

2.2 Notes - Part 1

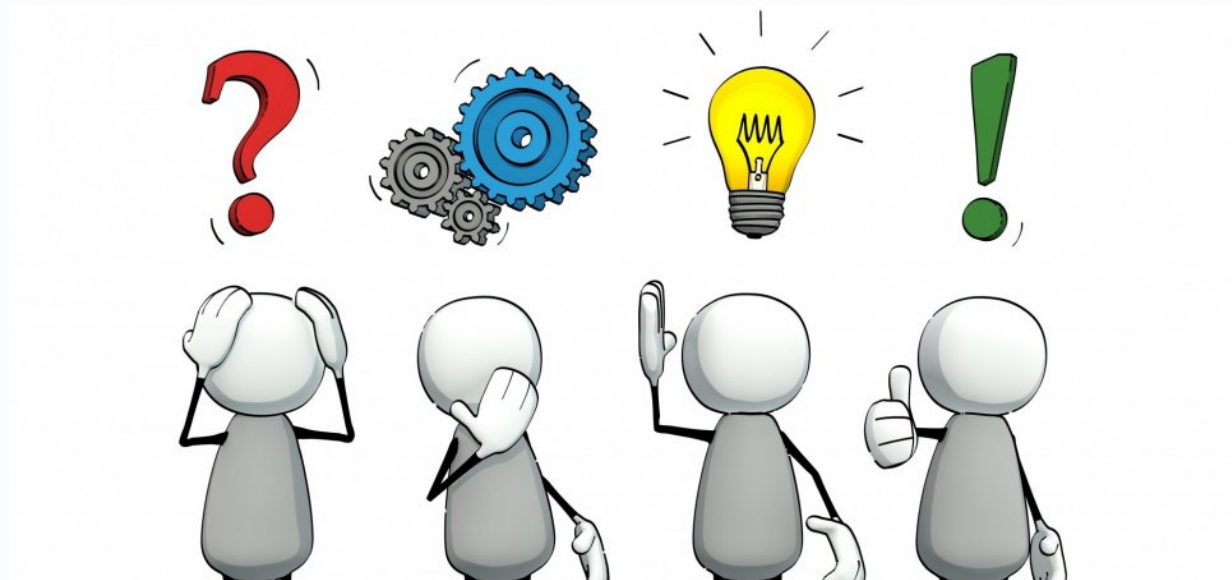
Properties of Parabolas

Learning Targets:

- I can find the maximum and minimum values of quadratic functions.
- I can graph quadratic functions using x -intercepts.
- I can solve real-life problems.

Think first, then discuss, then type...

Complete the sentence: "When I have to graph a parabola, it is helpful to know the axis of symmetry because..."



Example 1:

