


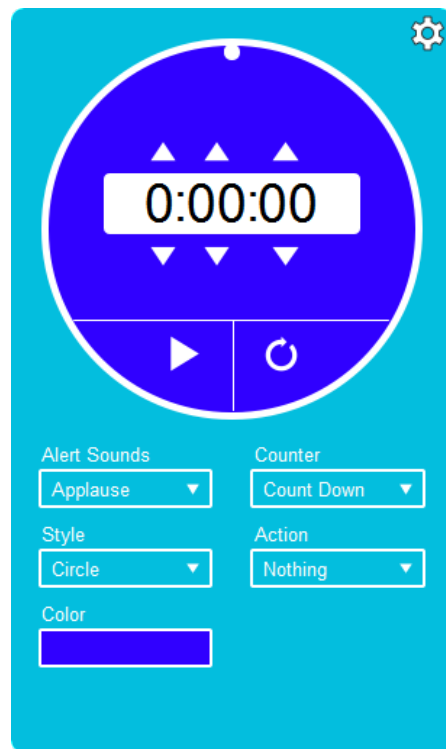
Warm-Up 2/26/18 OR 

Use the following description to write a quadratic equation:

The parent function  $f(x) = x^2$  is reflected across the x-axis, vertically stretched by a factor of 4 and translated right 3 units to create  $g(x)$ .

