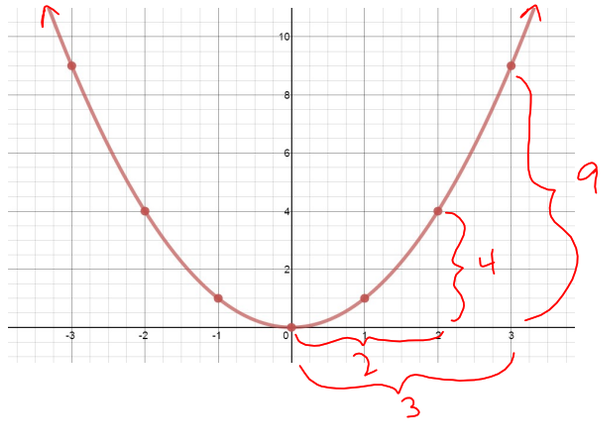
3.3A Investigate Transformations - Day 1

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

x	$y=x^2$
0	0
1	1
2	4
3	9

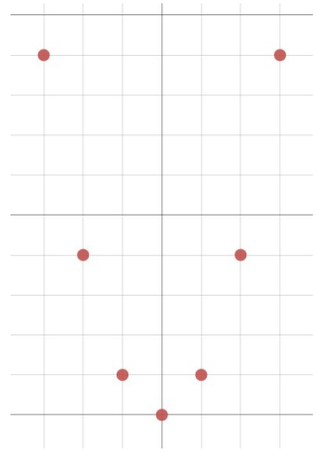


$y = x^2$

If we move $y = x^2$ right, left, up or down, it keeps its shape. Determine a pattern from the vertex to each of the points shown. Each square represents 1 unit.

the pattern from the vertex is:

1 out 1 up
2 out 4 up
3 out 9 up



All other parabolas are transformations on $y = x^2$.

Transformations include:

- translations (shifts up/down, left/right)
- reflections (in the x-axis)
- vertical stretches

Mar 16-10:15 PM

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

Use graphing technology!

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

a) $y = x^2$

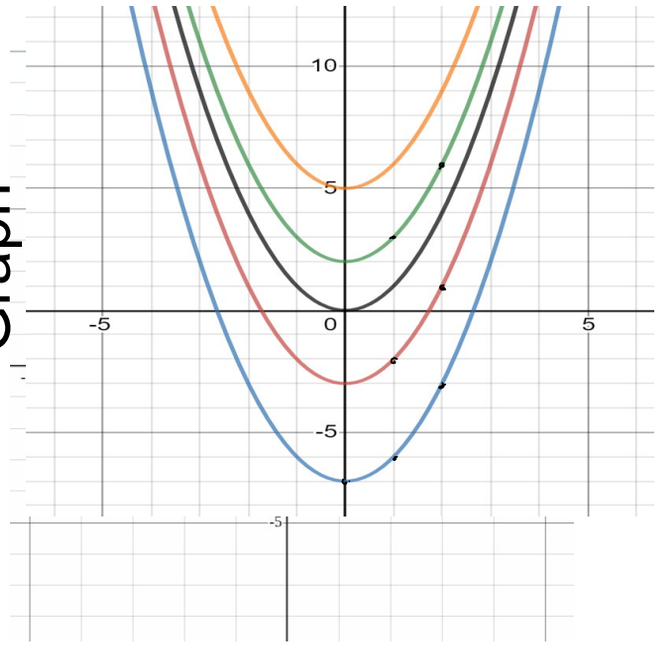
b) $y = x^2 + 5$

c) $y = x^2 + 2$

d) $y = x^2 - 3$

e) $y = x^2 - 7$

Graph



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

if $k > 0$, translated up k units

if $k < 0$, translated down k units

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.

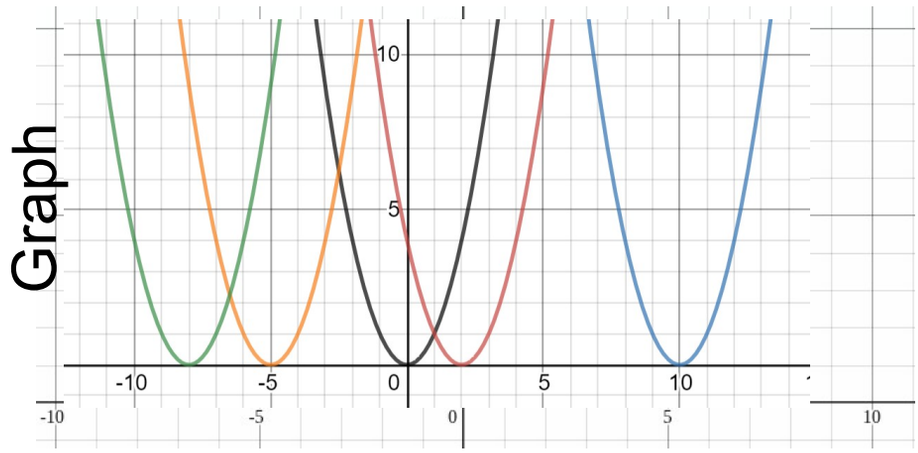
a) $y = x^2$

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

c) $y = (x + 8)^2$ (-8)

d) $y = (x - 2)^2$ (+2)

e) $y = (x - 10)^2$ (+10)



Compared to $y = x^2$, the graph of $y = (x - h)^2$:

if h > 0, translated RIGHT h units

if h < 0, translated LEFT h units

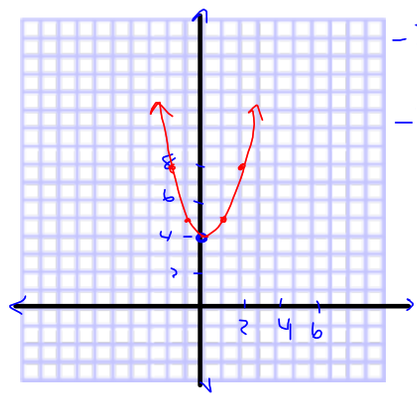
ex: $y = (x - 3)^2$ "Translated RIGHT 3 units"

$y = (x + 2)^2$ "Translated LEFT 2 units"

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

a) $y = x^2 + 4$

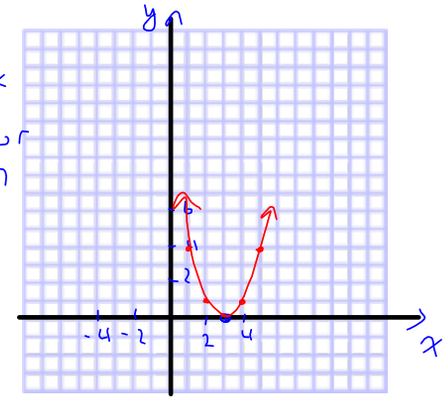
- Translated UP 4



- Plot new vertex
- Draw our pattern

b) $y = (x - 3)^2$

- Translated 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 $y = (x-6)^2 + 4$

Homework

p. 178 #2,3,6,7,9

Mar 16-10:25 PM