Circle

$C = 2\pi r = \pi D$

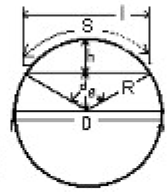
$S = R\varnothing = \frac{1}{2}D\varnothing = D\cos^{-1}(d/R)$

$l = 2\sqrt{R^2 - d^2} = 2R\sin(\varnothing/2) = 2d\tan(\varnothing/2)$

$d = \frac{1}{2}\sqrt{4R^2 - l^2} = R\cos(\varnothing/2) = \frac{1}{2}l\,\mathrm{ctn}(\varnothing/2)$

$h = R - d$

$\varnothing = S/R = 2S/D = 2\cos^{-1}(d/R) = 2\tan^{-1}(2/2d) = 2\sin^{-1}(l/D)$



$A\ (\text{circle}) = \pi R^2 = \frac{1}{4}\pi D^2$

$A\ (\text{sector}) = \frac{1}{2}Rs = \frac{1}{2}R^2\varnothing$

$A\ (\text{segment}) = A\ (\text{sector}) - A\ (\text{triangle}) = \frac{1}{2}R^2(\varnothing - \sin\varnothing)$

$\quad = R^2\cos^{-1}((R-h)/R) - (R-h)\sqrt{2Rh - h^2}$

where:

C = circumference	S = length of arc subtended by $\varnothing$
R = radius	l = chord subtended by arc S
D = diameter	h = rise
A = area	$\varnothing$ = central angle in radians

$\pi = 3.14159...$

Cone and Pyramid

Cone:

$V = \pi r^2 / 3$

$S = \pi r s + \pi r^2 = \pi r \sqrt{r^2 + h^2} + \pi r^2$

Pyramid:

$V = a\,b\,c\ /\ 3$

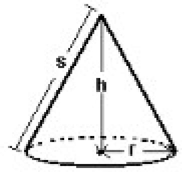
$S = bh + ci + bc$

where:

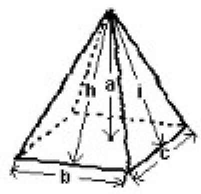
V = volume,

S = surface area,

$\pi = 3.14159\ldots$



Cone



Pyramid

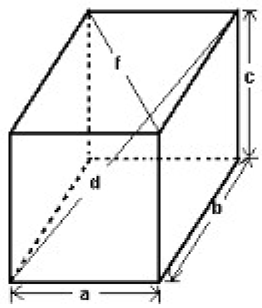
Cube and Cuboid

$V = abc$

$S = 2ac + 2bc + 2ab$

$f = \sqrt{a^2 + b^2}$

$d = \sqrt{a^2 + b^2 + c^2}$



where:

V = volume,

S = surface area,

f = face diagonal,

d = space diagonal.

Cylinder or Prism

Cylinder:

$V = \pi r^2 h = \frac{1}{4} \pi d^2 h$

$S = 2\pi r^2 + 2\pi r h = \frac{1}{2} \pi d^2 + \pi d h$

Prism:

$V = abh$

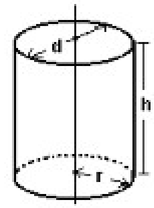
$S = 2ab + 2ah + 2bh$

where:

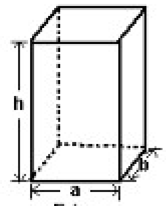
V = volume,

S = surface area,

$\pi = 3.14159\ldots$



Cylinder

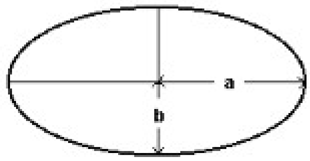


Prism

Ellipse

$A = \pi a b$,

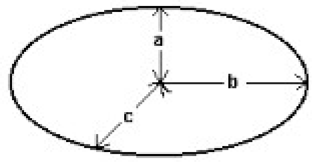
where:
A = area,
a = semi-major axis,
b = semi-minor axis.
π = 3.14159. . .



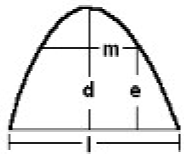
Ellipsoid

V = 4/3 π abc

where:
V = volume,
a, b, c = length of semi-axes,
π = 3.14159. . .



Parabola



Area = $2\,ld / 3$

where:

height of e = $d / l^2 (l^2 - m^2)$,

width of m = $l \sqrt{(d - e) / d}$,

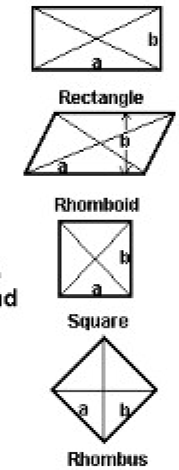
length of arc = $l \left[1 + 2/3(2d / l)^2 - 2/5(2d / l)^4 + \ldots\right]$.

Parallelogram

A = ab

where:
A = area

In a parallelogram all diagonals bisect each other, neighboring interior angles are supplementary and opposite interior angles are complementary.



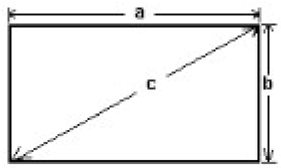
Rectangle

Area = ab

$c = \sqrt{a^2 + b^2}$

$a = \sqrt{c^2 - b^2}$

$b = \sqrt{c^2 - a^2}$



where:

a, b = length of side.

