❖ Mensuration 2D:

1. The base of a parallelogram is twice its height. If the area of the parallelogram is 98 sq.cm,find the height.

(A) 6 m (B) 5 m (C) 7 m (D) 8 m

2. The cross-section of a canal is trapezium in shape. The canal is 11 m wide at the top and 7m wide at the bottom. If the area of the cross-section is 576 sq.m. The depth of the canal is:

(A) 68 m (B) 57 m (C) 64 m (D) 87 m

3. Blacksmith Rahul bent a steel wire in the form of a square, encloses an area of 121 sq.cm.The same wire he bent in the form of a circle. Find the area of the circle.

(A) 145 cm^2 (B) 150 cm^2 (C) 154 cm^2 (D) 175 cm^2

4. The Radius of a circular wheel is $1\frac{1}{6}$ m. How many revolutions will it make in travelling 22 km?

(A) 500 (B) 2000 (C) 1000 (D) 3000

5. The length of diagonal of a square is $15\sqrt{2}$ cm. Its area is

(A) 112.5 cm^2 (B) 450 cm^2 (C) $\frac{225\sqrt{2}}{2}$ cm^2 (D) 225 cm2

6. The difference between the length and breadth of a rectangle is 23 m. If its perimeter is 206 m, then its area is

(A) 1520 m^2 (B) 2420 m^2 (C) 2480 m^2 (D) 2520 m^2

7. If the length and breadth of a rectangle are in the ratio 3 : 2 and its perimeter is 20 cm, then the area of the rectangle (in cm2) is :

(A) 24 (B) 48 (C) 72 (D) 96

8. If the numerical value of the perimeter of an equilateral triangle is √3 times the area of it, then the length of each side of the triangle is

(A) 2 units (B) 3 units (C) 4 units (D) 6 units

9. A street of width 10 meters surrounds from outside a rectangular garden whose measurement is 200 m × 180 m. The area of the path (in square meters) is

(A) 8000 (B) 7000 (C) 7500 (D) 8200

10. The area of an equilateral triangle is 4√3 cm2. The length of each side of the triangle is :

(A) 3 cm (B) 2√2 cm (C) 2√3cm (D) 4 cm

11. The area of a circle is increased by 22 cm its radius is increased by 1 cm. The original radius of the circle is

(A) 6 cm (B) 3.2 cm (C) 3 cm (D) 3.5 cm

12. If the difference between areas of the circumcircle and the incircle of an equilateral triangle is 44 cm2 , then the area of the triangle is

(A) 28 cm2 (B) 7√3 cm2 (C) 14√3 cm2 (D) 21 cm2

13. In a right angled triangle PQR, PR is the hypotenuse of length 20 cm, angle PRQ = 30°, the area of the triangle is

(A) 50 √3 cm^2 (B) 100 √3 cm^2 (C) 25 √3 cm^2 (D) $\frac{100}{\sqrt{3}}$ cm2

14. The area of a rhombus is 256 sq.cm. and one of its diagonals is twice the other in length. Then length of its larger diagonal is

(A) 32 cm (B) 16 cm (C) 48 cm (D) 24 cm

15. A took 15 seconds to cross a rectangular field diagonally walking at the rate of 56 m/min and B took the same time to cross the same field along its side walking at the 72 m/min, the area of the field is:

(A) 54m^2 (B) 46m^2 (C) 50m^2 (D) 64m^2

16. Three sides of a triangular field are of length 15 m, 20 m and 25 m long respectively. Find the cost of sowing seeds in the field at the rate of 5 rupees per sq.m.

(A) 300 (B) 600 (C) 750 (D) 150

❖ Mensuration 3D:

17. The maximum length of a rod, that can be kept in a rectangular box of dimension 16 cm x 14 cm x 22 cm is:

(A) 5√26 cm (B) 2√26 cm (C) 3√6cm (D) 6√26 cm

18. A hollow cylindrical tube 20 cm long, is made of iron and its external and internal diameters are 8 cm and 6 cm respectively. The volume of iron used in making the tube is

(A) 1760 cu.cm. (B) 880 cu.cm. (C) 440 cu.cm. (D) 220 cu.cm.

