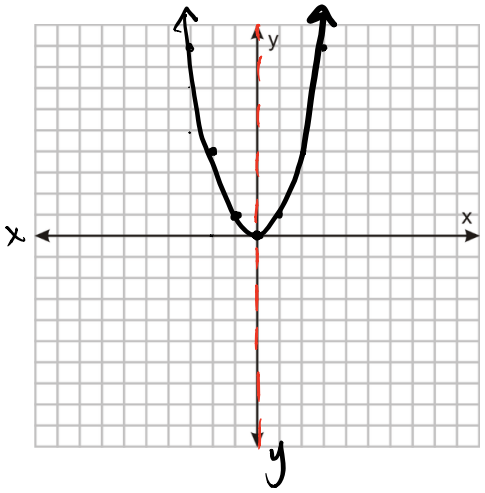
Algebra 1 **8.1 Notes**

Graph the parent function of a quadratic: $f(x) = x^2$



x	y
-3	9
-2	4
-1	1
0	0 ← vertex
1	1
2	4
3	9

Vertex: (0, 0)

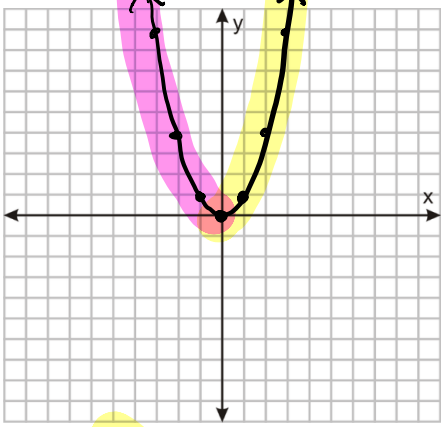
Axis of Symmetry: x = 0

Opens: up

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

Range: $y \in [0, \infty)$

Intervals when the Quadratic is increasing and decreasing.



Increasing: A function increases if the y-values go up as you read the graph from left to right.

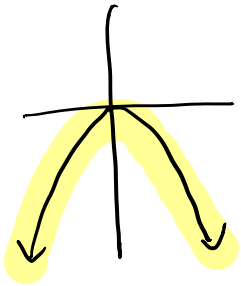
Decreasing: A function decreases if the y-values go down as you read the graph from left to right.

Now let's look at the graph of $f(x) = ax^2$. Notice what happens to the graph as a changes.

1) What do you notice? a increased, the graph got narrower
a decreased (0<a<1), the graph got wider

2) What happens when a is negative?
the graph opens down.

3) When is the graph of the function $f(x) = -x^2$ positive and when is it negative?



← positive above x-axis

← negative below x-axis

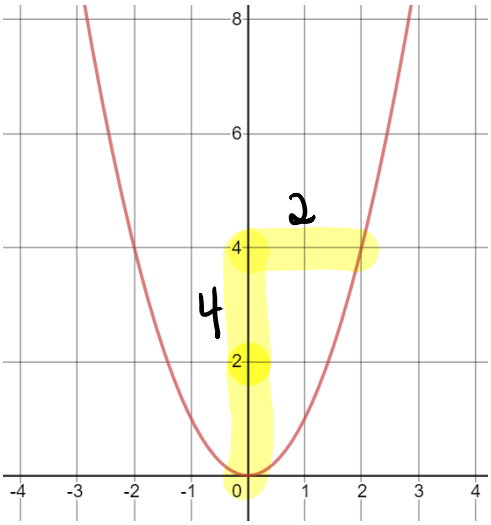
not pos. or neg. at (0,0)

Never positive
Negative for all values except x=0

Rate of Change: $\frac{\text{change in } y}{\text{change in } x}$

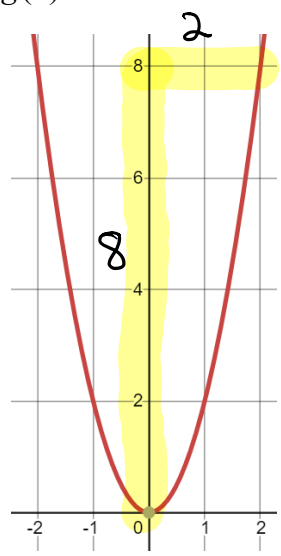
Let's compare the rate of change over the interval $x \in (0,2)$ for quadratics with different a values.

$f(x) = x^2$



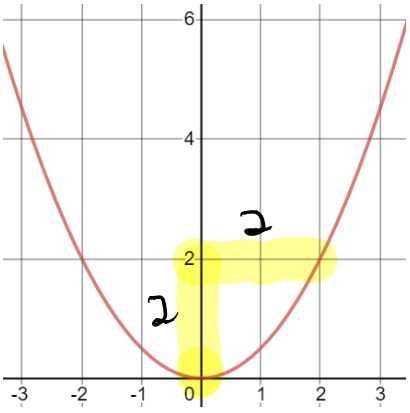
ROC: $\frac{4}{2} = 2$

$g(x) = 2x^2$



ROC: $\frac{8}{2} = 4$

$h(x) = \frac{1}{2}x^2$



ROC: $\frac{2}{2} = 1$

Which function had the greatest rate of change over the interval $x \in (0,2)$? g(x) had the greatest rate of change