Warm Up

Solve each equation.

1. $2x - 5 = 97$

2. $\frac{1}{3}x + 40 = 280$

3. $-4x - 10 = -26$

Miguel is planning a trip to Turkey. Before he leaves, he wants to exchange his money to the Turkish lira, the official currency of Turkey. The exchange rate at the time of his trip is 4 lira per 1 U.S. dollar.

1. **Complete the table of values to show the currency conversion for U.S. dollars to Turkish lira.**

2. **Write an equation to represent the number of lira in terms of the number of U.S. dollars.**

U.S. Currency (dollars)	Turkish Currency (lira)
100	
250	
400	
650	
1000	

Suppose at the end of his trip, Miguel needs to convert any remaining lira to dollars. This situation is the *inverse* of the original situation.

3. What are the independent and dependent quantities of the inverse of the problem situation? How do these quantities compare to the quantities in Question 1?

4. Complete the table of values to show the inverse of the problem situation.

5. Compare the tables in Questions 1 and 4. What do you notice?

6. Use the table to write an equation for the inverse of the problem situation. Does this equation represent a function? Explain your answer.

Recall that a function takes an input value, performs some operation(s) on this value, and creates an output value. The **inverse of a function** takes the output value, performs some operation(s) on this value, and arrives back at the original function's input value. In other words, an inverse of a function "undoes" the function.

Worked Example

Given a function, $f(x)$, you can determine the inverse algebraically by following these steps.

Step 1: Replace the function $f(x)$ with another variable, generally y.

Step 2: Switch the x and y variables in the equation.

Step 3: Solve for y.

7. **Use function notation to represent the number of lira $f(x)$ in terms of the number of U.S. dollars, x. Then complete the steps shown in the worked example to represent the number of U.S. dollars in terms of the number of lira. Compare the inverse to the equation you wrote in Question 6. What do you notice?**

Worked Example

Given a function, $f(x)$, you can determine the inverse of a function graphically by following these steps.

Step 1: Copy the coordinate plane and graph $f(x)$ and the line $y = x$ onto patty paper.

Step 2: Heavily trace the graph of $f(x)$ with a pencil.

Step 3: Reflect the patty paper across the line $y = x$, and rub the paper so that the image of the graph of its inverse appears.