19. A sphere of diameter 24 cm is drawn into a wire of diameter 6 mm. Find the length of the wire

(A) 220 m (B)243 m (C)256 m (D) 350 m

20. The curved surface area and the total surface area of a cylinder are in the ratio 1 : 2. If the total surface area of the right cylinder is 616 cm2 , then its volume is :

(A) 1232 cm^3 (B) 1848 cm^3 (C) 1632 cm^3 (D) 1078 cm^3

21. The ratio of height and the diameter of a right circular cone is 3 : 2 and its volume is 1078 cc, then its height is :

(A) 7 cm (B) 14 cm (C) 21 cm (D) 28 cm

22.The largest sphere is carved out of a cube of side 7 cm. The volume of the sphere (in cm 3) will be

(A) 718.66 (B) 543.72 (C) 481.34 (D) 179.67

23. Water is flowing at the rate of 5 km/h through a pipe of diameter 14 cm into a rectangular tank which is 50 m long, 44 m 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) $2\frac{1}{2}$**

24. If both the radius and height of a right circular cone are increased by 20%, its volume will be increased by

(A) 20% **(B) 40%** **(C) 60%** **(D) 72.8%**

25. A cubical shaped water tank, 2.1 m long and 1.5 m broad is half filled with water. If 630 litres more water is poured into that tank, the water level will rise

(A) 0.15 cm **(B) 0.20 metre** **(C) 0.18 cm** **(D) 2 cm**

26. The number of bricks, each measuring 25 cm x 12.5 cm x 7.5 cm, required to construct a wall 6 m long ,5 m high and 0.5 m thick,while the mortar occupies 5% of the volume of the wall,is:

(A) 6080 **(B) 5740** **(C) 3040** **(D) 8120**

Answer :

1.C	2.C	3.C	4.D	5.D	6.D	7.A	8.C	9.A	10.D
11.C	12.C	13.A	14.A	15.D	16.C	17.D	18.C	19.C	20.D
21.C	22.D	23.A	24.D	25.B	26.A				

❖ Solution:

❖ Mensuration 2D:

1. Let the height of the parallelogram be 'x' meters.

∴ Base of a parallelogram will be '2x' meters.So

area of parallelogram = 98 m^2

∴ base * height = 98

∴ 2x * x = 98

∴ $2x^2 = 98$

∴ $x^2 = 49$

∴ x = 7

∴ Height of a parallelogram = 7 mSo

option (C) is correct.

2. The cross-section of a canal is trapezium in shape.

∴ Area of trapezium = $\frac{1}{2}$ * (Sum of parallel sides) * Height

∴ 576 = $\frac{1}{2}$ * (11 + 7) * Height

∴ 2 * 576 = 18 * Height

∴ Height = $\frac{2*576}{18}$

∴ Height = 64 mSo

option (C) is correct.

3. Side of the square = √area = √121 = 11 cm

Perimeter of the square = 4 × side = 44 cm

Therefore, length of the wire = 44 cm

We know,

Circumference of the circle = Length of the wire

Therefore, Circumference of the circle = 44 cm

Let the radius of the circle be r cm.

Then, $2\pi r = 44$

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

Therefore, area of the circle = $\pi r2 = \frac{22}{7} \times 49 = 154\ cm^2$

So option (C) is correct.

4. Radius of a circular wheel = $1\frac{1}{6}m = \frac{7}{6}m$

Circumference of the wheel = $2\pi r = 2 * \frac{22}{7} * \frac{7}{6} = \frac{22}{3}$ m

$$\text{Total revolutions} = \frac{Total\ Distace}{Circumference\ of\ the\ wheel} = \frac{22\ kms}{\frac{22}{3}m} = \frac{22000}{\frac{22}{3}} = \frac{22000*3}{22} = 3000$$

So option (D) is correct.

