3D Shapes: Volume and Surface Area

Complete formulas for volume and surface area of all common 3D shapes.

Cube

Volume: $V = s^3$

Surface area: $SA = 6s^2$

Rectangular Prism

Volume: $V = lwh$

Surface area: $SA = 2(lw + lh + wh)$

Cylinder

Volume: $V = \pi r^2 h$

Curved SA: $2\pi rh$

Total SA: $SA = 2\pi r^2 + 2\pi rh$

General Prism

Volume: $V = Bh$ (B = base area)

Surface area: $SA = 2B + Ph$ (P = perimeter)

Cone

Volume: $V = (1/3)\pi r^2 h$

Slant height: $l = (r^2 + h^2)$

Curved SA: πrl

Total SA: $SA = \pi r^2 + \pi rl$

Sphere

Volume: $V = (4/3)\pi r^3$

Surface area: $SA = 4\pi r^2$

Pyramid

Volume: $V = (1/3)Bh$ (B = base area)

Square pyramid SA: $SA = B + 2sl$

s = base side, l = slant height

Hemisphere

Volume: $V = (2/3)\pi r^3$

Total SA: $SA = 3\pi r^2$

Notice the pattern: cones and pyramids are always 1/3 of their corresponding prism/cylinder volumes.