LESSON MAKER PRO

Reverse Function Lab

Switch inputs and outputs to find inverse rules.

HIGH SCHOOL · HSF-BF.B.4

CCSS.Math.Content.HSF-BF.B.4 "Find inverse functions."

NAME _____ DATE _____

UNDO THE RULE

To find an inverse, write y = the function rule, switch x and y, and solve for y. The inverse reverses the original function, so an input and output trade places. Check that the inverse's domain matches values the original function can produce.

WORKED EXAMPLE

Find $f^{-1}(x)$ for $f(x)=3x+8$.

1. Write $y=3x+8$.
2. Switch x and y: $x=3y+8$.
3. Subtract 8: $x-8=3y$.
4. Divide by 3: $y=(x-8)/3$.

Answer: $f^{-1}(x)=(x-8)/3$

PRACTICE 6 problems

1 Find the inverse of $f(x)=2x-5$.

ANSWER _____

2 Find the inverse of $g(x)=(x+4)/6$.

ANSWER _____

3 Find the inverse of $h(x)=x^5+1$.

ANSWER _____

4 Find the inverse of $k(x)=\sqrt{x+2}$, where $x\geq -2$. Include the domain of the inverse.

ANSWER _____

5 Find the inverse of $m(x)=1/(x-2)$. State the restriction on the inverse input.

ANSWER _____

6 Find the inverse of $n(x)=7-4x$.

ANSWER _____

APPLY IT Show your work

1 A game app gives 12 starter points and 7 points for each quest q. A player's score is S(q)=7q+12. Write $S^{-1}(x)$. Then use it to find how many quests a player completed for a score of 54.

WORK SPACE

ANSWER _____

2 A custom T-shirt site charges $5 for shipping plus $6 per shirt n, so T(n)=6n+5. Write $T^{-1}(x)$. What number of shirts has a total of $41?

WORK SPACE

ANSWER _____

CHALLENGE One step up

Find the inverse of r(x)=(5x-2)/(x+4). State the restriction on the inverse input and explain in one sentence why that input cannot be used.

WORK SPACE AND ANSWER

ANSWER KEY # Reverse Function Lab

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find the inverse of f(x)=2x-5.	**$f^{-1}(x)=(x+5)/2$**
2	Find the inverse of g(x)=(x+4)/6.	**$g^{-1}(x)=6x-4$**
3	Find the inverse of $h(x)=x^5+1$.	**$h^{-1}(x)=(x-1)^{(1/5)}$**
4	Find the inverse of k(x)=sqrt(x+2), where x>=-2. Include the domain of the inverse.	**$k^{-1}(x)=x^2-2$, where x>=0**
5	Find the inverse of m(x)=1/(x-2). State the restriction on the inverse input.	**$m^{-1}(x)=2+1/x$, where x!=0**
6	Find the inverse of n(x)=7-4x.	**$n^{-1}(x)=(7-x)/4$**

PART 2 · APPLY IT

1. **$S^{-1}(x)=(x-12)/7$; 6 quests** Switch the score and quest variables, then solve for q to get q=(x-12)/7. Substituting 54 gives (54-12)/7=6.
2. **$T^{-1}(x)=(x-5)/6$; 6 shirts** Switch the total and shirt variables, then solve for n to get n=(x-5)/6. Substituting 41 gives (41-5)/6=6.

CHALLENGE

$r^{-1}(x)=(4x+2)/(5-x)$, where x!=5. The input 5 cannot be used because no output of r(x) equals 5.

Accept algebraically equivalent inverse rules, such as -(x-7)/4 for problem 6. For inverse functions with restrictions, accept equivalent domain statements such as x cannot equal the excluded value.