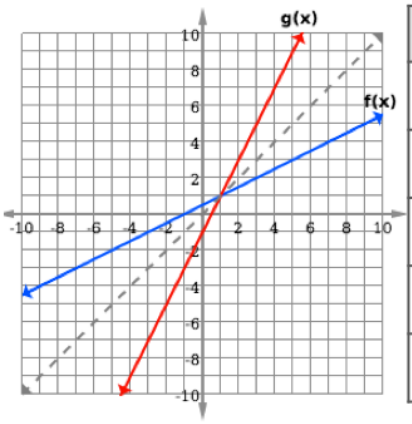
# LESSON 3.3: INVERSE FUNCTIONS

**A**




| x | *f(x)* |
|---|---|
| -7 | |
| -1 | |
| 1 | |
| 3 | |
| 5 | |

| x | *g(x)* |
|---|---|
| -3 | |
| 0 | |
| 1 | |
| 2 | |
| 3 | |

**1)** Fill in f(x) and g(x) values in the table.

**2)** ONLY using the table, identify the following:

Domain of *f(x)*:

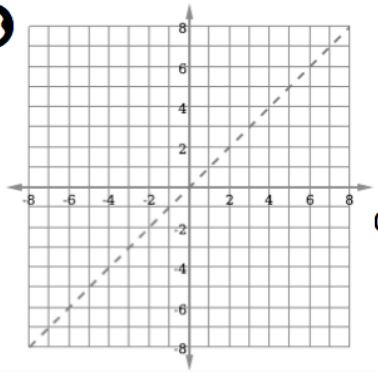
Range of *g(x)*:

Range of *f(x)*:

Domain of *g(x)*:

**3)** Do the two lines reflect over the line y = x?

**B**



Ordered pairs for *f(x)*:

{(-6, 0), (-2, 2), (0, 3), (4, 5), (6, 6)}

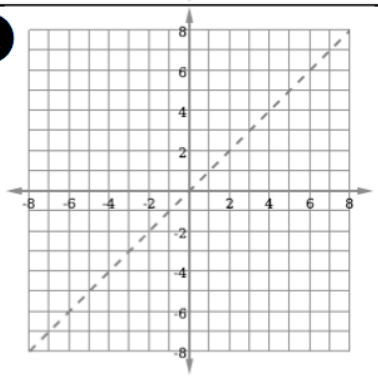
Ordered pairs for *g(x)*:

**4)** Write the ordered pairs for *g(x)* by switching the x and y values of *f(x)*.

**5)** Graph the ordered pairs and draw the lines for each function.

**6)** Do the two lines reflect over the line y = x?

**C**



Function *f*: y = 3x + 6

Function *g*:

**7)** To find and equation for function ***g***, switch the x and y values in function *f* and solve for y.

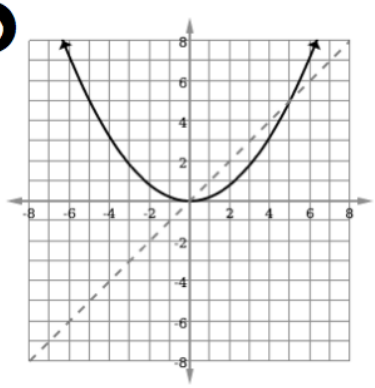
**8)** Graph functions *f* and *g*.

**9)** Your lines should reflect over the line y = x

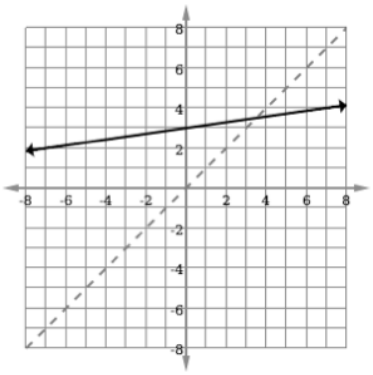
**10)** Identify the following points:

*f*(-1) = g(3)=

**D**



Graph *f(x)*



Graph *g(x)*

**GRAPH *f(x)*:**

**11)** Does this graph pass the Vertical Line Test (VLT)?

**12)** Sketch a graph of *f(x)* that reflects over the line y = x. Identify if it passes the VLT.

**GRAPH *g(x)*:**

**13)** Does this graph pass the VLT?

**14)** Sketch a graph of *g(x)* that reflects over the line y = x. Identify if it passes the VLT.

**E** Let $f(x) = 5x - 3$ and $g(x) = \frac{1}{5}x + \frac{3}{5}$. *They are inverse functions.* Find $f \circ g(x)$ and $g \circ f(x)$.

