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MENSURATION FORMULA CHEAT SHEET

A Quick Reference Guide for 2D Shapes, 3D Solids, Trigonometric Relations & Formulas

1. 2D GEOMETRY FORMULAS

Triangle (General) Area = $\frac{1}{2} \cdot b \cdot h$

Heron's Formula $A = \sqrt{s(s-a)(s-b)(s-c)}$ where $s = \frac{a+b+c}{2}$

Equilateral Triangle $A = \frac{\sqrt{3}}{4}a^2$, $h = \frac{\sqrt{3}}{2}a$

Rectangle $A = l \cdot w$, $P = 2(l + w)$, $d = \sqrt{l^2 + w^2}$

Square $A = a^2$, $P = 4a$, $d = a\sqrt{2}$

Parallelogram $A = b \cdot h$

Rhombus $A = \frac{1}{2}d_1d_2$, $P = 4a$, $a = \frac{1}{2}\sqrt{d_1^2 + d_2^2}$

Trapezoid $A = \frac{1}{2}(a + b) \cdot h$

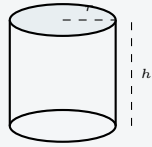
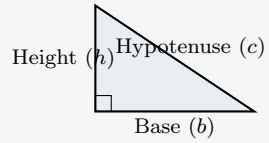
Circle $A = \pi r^2$, $C = 2\pi r = \pi d$

Circular Sector Arc Length $L = \frac{\theta}{360^\circ} \cdot 2\pi r$, Area = $\frac{\theta}{360^\circ} \cdot \pi r^2 = \frac{1}{2}Lr$

2. 3D GEOMETRY FORMULAS

Solid	Surface Area (LSA/CSA)	Total Area (TSA)	Volume (V)
Cube	$4a^2$	$6a^2$	a^3
Cuboid	$2h(l + w)$	$2(lw + wh + hl)$	$l \cdot w \cdot h$
Cylinder	$2\pi rh$	$2\pi r(r + h)$	$\pi r^2 h$
Cone	πrl ($l = \sqrt{r^2 + h^2}$)	$\pi r(r + l)$	$\frac{1}{3}\pi r^2 h$
Sphere	$4\pi r^2$	$4\pi r^2$	$\frac{4}{3}\pi r^3$
Hemisphere	$2\pi r^2$	$3\pi r^2$	$\frac{2}{3}\pi r^3$
Frustum	$\pi l(R + r)$	$CSA + \pi R^2 + \pi r^2$	$\frac{1}{3}\pi h(R^2 + r^2 + Rr)$

3. VISUAL GEOMETRY REFERENCE



4. UNIT CONVERSIONS & CONSTANTS

- **Value of Pi (π):** $\pi \approx 3.14159 \approx \frac{22}{7}$
- **Length:** $1 \text{ m} = 100 \text{ cm} = 1000 \text{ mm}$ | $1 \text{ km} = 1000 \text{ m}$ | $1 \text{ inch} = 2.54 \text{ cm}$
- **Area:** $1 \text{ m}^2 = 10,000 \text{ cm}^2$ | $1 \text{ Hectare} = 10,000 \text{ m}^2$ | $1 \text{ Acre} = 43,560 \text{ ft}^2$
- **Volume/Capacity:** $1 \text{ m}^3 = 1,000 \text{ Liters}$ | $1 \text{ Liter} = 1,000 \text{ cm}^3 = 1,000 \text{ mL}$

5. ADVANCED MENSURATION TRICKS

- **Euler's Formula for Polyhedra:** $F + V - E = 2$ (Faces + Vertices - Edges = 2)
- **Scale Factor Effects:** If linear dimensions scale by k :
 - Perimeter scales by k
 - Area scales by k^2
 - Volume scales by k^3
- **Inradius (Equilateral Triangle):** $r = \frac{a}{2\sqrt{3}}$
- **Circumradius (Equilateral Triangle):** $R = \frac{a}{\sqrt{3}}$