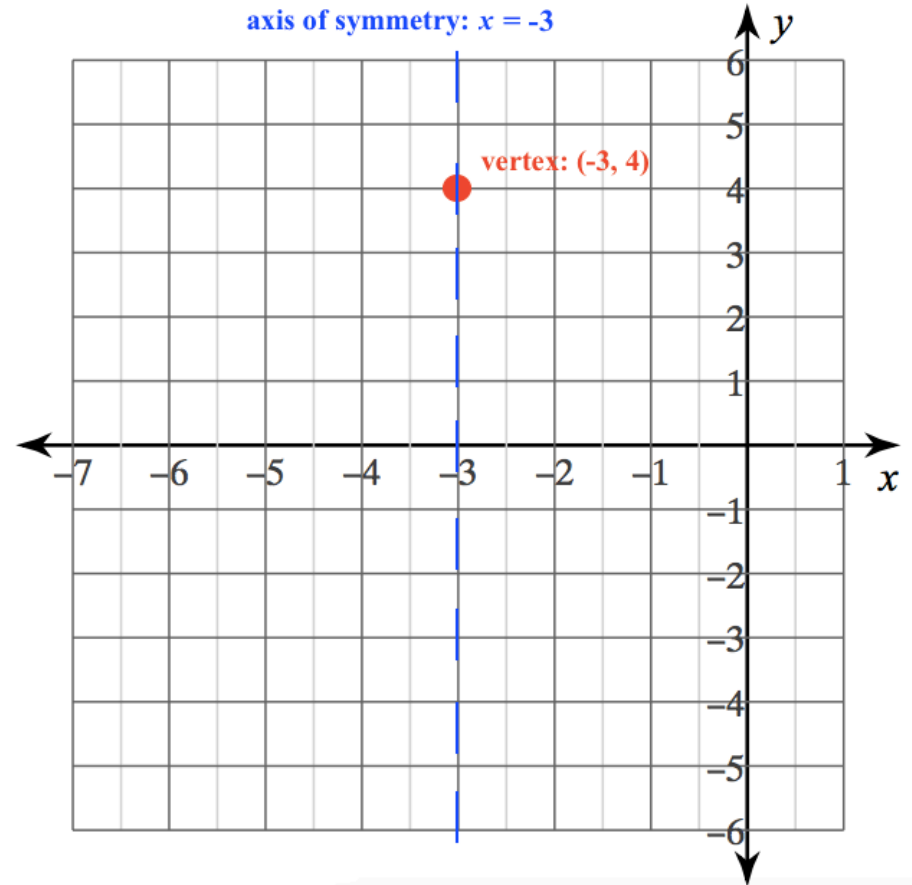
Graph $f(x) = -2(x + 3)^2 + 4$.

Label the vertex and axis of symmetry.

First, determine the vertex of the parabola.



vertex: $(-3, 4)$



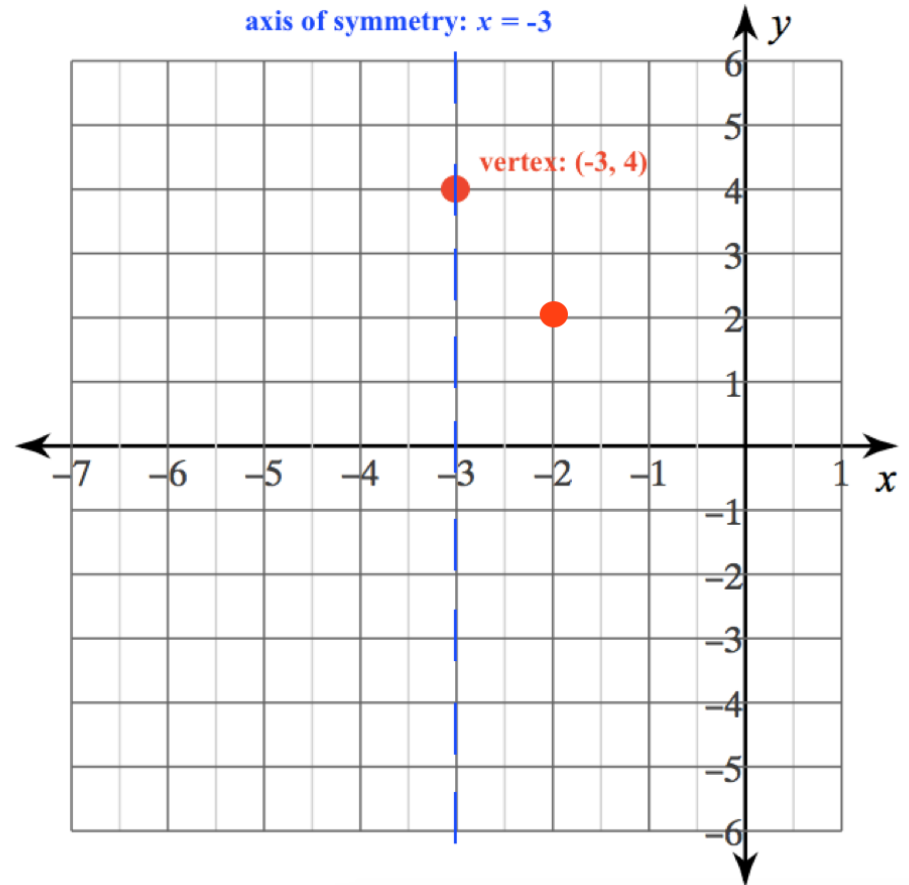
Example 1:

Graph $f(x) = -2(x + 3)^2 + 4$.