$$g(x) = \underline{-4(x - 3)^2}$$

# Complete your Matching Activity!!!

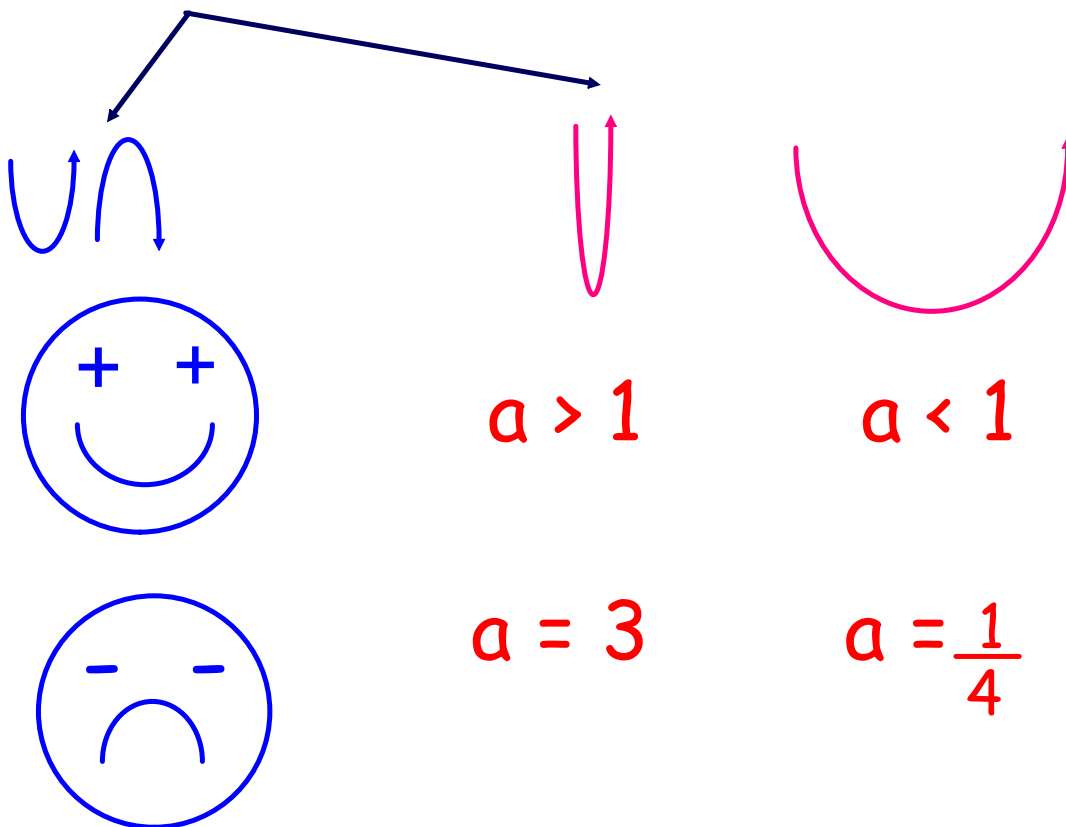


## Agenda 2/26/18

1. Warm-Up
2. Review Transformation Posters
3. Turn in HW on Transformations Day 2
4. Day 3 & 4: Characteristics

## Transformation of a Parabola: A-Value

$$V = a(x - h)^2 + k$$



## Transformation of a Parabola: h & k values

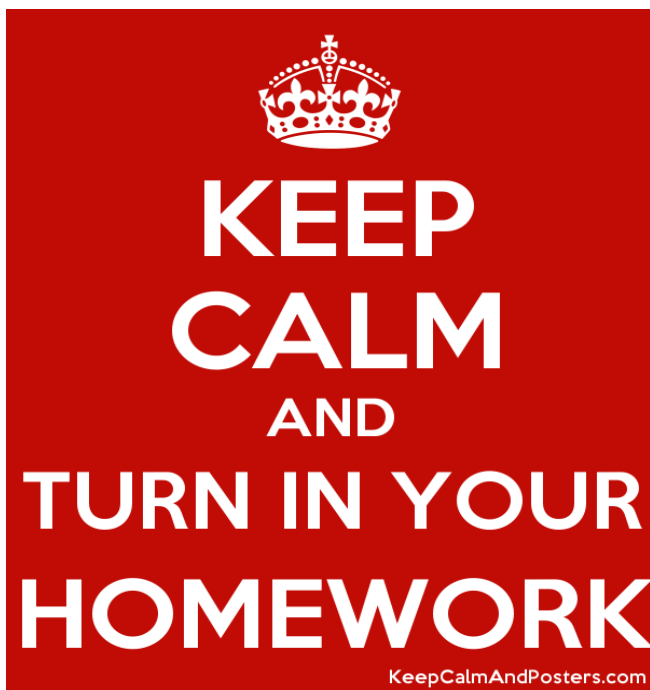
$$V = a(x - h)^2 + k$$

+ h, left

- h, right

+ k, up

- k, down



**TURN IN  
HOMEWORK  
AND  
YOU'LL GET  
BETTER GRADES**

## Essential Question:

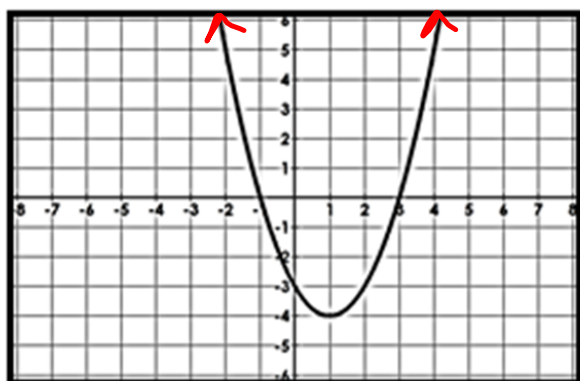
How can you describe the characteristics of a Quadratic Function on a graph?

Pages 12 - 20

# Domain & Range

Domain <i>X-values</i>		
<i>Define:</i> All possible values of x	<i>Think:</i> How far left to right does the graph go?	<i>Write:</i> Smallest $x \leq x \leq$ Biggest x *use < if the circles are open*
Range <i>Y-values</i>		
<i>Define:</i> All possible values of y	<i>Think:</i> How far down to how far up does the graph go?	<i>Write:</i> $y \leq$ highest y value (opens down) $y \geq$ lowest y value (opens up)

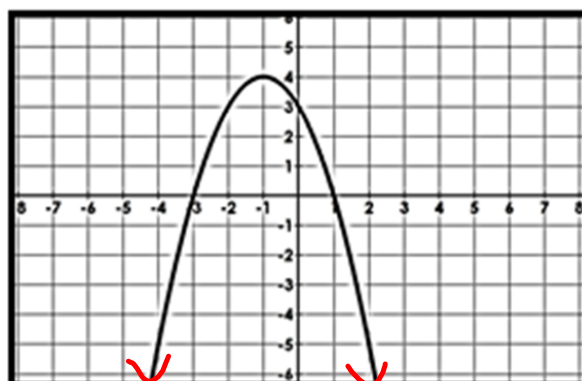
Graph 1



Domain:  $-\infty < x < \infty$   $(-\infty, \infty)$

Range:  $y \geq -4$   $[-4, \infty)$

Graph 2



Domain:  $(-\infty, \infty)$

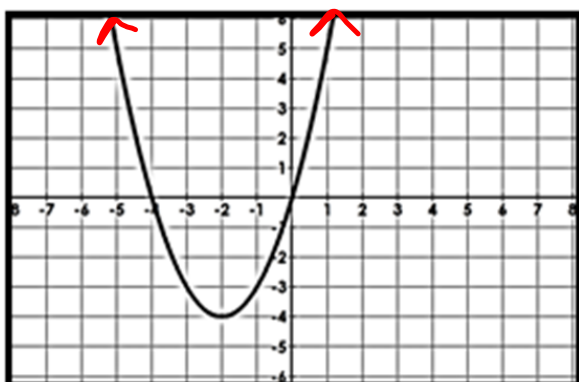
Range:  $y \leq 4$   $(-\infty, 4]$



# Domain & Range

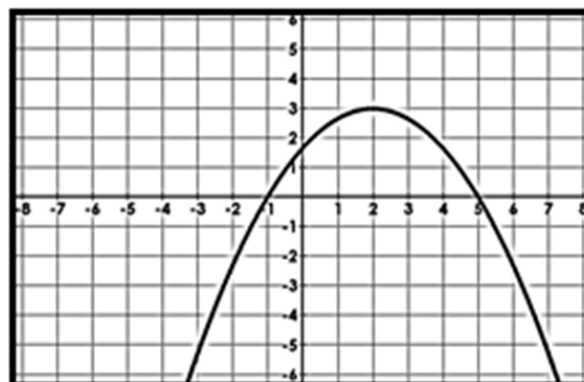
Domain		
<i>Define:</i> All possible values of x	<i>Think:</i> How far left to right does the graph go?	<i>Write:</i> Smallest $x \leq x \leq$ Biggest x *use < if the circles are open*
Range		
<i>Define:</i> All possible values of y	<i>Think:</i> How far down to how far up does the graph go?	<i>Write:</i> $y \leq$ highest y value (opens down) $y \geq$ lowest y value (opens up)

