

Inverse Detective

Decide when a function can be reversed.

HIGH SCHOOL • MA.912.F.3.6

MA.912.F.3.6 "Determine whether an inverse function exists by analyzing tables, graphs and equations."

NAME _____

DATE _____

WHEN CAN YOU REVERSE IT?

An inverse function exists when no output y is matched with more than one input x . In a table, look for repeated outputs, and on a graph use the horizontal line test. For an equation, decide whether different x -values can give the same y -value, considering any stated domain.

WORKED EXAMPLE

Determine whether $y=8x-11$ has an inverse function.

1. Start with $y=8x-11$.
2. Swap x and y : $x=8y-11$.
3. Add 11, then divide by 8: $y=(x+11)/8$.
4. Each input gives one output in this reversed rule.

Answer: Yes. An inverse exists: $y=(x+11)/8$.

PRACTICE 6 problems

- 1** Determine whether this table represents a function with an inverse. x : -5, -1, 2 y : 3, 0, 6

ANSWER _____

- 2** Determine whether this table represents a function with an inverse. x : -3, 1, 5 y : 2, 2, 9

ANSWER _____

- 3** Does the graph of $y=|x|$ have an inverse function?

ANSWER _____

- 4** Does the graph of $y=-3x+5$ have an inverse function?

ANSWER _____

- 5** Does $y=x^2+2$, with domain $x \geq 0$, have an inverse function?

ANSWER _____

- 6** Does $y=(x-1)^3-2$ have an inverse function?

ANSWER _____

APPLY IT Show your work

- 1** An art club's online portfolio maps the number of photos uploaded to storage credits used. photos: 2, 4, 6, 10 credits: 1, 3, 3, 5 Can storage credits be used to find exactly one number of photos? Determine whether an inverse function exists.

WORK SPACE

ANSWER _____

- 2** At an esports club, points are given by $y=6x+1$, where x is the number of completed challenges and x is a whole number greater than or equal to 0. Can a point total from this rule identify exactly one number of completed challenges? Determine whether an inverse function exists.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

A function is defined by $y=x^2-12x+20$ for $x \geq 6$. Does an inverse function exist? Explain your reasoning without finding the inverse equation.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Determine whether this table represents a function with an inverse. x: -5, -1, 2 y: 3, 0, 6	Yes. No output is repeated.
2	Determine whether this table represents a function with an inverse. x: -3, 1, 5 y: 2, 2, 9	No. The output 2 is paired with two different inputs.
3	Does the graph of $y= x $ have an inverse function?	No. A horizontal line such as $y=2$ intersects the graph twice.
4	Does the graph of $y=-3x+5$ have an inverse function?	Yes. Every horizontal line intersects the graph at most once.
5	Does $y=x^2+2$, with domain $x \geq 0$, have an inverse function?	Yes. On the stated domain, each output comes from only one input.
6	Does $y=(x-1)^3-2$ have an inverse function?	Yes. Different x-values give different outputs.

PART 2 • APPLY IT

- No. An inverse function does not exist.** The output 3 credits is paired with both 4 photos and 6 photos. The inverse would send one input to two outputs.
- Yes. An inverse function exists.** Each time x increases by 1, y increases by 6. No two completed-challenge totals produce the same point total.

CHALLENGE

Yes. For $x \geq 6$, $y=(x-6)^2-16$ increases as x increases, so every horizontal line meets the allowed part of the graph at most once.

Accept equivalent one-to-one reasoning, including references to repeated outputs or the horizontal line test. For the domain-restricted equation and challenge, students must use the stated domain when deciding whether an inverse exists.