




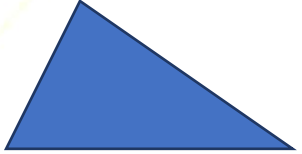
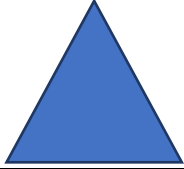
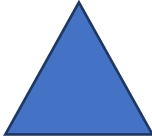


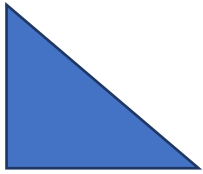


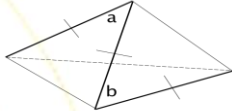

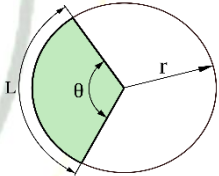
**MANIDHANA EYAM FREE IAS ACADEMY – TNPSG GROUP – I MAINS EXAM
PAPER – II – UNIT – III – GENERAL APTITUDE & MENTAL ABILITY**

AREA & VOLUME

Mensuration- 2D

Shape	Area	Perimeter/ Circumference	Figure
Square	a^2	$4a$	
Rectangle	$l \times b$	$2(l + b)$	
Circle	πr^2	$2\pi r$	
Semi-circle	$\pi r^2/2$	$r(\pi+2)$	
Quarter Circle	$\pi r^2/4$	$(\pi r/2)+2r$	
Scalar Triangle	$\sqrt{s(s-a)(s-b)(s-c)}$, Where, $s = (a+b+c)/2$	$a+b+c$	
Isosceles Triangle	$\frac{1}{2} \times b \times h$	$2a + b$	
Equilateral Triangle	$(\sqrt{3}/4) \times a^2$	$3a$	

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Right Angle Triangle	$\frac{1}{2} \times b \times h$	$b + \text{hypotenuse} + h$	
Rhombus	$\frac{1}{2} \times d_1 \times d_2$	$4 \times \text{side}$	
Parallelogram	$b \times h$	$2(l+b)$	
Quadrilateral	$\frac{1}{2} \times d \times (h_1 + h_2)$	$a+b+c+d$	
Trapezium	$\frac{1}{2} h(a+c)$	$a+b+c+d$	
Sector	$\pi r^2 \times \left(\frac{\theta}{360}\right)$	$2r+L$	

Q.1) The area of a rectangular land is 240m^2 . If 8 CM is decreased from its length it will become a square. Then the length and breadth of the land respectively are...

- (A) 12 cm, 20 cm
- (B) 20 cm, 12 cm
- (C) 12 cm, 8 cm
- (D) 20 cm, 8 cm

Ans: B

Solution: Let the breadth of the given rectangle be 'X' cm.

Then, length (X + 8) cm

Now area 240cm^2

Area of rectangle=length x breadth= (x + 8) x x =240

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$$x^2 + 8x - 240 = 0$$

$$x = 12 \text{ or } x = -20$$

But x cannot be negative, So, x = 12

Hence, length = $x + 8 = 12 + 8 = 20$ cm and breadth = 12 cm

Q.2) Find the side of the equilateral triangle if the area of an equilateral triangle is

$$900\sqrt{3} \text{ cm}^2$$

- (A) 30 cm
- (B) 90 cm
- (C) 60 cm
- (D) 120 cm

Ans: 60

Solution: The area of equilateral triangle is 900 cm^2

Since, the area of equilateral triangle = $\frac{\sqrt{3}}{4} a^2$

Therefore, $\frac{\sqrt{3}}{4} a^2 = 900\sqrt{3}$

$$a^2 = 4 \times 900 \rightarrow a = 60$$

Q.3) The semi perimeter of a triangle having sides 15 cm, 20 cm and 25 cm is

- (A) 60
- (B) 65
- (C) 30
- (D) 35

Ans: C

Solution: Perimeter of a triangle = Sum of their side lengths = $A + B + C$

$$\text{Perimeter} = 15 + 20 + 25 = 60$$

$$\text{So, Semi-perimeter} = 60/2 = 30$$

Q.4) Find the area of a semicircle whose radius is 28 cm.

- (A) 618 cm^2
- (B) 144 cm^2
- (C) 1232 cm^2
- (D) 784 cm^2

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Ans: B

Solution: Area of semi-circle = $\pi r^2/2$
 $= (1/2) \times (22/7) \times 28 \times 28$
 $= 1232 \text{ cm}^2$

Q.5) A horse is tethered to one corner of a rectangular field of dimensions 60 m by 42 m by a rope 14 m long for grazing. How much area can? The horse left ungrazed?

