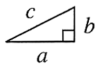
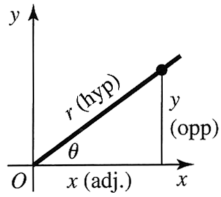
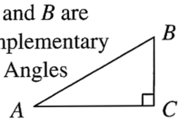
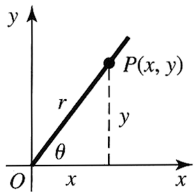
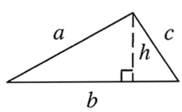
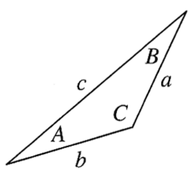
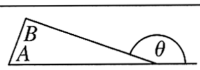
RIGHT TRIANGLES		Pythagorean Theorem	$a^2 + b^2 = c^2$	
	Trigonometric Ratios 	Sine	$\sin\theta = \frac{y}{r} = \frac{\text{opposite side}}{\text{hypotenuse}}$	
		Cosine	$\cos\theta = \frac{x}{r} = \frac{\text{adjacent side}}{\text{hypotenuse}}$	
		Tangent	$\tan\theta = \frac{y}{x} = \frac{\text{opposite side}}{\text{adjacent side}}$	
		Cotangent	$\cot\theta = \frac{x}{y} = \frac{\text{adjacent side}}{\text{opposite side}}$	
		Secant	$\sec\theta = \frac{r}{x} = \frac{\text{hypotenuse}}{\text{adjacent side}}$	
		Cosecant	$\csc\theta = \frac{r}{y} = \frac{\text{hypotenuse}}{\text{opposite side}}$	
	Reciprocal Relations	(a) $\csc\theta = \frac{1}{\sin\theta}$	(b) $\sec\theta = \frac{1}{\cos\theta}$	(c) $\cot\theta = \frac{1}{\tan\theta}$
	A and B are Complementary Angles 	Cofunctions	(a) $\sin A = \cos B$ (b) $\cos A = \sin B$ (c) $\tan A = \cot B$	(d) $\cot A = \tan B$ (e) $\sec A = \csc B$ (f) $\csc A = \sec B$
COORDINATE SYSTEMS		Rectangular	$x = r\cos\theta$	
			$y = r\sin\theta$	
		Polar	$r = \sqrt{x^2 + y^2}$	
			$\theta = \arctan\frac{y}{x}$	
ANY TRIANGLE	Areas 		Area $= \frac{1}{2}bh$	
		Hero's Formula: Area $= \sqrt{s(s-a)(s-b)(s-c)}$ where $s = \frac{1}{2}(a+b+c)$		
		Sum of the Angles	$A + B + C = 180°$	
		Law of Sines	$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$	
		Law of Cosines	$a^2 = b^2 + c^2 - 2bc\cos A$ $b^2 = a^2 + c^2 - 2ac\cos B$ $c^2 = a^2 + b^2 - 2ab\cos C$	
		Exterior Angle	$\theta = A + B$	
SIMILAR TRIANGLES	If two angles of a triangle equal two angles of another triangle, the triangles are similar.			
	Corresponding sides of similar triangles are in proportion.			

Basic Rules of Algebra for real numbers

Assume a, b, c, d are real numbers and that m, n are positive integers.

Commutativity	$a+b=b+a$	$a\cdot b=b\cdot a$
Note:	$a+a=2a$	$a\cdot a=a^2$
Associativity	$a+(b+c)=(a+b)+c$	$a\cdot(b\cdot c)=(a\cdot b)\cdot c$
Distributive law	$a(b+c)=ab+ac$	
Note:	$(a+b)(c+d)=(a+b)c+(a+b)d=ac+bc+ad+bd$	

Factoring Special Polynomials:

Perfect Squares	$a^2-2ab+b^2=(a-b)^2$	$a^2+2ab+b^2=(a+b)^2$
Difference of Squares	$a^2-b^2=(a-b)(a+b)$	
Difference/Sum of Cubes	$a^3-b^3=(a-b)(a^2+ab+b^2)$	$a^3+b^3=(a+b)(a^2-ab+b^2)$

Binomial Equation $(a+b)^n=\Sigma_{r=0}^{n}\binom{n}{r}a^{n-r}b^n$ where $\binom{n}{r}=\frac{n!}{(n-r)!r!}$ and $m!=m(m-1)\ldots1$ also $0!=1$

Identities and Inverses	$a+0=a=0+a$	$a\cdot1=a=1\cdot a$
	$a+(-a)=0=(-a)+a$	$a\cdot\left(\frac{1}{a}\right)=1=\left(\frac{1}{a}\right)\cdot a, a\neq0$
Fractions	$\frac{a}{b}+\frac{c}{d}=\frac{ad}{bd}+\frac{bc}{bd}=\frac{ad+bc}{bd}$	$\frac{a}{b}\cdot\left(\frac{c}{d}\right)=\frac{ac}{bd}$
	$\frac{a}{b}+\frac{c}{b}=\frac{a+c}{b}$	$\frac{a}{b}\cdot\left(\frac{c}{b}\right)=\frac{ac}{b^2}$
	$a+\frac{b}{c}=\frac{ac}{c}+\frac{b}{c}=\frac{ac+b}{c}$	$a\cdot\left(\frac{b}{c}\right)=\frac{a}{1}\cdot\left(\frac{b}{c}\right)=\frac{ab}{c}$
	$\frac{a}{b}-\frac{c}{d}=\frac{a}{b}+\frac{-c}{d}=\frac{ad-bc}{bd}$	$\frac{a}{b}\div\frac{c}{d}=\frac{a}{b}\cdot\frac{d}{c}=\frac{ad}{bc}$
Exponents	$a^0=1, a\neq0$	$0^a=0, a\neq0$
	$\underbrace{a\cdot a\cdot\ldots\cdot a}_{m\text{ times}}=a^m$	$a^{\frac{1}{m}}=\sqrt[m]{a}$

a^b is well defined when a and b are not both 0
(in other words 0^0 is not well defined for the purposes of 1st and 2nd year math courses)

a^b is a complex number if $a<0$ and $b=m\left(\frac{1}{2^n}\right)$
(in other words the even root of a negative number is not a real number)

$a^b\cdot a^c=a^{b+c}$	$\frac{a^b}{a^c}=a^{b-c}$	$\left(a^b\right)^c=a^{bc}$
$(ab)^c=a^c\cdot b^c$	$\left(\frac{a}{b}\right)^c=\frac{a^c}{b^c}$	$\left(\frac{a}{b}\right)^{-c}=\frac{a^{-c}}{b^{-c}}=\frac{b^c}{a^c}=\left(\frac{b}{a}\right)^c$
$a^b+a^b=2a^b$	but a^b+a^c and a^b+c^b cannot be simplified	

Logarithms: If $a=b^c$ then $c=\log_b a=\frac{\ln a}{\ln b}$, $b>0$ and $b\neq1$.

$\log_b b^c=c$	$\log_b(a^c)=c\log_b a$
$\log_b(ac)=\log_b a+\log_b c$	$\log_b\left(\frac{a}{c}\right)=\log_b a-\log_b c$
$\log_b(a+a)=\log_b(2a)$	but $\log_b(a+c)$ cannot be simplified

Credit: http://www.cs.uleth.ca/~wilsonn/BasicRulesOfAlgebra.pdf