

Finding Inverses - Microsoft Word

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## 7.8. Advanced Algebra

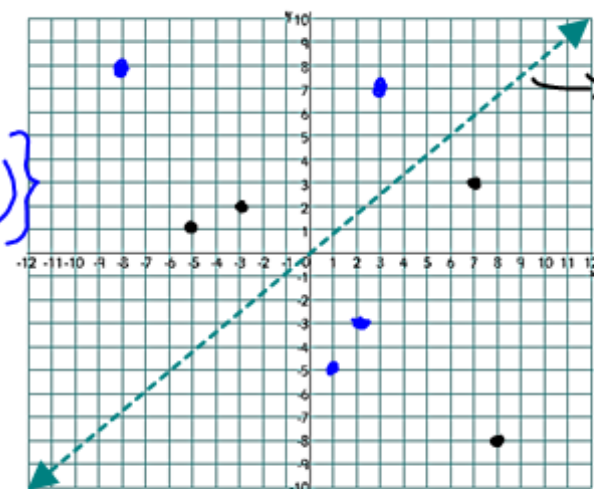
### Inverses

DATE: 9/16

1. Find the inverse of the given relation and graph both relations.

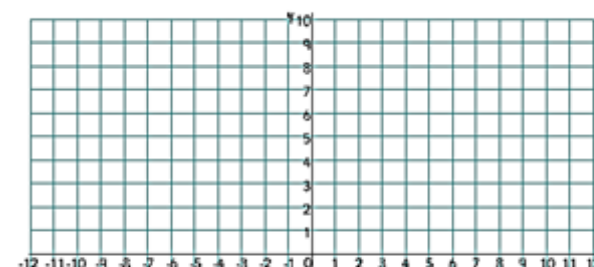
$$B = \{(-5, 1), (-3, 2), (8, -8), (7, 3)\}$$

$$B^{-1} = \{(1, -5), (2, -3), (-8, 8), (3, 7)\}$$



2. Find the inverse of the given function and graph both functions.

$$f(x) = 2x - 1$$



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2. Find the inverse of the given function and graph both functions.

$$f(x) = 2x - 1 \quad \text{slope: } \frac{2}{1} \uparrow \quad \text{y-int: } -1$$

Step 1: Make  $f(x) = y$ :  $y = 2x - 1$

Step 2: Interchange  $x$  and  $y$  in

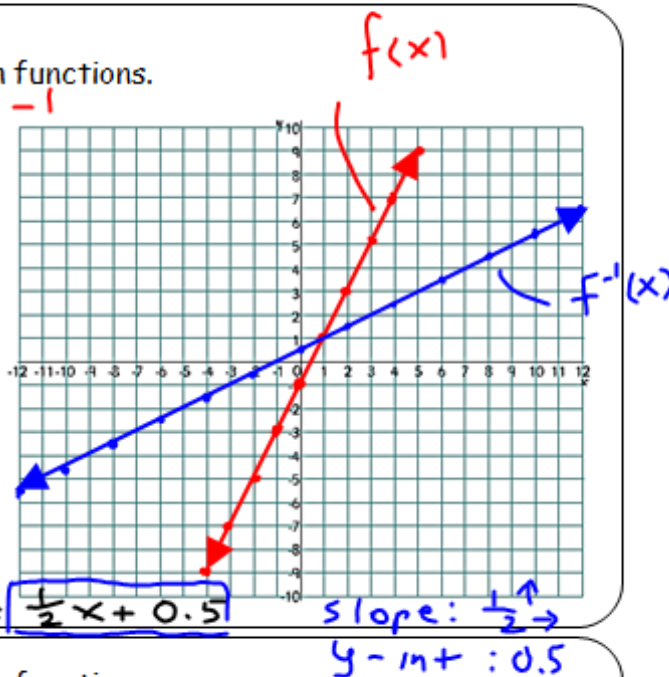
$$y = 2x - 1$$

Step 3:  $x = 2y - 1$ . Now solve for  $y$ .

