

Lesson 5 HW

December 13, 2018 1:20 PM

Name: Key

Date: _____

Pre-Calculus 11 CH3/4 HW Lesson 5: The Quadratic Formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}, \quad a \neq 0$$

1. Given each quadratic equation, indicate the values of the coefficients "a", "b" and "c":

a) $x^2 + 5x + 6 = 0$ $a = \underline{1} \quad b = \underline{5} \quad c = \underline{6}$	b) $12x^2 + 7x - 3 = 0$ $a = \underline{12} \quad b = \underline{7} \quad c = \underline{-3}$	c) $-2x^2 - 7x + 5 = 0$ $a = \underline{-2} \quad b = \underline{-7} \quad c = \underline{5}$
d) $4x^2 = 13x - 8$ $4x^2 - 13x + 8 = 0$ $a = \underline{4} \quad b = \underline{-13} \quad c = \underline{8}$	e) $x(7 - 8x) = 10$ $7x - 8x^2 - 10 = 0$ $0 = 8x^2 - 7x + 10$ [NOTE: Try to keep "a" positive] [MAXIMIZE SIMPLIFY] $a = \underline{8} \quad b = \underline{-7} \quad c = \underline{10}$	f) $x(x+2) = 6 - (x-3)(2x+1)$ $x^2 + 2x = 6 - [2x^2 - 6x + x - 3]$ $x^2 + 2x = 6 - [2x^2 - 5x - 3]$ $x^2 + 2x = 6 - 2x^2 + 5x + 3$ $3x^2 - 3x - 9 = 0$ ← Always simplify if possible $x^2 - x - 3 = 0$ $a = \underline{1} \quad b = \underline{-1} \quad c = \underline{-3}$

2. Solve for "x" for each of the following by using the quadratic formula:

a) $x^2 - 5x + 6 = 0$ $a=1 \quad b=-5 \quad c=6$ $x = \frac{5 \pm \sqrt{5^2 - 4(1)(6)}}{2(1)}$ $= \frac{5 \pm \sqrt{25 - 24}}{2}$ $= \frac{5 \pm 1}{2}$ $x_1 = \frac{5+1}{2} \quad x_2 = \frac{5-1}{2}$ $x_1 = \underline{3} \quad x_2 = \underline{2}$	b) $3x^2 - x + 1 = 3$ $3x^2 - x - 2 = 0$ $a=3 \quad b=-1 \quad c=-2$ $x = \frac{(1) \pm \sqrt{1^2 - 4(3)(-2)}}{2(3)}$ $= \frac{1 \pm \sqrt{1 + 24}}{6}$ $= \frac{1 \pm 5}{6}$ $x_1 = \frac{6}{6} = 1 \quad x_2 = \frac{-4}{6} = -\frac{2}{3}$	c) $2x^2 - 3x - 1 = 0$ $a=2 \quad b=-3 \quad c=-1$ $x = \frac{3 \pm \sqrt{3^2 - 4(2)(-1)}}{2(2)}$ $= \frac{3 \pm \sqrt{9 + 8}}{4}$ $= \frac{3 \pm \sqrt{17}}{4}$ $x_1 = \frac{3 + \sqrt{17}}{4} \quad x_2 = \frac{3 - \sqrt{17}}{4}$ These answers are in simplest form!
d) $-0.5x^2 + 4x + 12 = 0$ $a=-0.5 \quad b=4 \quad c=12$ $x = \frac{-4 \pm \sqrt{4^2 - 4(-0.5)(12)}}{2(-0.5)}$ $= \frac{-4 \pm \sqrt{16 + 24}}{-1}$ $= \frac{-4 \pm \sqrt{40}}{-1}$ $= \frac{-4 \pm 2\sqrt{10}}{-1} = \frac{4 \pm 2\sqrt{10}}{1}$ $x_1 = \underline{4 + 2\sqrt{10}} \quad x_2 = \underline{4 - 2\sqrt{10}}$	e) $-0.5x^2 + 3x = 6$ $-0.5x^2 + 3x - 6 = 0$ $a=-0.5 \quad b=3 \quad c=-6$ $x = \frac{-3 \pm \sqrt{3^2 - 4(-0.5)(-6)}}{2(-0.5)}$ $x = \frac{-3 \pm \sqrt{9 - 12}}{-1}$ This is negative $x = \frac{-3 \pm \sqrt{-3}}{-1}$ So no Real Roots!!	f) $-3x^2 = 12x - 5$ Move to the right so 'a' is positive $0 = 3x^2 + 12x - 5$ $a=3 \quad b=12 \quad c=-5$ $x = \frac{-12 \pm \sqrt{12^2 - 4(3)(-5)}}{2(3)}$ $x = \frac{-12 \pm \sqrt{144 + 60}}{6}$ NOTE: $204 = 4 \times 51$ $x = \frac{-12 \pm 2\sqrt{51}}{6}$ $x = \frac{-6 \pm \sqrt{51}}{3}$ $x_1 = \frac{-6 + \sqrt{51}}{3} \quad x_2 = \frac{-6 - \sqrt{51}}{3}$

