



Download the ExamBhai App: [Click Here](#)

ExamBhai.com — Premium Study Material

1. 2D Geometry Polygons

Triangles:

- Area: $A = \frac{1}{2}bh = \frac{1}{2}ab \sin(C)$
- Heron's Formula: $A = \sqrt{s(s-a)(s-b)(s-c)}$
where $s = \frac{a+b+c}{2}$
- Pythagorean Theorem: $a^2 + b^2 = c^2$

Circles:

- Area: $A = \pi r^2$, Circumference: $C = 2\pi r$
- Arc Length: $s = r\theta$ (in radians)
- Sector Area: $A_s = \frac{1}{2}r^2\theta$

Quadrilaterals:

- Trapezoid: $A = \frac{a+b}{2}h$
- Parallelogram: $A = bh$
- Rhombus: $A = \frac{1}{2}d_1d_2$

2. Coordinate Geometry

For points $P_1(x_1, y_1)$ and $P_2(x_2, y_2)$:

- **Distance:** $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
- **Midpoint:** $M = (\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2})$
- **Slope:** $m = \frac{y_2-y_1}{x_2-x_1} = \tan(\theta)$
- **Point-Slope Form:** $y - y_1 = m(x - x_1)$
- **Distance from Point to Line** $Ax + By + C = 0$:

$$d = \frac{|Ax_0 + By_0 + C|}{\sqrt{A^2 + B^2}}$$

4. 3D Geometry Solids

Sphere:

$$V = \frac{4}{3}\pi r^3, \quad A = 4\pi r^2$$

Cylinder:

$$V = \pi r^2 h, \quad A_{\text{total}} = 2\pi r h + 2\pi r^2$$

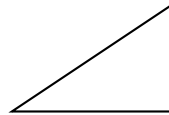
Cone:

$$V = \frac{1}{3}\pi r^2 h, \quad A_{\text{lateral}} = \pi r s \quad (s = \sqrt{r^2 + h^2})$$

Rectangular Prism / Cube:

$$V = lwh, \quad A = 2(lw + lh + wh)$$

3. Right Triangle Trigonometry



(2.7,0) – (2.7,0.3) – (3,0.3); [below] at (1.5,0) Adjacent (b); [right] at (3,1) Opposite (a); [above left] at (1.5,1) Hypotenuse (c); at (0.6,0.2) θ ;

$$\sin \theta = \frac{a}{c}, \quad \cos \theta = \frac{b}{c}, \quad \tan \theta = \frac{a}{b}$$

$$\csc \theta = \frac{c}{a}, \quad \sec \theta = \frac{c}{b}, \quad \cot \theta = \frac{b}{a}$$

5. Advanced Triangle Geometry

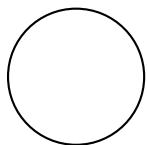
Key Triangle Centers:

- **Centroid** (G): Intersection of medians (divides 2 : 1).
- **Incenter** (I): Intersection of angle bisectors.
- **Circumcenter** (O): Intersection of perpendicular bisectors.
- **Orthocenter** (H): Intersection of altitudes.

Laws of Trigonometry:

- **Law of Sines:** $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} = 2R$
- **Law of Cosines:** $c^2 = a^2 + b^2 - 2ab \cos C$

6. Essential Circle Theorems



[thick] (-1.06,-1.06) - (0,1.5) -
(1.06,-1.06) - cycle; [black] (0,0) circle (1.5pt)
node[below] O ; at (0,0.8) θ ; at (-0.3,-1.3) 2θ ; [thick]
(-1.06,-1.06) - (0,0) - (1.06,-1.06);

- **Inscribed Angle Theorem:** Angle at center is double the angle at the circumference.
- **Thales' Theorem:** Angle inscribed in a semi-circle is a right angle (90°).
- **Intersecting Chords:** $PA \cdot PB = PC \cdot PD$