LESSON MAKER PRO

Inverse Unlock

Reverse a function to solve for the input.

HIGH SCHOOL · HSF-BF.B.4a

CCSS.Math.Content.HSF-BF.B.4a "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. For example, f(x) =2 x 3 or f(x) = (x+1)/(x-1) for x ≠ 1."

NAME _____ **DATE** _____

REVERSE THE RULE

To find an inverse, write y=f(x), switch x and y, and solve for y. If f has an inverse, you can solve f(x)=c by finding $f^{-1}(c)$. Keep any domain restrictions that prevent a denominator from being zero or make a function one-to-one.

WORKED EXAMPLE

For f(x)=8x-11, find $f^{-1}(x)$ and solve f(x)=29.

1. Write y=8x-11.
2. Swap x and y: x=8y-11.
3. Solve for y: y=(x+11)/8.
4. Evaluate the inverse: $f^{-1}(29)=(29+11)/8=5$.

Answer: $f^{-1}(x)=(x+11)/8$; x=5

PRACTICE 6 problems

1 For f(x)=3x+2, find $f^{-1}(x)$. Then solve f(x)=20.

ANSWER _____

2 For f(x)=(x-1)/6, find $f^{-1}(x)$. Then solve f(x)=4.

ANSWER _____

3 For f(x)=7-2x, find $f^{-1}(x)$. Then solve f(x)=1.

ANSWER _____

4 For f(x)=(x+2)/(x-3), x != 3, find $f^{-1}(x)$. Then solve f(x)=4.

ANSWER _____

5 For f(x)=(7x+1)/3, find $f^{-1}(x)$. Then solve f(x)=6.

ANSWER _____

6 For $f(x)=x^2$ with x >= 0, find $f^{-1}(x)$. Then solve f(x)=49.

ANSWER _____

APPLY IT Show your work

1 A student orders custom stickers. The total cost, in dollars, is C(n)=6n+4, where n is the number of stickers. Write $C^{-1}(x)$. Then find how many stickers were ordered if the total cost was $22.

WORK SPACE

ANSWER _____

2 During a science club project, a sensor reports temperature in kelvins using K(c)=c+273, where c is the temperature in degrees Celsius. Write $K^{-1}(x)$. Then find the Celsius temperature when the sensor reads 293 K.

WORK SPACE

ANSWER _____

CHALLENGE One step up

For f(x)=(2x-3)/(x+4), x != -4, write $f^{-1}(x)$, solve f(x)=1, and state the excluded value for the inverse.

WORK SPACE AND ANSWER

Inverse Unlock

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	For f(x)=3x+2, find $f^{-1}(x)$. Then solve f(x)=20.	**$f^{-1}(x)=(x-2)/3$; x=6**
2	For f(x)=(x-1)/6, find $f^{-1}(x)$. Then solve f(x)=4.	**$f^{-1}(x)=6x+1$; x=25**
3	For f(x)=7-2x, find $f^{-1}(x)$. Then solve f(x)=1.	**$f^{-1}(x)=(7-x)/2$; x=3**
4	For f(x)=(x+2)/(x-3), x != 3, find $f^{-1}(x)$. Then solve f(x)=4.	**$f^{-1}(x)=(3x+2)/(x-1)$, x != 1; x=14/3**
5	For f(x)=(7x+1)/3, find $f^{-1}(x)$. Then solve f(x)=6.	**$f^{-1}(x)=(3x-1)/7$; x=17/7**
6	For f(x)=x^2 with x >= 0, find $f^{-1}(x)$. Then solve f(x)=49.	**$f^{-1}(x)$=sqrt(x), x >= 0; x=7**

PART 2 · APPLY IT

1. **$C^{-1}(x)=(x-4)/6$; 3 stickers** Reverse the cost rule by subtracting 4 and dividing by 6. $C^{-1}(22)=(22-4)/6=3$.
2. **$K^{-1}(x)=x-273$; 20 degrees Celsius** Reverse the conversion by subtracting 273. $K^{-1}(293)=293-273=20$.

CHALLENGE

$f^{-1}(x)=(4x+3)/(2-x)$, x != 2; f(x)=1 when x=7.

Accept algebraically equivalent inverse expressions, including equivalent forms with both numerator and denominator multiplied by -1. Require the stated restrictions for the rational functions and the nonnegative domain for the square function.