

DO NOW

What is the formula for the axis of symmetry?

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

How can you determine whether the parabola has a maximum or minimum without looking at the graph?

the sign in front of the x^2 term

$+$ $\rightarrow$ minimum

$-$ $\rightarrow$ maximum

8.5 Graphing Quadratic Functions

axis of symmetry - vertical line of symmetry
 $\rightarrow$ passes through the vertex

$$\text{FORMULA: } x = \frac{-b}{2a}$$

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

Examples: Use the formula to find the axis of symmetry.

1. $y = -x^2 + 4x + 12$ 2. $y = x^2 - 5x - 14$

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

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

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

$$x = 2$$

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

$$x = \frac{5}{2(1)}$$

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

$$x = 2.5$$

Using the axis of symmetry to find the vertex:

Recall $\rightarrow$ the axis of symmetry is " $x =$ "
 $\rightarrow$ the axis of symmetry passes through the vertex

So the " $x =$ " is the x -value for the vertex

* SUBSTITUTE x into the equation; Solve for y .

Examples: Find the axis of symmetry and the vertex.

Identify the vertex as a maximum or minimum.

3. $y = -x^2 - 8x + 5$
 $x = \frac{-b}{2a}$
 $x = \frac{8}{2(-1)}$
 $x = \frac{8}{-2}$
 $x = -4$
 $y = -(-4)^2 - 8(-4) + 5$
 $y = -16 + 32 + 5$
 $y = 16 + 5$
 $y = 21$

$x = -4$
 axis of symmetry
 vertex: $(-4, 21)$
 maximum

4. $y = 2x^2 + 4x - 3$
 $x = \frac{-b}{2a}$
 $x = \frac{-4}{2(2)}$
 $x = \frac{-4}{4}$
 $x = -1$
 $y = 2(-1)^2 + 4(-1) - 3$
 $y = 2(-1) - 4 - 3$
 $y = -2 - 4 - 3$
 $y = -5$

$x = -1$
 axis of symmetry
 vertex: $(-1, -5)$
 minimum

Recall - domain: available x -values

***If you are given a domain for the graph:

There will be no arrows on the graph.

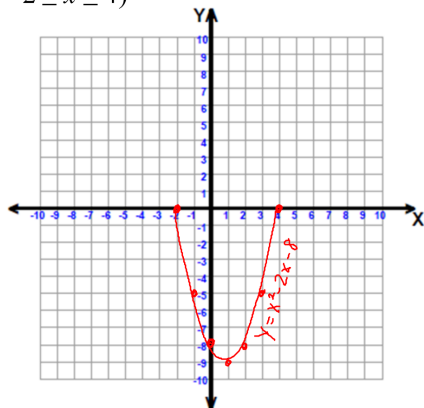
If given the domain $-2 \leq x \leq 4$:

Start $\swarrow$ $\nwarrow$ end
 on the x -axis

Examples: Using the domain indicated in the parentheses, prepare a table of values and graph the quadratic function.

5. $y = x^2 - 2x - 8$ ($-2 \leq x \leq 4$)

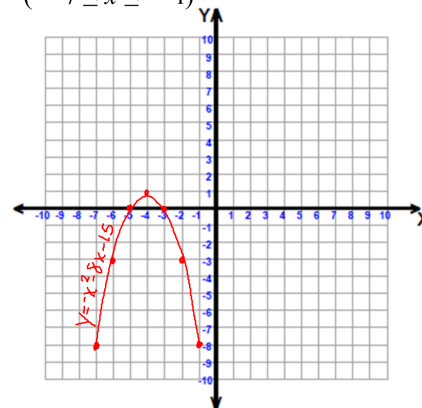
x	y
-2	0
-1	-5
0	-8
1	-9
2	-8
3	-5
4	0



Examples: Using the domain indicated in the parentheses, prepare a table of values and graph the quadratic function.

6. $y = -x^2 - 8x - 15$ ($-7 \leq x \leq -1$)

x	y
-7	-8
-6	-3
-5	0
-4	1
-3	0
-2	-3
-1	-8



HOMEWORK

Worksheet - HW 8.5

Graphing Quadratic Functions