

Input Output Detective

Decide when a rule is a function and read its outputs.

HIGH SCHOOL • HSF-IF.A.1

CCSS.Math.Content.HSF-IF.A.1 "Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain..."

NAME _____

DATE _____

ONE INPUT, ONE OUTPUT

A function matches every input in its domain with one and only one output in its range. An input cannot have two different outputs, but different inputs may share an output. In $y=f(x)$, $f(x)$ is the output for input x , and a point (x,y) on the graph shows $y=f(x)$.

WORKED EXAMPLE

For $f(x)=5x-2$, find $f(6)$.

1. Substitute 6 for x : $f(6)=5(6)-2$.
2. Multiply: $5(6)=30$.
3. Subtract: $30-2=28$.

Answer: $f(6)=28$

PRACTICE 6 problems

- 1** Does the relation $\{(a,r),(b,s),(c,t)\}$ define a function?

ANSWER _____

- 2** Does the relation $\{(p,m),(q,n),(p,k)\}$ define a function? If not, name the input that causes a problem.

ANSWER _____

- 3** If $g(x)=x+7$, find $g(-3)$.

ANSWER _____

- 4** Find the domain and range of $\{(-4,9),(0,7),(8,9)\}$.

ANSWER _____

- 5** The table shows a rule q . Input x : $-8 \mid 0 \mid 4$
Output $q(x)$: $9 \mid 9 \mid 9$ Does q define a function?

ANSWER _____

- 6** A point $(12,-9)$ is on the graph $y=r(x)$. Find $r(12)$.

ANSWER _____

APPLY IT Show your work

- 1** Maya uses a photo-printing app. The cost $c(n)$, in dollars, for n prints is $c(n)=n+4$. Find $c(16)$ and explain what it means.

WORK SPACE

ANSWER _____

- 2** An online game assigns a badge level based on total points. Its record lists (40,Bronze), (75,Silver), and (40,Gold), where each pair is (points,badge level). Does this record define a function from points to badge level? Explain.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

For which values of k does the relation $\{(k,8),(3,k),(7,11)\}$ define a function? Explain your reasoning.

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Does the relation $\{(a,r),(b,s),(c,t)\}$ define a function?	Yes. Each input, a, b, and c, has exactly one output.
2	Does the relation $\{(p,m),(q,n),(p,k)\}$ define a function? If not, name the input that causes a problem.	No. Input p has two different outputs, m and k.
3	If $g(x)=x+7$, find $g(-3)$.	$g(-3)=4$
4	Find the domain and range of $\{(-4,9),(0,7),(8,9)\}$.	Domain: $\{-4,0,8\}$; range: $\{7,9\}$
5	The table shows a rule q. Input x: -8 0 4 Output q(x): 9 9 9 Does q define a function?	Yes. Each input has exactly one output.
6	A point (12,-9) is on the graph $y=r(x)$. Find $r(12)$.	$r(12)=-9$

PART 2 · APPLY IT

- $c(16)=20$. Ordering 16 prints costs \$20.** Substitute 16 for n in $c(n)=n+4$. The output is the cost in dollars for 16 prints.
- No. The input 40 is assigned to two different outputs, Bronze and Gold.** Check whether each points value has one badge level. Since 40 appears with two different badge levels, the relation is not a function.

CHALLENGE

The relation is a function for all real values of k except 3 and 7. If $k=3$, input 3 has outputs 8 and 3. If $k=7$, input 7 has outputs 8 and 11.

Accept domain and range sets in any order. For function explanations, accept equivalent statements that identify one input paired with two different outputs.