Label the vertex and axis of symmetry.

Next, evaluate the function for any value of x . Let's use $x = -2$.

$$\begin{aligned} f(-2) &= -2(x + 3)^2 + 4 \\ &= -2(-2 + 3)^2 + 4 \\ &= -2(1)^2 + 4 \\ &= -2(1) + 4 \\ &= -2 + 4 \\ &= 2 \quad \longrightarrow \quad (-2, 2) \end{aligned}$$

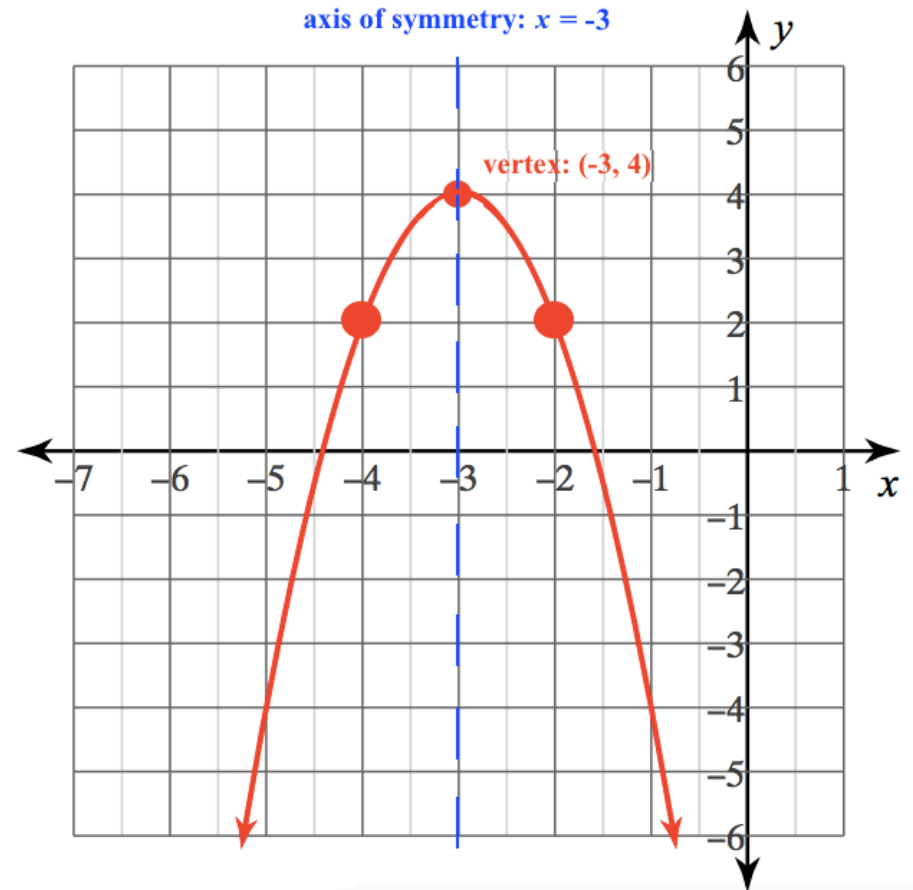


Example 1:

Graph $f(x) = -2(x + 3)^2 + 4$.

Label the vertex and axis of symmetry.

We can use the axis of symmetry to automatically get another point on the parabola.



