# Geometry Master Cheat Sheet

Essential formulas, theorems, and properties for quick reference

## 1. Basic Angles & Lines

- **Complementary Angles:** $\alpha + \beta = 90^\circ$
- **Supplementary Angles:** $\alpha + \beta = 180^\circ$
- **Vertically Opposite Angles:** Equal
- **Parallel Lines Transversal:** Corresponding, alternate interior, and alternate exterior angles are equal.

## 2. Triangles

- **Angle Sum:** $\alpha + \beta + \gamma = 180^\circ$
- **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:** $(n-2) \times 180^\circ$
- **Each Interior Angle (Regular):** $\frac{(n-2)180^\circ}{n}$
- **Sum of Exterior Angles:** $360^\circ$
- **Number of Diagonals:** $\frac{n(n-3)}{2}$

## 4. Circles

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



## 5. 3D Solids

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

## 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 ($m$):** $m = \frac{y_2 - y_1}{x_2 - x_1}$
- **Slope-Intercept Form:** $y = mx + b$