

Coordinate Geometry	Midpoint on a Coordinate Plane	$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$
	Midpoint on a Number Line	$M = \frac{a + b}{2}$
	Midpoint in Space	$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_1}{2}, \frac{z_1 + z_2}{2} \right)$
	Distance on a Coordinate Plane	$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
	Distance on a Number Line	$d = a - b $
	Distance in Space	$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$
	Arc Length	$\ell = \frac{N}{360} \cdot 2\pi r$
	Slope	$m = \frac{y_2 - y_1}{x_2 - x_1}$
	Slope-Intercept Form of a line	$y = mx + b$
	Point-Slope Form of a line	$y - y_1 = m(x - x_1)$
	Equation for a Circle on a Coordinate Plane	$(x - h)^2 + (y - k)^2 = r^2$
	Matrices	Matrix Multiplication
Polynomials	Quadratic Formula	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
	Difference of Two Squares	$a^2 - b^2 = (a + b)(a - b)$
	Perfect square trinomials	$a^2 + 2ab + b^2 = (a + b)^2$ $a^2 - 2ab + b^2 = (a - b)^2$
Logarithms	Change of Base Formula	$\log_a n = \frac{\log_b n}{\log_b a}$
Probability and Statistics	Permutations	$P(n, r) = \frac{n!}{(n-r)!}$
	Combinations	$C(n, r) = \frac{n!}{(n-r)!r!}$
	Standard Deviation	$\sigma = \sqrt{\frac{(x_1 - \bar{x})^2 + (x_2 - \bar{x})^2 + \dots + (x_n - \bar{x})^2}{n}}$
Trigonometry	Pythagorean Theorem	$a^2 + b^2 = c^2$
	Law of Sines	$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$

	Law of Cosines	$a^2 = b^2 + c^2 - 2bc \cos A$
	Trigonometric Functions	$\sin \theta = \frac{\text{opp}}{\text{hyp}}$ $\cos \theta = \frac{\text{adj}}{\text{hyp}}$ $\tan \theta = \frac{\text{opp}}{\text{adj}}$ $\csc \theta = \frac{\text{hyp}}{\text{opp}}$ $\sec \theta = \frac{\text{hyp}}{\text{adj}}$ $\cot \theta = \frac{\text{adj}}{\text{opp}}$
	Quotient Identities	$\tan \theta = \frac{\sin \theta}{\cos \theta}$ $\cot \theta = \frac{\cos \theta}{\sin \theta}$
	Reciprocal Identities	$\csc \theta = \frac{1}{\sin \theta}$ $\sec \theta = \frac{1}{\cos \theta}$ $\cot \theta = \frac{1}{\tan \theta}$
	Pythagorean Identities	$\cos^2 \theta + \sin^2 \theta = 1$ $\tan^2 \theta + 1 = \sec^2 \theta$ $\cot^2 \theta + 1 = \csc^2 \theta$
Algebraic Properties	Additive Identity	For any number a , $a + 0 = 0 + a = a$.
	Multiplicative Identity	For any number a , $a \cdot 1 = 1 \cdot a = a$.
	Substitution (=)	If $a = b$, then a may be replaced by b .
	Reflexive (=)	$a = a$
	Symmetric (=)	If $a = b$, then $b = a$.
	Transitive (=)	If $a = b$ and $b = c$, then $a = c$.
	Commutative (+)	For any numbers a and b , $a + b = b + a$
	Commutative (\times)	For any numbers a and b , $a \cdot b = b \cdot a$.
	Associative (+)	For any numbers a , b , and c , $(a + b) + c = a + (b + c)$.
	Associative (\times)	For any numbers a , b , and c , $(a \cdot b) \cdot c = a \cdot (b \cdot c)$.
	Distributive	For any numbers a , b , and c , $a(b + c) = ab + ac$ and $a(b - c) = ab - ac$.
	Additive Inverse	For any number a , there is exactly one number $-a$ such that $a + (-a) = 0$.
	Multiplicative Inverse	For any number $\frac{a}{b}$, where $a, b \neq 0$, there is exactly one number $\frac{b}{a}$ such that $\frac{a}{b} \cdot \frac{b}{a} = 1$.
	Multiplicative (0)	For any number a , $a \cdot 0 = 0 \cdot a = 0$.
	Addition (=)	For any numbers a , b , and c , if $a = b$, then $a + c = b + c$.
	Subtraction (=)	For any numbers a , b , and c , if $a = b$, then $a - c = b - c$.
	Division and Multiplication (=)	For any numbers a , b , and c , with $c \neq 0$, if $a = b$, then $ac = bc$ and $\frac{a}{c} = \frac{b}{c}$.
	Addition ($>$)	For any numbers a , b , and c , if $a > b$, then $a + c > b + c$.
	Subtraction ($>$)	For any numbers a , b , and c , if $a > b$, then $a - c > b - c$.
	Division and Multiplication ($>$)	For any numbers a , b , and c , <ol style="list-style-type: none"> if $a > b$ and $c > 0$, then $ac > bc$ and $\frac{a}{c} > \frac{b}{c}$. if $a > b$ and $c < 0$, then $ac < bc$ and $\frac{a}{c} < \frac{b}{c}$.
Zero Product	For any real numbers a and b , if $ab = 0$, then $a = 0$, $b = 0$, or both	