Graph 3



Domain:  $(-\infty, \infty)$   
 Range:  $y \geq -4$   $[-4, \infty)$

Graph 4

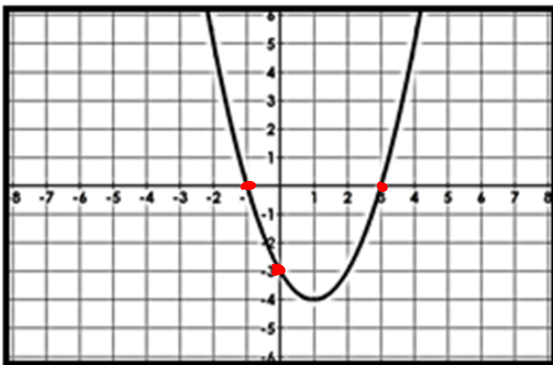


Domain:  $(-\infty, \infty)$   
 Range:  $y \leq 3$   $(-\infty, 3]$

# Zeros & Intercepts

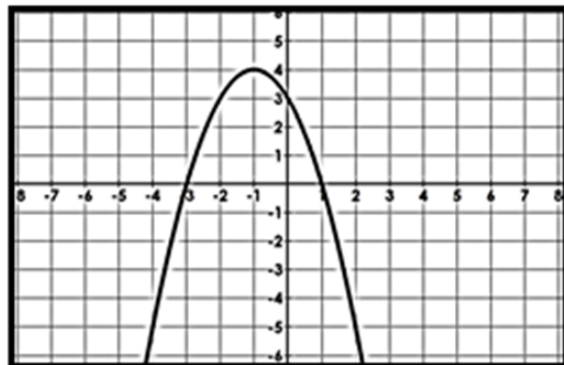
<i>Y-Intercept</i>		
<i>Define:</i> Point where the graph crosses the y-axis	<i>Think:</i> At what coordinate point does the graph cross the y-axis?	<i>Write:</i> (0, b)
<i>X-Intercept</i>		
<i>Define:</i> Point where the graph crosses the x-axis	<i>Think:</i> At what coordinate point does the graph cross the x-axis?	<i>Write:</i> (a, 0)
<i>Zero</i>		
<i>Define:</i> Where the function (y-value) equals 0	<i>Think:</i> At what x-value does the graph cross the x-axis?	<i>Write:</i> x = ____

Graph 1



X-intercepts:  $(-1, 0)$   $(3, 0)$  Y-intercept:  $(0, -3)$   
Zeros:  $x = -1$   $x = 3$

Graph 2

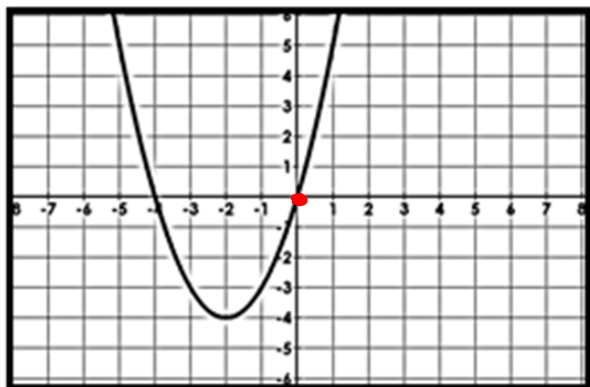


X-intercepts:  $(-3, 0)$   $(1, 0)$  Y-intercept:  $(0, 3)$   
Zeros:  $x = -3, x = 1$

## Zeros & Intercepts

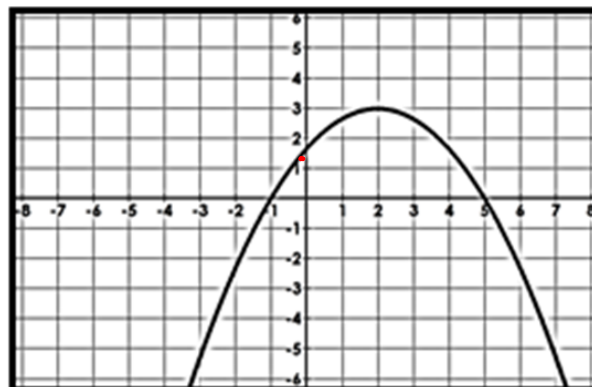
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<i>Zero</i>		
<i>Define:</i> Where the function (y-value) equals 0	<i>Think:</i> At what x-value does the graph cross the x-axis?	<i>Write:</i> x = ____

Graph 3



X-intercepts:  $(-4, 0)$       Y-intercept:  $(0, 0)$   
 Zeros:  $(0, 0)$   
 $x = -4, x = 0$

Graph 4

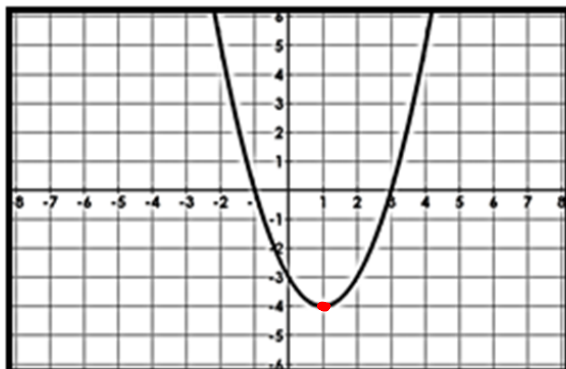


X-intercepts:  $(-1, 0)$       Y-intercept:  $(0, 1.5)$   
 Zeros:  $(5, 0)$   
 $x = -1, x = 5$

