Name _____ Date _____ Class _____

LESSON 1-8

Practice B

Exploring Transformations

Perform the given translation on the point (2, 5) and give the coordinates of the translated point.

1. left 3 units

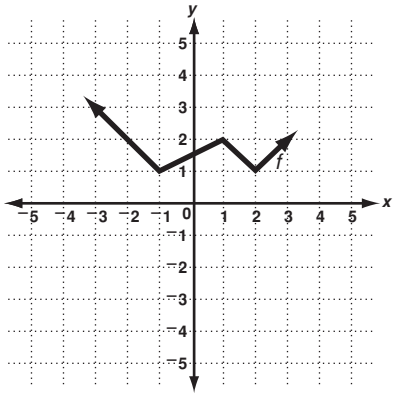
2. down 6 units

3. right 4 units, up 2 units

Use the table to perform each transformation of $y = f(x)$. Use the same coordinate plane as the original function.

4. translation left 1 unit, down 5 units

	x	*y*	
	−3	3	
	−1	1	
	1	2	
	2	1	
	3	2	



5. vertical stretch factor of $\frac{3}{2}$

x	*y*	
−3	3	
−1	1	
1	2	
2	1	
3	2	

6. horizontal compression factor of $\frac{1}{2}$

	x	*y*
	−3	3
	−1	1
	1	2
	2	1
	3	2

7. reflection across *x*-axis

x	*y*	
−3	3	
−1	1	
1	2	
2	1	
3	2	

Solve.

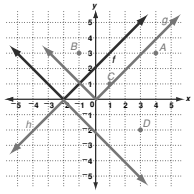
8. George has a goal for the number of computers he wants to sell each month for the next 6 months at his computer store. He draws a graph to show his projected profits for that period. Then he decides to discount the prices by 10%. How will this affect his profits? Identify the transformation to his graph and describe how to find the ordered pairs for the transformation.

LESSON 1-8

Practice A

Exploring Transformations

Use the graph to perform each transformation described.



1. Plot point *A* at (4, 3). Translate point *A* left 5 units. Label this point *B*. Give the coordinates of point *B*.

   $(-1, 3)$

2. Plot point *C* at (1, 1). Translate point *C* right 2 units and down 3 units. Label this point *D*. Give the coordinates of point *D*.

   $(3, -2)$

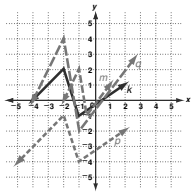
3. Transform $y = f(x)$ by translating it right 2 units. Label the new function *g*. Compare the points that make up the 2 functions. Which coordinate changes, *x* or *y*?

   x-coordinate

4. Transform $y = f(x)$ by reflecting it across the *x*-axis. Label the new function *h*. Which coordinate changes, *x* or *y*?

   y-coordinate

Use the graph to perform each transformation described.



5. Transform $y = k(x)$ by compressing it horizontally by a factor of $\frac{1}{2}$. Label the new function *m*. Which coordinate is multiplied by $\frac{1}{2}$, *x* or *y*?

   x-coordinate

6. Transform $y = k(x)$ by translating it down 3 units. Label the new function *p*. What happens to the *y*-coordinate in each new ordered pair?

   It is 3 less than the original *y*-coordinate.

7. Transform $y = k(x)$ by stretching it vertically by a factor of 2. Label the new function *q*. Which coordinate is multiplied by 2, *x* or *y*?

   y-coordinate

8. Describe how the coordinates of a function change when it is translated 2 units to the left and 4 units up.

   (x, y) becomes $(x - 2, y + 4)$.

9. Describe how the coordinates of a function change when you vertically compress a function by a factor of $\frac{2}{3}$.

   (x, y) becomes $\left(x, \frac{2}{3}y\right)$.

LESSON 1-8

Practice B

Exploring Transformations

Perform the given translation on the point (2, 5) and give the coordinates of the translated point.

1. left 3 units

   $(-1, 5)$

2. down 6 units

   $(2, -1)$

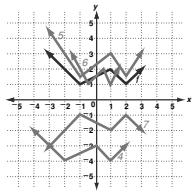
3. right 4 units, up 2 units

   $(6, 7)$

Use the table to perform each transformation of $y = f(x)$. Use the same coordinate plane as the original function.

