Some Basics

Perfect Square Rule: If $q^2 = p$, then $q = \pm\sqrt{p}$

So, if we have $t^2 = 7$, then $t = \pm\sqrt{7}$. "If something squared equals a number, then the something equals plus or minus the square root of the number."

Basic rules for working with fractions.

FUNDAMENTAL LAW OF FRACTIONS: $\frac{a}{b} = \frac{ax}{bx}$, where b and x are non-zero .

CANCELLATION LAW: $\frac{ax}{bx} = \frac{a}{b}$, where b and x are non-zero .

For example, $\frac{5}{9} = \frac{5 \cdot 3}{9 \cdot 3} = \frac{15}{27}$ and $\frac{6}{8} = \frac{3 \cdot \cancel{2}}{4 \cdot \cancel{2}} = \frac{3}{4}$.

$$\frac{a}{b} \cdot \frac{c}{d} = \frac{ac}{bd}$$

$$\frac{a}{b} \div \frac{c}{d} = \frac{\frac{a}{b}}{\frac{c}{d}} = \frac{a}{b} \cdot \frac{d}{c}$$

$$\frac{a}{b} + \frac{c}{b} = \frac{a+c}{b}$$

$$\frac{a}{b} + \frac{c}{d} = \frac{ak + cl}{D}, \text{ where } bk = D = dl \neq 0$$

$$\frac{a}{b} + \frac{c}{d} = \frac{ad + bc}{bd}$$

Order of Operations:

1a. Work Inside ---> Out of grouping symbols
1b. In a fraction, treat Numerator and Denominator independently until each is simplified as much as possible

2. Powers and roots in the order you see them Left ---> Right
3. Multiplication and Division in the order you see them Left ---> Right
4. Addition and Subtraction in the order you see them Left ---> Right

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Laws of Exponents

$x^0 = 1$ if $x \neq 0$;	$x^1 = x$
$x^n = x \cdot x \cdot \ldots \cdot x$	n copies of x multiplied together, $n \in \mathcal{N}$
$x^{-n} = \frac{1}{x^n}$ if $x \neq 0$	
$x^m x^n = x^{m+n}$	(multiply the bases, add the exponents)
$(x^m)^n = x^{mn}$	(power to a power, multiply the powers)
$(xy)^n = x^n y^n$	(power through a product)
$\left(\frac{x}{y}\right)^n = \frac{x^n}{y^n}$	(power through a quotient)
$\frac{x^m}{x^n} = x^{m-n}$	(divide the bases, subtract the exponents)
$\left(\frac{x}{y}\right)^{-n} = \left(\frac{y}{x}\right)^n$	

If negative powers appear in a problem involving ONLY multiplication and division, then use the above rules first and do any "flipping" last to get rid of negative exponents.

If negative powers appear in a problem involving addition or subtraction of such terms, then "flip" first to get rid of negative exponents.

Some special products:

$(a+b)^2 = a^2 + 2ab + b^2$ squaring a two term sum:
square of the first plus twice the product plus the square of the second

$(a-b)^2 = a^2 - 2ab + b^2$ squaring a two term difference:
square of the first minus twice the product plus the square of the second

$(a+b)(a-b) = a^2 - b^2$ product of conjugates:
square of the first minus the square of the second