$f \circ g =$ $g \circ f =$

**F** Let $f(x) = 2x + 10$

**STEP 1:** To find $g(x)$, switch the x and y values in $f(x)$ and solve for y.

**STEP 2:** *Find* $f \circ g =$ *Find* $g \circ f =$

## FINAL THOUGHTS

**Two functions *f* and *g* that "undo" each other are called INVERSE functions.**
Please fill in the missing information to make true statements about inverse functions.

**1 –** The inverse of a function _____ the members of the ordered pairs of the original function.

**2 –** The **domain** of the original function is the _____ of the inverse function. The **range** of the original function is the _____ of the inverse function.

**3 –** Inverse functions reflect over the line _____.

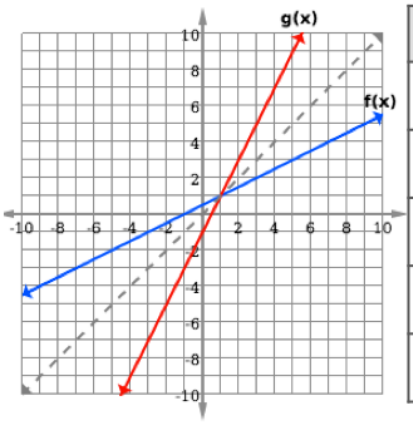
**4 –** In section **D**, conduct a Horizontal Line Test (HLT) on the original functions. Which one failed? What can you conclude?

**5 –** When inverse functions are plugged into each other (composite functions), the result is _____.

**6 –** The inverse function *f(x)* can also be denoted as $f^{-1}(x)$

# LESSON 3.3: INVERSE FUNCTIONS

**A**




| x | *f(x)* |
|---|---|
| -7 | -3 |
| -1 | 0 |
| 1 | 1 |
| 3 | 2 |
| 5 | 3 |

| x | *g(x)* |
|---|---|
| -3 | -7 |
| 0 | -1 |
| 1 | 1 |
| 2 | 3 |
| 3 | 5 |

**1)** Fill in f(x) and g(x) values in the table.

**2)** ONLY using the table, identify the following:

Domain of *f(x)*: {-7, -1, 1, 3, 5}

Range of *g(x)*: {-7, -1, 1, 3, 5}

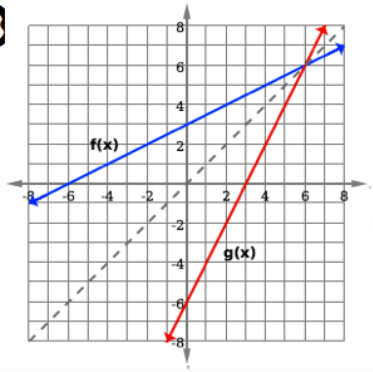
Range of *f(x)*: {-3, 0, 1, 2, 3}

Domain of *g(x)*: {-3, 0, 1, 2, 3}

**3)** Do the two lines reflect over the line y = x?

Yes

**B**




Ordered pairs for *f(x)*:

{(-6, 0), (-2, 2), (0, 3), (4, 5), (6, 6)}

Ordered pairs for *g(x)*:

{(0, -6), (2, -2), (3, 0), (5, 4), (6, 6)}

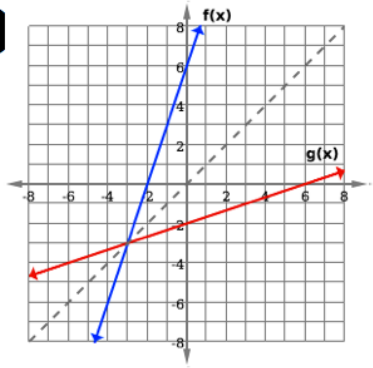
**4)** Write the ordered pairs for *g(x)* by switching the x and y values of *f(x)*.

