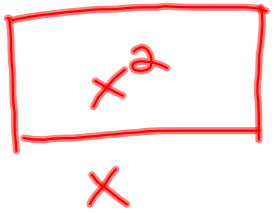
Quadratic Equations and Functions:

$ax^2+bx+c=y$

What is a quadratic?

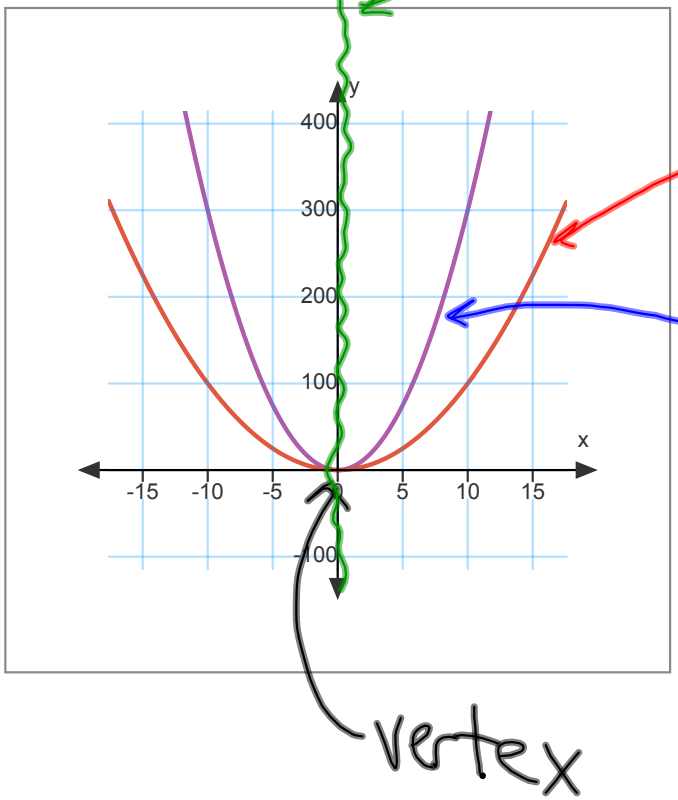


What is the "parent quadratic"?

$1x^2+0x+0=y$

$y=x^2$

Graphing Quadratics:



Start with the parent function:

$$y = x^2$$

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

- vertex? axis of symmetry?

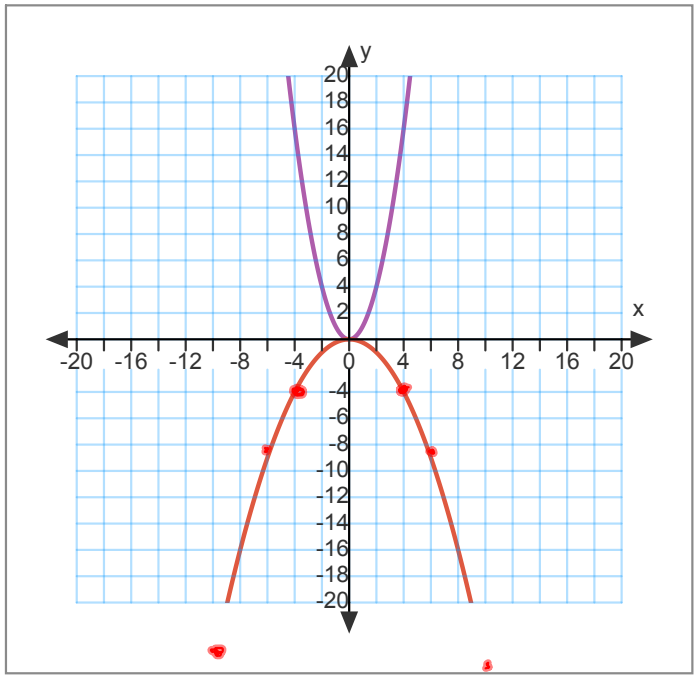
lowest / highest point

What about when a <> 0?

$$y = 3x^2$$

- vertical stretch (horizontal shrink) ...

More variations:



What if a < 0? Or a fraction?

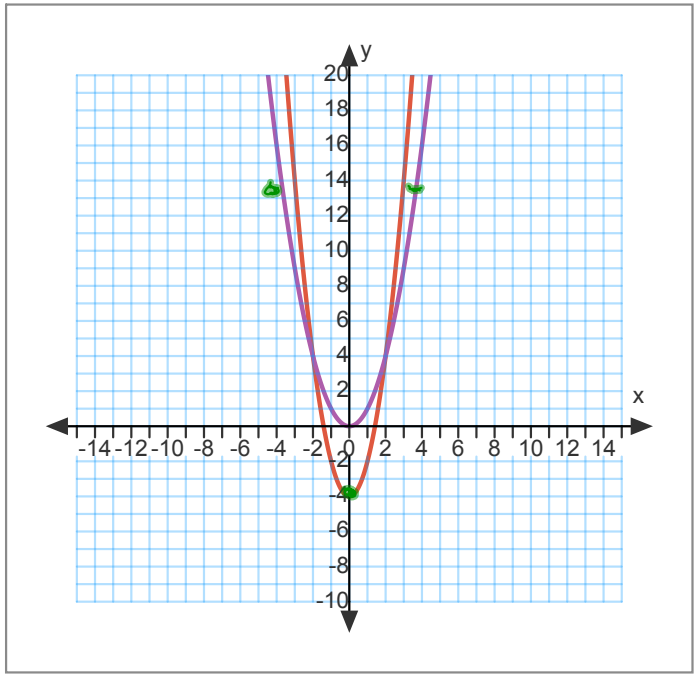
$$y = -\frac{1}{4}x^2$$

- vertical shrink and reflection

x	y
±4	−4
±6	−9
±10	−25

$$y = x^2$$

Still more variations:



What if c <> 0?