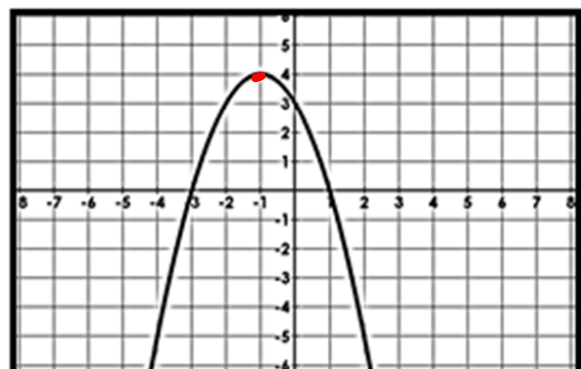
# Vertex & Axis of Symmetry

<i>Vertex</i>		
<i>Define:</i> Highest or lowest point or peak of a parabola	<i>Think:</i> What is my highest or lowest point on my graph?	<i>Write:</i> Name the point (h, k)
<i>Axis of Symmetry</i>		
<i>Define:</i> The vertical line that divides the parabola into mirror images and runs through the vertex	<i>Think:</i> What imaginary, vertical line would make the parabola symmetrical?	<i>Write:</i> $x = h$ (x value of the vertex)

Graph 1

Vertex:  $(1, -4)$ Axis of Symmetry:  $x = 1$ 

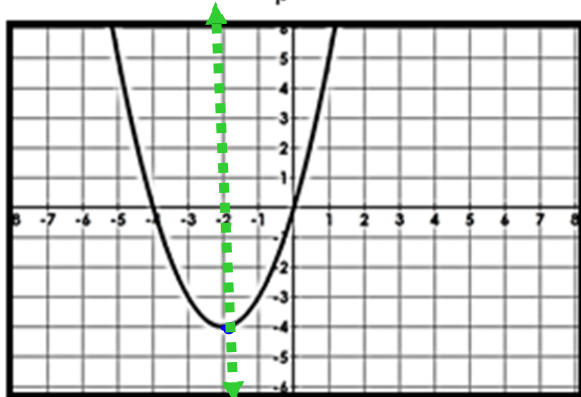
Graph 2

Vertex:  $(-1, 4)$ Axis of Symmetry:  $x = -1$

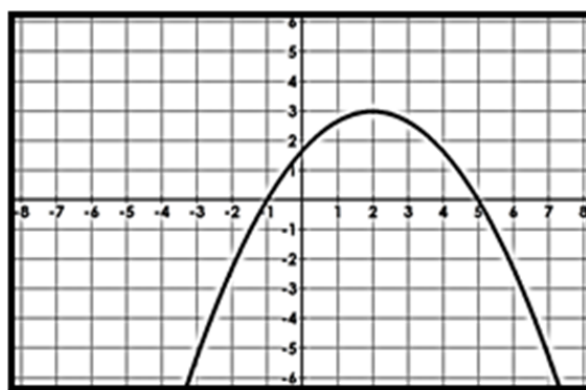
# Vertex & Axis of Symmetry

Vertex		
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Graph 3

Vertex:  $(-2, -4)$ Axis of Symmetry:  $x = -2$ 

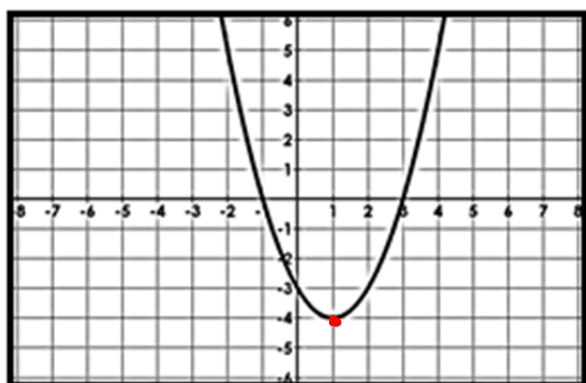
Graph 4

Vertex:  $(2, 3)$ Axis of Symmetry:  $x = 2$

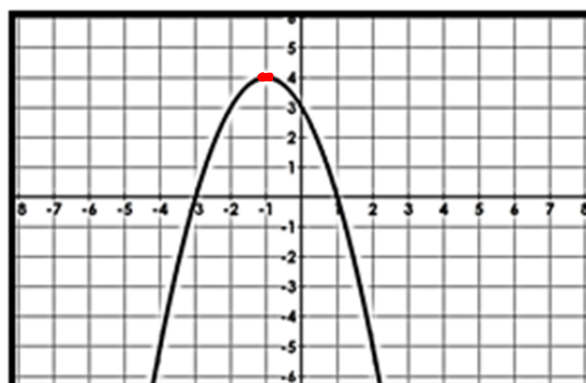
# Extrema: Maximum & Minimum

Maximum		
<i>Define:</i> Highest point or peak of a function.	<i>Think:</i> What is my highest point on my graph?	<i>Write:</i> $y = k$ (y-value of the vertex)
Minimum		
<i>Define:</i> Lowest point or valley of a function.	<i>Think:</i> What is the lowest point on my graph?	<i>Write:</i> $y = k$ (y-value of the vertex)

