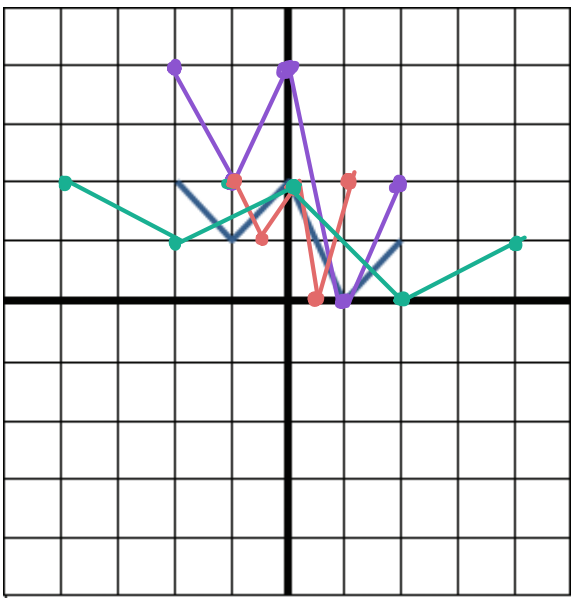
NAME: _____ PERIOD: _____ DATE: _____

Homework Problem Set

For Problems 1–3, use the graph given at the right to complete the tables. Then sketch each function.



Parent $y = f(x)$	
x	y
-2	2
-1	1
0	2
1	0
2	1

vertical stretch 2
$(x, 2y)$

1. $y = 2f(x)$		$2y$
x	y	
-2	2	4
-1	1	2
0	2	4
1	0	0
2	1	2

$(\frac{1}{2}, y)$ horizontal shrink

	2. $y = f(2x)$	
	x	y
-1	-2	2
$-\frac{1}{2}$	-1	1
0	0	2
$\frac{1}{2}$	1	0
1	2	1

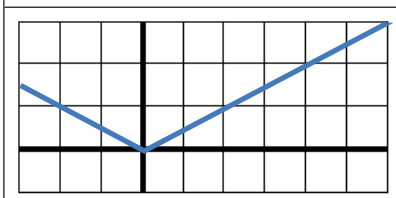
	3. $y = f(\frac{1}{2}x)$	
	x	y
-4	-2	2
-2	-1	1
0	0	2
2	1	0
4	2	1

horizontal stretch
$(2x, y)$

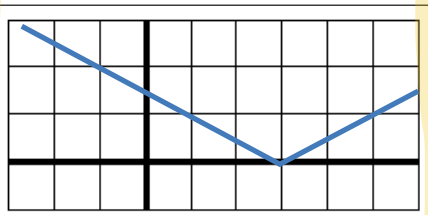
4. Which graph below is showing the transformation $g(x) = \frac{1}{2}f(x-3)$ for the absolute value parent graph.

translate horizontally right 3
vertical shrink $\frac{1}{2}$

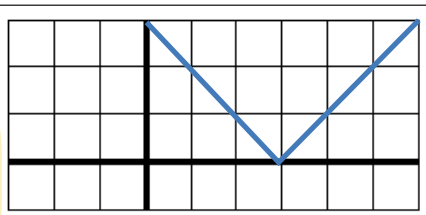
A.



