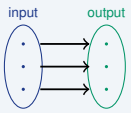
Relations and Functions

Name: _____	Date: _____	Score: _____ / 18

Quick Review and Helpful Hints

A *relation* is any set of ordered pairs. A *function* is a special relation where every input (x) has *exactly one* output (y). To check: make sure no x-value is paired with two different y-values. On a graph, use the *vertical line test* – a vertical line may touch the graph only once.

▷ **Example:** Is $\{(1,2),(2,4),(3,6)\}$ a function? **Work:** Each input $1, 2, 3$ appears just once, so each has only one output. ★ **Answer:** Yes



Each input → exactly one output.

Practice Problems

Tell whether each relation is a function (Yes/No).

1. $\{(1,2),(2,3),(3,4)\}$ _____
2. $\{(1,2),(1,3),(2,4)\}$ _____
3. $\{(0,5),(1,5),(2,5)\}$ _____
4. $\{(4,1),(4,2),(5,3)\}$ _____
5. $\{(-1,0),(0,1),(1,2)\}$ _____
6. $\{(2,2),(3,3),(2,4)\}$ _____
7. $\{(7,1),(8,1),(9,1)\}$ _____
8. $\{(1,1),(2,2),(3,3),(1,4)\}$ _____
9. Inputs $1, 2, 3, 4$ each with one y _____
10. A vertical line hits the graph twice _____
11. $\{(5,10),(6,12),(7,14)\}$ _____
12. $\{(0,0),(0,1)\}$ _____
13. $\{(-2,3),(-1,3),(0,3)\}$ _____
14. $\{(1,5),(2,6),(3,7),(2,8)\}$ _____

Word Problems

15. A machine gives each input exactly one output. Is it a function? _____
16. Is the relation "person → their birth month" a function? _____
17. Is "x → its square roots" a function (for example $4 \to 2$ and -2)? _____
18. Is $\{(1,2),(2,4),(3,6),(4,8)\}$ a function? _____

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Answer Keys

1. Yes	**7.** Yes	**13.** Yes
2. No	**8.** No	**14.** No
3. Yes	**9.** Yes	**15.** Yes
4. No	**10.** No	**16.** Yes
5. Yes	**11.** Yes	**17.** No
6. No	**12.** No	**18.** Yes

Step-by-Step Explanations

1. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Each x $(1, 2, 3)$ appears once: yes. So the final answer is Yes.

2. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is $x = 1$ pairs with both 2 and 3: no. So the final answer is No.

3. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Repeated y-values are fine; each x is unique: yes. So the final answer is Yes.

4. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is $x = 4$ pairs with both 1 and 2: no. So the final answer is No.

5. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Every x is different: yes. So the final answer is Yes.

6. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is $x = 2$ pairs with 2 and 4: no. So the final answer is No.

7. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Each x is unique (same y is okay): yes. So the final answer is Yes.

8. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is $x = 1$ appears with 1 and 4: no. So the final answer is No.

9. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is No input is repeated: yes. So the final answer is Yes.

10. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is It fails the vertical line test: no. So the final answer is No.

11. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Each x is unique: yes. So the final answer is Yes.

12. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is $x = 0$ has two outputs: no. So the final answer is No.

13. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is All x-values differ: yes. So the final answer is Yes.

14. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is $x = 2$ pairs with 6 and 8: no. So the final answer is No.

15. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is One output per input: yes. So the final answer is Yes.

16. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Each person has one birth month: yes. So the final answer is Yes.

17. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is 4 has two roots (2 and -2): no. So the final answer is No.

18. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Every x is unique: yes. So the final answer is Yes.

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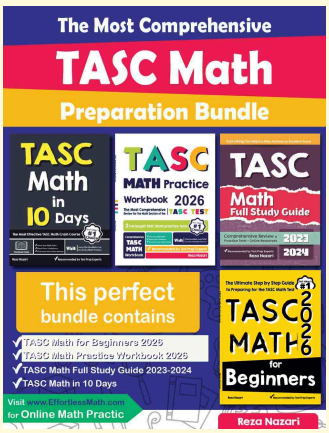

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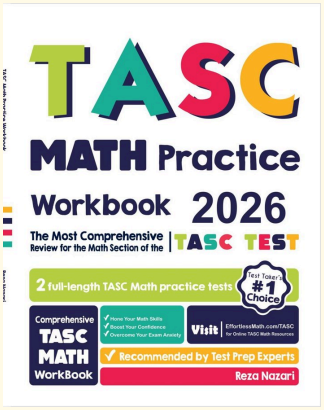

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