You Try:

Algebra 2

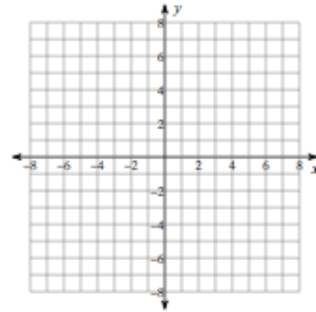
Name _____

Graphing in Vertex Form

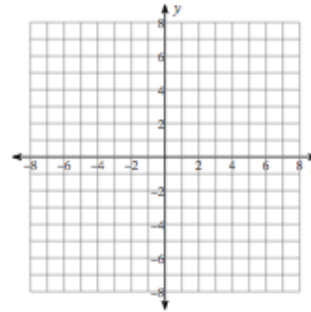
Date _____ Period _____

Identify the vertex and axis of symmetry of each, then sketch the graph. HINT: USE YOUR NOTES FROM LAST CLASS! Look at the notes posted online if you need.

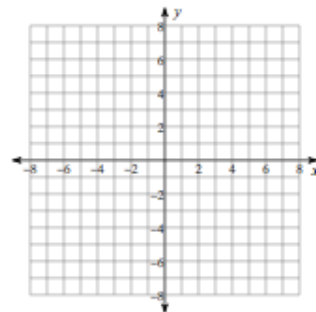
1) $f(x) = -2(x - 2)^2 - 5$



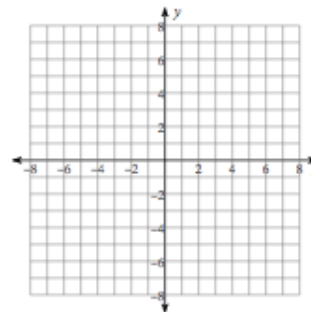
