

1-3 Transforming Linear Functions

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

Write the rule for $g(x)$.

1. $f(x) = 2x + 3$; vertical translation 4 units up

$$g(x) = f(x) + 4$$

$$g(x) = (2x + 3) + 4$$

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

2. $f(x) = x - 2$; horizontal translation right 3 units

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

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

$$g(x) = x - 5$$

3. $f(x) = 2x - 1$; horizontal compression by a factor of $1/3$

$$g(x) = f(3x)$$

$$g(x) = 2(3x) - 1$$

$$g(x) = 6x - 1$$

4. $f(x) = 3x + 2$; vertical compression by a factor of $1/4$

$$g(x) = \frac{1}{4}f(x)$$

$$g(x) = \frac{1}{4}(3x + 2)$$

$$g(x) = \frac{3}{4}x + \frac{1}{2}$$

5. $f(x) = x$; vertical shift down 2 units followed by a vertical stretch by a factor of 5

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

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

$$h(x) = 5g(x)$$

$$h(x) = 5(x - 2)$$

$$h(x) = 5x - 10$$

6. $f(x) = x$; vertical stretch
by a factor of 5 followed
by a vertical shift down 2
 $h(x)$

$$g(x) = 5f(x)$$

$$g(x) = 5x$$

$$h(x) = g(x) - 2$$

$$h(x) = 5x - 2$$

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

Write the rule for $g(x)$.

6. $f(x)$ is the linear function defined in the table; $g(x)$
is a reflection across the y-axis

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

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

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

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

| x | y |
|-----|-----|
| -1 | 0 |
| 0 | 2 |
| 1 | 4 |

7. $f(x)$ is the linear function defined in the table; $g(x)$
is a reflection across the x-axis

| x | y |
|-----|-----|
| -2 | 0 |
| 0 | 1 |
| 2 | 2 |