Graph 1

Extrema: **Minimum**Min/Max Value:  **$y = -4$** 

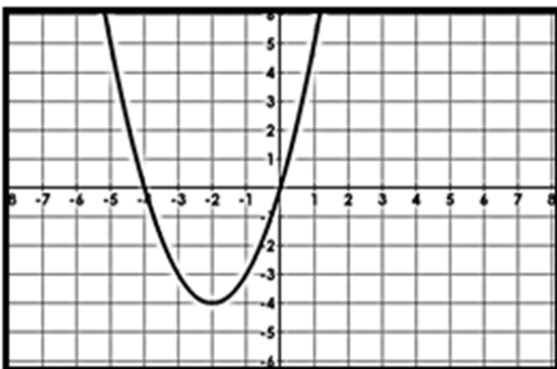
Graph 2

Extrema: **Maximum**Min/Max Value:  **$y = 4$**

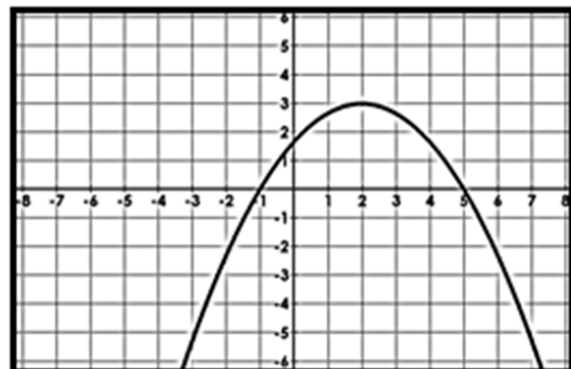
# Extrema: Maximum & Minimum

Maximum		
<b>Define:</b> Highest point or peak of a function.	<b>Think:</b> What is my highest point on my graph?	<b>Write:</b> $y = k$ (y-value of the vertex)
Minimum		
<b>Define:</b> Lowest point or valley of a function.	<b>Think:</b> What is the lowest point on my graph?	<b>Write:</b> $y = k$ (y-value of the vertex)

Graph 3

Extrema: **Minimum**Min/Max Value:  **$y = -4$** 

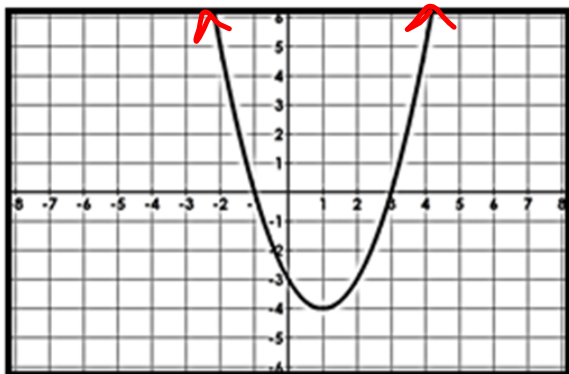
Graph 4

Extrema: **maximum**Min/Max Value:  **$y = 3$**

# End Behavior

End Behavior	
<i>Define:</i>	
Behavior of the ends of the function (what happens to the y-values or $f(x)$ ) as $x$ approaches positive or negative infinity. The arrows indicate the function goes on forever so we want to know where those ends go.	
<i>Think:</i> As $x$ goes to the left (negative infinity), what direction does the left arrow go?	<i>Write:</i> As $x \rightarrow -\infty$ , $f(x) \rightarrow$ _____
<i>Think:</i> As $x$ goes to the right (positive infinity), what direction does the right arrow go?	<i>Write:</i> As $x \rightarrow \infty$ , $f(x) \rightarrow$ _____

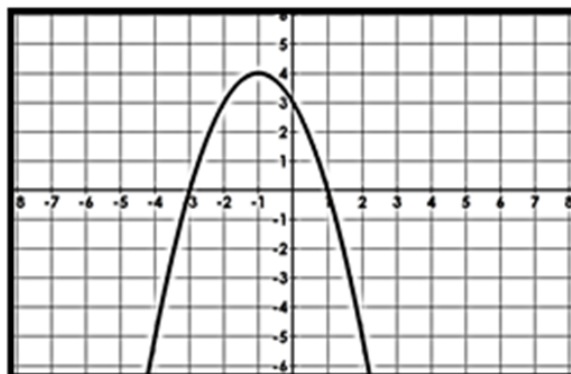
Graph 1



$$\text{As } x \rightarrow -\infty, f(x) \rightarrow \infty.$$

$$\text{As } x \rightarrow \infty, f(x) \rightarrow \infty.$$

Graph 2



$$\text{As } x \rightarrow -\infty, f(x) \rightarrow -\infty.$$

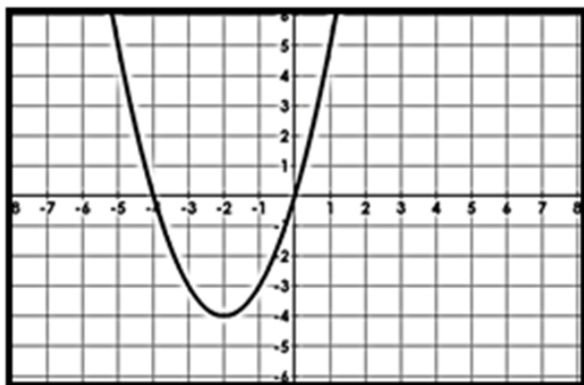
$$\text{As } x \rightarrow \infty, f(x) \rightarrow -\infty.$$