2) $f(x) = -(x + 1)^2 - 6$



3) $f(x) = (x + 5)^2 + 2$

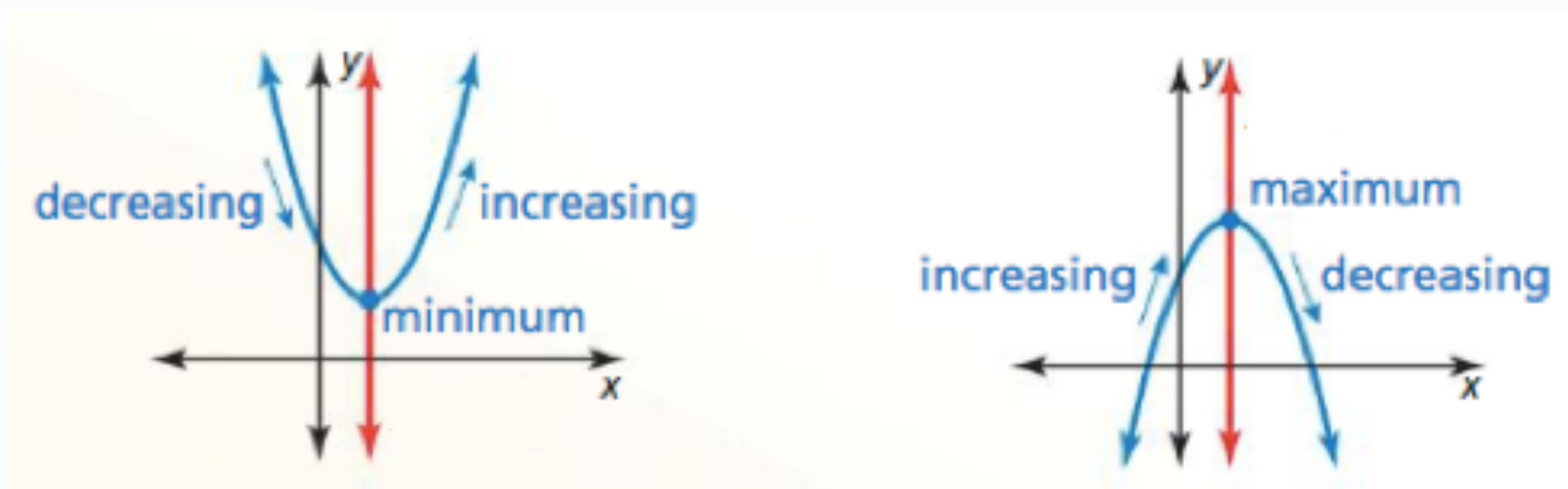


4) $f(x) = (x - 6)^2 - 1$

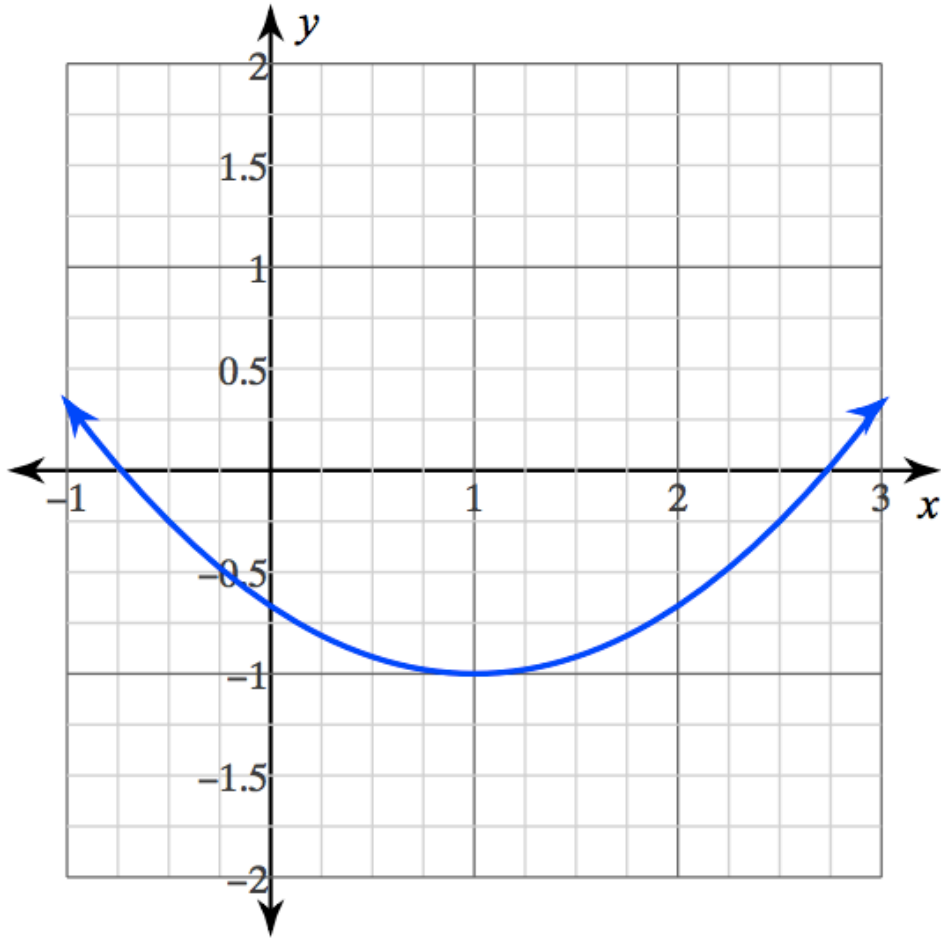


More Vocab

- The vertex is either a minimum value (*min*) or a maximum value (*max*).
 - We use the *y*-coordinate of the vertex to describe the min/max.
- To describe where a parabola is *increasing* and *decreasing*, we use *x*-values.



Examples:



