Name: KEY

Topic: 10.1-Exploring Quadratic Graphs

Date:_____ Block: ____

QUADRATIC FUNCTION: A function that can be written in the form of...

$y = ax^2 + bx + c$, where $a \neq 0$

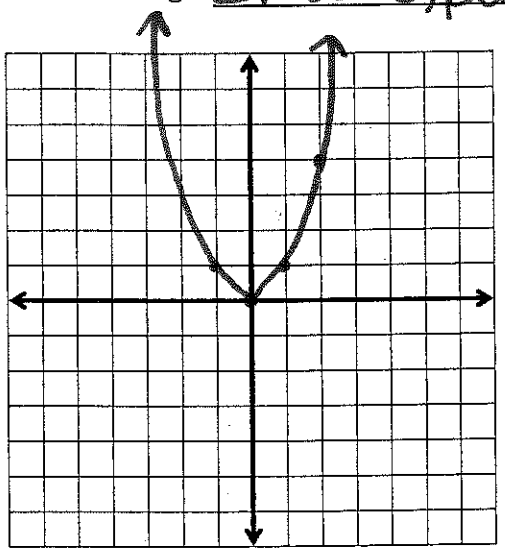
(highest exponent will be x^{2})

This is the Standard Form of a quadratic function.

The graph of this function is called a parabola ("U" shape)

Properties of Parabolas:

- Symmetry: You can fold so the 2 sides match exactly.
  - The fold line for a parabola is the "axis of symmetry".
- Vertex: The highest or lowest point of a parabola.
  - If $a>0$, parabola opens up, Vertex = minimum (on the axis of symmetry)
  - If $a<0$, parabola opens down, Vertex = maximum.



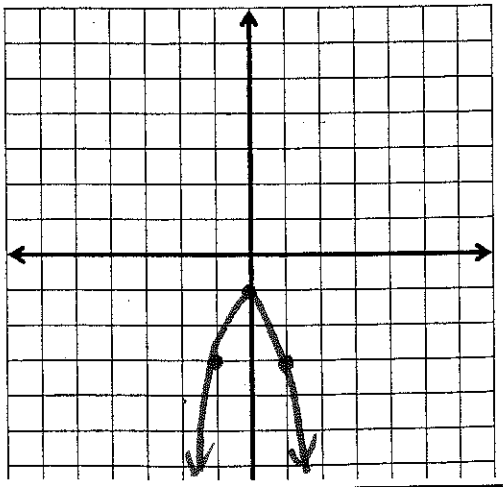
① $y = x^2$

Minimum or Maximum

$a = 1$

x	$y = x^2$	y
-1	$(-1)^2$	1
0	$(0)^2$	0
1	1^2	1
2	2^2	4

Vertex at: (0,0)



② $y = -2x^2 - 1$

Minimum or Maximum $a = -2$

x	$y = -2x^2 - 1$	y
-1	$-2(-1)^2 - 1$	-3
0	$-2(0) - 1$	-1
1	$-2(1)^2 - 1$	-3
2	$-2(2)^2 - 1$	-9

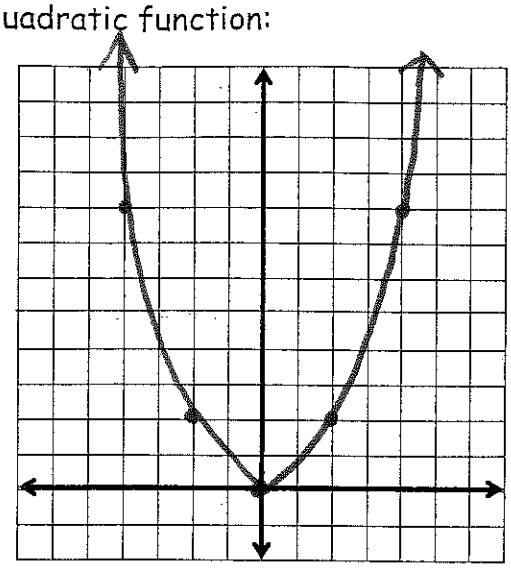
Vertex at: (0, -1)

