7-2

Inverses of Relations and Functions

You have seen the word *inverse* used in various ways.

The additive inverse of 3 is ___-3_____

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

The multiplicative inverse matrix of $A = \begin{bmatrix} 3 & 1 \\ 4 & 2 \end{bmatrix}$ is $A^{-1} =$ __$\begin{bmatrix} 1 & -0.5 \\ -2 & 1.5 \end{bmatrix}$____

You can also find and apply *inverses* to relations and functions.

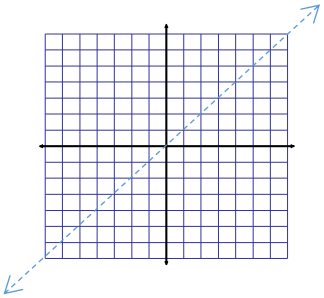
Inverse Relation – *the inverse of a relation consisting of all ordered pairs (x, y) is the set of all ordered pairs (y, x).*

The graph of an inverse relation is the reflection of the graph of the relation across the line $y = x$.

1. Graphing Inverse Relations

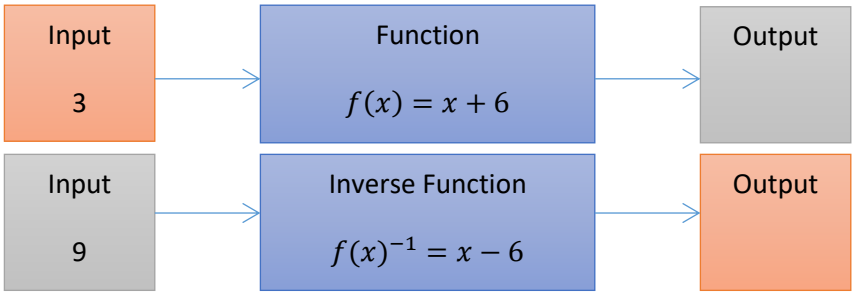
Graph the relation and connect the points. Then graph the inverse. Identify the domain and range of each function.

x	0	1	2	4	8
y	2	4	5	6	7



Inverse Functions – *functions that undo each other.*

Notation: $f^{-1}(x)$



2. Writing Inverse Functions Using Inverse Operations.

a) $f(x) = 2x$

$f^{-1}(x) = \frac{x}{2}$

For more complex problems, switch x and y and solve for y. Make sure to use the correct notation for the answer.

b) $f(x) = \left(\frac{x}{4}\right) - 5$

$x = \frac{y}{4} - 5$ $\quad x + 5 = \frac{y}{4}$ $\quad 4(x + 5) = y$

$f^{-1}(x) = 4x + 20$

c) $f(x) = \frac{x}{3}$

$f^{-1}(x) = 3x$

d) $f(x) = 5x - 7$

$x = 5y - 7$ $\quad x + 7 = 5y$ $\quad \frac{x+7}{5} = 7$

$f^{-1}(x) = \frac{x+7}{5}$

7-2
Inverses of Relations and Functions

- Students will be able to graph inverses of relations and functions with 80% accuracy.
- Students will be able to recognize inverses of relations and functions with 80% accuracy.
- Students will be able to find inverses of functions with 80% accuracy.

You have seen the word *inverse* used in various ways.

The additive inverse of 3 is -3

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

The multiplicative inverse matrix of

$A = \begin{bmatrix} 3 & 1 \\ 4 & 2 \end{bmatrix}$ is $A^{-1} = \begin{bmatrix} 1 & -0.5 \\ -2 & 1.5 \end{bmatrix}$

Inverse Relation –

The inverse of a relation consisting of all ordered pairs (x, y) is the set of ordered pairs (y, x)

The graph of an inverse relation is the reflection of the graph of the relation across the line $y = x$.

1. Graphing Inverse Relations

Graph the relation and connect the points. Then graph the inverse. Identify the domain and range of each function.

x	0	1	2	4	8
y	2	4	5	6	7

Flip to graph inverse

Relation

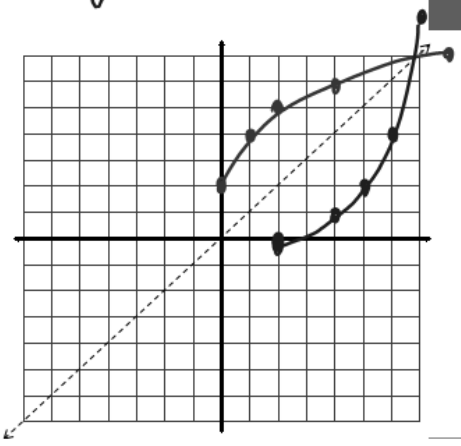
D: $0 \le x \le 8$

R: $2 \le y \le 7$

Inverse

D: $2 \le x \le 7$

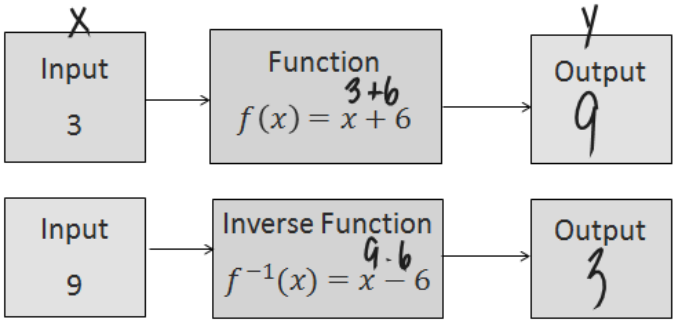
R: $0 \le y \le 8$



Inverse Functions –

Functions that undo each other.

Notation: $f^{-1}(x)$



2. Writing Inverse Functions Using Inverse Operations.

a) $f(x) = 2x$

$x = 2y$ $\quad f^{-1}(x) = \frac{x}{2}$

b) $f(x) = \left(\frac{x}{4}\right) - 5$

$4x = 4\frac{y}{4} - (5)4$

$x + 5 = \frac{y}{4}$

$y = 4(x + 5)$

$4x + 5$

$4x = y - 20$

$f^{-1}(x) = 4x + 20$

For more complex problems, switch x and y and solve for y. Make sure to use the correct notation for the answer.

c) $f(x) = \frac{x}{3}$

$f^{-1}(x) = 3x$

d) $f(x) = 5x - 7$

$x = 5y - 7$

$\frac{x+7}{5} = \frac{5y}{5}$

$f^{-1}(x) = \frac{x+7}{5}$

$\frac{x}{5} + \frac{7}{5}$

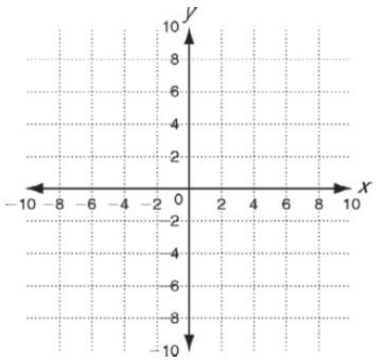
Name: _____ Date: _____ Period: _____

Worksheet 7-2

Graph the relation and connect the points. Then graph the inverse.
Identify the domain and range.

1.

x	0	1	5	8
y	2	5	6	9



Use inverse operations to write the inverse of each function.

2. $f(x) = 15x - 10$

3. $f(x) = 10 - 4x$

4. $f(x) = 5x + 2$

5. $(x) = x + 6$

7. $f(x) = -\frac{x}{12}$

8. $f(x) = \frac{x-12}{4}$

9. $f(x) = x - \frac{1}{2}$

10. $f(x) = \frac{3x-1}{6}$