CC-3

Inverse of a Linear Function

Content Standard

F.BF.4.a Solve an equation of the form $f(x) = c$ for a simple function f that has an inverse and write an expression for the inverse.

Let f be a function. If there is another function that pairs b with a whenever f pairs a with b, then functions are called **inverse functions.**

You can find the inverse function algebraically.

Example

Find the inverse of the function $f(x) = -2x + 4$.

Step 1 **Replace $f(x)$ with y. Then switch x for y and y for x.**

$y = -2x + 4$ Write $f(x)$ as y.

$x = -2y + 4$ Switch x and y.

Step 2 **Solve for y.**

$x - 4 = -2y$ Subtract 4 from each side.

$\frac{x - 4}{-2} = \frac{-2y}{-2}$ Divide by -2.

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

Step 3 **Write in function notation, using f^{-1} to represent the inverse of the function f.**

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

Exercises

Find the inverse of each function.

1. $f(x) = 4x - 2$
2. $f(x) = 3x + 2$
3. $f(x) = -2x - 3$
4. $f(x) = \frac{1}{2}x + 1$
5. $f(x) = 4x + 8$
6. $f(x) = -4x$
7. $f(x) = 2 - 7x$
8. $f(x) = \frac{1}{4}x - 4$
9. $f(x) = -\frac{2}{3}x + 1$
10. $f(x) = 2x + 8$
11. $f(x) = -4x + 8$
12. $f(x) = -1 - 2x$
13. $f(x) = -7 + x$
14. $f(x) = 4x - 5$
15. $f(x) = \frac{3}{4}x - 1$
16. $f(x) = x - 1$
17. $f(x) = -2 - \frac{3}{2}x$
18. $f(x) = -\frac{1}{6}x + 1$

19. **Reasoning** Why does interchanging the x and y match the definition of an inverse function?