Mensuration

MENSURATION

Mensuration is the science of measurement of the lengths of lines, areas of surfaces and volumes of solids.

Perimeter

Perimeter of a polygon is the sum of its all the sides. It is measured in cm, m, etc.

Area

The area of any figure is the amount of surface enclosed within its boundary lines. This is measured in square unit like cm^2, m^2, etc.

Volume

If an object is solid, then the space occupied by such an object is called its volume. This is measured in cubic unit like cm^3, m^3, etc.

PART I: PLANE FIGURES

TRIANGLE

Perimeter $(P) = a + b + c$

Area $(A) = \sqrt{s(s-a)(s-b)(s-c)}$,

where $s = \frac{a+b+c}{2}$ and a, b and c are three sides of the triangle.

Also, $A = \frac{1}{2} \times bh$; where b = base, h = altitude

Equilateral Triangle

Perimeter = $3a$

Area $= \frac{\sqrt{3}}{4} a^2$; where a = side

Right Triangle

Area $= \frac{1}{2} pb$ and $h^2 = p^2 + b^2$ (Pythagoras theorem)

where p = perpendicular
b = base
h = hypotenuse

Shapes	Area (a)	Perimeter (P)	Diagonal (d)	Nomenclature
Square	a^2	$4a$	$\sqrt{2}$a	Side = a
Rectangle	$l \times b$	$2(l + b)$	$\sqrt{2}(l^2 + b^2)$	Length = l, Breadth = b
Rhombus	$1/2 \times d_1 \times d_2$	$4a$	$2A/d_2$	Diagonals = d_1 and d_2
Parallelogram	$p \times h$	$2(p + q)$	$\sqrt{p^2 + q^2 - 2pqcos\beta}$	Base = P Side = q Angle = β
Circle	πr^2	$2\pi r$	–	Radius = r
Semi-Circle	$(\pi r^2)/2$	R (π+ 2)	–	

Shape	Volume	Surface Area
Cude	x^2	$6x^2$
Cuboid	$l \times b \times h$ l : length b: breadth h: height	$2lb + 2bh + 2lh$
Prism	Cross – section × Height	Add up areas of each sides
Cylinder	$\pi r^2 h$	$2\pi r^2 + 2\pi rh$
Pyramid	$\frac{1}{3}$ × base area × height	Add up areas of each sides
*Cone	$\frac{1}{3}\pi r^2 h$	$\pi r^2 + 2\pi rl$ l : slant height
*Sphere	$\frac{4}{3}\pi r^2$	$4\pi r^2$

EXERCISE

1. The length of a rectangular plot is thrice its breadth. If the area of the rectangular plot is 7803 sq. mts., what is the breadth of the rectangular plot?
(a) 51 metre (b) 153 metre
(c) 104 metre (d) 88 metre
(e) None of these

2. Area of a rectangle is equal to the area of the circle whose radius is 21 cm. If the length and the breadth of the rectangle are in the ratio of 14 : 11 respectively, what is its perimeter?
(a) 142 cm. (b) 140 cm.
(c) 132 cm. (d) 150 cm.
(e) None of these

3. The total area of a circle and a square together are equal to 2611 sq. cm. The diameter of the circle is 42 cms. What is the sum of the circumference of the circle and the perimeter of the square ?
(a) 272 cms. (b) 380 cms.
(c) 280 cms. (d) Cannot be determined
(e) None of these

4 The area of a rectangle is 4 times the area of a square. The length of the rectangle is 90 cm and the breadth of the rectangle is $\frac{2}{3}$ of the side of the square. What is the side of the square ?
(a) 10 cm (b) 20 cm
(c) 9 cm (d) Cannot be determined
(e) None of these

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

6. If the circumference of a circle is decreased by 50% then the percentage of decrease in its area is
(a) 25 (b) 50 (c) 60 (d) 75

7. 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
(a) 2.5 (b) 3 (c) 3.5 (d) 4

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

11. 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
(a) 4 (b) 6 (c) 8 (d) 15

12. 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 $\pi = \frac{22}{7}$)
(a) 7 (b) 10 (c) 11 (d) 14

13. 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
(a) 2 (b) $1\frac{1}{2}$ (c) 3 (d) $2\frac{1}{2}$

14. The wheel of a motor car makes 1000 revolutions in moving 440 m. The diameter (in metre) of the wheel is
(a) 0.44 (b) 0.14 (c) 0.24 (d) 0.34

