Solving Quadratic Equations

Factor

If it is easy to factor do so, otherwise try one of the other methods.

Solving by Factoring

1.) Write the equation in Standard Form so that one side equals 0, $ax^2 + bx + c = 0$.

2.) Factor completely. All linear factors must be found. (See Polynomial Factoring)

3.) Set each linear factor to zero, contains 1 variable to the 1^{st} degree.

4.) Solve the resulting equations for the variable.

   a. The solution to each factor is also a solution to the polynomial.

5.) Check all solutions in the original equation.

   a. If solving a word problem, does the value make sense?

Example 1

$0 = -4(x – 6)(x + 4)$ Steps 1 and 2 are already done.

$0 = x – 6$ or $0 = x + 4$ Step 3: only linear factors are set to 0. -4 is not a linear factor, and it can never be 0! So in order for the polynomial to equal zero, either of the 2 linear factors must be zero.

$6 = x$ or $-4 = x$ Step 4: Solve to find values of the variable to cause the polynomial to be zero.

$0 = -4([6] – 6)([6] + 4)$ or $0 = -4([-4] – 6)([-4] + 4)$ Step 5: Check each value.

$0 = -4(0)(10)$ or $0 = -4(-10)(0)$ Both of these are true.

Example 2

$x^2 – x + 6 = 0$ Step 1: Completed

$(x – 3)(x + 2) = 0$ Step 2: Factor

$x – 3 = 0$ or $x + 2 = 0$ Step 3: Set Linear Factors = 0.

$x = 3$ or $x = -2$ Step 4: Solve

Example 3

$7x^2 = 4x$

$7x^2 – 4x = 0$ Step 1: Set the equation into Standard Form

$x(7x – 4) = 0$ Step 2: Factor

$x = 0$ or $7x – 4 = 0$ Step 3: Set Linear Factors = 0. Be sure to go through the

$x = 0$ or $7x = 4$ steps for solving Linear Equations to be sure all of your signs are correct.

$x = 0 \text{ or } x = \frac{4}{7}$ Step 4: Solve

Example 4

$(x + 10)(x + 5) = 6$ Step 1: Set equation into Standard Form, if it is factored, but

$x^2 + 10x + 5x + 50 = 6$ not equal to zero, it needs to be multiplied out,

$x^2 + 15x + 44 = 0$ simplified & set equal to 0, before it can be factored.

$(x + 11)(x + 4) = 0$ Step 2: Factor.

$x + 11 = 0$ of $x + 4 = 0$ Step 3: Set Linear Factors = 0.

$x = -11$ or $x = -4$ Step 4: Solve.

You really should do Step 5, check your solution…