Warm-Up   2/8/18

Make the following perfect square trinomials and factor.

1. $x^2 + 14x + \underline{49} = (x + 7)^2$

$$\frac{14x}{2}(7)^2 = 49$$

2. $x^2 - 9x + \underline{81/-4} = (x - 9/2)^2$

$$\frac{-9x}{2} = 81/-4$$

$-9/2 = 81/-4$

3. $x^2 - 18x + \underline{81} = (x - 9)^2$

$$\frac{18x}{2}$$

$(9)^2 = 81$

4. $x^2 + 2x + \underline{1} = (x + 1)^2$

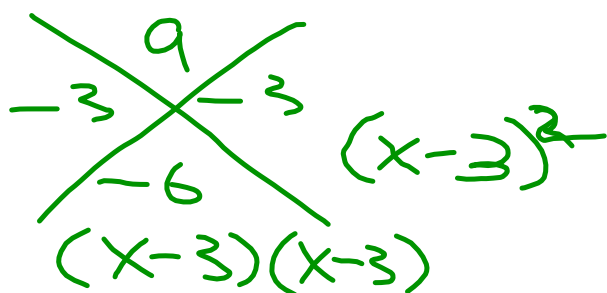$$\frac{2x}{2}(1)$$ $\underline{25}$

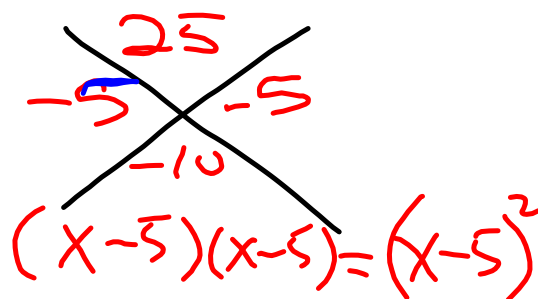5. $x^2 + 5x + \underline{\frac{25}{4}} = (x + \frac{5}{2})^2$

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Opening: 2/8/18

Review: Factor the following trinomials.

1. $x^2 - 6x + 9$ 2. $x^2 - 10x + 25$

$$(x-3)^2$$
$$(x-3)(x-3)$$

$$(x-5)(x-5) = (x-5)^2$$

- How does the constant term in the binomial relate to the b term in the trinomial?

- How does the constant term in the binomial relate to the c term in the trinomial?

Agenda for Today   2/8/18

1.   Warm-Up/Opening

2.   Presentations of defense
     for Matt or Marcus and
     present your error analysis
     for Emma's error.

3.   Post-It Check on
     Completing the Square

4.   Choose your activity

5.   Quadratic Formula

Presentations

Defend:

Matt is trying to solve the following problem by completing the square:

$$x^2 - 18x + 6 = 0$$

He believes he has got the answer and wants to compare it with his classmate, Marcus. He says, "Hey Marcus, I got $x = 9 + 5\sqrt{3}$ and $9 - 5\sqrt{3}$, what did you get?"

Marcus replied, "hmm that's weird I got $x = 9 + \sqrt{75}$ and $9 - \sqrt{75}$."

Matt then says "well we both got the 9 part so we have similar thinking, lets ask Tiffany!"

Tiffany looks at their work and says " I got the same thing as Matt I just combined like terms and got $x = 14\sqrt{3}$ and $4\sqrt{3}$."

More confused than ever they call over Mrs. Dombrowski. She assures them that one of them has the correct answer...

Who is correct? Explain.

$$x^2 - 18x + 6 = 0$$
$$ - 6 - 6$$

$$x^2 - 18x = -6$$
$$\frac{18x}{2} \quad (-9)^2 = 81$$
$$x^2 - 18x + 81 = -6 + 81$$

$$(x - 9)^2 = \sqrt{75}$$

$$x - 9 + 5\sqrt{3}$$
$$\boxed{x = 9 \pm 5\sqrt{3}}$$

Error Analysis:
Describe and correct the error Emma made when attempting to solve by completing the square.
Problem: $x^2 + 20x - 8 = 0$

Emma's Process: *Correct Process:*
$x^2 + 20x - 8 = 0$
$x^2 + 20x + \underline{\hspace{1cm}} = 8 + \underline{\hspace{1cm}}$
$x^2 + 20x + 10 = 8 + 10$
$x^2 + 20x + 10 = 18$

There are no numbers that multiply to 10 and
Add to 20. Therefore, it is not factorable.

$$x^2 + 20x - 8 = 0$$
$$ +8 \quad +8$$

$$x^2 + 20x = 8$$
$$\frac{20x}{2}$$

$$10^2 = 100$$
$$x^2 + 20x + 100 = 8 + 100$$
$$\sqrt{(x+10)^2} = \pm\sqrt{108}$$
$$(x+10) = \pm 6\sqrt{3}$$
$$10 = \pm 6\sqrt{3}$$

Solve by completing the square.

$$x^2 - 6x - 72 = 0$$

$$x^2 \quad \frac{+72 \quad +72}{}$$

$$x^2 - \frac{6x}{2} = 72 \quad (-3)^2 = 9$$

$$x^2 - 6x + 9 = 72 + 9$$

$$\sqrt{(x-3)^2} = \sqrt{81}$$

$$x - 3 = \pm 9$$

$$x = 3 \pm 9$$

$$x = 12 \text{ or } -6$$

Partner Review Activity (30 mins)

Choose your activity!

