P per metre.
(A) ₹ 21 (B) ₹ 27
(C) ₹ 33 (D) ₹ 39

3. A hall, whose length is 16 metres and breadth twice its height, takes 168 metres of paper 2 metres wide for its four walls. Find the area of the floor.
(A) 172 sq m (B) 182 sq m
(C) 192 sq m
(D) Can't be determined

4. In a right circular cone, the radius of its base is 7 cm and its height 24 cm. A cross-section is made through the midpoint of the height parallel to the base. The volume of the upper portion is
(A) 168 cm^3 (B) 154 cm^3
(C) 1078 cm^3 (D) 800 cm^3

5. If the height of a cylinder is increased by 15% and the radius of its base is decreased by 10%, then by what percent will its curved surface area change ?
(A) 3.5% decrease (B) 3.5% increase
(C) 5% increase (D) 5% decrease

6. The total surface area of a metallic hemisphere is 1848 cm^2. The hemisphere is melted to form a solid right circular cone. If the radius of the base of the cone is the same as the radius of the hemisphere, its height is
(A) 21 cm (B) 26 cm
(C) 28 cm (D) 30 cm

7. A cone, a hemisphere and a cylinder stand on equal bases and have the same height. The ratio of their respective volumes is
(A) 1 : 2 : 3 (B) 2 : 1 : 3
(C) 1 : 3 : 2 (D) 3 : 1 : 2

8. A cube and a sphere have equal surface areas. The ratio of their volumes is
(A) $\pi : 6$ (B) $\sqrt{\pi} : \sqrt{6}$
(C) $\sqrt{6} : \sqrt{\pi}$ (D) $6 : \pi$

9. A cuboidal block of 6 m × 9 m × 12 m is cut into exact number of equal cubes. The least possible number of cubes will be
(A) 6 (B) 9
(C) 24 (D) 30

10. A rectangular tank, measuring internally $37\frac{1}{3}$ metres in length, 12 metres in breadth and 8 metres in depth, is full of water. Find the weight of water in metric tons, given that one cubic metre of water weighs 1000 kilograms.
(A) 3584 metric tons
(B) 3685 metric tons
(C) 3756 metric tons
(D) 3868 metric tons

11. A cubic metre of gold is extended by hammering so as to cover an area of 6 hectares. Find the thickness of the gold.
(A) 0.0015 cm (B) 0.0017 cm
(C) 0.0019 cm (D) 0.0021 cm

12. A cube of sides 3 cm is melted and smaller cubes of sides 1 cm each are formed. How many such cubes are possible?
(A) 21 (B) 23
(C) 25 (D) 27

13. Find the volume of a cylinder which has a height of 14 metres and a base of radius 3 metres. Also find the curved surface of the cylinder.
(A) 392 m^3, 262 m^2
(B) 396 m^3, 264 m^2
(C) 398 m^3, 274 m^2
(D) 399 m^3, 276 m^2

14. A rectangular sheet with dimensions 22 m × 10 m is rolled into a cylinder so that the smaller side becomes the height of the cylinder. What is the volume of the cylinder so formed?
(A) 385 m^3 (B) 375 m^3
(C) 365 m^3 (D) 355 m^3

15. Find the volume, curved surface area and the total surface area of a hemisphere of radius 21 cm.
(A) 19404 cm^3, 2772 cm^2, 4158 cm^2
(B) 4158 cm^3, 5000 cm^2, 4000 cm^2
(C) 20000 cm^3, 40000 cm^2, 1000 cm^2
(D) 30000 cm^3, 2000 cm^2, 5000 cm^2

16. If the heights of two cones are in the ratio 1 : 4 and their diameters are in the ratio 4 : 5, what is the ratio of their volumes?
(A) 2 : 21 (B) 3 : 31
(C) 4 : 25 (D) 5 : 25

17. Each of the radius and the height of a right circular cylinder is both increased by 10%. Find the percentage by which the volume increases.
(A) 31.2% (B) 33.1%
(C) 35.1% (D) 37.5%

