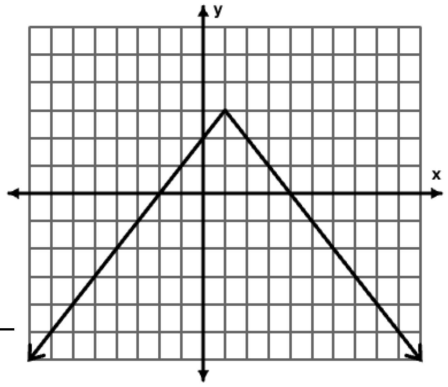
Notes

Introduction to Absolute Value Functions

Absolute Value Functions have the form $f(x) = a|x - c| + d$ and when graphed will form a _____ graph which will have a minimum value when _____ and will have a maximum value when _____.

Example 1: The function $f(x) = -|x - 1| + 3$ is shown below. Use the graph to answer the questions



a) The function is symmetric about the line _____

We call this line the _____ of symmetry (AOS)

b) Vertex:_____ c) y-intercept: _____

c) The function has a min/max value of _____ at x = _____

d) Domain: _____ Range:_____

Example 2: Generate a table for the function $f(x) = |x + 2| + 3$ for the interval x = -6 to x = 2 and then answer the questions.

x	-6	-5	-4	-3	-2	-1	0	1	2
$f(x)$									

a) The function is symmetric about the line _____ b) The vertex is _____

c) y-intercept:_____ d) The function has a max/min of _____ at x = _____

e) Increasing interval_____ f) Decreasing interval_____

g) Domain:_____ h) Range_____

Example 3: Determine whether the function will have a minimum or maximum, and then find the axis of Symmetry, vertex, and y-intercept.

a) $f(x) = 2|3x - 6| + 2$

Max/Min

AOS: _____

Vertex:_____

y-int: _____

b) $g(x) - \frac{1}{2}|2x + 8| - 2$

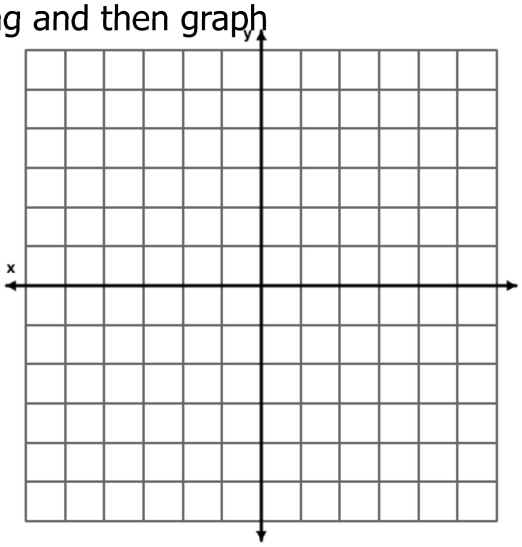
Max/Min

AOS: _____

Vertex:_____

y-int: _____

Example 4: If $f(x) = 3|x + 3| - 2$, find each of the following and then graph



a) Find the axis of symmetry and plot _____

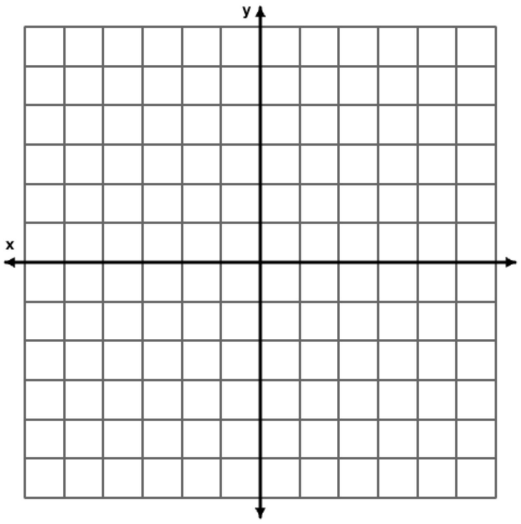
b) Find the vertex and plot _____

c) Use the value of "a" to plot the right side of the V-shape

d) Use symmetry to plot the left side of the V-shape

e) The graph has a min/max value of _____ at x = _____

Example 5: If $f(x) = -\frac{1}{2}|x - 2| + 3$, find each of the following and then graph



a) Find the axis of symmetry and plot

b) Find the vertex and plot

c) Use the value of "a" to plot the right side of the V-shape

d) Use symmetry to plot the left side of the V-shape

e) The graph has a min/max value of _____ at x = _____

Example 6: The number of shoppers in a store is modeled by the function below:

$$s(t) = -\frac{1}{2}|t - 288| + 144$$

where t is the time (in minutes) since the store opened at 10:00 A.M.

a) What is the greatest number of shoppers in the store?

b) At what time does the greatest number of shoppers occur?

