One Input, What?

Sort relations by what happens to each input.

MT.CORE.ALG.FUN.2 "Understand the definition of a function and distinguish between functions and relations."

NAME _____ DATE _____

FUNCTION	NOT A FUNCTION
Each input has exactly one output. Different inputs can share the same output. Input 11 gives output 20, and input 12 also gives output 20.	At least one input has two different outputs. Input 13 gives output 21 and output 22.

1 SORT

8 items

For each numbered relation, circle FUNCTION or FAILS, then choose two items from different categories and explain how you know.

1. 1. {(-6, 0), (0, 0), (3, 7)} FUNCTION FAILS

2. 2. {(-5, 2), (1, 4), (-5, 9)} FUNCTION FAILS

3. 3. {(-4, 1), (-4, 3), (2, 8)} FUNCTION FAILS

4. 4. $y = 3x + 1$, for all real x FUNCTION FAILS

5. 5. {(1, 2), (3, 4), (5, 6)} FUNCTION FAILS

6. 6. $y = x^2$, for all real x FUNCTION FAILS

7. 7. $y^2 = x^2 + 1$, for all real x FUNCTION FAILS

8. 8. {(1, -3), (2, -3), (3, -3)} FUNCTION FAILS

2 PROVE IT

Explain your thinking

Pick two items from Part 1. For each one, tell how you knew where it belonged.

ITEM # _____ **HOW I KNEW** _____

ITEM # _____ **HOW I KNEW** _____

3 MAKE YOUR OWN

One of each

Write one new relation that is a function and one new relation that is not a function.

FUNCTION _____

FAILS _____

CHALLENGE

Change exactly one ordered pair in item 3 to make it a function, then explain why your change works.

One Input, What?

PART 1 · SORT

#	ITEM	CATEGORY	WHY
1	1. {(-6, 0), (0, 0), (3, 7)}	**FUNCTION**	Each input appears with only one output; two inputs share output 0.
2	2. {(-5, 2), (1, 4), (-5, 9)}	**FAILS**	Input -5 has two different outputs, 2 and 9.
3	3. {(-4, 1), (-4, 3), (2, 8)}	**FAILS**	Input -4 has two different outputs, 1 and 3.
4	4. $y = 3x + 1$, for all real x	**FUNCTION**	The rule gives exactly one y-value for each real x-value.
5	5. {(1, 2), (3, 4), (5, 6)}	**FUNCTION**	Each input has exactly one output.
6	6. $y = x^2$, for all real x	**FUNCTION**	Squaring each real x-value gives exactly one y-value.
7	7. $y^2 = x^2 + 1$, for all real x	**FAILS**	Every real x-value gives two y-values, one positive and one negative.
8	8. {(1, -3), (2, -3), (3, -3)}	**FUNCTION**	Each input has one output, even though all three share output -3.

PART 2 · PROVE IT

Accept any explanation that names the deciding feature from the rule box for the chosen item.

PART 3 · MAKE YOUR OWN (SAMPLE ANSWERS)

- **FUNCTION**: {(14, 5), (15, 5), (16, 2)}
- **FAILS**: {(14, 5), (14, 6), (16, 2)}

Challenge: Change (-4, 3) to (6, 3). The inputs are now -4, 6, and 2, so each has exactly one output.

For Part 2, students should name an input and its output or outputs. For example, item 1 is a function because each input has one output; item 2 is not because -5 has outputs 2 and 9.