Make a table of values and graph the quadratic function:

- EX: $y = \frac{1}{2}x^2$

$a = \frac{1}{2}$, so opens up (minimum)

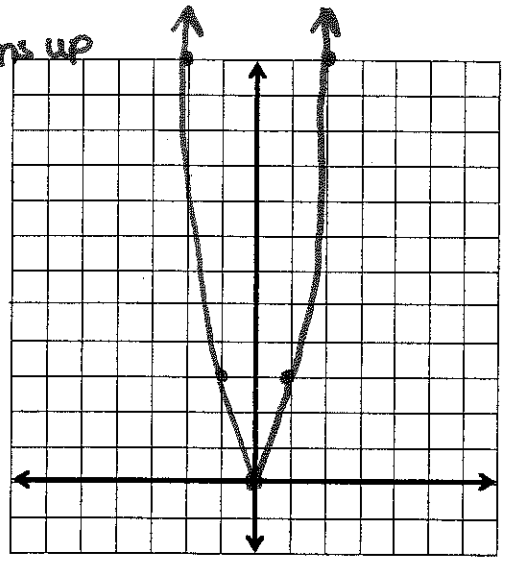
x	$y = \frac{1}{2}x^2$	(x, y)
0	$\frac{1}{2}(0)^2$	(0, 0)
2	$\frac{1}{2}(2)^2$	(2, 2)
4	$\frac{1}{2}(4)^2$	(4, 8)



*reflect points across y-axis

- TRY: $y = 3x^2$ $a = 3$, so opens up (minimum)

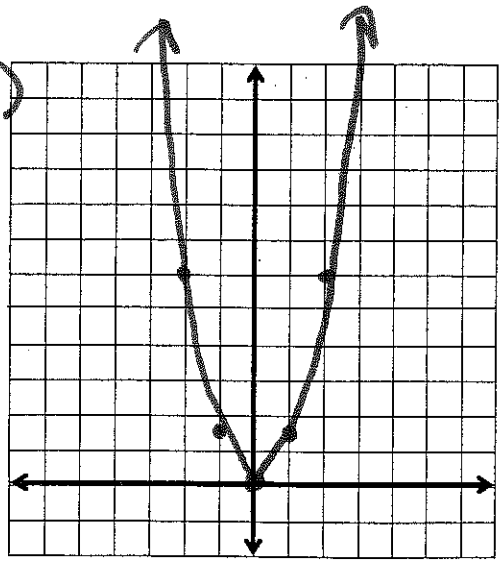
x	$y = 3x^2$	(x, y)
0	$3(0)^2$	(0, 0)
1	$3(1)^2$	(1, 3)
2	$3(2)^2$	(2, 12)



- TRY: $y = 1.5x^2$

$a = 1.5$, so opens up (minimum)

x	$y = 1.5x^2$	(x, y)
0	$1.5(0)^2$	(0, 0)
1	$1.5(1)^2$	(1, 1.5)
2	$1.5(2)^2$	(2, 6)

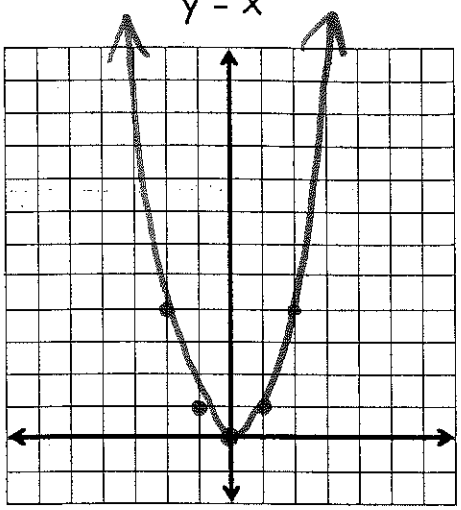


10.1 Notes

The graphs of 3 quadratic functions are below. Order them from widest to narrowest.