- (A) 2366 m²
 (B) 1827 m²
 (C) 1366 m²
 (D) 2212 m²

Ans: A

Solution: Area of the grazed field = $(\frac{\theta}{360}) \times \pi r^2$
 Area of the grazed field = $(\frac{90}{360}) \times \pi \times 14 \times 14 = 154 \text{ m}^2$
 Total area of the field = $60 \times 42 = 2520 \text{ m}^2$
 Area left ungrazed = Total area of the field - Area of the grazed field
 $= 2520 - 154 = 2366 \text{ m}^2$

Q.6) The radius of a cart wheel is 35 cm. How many revolutions does it make in travelling a distance of 154 m

- (A) 70
 (B) 189
 (C) 119
 (D) 86

Ans: A

Solution: According to the question, We need to cover 154 m distance
 $154 \text{ m} = 15400 \text{ cm}$
 The distance cover in one revolution = $2\pi r$
 $\Rightarrow 2 \times (22/7) \times 35 = 220 \text{ cm}$
 Number of revolutions = $15400/220 = 70$

Q.7) The sides of a triangle are 8 m, 10 m and 6 m, then the area of the triangle is

- (A) 18 m²
 (B) 24 m²
 (C) 86 m²
 (D) 72 m²

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Ans: B

Solution: Area of Scalar Triangle = $\sqrt{[s(s-a)(s-b)(s-c)]}$, Where, $s = (a+b+c)/2$

$$s = \frac{8+10+6}{2} = 12$$

$$Area = \sqrt{(12(12-8)(12-10)(12-6))}$$

$$Area = 24 \text{ m}^2$$

Q.8) The ratio of length and breadth of a rectangle is 3:2 respectively. The respective ratio of its perimeter and area is 5:9. What is the breadth of the rectangle in metres?

- (A) 6 m
- (B) 8 m
- (C) 9 m
- (D) 13 m

Ans: A

Solution: The breadth of the rectangle is 6m.

The ratio of Length and Breadth = 3:2

Let the length and breadth be $3x$ and $2x$ respectively

Perimeter of the rectangle = $2(3x + 2x) = 10x$

Area of the rectangle = $3x \times 2x = 6x^2$

Now the ratio of perimeter and area is given as 5:9

So, we can form the equation as: $10x/6x^2 = 5/9 \Rightarrow x = 3$

Hence, the breadth of the rectangle is $2x = 2 \times 3 = 6\text{m}$

Q.9) If the side of a square is increased by 20%. Then its area is increased by

- A) 20%
- B) 40%
- C) 60%
- D) 44%

Ans: D

Solution: Assume initial Area Percentage = 100%

If Area is increased by 20%, then new area percentage = $100 \times (120/100) \times (120/100) = 144\%$

Then, Increased area percentage is 44%

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Q.10) Find the length of the altitude of an equilateral triangle of sides $3\sqrt{3}$ cm

- (A) 5.4
- (B) 4.5
- (C) 4.0
- (D) 4.2

Ans: B

Solution: Side of an equilateral $\Delta ABC = 3\sqrt{3}$ cm.

$$AC = BC = 3\sqrt{3} \text{ cm}$$

Let $AD = h$ (Altitude)

$$BD = 3\sqrt{3} / 2 \text{ (ALTITUDE BISECTS THE BASE)}$$

$$AB^2 = AD^2 + BD^2 \Rightarrow (3\sqrt{3})^2 = h^2 + (3\sqrt{3} / 2)^2$$

$$27 = h^2 + (27/4) \Rightarrow h^2 = 27 - (27/4) = 81/4$$

$$h = 9/2 = 4.5 \text{ cm}$$

Q.11) What would be the measure of the diagonal of a square whose area is equal to 882 cm^2 ?

- (A) 38 cm
- (B) 42 cm
- (C) 32 cm
- (D) 48 cm

Ans: B

Solution: Area of a square = 882 sq.cms

$$\text{Area} = (\text{Side})^2 = 882$$

$$\text{Side} = \sqrt{882}$$

$$\text{Diagonal of a square} = \sqrt{2} \times \text{side} = \sqrt{882} \times \sqrt{2}$$

$$\text{Diagonal of a square} = 42 \text{ cm}$$

Q.12) The radius and length of arc of a sector are 10 cm and 15 cm respectively. Find its perimeter?

- (A) 35 cm
- (B) 15 cm
- (C) 25 cm
- (D) 30 cm

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Ans: A

Solution: Perimeter of Sector = $2r + L = (2 \times 10) + 15 = 35$ cm

Q.13) In a circle of radius 10 cm, an arc subtends an angle of 90° at the centre. Find the area of major sector.

- (A) $1650/3$ cm²
- (B) $1650/9$ cm²
- (C) $1650/11$ cm²
- (D) $1650/7$ cm²

Ans: D

Solution: Area of arc = $\pi r^2 \times \left(\frac{\theta}{360}\right) = (22/7) \times 10 \times 10 \times \left(\frac{90}{360}\right) = \frac{1650}{7}$ cm²

Q.14) The perimeter of a rectangle is 60 metres. If its length is twice its breadth, then its area is

- (A) 160 m²
- (B) 180 m²
- (C) 200 m²
- (D) 220 m²

Ans: C

Solution: Let the breadth of the rectangle be x metres

Then, length of the rectangle = 2x metres

Perimeter of rectangle = $2(\text{Length} + \text{Breadth}) = 2(2X + X) = 60$

So, length = 20 m, breadth = 10 m

Area = $(20 \times 10) = 200$ m²

Q.15) In a circular path, the radii of 2 concentric circles are 56 m and 49 m. Find the area of the circular path.

- (A) 3210 m²
- (B) 3120 m²
- (C) 2310 m²
- (D) 2130 m²

Ans: C

Solution: Let R, r are radii of two concentric circles.