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

16. Diagonal of a cube is $6\sqrt{3}$ cm. Ratio of its total surface area and volume (numerically) is:
(a) 2 : 1 (b) 1 : 6 (c) 1 : 1 (d) 1 : 2

17. The ratio of in radius and circumradius of a square is :
(a) 1 : 2 (b) 1 : $\sqrt{2}$
(c) $\sqrt{2}$: $\sqrt{3}$ (d) 1 : 3

18. If area of an equilateral triangle is a and height b, then value of $\frac{b^2}{a}$ is:
(a) 3 (b) $\frac{1}{3}$ (c) $\sqrt{3}$ (d) $\frac{1}{\sqrt{3}}$

19. 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:
(a) 900 (b) 1200
(c) 1800 (d) 720

20. If the volumes of two right circular cones are in the ratio 4 : 1 and their diameters are in the ratio 5 : 4 then the ratio of their heights is :
(a) 25: 16 (b) 25: 64
(c) 64 : 25 (d) 16: 25

21. The four equal circles of radius 4 cm. drawn on the four corners of a square touch each other externally. Then the area of the portion between the square and the four sectors is
(a) $9(\pi - 4)$ sq. cm (b) $16(4 - \pi)$ sq. cm
(c) $99(\pi - 4)$ sq. cm (d) $169(\pi - 4)$ sq. cm

22. $ABCD$ is a parallelogram in which diagonals AC and BD intersect at O. If E, F, G and H are the mid-points of AO, DO, CO and BO respectively, then the ratio of the perimeter of the quadrilateral $EFGH$ to the perimeter of parallelogram ABCD is

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

23. The length of a room floor exceeds its breadth by 20m. The area of the floor remains unaltered when the length is decreased by 10 m but the breadth is increased by 5 m. The area of the floor (in square meters) is:

(a) 280 (b) 325 (c) 300 (d) 420

24. Three solid iron cubes of edges 4 cm, 5 cm and 6 cm are melted together to make a new cube. 62 cm^3 of the melted material is lost due to improper handing. The area (in cm^2) of the whole surface of the newly formed cube is

(a) 294 (b) 343 (c) 125 (d) 216

25. A cylindrical can whose base is horizontal and is of internal radius 3.5 cm contains sufficient water so that when a solid sphere is placed inside, water just covers the sphere. The sphere fits in the can exactly. The depth of water in the can before the sphere was put, is

(a) $\frac{35}{3}$ cm (b) $\frac{17}{3}$ cm (c) $\frac{7}{3}$ cm (d) $\frac{14}{3}$ cm

26. A conical cup is filled with ice-cream. The ice-cream forms a hemispherical shape on its open top. The height of the hemispherical part is 7 cm. The radius of the hemispherical part equals the height of the cone. Then the volume of the ice-cream is $\left[\pi = \frac{22}{7}\right]$

(a) 1078 cubic cm (b) 1708 cubic cm
(c) 7108 cubic cm (d) 7180 cubic cm

27. The portion of a ditch 48 m long. 16.5 m wide and 4 m deep that can be filled with stones and earth available during excavation of a tunnel, cylindrical in shape, of diameter 4 m and length 56 m is $\left[\text{Take } \pi = \frac{22}{7}\right]$

(a) $\frac{1}{9}$ Part (b) $\frac{1}{2}$ Part
(c) $\frac{1}{4}$ Part (d) $\frac{2}{9}$ Part

28. Assume that a drop of water is spherical and its diameter is one tenth of a cm. A conical glass has a height equal to the diameter of its rim. If 32000 drops of water fill the glass completely, then the height of the glass (in cm.) is

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

29. Water flows at the rate of 10 metres per minute from cylindrical pipe 5 mm in diameter. How long it will take to fill up a conical vessel whose diameter at the base is 30 cm and depth is 24 cm?

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

30. The length, breadth and height of a cuboid are in the ratio 1 : 2 : 3. If they are increased by 100%, 200% and 200% respectively. then compared to the original volume the increase in the volume of the cuboid will be

(a) 5 times (b) 18 times
(c) 12 times (d) 17 times

31. A hemispherical cup of radius 4 cm is filled to the brim with coffee. The coffee is then poured into a vertical cone of radius 8 cm and height 16 cm. The percentage of the volume of the cone that remains empty is:

(a) 87.5% (b) 80.5% (c) 81.6% (d) 88.2%

32. The shape of an object is a right circular cylinder with a hemisphere on bottom and a right circular cone on the top. The radius of the cylinderical part is 5 cm and the height of cylinder part is 2.6 times the radius. What is the total height of the object, if the surface area of the object is770 cm^2?