Vertex: $(1, -1)$

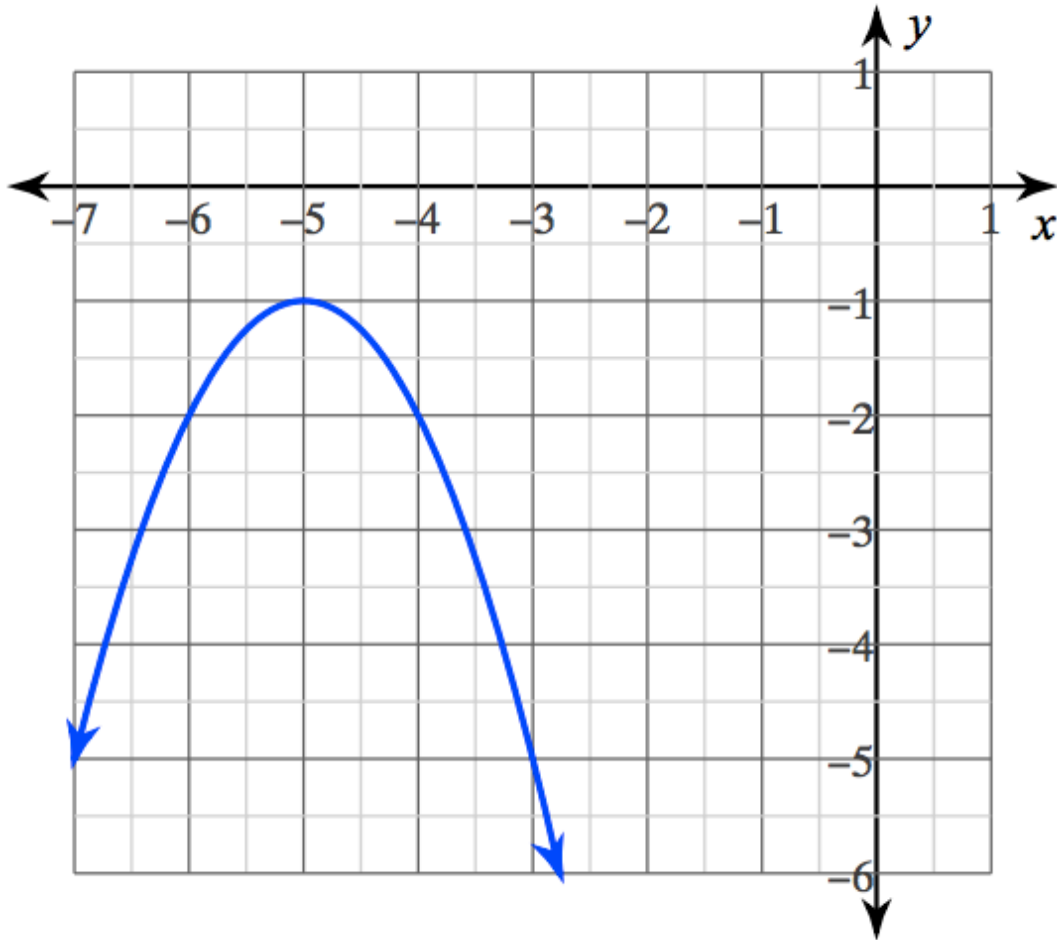
Axis of Symmetry: $x = 1$

Min/Max: **Min** at $(1, -1)$

Decreasing: $x < 1$

Increasing: $x > 1$

Examples:



