

Unit Overview #1: Solve a Quadratic Equation by Factoring

To solve by factoring, we have to factor and then use the zero-product PROPERTY, which says...

If two expressions multiply to make zero $(x+2)(x-5)=0$
 then, one of them must equal zero $x+2=0$ OR $x-5=0$

How to solve, step-by-step:

$$\begin{array}{r} 3x^2 - 16 = x^2 - 8x + 8 \\ +8x \quad -x^2 - 8 \quad -x^2 + 8x - 8 \\ \hline \end{array}$$

$$3x^2 - 16 = x^2 - 8x + 8$$

set equal to zero

$$\begin{array}{r} 3x^2 - 16 = x^2 - 8x + 8 \\ -3x^2 + 16 \quad -3x^2 + 16 \\ \hline \end{array}$$

$$\frac{0}{-2} = \frac{-2x^2 - 8x + 24}{-2}$$

$$0 = x^2 + 4x - 12$$

(optional):
 divide both sides
 by G.C.F. especially
 if negative

ONLY DIVIDE BY A NUMBER

FACTOR

ZERO
 PRODUCT
 PROPERTY

$$\frac{2x^2 + 8x - 24}{2} = \frac{0}{2}$$

$$x^2 + 4x - 12 = 0$$

	x	-2
x	x^2	$-2x$
6	$6x$	-12

$$(x-2)(x+6) = 0$$

$$\begin{array}{l} x-2=0 \quad \text{OR} \quad x+6=0 \\ +2 \quad +2 \quad \quad -6 \quad -6 \\ \hline x=2 \quad \quad \quad x=-6 \end{array}$$

$$x = \{2, -6\} \leftarrow \text{SOLUTION}$$

If an expression is PRIME (not factorable) then...

Your work should look exactly like this:

$$5x^2 + 10x - 77 = -2$$

$$\underline{\quad +2 \quad +2 \quad}$$

$$\frac{5x^2 + 10x - 75}{5} = \frac{0}{5}$$

$$x^2 + 2x - 15 = 0$$

	x	-3
x	x ²	-3x
5	5x	-15

$$(x-3)(x+5) = 0$$

$$x-3=0 \quad \text{or} \quad x+5=0$$

$$+3 \quad +3$$

$$-5 \quad -5$$

$$x=3$$

$$x=-5$$

$$x = \{3, -5\}$$

$$x^2 + 7x + 23 = 2 - 3x$$

$$\underline{\quad +3x \quad -2 \quad -2 \quad +3x \quad}$$

$$x^2 + 10x + 21 = 0$$

	x	7
x	x ²	7x
3	3x	21

$$(x+7)(x+3) = 0$$

$$x+7=0 \quad \text{or} \quad x+3=0$$

$$x=-7$$

$$x=-3$$

$$x = \{-7, -3\}$$

$$-x^2 + 4x + 6 = 1$$

$$\underline{\quad -1 \quad -1 \quad}$$

$$\frac{-x^2 + 4x + 5}{-1} = \frac{0}{-1}$$

$$x^2 - 4x - 5 = 0$$

	x	-5
x	x ²	-5x
1	x	-5

$$(x-5)(x+1) = 0$$

$$x-5=0 \quad \text{or} \quad x+1=0$$

$$x=5$$

$$x=-1$$

$$x = \{5, -1\}$$

$$x^2 = 25$$

$$\underline{\quad -25 \quad -25 \quad}$$

$$x^2 - 25 = 0 \leftarrow \text{Difference of two squares}$$

	x	5
x	x ²	5x
-5	-5x	-25

$$(x+5)(x-5) = 0$$

$$x+5=0 \quad \text{or} \quad x-5=0$$

$$x=-5$$

$$x=5$$

$$x = \{5, -5\}$$