## End Behavior

<i>End Behavior</i>	
<i>Define:</i> Behavior of the ends of the function (what happens to the y-values or $f(x)$ ) as $x$ approaches positive or negative infinity. The arrows indicate the function goes on forever so we want to know where those ends go.	
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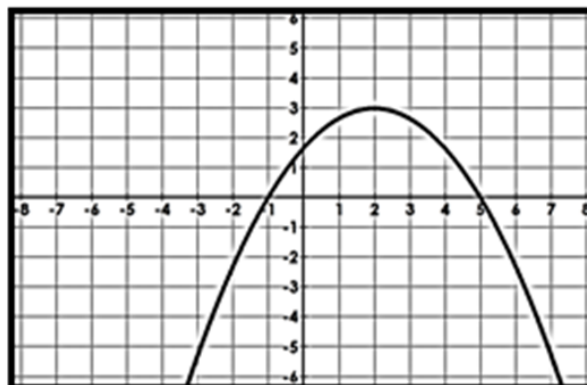
Graph 3



$$\text{As } x \rightarrow -\infty, f(x) \rightarrow \underline{\infty}$$

$$\text{As } x \rightarrow \infty, f(x) \rightarrow \underline{\infty}$$

Graph 4



$$\text{As } x \rightarrow -\infty, f(x) \rightarrow \underline{-\infty}$$

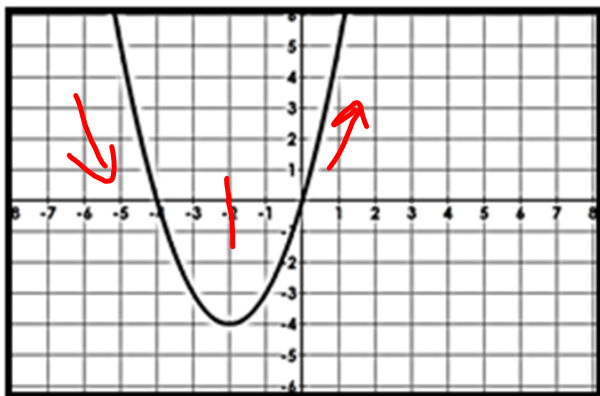
$$\text{As } x \rightarrow \infty, f(x) \rightarrow \underline{-\infty}$$



# Intervals of Increase & Decrease

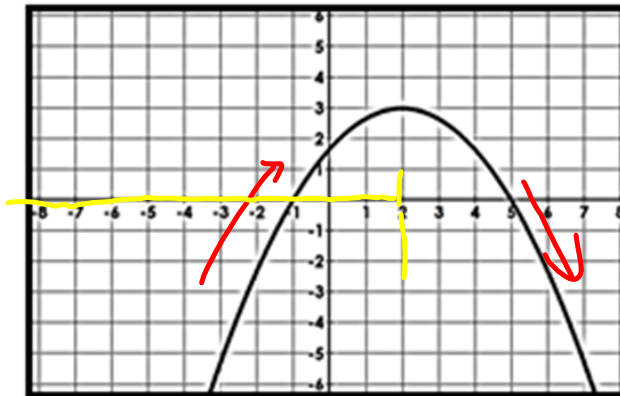
Interval of Increase		
<u>Define:</u> The part of the graph that is rising as you read left to right.	<u>Think:</u> From left to right, is my graph going up?	<u>Write:</u> An inequality using the x-value of the vertex
Interval of Decrease		
<u>Define:</u> The part of the graph that is falling as you read from left to right.	<u>Think:</u> From left to right, is my graph going down?	<u>Write:</u> An inequality using the x-value of the vertex

Graph 3



Interval of Increase:  $(-2, \infty)$   
Interval of Decrease:  $(-\infty, -2)$

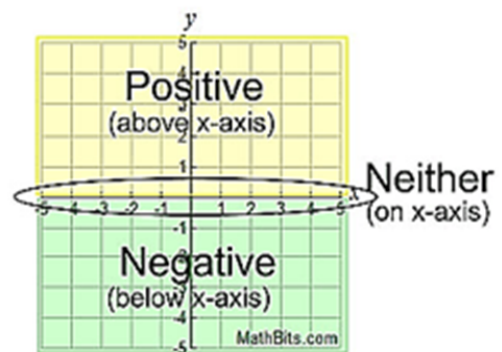
Graph 4



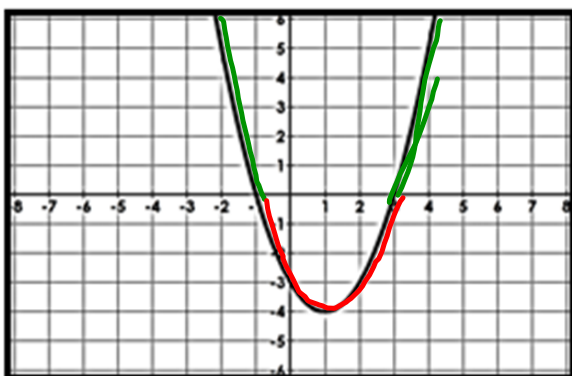
Interval of Increase:  $(-\infty, 2)$   
Interval of Decrease:  $(2, \infty)$

# Positive & Negative Parts of the Graph

Positive		
<b>Define:</b> The part of the function that is above the x-axis.	<b>Think:</b> Which part of the function is in the positive region and where?	<b>Write:</b> Inequality using the zeros value (x)
Negative		
<b>Define:</b> The part of the function that is below the x-axis.	<b>Think:</b> Which part of the function is in the negative region and where?	<b>Write:</b> Inequality using the zero values (x)