5. Length of a diagonal = 15√2 cm

$$\text{Area of square} = \frac{(diagonal)^2}{2} = \frac{(15\sqrt{2})^2}{2} = \frac{225*2}{2} = 225\ cm^2$$

So option (D) is correct.

6. Let the length and breadth of a rectangle be ‘x’ and ‘y’ meters respectively.

∴ According to first given condition, we get,

$x - y = 23$ ----------(1)

∴ According to second given condition, we get,

Perimeter of a rectangle = 206

∴ $2(x + y) = 206$

∴ $x + y = 103$----------(2)

Solving equations (1) & (2), we get,$x = 63$

& $y = 40$

∴ Area of a rectangle = length * breadth = $x * y = 63 * 40 = 2520\ m^2$So

option (D) is correct.

7. Let the length and breadth of a rectangle be ‘3x’ and ‘2x’ cm respectively.

∴ According to given condition, we get,

Perimeter of a rectangle = 20

∴ 2(length + breadth) = 20

∴ $(3x + 2x) = 10$

∴ $5x = 10$

∴ $x = 2$

∴ Area of a rectangle = length * breadth = $3x * 2x = 6x^2 = 6 * 2^2 = 6 * 4 = 24$So

option (A) is correct.

8. Perimeter of an equilateral triangle = √3 * Area of equilateral triangle

$\therefore \quad 3 * side = \sqrt{3} * \frac{\sqrt{3}}{4} * side^2$

$\therefore \quad side = 4$ units

So option (C) is correct.

9. For inner rectangle, length = 200 m & breadth = 180 m

For outer rectangle, length = 200 + 10 + 10 = 220 m

& breadth = 180 + 10 + 10 = 200 m

∴ Area of the path = Area of outer rectangle – Area of inner rectangle

$\therefore \quad = 220 * 200 - 180 * 200$

$\therefore \quad = 200(220 - 180)$

$\therefore \quad = 200 * 40$

$\therefore \quad = 8000$

So option (A) is correct.

10. Area of equilateral triangle = 4√3

$\therefore \quad \frac{\sqrt{3}}{4} * side^2 = 4\sqrt{3}$

$\therefore \quad side^2 = 16$

$\therefore \quad side = 4$ cm

So option (D) is correct.

11. Let original radius of the circle be 'r' cm.

According to given condition, we get,

$\pi(r + 1)^2 - \pi r^2 = 22$

$\therefore \pi[(r + 1)^2 - r^2] = 22$

$\therefore \frac{2}{7} * (r2 + 2r + 1 - r2) = 22$

$\therefore 2r + 1 = 7$

$\therefore 2r = 6$

$\therefore r = 3$

$\therefore$ Original radius of the circle = 3 cmSo

option (C) is correct.

12. Circumradius = $\frac{a}{\sqrt{3}}$ & Inradius = $\frac{a}{2\sqrt{3}}$

$\therefore \pi(\frac{a}{\sqrt{3}})2 - \pi(\frac{a}{2\sqrt{3}})2 = 44$

$\therefore \pi[\frac{a2}{3} - \frac{a2}{12}] = 44$

$\therefore \frac{22}{7} * (\frac{3a2}{12}) = 44$

$\therefore a^2 = \frac{44*7*12}{2*23}$

$\therefore a2 = 56$

$\therefore$ Area of an equilateral triangle = $\frac{\sqrt{3}}{4} * a2 = \frac{\sqrt{3}}{4} * 56 = 14\sqrt{3}\ cm^2$

So option (C) is correct.

13. In a right angled triangle PQR, PR is the hypotenuse of length 20 cm.

∠PRQ = 30°

∠PQR = 90°

∴ ∠QPR = 60° [Remaining angle of a triangle]

∴ ΔPQR is a 30°-60°-90° triangle.

