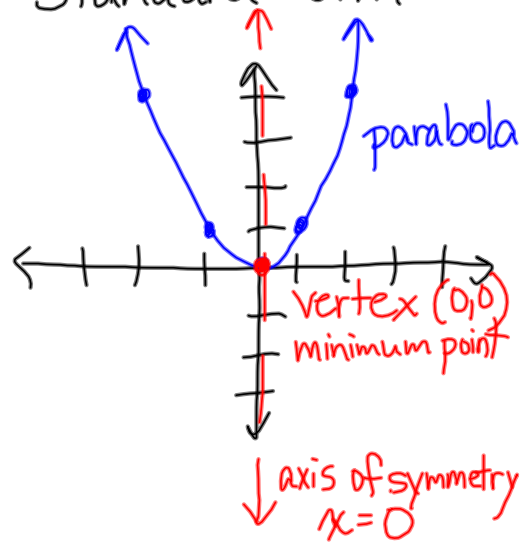


# Sec. 9.1 Quadratic Graphs and Their Properties

Quadratic function:  $y = ax^2 + bx + c$   
Standard Form

Parent: (simplest):  $y = x^2$

x	y
-2	4
-1	1
0	0
1	1
2	4



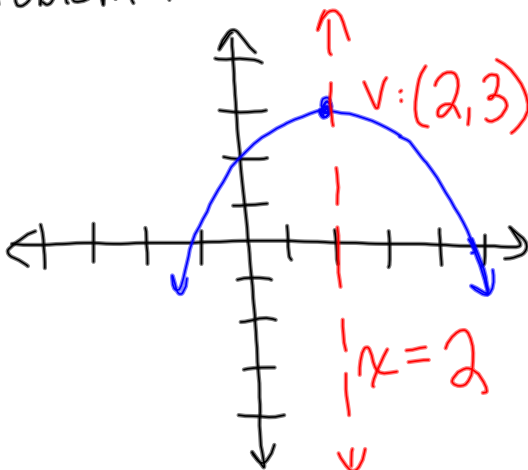
If  $a > 0$  graph opens up



If  $a < 0$  graph opens down



Problem 1: Find the vertex. Is it a maximum or a minimum?

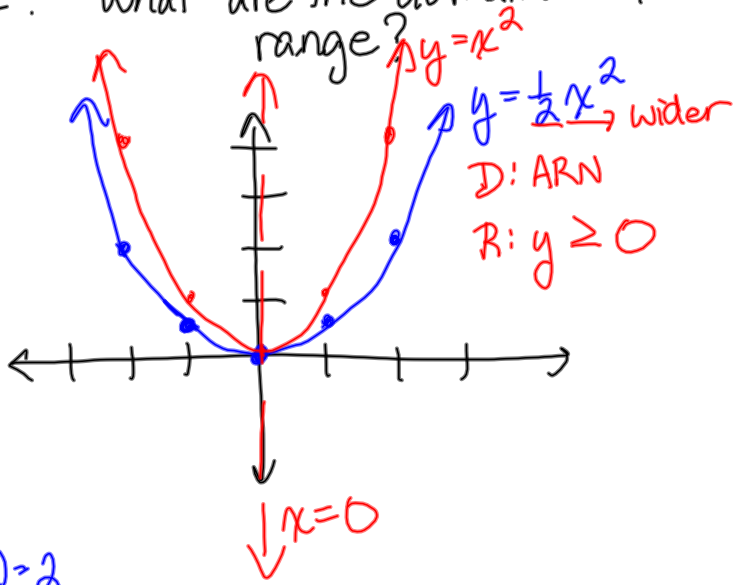


Domain:  $ARN$   
Range:  $y \leq 3$

Problem 2:

Graph  $y = \frac{1}{2}x^2$ . What are the domain and range?

x	y	
-1	$\frac{1}{2}$	$\frac{1}{2} \cdot 1$ $\frac{1}{2}(-1)^2$
0	0	
1	$\frac{1}{2}$	$\frac{1}{2} \cdot 1^2$
2	2	$\frac{1}{2}(2)^2$
-2	2	$\frac{1}{2}(-2)^2 = \frac{1}{2}(4) = 2$



Problem 3: Write in order, from widest to narrowest, the graphs of:

$f(x) = \boxed{4}x^2$ ,  $f(x) = \boxed{\frac{1}{4}}x^2$ ,  $f(x) = \boxed{1}x^2$

n                      w                      p

$f(x) = \frac{1}{4}x^2$ ,  $f(x) = x^2$ ,  $f(x) = 4x^2$

↪                      ↪                      ↕

Problem 4: How is the graph of  $y = 2x^2 + 3$  different from the graph of  $y = 2x^2$

x	$2x^2$	$2x^2 + 3$
-2	8	11
-1	2	5
0	0	3
1	2	5
2	8	11

It is shifted up 3 units.

$y = 2x^2 - 5$   
shift down 5 units

Problem 5: An acorn drops from a tree branch 20 ft above the ground.

$$h = -16t^2 + 20, \quad h = \text{height of acorn}$$

starting height

$$t = \text{number of seconds}$$

Graph. What time does the acorn hit the ground?



$$\frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$$

$t$	$h$
0	20
1	4
$\frac{1}{2}$	16

$$-16t^2 + 20$$

$$-16 \cdot 1^2 + 20$$

$$-16\left(\frac{1}{2}\right)^2 + 20$$

$$-16 \cdot \frac{1}{4} + 20$$

$$-4 + 20$$

woah... I can write on this