Surfaces\Volumes of Solids

Nomenclature

S  Lateral surface area
V  Volume
A  Area of section perpendicular to sides
B  Area of base
P  Perimeter of base
P_A  Perimeter of section perpendicular to its sides
R  Radius of sphere or circle
L  Slant height or lateral length
H  Perpendicular Height
C  Circumference of circle or sphere

\[
\begin{align*}
S &= PH \quad S = P_A L \\
V &= BH = AL
\end{align*}
\]

\[
\begin{align*}
S &= \frac{1}{2} PL \\
V &= \frac{1}{3} BH
\end{align*}
\]
Surfaces\Volumes of Solids

Pyramid or Cone, Right or Oblique, Regular or Irregular

\[ V = \frac{1}{3} BH \]

Prism: Right or Oblique, Regular or Irregular

\[ S = PH = P_A L \quad V = BH = AL \]

Cylinder: Right or Oblique, Circular or Elliptic

\[ S = PH = P_A L \quad V = BH = AL \]
Surfaces\Volumes of Solids

Frustum of any Prism or Cylinder

\[ V = BH \]
\[ V = \frac{1}{2} A(L_2 + L_1) \]

Frustum of Pyramid or Cone
Right and Regular, Parallel Ends

\[ S = \frac{1}{2} L(P + p) \]
\[ V = \frac{1}{3} H(B + b + \sqrt{Bb}) \]
\[ p = \text{perimeter of top} \]
\[ b = \text{area of top} \]

Frustum of any Pyramid or Cone, with Parallel Ends

\[ V = \frac{1}{3} H(B + b + \sqrt{Bb}) \]
\[ b = \text{area of top} \]
Surfaces/Volumes of Solids

Sphere

\[ S = 4\pi R^2 \quad V = \frac{4}{3}\pi R^3 \]

Spherical Sector

\[ S = \frac{1}{2} \pi R(4H + C) \quad V = \frac{2}{3}\pi R^2H \]

Spherical Segment

\[ S = 2\pi RH = \frac{1}{4} \pi (4H^2 + C^2) \]

\[ V = \frac{1}{3}\pi H^2(3R - H) \]
Surfaces\Volumes of Solids

Spherical Zone

\[ S = 2\pi RH \]
\[ V = \frac{1}{24} \pi H (3C^2 + 3C^2 + 4H^2) \]

Circular Ring

\[ S = 4\pi^2 Rr \]
\[ V = 2\pi^2 Rr^2 \]

Prismoidal Formula

\[ V = \frac{H}{6} (B + b + 4M) \]

\( M = \) Area of section parallel to bases, midway between them
\( b = \) area of top