

## What's Going On?

**Checking In**

F.F.M.

**Minds on**

Special Cases

**Action!**

Factoring when  $a \neq 1$

**Consolidation**

The Big Question

**Learning Goal - I will be able to factor standard form equations with  $a$  as a common factor.**

## Checking In

## F.F.M.

Factor the standard form equation below, plot your points and draw a rough sketch.

$$y = x^2 - x - 6$$

$$\begin{array}{l} 1 \quad 6 \\ 2 \quad -3 \end{array}$$

two numbers  
that multiply  
to -6 and add  
to -1.

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

What are the zeros?

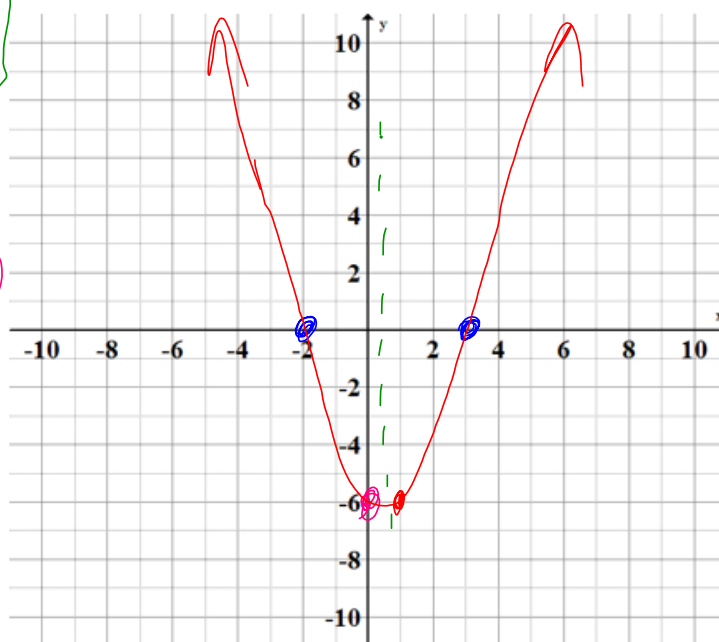
$$x = -2, 3$$

What's the axis of symmetry?

$$x = 0.5$$

What is the y-Intercept?

$$y = -6$$



## Minds on

### Special Cases

When we are asked to factor a standard form equation such as  $y = x^2 + 7x - 18$  we look for two numbers that multiply to  $-18$  (c) and add to  $+7$  (b).

What if you were asked to factor:

$$\begin{aligned} \text{a) } x^2 + 5x + 0 \\ &= (x+0)(x+5) \\ &= x(x+5) \end{aligned}$$

$$\begin{aligned} \text{b) } x^2 - 3x + 0 \\ &= (x+0)(x-3) \\ &= x(x-3) \end{aligned}$$

$$\begin{aligned} \text{c) } x^2 - 4 \\ \quad \uparrow \\ \quad +0x \\ (x+2)(x-2) \end{aligned}$$

$$\begin{aligned} \text{d) } x^2 - 16 \\ (x+4)(x-4) \end{aligned}$$

## Minds on

## Special Cases

**Common Factoring**

"Factor out" x from both terms...

Basically: Divide each term by x

$$\text{a) } \frac{x^2}{x} + \frac{5x}{x}$$

$$= x(x+5)$$

\* The zeros are 0  
and -5.

$$\text{b) } \frac{x^2}{x} - \frac{3x}{x}$$

$$= x(x-3)$$

\* The zeros are 0  
and +3.

**Minds on**

## Special Cases

Find two numbers that multiply to the last number and add to zero!

Basically: Find the square root of the last number (ignore the negative sign)

### Difference of Squares

c)  $x^2 - 4$

$$\sqrt{4} = 2$$

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

\*Zeros are  $-2, +2$

d)  $x^2 - 16$

$$\sqrt{16} = 4$$

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

\*Zeros are  $-4, +4$

**Action!**Factoring when  $a \neq 1$ 

Factor:

$$y = \underline{2x^2} + 10x + 12$$

not equal

Uhoh! We have only factored equations that look like:  $y = x^2 + bx + c$  ( $a = 1$ )

Don't worry! It's just one extra little step!

First, just divide each term by whatever the  $a$ -value is! (**Factor out  $a$** )

Then, factor the rest as usual!

**Action!**Factoring when  $a \neq 1$ 

Factor:

$$y = \frac{2x^2}{2} + \frac{10x}{2} + \frac{12}{2}$$

*Handwritten note: A red box around the constant term 12 is labeled "y-intercept".*

1. Factor out  $a$ , by dividing each term by  $a$ .

$$y = 2(x^2 + 5x + 6)$$

2. Factor the quadratic in brackets just as we did before!

$$y = 2(x + 2)(x + 3)$$

*Handwritten note: zeros: -2, -3*

$$y = \frac{-2x^2}{-2} - \frac{2x}{-2} + \frac{24}{-2}$$

$$y = -2(x^2 + 1x - 12)$$

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



## Consolidation

### The Big Question

Factor the standard form equation given below, then graph it!

$$y = -2x^2 - 6x + 8$$