Domain and Range: The Inputs and the Outputs

Domain is the inputs, the x values. Range is the outputs, the y values. Find both from a table, from a story, and from a graph. Write answers in words or as an inequality, with units.

Name _____ Date _____

Words we use

say the math word, then the plain English

WORD	PLAIN ENGLISH	WHAT YOU DO
Domain	The inputs: all the x values the function is allowed to take.	List them from a table, read left to right on a graph, or ask what makes sense in the story.
Range	The outputs: all the y values that come out.	List them from a table (each value once), read bottom to top on a graph, or feed in the smallest and largest inputs.
Reasonable domain and range	The inputs and outputs that make sense for the story: time is not negative, people come in whole numbers, a stadium holds only so many.	Ask: smallest input, largest input, fractions or whole things? Then feed in the ends.
Inequality (for an answer)	$0 \le x \le 8$ says x is between 0 and 8, ends included. Same as saying it in words.	Use words or an inequality for a connected graph. Use a list for separate dots.
Continuous	One connected piece: every in-between input is real (Lesson 2).	Write the domain and range as inequalities.
Discrete	Separate dots: only whole things (Lesson 2).	Write the domain and range as lists, or say whole numbers only.

Part A From a table

List the domain (the inputs) and the range (the outputs). List each value once.

TABLE	DOMAIN	RANGE
x: 1, 2, 3, 4 y: 5, 6, 7, 8		
x: 0, 2, 4, 6 y: 3, 1, 3, 1		
x: –2, 0, 5 y: 9, 9, 9		

Part B A reasonable domain and range

For each story, answer the three questions in the margin (smallest input, largest input, whole things or any number), then write the domain and the range with units.

1. A jar holds 200 marbles. You take out 5 each turn: marbles left = 200 – 5n.

3. A movie theater seats 150. Tickets are $9: money = 9p.

2. A hot air balloon rises 3 feet every second for 2 minutes: height = 3t.

4. A 12-inch sandwich is cut so each friend gets 2 inches: inches left = 12 – 2f.

Part C Read the graph

Use the descriptions. Write the domain and the range as inequalities for connected graphs and as lists for separate dots.

1. One connected piece from (0, 2) up to (3, 8) and down to (7, 5).

2. Separate dots at (1, 4), (2, 6), (3, 4), (4, 9).

3. One connected piece from (–4, –1) down to a lowest point (0, –5) and up to (5, 3).

Part D In your own words

1. What is the domain? What is the range? Use the words input and output.

2. Why does a story change the domain of a rule like 8 – t? Give the candle example or one of your own.

3. When do you write the range as a list instead of an inequality?

Part E Exit ticket

1. A pool drains from 500 gallons at 25 gallons a minute: water = 500 – 25t. Domain and range?

2. A connected graph from (–2, 4) down to (1, –1) and up to (6, 5). Domain and range?

Answer key

Part A. 1. Domain 1, 2, 3, 4; range 5, 6, 7, 8. 2. Domain 0, 2, 4, 6; range 1, 3. 3. Domain –2, 0, 5; range 9.

Part B. 1. n whole numbers 0 to 40 (200 – 5n = 0 at n = 40); marbles 0 to 200 in steps of 5. 2. $0 \le t \le 120$ seconds; 0 ≤ height ≤ 360 feet. 3. p whole numbers 0 to 150; money 0 to 1350 dollars in steps of 9. 4. f whole numbers 0 to 6; inches left 0, 2, 4, 6, 8, 10, 12.

Part C. 1. $0 \le x \le 7$; $2 \le y \le 8$. 2. Domain 1, 2, 3, 4; range 4, 6, 9. 3. $-4 \le x \le 5$; $-5 \le y \le 3$.

Part D. 1. Domain: the inputs, the x values allowed. Range: the outputs, the y values that come out. 2. The rule takes any number, but the story only makes sense for some: a candle cannot burn for –2 hours or past when it is gone. 3. When the graph is separate dots (discrete): the input is whole things.

Part E. 1. 0 ≤ t ≤ 20 minutes; 0 ≤ water ≤ 500 gallons. 2. $-2 \le x \le 6$; $-1 \le y \le 5$.