<p>g) $3x(2x-6)=8$ $6x^2-18x-8=0$ Simplify $3x^2-9x-4=0$ $a=3$ $b=-9$ $c=-4$ $x = \frac{9 \pm \sqrt{81-4(3)(-4)}}{2(3)}$ $x = \frac{9 \pm \sqrt{129}}{6}$ $x_1 = \frac{9+\sqrt{129}}{6}$ $x_2 = \frac{9-\sqrt{129}}{6}$ (Note: keep answers in exact form)</p>	<p>h) $\frac{4x^2}{3} = 4x-2$ \odot Multiply All Terms by 3. $4x^2 = 12x-6$ $4x^2-12x+6=0$ $2x^2-6x+3=0$ $x = \frac{6 \pm \sqrt{36-4(2)(3)}}{4}$ $x = \frac{6 \pm \sqrt{12}}{4} = \frac{6 \pm 2\sqrt{3}}{4}$ $x_1 = \frac{3+\sqrt{3}}{2}$ $x_2 = \frac{3-\sqrt{3}}{2}$</p>	<p>i) $x^2-2 = \frac{-7x}{2}$ \odot Multiply All Terms by 2. $2x^2-4 = -7x$ $2x^2+7x-4=0$ $a=2$ $b=7$ $c=-4$ $x = \frac{-7 \pm \sqrt{49-4(2)(-4)}}{2(2)}$ $x = \frac{-7 \pm \sqrt{81}}{4}$ $x_1 = \frac{-7+9}{4} = \frac{1}{2}$ $x_2 = \frac{-7-9}{4} = -4$</p>
<p>j) $2x^3-5x^2+7x=0$ $x(2x^2-5x+7)=0$ $x=0$ $a=2$ $b=-5$ $c=7$ $x = \frac{5 \pm \sqrt{25-4(2)(7)}}{2(2)}$ $= \frac{5 \pm \sqrt{25-56}}{4}$ $= \frac{5 \pm \sqrt{-31}}{4} \Rightarrow \frac{5 \pm 9}{4}$ $x_2 = \frac{5+9}{4}$ $x_3 = \frac{5-9}{4} = -\frac{4}{4}$ $x_2 = \frac{14}{4}$ $x_3 = -1$</p>	<p>k) $2x^2+6x-8=7x^2-2x$ $0 = 5x^2-8x+8$ $a=5$ $b=-8$ $c=8$ $x = \frac{8 \pm \sqrt{(-8)^2-4(5)(8)}}{2(5)}$ $= \frac{8 \pm \sqrt{64-160}}{10}$ $= \frac{8 \pm \sqrt{-96}}{10}$ \leftarrow NEGATIVE! No Real Soln</p>	<p>l) $2(2x-1)^2+9(2x-1)+7=0$ Let $A=2x-1$ so eqn becomes $2A^2+9A+7=0$ $3x7$ $(2A+7)(A+1)=0$ $A = -\frac{7}{2}$ $A = -1$ \leftarrow You can use the Q.F. or Factorize up to you! Now $2x-1 = -\frac{7}{2}$ $2x = -\frac{5}{2}$ $x_1 = -\frac{5}{4}$ $2x-1 = -1$ $2x = 0$ $x_2 = 0$</p>

3. Under what conditions will the equation have no solutions? $ax^2+bx+c=0$ Explain why

$b^2-4ac < 0$ $\leftarrow x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$ \leftarrow When this part of the Eqn is NEG., You CANT SQUARE ROOT A NEG. \rightarrow No Real Soln

4. Under what conditions will the equation have only one solution? $ax^2+bx+c=0$ Explain why

$b^2-4ac = 0$ $\leftarrow x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$ \leftarrow When this part is ZERO, You DONT ADD/SUBTRACT ANY VALUE

5. The revenue a company makes for selling shoes is given by the equation: $R = -8p^2 + 1200p$, where "R" is the revenue and 'p' is the price in dollars. At what price should the company sell their shoes to generate a revenue of \$400,000?

$400,000 = -8p^2 + 1200p$
 $0 = -8p^2 + 1200p - 400,000$
 $0 = -p^2 + 150p - 50,000$

6. Here are the steps that John used to solve the equation: $12x^2 - 7x - 3 = 0$. Find the mistakes:

$L_1: x = \frac{-7 \pm \sqrt{49^2 - 4(12)(3)}}{2(12)}$ \leftarrow This should be (-3)
 $L_2: x = \frac{-7 \pm \sqrt{2401-144}}{24}$ \leftarrow This term should be divided by 24
 $L_3: x = \frac{-7 \pm \sqrt{2257}}{24}$ \leftarrow This should be POSITIVE $(-7) = +7$
 $L_4: x = -7 \pm 1.9794955..$
 $L_5: x_1 = -7 + 1.9794955.. = -5.0205...$
 $L_6: x_2 = -7 - 1.9794955.. = -8.9794955...$