$R = 56$ cm, $r = 49$ cm

area of the pathway = $\pi R^2 - \pi r^2$

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$$= \pi (56 + 49) (56 - 49) = (22/7) 105 \times 7$$

$$= 22 \times 105 = 2310 \text{ cm}^2$$

Q.16) A playground 60 m x 40 m is extended on all sides by 3 m. What is the extended area

- (A) 366 m²
- (B) 636 m²
- (C) 666 m²
- (D) 638 m²

Ans: B

Solution: Length of rectangular park with path = 60 + 3 + 3 = 66m

Breadth of rectangular park with path = 40 + 3 + 3 = 46m

Area of path = Area of park with path - Area of park without path

$$= (66 \times 46) - (60 \times 40) = 3036 - 2400 = 636 \text{ m}^2$$

Q.17) The measures of the angles of a triangle are in the ratio 5:4:3. Find the angles of the triangle?

- (A) 65°, 60° and 55°
- (B) 85°, 50° and 45°
- (C) 75°, 70° and 35°
- (D) 75°, 60° and 45°

Ans: D

Solution: Consider angles of triangle is 5x, 4x, 3x

This property of triangle says that all Angles in a triangle sum up and make 180°

Now following the angle sum property.

$$5x + 4x + 3x = 180$$

$$12x = 180 \Rightarrow x = 15$$

Angles are 75, 60, 45

Q.18) Breadth of a rectangle is 27 cm less than its length. If the perimeter is 3 m 6 cm then its length and breadth are respectively

- (A) 100 cm, 73 cm
- (B) 90 cm, 63 cm
- (C) 80 cm, 53 cm
- (D) 103.5 cm, 76.5 cm

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Ans: B

Solution: Let the length be L cm; hence the breadth = (L - 27) cm

$$\text{Perimeter} = 306 = 2 \{L + (L - 27)\} = 4L - 54$$

$$4L = 306 + 54 = 360. \text{ OR } L = 90 \text{ cm}$$

$$\text{Therefore, Length} = 90 \text{ cm, Breadth} = (90 - 27) = 63 \text{ cm}$$

Q.19) The length of a chain used as the boundary of a semi-circular park is 72 m. What is the area of the park?

- (A) 77 m²
- (B) 90 m²
- (C) 126 m²
- (D) 308 m²

Ans: D

Solution: The area or the boundary of semi Circular Park

$$\Rightarrow \pi r + 2r = 72 \text{ m}$$

$$\Rightarrow r(\pi + 2) = 72$$

$$\Rightarrow r = 14 \text{ m}$$

$$\text{Area of the semi circular park} = \frac{\pi r^2}{2} = \frac{22}{7} * \frac{1}{2} * 14 * 14 = 308 \text{ m}^2$$

Q.20) The length of building is 40 m and its breadth is 20 m in. A path of the width 1 m is made all round the building outside. Find the area of the path,

- (A) 144 m²
- (B) 134 m²
- (C) 124 m²
- (D) 104 m²

Ans: C

Solution: Area of park = l x b = 40 x 20 = 800 m²

$$\text{Area of park with path is} = (42 \times 22) = 924 \text{ m}^2$$

$$\text{Therefore, Area of path} = \text{Area of park with path} - \text{Area of rectangular park} \\ = 924 - 800 = 124 \text{ m}^2$$

Q.21) Area of trapezium is 960 cm². The parallel sides are 40 cm and 60 cm. Find the distance between parallel sides

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- (A) 18.2 cm
(B) 19.2 cm
(C) 20.4 cm
(D) 21.4 cm

Ans: B

Solution: Area of trapezium = 960 = $\frac{1}{2} h(a+c) = \frac{1}{2} \times h \times (40+60) \Rightarrow h = 19.2 \text{ cm}$

Q.22) The area of field is the shape of trapezium measures 1440 m². The perpendicular distance between parallel sides is 24m. If the ratio of parallel sides is 5:3, then the length of longer parallel side is

- (A) 75 m
(B) 60 m
(C) 120 m
(D) 45 m

Ans: A

Solution: Area of trapezium = $\frac{1}{2}(\text{Sum of parallel sides}) \times \text{Height}$

$$1440 = \frac{1}{2} \times 24 (5x+3x) \Rightarrow x = 15$$

$$\text{The length of longer parallel side} = 5x = 5 \times 15 = 75$$

Q.23) If the length of a rectangle is decreased by 50% and the breadth is increased by 80%, then the % change in the area of rectangle is

- (A) Decreased by 10%
(B) Increased by 10%
(C) Decreased by 20%
(D) Increased by 20%

Ans: A

Solution: change in the area of rectangle = $100 \times (50/100) \times (180/100) = 90\%$. So, decreased by 10%

Q.24) A plot of land is in the form of a quadrilateral where one of its diagonals is 100 m long. If two vertices on either side of this diagonals are 50 m away from the diagonal. Find the area of the plot of land

- (A) 5000 m²

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- (B) 1000 m^2
 (C) 10000 m^2
 (D) 500 m^2

Ans: A

Solution: Length of the diagonal = 100 m

Two vertices on either side of diagonal = 50m.

Total length of two vertices = $50 \times 2 = 100\text{m}$

so, area of the plot = 5000m^2

Q.25) A rectangular swimming pool 60 m long, 40 m wide and 1.5 m deep is to be tiled. If the side of the square tile is 50 cm. Find the number of tiles needed.

