

NAME: _____ PERIOD: _____ DATE: _____

Homework Problem Set

1. Compare and contrast the graphs of the quadratic equations $y = x^2 + 1$ and $y = -2x^2 + 1$.

Both have a vertex of $(0, 1)$
 $y = x^2 + 1 \rightarrow$ same shape as parent graph & opens up
 $y = -2x^2 + 1 \rightarrow$ parabola is more narrow & opens down.

2. Compare and contrast the graphs of the quadratic equations $y = (x - 3)^2 + 2$ and $y = 2(x - 3)^2 + 4$.

Both equations shift to right 3 and up.

$y = (x - 3)^2 + 2 \rightarrow$ vertex of $(3, 2)$

$y = 2(x - 3)^2 + 4 \rightarrow$ vertex is $(3, 4)$ & vertical stretch of 2 (parabola is narrow)

3. Compare and contrast the graphs of the quadratic equations $y = (x + 5)^2$ and $y = (x - 5)^2$.

Both have same shape and didn't shift up or reflect.

$y = (x + 5)^2 \rightarrow$ vertex $(-5, 0)$

$y = (x - 5)^2 \rightarrow$ vertex $(5, 0)$

4. Compare and contrast the graphs of the quadratic equations $y = 3x^2$ and $y = \frac{1}{2}x^2$.

Both have vertex of $(0, 0)$ and open up \cup

$y = 3x^2$ vertical stretch (parabola is more narrow $\cup\cup$)

$y = \frac{1}{2}x^2$ vertical shrink (parabola is wider \cup)

5. Write a quadratic equation with a vertical stretch of 7 and a vertex of $(0, 3)$.

$$y = 7(x + 0)^2 + 3$$

$$y = 7x^2 + 3$$

6. Write a quadratic equation with a vertical shrink (compression) of $\frac{1}{3}$ and a vertex of (3, 0).

$$y = \frac{1}{3}(x-3)^2$$

7. Use the number bank below to fill in the quadratic equation frame to describe the graph given.

$$y = \underline{3}(x - \underline{1})^2 + \underline{4}$$

Number Bank

0	1	2
3	4	5
$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{4}$
-1	-2	-3

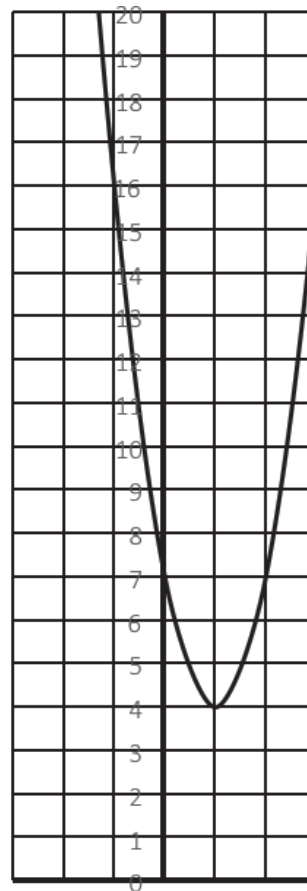
$$y = a(x-1)^2 + 4 \quad \text{use pt (2,7)}$$

$$7 = a(2-1)^2 + 4$$

$$7 = a(1)^2 + 4$$

$$7 = a + 4$$

$$3 = a$$



-3 -2 -1 0 1 2 3

8. Use the number bank below to fill in the quadratic equation frame to describe the graph given.

$$y = \frac{1}{3}(x - \underline{-2})^2 + \underline{0}$$

Number Bank

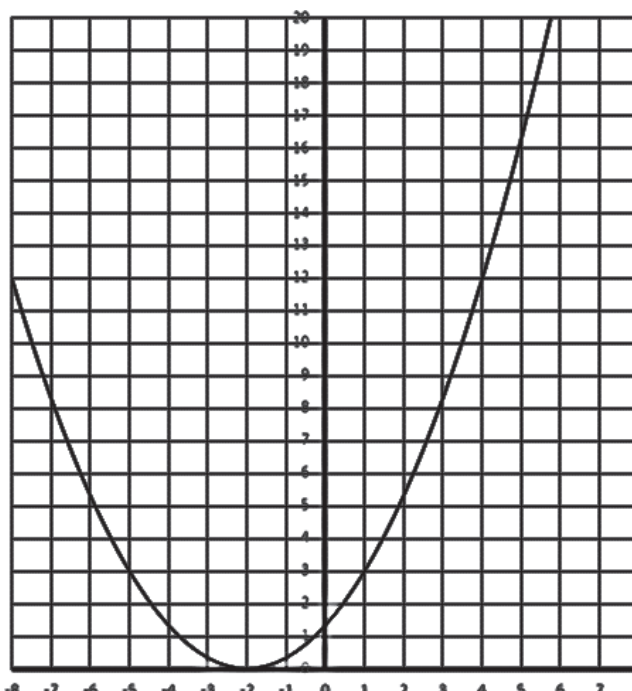
0	1	2
3	4	5
$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{4}$
-1	-2	-3

