

Warm Up

Determine the **number of solutions** to the system of equations below:

$$y = 3x^2 - 4x + 9 \quad \text{and} \quad y = 2x + 4$$

$$3x^2 - 4x + 9 = 2x + 4$$

$$3x^2 - 4x - 2x + 9 - 4 = 0$$

$$3x^2 - 6x + 5 = 0$$

Find the discriminant

$$b^2 - 4ac = (-6)^2 - 4(3)(5)$$

$$= 36 - 60$$

$$= -24$$

$$-24 < 0$$

\Rightarrow There are 0 solutions

Transformations

Lesson objectives

- I know how to identify the Vertical Translation up or down
- I know how to identify the Vertical Stretch/Compression/Reflection
- I know how to identify the Horizontal Translation left or right

1.1

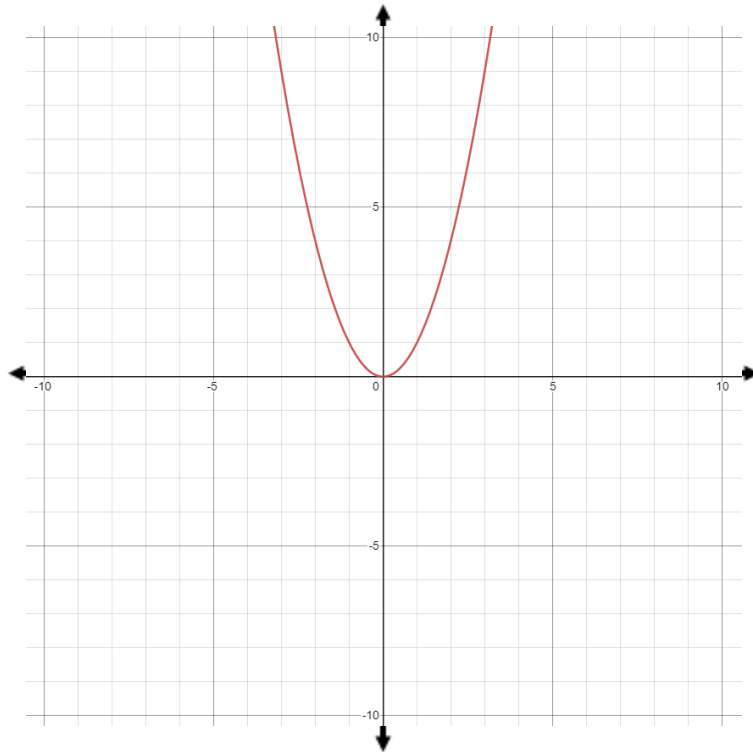
Lesson objectives

Teachers' notes

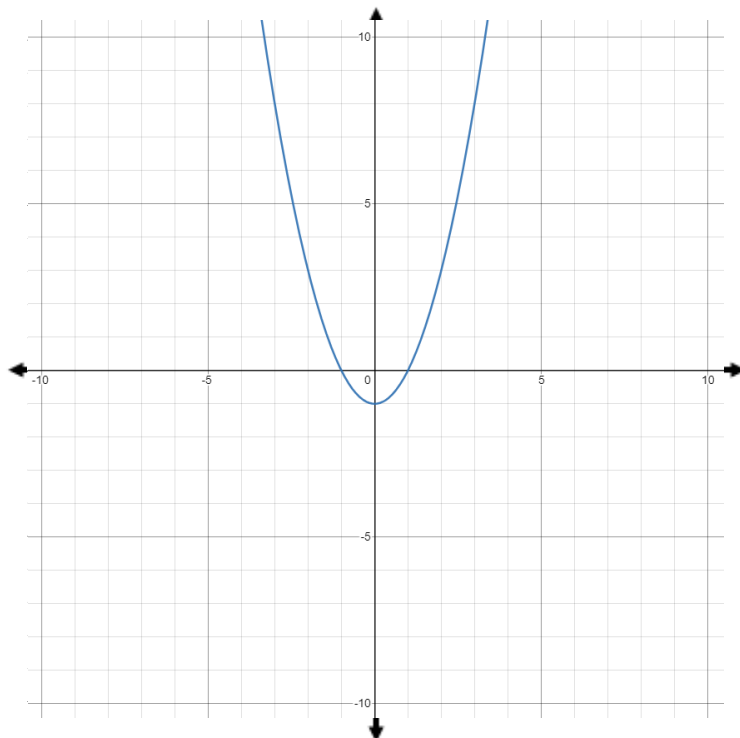
Lesson notes

Complete the HW Handout

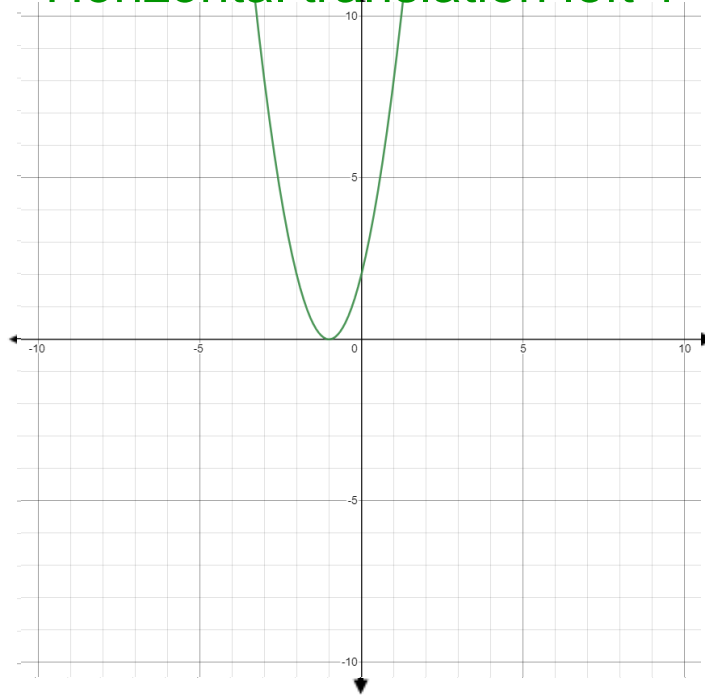
1 $g(x) = x^2$ Transformations:
NONE



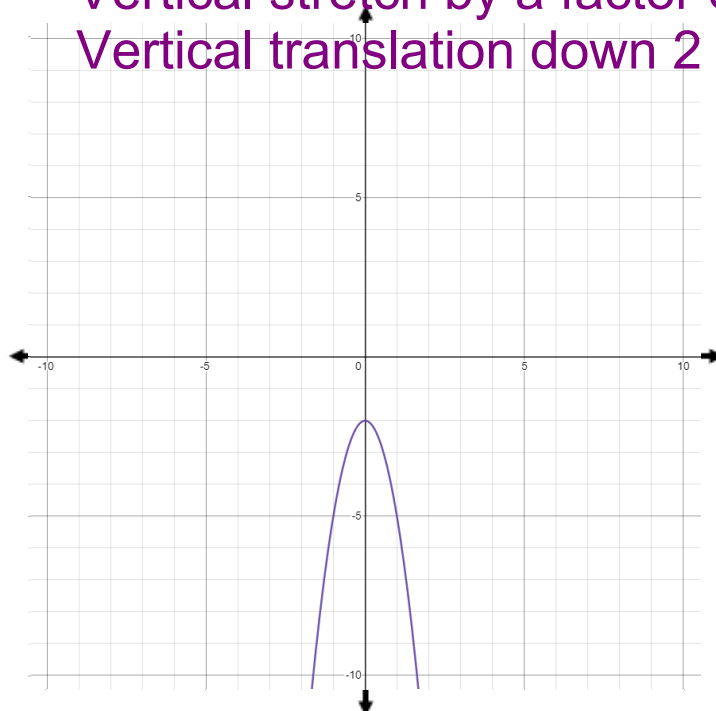
2 $g(x) = x^2 - 1$ Transformations:
Vertical translation down 1