Vertex: $(-5, -1)$

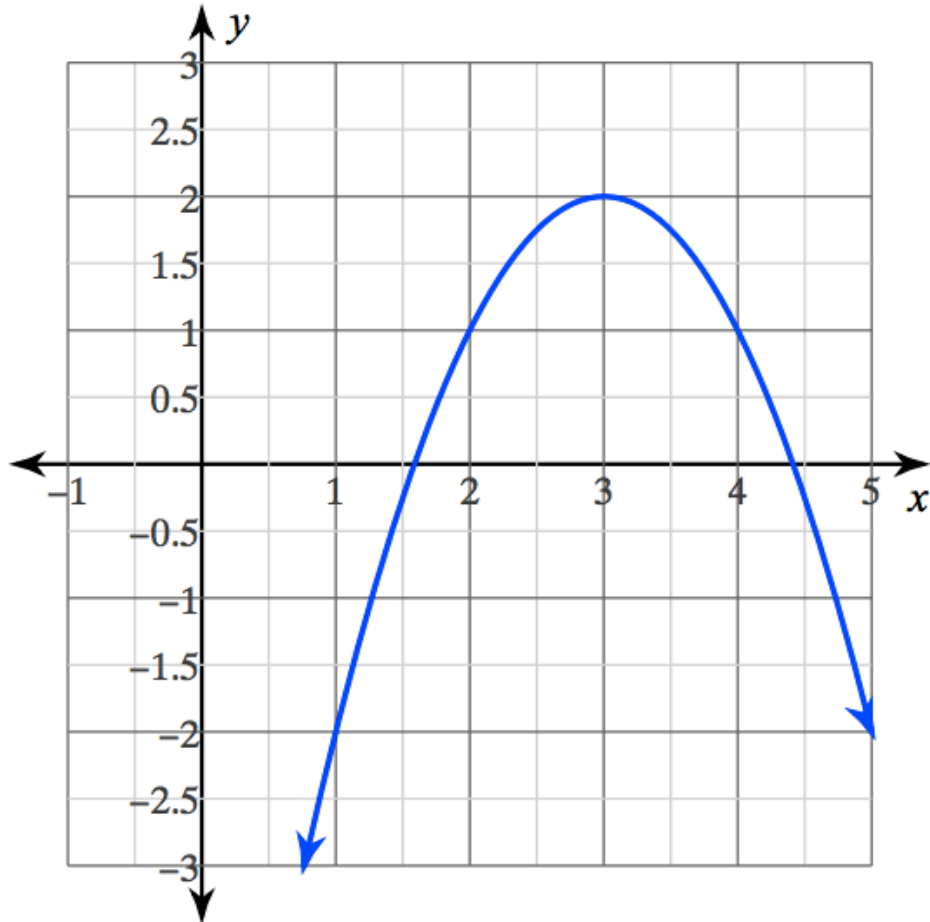
Axis of Symmetry: $x = -5$

Min/Max: **Max** at $(-5, -1)$

Decreasing: $x > -5$

Increasing: $x < -5$

Examples:



