What Is a Function?

Spot mistakes, reason, and work backward

Name _____ **Date** _____ **Score** _____ / 10

QUICK REVIEW

Test a proposed function by looking for a single input paired with different outputs. Repeating $(2, 5)$ does not create a conflict, but adding $(2, 7)$ does. A repair may delete one conflicting pair or change an output. Reversing inputs and outputs can destroy the function property when original outputs repeat.

Worked example

Example for form 2: test this assignment. $\{(2, 4), (3, 4), (4, 6)\}$

1. Group the pairs by input: $2 \mapsto 4$, $3 \mapsto 4$, $4 \mapsto 6$.

2. Input 2 gives only 4, and every other listed input also has exactly one output. Repeated outputs are allowed, so this relation is a function on its listed domain.

Answer: A function.

Practice Problems

Show your thinking.

1. A learner says repeated outputs make this fail. Correct the claim. $\{(1, 8), (2, 8), (3, 8)\}$

2. A learner says three pairs always form a function. Test the claim. $\{(2, 1), (2, 4), (5, 7)\}$

3. Delete one pair to make a function. $\{(0, 3), (1, 4), (0, 8)\}$

4. Repair by deleting one conflicting pair. $\{(-1, 2), (2, 5), (-1, 6)\}$

5. After reversing a function, these pairs result. Is the inverse relation a function? $\{(6, 1), (6, 2), (9, 3)\}$

6. A reversed relation has these pairs. Test whether it is a function. $\{(2, 1), (4, 2), (6, 3)\}$

7. Fill k so $(3, 8), (5, 9), (3, k)$ is a function.

8. Can changing only the last output repair $(1, 2), (1, 3), (4, 9)$? Explain.

9. A table lists $(0, 5), (1, 6), (0, 5)$. A learner counts two rows for 0 and rejects it. Explain.

10. Choose $a = 2$ or $a = 7$ so $(2, 3), (7, 8), (a, 3)$ is a function.

Answer Key

1. A function.
2. Not a function.
3. Remove $(0, 8)$ (one valid choice).
4. Remove $(-1, 6)$ (one valid choice).
5. Not a function.
6. A function.
7. $k = 8$
8. No.
9. It is a function.
10. $a = 2$

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. Group the pairs by input: $1 \mapsto 8$, $2 \mapsto 8$, $3 \mapsto 8$.

2. Input 1 gives only 8, and every other listed input also has exactly one output. Repeated outputs are allowed, so this relation is a function on its listed domain.

Problem 2

1. For input 2, the listed pairs give outputs 1 and 4; these are different because $1 \neq 4$.

2. The same input 2 therefore has two outputs. This violates the one-output rule, so this relation is not a function.

Problem 3

1. Only input 0 conflicts: it is paired with 3 and 8. Keep the pair $(0, 3)$.

2. Delete $(0, 8)$. Each remaining input has one output; deleting the other conflicting pair would also work.

Problem 4

1. Only input -1 conflicts: it is paired with 2 and 6. Keep the pair $(-1, 2)$.

2. Delete $(-1, 6)$. Each remaining input has one output; deleting the other conflicting pair would also work.

Problem 5

1. For input 6, the listed pairs give outputs 1 and 2; these are different because $1 \neq 2$.

2. The same input 6 therefore has two outputs. This violates the one-output rule, so this relation is not a function.

Problem 6

1. Group the pairs by input: $2 \mapsto 1$, $4 \mapsto 2$, $6 \mapsto 3$.

2. Input 2 gives only 1, and every other listed input also has exactly one output. Repeated outputs are allowed, so this relation is a function on its listed domain.

Problem 7

1. Input 3 already has output 8 in $(3, 8)$. The pair $(3, k)$ must agree with that assignment.

2. Therefore $k = 8$. The repeated pair $(3, 8)$ is harmless; any value $k \neq 8$ would give input 3 two different outputs.

Problem 8

1. The conflict is $(1, 2)$ versus $(1, 3)$: input 1 has outputs $2 \neq 3$. The pair $(4, 9)$ is not involved.

2. Changing 9 to any value leaves the two assignments for input 1. One of those first two pairs must change instead.

Problem 9

1. Both rows with input 0 give 5: $0 \mapsto 5$ and $0 \mapsto 5$. Input 1 gives 6.

2. There is only one distinct output for each input. Count different outputs, not repeated rows; the relation is a function.

Problem 10

1. If $a = 2$, the added pair is $(2, 3)$, which agrees with the existing output 3.

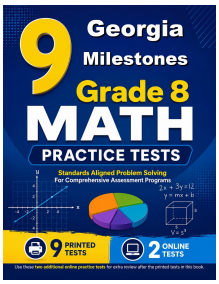
2. If $a = 7$, input 7 has outputs 8 and 3. Since $8 \neq 3$, reject 7 and choose $a = 2$.

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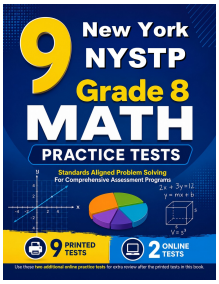
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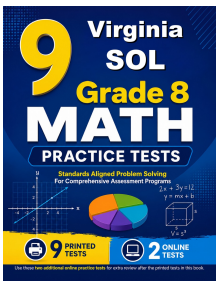
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