BASIC MATH "CHEAT SHEET" **all math 8-19-08**

Sign pattern
works for double signed numbers, multiplication, & division

$+ + = +$
$- - = +$
$+ - = -$
$- + = -$

Multiplying fractions
just multiply straight across

$$\frac{a}{b} * \frac{c}{d} = \frac{a*c}{b*d}$$

Adding (subtracting) fractions
Find LCD or any CD

$$\frac{a}{b}+\frac{c}{d} = \frac{CD/b*a}{CD/b\ b} + \frac{CD/d*c}{CD/d\ d} = \frac{(CD/b)*a + (CD/d)*c}{CD}$$

Exponents $a^n = a*a*a*a*\ldots*a$ for a total count of n factors of a, is NOT $n*a$

$a^n*a^m = a^{n+m}$	same base multiplied, add exponents
$a^n/a^m = a^{n-m}$	same base divided, subtract exponents
$(a^n)^m = a^{n*m}$	power to a power, multiply exponents
$(\text{anything})^0 = 1$	anything raised to power 0 is a one
$a^{1/n} = \sqrt[n]{a}$	fractional power 1/n same as n^{th} root
$a^{-n} = 1/a^n$ *and* $1/a^{-n} = a^n$	"round bottomed boat" rule

Simplifying radicals (products only)

$$\sqrt{(a^2b^4c^3)} = \sqrt{(a^2b^2b^2c^2c)} = \sqrt{a^2}\ \sqrt{b^2}\ \sqrt{b^2}\ \sqrt{c^2}\ \sqrt{c} = ab^2c\sqrt{c}$$

groups split up put together

Clearing radical denominators (use a "convenient 1" as a multiplier)

$$\frac{a}{\sqrt{b}} = \frac{a}{\sqrt{b}} * \frac{\sqrt{b}}{\sqrt{b}} = \frac{a\sqrt{b}}{(\sqrt{b})^2} = \frac{a\sqrt{b}}{b}$$

Square roots of negative numbers – use the imaginary number "i"

$$\sqrt{(-N)} = \sqrt{(N)}\sqrt{(-1)} = i\sqrt{(N)} \qquad \text{where } i = \sqrt{(-1)}$$

Complex numbers = sum of a real and an imaginary number $z = a + bi$

add (subtract) corresponding parts: $a+bi + c+di = (a+c) + (b+d)i$

multiply (treat like binomials and use $i^2 = -1$):

$$(a+bi)(c+di) = ac + bci + adi + bdi^2 = (ac - bd) + (bc + ad)i$$

divide (use conjugate of denominator in a "convenient 1" multiplier):

$$\frac{a+bi}{c+di} = \frac{(a+bi)(c-di)}{(c+di)(c-di)} = \frac{ac + bci - adi - bdi^2}{c^2 - d^2i^2} = \frac{(ac+bd)}{(c^2+d^2)} + \frac{(bc-ad)i}{(c^2+d^2)}$$