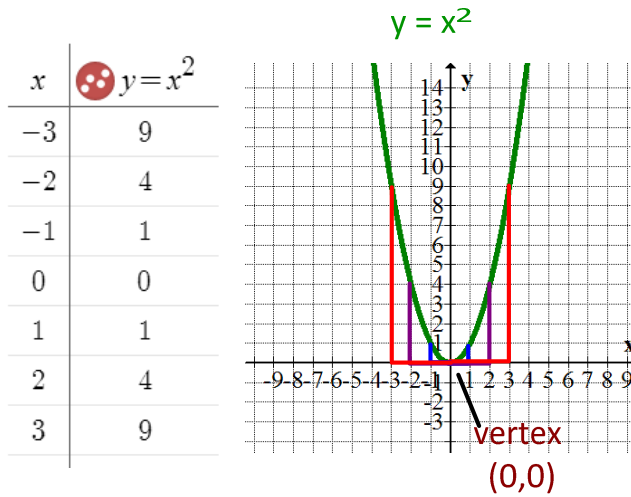


3.3 Investigate Transformations New

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



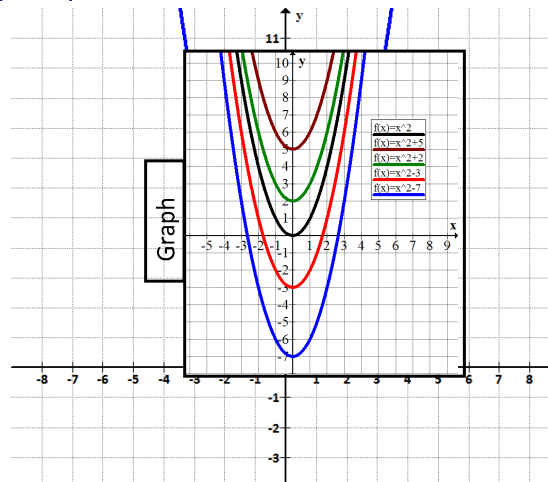
Pattern:
from the vertex
 over 1, up 1
 over 2, up 4
 over 3, up 9
 ...

Mar 16-10:15 PM

A. Investigate $y = x^2 + k$

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

- a) $y = x^2$
- b) $y = x^2 + 5$
- c) $y = x^2 - 3$



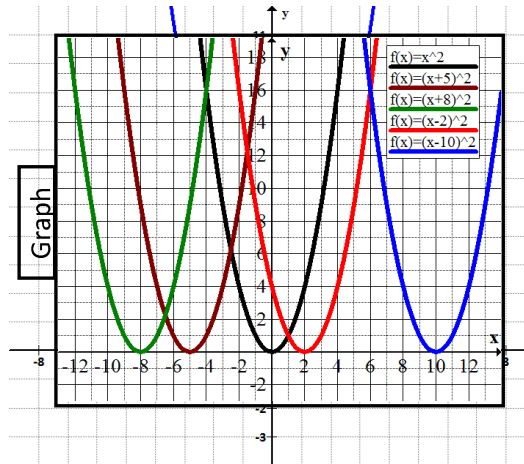
Compared to $y = x^2$, the graph of $y = x^2 + k$:
 if $k > 0$, shift vertically upward
 if $k < 0$, shift vertically downward

Mar 17-3:56 PM

B. Investigate $y = (x - h)^2$

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

- a) $y = x^2$
- b) $y = (x + 5)^2$
- c) $y = (x - 2)^2$

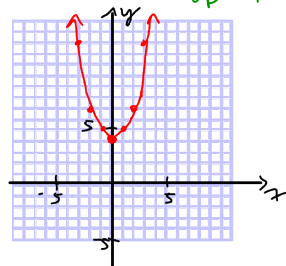


Compared to $y = x^2$, the graph of $y = (x - h)^2$:
 $(x - \dots)$ if $h > 0$, horizontal shift to the right
 $(x + \dots)$ if $h < 0$, horizontal shift to the left

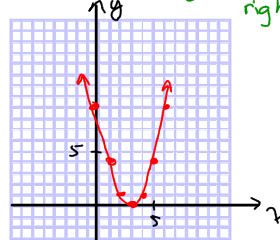
Mar 16-10:18 PM

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

a) $y = x^2 + 4$ - vert. shift up 4



b) $y = (x - 3)^2$ - horz. shift right 3



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

a) translated 5 units down $y = x^2 - 5$

b) translated 7 units right $y = (x - 7)^2$

c) translated 3 units left $y = (x + 3)^2$

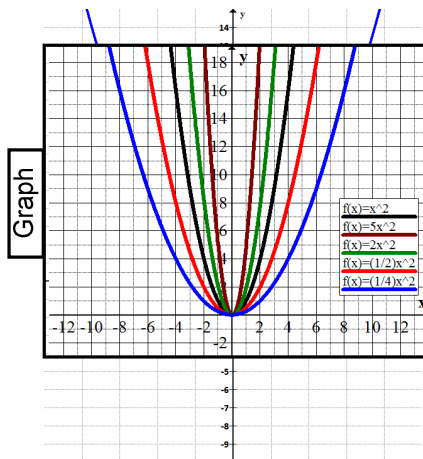
d) translated up 4 units and 6 units right $y = (x - 6)^2 + 4$

Mar 16-10:25 PM

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

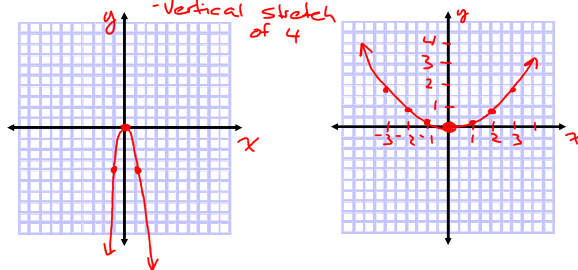


Compared to $y = x^2$, the graph of $y = ax^2$:
if $a > 1$, vertical stretch
if $0 < a < 1$, vertical compression

Mar 16-10:21 PM

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

- a) $y = -4x^2$ - V. Reflected - Vertical stretch of 4
- b) $y = 0.2x^2$ - Vertical Compress



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
 $y = \frac{1}{2}x^2$
- c) vertically stretched by a factor of 4 and translated 5 units left
 $y = 4(x+5)^2$
- d) vertically compressed by a factor of 3 and translated up 1 unit
stretched by $\frac{1}{3}$ $y = \frac{1}{3}x^2 + 1$
- e) vertically stretched by a factor of 3, translated 4 units left, translated 5 units down and reflected in the x-axis

Mar 3-11:19 AM

Practice:
#1 - 4 on Handout

Mar 4-8:36 AM