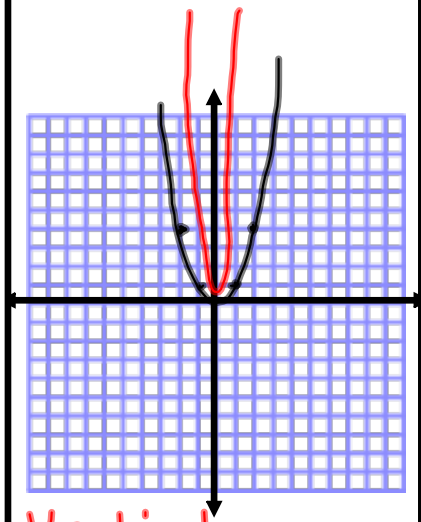
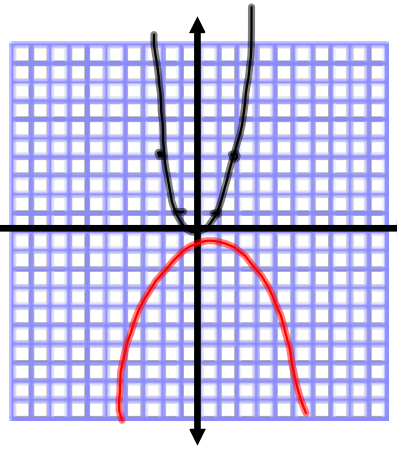
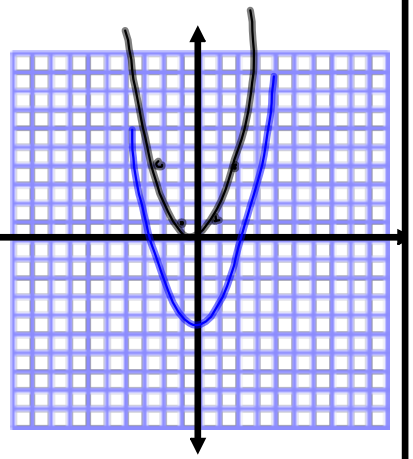
$$y = 2x^2 - 4$$

- vertical translation (+ vertical stretch)

x	y
±3	14
0	−4
±4	28

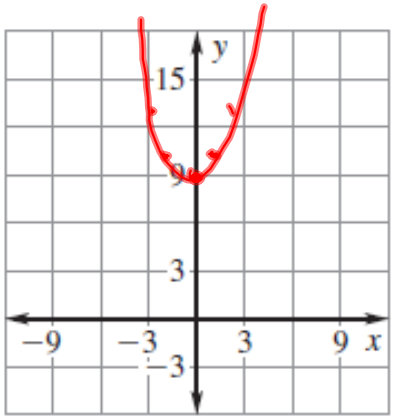
$$y = x^2$$

In Summary:

$y = ax^2, a > 0$	$y = ax^2, a < 0$	$y = ax^2 + c$
		
Vertical stretch	Vertical reflection	Vertical translation

Graph the function and ~~identify its domain and range~~. Compare the graph with the graph of $y = x^2$.

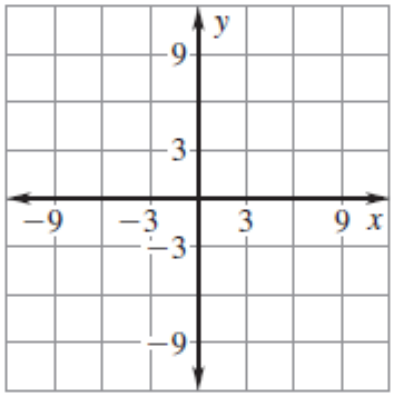
19. $y = x^2 + 9$



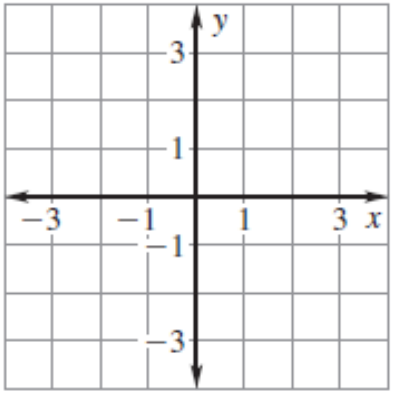
x	y
0	9
±1	10
±2	13

vertical translation

23. $y = 2x^2 - 9$



24. $y = -5x^2 + 2$



Roof Shingle A roof shingle is dropped from a rooftop that is 100 feet above the ground. The height y (in feet) of the dropped roof shingle is given by the function $y = -16t^2 + 100$ where t is the time (in seconds) since the shingle is dropped.

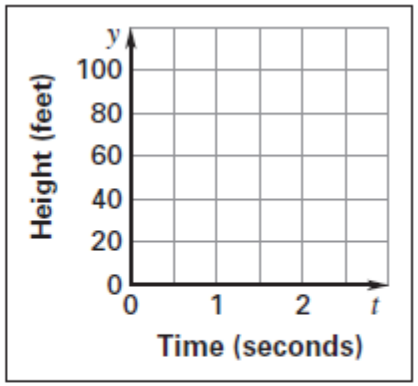
a. Graph the function.

b. Identify the domain and range of the function in this situation.

c. Use the graph to estimate the shingle's height at 1 second.

d. Use the graph to estimate when the shingle is at a height of 50 feet.

e. Use the graph to estimate when the shingle is at a height of 0 feet.



Homework:

p. 632, 6-21 by 3, 24-30 by 3, 37, 39