(a) 18 cm (b) 35 cm (c) 12 cm (d) 30 cm

33. Two concentric circles are drawn with radii 12 cm and 13 cm. What will be the length of any chord of the larger circle that is tangent to the smaller circle?

(a) 5 cm (b) 8 cm (c) 10 cm (d) 25 cm

34. A cylindrical tank of radius 5.6 m and depth of 'h' m is built by digging out earth. The sand taken out is spread all around the tank to form a circular embankment to a width of 7 m. What is the depth of the tank. If the height of the embankment is 1.97 m?

(a) 4.2 m (b) 7 m (c) 8 m (d) 6.7 m

Hints & Solutions

1. (a) Let the breadth be x metres.
Then, length = $3x$ metres
$\therefore$ Area $\Rightarrow 3x \times x = 7803$
$\Rightarrow x^2 = \frac{7803}{3} = 2601$
$\Rightarrow x = \sqrt{2601} = 51$ metres

2. (d) Area of rectangle = Area of circle
$= \frac{22}{7} \times 21 \times 21 = 1386\ cm^2$
Let the length and breadth of rectangle be $14x$ and $11x$ respectively.
Then $14x \times 11x = 1386$
$\Rightarrow x^2 = \frac{1386}{14 \times 11} = 9 \Rightarrow x = \sqrt{9} = 3$

Perimeter of rectangle = 2 (14x + 11x)

$\Rightarrow$ 2 × 25 × 3 = 150 cm.

3. (a) Area of circle $= \frac{22}{7} \times \left(\frac{42}{2}\right)^2 = 1386$ cm^2

Area of square = 2611 – 1386 = 1225 cm^2

Side of square = $\sqrt{1225}$ = 35 cm.

$\therefore$ Required sum = $2 \times \frac{22}{7} \times 21 + 4 \times 35$

= 132 + 140 = 272 cm.

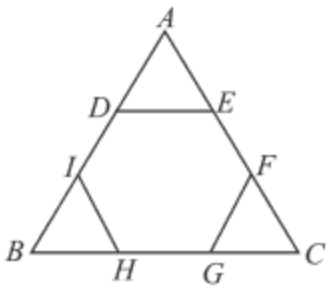
4. (e) Let the side of the square be x cm.

Area of square = x^2

Area of rectangle = $90 \times \frac{2}{3}x$

$90 \times \frac{2}{3}x = 4x^2 \Rightarrow x = 15$ cm

5. (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.

6. (d) Circumference = 2πr (one variable)

$\therefore$ The decrease in area $= -50 - 50 + \frac{50 \times 50}{100} = -75\%$

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

$\therefore$ $\pi \times 0.1 \times 0.1 \times 3600$ cm^3 $\Rightarrow$ 36π cm^3

Volume cylinder = vol. sphere

Volume of the sphere $= \frac{4}{3}\pi R^3 = 36\pi$

$\Rightarrow R^3 = \frac{36 \times 3}{4} = 27 \quad \therefore \quad R = \sqrt[3]{27} = 3$ cm

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

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

$\therefore$ Perimeter of semi-circle = (π + 2)r

where r = radius

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

$\Rightarrow r = \frac{36 \times 7}{36} = 7$ 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 × 40 × 3 m^3 = 240000 m^3

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

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

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

$\therefore$ Second side of triangle = 40 – 17 – x = 23 – x

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

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

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

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

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

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

$\Rightarrow$ $x = 8$ or 15

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

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

$\therefore$ $2\pi r = 44$

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

13. (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.

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

$\therefore$ $\pi \times$ diameter = $\frac{440}{1000}$

$\Rightarrow$ $\frac{22}{7} \times$ diameter = $\frac{440}{1000}$

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

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

$\therefore$ 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.

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

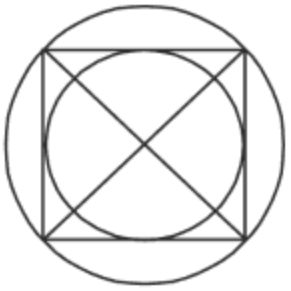
$\sqrt{3} \times$ side = $6\sqrt{3}$

$\therefore$ Side of a cube = 6

Surface area of cube = $6 \times (\text{side})^2 = 6 \times 6^2$
Volume of cube = $(\text{side})^3 = (6)^3$

Required ratio = $\frac{6\times6^2}{6^3} = \frac{1}{1}$ or 1 : 1

17. (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 = $\frac{\text{Side}}{2} : \frac{\text{Side}}{\sqrt{2}} = 1:\sqrt{2}$

