Activity

3-1 Relations and Functions

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EXPLORE & REASON

The desks in a study hall are arranged in rows like the horizontal ones in the picture.

A. What is a reasonable number of rows for the study hall? What is a reasonable number of desks?

B. **Look for Structure** What number of rows would be impossible? What number of desks would be impossible? Explain. MP.7

C. What do your answers to Parts A and B reveal about what the graph of rows to desks looks like?

HABITS OF MIND

Model with Mathematics What other representations could you use to display the student information? Select and describe one representation. Explain how the information would be presented. MP.4

Notes

Assess

EXAMPLE 1 Try It! Recognize Domain and Range

1. Identify the domain and the range of each function.

a.

x	2	3	4	5	6
y	0	1	2	3	4

b.

x	−3	−1	1	3	4
y	1	3	−2	2	6

EXAMPLE 2 Try It! Analyze Reasonable Domains and Ranges

2. Analyze each situation. Identify a reasonable domain and range for each situation. Explain.

a. A bowler pays $2.75 per game.

b. A car travels 25 miles using 1 gallon of gas.

HABITS OF MIND

Make Sense and Persevere How do characteristics of a situation impact the domain of a function that describes it? MP.1

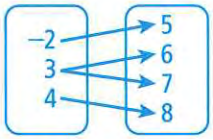
Notes

Assess

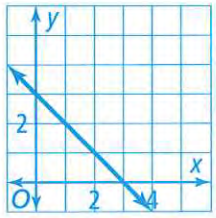
EXAMPLE 3 **Try It! Classify Relations and Functions**

3. Is each relation a function? If so, is it one-to-one or not one-to-one??

a.



b.



EXAMPLE 4 **Try It! Identify Constraints on the Domain**

4. Margaret has a monthly clothes budget of $50. She maps the amount of money she spends each month to the number of items of clothing she buys. What constraints are there on the domain?

HABITS OF MIND

Use Appropriate Tools What are the advantages of using mapping diagrams when analyzing functions? Explain. MP.5

Do You UNDERSTAND?

1. ESSENTIAL QUESTION What is a function? Why is domain and range important when defining a function?

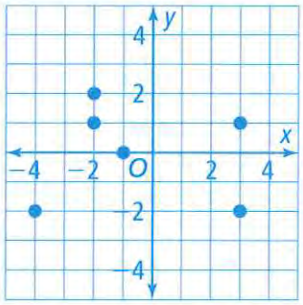
2. **Vocabulary** Maya is tracking the amount of rainfall during a storm. Describe the *domain* and *range* for this situation. Include *continuous* or *discrete* in your description.

3. **Reason** What can you conclude about the domain and the range of a function if a vertical line at $x = 5$ passes through 2 points? 1 point? No points? Explain. MP.2

4. **Error Analysis** Felipe states that every relation is a function, but not every function is a relation. Explain Felipe's error. MP.3

Do You KNOW HOW?

5. Use the graph to determine the domain and range of this relation. Is the relation a function?



6. For the set of ordered pairs shown, identify the domain and range. Does the relation represent a function?
{(1, 8), (5, 3), (7, 6), (2, 2), (8, 4), (3, 9), (5, 7)}

7. Each day Jacob records the number of laps and the distance he walks, in miles, on a track. Graph the relation and determine whether the distance that Jacob walks is a function of the number of laps.
{(3, 0.75), (6, 1.5), (9, 2.25), (2, 0.5), (7, 1.75), (10, 2.5), (4, 1)}