

Reflecting & Stretching Quadratic Relations

The simplest quadratic relation is $y = x^2$, called the parent function.



May 2-4:13 PM

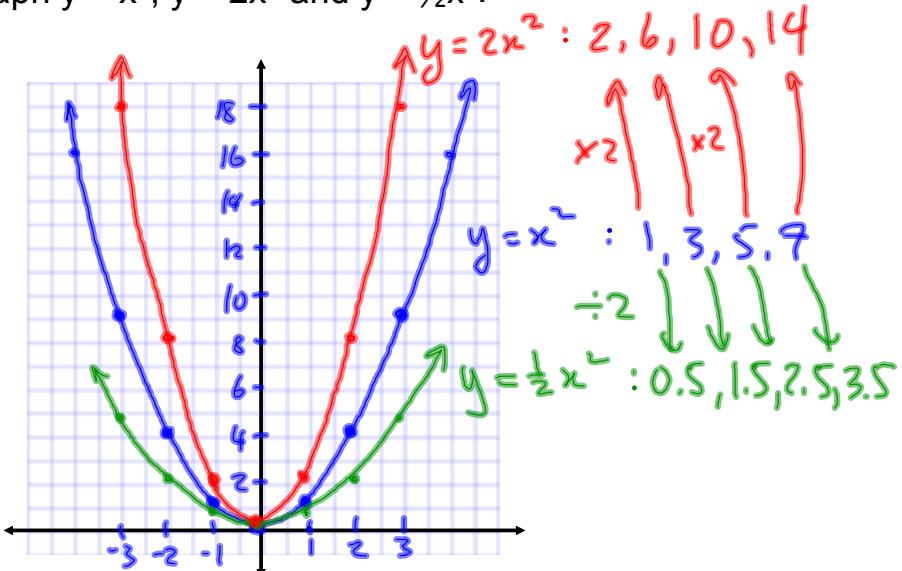
Compare the graphs and TOV for $y = x^2$, $y = 2x^2$, and $y = \frac{1}{2}x^2$.
What do you notice?

x	$y = x^2$	$y = 2x^2$	$y = \frac{1}{2}x^2$
-3	9	18	4.5
-2	4	8	2
-1	1	2	0.5
0	0	0	0
1	1	2	0.5
2	4	8	2
3	9	18	4.5

$$y = 2x^2$$

May 2-4:18 PM

Graph $y = x^2$, $y = 2x^2$ and $y = \frac{1}{2}x^2$.



The step patterns are scaled by the factor/coefficient in front of x^2 .

May 2-4:29 PM

See Geogebra quadratic translation demo
(click here for link)

Apr 29-9:10 PM

When ' a ' is a number other than 1 or -1, we say that $y = x^2$ has been vertically scaled.

For a vertical scaling, we only care about the size, or magnitude, of ' a ', so we ignore the sign.

When $a > 1$, the graph of $y = x^2$ gets thinner. The parent function undergoes a vertical stretch.

When $0 < a < 1$, the graph of $y = x^2$ gets wider. The parent function undergoes a vertical compression.

May 2-4:31 PM

$$y = x^2 \quad a = 1, \text{ so } a > 0, \text{ parabola opens up}$$

$$y = -x^2 \quad a = -1, \text{ so } a < 0, \text{ parabola opens down}$$

vertical reflection

The sign of a determines if there is a vertical reflection of the parent function, $y = x^2$.

Nov 8-1:22 PM

Ex.1. Describe the transformations to $y = x^2$ that yield the following:

(a) $y = \frac{1}{4}x^2$

Vertically scaled by $\frac{1}{4}$

or

Vertically compressed by 4

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

Vertically reflected

Vertically scaled by 3

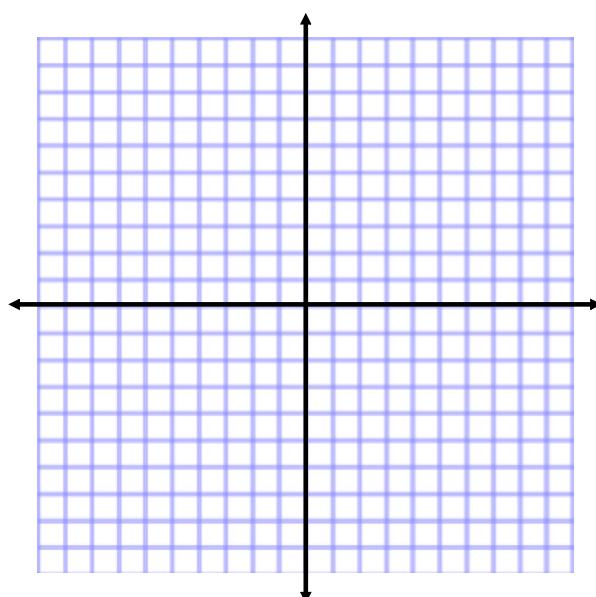
or

Vertically stretched
by 3

May 2-4:35 PM

Ex. 2. Graph (a) $y = -0.5x^2$ (b) $y = 3x^2$

x	$y = x^2$



Apr 11-8:49 PM

Assigned Work:

p. 256-258 # 1, 3, 4 ,5 ,7 ,8

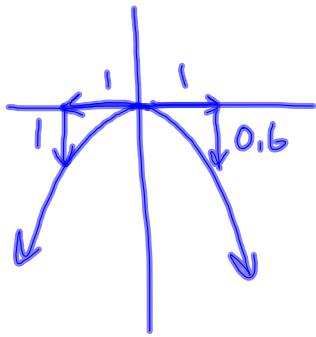
Mar 20 - 4:57 PM



V. reflected
V. stretched

Apr 13-2:01 PM

7.(a)



LHS
v.reflected

$$y = -x^2$$

$$y = -0.8x^2$$

RHS

v.reflected

v.scaled by 0.6

v.Compression $\frac{1}{0.6} = 1.67$

$$y = -0.6x^2$$

Apr 13-2:07 PM

8. (e) $y = -x^2$

vertically reflected.

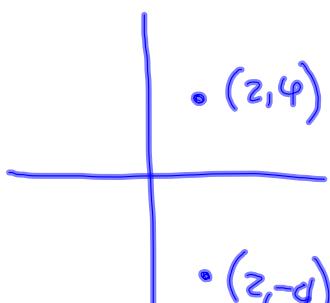
(2, 4)
↑
y-coord

(a) $y = 4x^2$

Vertically scaled by 4

Vertically stretched by 4

$$(2, 4) \rightarrow (2, 16)$$



Apr 13-2:14 PM