LESSON MAKER PRO

# Pairs With Purpose

*Study a whole set of input-output pairs.*

**HIGH SCHOOL · A1P.AF.E**

**A1P.AF.E** "Functions shift the emphasis from a point-by-point relationship between two variables (input/output) to considering an entire set of ordered pairs (where each first element is paired with exactly one second element) as an entity with its..."

**NAME** _____ **DATE** _____

## THE BIG IDEA

A relation is a set of ordered pairs. Its domain is the set of inputs, and its range is the set of outputs. The relation is a function if every input in the set is paired with exactly one output. Different inputs may share an output.

## WORKED EXAMPLE

For {(17, 23), (19, 29)}, find the domain and range. Is the relation a function?

1. Collect the first numbers: {17, 19}.
2. Collect the second numbers: {23, 29}.
3. Check the whole set: each input is paired with one output.

**Answer: Domain: {17, 19}; range: {23, 29}; yes, it is a function.**

## PRACTICE 6 problems

**1** Find the domain and range of {(1, 4), (2, 6), (3, 8)}.

**ANSWER** _____

**2** Is {(0, 5), (2, 7), (0, 9)} a function? Explain.

**ANSWER** _____

**3** Find the domain and range of the relation in the table.

**INPUT-OUTPUT PAIRS**

| Input | Output |
|---|---|
| -2 | 4 |
| -1 | 1 |
| 0 | 0 |
| 1 | 1 |

**ANSWER** _____

_____

**4** Is the relation in the table a function? Explain.

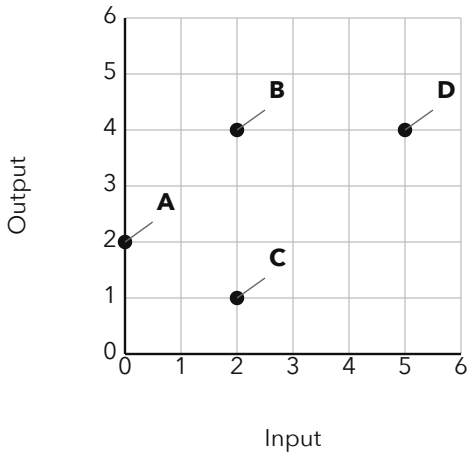
**INPUT-OUTPUT PAIRS**

| Input | Output |
|---|---|
| -3 | 2 |
| 0 | 2 |
| 3 | 2 |
| 6 | 2 |

**ANSWER** _____

_____

**5** Do the plotted points form a function? Explain.




**ANSWER** _____

_____

**6** Which pair can you add to {(1, 2), (3, 4)} so the relation remains a function: (1, 5), (3, 2), or (5, 2)?

**ANSWER** _____

## APPLY IT Show your work

**1** A concert venue charges $12 per ticket. Its records show (number of tickets, total cost in dollars): (1, 12), (2, 24), (3, 36), (4, 48). Find the domain and range. Is total cost a function of the number of tickets in this set?

WORK SPACE

**ANSWER** _____

**2** A gaming club records (hours played, points earned) for four matches: (1, 8), (2, 14), (2, 20), (3, 25). Do these records make points earned a function of hours played? Explain.

WORK SPACE

**ANSWER** _____

## CHALLENGE One step up

Start with {(0, 2), (1, 4), (2, 2)}. Give two different ordered pairs that could each be added separately so the relation remains a function, its domain has four values, and its range stays {2, 4}. Explain.

WORK SPACE AND ANSWER

**ANSWER KEY**

# Pairs With Purpose



## PART 1 · PRACTICE

| # | PROBLEM | ANSWER |
|---|---|---|
| 1 | Find the domain and range of {(1, 4), (2, 6), (3, 8)}. | **Domain: {1, 2, 3}; range: {4, 6, 8}.** |
| 2 | Is {(0, 5), (2, 7), (0, 9)} a function? Explain. | **No. Input 0 is paired with both 5 and 9.** |
| 3 | Find the domain and range of the relation in the table. | **Domain: {-2, -1, 0, 1}; range: {0, 1, 4}.** |
| 4 | Is the relation in the table a function? Explain. | **Yes. Each input has exactly one output, even though all inputs share output 2.** |
| 5 | Do the plotted points form a function? Explain. | **No. Input 2 is paired with outputs 4 and 1.** |
| 6 | Which pair can you add to {(1, 2), (3, 4)} so the relation remains a function: (1, 5), (3, 2), or (5, 2)? | **(5, 2)** |

## PART 2 · APPLY IT

1. **Domain: {1, 2, 3, 4}; range: {12, 24, 36, 48}; yes.** The first numbers form the domain, and the second numbers form the range. Each number of tickets has exactly one total cost.
2. **No. Two hours played is paired with both 14 and 20 points.** Check every pair with input 2. Because that input has two different outputs, the relation is not a function.

## CHALLENGE

**Two possible pairs are (3, 2) and (3, 4). Added separately, each gives the domain one new input and keeps the range {2, 4}; neither gives an existing input a second output.**

Accept sets in any order. For the challenge, accept any two distinct pairs whose inputs are not 0, 1, or 2 and whose outputs are either 2 or 4.