# Math 6 - Act. 08: Patterns

## Main Core Tie

Mathematics Grade 6

Strand: EXPRESSIONS AND EQUATIONS (6.EE) Standard 6.EE.9

## Group Size

Individual

## Materials

 Overhead transparency of patterns to be built
 Answer sheet for each student
 Centimeter cubes for each student
 Containers for cubes

Additional Resources

*Algebra Thinking, First Experiences* (Creative Publications)

*Middle Grades Math, Course 1* (Prentice Hall)

*Get It Together* (EQUALS, Lawrence Hall of Science,)

## Background for Teachers

Many students readily take to finding and continuing patterns. Patterns are found in a sequence of numbers when there is a common difference between the terms in the sequences. Patterns are also observed in many architectural works (buildings). These patterns are more geometric in nature.

This activity furthers the concept of patterns by creating tables for the patterns and then writing a rule about the pattern. The table (sometimes called 'table of values,' 'input/output table,' or 'function table') becomes the "X and Y coordinates," and can later be graphed on the coordinate plane.

Consistency is a basic rule in algebra, so consistent patterns can often explain why algebra works the way it does.

## Intended Learning Outcomes

6. Represent mathematical situations.

## Instructional Procedures

Invitation to Learn

Give each student 2 containers of centimeter cubes (one has 20 cubes—10 of one color and 10 of another and the other has 30 cubes—10 each of 3 different colors). Using their foam mats with the line down the middle, have them build a structure on the left with the 20 cubes and another structure on the right with the 30 cubes. Observe and comment on patterns that are being used in the building of the structures.

Instructional Procedures

 Guide the students through the first couple of patterns from the overhead transparency, completing the table on the answer sheet. Guide them through the rule portion of the answer sheet. The rule needs to relate the first column of the table to the second column of the table (how a change in "x" affects "y"). They should be encouraged to be explicit in writing the rule. Working in small groups, they can complete each table and rule from the patterns provided. The patterns should get progressively more difficult.

 After the worksheets are completed, students can be taught that the left side of the table represents the "X coordinate," and the right column represents the "Y coordinate." Then,

knowing the X and Y coordinates, they can graph the points on a coordinate plane.

Guide students in writing an equation from each table. The "rule" will help in establishing the equation.

Assign students to write in their journal to explain the connection between a table of values and a coordinate plane.

This activity will probably take more than one class period in order to make full understanding and connections between patterns, tables, graphs, and equations.

Curriculum Integration

*Geometry*—You can draw diagonals from one vertex inside a convex polygon to create triangles. As the number of sides of a polygon increases, the number of triangles you can make also increases. This can be recorded on a function table using "number of sides" on the left side of the table and "number of triangles" on the right side.

*Physical Education*—A table can be created relating the points scored as a function of baskets made (basketball), field goals kicked (football), or touchdowns completed (football).

*Science*— A table can be created showing the time it takes a person (animal) to travel to a certain location and the distance the person traveled. The speed would need to be constant. The information could be graphed to show the linear relationship that exists between time and distance.

Extensions

Possible Extensions/Adaptations

Have students use a graphing calculator to enter the data from a table of values. The calculator will create the table, create a graph, and allow for predictions to be made.

Homework & Family Connections

Assign students to check with parent(s) for permission to use a recent long-distance telephone bill. Then make a table with "time spent talking" (minutes) on the left and "cost of call" on the right. Make a graph of the information.

Assessment Plan

Tell students that they have just been hired at a job that pays $5 an hour. Assign them to work with a partner to make a Table of Values with "Hours Worked" on the left and "Wages Earned" on the right. Also have them construct a graph from the table and write an equation that relates to the table. Ask questions such as "How many hours must you work to earn $40?" and "If you receive a paycheck in the amount of $150, how many hours did you work during that pay period?"

Authors

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