

GOUR INSTITUTE

PSC, Bank (Clerk/PO), SSC, Railways, S.I., Classes

Director - Rajeev Sir, Mob. & WhatsApp No.  9826072042

F – 12, City Bazar, Thatipur, Gwalior (M.P.) www.gourinstitute.in

VOLUME AND AREA

INTRODUCTION

FUNDAMENTAL CONCEPTS

1. Results on Triangles:

- i. Sum of the angles of a triangle is 180° .
- ii. The sum of any two sides of a triangle is greater than the third side.
- iii. **Pythagoras Theorem:**

In a right-angled triangle, $(\text{Hypotenuse})^2 = (\text{Base})^2 + (\text{Height})^2$.
- iv. The line joining the mid-point of a side of a triangle to the opposite vertex is called the **median**.
- v. The point where the three medians of a triangle meet, is called **centroid**. The centroid divides each of the medians in the ratio 2 : 1.
- vi. In an isosceles triangle, the altitude from the vertex bisects the base.
- vii. The median of a triangle divides it into two triangles of the same area.
- viii. The area of the triangle formed by joining the mid-points of the sides of a given triangle is one-fourth of the area of the given triangle.

2. Results on Quadrilaterals:

- i. The diagonals of a parallelogram bisect each other.
- ii. Each diagonal of a parallelogram divides it into triangles of the same area.
- iii. The diagonals of a rectangle are equal and bisect each other.
- iv. The diagonals of a square are equal and bisect each other at right angles.
- v. The diagonals of a rhombus are unequal and bisect each other at right angles.
- vi. A parallelogram and a rectangle on the same base and between the same parallels are equal in area.
- vii. Of all the parallelogram of given sides, the parallelogram which is a rectangle has the greatest area.

IMPORTANT FORMULAE

- I. 1. Area of a rectangle = (Length x Breadth).

$$\therefore \text{Length} = \left(\frac{\text{Area}}{\text{Breadth}} \right) \text{ and Breadth} = \left(\frac{\text{Area}}{\text{Length}} \right).$$

- II. 2. Perimeter of a rectangle = $2(\text{Length} + \text{Breadth})$.

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III. Area of a square = $(\text{side})^2 = \frac{1}{2}(\text{diagonal})^2$.

IV. Area of 4 walls of a room = $2 (\text{Length} + \text{Breadth}) \times \text{Height}$.

V. 1. Area of a triangle = $\frac{1}{2} \times \text{Base} \times \text{Height}$.

2. Area of a triangle = $s(s-a)(s-b)(s-c)$

where a, b, c are the sides of the triangle and $s = \frac{1}{2}(a + b + c)$.

3. Area of an equilateral triangle = $\frac{3}{4} \times (\text{side})^2$.

4. Radius of incircle of an equilateral triangle of side $a = \frac{a}{2\sqrt{3}}$.

5. Radius of circumcircle of an equilateral triangle of side $a = \frac{a}{\sqrt{3}}$.

6. Radius of incircle of a triangle of area Δ and semi-perimeter $s = \frac{\Delta}{s}$

VI. 1. Area of parallelogram = $(\text{Base} \times \text{Height})$.

2. Area of a rhombus = $\frac{1}{2} \times (\text{Product of diagonals})$.

3. Area of a trapezium = $\frac{1}{2} \times (\text{sum of parallel sides}) \times \text{distance between them}$.

VII. 1. Area of a circle = πR^2 , where R is the radius.

2. Circumference of a circle = $2\pi R$.

3. Length of an arc = $\frac{2\pi R\theta}{360}$, where θ is the central angle.

4. Area of a sector = $\frac{1}{2}(\text{arc} \times R) = \frac{\pi R^2\theta}{360}$.

VIII. 1. Circumference of a semi-circle = πR .

2. Area of semi-circle = $\frac{\pi R^2}{2}$.

VOLUME AND AREA

EXERCISE

- Find the area of an isosceles triangle in which each one of equal sides is 5cm and the third side 6cm -
(a) 12cm^2 (b) 15cm^2 (c) 17cm^2 (d) 10cm^2 (e) none
- Find the perimeter of an equilateral triangle, whose area is $4\sqrt{3}\text{ m}^2$ -
(a) 12m (b) 25m (c) 37m (d) 10m (e) none
- Find the area of a square one whose diagonals measures $3\sqrt{2}\text{ m}^2$ -
(a) 15m^2 (b) 09m^2 (c) 12m^2 (d) 10m^2 (e) none
- Find the diameter of a circle whose perimeter is 88 m -
(a) 25m (b) 52m (c) 28m (d) 29m (e) none
- In a circle of Radius 7 cm, an subtends an angle of 60° at the centre. Find the area of the sector -
(Given $r = 7\text{m}$.)
(a) 22.52cm^2 (b) 25.66cm^2 (c) 23.78cm^2 (d) 20.23cm^2 (e) none
- A circle whose major chord is 10 m long, divided two equal part, Find the perimeter and area of the semi Circle -
(a) 52.02m^2 (b) 25.25m^2 (c) 39.25m^2 (d) 26.58m^2 (e) none
- In a circle radius of 7m an esc subtends an angle of 60° at the center. Find the area which is covered by major arch -
(a) 128.33m^2 (b) 165.12m^2 (c) 251.15m^2 (d) 103.04m^2 (e) none
- A rectangular plot is 30 meter by 10 meter. It has to make a path 2 m. wide all round it on the inside. Find the area of path -
(a) 155m^2 (b) 144m^2 (c) 177m^2 (d) 104m^2 (e) none
- A square of a 10m side it has gravel path 4 m wide all round it on the out side. Find the area of path -
(a) 255m^2 (b) 124m^2 (c) 258m^2 (d) 224m^2 (e) none
- A square of a 20m. side. It has trodden a path 2m. wide all round it on the inside. Find the area of path -
(a) 145m^2 (b) 144m^2 (c) 258m^2 (d) 224m^2 (e) none
- A room is 10m long, 8m broad and 8m high. Find the area of all 4 walls -
(a) 285m^2 (b) 154m^2 (c) 288m^2 (d) 294m^2 (e) none
- A room is 5m long, 6m broad and 7m high. Find the diagonal of room -
(a) 25.2m (b) 10.49m (c) 25.81m (d) 22.14m (e) none
- Both length and breadth of a square is increased by 10% . The percentage increased in area is -
(a) 20% (b) 21% (c) 22% (d) 23% (e) none
- Find the perimeter of a semi circle plot. (Given $r = 7\text{m}$.)
(a) 32m (b) 34m (c) 36m (d) 38m (e) none
- The diagonal of a rectangle is three times of its small side. Find the ratio of its sides -
(a) 3 : 2 (b) $\sqrt{3} : 1$ (c) $2\sqrt{2} : 1$ (d) $\sqrt{2} : 1$ (e) none
- If the radius of a circle of a circle increased by 100% . The percentage increase in area is -
(a) 200 (b) 300 (c) 400 (d) 150 (e) none

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ANSWER SHEET

VOLUME & AREA EXERCISE

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
A	A	B	C	B	C	A	B	D	B	C	B	B	E	C	B

