

Quadratic Equations and Functions:

a polynomial
that looks like
 $ax^2 + bx + c$

What is a quadratic?

$x + q$

$$ax^2 + bx + c$$

$x + p$

What is the "parent quadratic"?

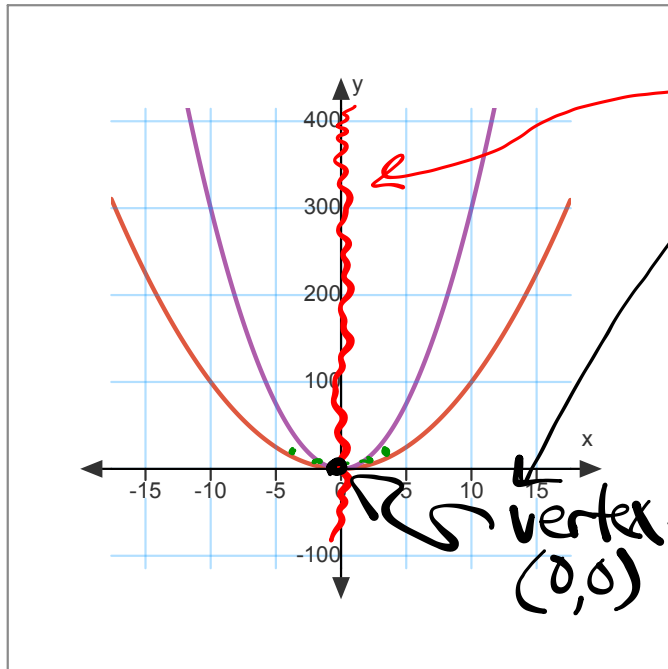
parent quadratic:
 $a=1, b=0, c=0$

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

$$f(x) = x^2$$

$f(x) = x$
(parent function
of a linear equation)

Graphing Quadratics:



Start with the parent function:

$$y = x^2$$

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

- vertex? lowest or highest point
axis of symmetry? (always the y-axis when $b=0$)

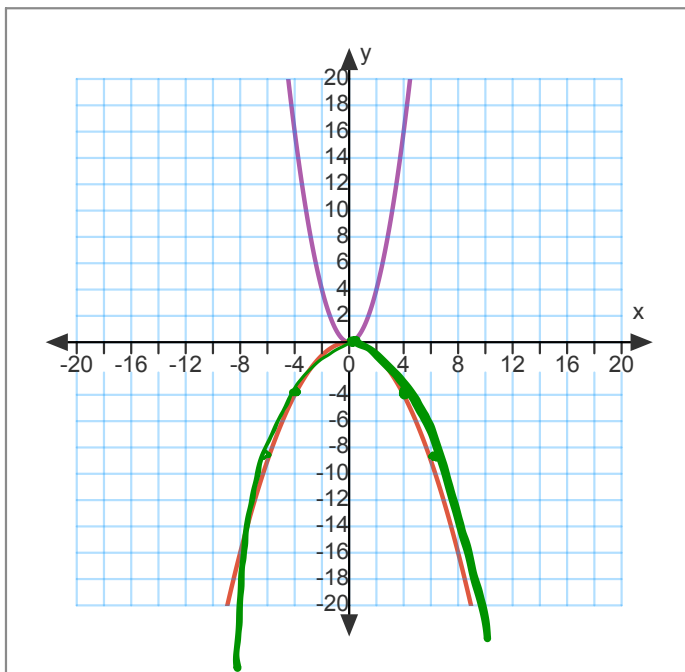
What about when $a < 0$?

$$y = 3x^2$$

- vertical stretch → $a > 0$
(horizontal shrink) ...

$$f(x) = ax^2 + bx + c$$

More variations:



$$y = x^2$$

What if $a < 0$? Or a fraction?

