

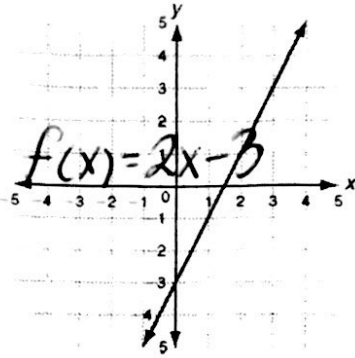
LESSON
1-3

Practice B

Transforming Linear Functions

Let $g(x)$ be the indicated transformation of $f(x)$. Write the rule for $g(x)$.

1.



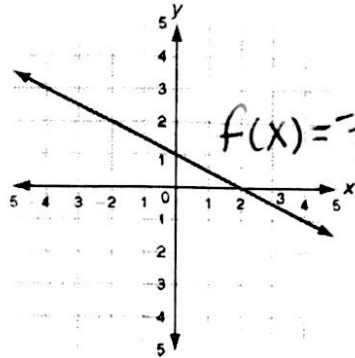
horizontal translation

left 3 units

$$g(x) = f(x+3) = 2(x+3) - 3$$

$$g(x) = 2x + 3$$

2.



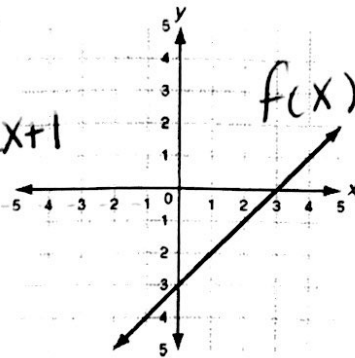
vertical compression by

a factor of $\frac{1}{5}$

$$g(x) = \frac{1}{5} f(x)$$

$$= \frac{1}{5} \left(-\frac{1}{2}x + 1 \right)$$

3.



reflection across the

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

$$g(x) = -x - 3$$

4. linear function defined by the table; horizontal stretch by

a factor of $(2.3) = \frac{23}{10}$

$$g(x) = f\left(\frac{10}{23}x\right) = 2\left(\frac{10}{23}x\right) + 7$$

$$g(x) = \frac{20}{23}x + 7$$

x	-5	0	7
y	-3	7	21

$$f(x) = 2x + 7$$

$$g(x) = 1.19x - 2.1$$

5. $f(x) = 1.7x - 3$; vertical compression by a factor of 0.7

$$g(x) = 0.7f(x) = 0.7(1.7x - 3)$$

Let $g(x)$ be the indicated combined transformation of $f(x) = x$. Write the rule for $g(x)$.

6. vertical translation down 2 units followed by a

horizontal compression by a factor of $\frac{2}{5}$

$$g(x) = \frac{5}{2}x - 2$$

7. horizontal stretch by a factor of (3.2) followed by a horizontal translation right 3 units

$$g(x) = h(x-3) = \frac{5}{16}(x-3)$$

$$g(x) = \frac{5}{16}x - \frac{15}{16}$$

Solve.

8. The Red Cab Taxi Service used to charge \$1.00 for the first $\frac{1}{5}$ mile and \$0.75 for each

additional $\frac{1}{5}$ mile. The company just raised its rates by a factor of 1.5.

$$f(x) = 1 + 0.75(x-1)$$

where $x = \#$ of $\frac{1}{5}$ miles

a. Write a new price function $g(x)$ for a taxi ride.

$$g(x) = 1.5 f(x) = 1.5 [1 + 0.75(x-1)]$$

$$g(x) = 0.375 + 1.125x$$

b. Describe the transformation(s) that have been applied.

Vertical stretch by a factor of 1.5

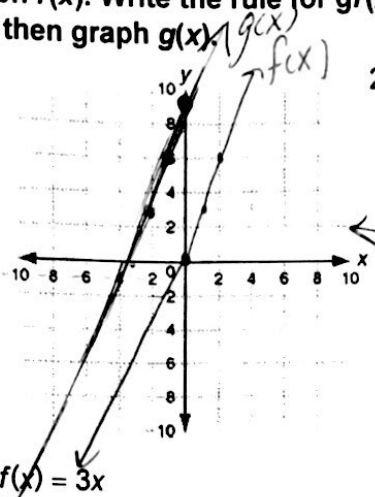
LESSON
1-3

Practice C

Transforming Linear Functions

Graph $f(x)$. Write the rule for $g(x)$, using the transformation given, and then graph $g(x)$.

1.

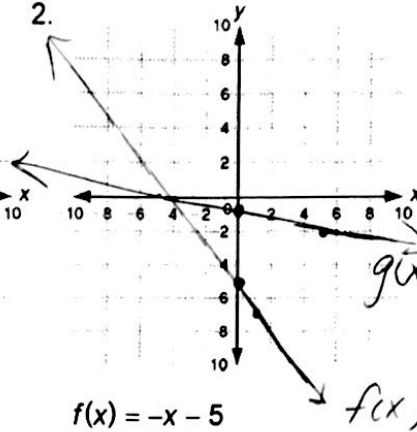


$f(x) = 3x$

horizontal translation
left 3 units

$g(x) = 3x + 9$

2.

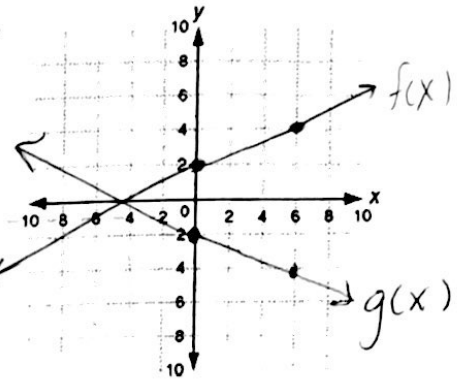


$f(x) = -x - 5$

vertical compression by
a factor of $\frac{1}{5}$

$g(x) = -\frac{1}{5}x - 1$

3.



$f(x) = \frac{x}{3} + 2$

reflection across the
x-axis

$g(x) = -\frac{x}{3} - 2$

Solve.

4. The rate of increase in a certain city's population in 2000 was 1.4%. The rate in 2001 was 1.9%.

- Write a function to represent the increase in population in 2000.
- Write a function to represent the increase in population in 2001.
- Describe the transformation that can be applied to the first function to get the second function.

$f(x) = 0.014x$

$g(x) = 0.019x$

OR horizontal compression

Vertical stretch by factor of $\frac{19}{14}$ (≈ 1.36) by $\frac{14}{19}$

d. Find the difference between the two possible growth rates if the population in 2030 is 8.5 billion.

omit

5. Let $g(x)$ be the reflection of $f(x)$ across the x-axis. Let $h(x) = x - 1$ be the reflection of $g(x)$ across the y-axis.

a. Find the rule for $g(x)$. $h(x) = g(-x)$

$g(x) = -x - 1$

b. Find the rule for $f(x)$. $g(x) = -f(x)$

$f(x) = x + 1$

c. Graph all three functions on a graphing calculator. Describe the transformation from $f(x)$ to $h(x)$.

vertical shift down 2

(or horizontal shift right 2)

* Please note: vertical stretches and horizontal compressions are NOT always interchangeable