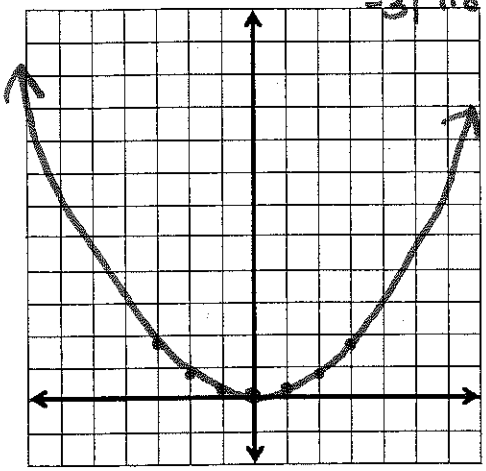
Parent Function

$y = x^2$

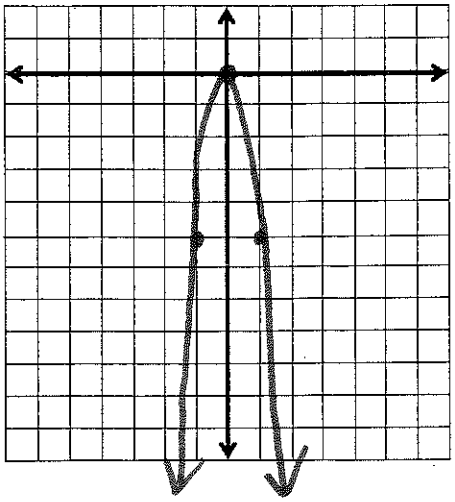


$y = -5x^2$

x	y
0	0
-1	.2
2	.8
-3	1.8



$y = \frac{1}{5}x^2$



Order the graphs from widest to narrowest.

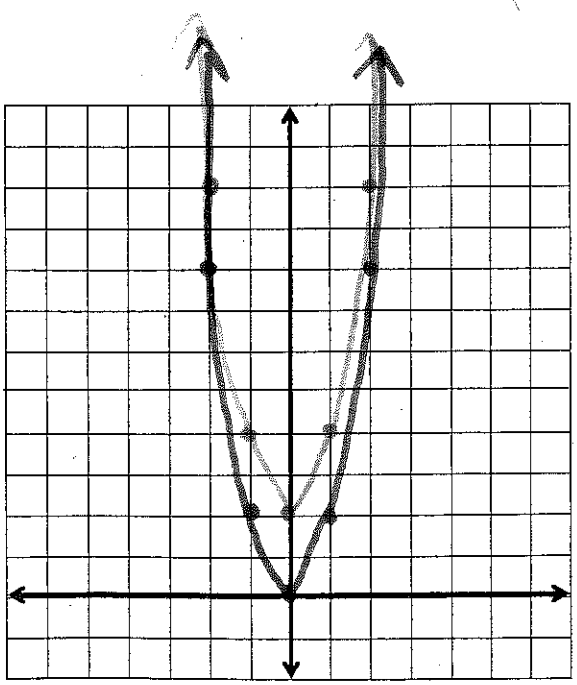
$y = \frac{1}{5}x^2$ $\quad$ $y = x^2$ $\quad$ $y = -5x^2$

- The value of "a" (# in front of x^2) affects the width of the parabola and the direction it opens:
  ① fraction → wider ② whole # → narrower ③ negative → flips upside down

Graphing $y = ax^2 + c$

Graph both functions using a table of values

x	$y = 2x^2$	$y = 2x^2 + 2$
-2	(-2,8)	(-2,10)
-1	(-1,2)	(-1,4)
0	(0,0)	(0,2)
1	(1,2)	(1,4)
2	(2,8)	(2,10)



The value of "c" (constant on end) moves (shifts) graph up or down (will shift your vertex). Also, c = y-Intercept