- (A) 10200
 (B) 20400
 (C) 10800
 (D) 20800

Ans: C

Solution: Total area to be tiled = $(60 \times 40) + (2 \times 1.5 \times 40) + (2 \times 1.5 \times 60)$
 $= 2400 + 120 + 180 = 2700 \text{ m}^2$

Area of one square tile = $0.5 \times 0.5 = 0.25 \text{ m}^2$

Number of square tiles = $2700/0.25 = 10800$ tiles

Q.26) The sides (in cm.) of a right-angled triangle are $x-1$, x , $x+1$. Then area of the right-angled triangle is

- (A) 12 sq. cm.
 (B) 20 sq. Cm.
 (C) 6 sq. cm.
 (D) 22 sq. cm.

Ans: C

Solution: As it is a right-angled triangle, we apply Pythagoras theorem

$$\text{Therefore, } (x-1)^2 + x^2 = (x+1)^2$$

$$x^2 - 4x = 0 \Rightarrow x = 4$$

So, other sides are 3 and 5

$$\text{Area right angle triangle} = \frac{1}{2} \times b \times h = \frac{1}{2} \times 3 \times 4 = 6 \text{ cm}^2$$

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Q.27) ABCD is parallelogram. P and Q are the mid-points of sides BC and CD respectively. If the area of ΔABC is 12 cm^2 , then the area of ΔAPQ is

- (a) 12 cm^2
- (b) 8 cm^2
- (c) 9 cm^2
- (d) 10 cm^2

Ans: C

Solution: $\Delta APQ = \frac{3}{8} (\blacksquare ABCD)$
 $= \frac{3}{4} (\Delta ABC)$
 $= \left(\frac{3}{4}\right) \times 12 = 9 \text{ sq.cm.}$

Q.28) Perimeter of a rhombus is $2p$ unit and sum of length of diagonals is m unit, then area of the rhombus is

- (a) $\left(\frac{1}{4}\right) m^2 p$ sq unit
- (b) $\left(\frac{1}{4}\right) mp^2$ sq unit
- (c) $\left(\frac{1}{4}\right) (m^2 - p^2)$ sq unit
- (d) $\left(\frac{1}{4}\right) (p^2 - m^2)$ sq unit

Ans: c

Solution: $\left(\frac{1}{4}\right) (m^2 - p^2)$ sq unit

Q.29) The outer and inner diameter of a circular path be 728 metre and 700 metre respectively. The breadth of the path is

- (a) 7 metres
- (b) 28 metres
- (c) 14 metres
- (d) 20 metres

Ans: C

Solution: Width of path = Outer Radius - Inner Radius = $364 - 350 = 14 \text{ m}$

Q.30) In a rhombus ABCD, $\angle A = 60^\circ$ and $AB = 12 \text{ cm}$. Then the diagonal BD is

- (a) 10 cm
- (b) $2\sqrt{3} \text{ cm}$
- (c) 6 cm
- (d) 12 cm

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Ans: D

Solution: In rhombus ABCD Using $\cos \theta = B/H$

$$\cos 60^\circ = BD/12 \Rightarrow \frac{1}{2} = BD/12 \Rightarrow 2BD = 12 \text{ cm}$$

Q.31) The perimeter of a sheet of paper in the shape of a quadrant of a circle is 75 cm. Its area would be?

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

Ans: B

Solution: Perimeter = $(\pi r/2) + 2r \Rightarrow 75 = (22r/14) + 2r$

$$75 = 50r/14 \Rightarrow r = 21$$

$$\text{Area of quadrant} = \pi r^2/4 = (1/4) \times (22/7) \times 21 \times 21 = 346.5 \text{ cm}^2$$

Q.32) The hypotenuse of a right-angled triangle is 39 cm and the difference of other two sides is 21 cm. Then, the area of the triangle is

- (a) 270 sq. cm
- (b) 450 sq. cm
- (c) 540 sq. cm
- (d) 180 sq. cm

Ans: A

Solution: 270 cm²

Q.33) Calculate the perimeter of a quadrant of a circle of radius 21 cm.

- (A) 65 cm
- (B) 44 cm
- (C) 75 cm
- (D) 88 cm

Ans: C

Solution: Perimeter = $(\pi r/2) + 2r = ((1/2) \times (22/7) \times 21) + (2 \times 21) = 75 \text{ cm}$

Q.34) If the diagonal of a square is 10 cm, then the side of the square is

- (A) $5\sqrt{2}$ cm
- (B) $2\sqrt{5}$ cm

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(C) $3\sqrt{5}$ cm

(D) $5\sqrt{3}$ cm

Ans: A

Solution: According to Pythagoras theorem, $a^2 + a^2 = 10^2$

$$2a^2 = 10^2 \Rightarrow a = 5\sqrt{2} \text{ cm}$$

Q.35) A school auditorium is 45 m long and 27 m wide. This auditorium is surrounded by a veranda of width 3 m on its outside. Find the area of the veranda