$$y = a(x+2)^2 \quad \text{pt (1,3)}$$

$$3 = a(1+2)^2$$

$$3 = a(9)$$

$$a = \frac{1}{3}$$



-8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8

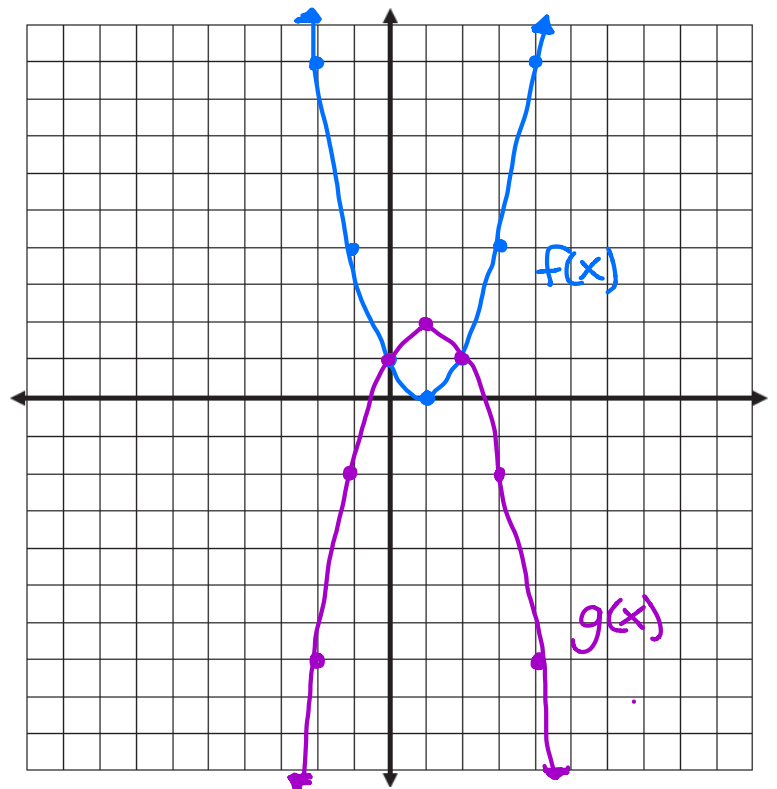
9. $g(x) = -\frac{1}{3}f(x + 4)$

Vertical Transformations	Horizontal Transformations
Reflect over the x-axis	Reflect over the y-axis
Translate (shift) up 4	Translate (shift) left 4
Translate (shift) down 4	Translate (shift) right 4
Stretch by 3	Stretch by 3
Shrink (compress) by $\frac{1}{3}$	Shrink (compress) by $\frac{1}{3}$

10. Graph $f(x) = (x - 1)^2$ and $g(x) = -(x - 1)^2 + 2$ on the grid below. Then describe the differences between the two graphs.

	$f(x)$	$g(x)$
VERTEX	(1, 0)	(1, 2)
OPENS	up	down
VERTICAL SHIFT	None	up 2

$g(x)$ is a transformation of $f(x)$ by reflecting over x-axis and shifting up 2



For Problems 11–14, write the abstract form of each equation if $f(x) = x^2$.

11. $g(x) = -(x - 1)^2 + 2$

$$g(x) = -f(x-1) + 2$$

12. $h(x) = 3(x - 1)^2 - 4$

$$h(x) = 3f(x-1) - 4$$

13. $j(x) = -\frac{1}{8}(x - 1)^2$

$$j(x) = -\frac{1}{8}f(x-1)$$

14. $k(x) = (x - 2)^2$

$$k(x) = f(x-2)$$

Challenge for Problems 15–18, write the abstract form of each equation if $f(x) = (x - 1)^2$.

15. $g(x) = -(x - 1)^2 + 2$

$$g(x) = -f(x) + 2$$

16. $h(x) = 3(x - 1)^2 - 4$

$$h(x) = 3f(x) - 4$$

17. $j(x) = -\frac{1}{8}(x - 1)^2$

$$j(x) = -\frac{1}{8}f(x)$$

18. $k(x) = (x - 2)^2$

$$k(x) = f(x-1)$$