1. Solving by Factoring Connect 4 Partner Activity
2. Quadratic Equations Coloring Worksheet
3. Who killed Mr. Quadratic?

Essential Question 2/8/18

How is the Quadratic Formular developed by completing the square?

Deriving the Quadratic Formula

$$ax^2 + bx + c = 0$$
$$\underline{\;\; -c \quad -c}$$

$$\frac{ax^2 + bx}{a} = \frac{-c}{a}$$

$$x^2 + \frac{b}{a}x = -\frac{c}{a}$$

$$\left(\frac{b}{a} \cdot \frac{1}{2}\right) = \left(\frac{b}{2a}\right)^2 = \boxed{\frac{b^2}{4a^2}}$$

$$x^2 + \frac{b}{a}x + \frac{b^2}{4a^2} = \frac{-c}{a} + \frac{b^2}{4a^2}$$

$$\left(x + \frac{b}{2a}\right)^2 = \sqrt{\frac{b^2}{4a^2} - \frac{c}{a} \cdot \frac{4a}{4a}}$$

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

$$-\frac{b}{2a} \qquad \frac{-b}{2a}$$

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

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

THE QUADRATIC FORMULA

So far we have learned several methods for solving quadratic equations.

The quadratic formula will work for ANY **quadratic equation** written in standard form : **ax² + bx + c = 0**

Steps for successfully applying the Quadratic Formula:
1. Write the equation in standard form.
2. Set the function equal to 0 if necessary.
3. Identify a, b, and c and plug them into the quadratic formula using parentheses.
4. Use the order of operations to simplify.
5. Simplify the radical if you can.

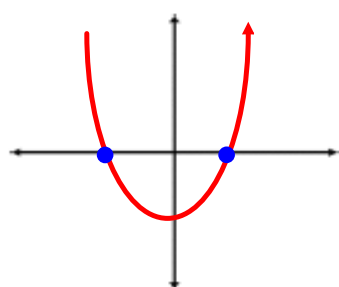## Quadratic Formula

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

** WRITE THE QUADRATIC FORMULA FOR EVERY PROBLEM**
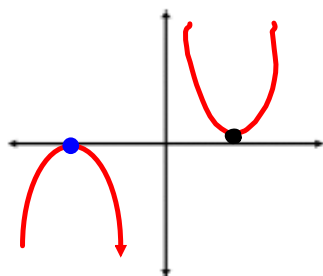
THE DISCRIMINANT OF A QUADRATIC
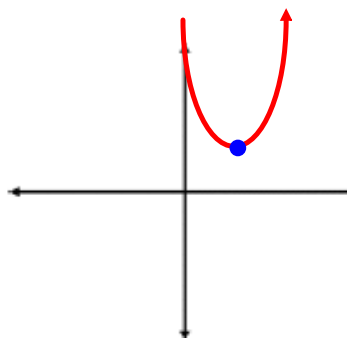
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Discriminant

The discriminant tells the number of solutions of a quadratic.

Discriminant: **Positive, b^2-4ac > 0**

Number of Solutions: **Two real solutions**

Discriminant: **Positive, b^2-4ac = 0**

Number of Solutions: **One real solution**

Discriminant: **Negative, b^2-4ac < 0**

Number of Solutions: **No real solution (two imaginary solutions)**

Finding the discriminant for each equation, and then find the solutions using the quadratic formula.

A) $f(x) = 3x^2 - 5x - 2$

$a = 3 \quad b = -5 \quad c = -2$

$D = b^2 - 4ac$

$D = (-5)^2 - 4(3)(-2)$

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

$D = 25 + 24 \qquad -6$

$D = 49$

$X = \dfrac{-(-5) \pm \sqrt{49}}{2(3)}$

$X = \dfrac{5 \pm 7}{6}$

$X = 2 \text{ or } -\frac{2}{6} = -\frac{1}{3}$

Discriminant: __49__

Number of Solutions: __2__   Solutions: __2 or -1/3__

B) $x^2 + 2 = 2x$

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

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

$D = (-2)^2 - 4(1)(2)$

$D = 4 - 8 \qquad \sqrt{2}$

$D = -4$

$X = \dfrac{-(-2) \pm \sqrt{-4}}{2(1)}$

$X = \dfrac{2 + 2i}{2}$ imaginary

no solution

Discriminant: __-4__

Number of Solutions: __None__   Solutions: __no__

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Attachments

Day 4 Quiz Review - Jeopardy.ppt