(A) 864 m^2

(B) 846 m^2

(C) 468 m^2

(D) 648 m^2

Ans: C

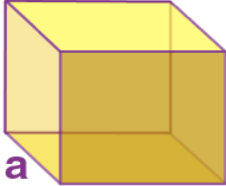
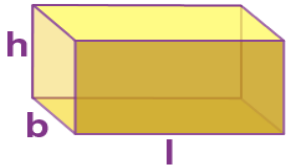
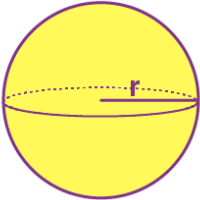
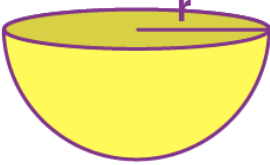
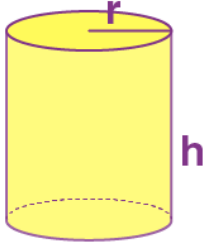
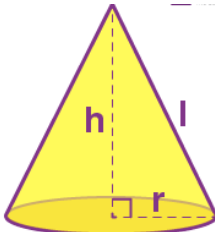
Solution: Area of the veranda = Area of auditorium with veranda - Area of auditorium

$$= (51 \times 33) - (45 \times 27) = 468 \text{ m}^2$$

Mensuration- 3D

Shape	Volume (Cubic Units)	Curved Surface Area (CSA) or Lateral Surface Area (LSA)	Total Surface Area (TSA) (Square units)	Figure

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		(Square units)		
Cube	a^3	$LSA = 4 a^2$	$6 a^2$	
Cuboid	$l \times b \times h$	$LSA = 2h(l + b)$	$2 (lb + bh + hl)$	
Sphere	$(4/3) \pi r^3$	$4 \pi r^2$	$4 \pi r^2$	
Hemi-Sphere	$(2/3) \pi r^3$	$2 \pi r^2$	$3 \pi r^2$	
Cylinder	$\pi r^2 h$	$2 \pi r h$	$2\pi r h + 2\pi r^2$	
Cone	$(1/3) \pi r^2 h$	$\pi r l$	$\pi r (r + l)$	

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Q.1) Volume of a hollow sphere is $11352/7 \text{ cm}^3$. If the outer radius is 8 cm, find the inner radius of the sphere

- (A) 6cm
- (B) 8 cm
- (C) 5 cm
- (D) 7 cm

Ans: C

Solution: Now, given that $V = 11352/7 \text{ cm}^3$

$$\Rightarrow 34\pi(R^3 - r^3) = 11352/7$$

$$\Rightarrow 34 \times (22/7)(8^3 - r^3) = 11352/7$$

$$512 - r^3 = 387 \Rightarrow r^3 = 125 = 5$$

Hence, the inner radius, $r = 5 \text{ cm}$.

Q.2) If the ratio of radius of two spheres is 4:7, the ratio of their volume is

- (A) 4: 7
- (B) 64: 343
- (C) 49: 16
- (D) 16: 49

Ans: B

Solution: Ratio of radii of 2 spheres is 4: 7.

$$\text{Ratio of their volume} = 4^3 : 7^3 = 64 : 343$$

Q.3) The slant height of a right circular cone is 13 m and its height is 5 m. Find area of the curved surface.

- 1. 490.28 m^2
- 2. 288.28 m^2
- 3. 450 m^2
- 4. 200 m^2

Ans: A

Solution: Area of curved surface = $\pi r l$

$$\text{Now } r = \sqrt{(13^2 - 5^2)} = \sqrt{169 - 25} = \sqrt{144} = 12 \text{ m}$$

$$\text{Required Area} = (22/7) \times 13 \times 12 = 490.28 \text{ m}^2$$

Q.4) Ratio of Volumes of cube and Sphere is $6/\pi$. Find the ratio of side of cube and radius of sphere.

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- (A) 2: 1
(B) 3: 1
(C) 4: 1
(D) 5: 1

Ans: A

Solution: Let the side of cube is 'a' and radii of sphere is 'r'.

Now Volume of cube = a^3

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

$$a^3 / (\frac{4}{3}) \pi r^3 = 6 / \pi$$

$$a / r = 2 / 1$$

Q.5) How many coins 3 mm thick and 1.2 cm in diameter should be melted in order to form a right circular cylinder, having base diameter 4 cm and height 27 cm?

- (A) 850
(B) 950
(C) 980
(D) 1000

Ans: D

Sol: Let the number of coins be n. We have

$$n \times \pi \times (1.2/2)^2 \times 0.3 = \pi (4/2)^2 \times 27$$

$$\Rightarrow n = 1000$$

Q.6) An open rectangular tank is made of concrete, the sides and base being 30 cm thick. Internally the tank is 8m long, 4 m broad and 3 m high. Find its weight in kg, if concrete weighs 1 kg per 1000 cubic centimetre.

- (A) 34,548 kg
(B) 44,416 kg
(C) 39,416 kg
(D) 40,000 kg

Ans: A

Solution: The outer dimensions are 8.6 x 4.6 x 3.3 m.

So volume of the block = $8.6 \times 4.6 \times 3.3 - 8 \times 4 \times 3 = 130.548 - 96 = 34.548 \text{ cu. m} = 34548000 \text{ cu cm}$,

Weight of the block = $34548000/1000 = 34548 \text{ kg}$.

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Q.7) In a cylinder, if radius is doubled and height is halved. then what happens to the curved surface area?

- (A) Halved
- (B) Doubled
- (C) Does not change
- (D) Four times

Ans: C

Solution: Original curved surface area = $2\pi rh$

New curved surface area = $2\pi(2r)\left(\frac{h}{2}\right) = 2\pi rh$ so, Does not change

Q.8) The length, breadth and height of a hall are 8 m, 10 m, 4 m respectively and the hall has one door of area 3 m x 1.5 m. Find the cost of painting the walls at the rate of 200 per square metre.