18. A conical vessel, whose internal radius is 10 cm and height 48 cm, is full of water. If this water is poured into a cylindrical vessel with internal radius 20 cm, find the height to which the water rises in it.
$\left[\text{Use } \pi = \frac{22}{7}\right]$
(A) 2 cms (B) 4 cms
(C) 6 cms (D) 8 cms

19. Two cubes each of edge = 10 m are joined to form a single cuboid. What is the surface area of the new cuboid so formed?
(A) 800 cm^2
(B) 900 cm^2
(C) 1000 cm^2
(D) Can't be determined

20. A right circular cone is exactly fitted inside a cube in such a way that the edges of the base of the cone are touching the edges of one of the faces of the cube and the vertex is on the opposite face of the cube. If the volume of cube is 343 cc, what approximately is the volume of the cone?
(A) 80 cc (B) 90 cc
(C) 110 cc (D) 100 cc

21. A hall's dimensions are 12 m, 10 m and 8 m. Find the volume of the hall.
(A) 480 cm^3 (B) 960 cm^3
(C) 720 cm^3 (D) 1200 cm^3

22. A cuboid's dimensions are in the ratio of 2 : 3 : 4. If its volume is 3000 c.c. then what is its surface area in cm^2.
(A) 1300 cm^2 (B) 1800 cm^2
(C) 2300 cm^2 (D) 650 cm^2

23. The ratio between two cubes volumes is 8 : 27. Find the ratio between their edges.
(A) 2 : 3 (B) 3 : 2
(C) 4 : 9 (D) 9 : 4

24. A tank is 10 m long and 8 m wide. There is some water in the tank. If a stone of the shape of a cube and side 2 m is put in the tank, then how high will the water level rise?
(A) 10 cm (B) 8 cm
(C) 6 cm (D) 3 cm

25. A sheet area of 600 m^2 is made out of unit cubic meter of a metal. Find the thickness of the sheet.
(A) $\frac{1}{3}$ cm (B) $\frac{1}{4}$ cm
(C) $\frac{1}{2}$ cm (D) $\frac{1}{6}$ cm

26. A well with 3.5 m radius is dug 40 m deep. Find the volume of the earth taken out of it.
(A) 1500 m^3 (B) 2540 m^3
(C) 1540 m^3 (D) 1560 m^3

27. Two cylinders are same in volumes. Their heights are in the ratio of 1 : 2. find the ratio between their diameters.
(A) $1 : \sqrt{2}$ (B) $\sqrt{2} : 1$
(C) $1 : (\sqrt{2}-1)$ (D) $(\sqrt{2}-1) : 1$

28. External and internal dimeters of a empty sphere 28 cm and 14 cm respectively. Find the volume of the metal which is required for make it.
(A) $10061\frac{1}{3}$ cm^3 (B) $10061\frac{2}{3}$ cm^3
(C) $20061\frac{2}{3}$ cm^3 (D) $30061\frac{1}{3}$ cm^3

29. The radius of the base of conical tent is 6m and height is 8 m. What is area of the canvas that is required for this tent.
(A) 90 π m^2 (B) 40 π m^2
(C) 120 π m^2 (D) 60 π m^2

30. The radius of the base of a conical tent is 7 m and its height is 24 m. What is the length of the canvas that is 2.5 m wide required for this tent?
(A) 200 m (B) 240 m
(C) 260 m (D) 220 m

31. Ratio between the heights of two cones is 5 : 8 and that between their diameters is 3 : 8. Find the ratio between their volume.
(A) 512 : 45 (B) 4 : 48
(C) 48 : 5 (D) 45 : 512

32. Find the volume of circum-cylinder of a sphere with the base diameter of 14 cm.
(A) 5110 cm^3 (B) 2156 cm^3
(C) 5126 cm^3 (D) 2828 cm^3

33. The ratio between volumes of a hemisphere and a cone is 1:1. If the cone's height is equal to its diameter. Find the ratio between diameters of hemisphere and cone.
(A) 2 : 1 (B) 1 : 1
(C) 3 : 2 (D) 2 : 3

34. The ratio between diameter of a sphere and height of a cone is 1 : 2. If their volumes are same, Find the ratio between their raddi.
(A) 2 : 3 (B) 3 : 2
(C) 1 : 1 (D) 2 : 1

