

### Warm-up:

1. Solve each equation by using square roots.

$$\text{a) } 2x^2 - 6 = 26$$

$$\frac{2x^2}{2} = \frac{32}{2}$$

$$x^2 = 16$$

$$\sqrt{x^2} = \pm\sqrt{16}$$

$$\underline{x = 4 \text{ or } -4}$$

$$\text{b) } 4(x-1)^2 + 2 = 10$$

$$\frac{4(x-1)^2}{4} = \frac{8}{4}$$

$$(x-1)^2 = 2$$

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

$$x-1 = \pm\sqrt{2}$$

$$\underline{x = 1 \pm\sqrt{2}}$$

2) What does it mean to "solve" a quadratic equation?

To solve a quadratic means to find the x-values

Agenda:

- 1) Warm-up
- 2) Homework questions
- 3) New Lesson---3.1 Solving quadratic equations (day 2)
- 4) Homework/in-class activity

## Algebra 2: 3.1 Solving Quadratic Equations (day 2):

### Learning Targets for Today:

- 1) Solve quadratic equations by factoring!

### (A) Solving Quadratic Equations by factoring

A quadratic equation is an equation that can be written in the form  $f(x) = ax^2 + bx + c$ , where "a" cannot be 0. A root of an equation is a solution of the equation.

- When the left side of  $ax^2 + bx + c = 0$  is factorable, you can solve the equation using the *Zero Product Property!*

#### Core Concept:

- Zero Product Property
- If the product of two expressions is zero, then one or both of the expressions is equal to zero.

$$( \quad x \quad ) = 0 \quad \xrightarrow{\text{then}} \quad ( \quad ) = 0 \quad \text{or} \quad ( \quad ) = 0$$

#### Factoring (trinomials):

$$Y = x^2 + bx + c$$

Step 1: Set the equation equal to 0

Step 2: Break into 2 binomials:  $(x \quad )(x \quad ) = 0$

#### Step 3: Signs:

- 1<sup>st</sup> sign goes to the bigger number in the binomials
- 2<sup>nd</sup> sign from the trinomial tells us if the signs in the binomials are the same or different  
+ = same    - = different

Step 4: Find all factors of the 3<sup>rd</sup> number. Pick the combo that adds or subtracts to the middle number.

\*You can always check your answer by FOIL!

Example:

$$x^2 - 12x = 28$$

step 1:  $x^2 - 12x - 28 = 0$

step 2:  $(x - 14)(x + 2) = 0$

$$\begin{array}{r} 28 \cdot 1 \\ 14 \cdot 2 \\ \hline 7 \cdot 4 \end{array}$$

step 3:



$$\begin{array}{l} x - 14 = 0 \quad x + 2 = 0 \\ \underline{x = 14} \quad \underline{x = -2} \end{array}$$

Try:

1)  $x^2 + 5x + 4 = 0$

$$(x + 4)(x + 1) = 0$$

$$x + 4 = 0 \quad x + 1 = 0$$

$$\underline{x = -4} \quad \underline{x = -1}$$

2)  $x^2 - 4x + 3 = 0$

$$(x - 3)(x - 1) = 0$$

$$x - 3 = 0 \quad x - 1 = 0$$

$$\underline{x = 3} \quad \underline{x = 1}$$

3)  $x^2 + 3x = 10$

$$x^2 + 3x - 10 = 0$$

$$(x + 5)(x - 2) = 0$$

$$x + 5 = 0 \quad x - 2 = 0$$

$$\underline{x = -5} \quad \underline{x = 2}$$

4)  $x^2 - 14x = 72$

$$x^2 - 14x - 72 = 0$$

$$(x - 18)(x + 4) = 0$$

$$x - 18 = 0 \quad x + 4 = 0$$

$$\underline{x = 18} \quad \underline{x = -4}$$

5)  $x^2 - 6 = -5x$

$$x^2 + 5x - 6 = 0$$

$$(x + 6)(x - 1) = 0$$

$$x + 6 = 0 \quad x - 1 = 0$$

$$\underline{x = -6} \quad \underline{x = 1}$$

\*in-class worksheet Kuta (solve by factoring #1)

↳ elbow partners w/stations

\*as a first step to factoring you should check to see whether the terms have a common term to factor out!

Common Term Factoring:

Step 1: Find the biggest number that you can divide out of every term

Step 2: Find the biggest letter that you can divide out of every term

Step 3: Divide-out the number and the letter from every term

(it goes out in front)

Example:

$$\frac{6x^2}{6x} + \frac{12x}{6x} = 0 \quad \rightarrow \quad 6x(x+2) = 0$$

$$6x = 0 \quad x+2 = 0$$

$$\underline{x=0} \quad \underline{x=-2}$$

Try:

1)  $5x^2 - 20 = 0$

$5(x^2 - 4) = 0$  ← square-root

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

$x^2 = 4$

$\underline{x = 2} \quad \underline{x = -2}$

2)  $2y^2 + 8y = 0$

$2y(y+4) = 0$

$2y = 0 \quad y+4 = 0$

$\underline{y = 0} \quad \underline{y = -4}$

3)  $3x^2 + 6x = 144$

$3x^2 + 6x - 144 = 0$

$3(x^2 + 2x - 48) = 0$

$3(x + 8)(x - 6) = 0$

$x = -8$   
 $x = 6$

48 · 1  
24 · 2  
16 · 3  
12 · 4  
8 · 6

4)  $2x^2 - 8x = 90$

$2x^2 - 8x - 90 = 0$

$2(x^2 - 4x - 45) = 0$

$2(x - 9)(x + 5) = 0$

$2 = 0 \quad x - 9 = 0 \quad x + 5 = 0$

$\underline{x = 9} \quad \underline{x = -5}$

45 · 1  
15 · 3  
9 · 5

**Homework: wks solving quadratic equations by factoring #2**