Surface Area Formula Sheet

Surface area

Right prism, lateral	$S = Ph$
Right prism, total	$S = Ph + 2B$
Right cylinder, lateral	$S = 2\pi rh$
Right cylinder, total	$S = 2\pi rh + 2\pi r^2$

P is base perimeter; B is base area. Total adds both bases. Use square units.



Pyramids & right cones

Regular pyramid, lateral	$S = P\ell/2$
Right cone, lateral	$S = \pi r\ell$
Right cone, total	$S = \pi r\ell + \pi r^2$
Right cone slant height	$\ell = \sqrt{(r^2 + h^2)}$

Add base area for total pyramid surface area. Use slant height for the lateral face and perpendicular height for the solid.

Spheres & other curved solids

Sphere	$S = 4\pi r^2$
Closed hemisphere	$S = 3\pi r^2$
Closed cone frustum	$S = \pi(R + r)\ell + \pi(R^2 + r^2)$
Ring torus	$S = 4\pi^2 Rr$

For a ring torus, R is centerline radius and r is tube radius, with R > r.

Ellipsoid approximation

Semiaxes	$a, b, c > 0$
Exponent	$p \approx 1.6075$

Approximate area

$$S \approx 4\pi[(a^p b^p + a^p c^p + b^p c^p)/3]^{1/p}$$

The formula is exact for a sphere and approximate for a general ellipsoid.

Example: A cylinder’s surface

Side only	$2\pi \times 3 \times 5 = 30\pi$ cm^2
Side and both ends	$30\pi + 2\pi \times 3^2 = 48\pi$ cm^2

The radius is 3 cm and the height is 5 cm.
Add both circular ends for total area.



Surface of revolution

About the x-axis $S = 2\pi \int_a^b |f(x)| \sqrt{(1 + f'(x)^2)}\, dx$

Example: f(x) = 3 on [0,5] $S = 2\pi \times 3 \times 5 = 30\pi$

This measures the swept surface, without end caps. Use a smooth profile without overlapping sweeps.