35. Find the ratio among the volumes of a cylinder, a cone and a sphere that have same diameters and same heights.
(A) 3 : 1 : 2 (B) 3 : 2 : 1
(C) 1 : 2 : 3 (D) 2 : 1 : 3

36. A cuboid is 20 m long, 14 m wide and 28 m high. Find the surface area of a greatest sphere which can be set completely and gently in the cuboid.
(A) 308 m^2 (B) 924 m^2
(C) 616 m^2 (D) 1232 m^2

37. Find the volume of the greatest sphere which may be put completely and gently in a cubical tank having each side 14 m.
(A) $1437\frac{1}{3}$ m^3 (B) $1437\frac{2}{3}$ m^3
(C) $1439\frac{2}{3}$ m^3 (D) $1439\frac{1}{3}$ m^3

38. A sphere is put in a cube such that it touches each surface of cube. Find the ratio between volumes of cube and sphere.
(A) 1 : 2 (B) 21 : 11
(C) 11 : 21 (D) 2 : 1

39. Find the curved area of a frustum, having radii 7 cm and 14 cm respectively and slant height 8 cm.
(A) 428 cm^2 (B) 535 cm^2
(C) 628 cm^2 (D) 528 cm^2

40. Diameters of a frustum are 18 cm and 24 cm while slant height is 5 cm. Find the total surface area of the frustum.
(A) 1075.14 cm^2 (B) 1073.14 cm^2
(C) 1037.14 cm^2 (D) 1703.14 cm^2

41. Find the width of a roller which traverses 128 km while cutting 6.4 hectares of grass.
(A) 50 cm (B) 100 cm
(C) 75 cm (D) 25 cm

42. A rectangular tank measuring internally $37\frac{1}{3}$ meters in length, 12 meters in breadth and 8 meters in depth, is full of water. Find the weight of water in metric tons, given that one cubic meter of water weighs 1000 kilograms.
(A) 3584 m tons (B) 3854 m tons
(C) 3458 m tons (D) 3485 m tons

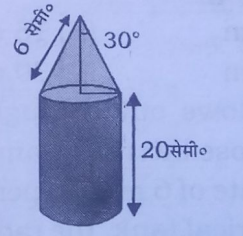
43. A brick measures 20 cm by 10 cm by $7\frac{1}{2}$ cm. How many bricks will be required for a wall 25 m long, 2, high and $\frac{3}{4}$ m thick?
(A) 2000 (B) 2500
(C) 20000 (D)2500

44. The annual rainfall at a place is 43 cm. Find the weight in metric tonnes of the annual rain falling there on a hectare of land, taking the weight of water to be 1 metric tonne to the 1 cubic meter.
(A) 3000 m tons (B) 4000 m tons
(C) 4500 m tons (D) 4300 m tons

45. A hollow cylindrical tube that is open at both ends is made of iron 2cm thick. If the external diameter be 50 cm and the length of the tube be 140 cm, find the number of cubic cm of iron in it.
(A) 2212 cm^3 (B) 21220 cm^3
(C) 42240 cm^3 (D) 44240 cm^3

46. A frustum of a right circular cone has a diameter of base 10 cm, of top 6 cm and a height of 5 cm; find the area of its whole surface and volume.
(A) 242.25 cm^2, $256\frac{2}{3}$ cm^3
(B) 282.25 cm^2, $256\frac{2}{3}$ cm^3
(C) 242.25 cm^2, $286\frac{2}{3}$ cm^3
(D) 282.25 cm^2, $286\frac{2}{3}$ cm^3

47. The diagram shows a section of a rocket firework. If this section can be completely filled with gunpowder, what is the volume of gunpowder required?