- (A) Rs. 28,800
- (B) Rs. 59,900
- (C) Rs. 27,900
- (D) Rs. 29,900

Ans: C

Sol: Surface area of the room = $2(l + b) \times h$

$$= 2 * (8+10) * 4$$

$$= 2(18) * 4 = 144 \text{ m}^2$$

$$\text{Area of the door} = l * b = 3 \times 1.5 = 4.5 \text{ m}^2$$

$$\text{Area of the wall: } 144 - 4.5 = 139.5 \text{ m}^2$$

$$\text{Cost of painting per square metre} = \text{Rs.}200$$

$$\text{Cost of painting per square metre } 139.5 \times 200 = \text{Rs.}2790$$

Q.9) If the capacity of a cylindrical tank is 1848 m^3 and the diameter of its base is 14 m, then find the depth of the tank?

- (A) 12 m
- (B) 13 m
- (C) 14 m

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(D) 15 m

Ans: A

Sol: Volume of cylinder = 1848 = $\pi r^2 h = \pi \times 7 \times 7 \times h \Rightarrow h = 12m$

Q.10) Three solid metal cubes, whose edges are 6 cm, 8 cm and 10 cm are melted and a new cube is made. Find the length of edge of the new cube.

(A) 12 cm

(B) 24 cm

(C) 20 cm

(D) 48 cm

Ans: A

Sol: Volume of the new cube = Sum of the volumes of all the three smaller cubes

$$6^3 + 8^3 + 10^3 = a^3 \Rightarrow a^3 = 1728 \Rightarrow a = 12cm$$

Q.11) A heap of paddy is in the form of a right circular cone whose diameter is 4.2 m and height 2.8 m. If the heap is to be covered exactly by a canvas to protect it from rain, find the area of the canvas required.

(A) 22.6 m²

(B) 27.2 m²

(C) 23.1 m²

(D) 11.3 m²

Ans: C

Sol: diameter = 4.2 m, radius = 2.1 m Also given, height = 2.8 m

Let 'l' be the slant height of the cone

$$l = \sqrt{(h^2 + r^2)} = \sqrt{(2.8^2 + 2.1^2)} = \sqrt{12.25} = 3.5 \text{ m}$$

$$\text{Curved surface area of cone} = \pi r l = 22 \times 2.1 \times 3.5 = 23.1 \text{ m}^2$$

Q.12) The radii of two right circular cylinders are in the ratio 4:3 and their heights are in the ratio 7:4 then the ratio of their curved surface areas is in the ratio

(A) 3:5

(B) 5:3

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(C) 3:7

(D) 7:3

Ans: D

Solution: $S_2/S_1 = 2\pi r_1 h_1 / 2\pi r_2 h_2 = (4/3) \times (7/4) = 7:3$

Q.13) A wall is to be constructed with length 60 m, breadth 3 m and height 5 m. How many bricks are required to construct a wall with length 30 cm, breadth 15 cm and height 20 cm?

(A) 135,000

(B) 150,000

(C) 175,000

(D) 100,000

Ans: D

Solution: Number of bricks = Volume of wall / volume of brick =
 $(60 \times 3 \times 5) / (0.3 \times 0.15 \times 0.2) = 100,000$

Q.14) Using the clay, Malar makes a cone, a hemisphere and a cylinder have equal bases and the heights of the cone and a cylinder are equal. They same as the common radius then find the ratio of their respective volumes

(A) 1:2:3

(B) 1:2:4

(C) 1:2:6

(D) 1:2:8

Ans: A

Solution: Bases of a cone, hemisphere and a cylinder are same Let radius of each = r and height of each = r

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

$$\text{Volume of hemisphere} = \frac{2}{3}\pi r^3$$

$$\text{volume of cylinder} = \pi r^2(r) = \pi r^3$$

$$\text{ratio in their volumes} = (\frac{1}{3})\pi r^3 : (\frac{2}{3})\pi r^3 : \pi r^3 = 1/3 : 2/3 : 1 = 1:2:3$$

Q.15) Spherical metal ball of radius 6 cm is melted and casted into small spherical balls having diameter 6 mm. How many small balls can be casted

(A) 1000

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- (B) 2000
(C) 6000
(D) 8000

Ans: D

Solution: Number of balls= Volume of Sphere/ Volume of spherical ball

$$\text{Number of small balls} = \left\{ \left(\frac{4}{3} \right) \times \left(\frac{22}{7} \right) \times 6 \times 6 \times 6 \right\} / \left\{ \left(\frac{4}{3} \right) \times \left(\frac{22}{7} \right) \times 0.6 \times 0.6 \times 0.6 \right\} = 8000$$

Q.16) The radii of two circular ends of a frustum shaped bucket are 15 cm and 8 cm. If its depth is 63 cm, find the capacity of the bucket in litres

- (A) 2.6994 litres
(B) 269.94 litres
(C) 26.994 litres
(D) 2699.4 litres

Ans: C

Solution: The volume of the bucket (frustum) = $(1/3)\pi(R^2 + r^2 + Rr)$

$$= (1/3) \times (22/7) \times 63 \times (15^2 + 8^2 + 15 \times 8) = 29664/1000 \text{ litres}$$

Thus, the capacity of the bucket = 26.994 litres.

Q.17) Using clay, a student made a right circular cone of height 48 cm and base radius 12 cm. Another student reshapes it in the form of sphere. Find the radius of the sphere.