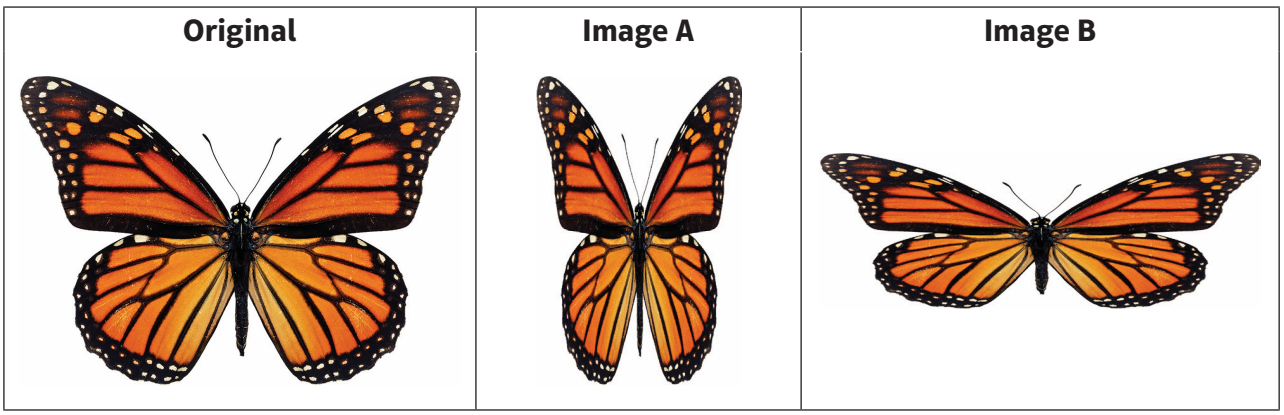
B.



C.



5. For the images of the butterflies below, tell what transformation was done to each image.

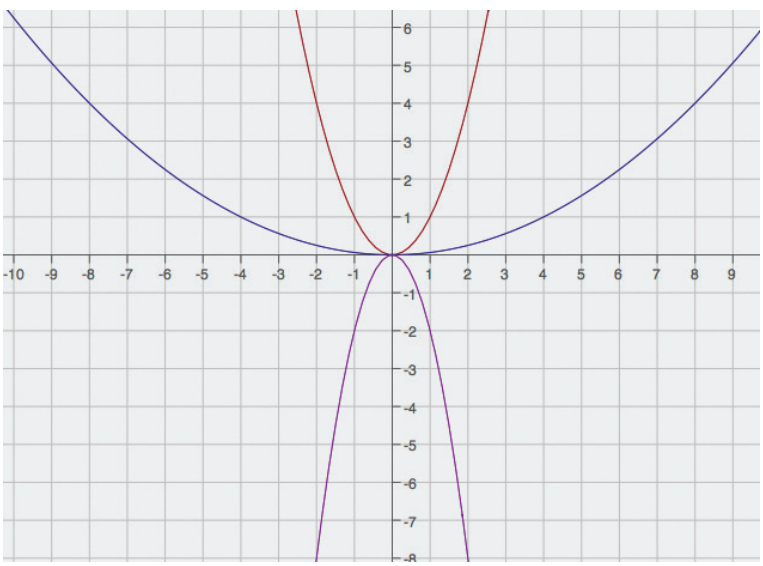


Monarch modified from © Butterfly Hunter/ Shutterstock.com

Horizontal Shrink

Vertical Shrink

6. The red curve is the parent graph. For the other two graphs shown, identify the equation that matches the curve. Explain how you determined which equation goes with each graph.