(A) 614.70 cm^3 (B) 700.98 cm^3
(C) 453.78 cm^3 (D) 653.78 cm^3

48. Ratio of the volume of a cylinder with radius R and height H to the volume of a cylinder with radius H and height R is
(A) $\frac{H}{R}$ (B) $\frac{H}{\pi R}$
(C) $\frac{R}{H}$ (D) $\frac{\pi R}{H}$

49. The area of the base of a rectangular tank is 6500 cm^2 and the volume of water contained in it is 2.6 cubic metres. The depth of the water in the tank is

(A) 2.5 m (B) 3 m
(C) 5.5 m (D) 4 m

50. How many bricks will be needed to construct a wall 4m long, 3m high and 13 cm broad, if each brick measures 20 cm × 12 cm × 6.5 cm?

(A) 200 (B) 100
(C) 150 (D) 400

51. A wall 24 m long, 8 m high and 60 cm thick is made up of bricks, each measuring 24 cm × 12 cm × 8 cm, it being given that 10% of the volume of the wall consists of mortar. How many bricks will be needed?

(A) 15000 (B) 45000
(C) 42000 (D) 60000

52. The areas of three adjacent faces of a cuboid are in the ratio 2 : 3 : 4 and its volume is 9000 cm^3. The smallest side has a length of

(A) 10 cm (B) 15 cm
(C) 20 cm (D) 30 cm

53. Water flows out through a circular pipe whose internal diameter is 2 cm, at the rate of 6 metres per second into a cylindrical tank, the radius of whose base is 60 cm. By how much will the level of water rise in 30 minutes?

(A) 2 m (B) 3 m
(C) 4 m (D) 5 m

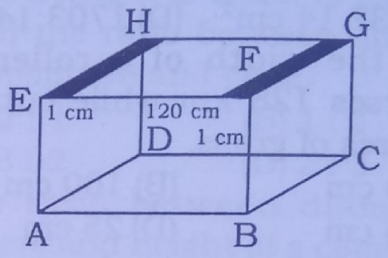
54. 0.88 m^3 of iron is melted and moulded in the form of iron rods, each of diameter 2 cm and length 7 m. How many rods are formed?

(A) 400 (B) 392
(C) 616 (D) 2000

55. A spherical ball of lead 3 cm in diameter, is melted and recast into three spherical balls. The diameters of two of these balls are 1.5 cm and 2 cm respectively. The diameter of the third ball is

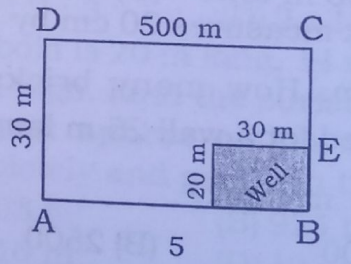
(A) 2.5 cm (B) 2, 66 cm
(C) 3 cm (D) 3.5 cm

56. A wooden box is made of a board 1 cm thick. It is 120 cm long, 80 cm wide and 60 cm high. Find the capacity of box and quantity of wood used.



(A) 42268 cm^3 (B) 42168 cm^3
(C) 43168 cm^3 (D) 24168 cm^3

57. A field is 500 m long and 30 m broad. A tank 30 m long 20 m broad and 12 deep is in the field and then earth is taken out of it is spread out of it equally over the field. How much does the level of field rise?

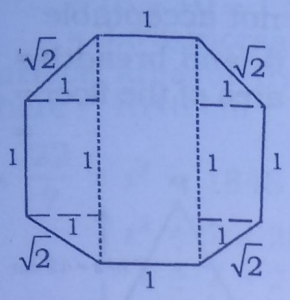


(A) 50 cm (B) 100 cm
(C) 80 cm (D) 60 cm

58. A rectangle piece of paper is 44 cm long and 10 cm wide. A cylinder is formed by rolling the paper along its length. Find the volume of cylinder.

(A) 350 cm (B) 616 cm
(C) 1540 cm (D) None

59. The figure below shows the length of the sides of an equiangular polygon. What is the area of the polygon?



(A) $14\sqrt{2}$ (B) 8
(C) 9 (D) 7

60. An aluminium metal sheet 27 cm long, 8 cm broad and 1 cm thick is melted into a cube. The difference in the surface areas of the two solids would be
(A) 284 cm^2 (B) 0
(C) 296 cm^2 (D) 286 cm^2