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

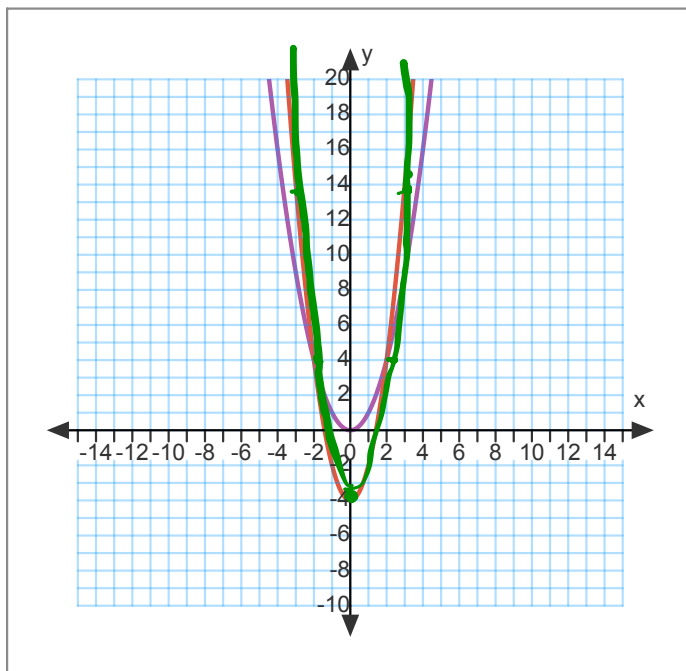
- vertical shrink
and reflection

$0 < |a| < 1 \rightarrow$ vertical
Shrink

$a < 0 \rightarrow$ reflection

x	y
0	0
4	-4
6	-9
-4	-4
-6	-9

Still more variations:



$$y = x^2$$

What if $c \neq 0$?

