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Ultimate Geometry Cheat Sheet

1. Basic Angles Lines

- **Complementary Angles:** $\alpha + \beta = 90^\circ$
- **Supplementary Angles:** $\alpha + \beta = 180^\circ$
- **Vertically Opposite Angles:** Equal in measure.
- **Parallel Lines (Transversal):**
 - Alternate interior angles are equal.
 - Corresponding angles are equal.
 - Consecutive interior angles sum to 180° .

2. Triangles

- **Angle Sum Theorem:** The sum of interior angles in a triangle is 180° .

- **Area Formulas:**

$$\text{Area} = \frac{1}{2}bh$$

$$\text{Area} = \sqrt{s(s-a)(s-b)(s-c)} \quad (\text{Heron's Formula})$$

$$\text{where } s = \frac{a+b+c}{2}.$$

- **Pythagorean Theorem (Right Triangle):**

$$a^2 + b^2 = c^2$$

- **Law of Sines:**

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

- **Law of Cosines:**

$$c^2 = a^2 + b^2 - 2ab \cos C$$

3. Polygons

- **Sum of Interior Angles (n-gon):**

$$S = (n - 2) \times 180^\circ$$

- **Measure of Interior Angle (Regular n-gon):**

$$\theta = \frac{(n - 2)180^\circ}{n}$$

- **Sum of Exterior Angles:** Always 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):** $s = r\theta$ (θ in radians)

- **Sector Area:** $A = \frac{1}{2}r^2\theta$

- **Power of a Point Theorem:** If two chords intersect inside a circle, the products of their segments are equal: $a \cdot b = c \cdot d$.

5. 3D Solids

- **Rectangular Prism:**

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

- **Cylinder:**

$$V = \pi r^2 h \quad SA = 2\pi rh + 2\pi r^2$$

- **Sphere:**

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

- **Cone:**

$$V = \frac{1}{3}\pi r^2 h \quad SA = \pi rl + \pi r^2 \quad (l = \text{slant height})$$

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):**

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

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

$$y = mx + b$$