Regular Polygon

$A = \frac{1}{4}\, n\, z^2 \operatorname{ctn}(180 / n)$

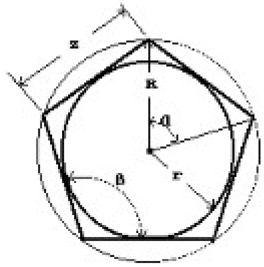
$R = \frac{1}{2}\, z \csc(180 / n)$

$r = \frac{1}{2}\, z \operatorname{ctn}(180 / n)$

$\alpha = 360 / n = 2\pi / n$

$\beta = 180((n - 2) / n) = \pi((n - 2) / n)$

$z = 2\, r \tan(\alpha / 2) = 2\, R \sin(\alpha / 2)$



where:

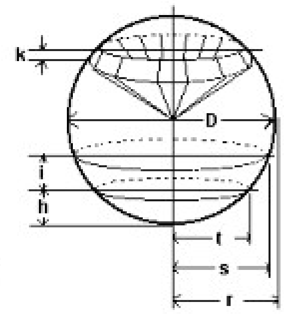
A = area of polygon,

α, β are in radians.

$\pi = 3.14159...$

Sphere

A (sphere) = $4\pi r^2 = \pi D^2$
A (zone) = $2\pi rk = \pi Dk$
A (lune) = $2r^2Ø$
V (sphere) = $4/3\pi r^3 = 1/6\pi D^3$
V (spherical sector) = $2/3\pi r^2k = 1/6\pi D^2k$
V (spherical segment of
one base) = $1/6\pi h(3t^2 + h^2)$
V (spherical segment of
two bases) = $1/6\pi i(3t^2 + 3s^2 + i^2) = 2r^2Ø$

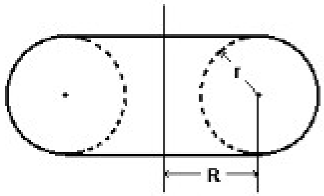


where:
A = area,
V = volume,
Ø = angle of lune in radians,
π = 3.14159. . .

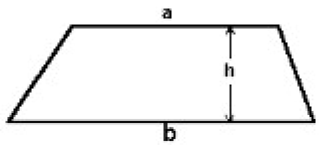
Torus

$V = 2\pi^2 R r^2$
$S = 4\pi^2 R r$

where:
V = volume,
S = surface area,
$\pi = 3.14159...$



Trapezoid



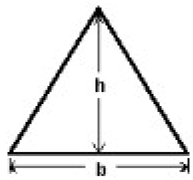
$A = ½ h(a + b)$

where:
A = area,
a, b = length of parallel sides,
h = altitude.

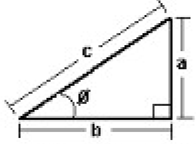
Triangle

Area = bh / 2

where:
b = length of base,
h = height of triangle.



Trigonometry



$\sin \varnothing = a/c$ $\cos \varnothing = b/c$
$\tan \varnothing = a/b$ $\cot \varnothing = b/a$
$\sec \varnothing = c/b$
$\csc \varnothing = c/a$
$\operatorname{exsec} \varnothing = c/b - 1$
$\operatorname{vers} \varnothing = 1 - b/c$
$\operatorname{covers} \varnothing = 1 - a/c$
$\operatorname{hav} \varnothing = \frac{1}{2}(1 - b/c)$
$\sin^2 x + \cos^2 x = 1$
$\tan x = \sin x / \cos x$
$\cot x = 1/\tan x = \cos x/\sin x$
$\sec^2 x = 1 + \tan^2 x$
$\csc^2 x = 1 + \cot^2 x$
$\cot x - \cot y = \sin(y - x) / (\sin x \sin y)$
$\sin^2 x - \sin^2 y = \cos^2 y - \cos^2 x$
$\cos^2 x - \sin^2 y = \cos^2 y - \sin^2 x$
$\sin(-x) = -\sin x$ $\cos(-x) = \cos x$
$\tan(-x) = -\tan x$
$c^2 = a^2 + b^2$
$\sin(x + y) = \sin x \cos y + \cos x \sin y$
$\cos(x + y) = \cos x \cos y - \sin x \sin y$
$\tan(x + y) = (\tan x + \tan y) / (1 - \tan x \tan y)$
$\cot(x + y) = (\cot x \cot y - 1) / (\cot x + \cot y)$
$\sin(x - y) = \sin x \cos y - \cos x \sin y$
$\cos(x - y) = \cos x \cos y + \sin x \sin y$
$\tan(x - y) = (\tan x - \tan y) / (1 + \tan x \tan y)$
$\cot(x - y) = (\cot x \cot y + 1) / (\cot y - \cot x)$
$\sin x + \sin y = 2\sin \frac{1}{2}(x + y) \cos \frac{1}{2}(x - y)$
$\sin x - \sin y = 2\cos \frac{1}{2}(x + y) \sin \frac{1}{2}(x - y)$
$\cos x + \cos y = 2\cos \frac{1}{2}(x + y) \cos \frac{1}{2}(x - y)$
$\cos x - \cos y = -2\sin \frac{1}{2}(x + y) \sin \frac{1}{2}(x - y)$
$\tan x + \tan y = \sin(x + y) / (\cos x \cos y)$
$\cot x + \cot y = \sin(x + y) / (\sin x \sin y)$
$\tan x - \tan y = \sin(x - y) / (\cos x \cos y)$