Bellwork 11/17/15

- Review: Find the vertex:
  \[ f(x) = (x - 4)^2 + 7 \quad f(x) = |x + 5| - 3 \]

- Review: Factor:
  \[ x^2 - x - 30 \quad x^2 - 5x \]

**Zero product property:**

If the product of two quantities is zero, one of the two quantities must be zero.

\[(a)(b) = 0, \text{ either } a = 0 \text{ or } b = 0\]

**Will always have two possible solutions**

**SECTION 4-5: SOLVING QUADRATIC EQUATIONS**

**Example #1: Solve the quadratic function**

Step #1: Set each equation equal to zero
Step #2: Factor the quadratic expression (5 methods of factoring)
1. Greatest common factor (undo distribution)
2. Factoring trinomials (unfoiling)
3. Difference of Two Squares
4. Perfect Square Trinomials
5. Leading Coefficient Trinomials

**Solve each equation by factoring. Check your answers.**

**Set each equation equal to zero**

**To start, factor the quadratic expression.**

\[a. \quad x^2 - x - 30 = 0\]
\[b. \quad x^2 = 25\]
\[c. \quad x^2 = -10x - 9\]
\[d. \quad x^2 - 5x = 0\]

Solve each equation by factoring. Check your answers.

**Set each equation equal to zero**

**To start, factor the quadratic expression.**

\[a. \quad x^2 - x - 30 = 0\]
\[b. \quad x^2 = 25\]
\[c. \quad x^2 = -10x - 9\]
\[d. \quad x^2 - 5x = 0\]
Solve each equation by factoring.
Check your answers.
**Set each equation equal to zero**
**To start, factor the quadratic expression.**

e. \(10x - 24 = x^2 \)
\(0 = x^2 - 10x + 24\)
\(0 = (x - 6)(x - 4)\)
\(x = 6 \quad x = 4\)

f. \(x^2 = -12x\)
\(0 = x^2 + 12x = 0\)
\(x(x + 12) = 0\)
\(x = 0 \quad x = -12\)

Creating a quadratic
Create a quadratic with the following pairs of solutions.
(Hint: start with \((x \quad x\) insert numbers, then FOIL)

3 and \(-5\)
\((x - 3)(x + 5)\)

\(-6 \quad 0\)
\((x - 6)(x + 6)\)

\[x^2 + 5x - 3x - 15\]
\(x(x + 6)\)

\[f(x) = x^2 + 2x - 15\]
\(C(x) = x^2 + 6x\)

The Quadratic Formula!

- The Quadratic Formula:

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

Solving using the quadratic formula

Ex 1: \(-3x^2 + 7x - 2 = 0\)
\(a = -3 \quad b = 7 \quad c = -2\)
\(x = \frac{-7 \pm \sqrt{49 + 24}}{2(-3)}\)
\(x = \frac{-7 + 7}{-6} = \frac{0}{-6} = 0\)
\(x = \frac{-7 - 7}{-6} = \frac{-14}{-6} = \frac{7}{3}\)

Ex 2: \(x^2 - 8x + 15 = 0\)

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

\(a = 1 \quad b = -8 \quad c = 15\)
\(x = \frac{-(-8) \pm \sqrt{(-8)^2 - 4(1)(15)}}{2(1)}\)
\(x = \frac{8 \pm \sqrt{64 - 60}}{2}\)
\(x = \frac{8 \pm 2}{2}\)
\(x = 5 \quad x = 3\)

Just Set It Up!!

On your whiteboards. Just set up – don’t solve!

1. \(-x^2 + 7x - 3 = 0\)
\(a = -1 \quad b = 7 \quad c = -3\)
\(x = \frac{-7 \pm \sqrt{49 + 12}}{2(-1)}\)
\(x = \frac{-7 \pm 7}{-2}\)
\(x = 0 \quad x = 3\)

2. \(x^2 + 6x = 10\)
\(x^2 + 6x - 10 = 0\)
\(a = 1 \quad b = 6 \quad c = -10\)
\(x = \frac{-6 \pm \sqrt{36 + 40}}{2}\)
\(x = \frac{-6 \pm 8}{2}\)
\(x = -1 \quad x = 2\)

3. \(2x^2 + 4x - 3 = 0\)
\(a = 2 \quad b = 4 \quad c = -3\)
\(x = \frac{-4 \pm \sqrt{16 + 24}}{4}\)
\(x = \frac{-4 \pm 4}{4}\)
\(x = 0 \quad x = -\frac{3}{2}\)
Solving using quadratic formula:

Ex 3: \( x^2 = 4x - 1 \)

Finding the number of solutions

- The value under the radical symbol determines the number of real solutions for \( ax^2 + bx + c = 0 \).

\[
\Delta = b^2 - 4ac
\]

The value under the radical, \( b^2 - 4ac \), is called the discriminant.

Evaluate the discriminant for each equation. Determine the number of real solutions.

1. \(-3x^2 + 7x - 2 = 0\)
2. \(4x^2 + 7 = 9x\)
3. \(x^2 - 4x = -4\)

Which is the correct quadratic formula?

A. \( \frac{b \pm \sqrt{(-b)^2 - 4ab}}{2a} \)

B. \( -\frac{b \pm \sqrt{b^2 - 2ac}}{4a} \)

C. \( -\frac{b \pm \sqrt{b^2 - 4ac}}{2a} \)

Which is correct?

Given: \( 2x^2 + 3x - 4 = 0 \)

A. \( \frac{3 \pm \sqrt{3^2 + 4(2)(4)}}{2(2)} \)

B. \( \frac{-3 \pm \sqrt{3^2 - 4(2)(-4)}}{2(2)} \)

C. \( \frac{-3 \pm \sqrt{2^2 + 2(3)(4)}}{4(2)} \)