61. A farmer has four children. One day he decides to divide his field into triangular forms. the farmer's field is in the shape of a rhombus and has the distance between the pairs of opposite vertices as 120 m and 22 m. What would be the cost of fencing the field at ₹ 20 per metre?
(A) ₹ 7320 (B) ₹ 7,720
(C) ₹ 8,520 (D) ₹ 9,560

62. If three equal cubes are placed adjacently in a row, the ratio of the total surface of the new cuboid to that of the sum of the surface areas of the three cubes will be
(A) 5 : 9 (B) 1 : 3
(C) 2 : 3 (D) 7 : 9

63. An equilateral triangle and a regular hexagon are inscribed in a given circle. If a and b are the lengths of their sides respectively, then which one of the following is correct?
(A) $a^2 = 2b^2$ (B) $b^2 = 3a^2$
(C) $b^2 = 2a^2$ (D) $a^2 = 3b^2$

64. A solid is composed of a cylinder with hemispherical ends. If the whole length of the solid is 104 cm and the radius of each of the hemispherical ends is 7 cm, find the cost of polishing its surface at the rate of Re 1 per dm^2.
(A) ₹ 42.68 (B) ₹ 40.76
(C) ₹ 48.70 (D) ₹ 45.76

65. Find the mass of a 3.5 m long lead pipe, if the external diameter of the pipe is 2.4 cm, thickness of the metal is 2 mm and the mass of 1 cm^3 of lead is 11.4 g.
(A) $9.68\frac{1}{7}$ (B) $\frac{9.68}{7}$
(C) $\frac{9.68}{11}$ (D) $\frac{9.68}{9}$

66. A right triangle, whose sides are 15 cm and 20 cm, is made to revolve about its hypotenuse. Find the volume and the surface area of the double cone so formed. (Use $\pi = 3.14$)
(A) 3678 cm^3, 520 π
(B) 3867 cm^3, 524 π
(C) 3768 cm^3, 420 π
(D) 3876 cm^3, 424 π

67. A solid toy is in the form of a hemisphere surmounted by a right circular cone. Height of the cone is 2 cm and the diameter of the base is 4 cm. If a right circular cylinder circumscribes the solid, find how much more space will it cover?
(A) 4π cm^3 (B) 2π cm^3
(C) 16π cm^3 (D) 8π cm^3

SOLUTION

1. (D) Let the height of the cylindrical tank $= x$ cm

$\therefore$ Radius of tank $= \frac{3x}{4}$ cm

We know that 1 ml = 1 cm^3

38808 ml = 38808 cm^3

$\therefore$ Volume of the cylindrical tank $= \pi r^2 h$

$$\cong 38808 = \frac{22}{7} \times \left(\frac{3x}{4}\right)^2 \times x$$

$$\cong 38808 = \frac{22}{7} \times \frac{9}{16} \times x^3$$

$$\Rightarrow x^3 = \frac{38808 \times 7 \times 16}{22 \times 9}$$

$$= 21952$$

$\therefore$ $x = 28$ cm

$\therefore$ Radius $= \frac{3}{4} \times 28 = 21$ cm

$\therefore$ Diameter $= 2 \times 21 = 42$ cm

2.(D) Areas of walls $= 2(8 + 6)3$

$= 84$ sq. m.

Area of two windows and door

$$= 2 \times 1\frac{1}{2} \times 1 + 2 \times 1\frac{1}{2}$$

$= 6$ sq m

Area to be covered $= 84 - 6$

$= 78$ sq. m.

$\therefore$ length of paper $= \frac{78 \times 100}{50}$ m

$= 156$ m.

$\therefore$ cost $= ₹ \frac{156 \times 25}{100} = ₹ 39$

3.(C) Let the breadth $= 2h$ metres,

then height $= h$ metres.