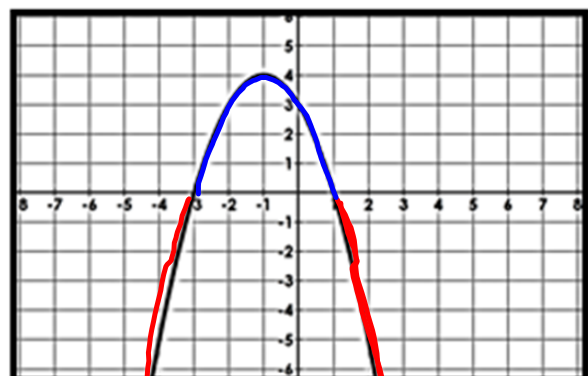
Graph 1



Positive:  $x < -1, x > 3$

Negative:  $-1 < x < 3$

Graph 2

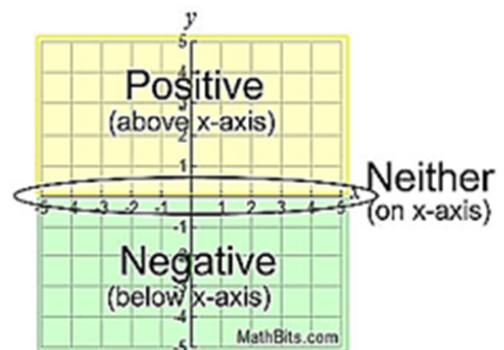


Positive:  $-3 < x < 1$

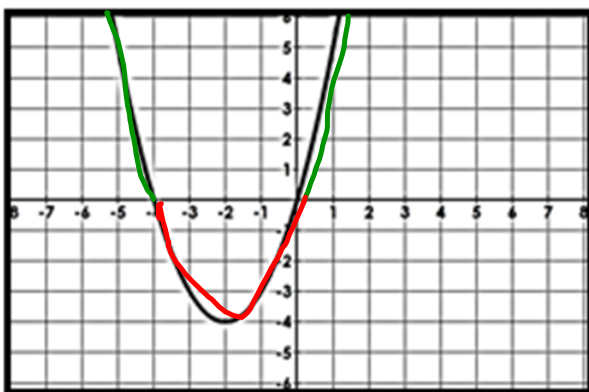
Negative:  $x < -3, x > 1$

## Positive & Negative Parts of the Graph

<i>Positive</i>		
<i>Define:</i> The part of the function that is above the x-axis.	<i>Think:</i> Which part of the function is in the positive region and where?	<i>Write:</i> Inequality using the zeros value (x)
<i>Negative</i>		
<i>Define:</i> The part of the function that is below the x-axis.	<i>Think:</i> Which part of the function is in the negative region and where?	<i>Write:</i> Inequality using the zero values (x)

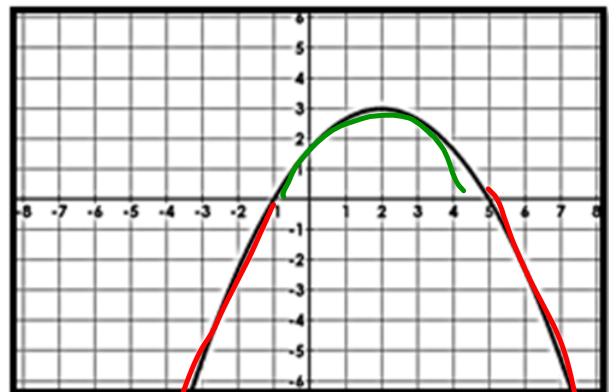


Graph 3



Positive:  $x < -4, x > 0$   
 Negative:  $-4 < x < 0$

Graph 4

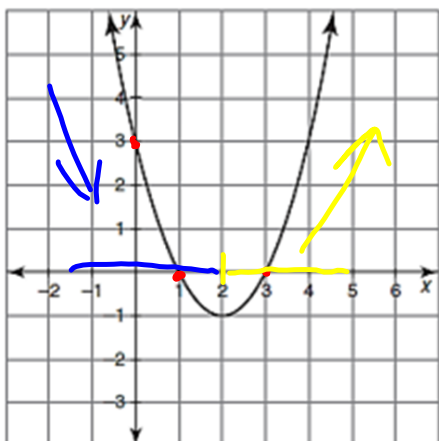


Positive:  $-1 < x < 5$   
 Negative:  $x < -1, x > 5$

## Class Practice

2/27/18

1.

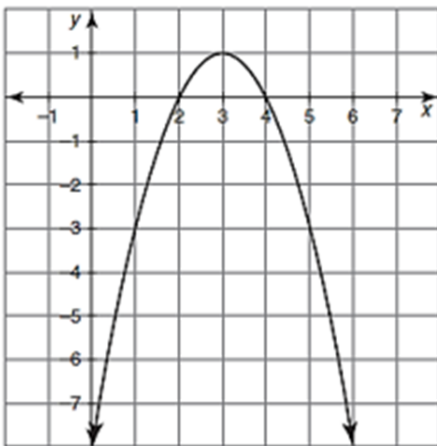


All real #s  $\mathbb{R}$

Domain: $(-\infty, \infty)$	Range: $[-1, \infty)$
Vertex: $(2, -1)$	Axis of Sym. $x = 2$
Y-Intercept: $(0, 3)$	Zeros: $x = 1, x = 3$
Extrema: <u>Min</u>	Max/Min Value: <u><math>y = -1</math></u>
Int of Inc: $(2, \infty)$	Int of Dec: $(-\infty, 2)$
Positive: $x < 1, x > 3$	Negative: $1 < x < 3$
End Behavior: As $x \rightarrow -\infty$ , $f(x) \rightarrow \infty$ . As $x \rightarrow \infty$ , $f(x) \rightarrow \infty$	

# Class Practice 2/27/18

2.