		<i>a</i> and <i>b</i> equal zero.	
Perimeter and Circumference	square	$P = 4s$	
	rectangle	$P = 2\ell + 2w$	
	circumference of a circle	$C = 2\pi r$ or $C = \pi d$	
Area	square	$A = s^2$	
	rectangle	$A = \ell w$ or $A = bh$	
	parallelogram	$A = bh$	
	trapezoid	$A = \frac{1}{2}h(b_1 + b_2)$	
	rhombus	$A = \frac{1}{2}d_1d_2$ or $A = bh$	
	triangle	$A = \frac{1}{2}bh$	
	regular polygon	$A = \frac{1}{2}Pa$	
	circle	$A = \pi r^2$	
	sector of a circle	$A = \frac{N}{360} \cdot \pi r^2$	
Lateral Surface Area	prism	$L = Ph$	
	cylinder	$L = 2\pi rh$	
	pyramid	$L = \frac{1}{2}P\ell$	
	cone	$L = \pi r\ell$	
Total Surface Area	prism	$T = Ph + 2B$	
	cylinder	$T = 2\pi rh + 2\pi r^2$	
	cube	$T = 6s^2$	
	pyramid	$T = \frac{1}{2}P\ell + B$	
	cone	$T = \pi r\ell + \pi r^2$	
	sphere	$T = 4\pi r^2$	
Volume	cube	$V = s^3$	
	rectangular prism	$V = \ell wh$	
	prism	$V = Bh$	
	cylinder	$V = \pi r^2 h$	
	pyramid	$V = \frac{1}{3}Bh$	
	cone	$V = \frac{1}{3}\pi r^2 h$	
	sphere	$V = \frac{4}{3}\pi r^3$	
Measurement Conversions	Length	1 kilometer = 1,000 meters 1 meter = 100 centimeters 1 centimeter = 10 millimeters	1 foot = 12 inches 1 yard = 3 feet or 36 inches 1 mile = 1,760 yards or 5,280 feet
	Volume and Capacity	1 liter = 1,000 milliliters 1 kiloliter = 1,000 liters	1 cup = 8 fluid ounces 1 pint = 2 cups

			1 quart = 2 pints 1 gallon = 4 quarts
	Weight and Mass	1 kilogram = 1,000 grams 1 gram = 1,000 milligrams 1 metric ton = 1,000 kilograms	1 pound = 16 ounces 1 ton = 2,000 pounds
	Time	1 minute = 60 seconds 1 hour = 60 minutes 1 day = 24 hours	1 week = 7 days 1 year = 12 months or 52 weeks or 365 days 1 leap year = 366 days
	Metric to Customary	1 meter \approx 39.37 inches 1 kilometer \approx 0.62 mile 1 centimeter \approx 0.39 inch	1 kilogram \approx 2.2 pounds 1 gram = 0.035 ounce 1 liter \approx 1.057 quarts
Temperature	Fahrenheit to Celsius	$C = \frac{5}{9}(F - 32)$	
	Celsius to Fahrenheit	$F = \frac{9}{5}C + 32$	