Volume and Surface Area of Solids

Volume and total surface area of a cylinder, cone, frustum, sphere, rectangular box, square pyramid or hemisphere from its dimensions.

Method: Solid geometry

Input parameters

Unit system: SI

Parameter	Value	Unit
Solid	Frustum (diameters a and b, height c)	
Dimension a	2.0000	m
Dimension b	1.0000	m
Dimension c	1.5000	m

Calculated results

Parameter	Value	Unit
Volume	2.7489	m^3
Total surface area	11.378	m^2

Notes for this case

- Surface areas include the flat ends and bases.

Formula and method

$$\text{Cylinder}: \; V=\frac{\pi a^2 b}{4}, \quad S=\pi ab+\frac{\pi a^2}{2}$$

$$\text{Cone}: \; V=\frac{\pi a^2 b}{12}, \quad S=\frac{\pi a}{2}\left(\frac{a}{2}+\sqrt{\frac{a^2}{4}+b^2}\right)$$

$$\text{Frustum}: \; V=\frac{\pi c}{3}(R^2+Rr+r^2), \quad S=\pi(R+r)\sqrt{(R-r)^2+c^2}+\pi(R^2+r^2)$$

$$\text{Sphere}: \; V=\frac{\pi a^3}{6}, \quad S=\pi a^2; \qquad \text{Hemisphere}: \; V=\frac{\pi a^3}{12}, \quad S=\frac{3\pi a^2}{4}$$

$$\text{Box}: \; V=abc, \quad S=2(ab+bc+ac); \qquad \text{Square pyramid}: \; V=\frac{a^2 b}{3}, \quad S=a^2+2a\sqrt{\frac{a^2}{4}+b^2}$$

Variables

solid	Solid	-
a	Dimension a	m
b	Dimension b	m
c	Dimension c	m
R, r	Frustum end radii a/2 and b/2	m
V	Volume	m^3
S	Total surface area	m^2

Method and standards

Solid geometry.

Assumptions and limits

- Ideal shapes.

References

- Solid geometry

Report details

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Software release	FireCAD Calc, release of 17 November 2026
Release checks	7 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/general/geometry/volume-surface-solids

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.