∴ By 30°-60°-90° theorem, we get,

Side opposite to 30° = PQ = $\frac{1}{2}$ * Hypotenuse

∴ $= \frac{1}{2} * 20$

∴ PQ = 10 cm

Side opposite to 60° = QR = $\frac{\sqrt{3}}{2}$ * Hypotenuse

∴ $= \frac{\sqrt{3}}{2} * 20$

∴ QR = 10√3 cm

∴ Area of triangle = $\frac{1}{2}$ * Base * Height

∴ $= \frac{1}{2}$ *PQ * QR

∴ $= \frac{1}{2} * 10 * 10\sqrt{3}$

∴ $= 50\sqrt{3}$ cm^2

So option (A) is correct.

14. Let larger and smaller diagonals of a Rhombus be '2x' & 'x' respectively.Area of a Rhombus = 256

∴ $\frac{1}{2}$* Product of diagonals = 256

∴ $\frac{1}{2}$ * 2x * x = 256

∴ $x^2 = 256$

∴ x = 16

∴ Larger diagonal = 2x = 2 * 16 = 32 cmSo

option (A) is correct.

15. Distance travelled by A in 15 seconds = $\frac{56}{60}$ *15 = 14 meters

∴ Length of diagonal = 14 meters

∴ $\sqrt{(l^2 + b^2)} = 14$

∴ $l^2 + b^2 = 196$

Distance travelled by B in 15 seconds = $\frac{72}{60}$ * 15 = 18 meters

∴ l + b = 18

As we know that.

$(l + b)^2 = l^2 + b^2 + 2lb$

∴ $18^2 = 196 + 2lb$

∴ 324 – 196 = 2lb

∴ 128 = 2lb

∴ lb = 64

∴ Area of the field = 64 m^2So

option (D) is correct.

16. Three sides of a triangular field are of length 15 m, 20 m and 25 m long respectively.Let a = 15 m, b = 20 m, c = 25 m.

$$\therefore s = \frac{a+b+c}{2} = \frac{15+20+25}{2} = \frac{60}{2} = 30 \text{ m}$$

By heron's formula, we get,

Area of triangle = √[s * (s – a) * (s – b) * (s – c)]

∴ = √[30 * (30 – 15) * (30 – 20) * (30 – 25)]

∴ = √(30 * 15 * 10 * 5)

∴ = √22500

∴ = 150 m^2

∴ Cost of sowing seeds = 150 * 5 = Rs 750So

option (C) is correct.

❖ Mensuration 3D:

17. Maximum length of a rod = Diagonal of a cuboid

∴ = √($l^2 + b^2 + h^2$)

∴ = √($16^2 + 14^2 + 22^2$)

∴ = √(256 + 196 + 484)

∴ = √936

∴ = 6√26 cm

So option (D) is correct.

18. Let radii of outer & inner cylinder be R & r respectively.

Volume of iron used in making the tube

= Volume of outer cylinder – Volume of inner cylinder

$= \pi * R^2 * h - \pi * r^2 * h$

$= \pi * (R^2 - r^2) * h$

$= \pi * (4^2 - 3^2) * h$

$= \frac{22}{7} * (16 - 9) * 20$

$= \frac{22}{7} * 7 * 20$

$= 440\ cm^3$

So option (C) is correct.

19.

Radius of a sphere(R) = $\frac{24}{2} = 12$ cm $= \frac{12}{100} = 0.12$ m

Radius of a wire(r) = $\frac{6}{2} = 3$ mm $= \frac{3}{1000} = 0.003$ m

As per the given condition, we get,

Volume of wire = Volume of sphere

$\therefore \pi * r^2 * h = \frac{4}{3} * \pi * R^3$

$\therefore h = \frac{4*0.12*0.12*0.12}{3*0.003*0.003} = \frac{4*12*12*12}{3*3*3} = 4 * 4 * 4 * 4 = 256$ m

So option (C) is correct.

