

Relationships Round Robin

Reporting Category	Patterns, Functions, and Algebra
Topic	Representing relationships with tables, graphs, rules, and words
Primary SOL	7.12 The student will represent relationships with tables, graphs, rules, and words.
Related SOL	7.13, 7.14

Materials

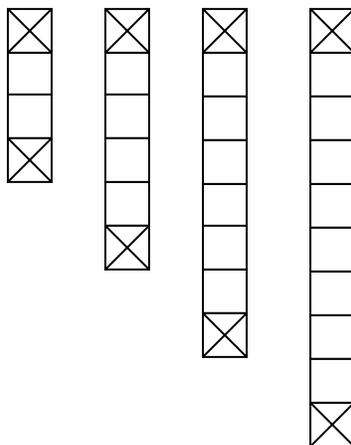
- Linking cubes
- Toothpicks
- Pattern blocks
- Square tiles
- Activity Work Page (attached)
- Sample Pattern Stations (attached)
- Calculators

Vocabulary

repeating pattern, growing pattern, numerical pattern, geometric pattern, arithmetic sequence, geometric sequence, common difference, common ratio, expression, variable, equation, term, coefficient, stage (earlier grades)
relation, function (7.12)

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Show students the first four stages of the pattern below (or create one of your own). Discuss what the vocabulary word *stage* means and how others words may be used to represent the parts of a pattern (e.g., figure). Note that one way to represent patterns is concretely. As a class, discuss what patterns they see (there is more than one that can be examined).



2. Choose a pattern, and have students extend it by drawing the next three stages of the pattern. Have students share their results. Note that one way patterns can be represented

is with concrete materials and/or pictures. Record this on the Activity Work Page as a model for students to refer to later.

3. Note that in addition to representing patterns concretely, they can also be represented with words. Have students use the Think-Pair-Share strategy to describe the pattern in words. Discuss as a class. Record this on the Activity Work Page as a model for students to refer to later.
4. Note that a third way to represent patterns is in a table. Ask students to draw an x - y table to display their pattern information. Ask what the x values would represent and what the y values would represent. Ask students what patterns the table would show. Look at the x values, the y values, as well as the relationship between the x and the y values. Using these patterns, have them draw and describe the 12th stage of the pattern. Record this on the Activity Work Page as a model for students to refer to later.
5. Ask students how they could determine the 20th stage of the pattern. The 50th? This discussion should lead to a need for a rule—the fourth way to represent patterns. Have students discuss ways to find the rule from the information they already have. Assist students in creating a rule based on the results of the concrete/pictorial, verbal, and table representations of the pattern. Record this on the Activity Work Page as a model for students to refer to later.
6. Note the fifth way to represent a pattern is on a coordinate graph. Ask students where we could get the information we would need to plot points on a coordinate graph. Assist students in correctly plotting the points. Note the importance of including titles and labels. Also, discuss whether the data is discrete or continuous and how determining this lets you know whether to use a dotted line or a solid line. Record this on the Activity Work Page as a model for students to refer to later.
7. Construct the “pattern stations” illustrated on Sample Pattern Stations. Be sure to provide the necessary manipulatives at each station. Have students complete an Activity Work Page for each pattern station.

Assessment

- **Questions**
 - What are the different ways to represent the relationship between two sets of numbers?
 - What pattern was the most interesting to you? Why?
 - Why is it important to know how to represent the relationship between two sets of numbers in more than one way?
- **Journal/Writing Prompts**
 - Choose or create a pattern and represent it with a table, a graph, words, and a rule. Explain how the pattern is expressed through each of the representations.
- **Other**
 - Have students create their own patterns and then exchange with a partner to represent the relationship with a table, graph, rule, and words.
 - A student described her function in words this way: “It increases by five each time, beginning with two.” Construct a picture, table, graph, and rule for this function.

Extensions and Connections (for all students)

- Use graphing calculators to represent relationships with tables, graphs, and rules.

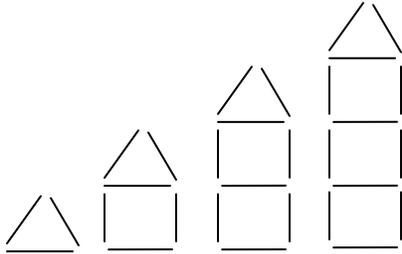
Strategies for Differentiation

- Assign students different patterns based on choice or ability.
- Model this activity in small groups.
- Prior to the lesson, focus on each pattern representation separately so students are comfortable with all of them before making connections between them.

Activity Work Page

Name _____ Date _____

Draw and extend the geometric pattern.



Use words to describe the pattern.

Create a function table to describe the pattern.

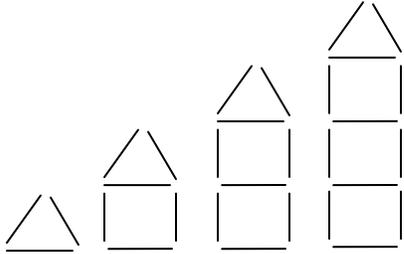
Draw and describe the _____ stage.

What is the specific rule for this function?

Use the numbers in the function table to create a graph of the function. List the coordinate points in the space below. Plot the coordinate points on graph paper. If the data is continuous, connect the points with a line. If the data is discrete, connect the points with a dotted line. Be sure to include a title and labels for the x- and y-axes.

Sample Pattern Stations

This pattern is constructed with toothpicks.

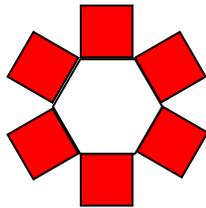


This pattern is constructed with pattern blocks.

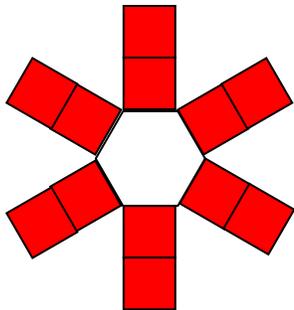
Stage 1



Stage 2

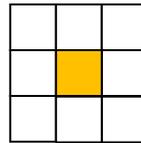


Stage 3

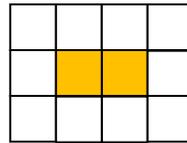


This pattern is constructed with square tiles in two different colors.

Stage 1



Stage 2



Stage 3