$$\frac{1}{2}x + \frac{1}{2} = 2y$$

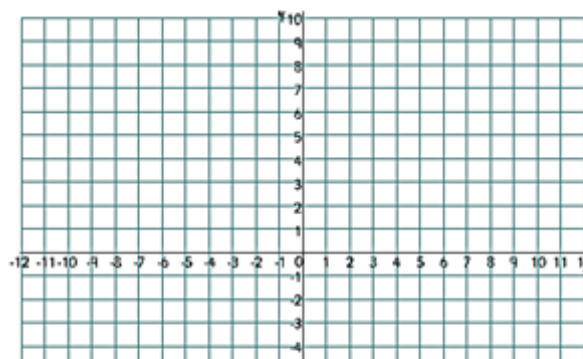
$$\frac{1}{2}x + 0.5 = y$$

Step 4: Write as inverse  $f^{-1}(x) = \frac{1}{2}x + 0.5$



3. Find the inverse of the given function and graph both functions.

$$g(x) = \frac{2}{3}x - 4$$



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3. Find the inverse of the given function and graph both functions.

$$g(x) = \frac{2}{3}x - 4 \quad \text{slope } \frac{2}{3} \rightarrow \text{y-int: } -4$$

Step 1:  $y = \frac{2}{3}x - 4$

Step 2:  $x = \frac{2}{3}y - 4$

Step 3: Solve for y in Step 2.

$$x = \frac{2}{3}y - 4$$

$$\begin{array}{r} +4 \\ \hline \end{array}$$

$$(3) \quad x + 4 = \frac{2}{3}y$$

$$\frac{3}{2}x + 12 = 2y$$

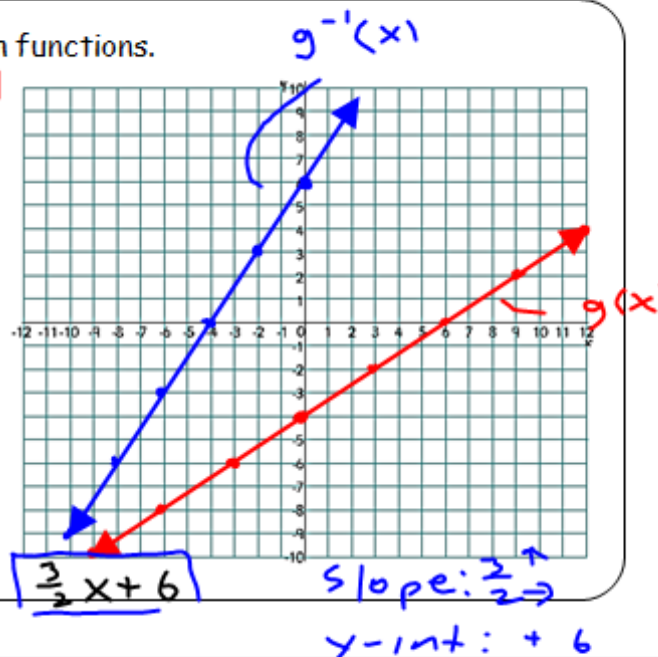
$$\frac{3}{2}x + 6 = y$$

Step 4:

$$g^{-1}(x) = \frac{3}{2}x + 6$$

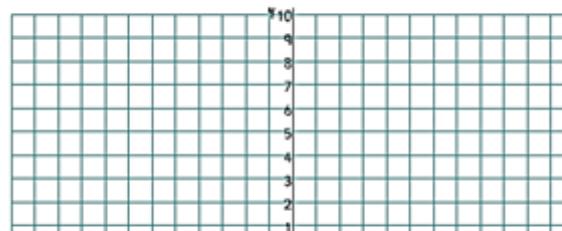
Slope:  $\frac{3}{2}$

y-int: +6



4. Find the inverse of the given function and graph both functions.

$$h(x) = \frac{1}{2}x + 4$$



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4. Find the inverse of the given function and graph both functions.