18. (c) Let side of triangle = x

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

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

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

Putting x in equation (i)

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

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

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

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

$\Rightarrow \quad 27h = 15 \times 12$

$\Rightarrow \quad h = \frac{15\times12}{27} = \frac{20}{3}$ meter

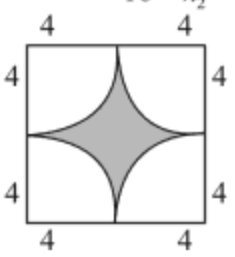
$\therefore$ Volume of the godown

$= \frac{15\times12\times20}{3} = 1200$ cu. meter

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

$\Rightarrow \quad \frac{4}{1} = \frac{25}{16}\times\frac{h_1}{h_2} \quad \Rightarrow \quad \frac{h_1}{h_2} = \frac{16\times4}{25} = \frac{64}{25}$

21. (b)

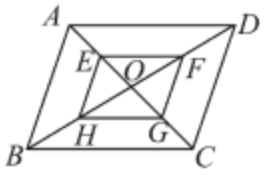


Area of shaded portion = $8 \times 8 - p \times 4^2$

$= 64 - 16\pi = 16(4 - \pi)\text{cm}^2$

22. (c) In ΔOBC,

H and G are the midpoints of OB and OC



$\therefore \quad HG = \frac{1}{2}BC$

Similarly, $FG = \frac{1}{2}CD$ and $EF = \frac{1}{2}AD$,

$HE = \frac{1}{2}AB$

On adding,

$HE + HG + FG + EF = \frac{1}{2}(AB + BC + CD + AD)$

perimeter of $EFGH = \frac{1}{2}\times$ perimeter of $ABCD$

$\frac{\text{Perimeter of } EFGH}{\text{Perimeter of } ABCD} = \frac{1}{2}$

23. (c) Let the breadth = x cm

$\Rightarrow$ length = $(x + 20)$ cm

According to the question,

$5(x + 20) = (x + 10)(x + 5)$

$\Rightarrow \quad x^2 + 20x = x^2 + 15x + 50$

$\Rightarrow \quad 5x = 50 \quad \Rightarrow \quad x = 10$

$\Rightarrow$ Area = $10(10 + 20) = 300\ \text{m}^2$

24. (a) Volume of all three cube = $4^3 + 5^3 + 6^3$

$= 64 + 125 + 216\ \text{cm}^3 = 405\ \text{cm}^3$

Now, 62 cm^3 is lost

$\therefore$ Volume of new cube = 405 – 62 = 343

$(\text{side of new cube})^3 = 343$

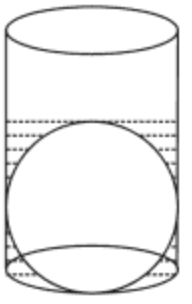
side of new cube = $\sqrt[3]{343} = 7$

Total surface area of new cube

$= 6\ (\text{side})^2 = 6 \times (7)^2 = 6 \times 49 = 294\ \text{cm}^2$

25. (c) Height of water after ball is immersed

$= 3.5 \times 2 = 7$ cm



$\Rightarrow$ Volume of water

$= \pi r^2 h - \frac{4}{3}\pi r^3$

$= \pi r^2\left(h - \frac{4}{3}r\right)$

$= \frac{22}{7}\times3.5\times3.5\left(7 - \frac{4}{3}\times3.5\right)$

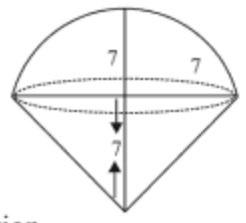
$= 11\times3.5\left(\frac{7}{3}\right) = \frac{269.5}{3}\ \text{cm}^3$

Volume of water before ball was immersed

$= \pi(3.5)^2 \times h = \frac{269.5}{3}$

$= h = \frac{269.5\times7}{3\times3.5\times3.5\times22} = \frac{7}{3}$ cm

26. (a)



