

Lesson 3.5- SWBAT find inverse functions given points or an equation.
Kick off- Take out your homework and answer the following questions.

1) Solve the system of equation: $-4x + 9y = 9$
 $4(x - 3y) = -6$
 $4x - 12y = -24$
 $-3y = -15$
 $y = 5$
 $x - 3(5) = -6$
 $x - 15 = -6$
 $+15 +15$
 $x = 9$

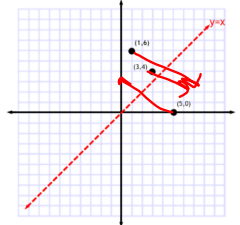
2) Solve and graph the following inequality: $|10 + 4x| < 14$
 $10 + 4x < 14$
 $-10 -10$
 $4x < 4$
 $x < 1$
 $-10 -4x < 14$
 $+10 +10$
 $-4x < 24$
 $-4 -4$
 $x > -6$
 Graph: -8 -6 0 1 3
 $10 + 4(-8) = -22 < 14$
 $10 + 4(0) = 10 < 14$
 $10 + 4(3) = 22 < 14$

③ $3x - 2y = 2$
 $-3(5x - 5y) = 10$
 $15x - 10y = 10$
 $+ -15x + 15y = -30$
 $5y = -20$
 $y = -4$

④ $-(-4x - 15y) = -17$
 $4x + 15y = 17$
 $-4x + 15y = -52$

Inverse Functions- an inverse function is the "reverse" function of another function.
This reverse happens when there is a reflection over the line $y = x$.

★ The rule of an inverse function is simple: interchange the x and y! ★
 The notation of an inverse function is $f^{-1}(x)$.

1) $f(x) = \{(1,6) (3,4) (5,0)\}$
 $f^{-1}(x) = \{(6,1) (4,3) (0,5)\}$
 ★ inverse!


2) $g(x) = \{(4,8) (-2,3) (5,-6)\}$
 $g^{-1}(x) = \{(8,4) (3,-2) (-6,5)\}$

Finding the Inverse Function Algebraically

- 1) Change $f(x)$ to y
- 2) Switch x and y
- 3) Solve for y
- 4) Replace y with $f^{-1}(x)$

EX: If $f(x) = 3x - 2$ find $f^{-1}(x)$

$y = 3x - 2$
 $x = 3y - 2$
 $+2 +2$
 $x + 2 = 3y$
 $x + 2 = y$
 $\frac{x + 2}{3} = f^{-1}(x)$

3) a. Find $f^{-1}(x)$ if $f(x) = \frac{1}{2}x + 2$
 $2(x-2) = y$
 $2x - 4 = y$
 $2x - 4 = f^{-1}(x)$
 $\frac{2}{2} \rightarrow \frac{y}{2} + 2$
 $2(x-2) = \frac{y}{2} + 2$
 $y = \frac{1}{2}x + 2$
 $x = \frac{1}{2}y + 2$
 $2x - 4 = f^{-1}(x)$
 $\frac{2+5}{2} = \frac{7}{2}$

b. Find $f^{-1}(-3)$
 $f^{-1}(x) = 2x - 4$
 $= 2(-3) - 4$
 $= -10$

4) a. Find $g^{-1}(x)$ if $g(x) = 2x - 5$
 $y = 2x - 5$
 $x = \frac{y+5}{2}$
 $\frac{x+5}{2} = \frac{2y}{2} \rightarrow \frac{x+5}{2} = y$
 $\frac{x+5}{2} = g^{-1}(x)$

b. Find $g^{-1}(2)$
 $\frac{2+5}{2} = \frac{7}{2}$

5) a. Find $j^{-1}(x)$ if $j(x) = -3x + 11$
 b. Find $j^{-1}(-1)$

6) a. Find $m^{-1}(x)$ if $m(x) = -\frac{1}{3}x + 4$
 b. Find $m^{-1}(-4)$

7) a. Find $f^{-1}(x)$ if $f(x) = -x - 10$

b. Find $f^{-1}(2)$

8) a. Find $g^{-1}(x)$ if $g(x) = 5x - 2$

b. Find $m^{-1}(1)$