Algebra 1   4.7
Find the inverse of a relation
Find the inverse of a linear function

relation
inverse
function
inverse function
⎡domain   x's
⎣range   y's
whiteboards

Find the inverse of each function.

14. $f(x) = 25 + 4x$ → $x = 25 + 4y$

$\underline{-25 \quad -25}$

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

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

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

Distributive property first?
(might be easier)

org

$(3, 5) \quad (2, 4) \quad (-6, 4)$

inv. ↓ ↓ ↓

$(5, 3) \quad (4, 2) \quad (4, -6)$

D: 3, 2, -6
R: 5, 4

D: 5, 4
R: 3, 2, -6

$$f(x) = 4(x+17)$$
$$y = 4x + 68$$

$$f^{-1}(x) = \frac{x - 68}{4}$$

$$x = 4y + 68$$
$$-68 \qquad -68$$

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

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

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

y= cost C(x)

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.

$$x = 3.99 + 0.99y$$
$$-3.99 \quad -3.99$$

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?

27.75

a)

$$C^{-1}(x) = \frac{x - 3.99}{0.99}$$

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

$$x = 24$$

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.

$x = 10 + 35y$
$-10 \quad -10$

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?

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

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

$$= \frac{780-10}{35} = 22$$

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

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