Areas of walls $= 2(16 + 2h)h$ sq m

Area of paper 168×2 sq m

$\therefore$ $2(16 + 2h)h = 168 \times 2$

$\therefore$ $(8 + h)h = 84$

On solving, $h = 6, -14$;

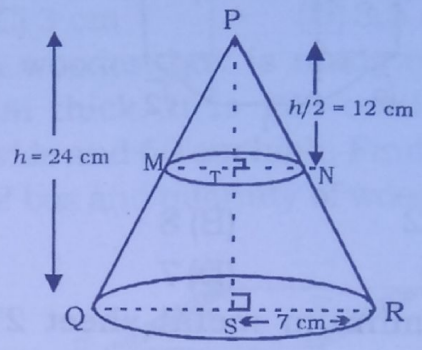
-14 is not acceptable

$\therefore$ $h = 6$, and breadth $= 12$

$\therefore$ area of the floor $= 16 \times 12$ sq. m

$= 192$ sq m

4.(B)



Let PQR be any right circular cone of height $h = 24$ cm

and the radius of the base = 7 cm

Again let T be the mid point of PS,

$\therefore$ PT = TS $= \frac{PS}{2} = \frac{h}{2} = 12$ cm

From the geometry of the figure,

$\Delta PRS \sim \Delta PNT$

$$\Rightarrow \frac{PR}{PN} = \frac{RS}{NT} = \frac{SP}{TP}$$

From, $\frac{RS}{NT} = \frac{SP}{TP}$

$$\Rightarrow \frac{7}{NT} = \frac{24}{12}$$

$$\Rightarrow NT = \frac{7}{2} = 3.5 \text{ CM}$$

$\therefore$ The volume of the upper portion i.e. the volume of the smaller cone

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

$$= \frac{1}{3} \times \frac{22}{7} \times (3.5)2 \times 15$$

$= 154$ cm^2

5. (B) Required percentage change

$$= +15 - 10 - \frac{15\times10}{100}$$

$$= 15 - 10 - 1.5$$

$$= 3.5\% \text{ increase}$$

6. (C) Total surface area of the metallic hemisphere $= 1848\ cm^2$

$$3 \times \frac{22}{7} \times r^2 = 1848$$

or $\quad r^2 = 7 \times 28 = 196$

$\therefore \quad r = 7 \times 2$

$= 14$

Volume of hemisphere

$$= \frac{2}{3}\times\frac{22}{7}\times14\times14\times14 \text{ c}$$

Radius of base of the cone = 14 cm

Height of the cone be h cm

$\therefore$ Volume of the cone

$$= \frac{1}{3}\times\frac{22}{7}\times 14\times 14\times h \text{ cc}$$

$$\therefore \frac{1}{3}\times\frac{22}{7}\times 14\times 14\times h$$

$$= \frac{1}{3}\times\frac{22}{7}\times 14\times 14\times 14$$

$h = 14 \times 2$ cm $= 28$ cm

7. (A) Required ratio of volume

$$= \frac{1}{3}.\pi.r^2.r : \frac{2}{3}\pi r^3 : \pi r^2.r.$$

$$= \frac{1}{3} : \frac{2}{3} : 1 = 1 : 2 : 3$$

8. (B) Let the side of the cube and radius of the sphere be a and r respectively

$\because \quad 6a^2 = 4\pi r^2$

$$\Rightarrow \quad a^2 = \frac{4}{6}\pi r^2$$

$$\Rightarrow \quad a^2 = r\left(\frac{2}{3}\pi\right)^{1/2}$$

$$\frac{r_1}{r_2}\frac{a^3}{\frac{4}{3}\pi r^3} = \frac{r^3\left(\frac{2}{3\pi}\right)^{3/2}}{\frac{4}{3}\pi r^3}$$

$$\frac{2\sqrt{2}\pi^{3/2}}{3\sqrt{3}} \times \frac{3}{4\pi} = \sqrt{\pi} : \sqrt{6}$$

9. (C) $\because$ H. C. F. of 6, 9 and 12 = 3

$\therefore$ Least possible number of cubes

$$= \frac{6\times9\times12}{3\times3\times3} = 24$$

10. (A) Volume of water $= 37\frac{1}{3}\times12\times8$ cu. m

Weight of water

$$= \frac{112}{3} \times 12 \times 8 \times 1000 \text{ kg}$$

$= 3584000$ kg

$= 3584$ metric tons

11. (B) The underlying concept for these type of questions is that the total volume of a solid does not change even when its shape changes.

