

Bellwork

Factor each of the following expressions:

$$1. \frac{-42b^2}{-2} - \frac{110b}{-2} + \frac{100}{-2}$$

$$\begin{aligned} & 21b^2 + 55b - 50 \\ & 21b^2 - 15b + 70b - 50 \\ & (21b^2 - 15b) + (70b - 50) \\ & 3b(7b - 5) + 10(7b - 5) \\ & (3b + 10)(7b - 5) \end{aligned}$$

So...

$$\boxed{-2(3b + 10)(7b - 5)}$$

$$2. 289x^2 - 144$$

$$\text{Square root of } 289x^2 = 17x$$

$$\text{Square root of } 144 = 12$$

Difference of Squares Rule:

$$a^2 - b^2 = (a + b)(a - b)$$

So...

$$\boxed{(17x + 12)(17x - 12)}$$

Graphing Quadratic Equations - Key Elements

What will you need to graph the given functions?

1. The Axis of Symmetry (AOS)
2. A table of values revolved around the AOS
3. Identify the Vertex
4. Identify the X-intercept
5. Identify the Y-intercept

Axis of Symmetry

Procedure:

Given that the equation is in standard form...

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

Step 1: Identify the opposite of the b value.

Step 2: Identify twice the a value.

Step 3: Set up the equation...

$$x = \frac{-b}{2a}$$

Step 4: Reduce and plot on the graph as a dashed line (Will be a vertical line!)

Creating a Table of Values

Procedure:

Step 1: Create a T-chart that will fit 7 values.

Step 2: Put the value of the AOS in the middle placement.

Step 3: Identify 3 numbers to the left of the AOS and put them above the middle.

Step 4: Identify 3 numbers to the right of the AOS and put them below the middle.

Step 5: Plug each of the values listed in the chart into the equation and list the result right next to it.

Identify the Vertex

Vertex - The point that is the lowest or the highest point of a quadratic function.

Procedure:

Step 1: Identify the middle point in the chart.

Step 2: Graph this point.

Identify the X-intercept

X-intercept: The point(s) where the function crosses the x-axis.

Procedure:

Step 1: If the graph indicates an actual point, Identify that specific point.

Step 2: If your graph does not indicate a point state that the x-intercept is between 2 integers.

(Ex. If the line crosses at around 2.3,
Then you state $2 < x < 3$)

Identify the Y-intercept

Y-intercept: The point where the function crosses the y-axis.

Procedure:

Step 1: Plug in 0 for all of the x's

Step 2: Solve for y.

Example

Graph the following function:

$$1. y = -x^2 - 2x + 8$$

$$a = -1, b = -2, \text{ \& } c = 8$$

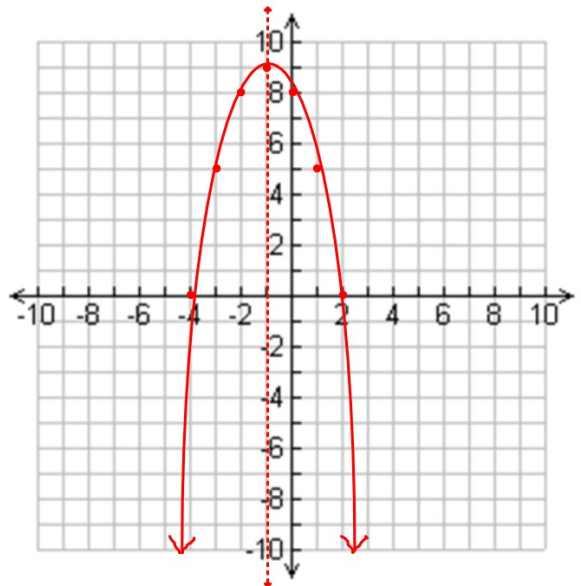
$$\text{AOS: } x = \frac{-(-2)}{2(-1)} = \frac{2}{-2} = -1$$

$$\text{Vertex: } (-1, 9)$$

$$\text{X-intercepts: } (-4, 0) \text{ \& } (2, 0)$$

$$\text{Y-intercept: } (0, 8)$$

x	$y = -x^2 - 2x + 8$	(x, y)
-4	$y = -(-4)^2 - 2(-4) + 8$	(-4, 0)
-3	$y = -(-3)^2 - 2(-3) + 8$	(-3, 5)
-2	$y = -(-2)^2 - 2(-2) + 8$	(-2, 8)
-1	$y = -(-1)^2 - 2(-1) + 8$	(-1, 9)
0	$y = -(0)^2 - 2(0) + 8$	(0, 8)
1	$y = -(1)^2 - 2(1) + 8$	(1, 5)
2	$y = -(2)^2 - 2(2) + 8$	(2, 0)



Example

Graph the following function:

1. $y = 2x^2 + 3x - 7$

$a = 2, b = 3, c = -7$

AOS: $x = \frac{-(3)}{2(2)} = \frac{-3}{4}$

Vertex: $(-3/4, -65/8)$

X-intercepts: $-3 < x < -2$
 $1 < x < 2$

Y-intercepts: $(0, -7)$

x	$y = 2x^2 + 3x - 7$	(x, y)
-3	$y = 2(-3)^2 + 3(-3) - 7$	$(-3, 2)$
-2	$y = 2(-2)^2 + 3(-2) - 7$	$(-2, -5)$
-1	$y = 2(-1)^2 + 3(-1) - 7$	$(-1, -8)$
$-3/4$	$y = 2(-3/4)^2 + 3(-3/4) - 7$	$(-3/4, -65/8)$
0	$y = 2(0)^2 + 3(0) - 7$	$(0, -7)$
1	$y = 2(1)^2 + 3(1) - 7$	$(1, -2)$
2	$y = 2(2)^2 + 3(2) - 7$	$(2, 7)$