Domain: $(-\infty, \infty)$	Range: $(-\infty, 1]$
Vertex: $(3, 1)$	Axis of Sym: $x = 3$
Y-Intercept: $(0, -8)$	Zeros: $x = 2, x = 4$
Extrema: <b>Max</b>	Max/Min Value: $y = 1$
Int of Inc: $(-\infty, 3)$	Int of Dec: $(3, \infty)$
Positive: $2 < x < 4$	Negative: $x < 2, x > 4$
End Behavior: As $x \rightarrow -\infty, f(x) \rightarrow -\infty$ . As $x \rightarrow \infty, f(x) \rightarrow -\infty$	

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0:00:32

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Alert Sounds

Applause ▾

Style

Rectangle ▾

Color

Counter

Count Down ▾

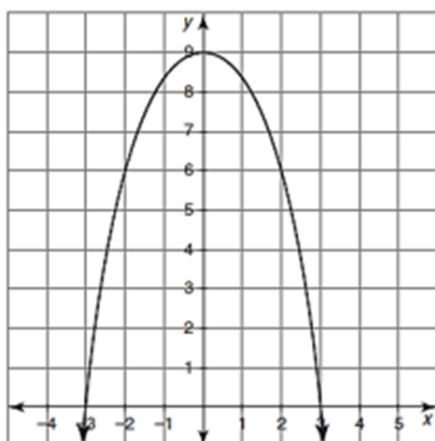
Action

Nothing ▾

## Class Practice

2/27/18

3.



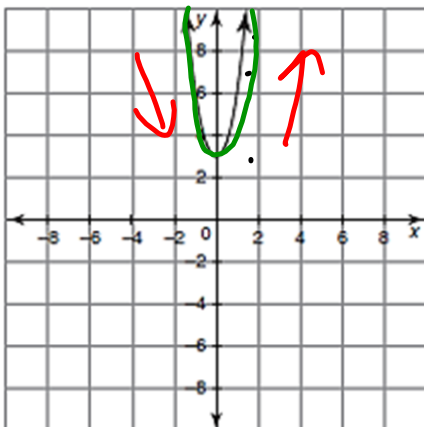
Domain: $(-\infty, \infty)$	Range: $(-\infty, 9]$
Vertex: $(0, 9)$	Axis of Sym. $x = 0$
Y-Intercept: $(0, 9)$	Zeros: $x = -3, x = 3$
Extrema: <u>Maximum</u>	Max/Min Value: $y = 9$
Int of Inc: $(-\infty, 0)$	Int of Dec: $(0, \infty)$
Positive: $-3 < x < 3$	Negative: $x < -3, x > 3$
End Behavior: As $x \rightarrow -\infty$ , $f(x) \rightarrow -\infty$ . As $x \rightarrow \infty$ , $f(x) \rightarrow -\infty$	



# Class Practice

2/27/18

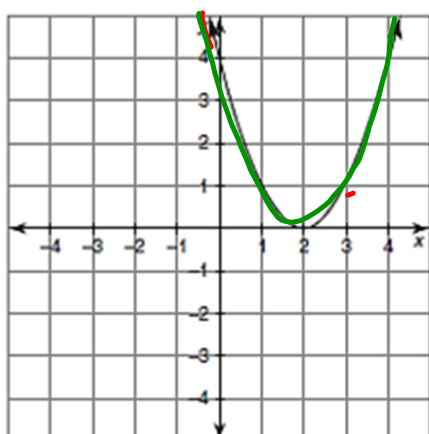
4.



Domain: <u>All real #</u>	Range: <u>(3, ∞)</u>
Vertex: <u>(0, 3)</u>	Axis of Sym. <u>y = 0</u>
Y-Intercept: <u>0, 3</u>	Zeros: <u>none</u>
Extrema: <u>Min.</u>	Max/Min Value: <u>y = 4</u>
Int of Inc: <u>-∞, 0</u>	Int of Dec: <u>∞</u>
Positive: <u>(-∞, ∞)</u>	Negative: <u>none</u>
End Behavior: As $x \rightarrow -\infty$ , $f(x) \rightarrow \infty$	As $x \rightarrow \infty$ , $f(x) \rightarrow \infty$

# Closing: Class Practice 2/27/18

## 5.



Domain: <u>All Real #</u>	Range: <u>(2, ∞)</u>
Vertex: <u>2, 0</u>	Axis of Sym. <u>x = 2</u>
Y-Intercept: <u>0, 4</u>	Zeros: <u>x = 2</u>
Extrema: <u>Min</u>	Max/Min Value: <u>y = 0</u>
Int of Inc: <u>(2, ∞)</u>	Int of Dec: <u>(-∞, 2)</u>
Positive: <u>(-∞, ∞)</u>	Negative: <u>none</u>
End Behavior: As $x \rightarrow -\infty$ , $f(x) \rightarrow \infty$ . As $x \rightarrow \infty$ , $f(x) \rightarrow \infty$	

Class Work/Home Work (Day 3  
Characteristics) is due on  
Wednesday, 2/28/18