4-7 Study Guide and Intervention
Inverse Linear Functions

Inverse Relations An **inverse relation** is the set of ordered pairs obtained by exchanging the *x*-coordinates with the *y*-coordinates of each ordered pair. The domain of a relation becomes the range of its inverse, and the range of the relation becomes the domain of its inverse

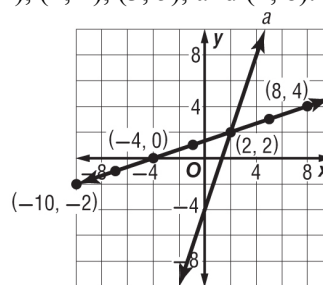**Example: Find and graph the inverse of the relation represented by line *a*.**

The graph of the relation passes through (–2, –10), (–1, –7), (0, –4), (1, –1), (2, 2), (3, 5), and (4, 8).

To find the inverse, exchange the coordinates of the ordered pairs.

The graph of the inverse passes through the points
(–10, –2), (–7, –1), (–4, 0), (–1, 1), (2, 2), (5, 3), and (8, 4).
Graph these points and then draw the line that passes through them.

Exercises

Find the inverse of each relation.

1. {(4, 7), (6, 2), (9, –1), (11, 3)}

2. {(–5, –9), (–4, –6), (–2, –4), (0, –3)}

3.

x	y
–8	–15
–2	–11
1	–8
5	1
11	8

4.

x	y
–8	3
–2	9
2	13
6	18
8	19

5.

x	y
–6	14
–5	11
–4	8
–3	5
–2	2

Graph the inverse of each relation.

6.

7.

8.
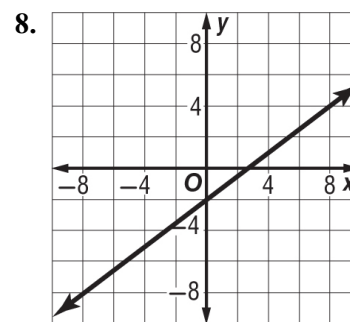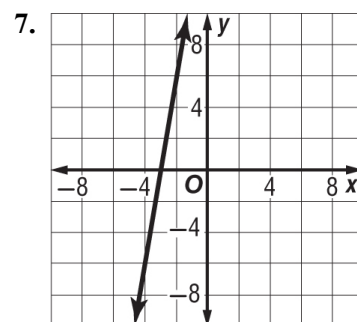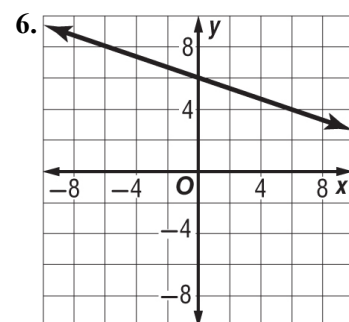
4-7 Study Guide and Intervention *(continued)*
Inverse Linear Functions

Inverse Functions A linear relation that is described by a function has an **inverse function** that can generate ordered pairs of the inverse relation. The inverse of the linear function $f(x)$ can be written as $f^{-1}(x)$ and is read *f of x inverse* or *the inverse of f of x.*

Example: Find the inverse of $f(x) = \frac{3}{4}x + 6$.

Step 1	$f(x) = \frac{3}{4}x + 6$	Original equation
	$y = \frac{3}{4}x + 6$	Replace $f(x)$ with y.
Step 2	$x = \frac{3}{4}y + 6$	Interchange y and x.
Step 3	$x - 6 = \frac{3}{4}y$	Subtract 6 from each side.
	$\frac{4}{3}(x - 6) = y$	Multiply each side by $\frac{4}{3}$.
Step 4	$\frac{4}{3}(x - 6) = f^{-1}(x)$	Replace y with $f^{-1}(x)$.

The inverse of $f(x) = \frac{3}{4}x + 6$ is $f^{-1}(x) = \frac{4}{3}(x - 6)$ or $f^{-1}(x) = \frac{4}{3}x - 8$.

Exercises

Find the inverse of each function.

1. $f(x) = 4x - 3$

2. $f(x) = -3x + 7$

3. $f(x) = \frac{3}{2}x - 8$

4. $f(x) = 16 - \frac{1}{3}x$

5. $f(x) = 3(x - 5)$

6. $f(x) = -15 - \frac{2}{5}x$