4. translation left 1 unit, down 5 units

$x - 1$	x	y	$y - 5$
-4	-3	3	-2
-2	-1	1	-4
0	1	2	-3
1	2	1	-4
2	3	2	-3



5. vertical stretch factor of $\frac{3}{2}$

x	y	$\frac{3}{2}y$
-3	3	$\frac{9}{2}$
-1	1	$\frac{3}{2}$
1	2	3
2	1	$\frac{3}{2}$
3	2	3

6. horizontal compression factor of $\frac{1}{2}$

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

7. reflection across *x*-axis

x	y	$-y$
-3	3	-3
-1	1	-1
1	2	-2
2	1	-1
3	2	-2

Solve.

8. George has a goal for the number of computers he wants to sell each month for the next 6 months at his computer store. He draws a graph to show his projected profits for that period. Then he decides to discount the prices by 10%. How will this affect his profits? Identify the transformation to his graph and describe how to find the ordered pairs for the transformation.

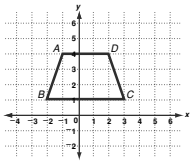
   Profits are reduced by 10%; vertical compression; $(x, 0.9y)$.

LESSON 1-8

Practice C

Exploring Transformations

Transform trapezoid *ABCD* as indicated. Estimate the area of each transformed trapezoid as compared to the area of trapezoid *ABCD*.



1. reflection across the *x*-axis

   Areas are equal.

2. horizontal compression by a factor of $\frac{1}{2}$

   Area is $\frac{1}{2}$ of original trapezoid.

3. horizontal stretch by a factor of 2

   Area is doubled.

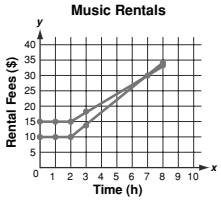
4. vertical compression by a factor of $\frac{1}{2}$

   Area is $\frac{1}{2}$ of original trapezoid.

5. vertical stretch by a factor of $\frac{3}{2}$

   Area is $\frac{3}{2}$ of original trapezoid.

Tucci's House of Music rents practice space and musical instruments. Use of a practice room costs $10 for the first 2 hours and $4 for each additional hour. An electric guitar rents for $15 for the first 2 hours and $3 for each additional hour.



6. Sketch a graph of two functions, one for the cost of renting a practice room and another for the cost of renting an electric guitar.

Identify the transformation of the original graphs represented by the following changes.

7. The charge for the first 2 hours' rental of a practice room increases to $12.

   Translation

8. As a special promotion, Tucci's House of Music cuts the practice room charges by 50% for first-time users.

   Vertical compression

9. The cost of renting a guitar increases to $30 for the first 4 hours and $6 for each additional hour.

   Horizontal stretch and translation

LESSON 1-8

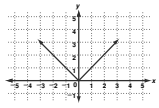
Review for Mastery

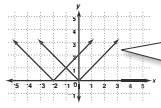
Exploring Transformations

A **translation** moves a point, figure, or function right, left, up, or down.

Horizontal Translation (right or left)	**Vertical Translation** (up or down)
The *x*-coordinate changes. $(x, y) \rightarrow (x + h, y)$	The *y*-coordinate changes. $(x, y) \rightarrow (x, y + k)$

Translate the function $y = f(x)$ left 2 units.



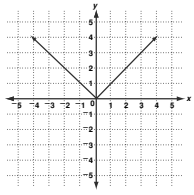


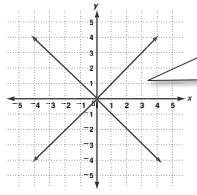
Move each point 2 units left. Connect the points. $(x, y) \rightarrow (x - 2, y)$

A **reflection** flips a point, figure, or function across a line.

Reflection Across *y*-axis	**Reflection Across *x*-axis**
The *x*-coordinate changes. $(x, y) \rightarrow (-x, y)$	The *y*-coordinate changes. $(x, y) \rightarrow (x, -y)$

Reflect the function $y = f(x)$ across the *x*-axis.

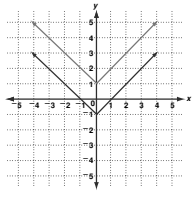




Flip each point across the axis. Connect the points. $(x, y) \rightarrow (x, -y)$

Perform each transformation of $y = f(x)$.

1. translation up 2 units



2. reflection across *x*-axis