6.4 Use Inverse Functions

TEKS 2A.4.C, 2A.9.B, 2A.9.F, 2A.9.G

Before You performed operations with functions.

Now You will find inverse functions.

Why? So you can convert temperatures, as in Ex. 48.

Key Vocabulary
- **inverse relation**
- **inverse function**

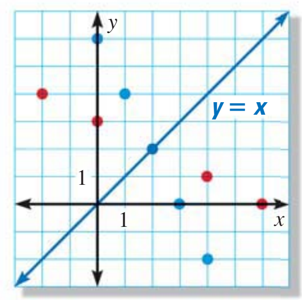
In Lesson 2.1, you learned that a relation is a pairing of input values with output values. An **inverse relation** interchanges the input and output values of the original relation. This means that the domain and range are also interchanged.

Original relation

x	0	1	2	3	4
y	6	4	2	0	−2

Inverse relation

x	6	4	2	0	−2
y	0	1	2	3	4



The graph of an inverse relation is a *reflection* of the graph of the original relation. The line of reflection is $y = x$. To find the inverse of a relation given by an equation in x and y, switch the roles of x and y and solve for y.

EXAMPLE 1 Find an inverse relation

Find an equation for the inverse of the relation $y = 3x - 5$.

$y = 3x - 5$ — **Write original relation.**

$x = 3y - 5$ — **Switch x and y.**

$x + 5 = 3y$ — **Add 5 to each side.**

$\frac{1}{3}x + \frac{5}{3} = y$ — **Solve for y. This is the inverse relation.**

In Example 1, both the original relation and the inverse relation happen to be functions. In such cases, the two functions are called **inverse functions**.

READING
The symbol −1 in f^{-1} is not to be interpreted as an exponent. In other words, $f^{-1}(x) \neq \frac{1}{f(x)}$.

KEY CONCEPT *For Your Notebook*

Inverse Functions

Functions f and g are inverses of each other provided:

$$f(g(x)) = x \quad \text{and} \quad g(f(x)) = x$$

The function g is denoted by f^{-1}, read as "f inverse."