**7-2** **Inverses of Relations and Functions**

### Lesson Objective

Graph and recognize inverses of relations and functions.

Find inverses of functions.

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The additive inverse of 3 is −3.

The multiplicative inverse of 5 is $\frac{1}{5}$.

You can also find and apply inverses to relations and functions. To graph the **inverse relation**, you can reflect each point across the line $y = x$. This is equivalent to switching the $x$- and $y$-values in each ordered pair of the relation.
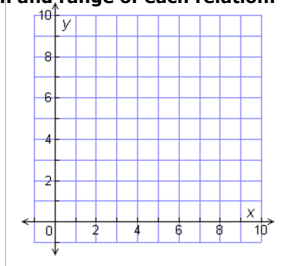
**Remember!**

A *relation* is a set of ordered pairs. A *function* is a relation in which each $x$-value has, at most, one $y$-value paired with it.
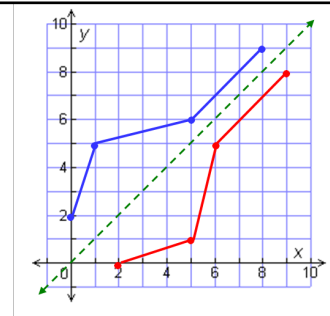
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**Graph the relation and connect the points. *Then graph the inverse.* Identify the domain and range of each relation.**

| $x$ | 0 | 1 | 5 | 8 |
|---|---|---|---|---|
| $y$ | 2 | 5 | 6 | 9 |

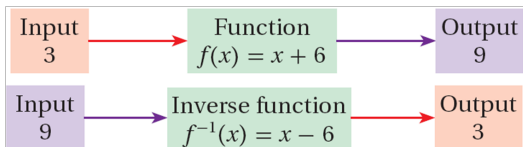| $x$ | | | | |
|---|---|---|---|---|
| $y$ | | | | |



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When the relation is also a function, you can write the inverse of the function $f(x)$ as $f^{-1}(x)$. This notation does **not** indicate a reciprocal.

Functions that undo each other are **inverse functions**.

| Input 3 | → | Function $f(x) = x + 6$ | → | Output 9 |
|---|---|---|---|---|
| Input 9 | → | Inverse function $f^{-1}(x) = x - 6$ | → | Output 3 |

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**Use inverse operations to write the inverse of**
$f(x) = x - \frac{1}{2}$ **if possible.**

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**1**
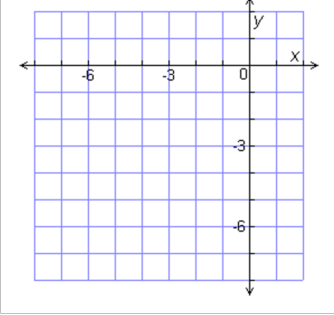
Use inverse operations to write the inverse of     **WE DO**
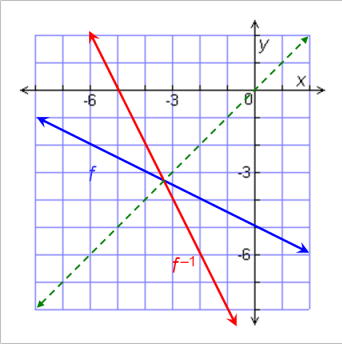$f(x) = 3(x - 7)$.

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Use inverse operations to write the inverse of     **You Do**
$f(x) = 5x - 7$.

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**Graph $f(x) = -\frac{1}{2}x - 5$. Then write the inverse and graph**
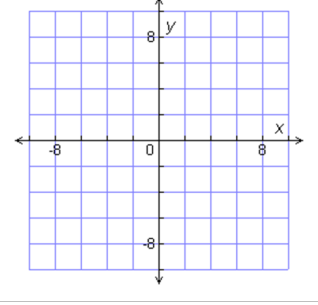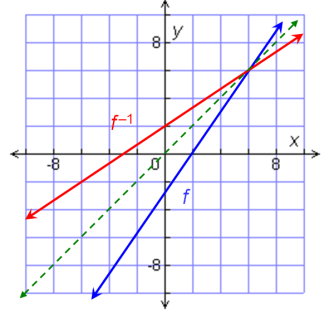


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**Graph $f(x) = \frac{2}{3}x + 2$. Then write the inverse and graph**



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**2**
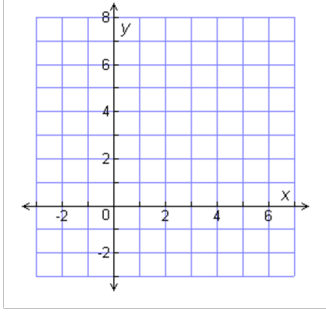
Determine the inverse of: $f(x) = 3x - 4$.



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