

Geometry Formulas — 2D & 3D Reference

Area, perimeter, surface area and volume for every common shape.

— 2D SHAPES —

Square

Area: $A = s^2$
 Perimeter: $P = 4s$
 Diagonal: $d = s\sqrt{2}$

Rectangle

Area: $A = l \cdot w$
 Perimeter: $P = 2(l + w)$
 Diagonal: $d = \sqrt{l^2 + w^2}$

Triangle

Area (base & height): $A = \frac{1}{2} b h$
 Area (Heron's): $A = \sqrt{s(s-a)(s-b)(s-c)}$
 Semiperimeter: $s = (a+b+c)/2$
 Perimeter: $P = a + b + c$

Right Triangle

Hypotenuse: $c = \sqrt{a^2 + b^2}$
 Area: $A = \frac{1}{2} a b$
 Perimeter: $P = a + b + c$

Circle

Area: $A = \pi r^2$
 Circumference: $C = 2\pi r$
 Diameter: $d = 2r$

Trapezoid

Area: $A = \frac{1}{2}(a + b)h$
 Median: $m = (a + b)/2$

Parallelogram

Area: $A = b h$
 Perimeter: $P = 2(a + b)$

Rhombus

Area: $A = \frac{1}{2} d_1 d_2$
 Side: $s = \sqrt{((d_1/2)^2 + (d_2/2)^2)}$
 Perimeter: $P = 4s$

Regular Polygon

Perimeter: $P = n s$
 Apothem: $a = s/(2 \tan(180^\circ/n))$
 Area: $A = \frac{1}{2} a P$
 Interior angle: $((n-2) \cdot 180^\circ)/n$

— 3D SOLIDS —

Cube

Volume: $V = s^3$
 Surface area: $SA = 6s^2$
 Space diagonal: $d = s\sqrt{3}$

Rectangular Prism

Volume: $V = l w h$
 Surface area: $SA = 2(lw + lh + wh)$
 Space diagonal: $d = \sqrt{l^2 + w^2 + h^2}$

Triangular Prism

Volume: $V = B \cdot L$
 Surface area: $SA = 2B + (a+b+c)L$

Cylinder

Volume: $V = \pi r^2 h$
 Lateral surface: $LSA = 2\pi r h$
 Surface area: $SA = 2\pi r(r + h)$

Cone

Slant height: $\ell = \sqrt{r^2 + h^2}$
 Volume: $V = \frac{1}{3}\pi r^2 h$
 Lateral surface: $LSA = \pi r \ell$
 Surface area: $SA = \pi r(r + \ell)$

Sphere

Volume: $V = (4/3)\pi r^3$
 Surface area: $SA = 4\pi r^2$

Hemisphere

Volume: $V = \frac{2}{3}\pi r^3$
 Curved surface: $2\pi r^2$
 Total surface area: $SA = 3\pi r^2$

Square Pyramid

Volume (any pyramid): $V = \frac{1}{3} B h$
 Slant height: $\ell = \sqrt{((b/2)^2 + h^2)}$
 Volume (square base): $V = \frac{1}{3} b^2 h$
 Lateral surface: $LSA = 2 b \ell$
 Surface area: $SA = b^2 + 2 b \ell$