Date: Nov. 13/17

LEARNING TARGET:

"I can relate the factors of a trinomial to finding the zeros (*x*-intercepts) of a parabola."
"I can find the axis of symmetry for a parabola".
"I can use the equation of the parabola and its axis of symmetry to find the vertex of the parabola."

$y = x^2 - 2x - 3$

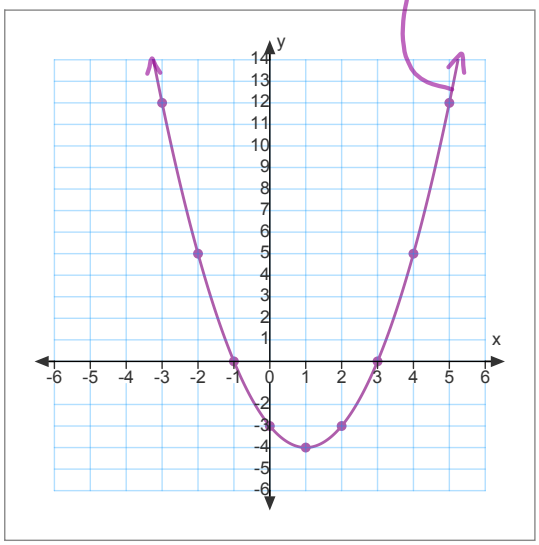
WHY do we factor parabolas???

Graph the relation, **y = x^2 - 2*x* - 3** using a table of values:

y=x²-2x-3

9+6-3

x	y = x^2 – 2*x* - 3
-3	(-3)²-2(-3)-3 = 12
-2	(-2)²-2(-2)-3 = 5
-1	(-1)²-2(-1)-3 = 0
0	-3
1	(1)²-2(1)-3 = -4
2	(2)²-2(2)-3 = -3
3	(3)²-2(3)-3 = 0
4	(4)²-2(4)-3 = 5
5	(5)²-2(5)-3 = 12



Now factor the same relation: **y = x^2 - 2*x* – 3**

=(x-3)(x+1)

Now set the equation equal to zero and solve for ***x*.**

A×B=0

A=0 or B=0 (or Both)

y = (x-3)(x+1)

0 = (x-3)(x+1) (A, B)

x-3=0 or x+1=0

x=3 or x=-1

****Notice that if either factor equals zero, the whole expression equals zero.**

What do you NOTICE?? (with respect to the graph)

The zeros of the equation, are the *x*-intercepts on the graph.

A quadratic equation can be expressed in the form $y = a(x - s)(x - t)$, where $a \neq 0$. In this form, s and t are the **zeros** or x-intercepts of the graph (parabola) of the relation....SO, this is called **INTERCEPT FORM.**

We can convert from **standard form** to **intercept form** by factoring the trinomial that describes the parabola.

1. Convert the following equations from standard form to intercept form:

a) $y = x^2 + 2x - 8$ $= (x-2)(x+4)$

b) $y = x^2 - 7x + 12$ $= (x-4)(x-3)$

2. Now find the zeros (x-intercepts) of each parabola by setting each factor equal to zero:

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

$x-2=0$ or $x+4=0$

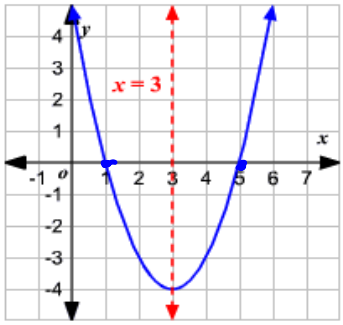
$x = 2$ or $x = -4$

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

$x-4=0$ or $x-3=0$

$x = 4$ or $x = 3$

Parabolas are symmetric (mirror image) about a line that runs vertically through the vertex. We call this line the **AXIS OF SYMMETRY.**



This parabola has an axis of symmetry of x = 3.

What are its zeros? 5 and 1

How is the location of the axis of symmetry related to the zeros?

it's half-way between them

Find the axis by: Eq'n of the

$x = \frac{s+t}{2} = \frac{5+1}{2} \rightarrow x = 3$

$x = \frac{2+(-4)}{2}$

3. For the parabolas $y = x^2 + 2x - 8$ and $y = x^2 - 7x + 12$, find the axis of symmetry

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

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

$x = -4$ or $x = 2$

$x = \frac{-4+2}{2} = \frac{-2}{2}$

$x = -1$

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

$y = x^2 - 7x + 12$

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

$x = 4$ or $x = 3$

Both

$x = \frac{4+3}{2} = \frac{7}{2} = 3.5$

4. Finally, we can find the coordinates of the vertex by substituting the x-value of the axis of symmetry into the equation and solving for y:

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

$= (-1)^2 + 2(-1) - 8$

$= 1 - 2 - 8$

$= -9$

The vertex is at $(-1, -9)$

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

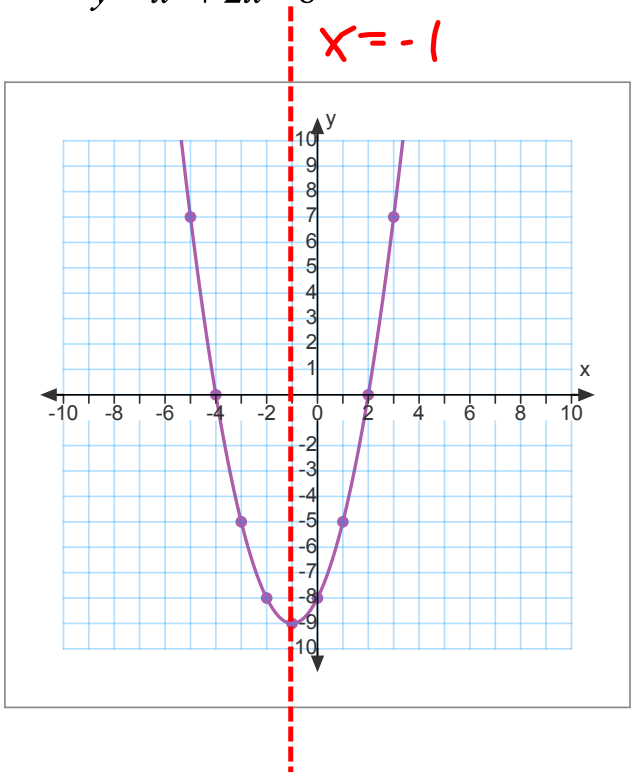
$= ((-1)+4)((-1)-2)$

$= (3)(-3)$

$= -9$

HW: p. 281 #1ab, 2ab, 3ab, 4, 5ab, 6

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



$y = a(x-h)^2 + k$ $v(h,k)$

$y = (x-7)^2 + 3$

$v(7, 3)$

$y = (x+2)^2 - 8$

$v(-2, -8)$