1. Consider the graph of the function $f(x) = 4x$ from the previous activity. Complete the steps in the worked example to graph the inverse using patty paper.
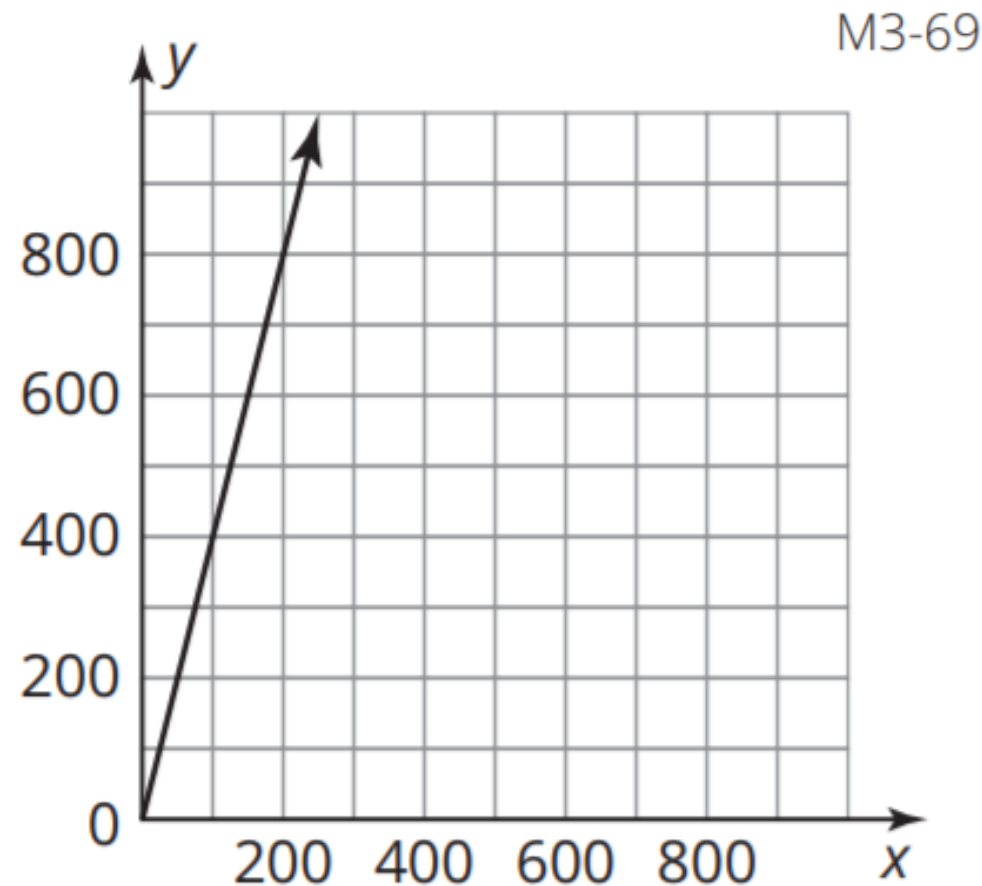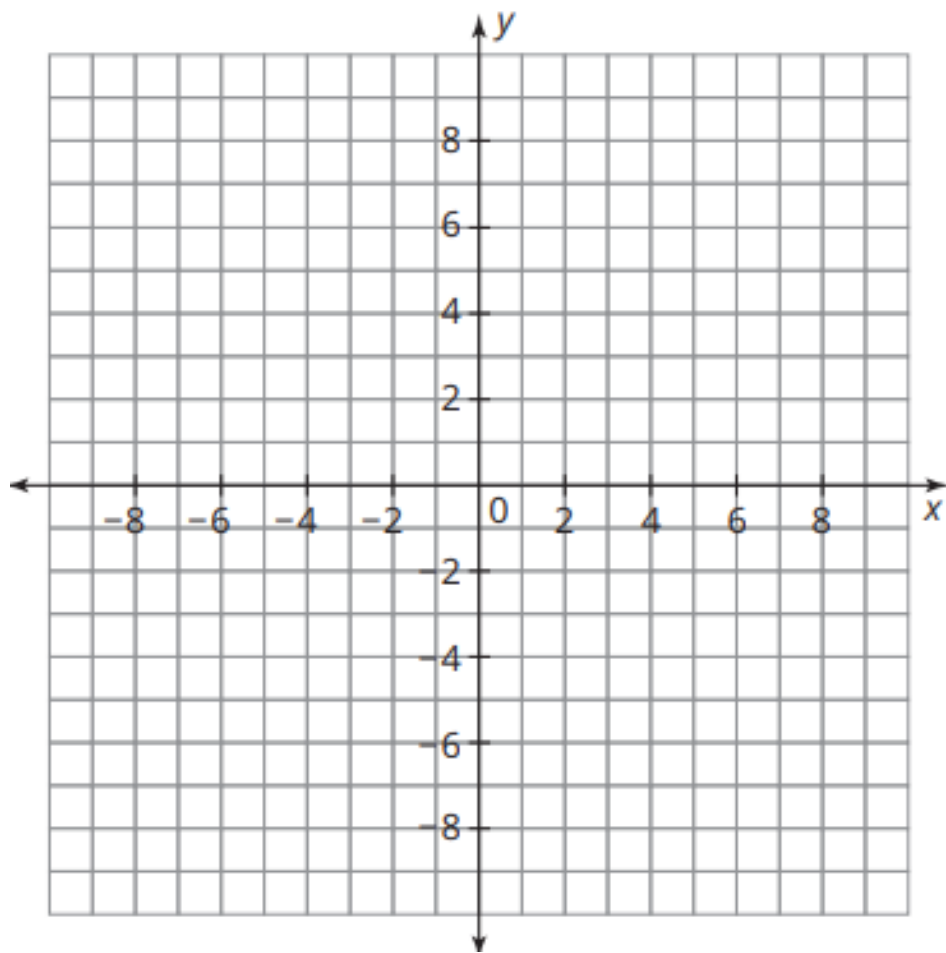
2. **Compare the image you created and the graph of the inverse.**

   a. **What do you notice about the image and the graph of the inverse?**

   b. **What does this tell you about the graph of a function and its inverse and about the line $y = x$?**

3. For each function and a given point on the graph of the function, determine the corresponding point on the graph of the inverse of the function.

   a. Given that (3, 2) is a point on the graph of $g(x)$, what is the corresponding point on the graph of the inverse of $g(x)$?

   b. Given that (−1, 0) is a point on the graph of $h(x)$, what is the corresponding point on the graph of the inverse of $h(x)$?

c. Given that (a, b) is a point on the graph of $f(x)$, what is the corresponding point on the graph of the inverse of $f(x)$?

a. $f(x) = 3x - 6$

x	f(x)
−2	
−1	
0	
1	
2	

Inverse of f(x)

x	y
	−2
	−1
	0
	1
	2