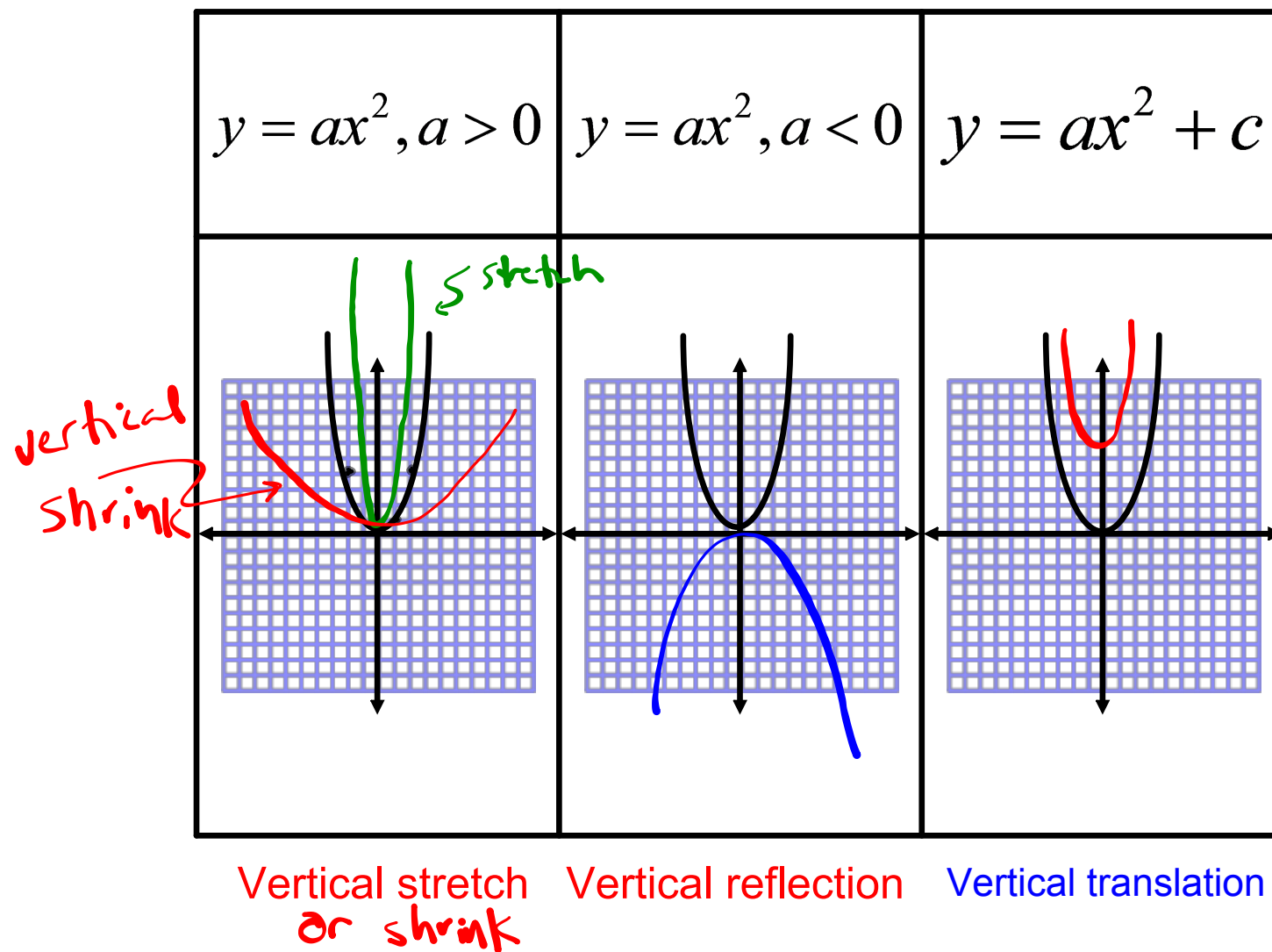
$$y = 2x^2 - 4$$

- vertical
translation
(+ vertical
stretch)

$c \neq 0 \rightarrow$
vertical
translation

x	y
0	-4
3	14
2	4
-2	4
-3	14

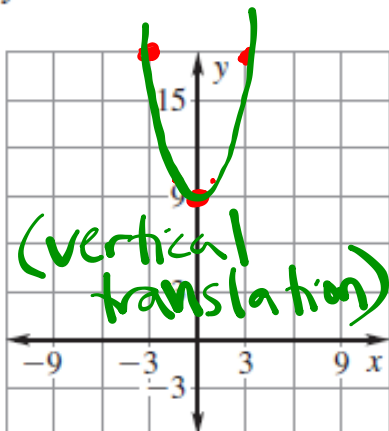
In Summary:



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

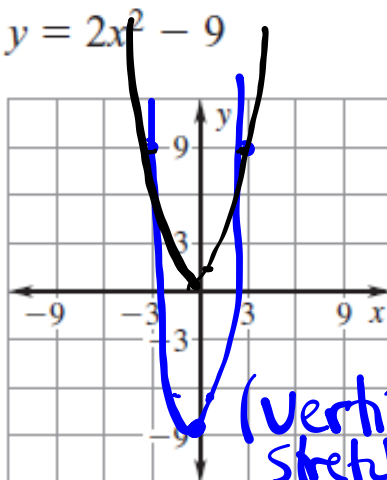
$$y = x^2$$

19. $y = x^2 + 9$



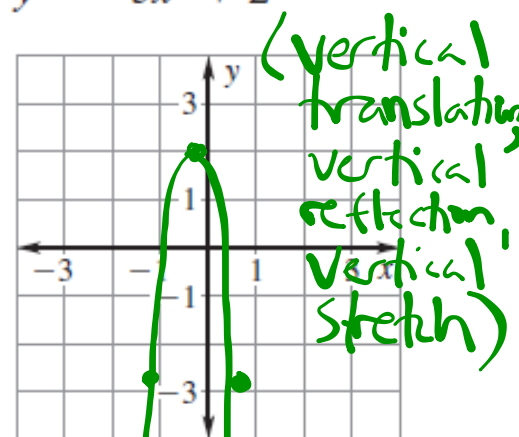
x	y
0	9
3	18
-3	18
1	10
-1	10

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



x	y
0	-9
3	9
-3	9
1	-7

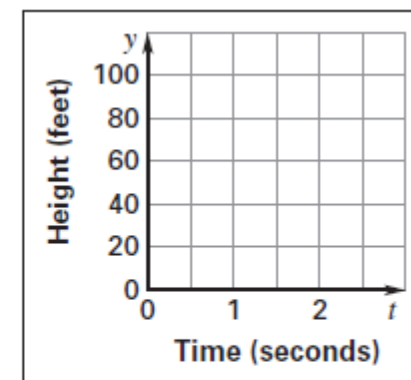
24. $y = -5x^2 + 2$



x	y
0	2
1	-3
-1	-3

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.

- Graph the function.
- Identify the domain and range of the function in this situation.
- Use the graph to estimate the shingle's height at 1 second.
- Use the graph to estimate when the shingle is at a height of 50 feet.
- 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