- (A) 12 cm
(C) 9 cm
(B) 15 cm
(D) 14 cm

Ans: A

Solution: $(4/3)\pi r^3 = (1/3) \times \pi \times (12)^2 \times (48) \Rightarrow 4r^3 = (12)^2 \times (48)$

$$r^3 = (12)^3 \Rightarrow r = 12 \text{ cm}$$

Q.18) The radius of a spherical balloon increases from 7cm to 14 cm as air is being pumped into it. Find the ratio of surface areas of the balloon in two cases

- (A) 1: 27
(B) 1: 4

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(C) 1: 9

(D) 1: 8

Ans: B

Solution: Given radius $r_1=7$ cm, $r_2=14$ cm

Initial surface area ($r_1=7$)= $4\pi r^2 = 4 \times (22/7) \times 7 \times 7 = 616 \text{ cm}^2$

Surface area ($r_2=14$)= $4\pi r^2 = 4 \times (22/7) \times 14 \times 14 = 2464 \text{ cm}^2$

Ratio of surface area = $2464/616 = 1/4$

Q.19) The volume of a solid hemisphere is 29106 cm^3 . Another hemisphere whose volume is two-third of the above is carved out. Find the radius of the new hemisphere.

(A) 21.5 cm

(B) 12 cm

(C) 21 cm

(D) 23 cm

Ans: C

Solution: The volume of hemisphere = 29106 cm^3

Let the radius of another hemisphere = R

The volume of new hemisphere = $2/3 \times 29106 = 19404 \text{ cm}^3$

$(2/3) \pi R^3 = 19404 \Rightarrow 19404 \times 3/2 \times 7/22$

$9261 = r^3 \Rightarrow r = 21$

Q.20) A hemispherical tank of radius 1.75 m is full of water. It is connected with a pipe which empties the tank at the rate of 7 litres per second, how much time will it take to empty the tank completely?

(A) 27 minutes

(B) 26 minutes

(C) 72 minutes

(D) 62 minutes

Ans: A

Solution:

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$$\begin{aligned}
 7000x &= \frac{2}{3} \times \frac{22}{7} \times 175 \times 175 \times 175 \\
 x &= \frac{2}{3} \times \frac{22}{7} \times \frac{175 \times 175 \times 175}{7000} \\
 &= 1604.16 \text{ seconds} \\
 x &= \frac{1604.16}{60} \text{ minutes} \\
 x &= 26.73 \text{ minutes} \\
 &\cong 27 \text{ minutes}
 \end{aligned}$$

Q.21) The length, breadth and height of a room are respectively 12 metres, 9 metres and 6 metres. How many cubic boxes are needed to fill the room if the side of each box is 1.5 metres?

- (A) 1072
(B) 648
(C) 324
(D) 192

Ans: D

Solution: Volume of room = $l \times b \times h = 12 \times 9 \times 6 = 648 \text{ m}^3$

volume of one cubic box = $a^3 = (1.5)^3 = 3.375 \text{ m}^3$

so no of boxes required = $648/3.375 = 192$

Q.22) A hollow cylindrical iron pipe is of length 35 cm. Its outer and inner diameters are 10 cm and 8 cm respectively, Find the weight of the pipe if 1 cu.cm of iron weighs 7 gm.

- (A) 6.93 kg
(B) 9.90 kg
(C) 7.53 kg
(D) 7.93 kg

Ans: A

Solution: volume of the hollow cylinder = $V = \pi R^2 h - \pi r^2 h$

$$V = \left(\frac{10}{2}\right) \times 35 \times \left(\left(\frac{10}{2}\right)^2 - \left(\frac{8}{2}\right)^2\right) = 990 \text{ cm}^3$$

Weight of 1 cm^3 of the metal = 7 gm/ cm^3

$$m = 990 \times 7 \text{ gm} = 6930 \text{ gm} = 6.93 \text{ kg}$$

Q.23) Two iron sheets spherical in shape each of diameters 6 cm are immersed in the water contained in a cylindrical vessel of radius 6 cm. the level of the water in the vessel will be raised by?

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- (a) 1 cm
- (b) 2 cm
- (c) 3 cm
- (d) 6 cm

Ans: B

Solution:

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

$$\Rightarrow 2 \times \frac{4}{3} \times \pi \times 27 = \pi \times 36 \times h$$

$$h = \frac{27 \times 4 \times 2}{36 \times 3}$$

$$\Rightarrow h = \frac{8 \times 27}{3 \times 36} = 2 \text{ cm}$$

Q.24) Total surface area of hollow hemisphere is equal to

- (A) $2\pi(R^2 + r^2)$ sq. units
- (B) $2\pi(R^2 - r^2)$ sq. units
- (C) $\pi(R^2 + r^2)$ sq. units
- (D) $\pi(3R^2 + r^2)$ sq. units

Ans: B

Solution: $\pi(3R^2 + r^2)$ sq. units

Q.25) The cylinder whose base is not in circular form is called

- (A) Circular cylinder
- (B) Right circular cylinder
- (C) Oblique cylinder
- (D) Irregular Cylinder

Ans: C

Solution:

- (1) If the base of a cylinder is not circular then it is called Oblique cylinder.
- (2) If the base is circular but not perpendicular to the axis of the cylinder, then the cylinder is called Circular cylinder.
- (3) If the axis is perpendicular to the circular base, then the cylinder is called Right circular cylinder.

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Q.26) A circus tent is cylindrical to a height of 3 m and conical above it. If the base radius is 52.5 m and slant height of the cone is 53 m, find the area of canvas required to make the tent.

