LC MATH I

Unit Overview #2: Solve a Quadratic Equation by using the Quadratic Formula

The quadratic formula is ...

$$X = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

In order to use the quadratic formula, the equation needs to be...

in standard form, set equal to zero

$$ax^2+bx+c=0$$

How to solve, step-by-step:

$$7x^2 - 7 = -10x$$

SET EQUAL TO ZERO

$$+10x \quad +10x$$

$$7x^2+10x-7=0$$

IDENTIFY a, b, & C

$$a=7 \quad b=10 \quad c=-7$$

SUBSTITUTE INTO FORMULA

$$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

$$x = \frac{-10 \pm \sqrt{10^2-4(7)(-7)}}{2(7)}$$

USE ORDER OF OPERATIONS TO SIMPLIFY

$$x = \frac{-10 \pm \sqrt{100+196}}{14}$$

$$x = \frac{-10 \pm \sqrt{296}}{14}$$

SIMPLIFY RADICAL

296
4 74
2 37

$$x = \frac{-10 \pm \sqrt{4 \cdot 74}}{14}$$

$$x = \frac{-10 \pm 2\sqrt{74}}{14}$$

SIMPLIFY COMMON FACTOR

$$x = \frac{2(-5 \pm \sqrt{74})}{2(7)}$$

$$x = \left\{\frac{-5 \pm \sqrt{74}}{7}\right\}$$

$$x = \left\{\frac{-5+\sqrt{74}}{7}, \frac{-5-\sqrt{74}}{7}\right\}$$

Your work should look exactly like this:

$5x^2 - 57 = 4x$

$-4x \quad -4x$

$5x^2 - 4x - 57 = 0$

$a=5 \quad b=-4 \quad c=-57$

$x = \dfrac{-b \pm \sqrt{b^2-4ac}}{2a}$

$x = \dfrac{-(-4) \pm \sqrt{(-4)^2-4(5)(-57)}}{2(5)}$

$x = \dfrac{4 \pm \sqrt{16+1140}}{10}$

$x = \dfrac{4 \pm \sqrt{1156}}{10}$

$x = \dfrac{4 \pm 34}{10}$

$x = \left\{\dfrac{4+34}{10}, \dfrac{4-34}{10}\right\}$

$x = \left\{\dfrac{38}{10}, \dfrac{-30}{10}\right\} = \left\{\dfrac{17}{5}, -3\right\}$

$7x^2 = -x - 2$

$+x+2 \quad +x+2$

$7x^2 + x + 2 = 0$

$a=7 \quad b=1 \quad c=2$

$x = \dfrac{-b \pm \sqrt{b^2-4ac}}{2a}$

$x = \dfrac{-1 \pm \sqrt{1^2-4(7)(2)}}{2(7)}$

$x = \dfrac{-1 \pm \sqrt{1-56}}{14}$

$x = \dfrac{-1 \pm \sqrt{-55}}{14}$ ← negative inside square root

no solution

$10x^2 = -x + 6$

$+x-6 \quad +x-6$

$10x^2 + x - 6 = 0 \quad a=10 \quad b=1 \quad c=-6$

$x = \dfrac{-b \pm \sqrt{b^2-4ac}}{2a}$

$x = \dfrac{-1 \pm \sqrt{1^2-4(10)(-6)}}{2(10)}$

$x = \dfrac{-1 \pm \sqrt{1+240}}{20}$

$x = \left\{\dfrac{1 \pm \sqrt{241}}{20}\right\}$

since 241 is prime, you can't keep going

$6x^2 = 5 - 4x$

$+4x-5 \quad -5+4x$

$6x^2 + 4x - 5 = 0 \quad a=6 \quad b=4 \quad c=-5$

$x = \dfrac{-b \pm \sqrt{b^2-4ac}}{2a}$

$x = \dfrac{-4 \pm \sqrt{4^2-4(6)(-5)}}{2(6)}$

$x = \dfrac{-4 \pm \sqrt{16+120}}{12}$

$x = \dfrac{-4 \pm \sqrt{136}}{12}$ ← $\sqrt{136} = \sqrt{4 \cdot 34} = 2\sqrt{34}$

$x = \dfrac{-4 \pm 2\sqrt{34}}{12}$

$x = \dfrac{2 \cdot (-2 \pm \sqrt{34})}{2 \cdot 6}$

$x = \left\{\dfrac{-2 \pm \sqrt{34}}{6}\right\}$