In the question,
Radius of hemisphere = Radius of cone
= height of cone = 7 cm
∴ Height of hemisphere
= radius of hemisphere
Volume of ice-cream
= Volume of hemisphere part
+ Volume of conical part

$$= \frac{2}{3} \times \frac{22}{7} \times (7)^3 + \frac{1}{3} \times \frac{22}{7} \times 7^3$$

$$= \frac{22}{7} \times 7^3 = 22 \times 7^2 = 1078 \text{ cm}^3$$

27. (d) Let part filled be 'x'
ATQ,

$$x \times (48\text{m} \times 16.5\text{m} \times 4\text{m}) = \pi(2)^2 \times 56$$

$$x = \frac{22 \times 4 \times 56}{7 \times 48 \times 16.5 \times 4}$$

$$x = \frac{2}{9}$$

28. (b) According to the question,

$$\text{Radius of the drop of water} = \frac{1}{20} \text{ cm}$$

$$\therefore \quad \text{Volume of drop of water} = \frac{4}{3} \times \frac{1}{20 \times 20 \times 20} \times \pi$$

$$\text{Volume of 32000 drops} = \frac{4}{3} \times \frac{\pi}{8000} \times 32000 = \frac{16}{3}\pi$$

∴ Volume of 32000 drops of water
= Volume of cone

$$\Rightarrow \quad \frac{16\pi}{3} = \frac{1}{3} \times \pi r^2 \times h$$

and from question $2r = h$

$$\therefore \quad r = \frac{h}{2}$$

$$\frac{16\pi}{3} = \frac{1}{3}\pi \times \frac{h^2}{4} \times h$$

$$16 \times 4 = h^3 \quad \Rightarrow \quad h = 4 \text{ cm}$$

29. (a) Diameter = 5 mm = 0.5 cm
Radius = 0.25 cm
Volume of water flowing from the pipe in 1 minute
$= \pi \times 0.25 \times 0.25 \times 1000 \text{ cm}^3$

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

$$\therefore \quad \text{Time} = \frac{\frac{1}{3} \times \pi \times 15 \times 15 \times 24}{\pi \times 0.25 \times 0.25 \times 1000} = 28\frac{4}{5} \text{ minutes}$$

= 28 minutes 48 second

30. (d)

Length	1	→	2
Breadth	2	→	6
Height	3	→	9
Volume	6	→	108

⇒ New volume = 18 times the original volume
⇒ Increase in volume = 18 – 1 = 17 times

31. (a) $\text{Volume of coffee} = \frac{2}{3}\pi r^3 = \frac{2}{3} \times \pi \times (4)^3$

$$= \frac{128}{3}\pi \text{ cm}^3$$

$$\text{Volume of cone} = \frac{1}{3}\pi r^2 \times h$$

$$= \frac{1}{3}\pi (8)^2 \times 16 = \frac{1024}{3}\pi$$

∴ Required percentage

$$= \frac{\left(\frac{1024}{3} - \frac{128}{3}\right)\pi}{\frac{1024}{3}\pi} \times 100 = 87.5\%$$

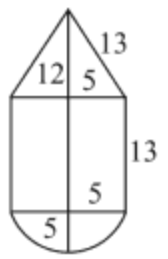
32. (d) $\pi rl + 2\pi rh + 2\pi r^2 = 770$

$$\pi r(l + 2h + 2r) = 770$$

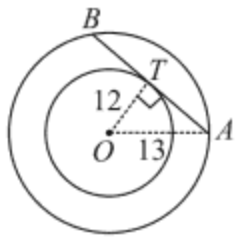
$$\frac{22}{7} \times 5(l + 13 \times 2 + 10) = 770$$

$$l + 26 + 10 = 49 \Rightarrow l = 13$$

Height of cone = 12 (pythagours)
Total height = 12 + 5 + 13 = 30 cm.



33. (c)



Line BTA is the tangent of small circle
OT will make ⊥ on line AB
Then in right angle Δ OTA

$$(AT) = \sqrt{(13)^2 - (12)^2} = \sqrt{25}$$

$AT = 5 \Rightarrow AB = 10$ cm

34. (c) Volume of soil = $\pi r^2 h = \pi \times 5.6 \times 5.6 \times h$
Area of Platform = $\pi R^2 - \pi r^2 = \pi (R^2 - r^2)$
Height of Platform = 1.97 m
$R = 12.6\ m \quad \Rightarrow \quad r = 5.6$
Now, $\pi (R^2 - r^2) \times \text{height} = \pi \times 5.6 \times 5.6 \times h$

$$\Rightarrow \quad \pi (R - r)(R + r) \times 1.97 = \pi \times 5.6 \times 5.6 \times h$$

$$\Rightarrow \quad 7 \times (18.2) \times 1.97 = 5.6 \times 5.6 \times h$$

$$\Rightarrow \quad 250.98 = 31.36 \times h$$

$$\therefore \quad h = \frac{250.98}{31.36} = 8.0031 \text{ m. or } 8 \text{ m. (Approx)}$$