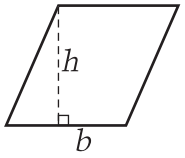
GEOMETRY

P = perimeter (or perimeter of base)
C = circumference
ℓ = lateral height or slant height

A = area
B = area of base of a solid
SA = surface area

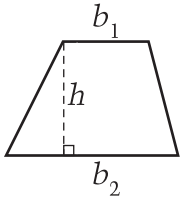
V = volume

Parallelogram



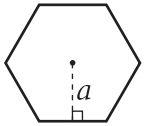
$A = bh$

Trapezoid



$A = \frac{1}{2}(b_1 + b_2)h$

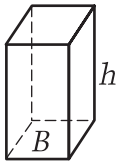
Regular Polygon with *n* sides



(A regular polygon with 6 sides is shown.)

$A = \frac{1}{2}aP$

Right Prism

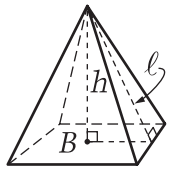


(A right rectangular prism is shown.)

$SA = 2B + Ph$

$V = Bh$

Pyramid with Base that is a Regular Polygon

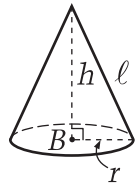


(A pyramid with a square base is shown.)

$SA = B + \frac{1}{2}\ell P$

$V = \frac{1}{3}Bh$

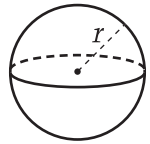
Right Circular Cone



$SA = B + \pi r\ell$

$V = \frac{1}{3}Bh$

Sphere



$SA = 4\pi r^2$

$V = \frac{4}{3}\pi r^3$

ELLIPSE with center (*h*, *k*) and *a* > *b*

$$\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1 \quad \text{OR} \quad \frac{(x-h)^2}{b^2} + \frac{(y-k)^2}{a^2} = 1$$

HYPERBOLA with center (*h*, *k*)

$$\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1 \quad \text{OR} \quad \frac{(y-k)^2}{a^2} - \frac{(x-h)^2}{b^2} = 1$$

INTEREST

A = value of investment at the end of t years
P = value of initial investment
r = annual interest rate, expressed as a decimal
t = number of years of investment
n = number of compounding periods per year

Simple Interest

$A = P + Prt$

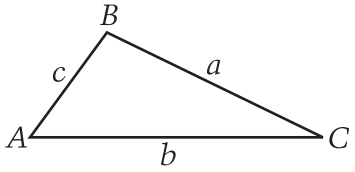
Compounded *n* times per year

$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

Compounded Continuously

$A = Pe^{rt}$

TRIGONOMETRY



Law of Sines

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

Law of Cosines

$$a^2 = b^2 + c^2 - 2bc\cos A$$
$$b^2 = a^2 + c^2 - 2ac\cos B$$
$$c^2 = a^2 + b^2 - 2ab\cos C$$

Double-Angle Formulas

$$\sin(2\theta) = 2\sin\theta\cos\theta$$
$$\cos(2\theta) = \cos^2\theta - \sin^2\theta$$
$$= 1 - 2\sin^2\theta$$
$$= 2\cos^2\theta - 1$$
$$\tan(2\theta) = \frac{2\tan\theta}{1-\tan^2\theta}$$

Sums and Differences

$$\sin(\alpha \pm \beta) = \sin\alpha\cos\beta \pm \cos\alpha\sin\beta$$
$$\cos(\alpha \pm \beta) = \cos\alpha\cos\beta \mp \sin\alpha\sin\beta$$
$$\tan(\alpha \pm \beta) = \frac{\tan\alpha \pm \tan\beta}{1 \mp \tan\alpha\tan\beta}$$

Half-Angle Formulas

$$\sin\frac{\theta}{2} = \pm\sqrt{\frac{1-\cos\theta}{2}}$$
$$\cos\frac{\theta}{2} = \pm\sqrt{\frac{1+\cos\theta}{2}}$$
$$\tan\frac{\theta}{2} = \pm\sqrt{\frac{1-\cos\theta}{1+\cos\theta}}$$
$$= \frac{1-\cos\theta}{\sin\theta}$$
$$= \frac{\sin\theta}{1+\cos\theta}$$

Pythagorean Identity

$$\sin^2\theta + \cos^2\theta = 1$$

SERIES

Arithmetic Series

a_1 = first term
d = common difference
$a_n = a_1 + (n-1)d$ = nth term

$$S_n = \sum_{k=1}^{n}[a_1 + (k-1)d] = \frac{n(a_1 + a_n)}{2}$$

Finite Geometric Series

a_1 = first term
r = common ratio

$$S_n = \sum_{k=1}^{n} a_1 \cdot r^{(k-1)} = \frac{a_1(1-r^n)}{1-r}, \text{ for } r \neq 1$$

Infinite Geometric Series

a_1 = first term
r = common ratio

$$S = \sum_{k=1}^{\infty} a_1 \cdot r^{(k-1)} = \frac{a_1}{1-r}, \text{ for } |r| < 1$$

COMBINATIONS, PERMUTATIONS, BINOMIAL PROBABILITY

Factorial

$k! = k(k-1)(k-2)\cdots 3 \cdot 2 \cdot 1$

Combinations

The number of combinations of n objects taken r at a time:

$$_nC_r = \binom{n}{r} = \frac{n!}{r!(n-r)!}$$

Permutations

The number of permutations of n objects taken r at a time:

$$_nP_r = \frac{n!}{(n-r)!}$$

Binomial Theorem

$$(x+y)^n = \sum_{k=0}^{n} \binom{n}{k} x^{n-k}y^k$$