NAME ____________________________________________ DATE ___________________________ PERIOD ____________

# Study Guide and Intervention
## *Transforming and Analyzing Linear Functions*

**Example** **Describe the transformation.**

**What transformations of the linear parent function, *f(x)* = *x*, will result in the graph of the linear function *g(x)* = -3(0.5x + 4) + $\frac{2}{5}$?**

**Solution**

**Step 1** **Rewrite the equation of g(x) in general form to determine the values of the parameters a, b, c, and d.**

$g(x) = -3(0.5x + 4) + \frac{2}{5}$

$g(x) = -3(0.5x - (-4)) + \frac{2}{5}$

**Therefore, a = -3, b = 0.5, c = -4, and d = $\frac{2}{5}$,**

**Step 2** **Use the values of the parameters to describe the transformations of the linear parent function f(x) that are necessary to produce g(x).**

a = -3, so |a| >1. The range values (y-coordinates) of the linear parent function are multiplied by a factor of 3 in order to vertically stretch the graph. Since a is negative, the graph is also reflected over the x-axis.

b = 0.5, so 0 < b < 1. The domain values (x-coordinates) of the linear parent function are multiplied by a factor of $\frac{1}{0.5} = 2$ in order to horizontally stretch the graph of the line.

c = -4, so c < 0. The graph of the linear parent function will translate $|\frac{-4}{0.5}| = 8$ units to the left

d = $\frac{2}{5}$, so d > 0. The graph of the linear parent function will translate $|\frac{2}{5}| = \frac{2}{5}$ of a unit up.

## Exercises

**For questions 1-4, describe the transformation of the linear parent function, f(x) = x that will result in the graph of the linear function given.**

**1.** h(x) = (4x – 1)

**2.** h(x) = 3(x+ 2)

**3.** $h(x) = -\frac{3}{4}(x - 8) + 2$

**4.** $h(x) = -4(\frac{1}{2}x - 3) + 4$

NAME ____________________________________________ DATE ___________________________ PERIOD ____________

# Study Guide and Intervention

## *Transforming and Analyzing Linear Functions (cont.)*

**Example** **Identify the domain, range, x-intercept and y-intercept of the linear function described by the equation shown below. Write the domain and range as inequalities, as intervals, and in set builder notation.**

$$f(x) = 4(x - 8) + 7$$

**Solution**

**Step 1** **Determine the domain and range of f(x).**

Since this is a linear function, the domain and range are both *all real numbers.* As an inequality, this is written as

Domain: $-\infty < x < \infty$, Range: $-\infty < y < \infty$

As an interval

Domain: $(-\infty, \infty)$ Range: $(-\infty, \infty)$

Set builder notation

Domain: $\{x|x \in \mathbb{R}\}$ Range: $\{y|y \in \mathbb{R}\}$

**Step 2** **Determine the x-intercept of f(x).**

x-intercepts occur where f(x) = 0

$$0 = 4(x - 8) + 7$$
$$0 = 4x - 32 + 7$$
$$0 = 4x - 25$$
$$0 + 25 = 4x - 25 + 25$$
$$25 = 4x$$
$$\frac{25}{4} = \frac{4x}{4}$$
$$6.25 = x$$

The x-intercept of f(x) is (6.25, 0)

**Step 3** **Determine the y-intercept of f(x).**

y-intercepts occur where x = 0

$$f(0) = 4(0 - 8) + 7$$
$$f(0) = 4(-8) + 7$$
$$f(0) = -32 + 7$$
$$f(0) = -25$$

The y-intercept of f(x) is (0, -25)

## Exercises

**For questions 5-10, identify the domain, range, x-intercept and y-intercept of the linear function described by the equation shown below. Write the domain and range as inequalities, as intervals, and in set builder notation.**

**5.** $f(x) = (2x + 3)$

**6.** $f(x) = 4(\frac{-1}{8}x + 2) - 5$

**7.** $f(x) = \frac{1}{4}(x + 8)$

**8.** $f(x) = -2(\frac{-1}{2}x + 3) + 5$

**9.** $f(x) = \frac{-2}{5}(x + 8)$

**10.** $f(x) = -3(2x + 5) + 9$