$$h(x) = \frac{1}{2}x + 4 \quad \text{slope: } \frac{1}{2} \uparrow \quad \text{y-int: } +4$$

step 1:  $y = \frac{1}{2}x + 4$

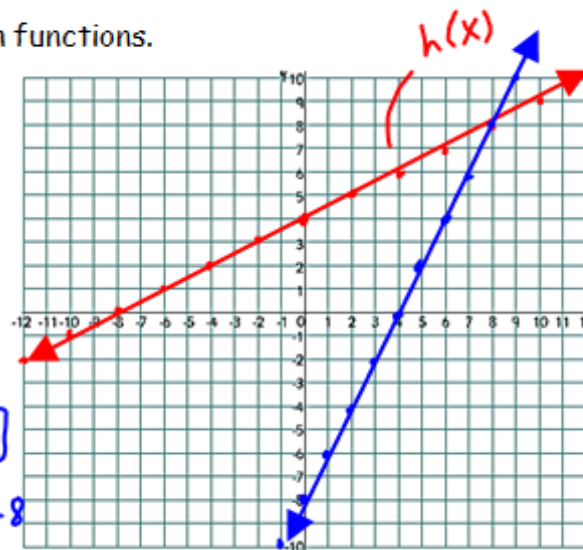
step 2:  $x = \frac{1}{2}y + 4$

step 3: Solve  $x = \frac{1}{2}y + 4$  for  $y$ .

$$\begin{aligned} x - 4 &= \frac{1}{2}y \\ (2)(x - 4) &= (2)\left(\frac{1}{2}y\right) \\ \boxed{2x - 8} &= y \end{aligned}$$

step 4:  $h^{-1}(x) = \boxed{2x - 8}$

slope:  $\frac{2}{1} \uparrow$  y-int:  $-8$



Determine whether each pair both functions are inverse functions.

5.  $g(x) = 5x + 10$

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

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Determine whether each pair both functions are inverse functions.

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

Choose  $g(x)$  or  $h(x)$ .

step 1:  $y = 5x + 10$

step 2:  $x = 5y + 10$

step 3: solve  $x = 5y + 10$  for  $y$ .

$$\frac{x - 10}{5} = \frac{5y}{5} \quad \frac{1}{5}x - 2 = y$$

Yes,  $g(x)$  and  $h(x)$  are inverses of each other.

6.  $f(x) = 2x - 3$   
 $g(x) = \frac{x+3}{2}$

Choose  $f(x)$  or  $g(x)$ .

step 1:  $y = \frac{x+3}{2}$

step 2:  $x = \frac{y+3}{2}$

step 3: solve for  $y$ .

$$(2)x = \frac{y+3}{2} \quad (2)$$

$$2x = \frac{y+3}{2}$$

$$-3 \quad -3$$

$$2x - 3 = y$$

Yes,  $f(x)$  and  $g(x)$  are inverses of each other.

7.  $s(x) = \frac{3}{4}x - 6$   
 $t(x) = \frac{4}{3}x + 8$

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$$6. \begin{aligned} f(x) &= 2x - 3 \\ g(x) &= \frac{x+3}{2} \end{aligned}$$

$$7. \begin{aligned} s(x) &= \frac{3}{4}x - 6 \\ t(x) &= \frac{4}{3}x + 8 \end{aligned}$$

choose  $s(t)$   
or  $t(x)$ .

step 1:  $y = \frac{3}{4}x - 6$

step 2:  $x = \frac{3}{4}y - 6$

step 3: solve for  $y$ .

$$x = \frac{3}{4}y - 6$$

$$+6$$

$$x + 6 = \frac{3}{4}y$$

$$4 \cdot x + 4 \cdot 6 = \frac{3}{4}y \cdot 4$$

$$\frac{4x + 24}{3} = \frac{3y}{3}$$

Again, yes!

$$\frac{4}{3}x + 8 = y$$