What's Going On?

Checking In

Minds on Factor!

Action! Solve by Factoring!

Consolidation Special Cases

Learning Goal - I will be able to "solve" quadratic equations by factoring.

Minds on

Factoring when a = 1!

$$ax^2 + bx + c$$

$$x^2 + 7x + 12$$

Find two numbers that
add to b and **multiply to c**

$$(x + 3)(x + 4)$$

Minds on

Factoring when $a \neq 1$!

$$ax^2 + bx + c$$

$$2x^2 - 6x - 20$$

Common Factor

$$2(x^2 - 3x - 10)$$

Find two numbers that add to **-3** and multiply to **-10**

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

Factor

$$-0.5x^2+2x+6$$

$$=-0.5(x^2-4x-12)$$

$$=-0.5(x+2)(x-6)$$

Minds on

Factor It!

With a partner, factor one of the standard form equations from yesterday.

When you are done, find your factored-form equation and tape it to the corresponding poster! (Use the **standard form equation** you started with to find your poster.

Minds on

Factor It!

Now, look at the factored-form equation that goes with each poster... what do you notice?

Action!

Make it So!

When is the statement below true?

$$2(a)(b) = 0$$

This equation holds when **either** **a** is 0, **or** when **b** is 0.

Action!

Make it So!

When is the statement below true?

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

Holds when $x - 4 = 0$ **OR** when $x + 3 = 0$

$+4 \quad +4$

$x = +4$

$-3 \quad -3$

$x = -3$

Action!

Factored Form

A quadratic equation in factored form typically looks like:

$$a(x - x_1)(x - x_2) = 0$$

where x_1 and x_2 are the **roots** of the equation.

Minds on

Solving by Factoring when a = 1!

$ax^2 + bx + c = 0$

$x^2 + 7x + 12 = 0$

Find two numbers that **add to b** and **multiply to c**

$(x + 3)(x + 4) = 0$

Therefore, we have roots when:

$(x + 3) = 0$ **AND** $(x + 4) = 0$

$x = -3$ $x = -4$

∴ the roots are $x = -3, -4$

Minds on

Factoring when $a \neq 1$!

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

$$2x^2 - 6x - 20 = 0$$

Common Factor

$$2(x^2 - 3x - 10) = 0$$

Find two numbers that add to **-3** and multiply to **-10**

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

Therefore, we have roots when:

$$(x + 2) = 0 \quad \underline{\text{AND}} \quad (x - 5) = 0$$

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

$\therefore$ the roots are $x = -2, 5$

Action!

Solving by Factoring when $a \neq 1$!

$$6x^2 + 13x - 5 = 0$$

Find two numbers that **add to b** and **multiply to ac**

$+15$ and -2

Break up the middle term

$$6x^2 + 15x - 2x - 5 = 0$$

$$3x(2x + 5) - 1(2x + 5) = 0$$

Factor by Grouping

$$(3x - 1)(2x + 5) = 0$$

$$(3x - 1)(2x + 5) = 0$$

We can find the roots by setting **either** set of brackets to zero and solving for x.

$(3x - 1) = 0$

$3x - 1 = 0$

$+1 \quad +1$

$\frac{3x}{3} = \frac{1}{3}$

$x = \frac{1}{3}$

$(2x + 5) = 0$

$2x + 5 = 0$

$-5 \quad -5$

$\frac{2x}{2} = \frac{-5}{2}$

$x = -\frac{5}{2}$

$\therefore$ the roots are $x = \frac{1}{3}, -\frac{5}{2}$

$$(3x - 1)(2x + 5) = 0$$

But hold on!! That's not in the form:

$$a(x - x_1)(x - x_2) = 0$$

It's true :(
Sometimes,
life is complicated.

Consolidation

Steps to Solving by Factoring

1. If there are fractions, clear the fractions by multiplying by the **LCD**.

2. Move everything to the **left side**.

3. Expand / simplify the quadratic equation into $ax^2 + bx + c$ form.

4. Factor fully, using the methods from Unit 4.

5. Use the **zero product property**
   (set the contents of each set of brackets to 0 and solve for x)

The values of x are the roots of your equation!

Consolidation

Special Cases

Solving $ax^2 + bx + c$ by factoring when $c = 0$.

"Solve" $3x^2 + 5x = 0$

$(x)(3x+5)=0$

$(x)=0$

$x=0$

$(3x+5)=0$

$3x+5=0$

$-5 \quad -5$

$\frac{3x}{3} = \frac{-5}{3}$

$x = -\frac{5}{3}$

$\therefore$ the roots are $x = 0, -\frac{5}{3}$.

Consolidation

Special Cases

Solving $ax^2 + bx + c$ by factoring when b = 0.

"Solve" $2x^2 - 18 = 0$

$2(x^2 - 9) = 0$

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

$\therefore$ the roots are $x = -3, +3$

Consolidation

Special Cases

Solving $ax^2 + bx + c$ with fractions.

"Solve" $\frac{x^2}{6} - \frac{4x}{3} = -2$

$\frac{1x^2}{6} - \frac{8 4x}{3} = -12$

$x^2 - 8x = -12$

1. clear fractions

$x^2 - 8x + 12 = 0$

2. move everything to left side

$(x-2)(x-6)$

3. factor

$x-2=0$ and $x-6=0$

4. use zero product property

$x=2 \quad x=6$

5. solve for x

$\therefore$ the roots are $x=2, 6$

6. therefore statement

Consolidation

Homework

Pg. 282-283

1(a, e, h)
4-9 (a, b, e, f)