3 $f(x) = 2(x+1)^2$ Transformations:
Vertical stretch by a factor of 2
Horizontal translation left 1



4 $h(x) = -3x^2 - 2$ Transformations:
Reflection in x-axis
Vertical stretch by a factor of 3
Vertical translation down 2

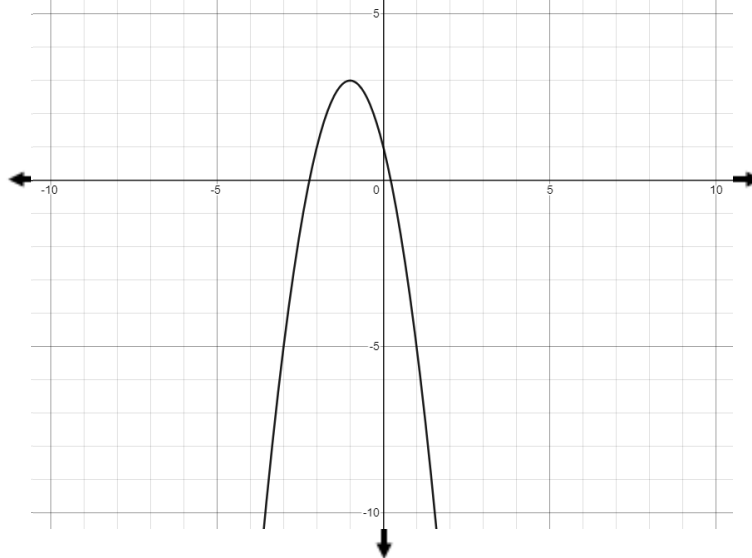


5 $g(x) = -2(x+1)^2 + 3$ Transformations:Reflection in the x-axis

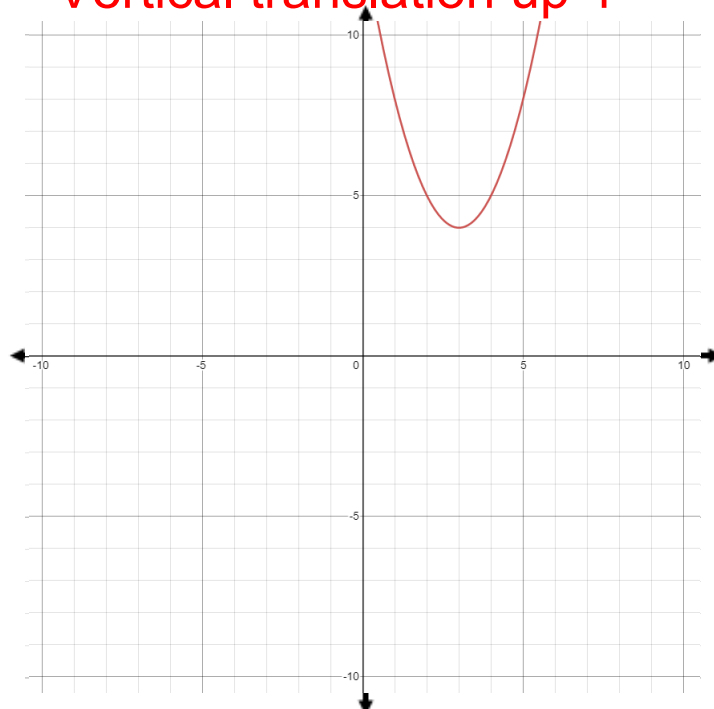
Vertical stretch by a factor of 2

Horizontal translation left 1

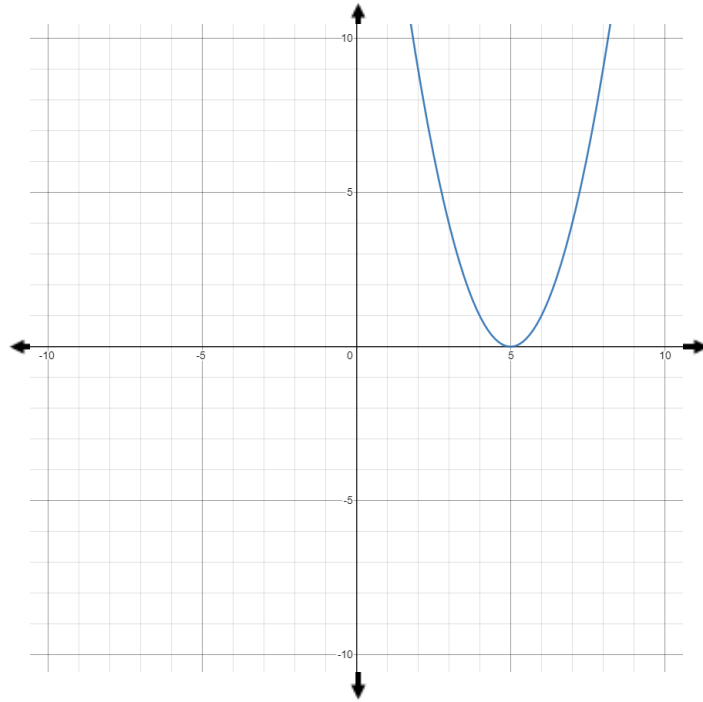
Vertical translation up 3

# 6 $g(x) = (x-3)^2 + 4$ Transformations:Horizontal translation right 3

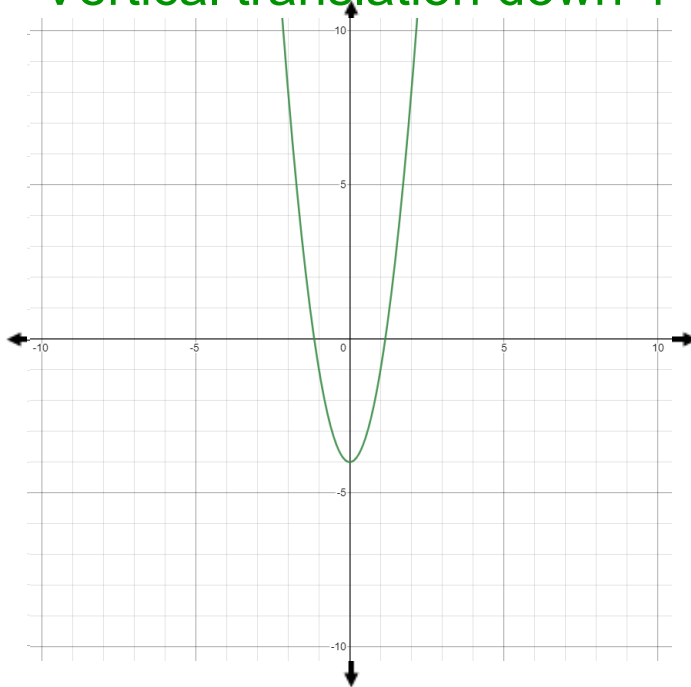
Vertical translation up 4



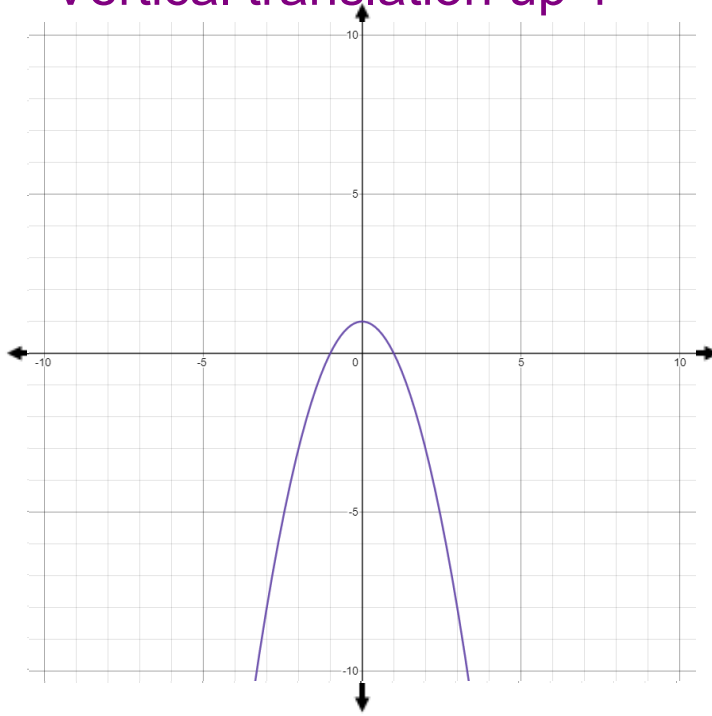
7 $f(x) = (x - 5)^2$ Transformations:
Horizontal translation right 5



8 $h(x) = 3x^2 - 4$ Transformations:
Vertical stretch by a factor of 3
Vertical translation down 4



