Warm up:

Solve for y:

3-y=2x 2y-x=9 5x+5=5y

$-3 \quad -3$

$\frac{-y}{-1} = \frac{2x-3}{-1}$

$y = 3-2x$

7-2 Inverses of Relations and Functions

Objectives

Graph and recognize inverses of relations and functions.

Find inverses of functions.

7-2 Inverses of Relations and Functions

Vocabulary

inverse relation
inverse function

7-2 Inverses of Relations and Functions

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.

Holt Algebra 2
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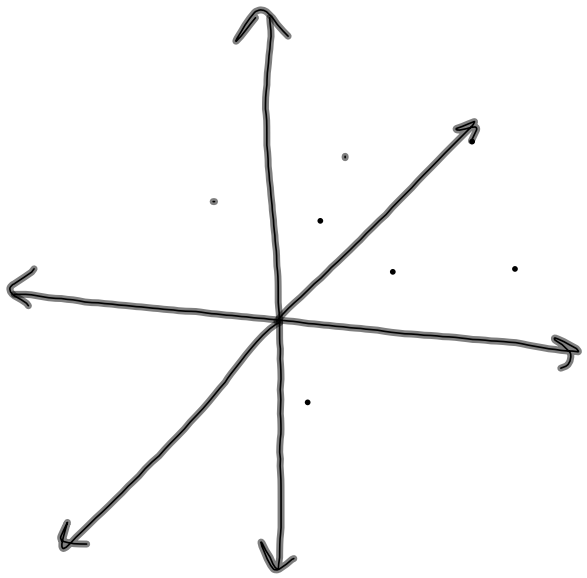
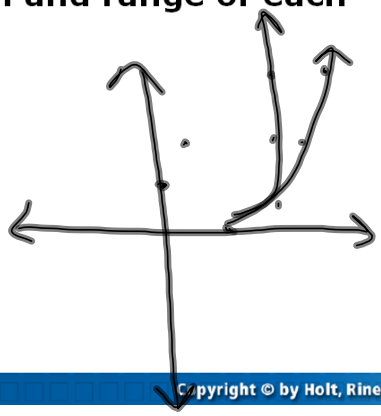


7-2 Inverses of Relations and Functions

Example 1: Graphing Inverse Relations

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

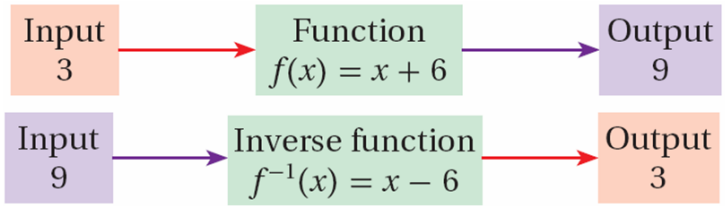


x 2 5 6 9
y 0 1 5 8

7-2 Inverses of Relations and Functions

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**.



To find the inverse function, use the inverse operation. In the example above, 6 is added to x in $f(x)$, so 6 is subtracted to find $f^{-1}(x)$.

To graph the inverse of an equation all we did was switch the x and y coordinates. So when we want to find the inverse equation of an equation, naturally what should we do?

Why does switching x with y and then solving for y work? Think: what are we really doing when we find the inverse function or inverse points?

$x = y$

$y = 3x + 2$

$x = 3y + 2$

7-2 Inverses of Relations and Functions

Example 4: Writing and Graphing Inverse Functions

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

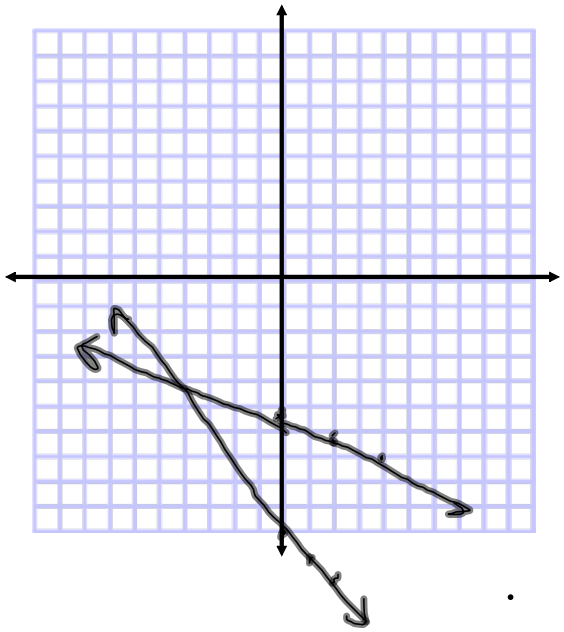
$y = -\frac{1}{2}x - 5$

$x = -\frac{1}{2}y - 5$

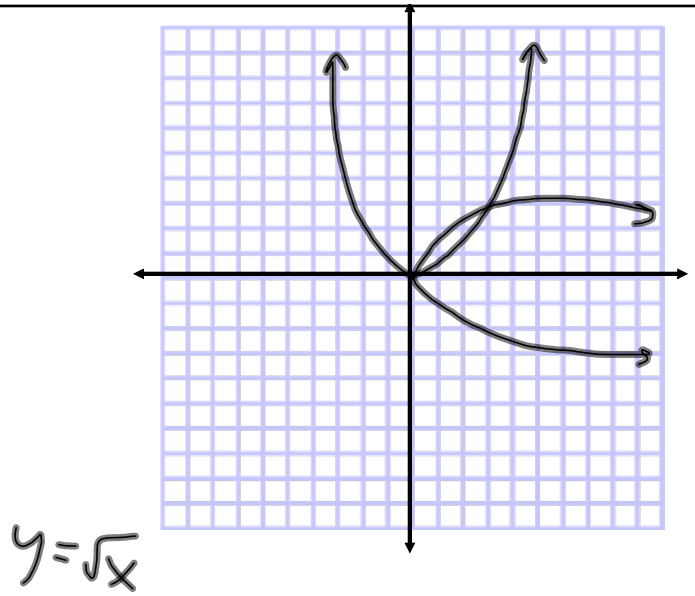
$+5 \quad +5$

$-2(x+5) = -\frac{1}{2}y \cdot -2$

$-2x - 10 = y$



Find the inverse of $y=x^2$ and graph both the function and its inverse.



Is the inverse also a function? Do all inverses have to be functions?

The only exception to the flip the x and y rule comes with real world situations. In these cases, don't flip the variables, just isolate the other one. For instance, Celcius and Farenheit are related by: C=5/9(F-32)

What happens when you switch C and F? What happens when you just solve for F?

Homework

p. 501 # 4-16 even, 18, 32, 33, 41-46 (justify your answer)

43 45