$\therefore$ old volume = new volume

$\Rightarrow$ 1 cu. m. = 60000 × thickness

$$\Rightarrow \quad \text{thickness} = \frac{1}{60{,}000} \text{ m}$$

$= 0.0017$ cm.

12. (D) **Short-Cut Method:**

In such questions use the rule:

Possible number of cubes

$$= \left(\frac{\text{Original length of side}}{\text{New length of side}}\right)^3$$

$\therefore$ In this question possible number of cubes

$$= \left(\frac{3}{1}\right)^3 = 27$$

13. (B) Volume of Cylinder $= \pi r^2 h$

$$= 3 \times 3 \times \frac{22}{7} \times 14 \text{ cu m}$$

$= 396$ cu m

Curved surface

= Circumference × height

$$= 2 \times 3 \times \frac{22}{7} \times 14 \text{ sq m}$$

$= 264$ sq m

14.(A) **Short-cut Method:**

In such cases, use the rule:

$$\text{Volume} = \frac{\text{Height} \times (\text{other side of the sheet})^2}{4\pi}$$

$\therefore$ In the given question,

$$\text{Volume} = \frac{10 \times (22)^2}{4 \times \frac{22}{7}} \text{ m}^3$$

$$= 385 \text{ m}^3$$

15.(A) Volume of hemisphere $= \frac{2}{3}\pi r^3$

$$= \frac{2}{3} \times \frac{22}{7} \times 21 \times 21 \times 21 \text{ cm}^2$$

$$= 19404 \text{ cm}^3$$

Curved surface area of hemisphere

$$= 2\pi r^2$$

$$= 2 \times \frac{22}{7} \times 21 \times 21 \text{ cm}^2$$

$$= 2772 \text{ cm}^2$$

Total surface area of hemisphere

$$= 3\pi r^2$$

$$= 3 \times \frac{22}{7} \times 21 \times 21 \text{ cm}^2$$

$$= 4158 \text{ cm}^2$$

16.(C) Volume of cone

$$= \frac{1}{3} \times \text{Area of base} \times \text{height}$$

Ratio of radii = Ratio of diameters

Let h_1 & h_2 are heights of two cones and their radii are r_1 and r_2

Acccording to question:

$$h_1 : h_2 = 1 : 4$$

$$\equiv \quad 4h_1 = h_2$$

and $\quad r_1 : r_2 = 4 : 5$

$$\equiv \quad 5r_1 = 4r_2$$

$$\Rightarrow \quad \frac{5}{4} r_1 = r_2$$

$$\text{Ratio of their volume} = \frac{\frac{1}{3}\pi r_1^2 h_1}{\frac{1}{3}\pi r_2^2 h_2}$$

$$= \frac{r_1^2 h_1}{r_2^2 h_2} = \frac{r_1^2 h_1}{(\frac{5}{4} r_1)^2 . 4h_1}$$

$$= \frac{4}{25}$$

17.(B) Volume of circular cylinder $= \pi r^2 h$

If initial radius = 10 cm

and height = 10 cm

So,

initial volume $= \pi \times 10^2 \times 10^2 \text{ cm}^3$

$= 1000 \pi \text{cm}^3$

After increment, New radius

$$= 10 \text{ cm} + 10 \times \frac{10}{100} \text{ cm}$$

$$= 11 \text{ cm}$$

New height $= 10 \text{ cm} + 10 \times \frac{10}{100} \text{ cm}$

$$= 11 \text{ cm}$$

so, New volume of cylinder

$$= \pi \times 11^2 \times 11 \text{ cm}^3$$

$$= 1331 \pi \text{ cm}^3$$

Increased volume of cylinder

$$= (1331\pi - 1000\pi) \text{ cm}^3$$

$$= 331\pi \text{ cm}^3$$

$$\% \text{ volume increment} = \frac{331\pi}{1000\pi} \times 100$$

$$= 33.1\%$$

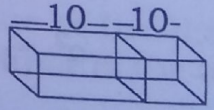
18.(B) Let the height upto which water rises in cylindrical vessel = h cm

Then,

$$\pi \times 20 \times 20 \times h = \frac{1}{3} \times \pi \times 10 \times 10 \times 48$$

$$h = \frac{16}{4} = 4 \text{ cm}$$

19.(C)



