

Geometry Ultimate Cheat Sheet

Essential formulas, theorems, and properties for quick revision

1. Basic Angles & Lines

- **Supplementary Angles:** $\alpha + \beta = 180^\circ$
- **Complementary Angles:** $\alpha + \beta = 90^\circ$
- **Vertically Opposite Angles:** Equal in measure.
- **Parallel Lines Transversal:** Alternate interior, corresponding, and consecutive interior angles apply.

2. Triangles

- **Sum of Angles:** $\alpha + \beta + \gamma = 180^\circ$
- **Area (General):** $A = \frac{1}{2}bh$
- **Area (Heron's):** $A = \sqrt{s(s-a)(s-b)(s-c)}$
where $s = \frac{a+b+c}{2}$
- **Area (Equilateral):** $A = \frac{\sqrt{3}}{4}a^2$
- **Pythagorean Theorem:** $a^2 + b^2 = c^2$

3. Polygons

- **Sum of Interior Angles:** $S = (n-2) \times 180^\circ$
- **Each Interior Angle (Regular):** $\theta = \frac{(n-2)180^\circ}{n}$
- **Sum of Exterior Angles:** 360°
- **Number of Diagonals:** $D = \frac{n(n-3)}{2}$

4. Circles

- **Circumference:** $C = 2\pi r$
- **Area:** $A = \pi r^2$
- **Arc Length:** $s = r\theta$ (θ in radians)
- **Sector Area:** $A = \frac{1}{2}r^2\theta$
- **Inscribed Angle Theorem:** An inscribed angle is half the central angle subtending the same arc.

5. 3D Solids

- **Cylinder Volume:** $V = \pi r^2 h$
- **Cylinder Surface Area:** $A = 2\pi r h + 2\pi r^2$
- **Cone Volume:** $V = \frac{1}{3}\pi r^2 h$
- **Cone Surface Area:** $A = \pi r s + \pi r^2$
- **Sphere Volume:** $V = \frac{4}{3}\pi r^3$
- **Sphere Surface Area:** $A = 4\pi r^2$

6. Coordinate Geometry

- **Distance Formula:**

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

- **Midpoint Formula:**

$$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

- **Slope (m):**

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \tan \theta$$

- **Equation of a Line (Slope-Intercept):**

$$y = mx + c$$

- **Circle Equation (Center (h, k)):**

$$(x - h)^2 + (y - k)^2 = r^2$$

7. Transformations

- **Reflection across x -axis:** $(x, y) \rightarrow (x, -y)$
- **Reflection across y -axis:** $(x, y) \rightarrow (-x, y)$
- **Rotation 90° CCW:** $(x, y) \rightarrow (-y, x)$
- **Dilation (scale factor k):** $(x, y) \rightarrow (kx, ky)$