Domain and Range of a Function

Name: _____	Date: _____	Score: _____ / 24

Quick Review

The **domain** of a function is the set of all its *inputs* — every x-value that the function uses. The **range** is the set of all its *outputs* — every y-value the function produces. When a function is given as ordered pairs (x, y), just collect the first numbers for the domain and the second numbers for the range. List each value *once*, and it is good habit to write them from least to greatest. Think of the domain as the "ingredients you can put in" and the range as the "meals that can come out."

◇ **Example:** Find the domain and range of $\{(1,4),\ (3,4),\ (5,9),\ (7,2)\}$.

⇒ For the domain, gather the first number of each pair: $1, 3, 5, 7$. They are all different, so the domain is $\{1, 3, 5, 7\}$. For the range, gather the second numbers: $4, 4, 9, 2$. The value 4 appears twice, but we only list it once, and we sort: the range is $\{2, 4, 9\}$. That's it — inputs in the domain, outputs in the range!

Answer: $D = \{1, 3, 5, 7\},\quad R = \{2, 4, 9\}$

PRACTICE

Find the domain and range of each function described by ordered pairs.

1. {(2, 5), (3, 6), (4, 7)}: domain _____
2. {(2, 5), (3, 6), (4, 7)}: range _____
3. {(0, 1), (1, 1), (2, 1)}: domain _____
4. {(0, 1), (1, 1), (2, 1)}: range _____
5. {(-3, 0), (-1, 4), (2, 8)}: domain _____
6. {(-3, 0), (-1, 4), (2, 8)}: range _____
7. {(5, 5), (6, 6), (7, 7), (8, 8)}: domain _____
8. {(5, 5), (6, 6), (7, 7), (8, 8)}: range _____
9. {(1, 9), (2, 8), (3, 7), (4, 6)}: domain _____
10. {(1, 9), (2, 8), (3, 7), (4, 6)}: range _____
11. {(10, 2), (20, 4), (10, 2)}: domain _____
12. {(10, 2), (20, 4), (10, 2)}: range _____
13. {(-2, -2), (0, 0), (2, 2)}: domain _____
14. {(-2, -2), (0, 0), (2, 2)}: range _____
15. {(4, 1), (4, 1), (4, 1)}: domain _____
16. {(4, 1), (4, 1), (4, 1)}: range _____
17. {(1, 3), (2, 6), (3, 3), (4, 6)}: domain _____
18. {(1, 3), (2, 6), (3, 3), (4, 6)}: range _____
19. {(-5, 10), (-4, 8), (-3, 6)}: domain _____
20. {(-5, 10), (-4, 8), (-3, 6)}: range _____

♦ Word Problems

21. A shop sells T-shirts in sizes S, M, L (coded $1, 2, 3$) for prices \$12, \$12, \$15. The function is $\{(1, 12), (2, 12), (3, 15)\}$. State the domain and range. _____

22. A bus stops at 4 stations. The function pairs each station number with riders boarding: $\{(1, 8), (2, 5), (3, 8), (4, 12)\}$. State the domain and range. _____

23. A thermostat records the temperature at 3 times of day: $\{(6, 60),\ (12, 75),\ (18, 68)\}$, where the input is the hour. State the domain and range. _____

24. A function pairs the number of guests with tables needed: $\{(4, 1),\ (8, 2),\ (12, 3),\ (16, 4)\}$. If only $4, 8, 12,$ or 16 guests are allowed, state the domain and range. _____

Answer Keys

1. $\{2, 3, 4\}$
2. $\{5, 6, 7\}$
3. $\{0, 1, 2\}$
4. $\{1\}$
5. $\{-3, -1, 2\}$
6. $\{0, 4, 8\}$
7. $\{5, 6, 7, 8\}$
8. $\{5, 6, 7, 8\}$
9. $\{1, 2, 3, 4\}$
10. $\{6, 7, 8, 9\}$
11. $\{10, 20\}$
12. $\{2, 4\}$
13. $\{-2, 0, 2\}$
14. $\{-2, 0, 2\}$
15. $\{4\}$
16. $\{1\}$
17. $\{1, 2, 3, 4\}$
18. $\{3, 6\}$
19. $\{-5, -4, -3\}$
20. $\{6, 8, 10\}$
21. $D = \{1, 2, 3\},\ R = \{12, 15\}$
22. $D = \{1, 2, 3, 4\},\ R = \{5, 8, 12\}$
23. $D = \{6, 12, 18\},\ R = \{60, 68, 75\}$
24. $D = \{4, 8, 12, 16\},\ R = \{1, 2, 3, 4\}$

Step-by-Step Explanations

1. The domain is the set of inputs — the first numbers: $\{2, 3, 4\}$.
2. The range is the set of outputs — the second numbers: $\{5, 6, 7\}$.
3. Collect the inputs: $\{0, 1, 2\}$.
4. All outputs are 1, and we list each value once: $\{1\}$.
5. The inputs, sorted least to greatest, are $\{-3, -1, 2\}$.
6. The outputs are $\{0, 4, 8\}$.
7. Collect the inputs: $\{5, 6, 7, 8\}$.
8. Here the outputs happen to equal the inputs: $\{5, 6, 7, 8\}$.
9. The inputs are $\{1, 2, 3, 4\}$.
10. The outputs, sorted, are $\{6, 7, 8, 9\}$.
11. The input 10 repeats, but we list it once: $\{10, 20\}$.
12. The outputs are 2 and 4, each listed once: $\{2, 4\}$.
13. The inputs, sorted, are $\{-2, 0, 2\}$.
14. The outputs match the inputs here: $\{-2, 0, 2\}$.
15. Every pair has input 4, so the domain is just $\{4\}$.
16. Every output is 1, so the range is $\{1\}$.
17. The inputs are $\{1, 2, 3, 4\}$.
18. The outputs are 3 and 6 (each repeated), listed once: $\{3, 6\}$.
19. The inputs, sorted least to greatest, are $\{-5, -4, -3\}$.
20. The outputs, sorted, are $\{6, 8, 10\}$.
21. The domain is the size codes $\{1, 2, 3\}$. The range is the prices, with \$12 listed once: $\{12, 15\}$.
22. The domain is the station numbers $\{1, 2, 3, 4\}$. The range is the rider counts $5, 8, 12$ — the 8 appears twice but is listed once.
23. The domain is the recorded hours $\{6, 12, 18\}$. The range is the temperatures, sorted: $\{60, 68, 75\}$.
24. The domain is the allowed guest counts $\{4, 8, 12, 16\}$. The range is the number of tables that can result: $\{1, 2, 3, 4\}$.

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