

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

CHALLENGE

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.

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 $x \geq -2$. Include the domain of the inverse.	$k^{-1}(x)=x^2-2$, where $x \geq 0$
5	Find the inverse of $m(x)=1/(x-2)$. State the restriction on the inverse input.	$m^{-1}(x)=2+1/x$, where $x \neq 0$
6	Find the inverse of $n(x)=7-4x$.	$n^{-1}(x)=(7-x)/4$

PART 2 · APPLY IT

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