Inputs or Outputs

Sort the sets, explain two choices, and create your own.

A2.F.1.1 "Use algebraic, interval, and set notations to specify the domain and range of various types of functions, and evaluate a function at a given point in its domain."

NAME _____ DATE _____

DOMAIN

The domain is the set of all allowed inputs. A number belongs to the domain if you can use it in the function.

For $f(t) = \ln(t - 11)$, the domain is $(11, \infty)$.

RANGE

The range is the set of all possible outputs. A number belongs to the range if the function can produce it.

For $g(t) = -t^4 - 17$, the range is $(-\infty, -17]$.

1 SORT

8 items

Circle DOMAIN or RANGE for each set, then choose two items, one from each category, and explain how you knew.

1. $f(x) = \sqrt{(x - 6)}$; $[6, \infty)$ DOMAIN RANGE

2. $f(x) = 1/(x + 4)$; $\{x \in \mathbb{R} \mid x \neq -4\}$ DOMAIN RANGE

3. $f(x) = (x - 2)^2 + 7$; $[7, \infty)$ DOMAIN RANGE

4. $f(x) = 2^x + 6$; $(-\infty, \infty)$ DOMAIN RANGE

5. $f(x) = \sqrt{(10 - x)}$; $(-\infty, 10]$ DOMAIN RANGE

6. $f(x) = |x - 8| - 3$; $[-3, \infty)$ DOMAIN RANGE

7. $f(x) = 1/(x - 3) + 2$; $\{y \in \mathbb{R} \mid y \neq 2\}$ DOMAIN RANGE

8. $f(x) = (x + 5)^2$, $x \geq -5$; $[-5, \infty)$ DOMAIN RANGE

2 PROVE IT

Explain your thinking

Choose two items, one from each category, and explain how you knew.

ITEM # _____ **HOW I KNEW** _____

ITEM # _____ **HOW I KNEW** _____

3 MAKE YOUR OWN

One of each

Write a new function and its complete domain for DOMAIN, then a different function and its complete range for RANGE; use interval or set notation.

DOMAIN _____

RANGE _____

CHALLENGE

Create a function whose domain excludes exactly one real number and whose range excludes a different real number; give both sets in set notation and evaluate the function at one allowed input.

ANSWER KEY

Inputs or Outputs

PART 1 · SORT

#	ITEM	CATEGORY	WHY
1	$f(x) = \sqrt{(x - 6)}$; $[6, \infty)$	**DOMAIN**	The expression under the square root must be nonnegative, so $x \geq 6$.
2	$f(x) = 1/(x + 4)$; $\{x \in \mathbb{R} \mid x \neq -4\}$	**DOMAIN**	The denominator cannot be zero, so -4 is the only excluded input.
3	$f(x) = (x - 2)^2 + 7$; $[7, \infty)$	**RANGE**	The squared term is nonnegative, and the minimum output is 7.
4	$f(x) = 2^x + 6$; $(-\infty, \infty)$	**DOMAIN**	Any real number can be an exponent here.
5	$f(x) = \sqrt{(10 - x)}$; $(-\infty, 10]$	**DOMAIN**	The expression under the square root must be nonnegative, so $x \leq 10$.
6	$f(x) = \lvert x - 8 \rvert - 3$; $[-3, \infty)$	**RANGE**	Absolute value is nonnegative, and the minimum output is -3.
7	$f(x) = 1/(x - 3) + 2$; $\{y \in \mathbb{R} \mid y \neq 2\}$	**RANGE**	The fraction can never equal zero, so the output can never equal 2.
8	$f(x) = (x + 5)^2$, $x \geq -5$; $[-5, \infty)$	**DOMAIN**	The stated restriction allows exactly the inputs $x \geq -5$.

PART 2 · PROVE IT

Task: Choose two items, one from each category, and explain how you knew.
Accept any explanation that names the deciding feature from the rule box for the chosen item.

PART 3 · MAKE YOUR OWN (SAMPLE ANSWERS)

- **DOMAIN**: $h(x) = \sqrt{(x + 12)}$; domain: $[-12, \infty)$.
- **RANGE**: $k(x) = (x - 4)^2 - 9$; range: $[-9, \infty)$.

Challenge: $h(x) = 1/(x - 12) + 4$; domain: $\{x \in \mathbb{R} \mid x \neq 12\}$; range: $\{y \in \mathbb{R} \mid y \neq 4\}$; $h(13) = 5$.

For Part 2, accept explanations that connect the set to all allowed inputs or all possible outputs. Item 8 has a restricted domain even though its formula alone accepts every real input.