- (A) $315 \pi \text{ m}^2$
- (B) $3097.5 \pi \text{ m}^2$
- (C) $2782.5 \pi \text{ m}^2$
- (D) $9735 \pi \text{ m}^2$

Ans: B

Solution: C.S.A of cylinder $= 2\pi rh$

C.S.A. of conical portion $S_2 = \pi rl$

Area of canvas of tent $= S_1 + S_2 = 2\pi rh + \pi rl = \pi r(2h + l)$

$$= (\pi) \times 52.5(3 \times 2 + 53) = 3097.5 \pi \text{ m}^2$$

Q.27) The breadth, height and volume of a cuboid are 10 cm, 11 cm and 3080 cm³ respectively. Find the length of the cuboid.

- (A) 21 cm
- (B) 28 cm
- (C) 24 cm
- (D) 30 cm

Ans:

Solution: Vol. of Cuboid $= l \times b \times h = L \times 10 \times 11 = 3080 \Rightarrow L = 3080/110 = 28 \text{ cm}$

Q.28) The radius and height of cylinder and cone are equal. If the volume of cylinder is 120 cm³, then the volume of cone is

- (A) 90 cm³
- (B) 40 cm³
- (C) 30 cm³
- (D) 100 cm³

Ans: B

Solution:

Volume of a right circular cone $= (1/3)\pi r^2 h$

Volume of right circular cylinder $= \pi r^2 h$

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Volume of a right circular cone = $(1/3)$ Volume of right circular cylinder = $(1/3) \times 120 = 40 \text{ cm}^3$

Q.29) A rectangular paper of width 14 cm is rolled along with its width and a cylinder of radius 20 cm is formed. Find the volume of the cylinder.

- (A) 980 cc
- (B) 1400 cc
- (C) 1960cc
- (D) 17600 cc

Ans: D

Solution: Radius of cylinder = $r = 20 \text{ cm}$.

$$\text{Volume of the cylinder} = \pi r^2 h = \left(\frac{22}{7}\right) \times 20 \times 20 \times 14 = 17600 \text{ cm}^3$$

Q.30) Surface Area of a hemisphere is 2772 cm^2 . Then the total surface area of hemisphere is

- (A) 4158 cm^2
- (B) 3882 cm^2
- (C) 3172 cm^2
- (D) 4258 cm^2

Ans: A

Solution: CSA of hemisphere = $2\pi r^2$

$$\Rightarrow 2\pi r^2 = 2772 = 2 \times \frac{22}{7} \times r^2 = 2772$$

$$\Rightarrow r^2 = \frac{2772 \times 7}{2 \times 22} = 441 \Rightarrow r = 21 \text{ cm}$$

$$\text{TSA of hemisphere} = 3\pi r^2 = 3 \times \frac{22}{7} \times 21 \times 21 = 4158 \text{ cm}^2$$

Q.31) The volume of a sphere-shaped shot-put is 310.464 cu.cm , then the radius is

- (A) 4.2
- (B) 6.4
- (C) 4.8

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(D) 8.4

Ans: D

Solution: Volume of shot-put, $V = \frac{4}{3}\pi r^3 = 310.464$

$$310.464 = \frac{4}{3} \times \frac{22}{7} \times r^3 \Rightarrow r = 8.4 \text{ cm}$$

Q.32) What is the volume of a cube whose diagonal measure is $4\sqrt{3}$ c.m?

(A) 16

(B) 19

(C) 22

(D) 64

Ans: D

Solution: Given, diagonal of a cube $4\sqrt{3}$ cm

Let the length of an edge of the cube be x cm

Then diagonal of the cube = $a\sqrt{3} = 4\sqrt{3} \Rightarrow a = 4$

volume of the cube = $a^3 = 64 \text{ cm}^3$

Q.33) Three solid cubes of sides 1 cm, 6 cm and 8 cm are melted to form a new cube. Find the total surface area of the cube so formed?

(A) 384 cm²

(B) 486 cm²

(C) 456 cm²

(D) 430 cm²

Ans: B

Solution: Volume of cube formed = volume of cube 1 + volume of cube 2 + volume of cube 3

$$a^3 = 1^3 + 6^3 + 8^3 = 729 \text{ cm}^3 \Rightarrow a = 9$$

$$\text{Surface area of the cube formed} = 6a^2 = 6 \times 9 \times 9 = 486 \text{ cm}^2$$

Q.34) The ratio of the volume of a cube to that of a sphere which will exactly fit inside the cube is

(A) $\pi:4$

(B) $1:\pi$

(C) $6:\pi$

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(D) π : 1

Ans: D

Solution: Let the side cube be 'a' cm.

So, the total surface area of the cube = $6a^2$ cm²

And, total surface area of the sphere = $4 \times \pi \times (a/2)^2$ cm²

$$4 \times \pi \times (a/2)^2 = 6a^2 \Rightarrow 6 : \pi$$

Q.35) A cylindrical shaped well of depth 20m and diameter 14m is dug. The dug out soil is evenly spread to form a cuboid-platform with base dimensions 20m×14m. Find the height of the platform.

(A) 44 m

(C) 22 m

(C) 33 m

(D) 11 m

Ans: D

Solution: $20 \times 14 \times x = 22 \times 7 \times 20$

$$2 \times x = 22$$

$$x = 11 \text{ m}$$