**5)** Graph the ordered pairs and draw the lines for each function.

**6)** Do the two lines reflect over the line y = x?

Yes

**C**




Function *f*: y = 3x + 6

Function *g*:

$x = 3y + 6$

$3y = x - 6$

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

**7)** To find and equation for function ***g***, switch the x and y values in function *f* and solve for y.

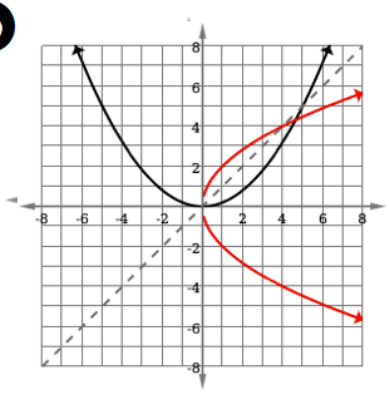
**8)** Graph functions *f* and *g*.

**9)** Your lines should reflect over the line y = x

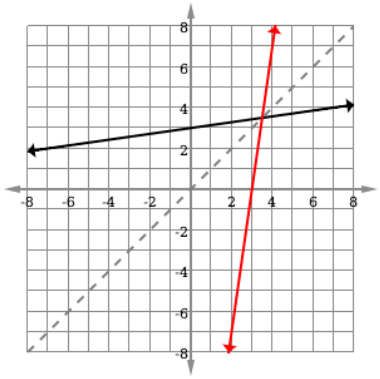
**10)** Identify the following points:

*f*(-1) = 3 *g*(3)= -1

**D**



Graph *f(x)*



Graph *g(x)*

**GRAPH *f(x)*:**

**11)** Does this graph pass the Vertical Line Test (VLT)? Yes

**12)** Sketch a graph of *f(x)* that reflects over the line y = x. Identify if it passes the VLT.

No

**GRAPH *g(x)*:**

**13)** Does this graph pass the VLT?

Yes

**14)** Sketch a graph of *g(x)* that reflects over the line y = x. Identify if it passes the VLT.

Yes

**E** Let $f(x) = 5x - 3$ and $g(x) = \frac{1}{5}x + \frac{3}{5}$. *They are inverse functions.* Find $f \circ g(x)$ and $g \circ f(x)$.

$f \circ g =$ $5\left(\frac{1}{5}x + \frac{3}{5}\right) - 3$

$= x + 3 - 3$

$= x$

$g \circ f =$ $\frac{1}{5}(5x - 3) + \frac{3}{5}$

$= x - \frac{3}{5} + \frac{3}{5}$

$= x$

**F** Let $f(x) = 2x + 10$

**STEP 1:** To find $g(x)$, switch the x and y values in $f(x)$ and solve for y.

$x = 2y + 10$

$2y = x - 10$

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

$g(x) = \frac{1}{2}x - 5$

**STEP 2:** *Find* $f \circ g =$

$= 2\left(\frac{1}{2}x - 5\right) + 10$

$= x - 10 + 10$

$= x$

*Find* $g \circ f =$

$= \frac{1}{2}(2x + 10) - 5$

$= x + 5 - 5$

$= x$

## FINAL THOUGHTS

**Two functions *f* and *g* that "undo" each other are called INVERSE functions.**
Please fill in the missing information to make true statements about inverse functions.

**1** – The inverse of a function ___interchanges___ the members of the ordered pairs of the original function.

**2** – The **domain** of the original function is the ___range___ of the inverse function. The **range** of the original function is the ___domain___ of the inverse function.

**3** – Inverse functions reflect over the line ___y = x___.

**4** – In section **D**, conduct a Horizontal Line Test (HLT) on the original functions. Which one failed? What can you conclude? f(x) failed

HLT can be conducted to determine if the inverse is a function.

**5** – When inverse functions are plugged into each other (composite functions), the result is ___x___.

**6** – The inverse function $f(x)$ can also be denoted as $f^{-1}(x)$

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