A. $g(x) = \left(\frac{1}{4}x\right)^2$

Horizontal Stretch of 4

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

- Vertical Stretch of 2
- Reflection over x-axis

7. Graph the functions below in the same coordinate plane. Be sure to clearly label the functions.

   A. $f(x) = |x|$ B. $g(x) = 2|x|$ C. $h(x) = |3x|$ D. $k(x) = 2|3x|$

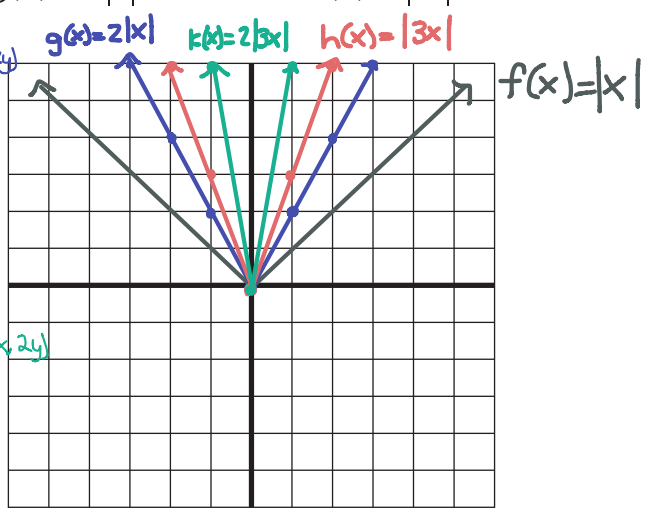
PARENT FUNCTION

$f(x) = |x|$

x	y
-3	3
-2	2
-1	1
0	0
1	1
2	2
3	3

$g(x) = 2|x|$ vertical stretch 2 $(x, 2y)$

x	y	$2y$
-3	3	6
-2	2	4
-1	1	2
0	0	0
1	1	2
2	2	4
3	3	6



$h(x) = |3x|$ HORIZONTAL SHRINK $\frac{1}{3}$

$\frac{1}{3}x$	x	y
-1	-3	3
$-\frac{2}{3}$	-2	2
$-\frac{1}{3}$	-1	1
0	0	0
$\frac{1}{3}$	1	1
$\frac{2}{3}$	2	2
1	3	3

$k(x) = 2|3x|$ HORIZONTAL SHRINK $\frac{1}{3}$ VERTICAL STRETCH 2

$\frac{1}{3}x$	x	y	$2y$
-1	-3	3	6
$-\frac{2}{3}$	-2	2	4
$-\frac{1}{3}$	-1	1	2
0	0	0	0
$\frac{1}{3}$	1	2	4
$\frac{2}{3}$	2	3	6
1	3	3	6

8. Explain how the graphs of $g(x) = 3|x|$ and $h(x) = |3x|$ are related.

$g(x) = 3|x|$ vertical stretch

x	y	$3y$
-3	3	9
-1	1	3
0	0	0
1	1	3
3	3	9

$h(x) = |3x|$ horizontal shrink

$\frac{1}{3}x$	x	y
-1	-3	3
$\frac{1}{3}$	-1	1
0	0	0
$\frac{1}{3}$	1	1
1	3	3

$(-1, 3), (0, 0), (1, 3)$

* In this case, vertical stretch & horizontal shrink will have the same results

Since $|3| = 3$ the function $h(x) = |3x|$ c
written $h(x) = 3|x|$

9. Write a function, g, in terms of another function, f, such that the graph of g is a vertical shrink of the graph f by a factor of 0.75.

$$g(x) = 0.75f(x)$$

10. A teacher wants the students to write a function based on the parent function $f(x) = \sqrt[3]{x}$. The graph of f is stretched vertically by a factor of 4 and shrunk horizontally by a factor of $\frac{1}{3}$. Mike wrote $g(x) = 4\sqrt[3]{3x}$ as the new function, while Lucy wrote $h(x) = 3\sqrt[3]{4x}$. Which one is correct? Justify your answer.

mike is correct

$4\sqrt[3]{3x}$

4 outside expression signifies vertical stretch of 4

The 3 inside the cube root signifies a horizontal shrink.

Spiral REVIEW—Describing Transformations

For each equation below, describe the transformations of the parent graph, *f*(*x*).

11. $g(x) = -f(x)$

reflection over x-axis

12. $h(x) = f(x + 4) - 1$

- Translate horizontally left 4
- Translate vertically down 1

13. $j(x) = 2f(x) + 1$

- vertical stretch by a factor of 2
- Translate vertically up 1

14. $k(x) = \frac{1}{4}f(3x)$

- horizontal shrink by a factor of $\frac{1}{3}$
- vertical shrink by a factor of $\frac{1}{4}$

15. $m(x) = f(3x + 2)$

- Horizontal shrink by a factor of $\frac{1}{3}$
- Translate horizontally left 2

16. $n(x) = f(-x) + 5$

- reflect over y-axis
- vertical translation up 5