Algebra 1 4.7

Find the inverse of a relation

Find the inverse of a linear function

relation

inverse

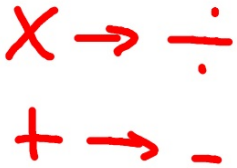
function

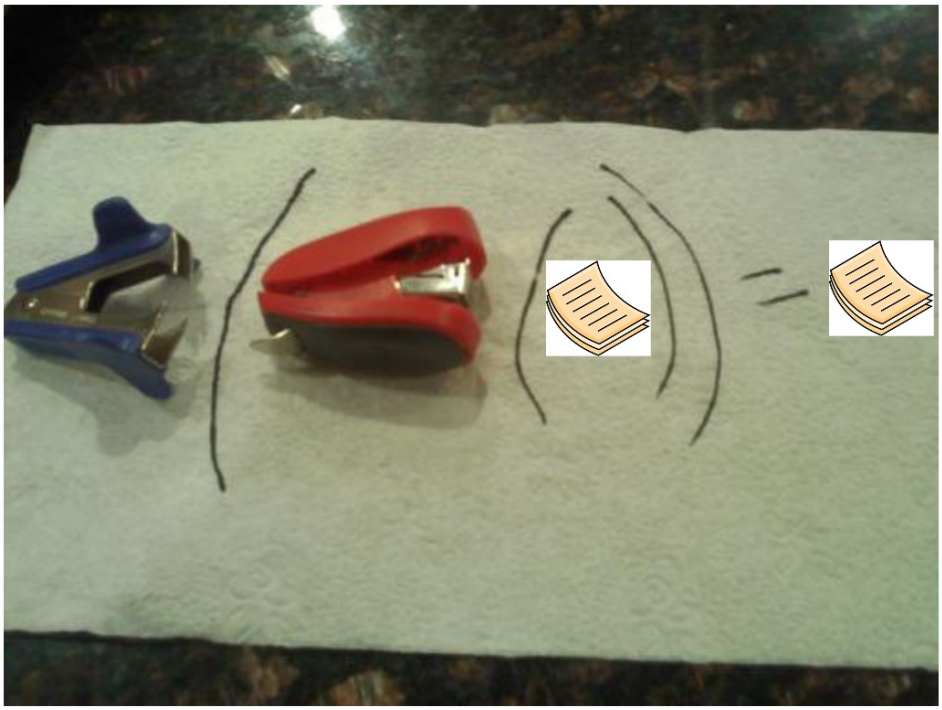
inverse function

domain

range

whiteboards





GuidedPractice

1A. $\{(-6, 8), (-15, 11), (9, 3), (0, 6)\}$

(8,-6) (11,-15) (3,9)
(6,0)

1B.

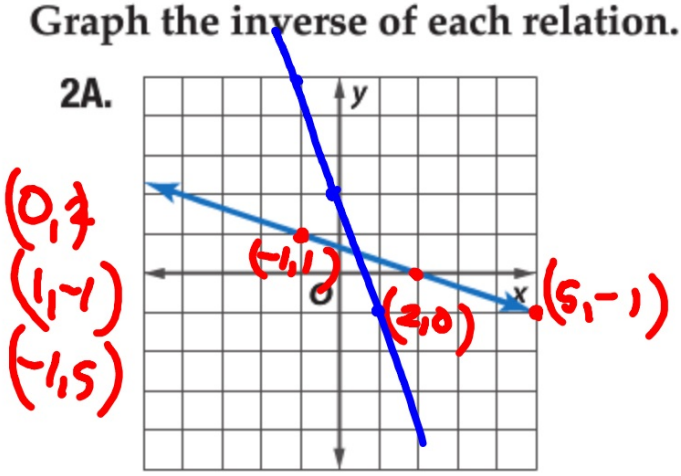
x	−10	−4	−3	0
y	5	11	12	15

(5,-10) (12,-3)
(11,-4) (15,0)