Vertex: $(3, 2)$

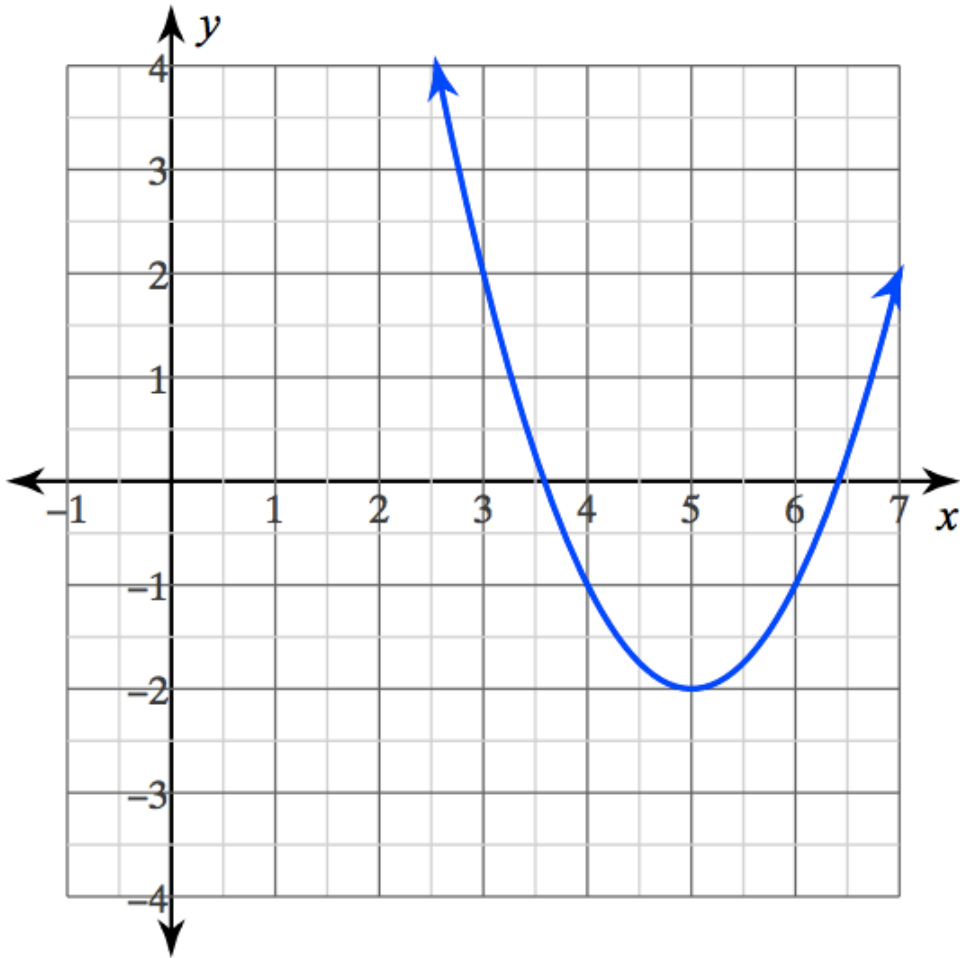
Axis of Symmetry: $x = 3$

Min/Max: **Max** at $(3, 2)$

Decreasing: $x > 3$

Increasing: $x < 3$

Examples:



Vertex: $(5, -2)$

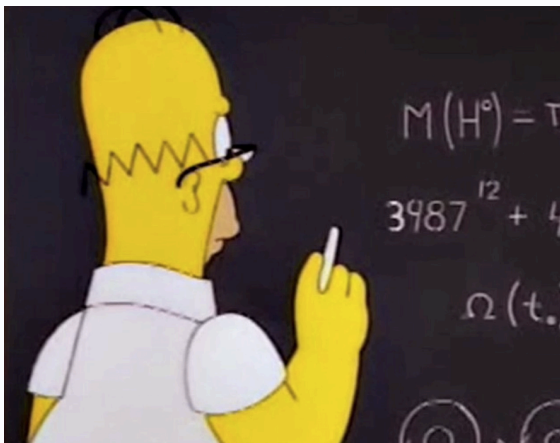
Axis of Symmetry: $x = 5$

Min/Max: **Min** at $(5, -2)$

Decreasing: $x < 5$

Increasing: $x > 5$

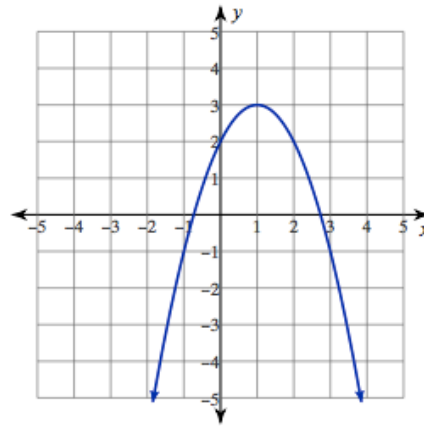
Now you try...



Algebra 2

Analyzing Parabolas

1)

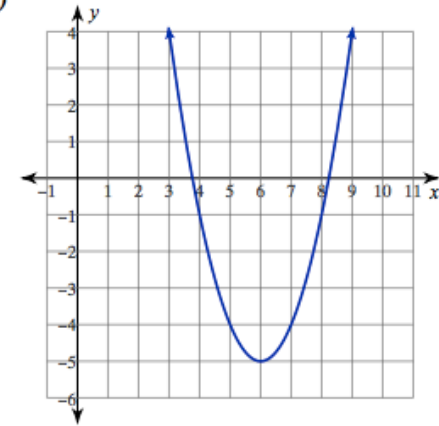


- vertex: _____
- axis of symmetry: _____
- direction of opening: _____
- max/min value: _____
- decreasing values: _____
- increasing values: _____

Name _____

Date _____ Period _____

2)



- vertex: _____
- axis of symmetry: _____
- direction of opening: _____
- max/min value: _____
- decreasing values: _____
- increasing values: _____