

Reverse Function Lab

Undo a function to find the original input.

HIGH SCHOOL • MA.912.F.3.9

MA.912.F.3.9 "Solve mathematical and real-world problems involving inverse functions."

NAME _____

DATE _____

UNDO THE RULE

An inverse function reverses the rule of the original function. To find an inverse, write $y = f(x)$, switch x and y , then solve for y . An inverse should return the original input when it undoes the function.

WORKED EXAMPLE

Find the inverse of $g(x) = 4x + 11$.

1. Write $y = 4x + 11$.
2. Switch x and y : $x = 4y + 11$.
3. Subtract 11: $x - 11 = 4y$.
4. Divide by 4: $y = (x - 11)/4$.

Answer: $g^{-1}(x) = (x - 11)/4$

PRACTICE 6 problems

1 Find the inverse of $f(x) = 3x - 8$.

ANSWER _____

2 Find the inverse of $h(x) = (x + 2)/7$.

ANSWER _____

3 Find the inverse of $p(x) = x^2 - 9$, where $x \geq 0$.

ANSWER _____

4 Find the inverse of $q(x) = 12 - 5x$.

ANSWER _____

5 For $r(x) = 2x + 13$, find $r^{-1}(23)$.

ANSWER _____

6 Let $m(x) = 3x + 1$ and $n(x) = x - 6$. Find the inverse of $m(n(x))$.

ANSWER _____

APPLY IT Show your work

- 1** A music app gives a creator score using the rule $\text{score} = 3x + 12$, where x is the number of downloads in hundreds. A creator has a score of 42. How many downloads does the creator have?

WORK SPACE

ANSWER _____

- 2** At a skateboard shop, a deck length in centimeters is found using $C = 2.54x$, where x is the length in inches. A deck is 76.2 centimeters long. How long is it in inches?

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Find the inverse of $u(x) = (3x + 2)/(x - 5)$. State the value that x cannot equal in the inverse function.

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find the inverse of $f(x) = 3x - 8$.	$f^{-1}(x) = (x + 8)/3$
2	Find the inverse of $h(x) = (x + 2)/7$.	$h^{-1}(x) = 7x - 2$
3	Find the inverse of $p(x) = x^2 - 9$, where $x \geq 0$.	$p^{-1}(x) = \sqrt{x + 9}$
4	Find the inverse of $q(x) = 12 - 5x$.	$q^{-1}(x) = (12 - x)/5$
5	For $r(x) = 2x + 13$, find $r^{-1}(23)$.	5
6	Let $m(x) = 3x + 1$ and $n(x) = x - 6$. Find the inverse of $m(n(x))$.	$(m(n(x)))^{-1} = (x + 17)/3$

PART 2 · APPLY IT

- 1,000 downloads** Set $42 = 3x + 12$ and solve to get $x = 10$. Since x counts hundreds of downloads, 10 means 1,000 downloads.
- 30 inches** Use the inverse rule $x = C/2.54$. Substitute 76.2 for C to get $x = 30$.

CHALLENGE

$$u^{-1}(x) = (5x + 2)/(x - 3), \text{ where } x \neq 3$$

Accept algebraically equivalent inverse rules and equivalent restriction wording. For the music score problem, accept $x = 10$ only when it is identified as 10 hundreds, or 1,000 downloads.