$l = 20, b = 10, h = 10$

Total Surface of a cuboid so formed

$= 2(lb + bh + lh)$

$= 2(20 \times 10 + 10 \times 10 + 10 \times 20)$

$= 2(200 + 100 + 200)$

$= 2(500) = 1000$

20.(B) Edge of the cube $= \sqrt[3]{343} = 7$ cm

$\therefore$ Radius of cone = 3.5 cm

Height = 7 cm

Volume of cone

$$= \frac{1}{3}\pi r^2 h$$

$$= \frac{1}{3} \times \frac{22}{7} \times 3.5 \times 3.5 \times 7$$

$$= \frac{1}{3} \times 22 \times 12.25$$

$$\approx 90 \text{ cc}$$

21.(B) Hall's Volume $= l.b.h. = 12 \times 10 \times 8$

$= 960 \text{ m}^3$

22.(A) Let the dimensions are $2x$, $3x$, $4x$ respectively

$\therefore 2x \times 3x \times 4x = 3000$

$\Rightarrow x^3 = 125$

$\therefore x^3 = 53 \Rightarrow x = 5$

$\Rightarrow$ Surface area of cuboid

$= 2(lb + bh + lh)$

$= 2(2x \times 3x + 3x \times 4x + 4x \times 2x)$

$= 2(6x^2 + 12x^2 + 8x^2 +)$

$= 2 \times 26x^2$

$= 2 \times 26 \times 25 = 1300 \text{ cm}^2$

23.(A) Ratio between edges

= ratio between cube roots of volumes

$= \sqrt[3]{8:27} = 2:3$

24.(A) Volume of water that has risen

= volume of stone (cube)

$= (2)^3 = 8 \text{ m}^3$

25.(D) Area of sheet $= 600 \text{m}^2$

$\therefore$ Volume of sheet = volume of metal

$\therefore$ area $\times$ thickness $= 1\text{m}^3$

$\therefore$ $600 \times$ thickness $= 1$

$$\therefore \text{thickness} = \frac{1}{600} \text{ m}$$

$$= \frac{1}{600} \times 100$$

$$= \frac{1}{6} \text{ cm}$$

26.(C) Volume of the earth taken out

= volume of the well

$= \pi r^2 h$

$$= \frac{22}{7} \times 3.5 \times 3.5 \times 40$$

$$= 1540 \text{ m}^3$$

27.(B) Let heights of the cylinders are h and $2h$ respectively

$\therefore$ First cylinder's volume = second cylinder's volume

$\pi r_1^2 . h = \pi r_2^2 . 2h$

$\Rightarrow r_1^2 = r_2^2 \times 2$

$r_1 = r_2 \times \sqrt{2}$

$$\Rightarrow \frac{r_1}{r_2} = \frac{\sqrt{2}}{1}$$

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

28.(A) Volume of the metal

= Volume of the empty sphere

$$= \frac{4}{3}\pi(R^3 - r^3) = \frac{4}{3} \times \frac{22}{7} (14^3 - 7^3)$$

$$= \frac{4}{3} \times \frac{22}{7} \times (2744 - 343)$$

$$= \frac{4}{3} \times \frac{22}{7} \times 2401$$

$$= 10061 \frac{1}{3} \text{ cm}^3$$

29.(D) The slant height of the cone

$= \sqrt{64 + 36} = \sqrt{100} = 10\text{m}$

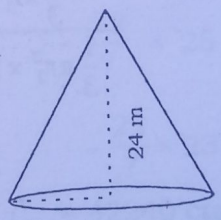
$\therefore$ Required canvas

= curved area of the cone

$= \pi rl$

$= \pi \times 6 \times 10 = 60\pi \text{m}^2$

30.(D)



$\therefore l^2 = h^2 + r^2 = 24^2 + 7^2$

$l = 25$ m

Curved surface area $= \pi rl =$ Area of tent

$$\frac{22}{7} \times 7 \times 25 = 2.5 \times L$$

$L = 220$ m

L = length of tent required which has breadth 2.5 m.