Algebra 1 4.7

Find the inverse of a relation

Find the inverse of a linear function

relation orig → (2, 5) (1, −6) (0, 5)

inverse function inv → (5, 2) (−6, 1) (5, 0)

inverse function

domain

range

whiteboards

Find the inverse of each relation

GuidedPractice

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

1B.

x	−10	−4	−3	0
y	5	11	12	15

y = x

function & inv.

reflect y = x

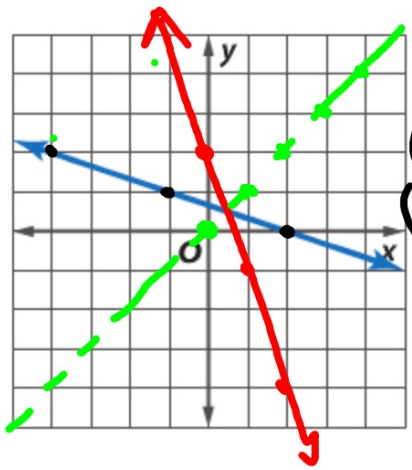
y = 1x + 0

GuidedPractice

Graph the inverse of each relation.

Line of symmetry

2A.



(2, 0)

(−1, 1)

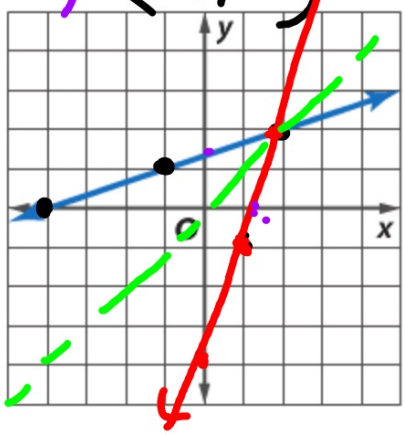
(−4, 2)

2B.

(−1, 1)

(2, 2)

(−4, 0)



Find the inverse of each function:
"What should I expect to see?"

GuidedPractice

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

$y = 4x - 12$

$x = 4y - 12$

$+12 \quad +12$

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

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

$\frac{1}{4}x + 3 = y$

$f^{-1}(x) = \frac{1}{4}x + 3$

1. Change to y=
2. Exchange x&y
3. Solve for y= again
4. Relabel f^{-1}

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

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

$$-7 \qquad -7$$

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

$$3x - 21 = y$$

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

Find the inverse of each function.

14. $f(x) = 25 + 4x$

16. $f(x) = 4(x + 17)$

$y = 25 + 4x$

$x = 25 + 4y$

$-25 \quad -25$

$\frac{-25 + x}{4} = \frac{4y}{4}$

$-\frac{25}{4} + \frac{1}{4}x = y$

$-6.25 + \frac{1}{4}x = y$

$f(x) = 4x + 68$

$y = 4x + 68$

$x = 4y + 68$

$-68 \quad -68$

Distributive property first? (might be easier)

$\frac{x - 68}{4} = \frac{4y}{4}$

$\frac{1}{4}x - 17 = y$

$f^{-1}(x) = \frac{1}{4}x - 17$

$f^{-1}(x) = \frac{1}{4}x - \frac{2}{4}$

$\frac{y}{2} \cdot \frac{2}{1}$ $\quad -\frac{1}{3}y \cdot \frac{-3}{1}$

1. Change to y=
2. Exchange x&y
3. Solve for y= again
4. Relabel f^{-1}

y= cost C(x)

DOWNLOADS An online music subscription service allows members to download songs for $0.99 each after paying a monthly service charge of $3.99. The total monthly cost $C(x)$ of the service in dollars is $C(x) = 3.99 + 0.99x$, where x is the number of songs downloaded.

$y = 3.99 + 0.99x$

a. Find the inverse function.

b. What do x and $C^{-1}(x)$ represent in the context of the inverse function?

c. How many songs were downloaded if a member's monthly bill is $27.75?

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$x = 3.99 + 0.99y$

$-3.99 \quad -3.99$

$\frac{x - 3.99}{0.99} = \frac{0.99y}{0.99}$

$C^{-1} = \frac{27.75 - 3.99}{0.99}$

cost is a function of # of songs
songs is a function of cos

y= cost C(x)

21. LANDSCAPING At the start of the mowing season, Chuck collects a one-time maintenance fee of $10 from his customers. He charges the Fosters $35 for each cut. The total amount collected from the Fosters in dollars for the season is $C(x) = 10 + 35x$, where x is the number of times Chuck mows the Fosters' lawn.

a. Find the inverse function.

b. What do x and $C^{-1}(x)$ represent in the context of the inverse function?

c. How many times did Chuck mow the Fosters' lawn if he collected a total of $780 from them?

$y = 10 + 35x$

$x = 10 + 35y$

$-10 \quad -10$

$\frac{-10+x}{35} = \frac{35y}{35}$

$C^{-1}(x) = -\frac{2}{7} + \frac{1}{35}x = y$

$C^{-1}(x) = \frac{x-10}{35} = y$

Cost is a function of number of times mowed

# of times mowed is a function of cost

$C^{-1}(x) = \frac{780-10}{35}$

$$f(x) = 3x + 8$$

$$y = 3x + 8$$

$$x = 3y + 8$$

$$-8 \quad -8$$

$$\frac{x-8}{3} = \frac{3y}{3}$$

$$\frac{1}{3}x + \frac{-8}{3} = y$$

$$f^{-1}(x) = \frac{1}{3}x - \frac{8}{3}$$