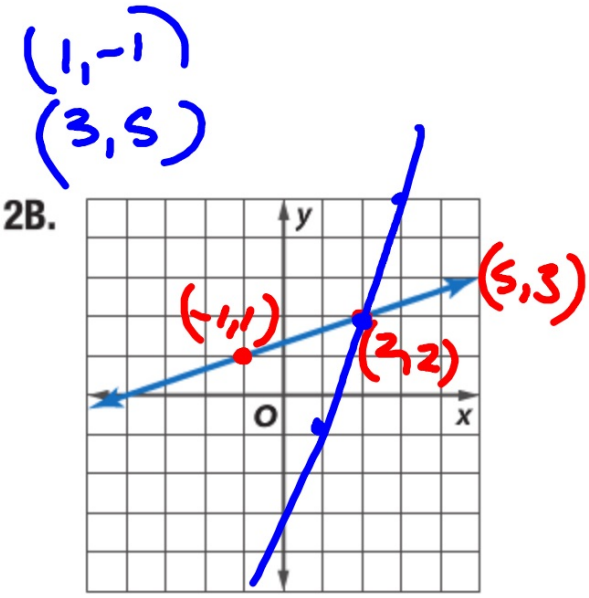
GuidedPractice

Graph the inverse of each relation.

2A.



2B.



where is y=x?

Writing equations:
slope-intercept form

function form

$y = 2x + 3$

$f(x) = 2x + 3$

$y = 2x + 3$

$x = 2y + 3$

$-3 \quad -3$

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

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

$y = 4x - 6$

$g(x) = 4x - 6$

$x = 4y - 6$

$+6 \quad +6$

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

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

KeyConcept Finding Inverse Functions

To find the inverse function $f^{-1}(x)$ of the linear function $f(x)$, complete the following steps.

Step 1 Replace $f(x)$ with y in the equation for $f(x)$.

Step 2 Interchange y and x in the equation.

Step 3 Solve the equation for y.

Step 4 Replace y with $f^{-1}(x)$ in the new equation.

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

Remember: x and y trade places...
To consider: "What is happening to x? What would be the opposite thing?"
...so I should expect to see....

Example 3 Find Inverse Linear Functions

Find the inverse of each function.

a. $f(x) = 4x - 8$

$y = 4x - 8$

$x = 4y - 8$

$+8 \quad +8$

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

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

$f^{-1}(x) = \frac{x+8}{4}$

$f^{-1}(x)$

b. $f(x) = -\frac{1}{2}x + 11$

$y = -\frac{1}{2}x + 11$

$x = -\frac{1}{2}y + 11$

$-11 \quad -11$

$\frac{-2}{1}(x-11) = \left(\frac{-1}{2}y\right)\frac{-2}{1}$

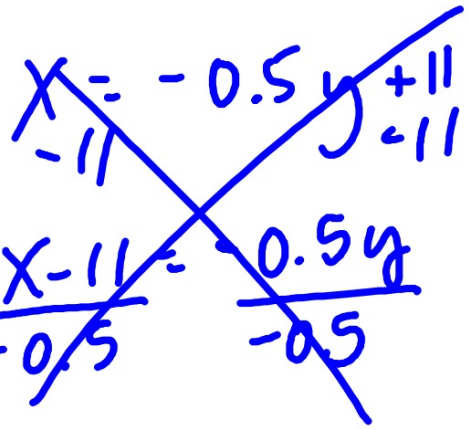
$-2(x-11) = y$

$f^{-1}(x) = -2(x-11)$

$x = -0.5y + 11$

$-11 \quad -11$

$\frac{x-11}{-0.5} = \frac{-0.5y}{-0.5}$



GuidedPractice $f^{-1}(x) = \frac{x+12}{4}$

3A. $f(x) = 4x - 12$

$y = 4x - 12$

$x = 4y - 12$

$+12 \quad +12$

$\frac{x+12}{4} = \frac{4y}{4}$

3B. $f(x) = \frac{1}{3}x + 7$

$y = \frac{1}{3}x + 7$

$x = \frac{1}{3}y + 7$

$-7 \quad -7$

$\frac{3}{1}(x-7) = \frac{1}{3}y \cdot \frac{3}{1}$

$3(x-7) = y$

* $f^{-1}(x) = 3x - 21$

$= 3(x-7)$