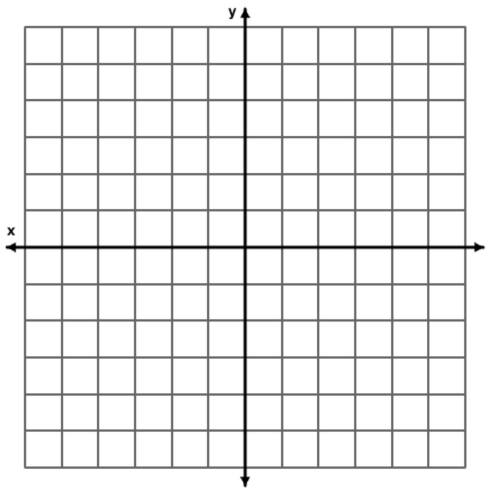
Name_____ Period_____

Practice

Introduction to Absolute Value

In 1 – 3, find the requested information and then graph

1. $f(x) = |x - 1| + 2$



AOS: _____

Vertex: _____

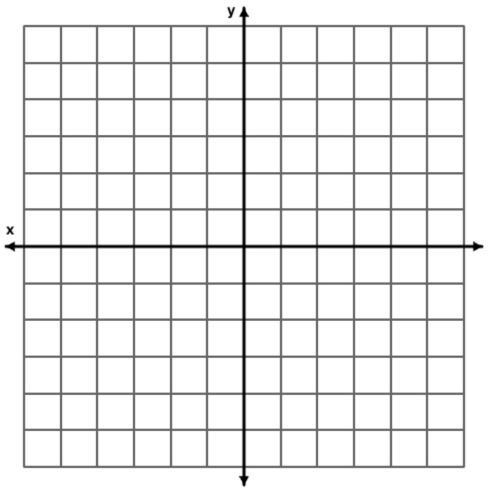
Value of a: _____

y-intercept: _____

The function has a minimum value of _____at x = _____

Domain _____ f) Range:_____

2. $f(x) = 2|x + 1| - 3$



AOS: _____

Vertex:: _____

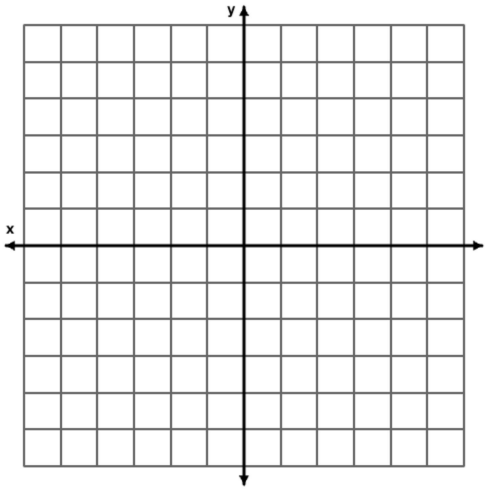
Value of a: _____

y-intercept: _____

The function has a minimum value of _____ at x = _____

Domain _____ f) Range:_____

3. $f(x) = -\frac{1}{2}|x - 1| + 4$



AOS: _____

Vertex:: _____

Value of a: _____

y-intercept: _____

The function has a maximum value of _____at x = _____

Domain _____ f) Range:_____

4. The table below shows some values of a quadratic functions. Use the values to answer the questions.

x	0	1	2	3	4	5	6
f(x)	-1	0	1	2	1	0	-1

a) What is the axis of symmetry? _____ b) What is the vertex?_____

c) What is the y-intercept? _____ d) What is the maximum value? _____

e) Increasing interval_____ f) Decreasing interval _____

g) What is the domain? _____ h) What is the range? _____

5. Given $\boldsymbol{f(x) = 2|x + 1| - 3}$, find each of the following

a) What is the axis of symmetry? _____ b) What is the vertex?_____

c) What is the y-intercept? _____ d) What is the minimum value? _____

e) Increasing interval_____ f) Decreasing interval _____

g) What is the domain? _____ h) What is the range? _____

6. A band's new album is released. Weekly sales, (in thousands), increase steadily for a while and then decrease according to the model $s(t) = -2|t - 22| + 44$ where t represents the time in weeks.

a) In what week did their largest sales occur?

b) What were their sales for this week?