Algebra 1 4.7

Find the inverse of a relation

Find the inverse of a linear function

relation

inverse

function

inverse function

x

domain

y

range

whiteboards

$(3, 5) \rightarrow (5, 3)$

$(-2, 6) \rightarrow (6, -2)$

$y = mx + b$

$x = my + b$

Find the inverse of each function.

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

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

$y = 4x + 68$

$\frac{1}{\frac{1}{2}} \cdot \frac{2}{1}$

Distributive property first?
(might be easier)

$y = 25 + 4x$

$x = 25 + 4y$

$-25 \quad -25$

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

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

$f^{-1}(x) = \frac{1}{4}x - \frac{25}{4}$

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

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

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

$-5 \quad -5$

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

$2x - 10 = y$

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

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

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

$-x \quad -x$

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

$y = 2x - 10$

$y = 4x + 68$

$x = 4y + 68$

$-68 \quad -68$

$x + -68 = 4y$

$\frac{}{4} \quad \frac{}{4} \quad \frac{4y}{4}$

$x = 4y + 68$

$-4y \quad -4y$

$-4y + x = 68$

$-x \quad -x$

$-4y = -x + 68$

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

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

$f(x) = 2(x-6)$

$y = \frac{1}{3}x + 5$

$x = \frac{1}{3}y + 5$

$-\frac{1}{3}4 \quad -\frac{1}{3}y$

$-\frac{1}{3}y + x = 5$

$-x \quad -x$

$-3 \cdot -\frac{1}{3}y = -x + 5$

$-3 \quad -3$

$y = 3x + -15$

$f(x) = 4x - 6$

$y = 4x - 6$

$x = 4y - 6$

$-4y \quad -4y$

$-4y + x = -6$

$-x \quad -x$

$-4y = -x - 6$

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

$y = \frac{1}{4}x + \frac{3}{2}$

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.

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?

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

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?

Cost is a function of number of times mowed
# of times mowed is a function of cost