20. As per the given information, we get,

$$\frac{Curved\ surface\ area}{Total\ surface\ area} = \frac{1}{2}$$

$$\therefore \frac{2*\pi*r*h}{2*\pi*r\,(h+r)} = \frac{1}{2}$$

$$\therefore \frac{h}{h+r} = \frac{1}{2}$$

∴ 2h = h + r

∴ 2h – h = r

∴ h = r = x (say)

Total surface area of cylinder = 616 cm^2

∴ 2 * π * r(h + r) = 616

∴ $2 * \frac{22}{7} * x(x + x) = 616$

∴ $x(2x) = \frac{616*7}{22*2}$

∴ $2x^2 = 98$

∴ $x^2 = 49$

∴ x = 7 cm = h = r

Now, Volume of cylinder = $\pi r^2 h = \frac{22}{7} * 7 * 7 * 7 = 1078\ cm^3$

So option (D) is correct.

21. The ratio of height and the diameter of a right circular cone is 3 : 2

∴ Height = 3x & Diameter = 2x

∴ Radius = x

Volume of a cone = 1078 cm^3

∴ $\frac{1}{3} * \pi * r^2 * h = 1078$

∴ $\frac{1}{3} * \frac{22}{7} * x^2 * 3x = 1078$

∴ $x^3 = \frac{1078*7}{22} = 49 * 7 = 343$

∴ x = 7

∴ Height of a right circular cone = 3x = 3 * 7 = 21 cm

So option (c) is correct.

22. Diameter of a sphere = Side of a cube = 7 cm

∴ Radius of a sphere = $\frac{7}{2}$ = 3.5 cm

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

∴ $= \frac{4}{3} * \frac{22}{7} * 3.5 * 3.5 * 3.5$

∴ = 179.67 cm^3

So option (D) is correct.

23. Rate of flow = 5 km/hr = 5000 m/hour.

Length of cylinder for water flowing in one hour = 5000 m.

Radius = 7 cm = $\frac{7}{100}$ m

∴ Volume of water flowing through the pipe per hour

= $\pi r^2 h$

= $\frac{22}{7} * \frac{7}{100} * \frac{7}{100} * 5000$

= 77 m^3

Volume of water to be filled in the rectangular tank

= 50 * 44 * 7/100

= 154 m^3

∴ Required time = 154/77 = 2 hours.

So option (A) is correct.

24. Let initially r, h, v be the radius, height, volume of the cone respectively& V be the final volume.

∴ v = $\frac{1}{3}$ * π * r2 * h ----- (initial volume)

∴ V = $\frac{1}{3}$ * π * (1.2r)2 * 1.2h

∴ = $\frac{1}{3}$ * π * r 2 * h * 1.728 ------ (Final volume)

∴ Increase in the volume = V – v = $\frac{1}{3}$ * π * r^2 * h * 1.728 - $\frac{1}{3}$ * π * r^2 * h

∴ $= \frac{1}{3} * \pi * r^2 * h(1.728 - 1)$

∴ $= \frac{1}{3} * \pi * r^2 * h * 0.728$

∴ Percentage increase = $\frac{0.728 * \frac{1}{3} * \pi * r^2 * h}{\frac{1}{3} * \pi * r^2 * h}$ * 100 = 0.728 * 100 = 72.8 %

So option (D) is correct.

25. As per given information, we get,

2.1 m * 1.5 m * h = 630 L

∴ $\frac{21}{10}$ m * $\frac{15}{10}$ m * h = $\frac{630}{1000}$ m3

∴ h = $\frac{630 * 10 * 10 * m3}{1000 * 21 * 15 * m2}$ = 0.2 m So option (B) is correct.

26. Total volume of a wall(V) = 600 * 500 * 50 cm^3.....(1)

∴ Volume of the mortar = 5% of V = $\frac{V}{20}$ cm^3.

Thus, actual volume of the wall = V - $\frac{V}{20}$ = $\frac{19V}{20}$ cm^3.

∴ Number of the bricks = $\frac{Actual\ volume\ of\ wall}{Volume\ of\ a\ brick}$

∴ $= \frac{\frac{19}{20} * V}{25 * 12.5 * 7.5}$

∴ $= \frac{19 * 600 * 500 * 50}{20 * 25 * 12.5 * 7.5}$

∴ = 19 * 80 * 4

∴ = 6080 bricks.

So option (A) is correct.