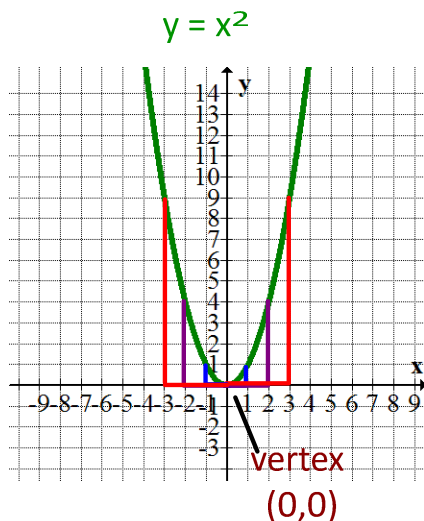


3.3 Investigate Transformations - Day 2

Recall: The base graph of all parabolas is $y = x^2$.



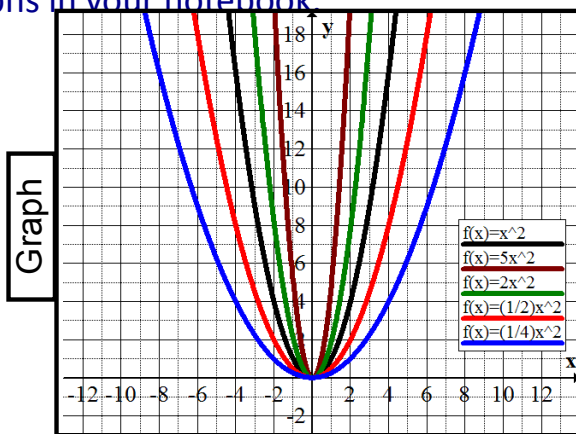
Pattern:
from the vertex
 over 1, up 1
 over 2, up 4
 over 3, up 9
 ...

C. Investigate $y = ax^2$, $a > 0$

Compare the following graphs to $y = x^2$.

Sketch the graphs in your notebook

- a) $y = x^2$
- b) $y = 5x^2$
- c) $y = 2x^2$
- d) $y = \frac{1}{2}x^2$
- e) $y = \frac{1}{4}x^2$

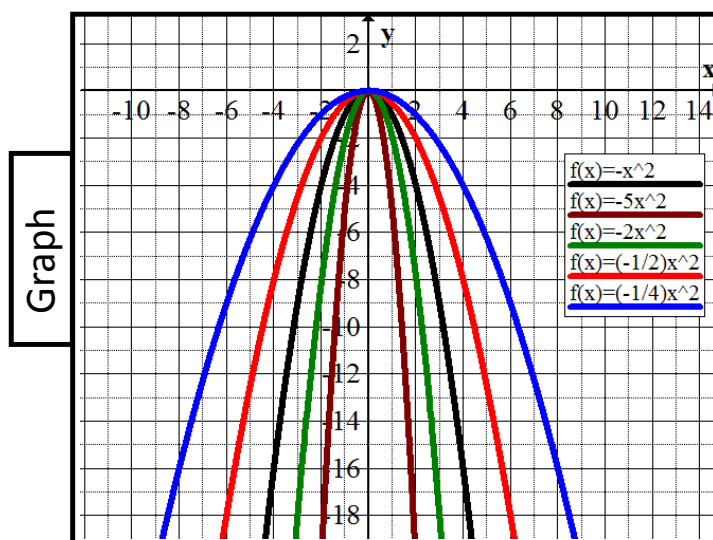


Compared to $y = x^2$, the graph of $y = ax^2$:
 if $a > 1$, vertical stretch
 if $0 < a < 1$, vertical compression

D. Investigate $y = ax^2$, $a < 0$

Compare the following graphs to $y = x^2$.
Sketch the graphs in your notebook.

- a) $y = -x^2$
- b) $y = -5x^2$
- c) $y = -2x^2$
- d) $y = -\frac{1}{2}x^2$
- e) $y = -\frac{1}{4}x^2$



Compared to $y = x^2$, the graph of $y = ax^2$:

if $a < 0$, reflection over the x-axis

Same pattern... TIMES 'a'

Pattern:
from the vertex
 over 1, up 1(a)
 over 2, up 4(a)
 over 3, up 9(a)

...

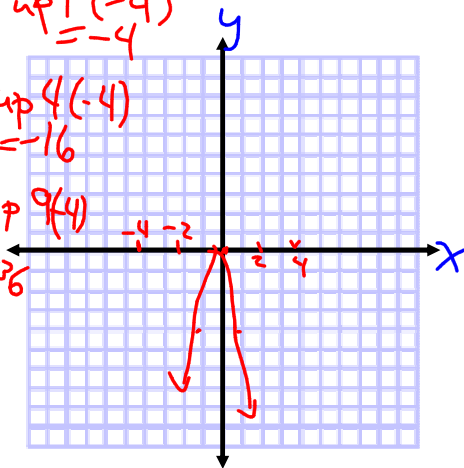
Ex. 1 List the transformations on $y = x^2$ and sketch the graph.

a) $y = -4x^2$

Pattern
 over 1 up 1 (-4)
 = -4

over 2 up 4 (-4)
 = -16

over 3 up 9 (-4)
 = -36



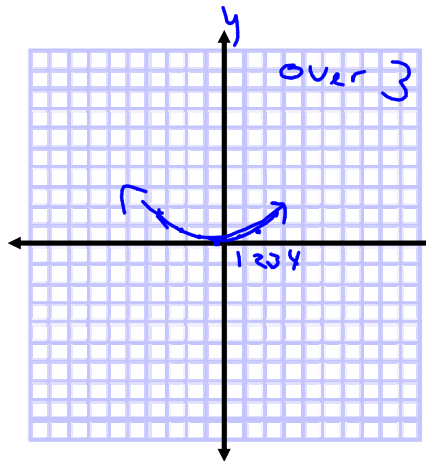
b) $y = 0.2x^2$

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

over 1 up 1 (0.2)

over 2 up 4 (0.2)
 = 0.8

over 3 up 9 (0.2)
 = 1.8



Ex. 2 Write an equation of a quadratic relation under the following transformations on $y = x^2$:

- a) vertically stretched by a factor of 7

$$y = 7x^2$$

- b) vertically stretched by a factor of 1/2 and reflected in the x-axis
(sometimes called "compressed by factor of 2")

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

mean
same
thing

- c) vertically stretched by a factor of 4 and translated 5 units left

$$y = 4(x+5)^2$$

- d) vertically stretched by a factor of 1/3 and translated up 1 unit
("compressed by a factor of 3")

means
same thing

$$y = \frac{1}{3}x^2 + 1$$

- e) vertically stretched by a factor of 3, translated 4 units left,
translated 5 units down and reflected in the x-axis

$$y = -3(-x+4)^2 - 5$$

Your Turn:
Page 178-179
#C2,4,8,10,13,14