9 $h(x) = -x^2 + 1$ Transformations:
Reflection in the x-axis
Vertical translation up 1



10. Quadratic-vertical shift up 5, horizontal shift right 3.

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

11. Quadratic -vertical stretch/compression by $\frac{2}{5}$

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

12. Quadratic -flipped over the x axis, vertical shift down 2.

$y = -x^2 - 2$ $a = -1$
 $k = -2$

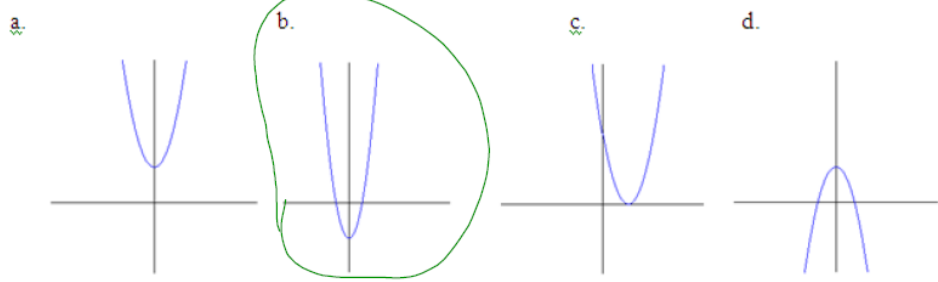
13. Quadratic -vertical stretch by 8

$y = 8x^2$ $a = 8$

14. Quadratic-vertical stretch by 5, horizontal shift left 8.

$y = 5(x+8)^2$ $a = 5$
 $h = -8$

15. Which graph best represents the function $f(x) = 2x^2 - 2$? What could an equation of the other 3 graphs be?



Summary:

$$y = a(x - h)^2 + k$$

a: Vertical Stretch/Compression/Reflection

$|a| > 1$: we get a vertical stretch by a factor of a

$0 < |a| < 1$: we get a vertical compression by a factor of a

$a < 0$: we get a reflection in the x-axis

h: Horizontal Translation

$(x - h)$: we get a horizontal translation h units to the right

$(x + h)$: we get a horizontal translation h units to the left

k: Vertical Translation

$k > 0$: we get a vertical translation k units up

$k < 0$: we get a vertical translation k units down

Transforming the coordinates of a Point:

Apply the horizontal transformations to the x value and apply the vertical transformation to the y value.

***Remember BEDMAS**

Ex: Find the transformed coordinates of the point (2, -3) for the equation $y = 3(x - 2)^2 - 4$

x-transformations - HT right 2

$$x \rightarrow x + 2 \Rightarrow 2 \rightarrow 2 + 2 = 4$$

y-transformations - VS factor 3 and VT down 4

$$y \rightarrow 3y - 4 \Rightarrow -3 \rightarrow 3(-3) - 4 = -13$$

Transformed point has moved to (4, -13)