

Patterns in Measurement

Summary

This activity uses squares and cubes to find patterns in perimeter, area, and volume.

Main Core Tie

Mathematics Grade 6

[Strand: GEOMETRY \(6.G\)](#)

Materials

Square color tiles
Interlocking cubes

- [Patterns in Measurement worksheet](#)
Math journals

Additional Resources

Book

- *Navigating Through Algebra in Grades 3-5*
, by Gilbert J. Cuevas and Karol Yeatts; ISBN 0-87353-500-7

Background for Teachers

The ability to find and describe patterns found in numbers, charts, operations, geometric figures, and graphs is important for the development of a deep understanding of mathematics and algebra. This activity uses squares and cubes to find patterns in perimeter, area, and volume. Students then chart and graph the information found in the experiment.

Intended Learning Outcomes

2. Become mathematical problem solvers.
3. Reason mathematically.
4. Communicate mathematically.

Instructional Procedures

Invitation to Learn

Students use colored squares to make the following pattern: orange, orange, yellow, blue, orange, orange, yellow, blue. When there are 14 yellow squares, how many orange and blue squares will there be? How many squares will there be altogether?

Students record their work and explain how they calculated the number of orange and blue squares and the total number of squares in their math journals.

Instructional Procedures

Students use the plastic squares to create a 1 cm x 1 cm square. Calculate the perimeter and area of the square and record the results on the [Patterns in Measurement worksheet](#). Increase the length of the sides by 1 cm. Calculate the perimeter and area and record it on the worksheet.

Increase the square six more times (1 cm each time), recording the perimeter and area for each increase.

Demonstrate how to find volume with a cube.

Students calculate the volume for a 1 cm x 1 cm cube and record the information on the worksheet.

Increase each side of the cube by 1 cm. Calculate the volume and record it on the worksheet. Increase the cube six more times, each time recording the volume on the worksheet. Students complete the questions on the worksheet until the graphs section. Have students graph the information on perimeter, area, and volume from the table. Connect the dots on each graph and finish the questions on the worksheet. Have students write about the patterns they found during this activity in their math journals. Discuss the patterns the students found during the activity. What were the differences in the patterns of the perimeter, area, and volume? How did the graphs differ from each other?

Extensions

One number pattern related to Ancient Greece is the Golden Ratio. Artists often use the Golden Ratio because it produces shapes that are pleasing to the eye. The Golden Ratio is a person's total height compared to waist height. The Golden Ratio is 1.618. One of the most famous buildings of Ancient Greece, the Parthenon, was designed using the Golden Ratio. Use Excel to create three graphs, one for perimeter, one for area, and one for volume, using information during the activity.

Family Connections

Students play the Input/Output game with a family member. Create a pattern using 10 colored squares. Have students ask a family member what color the 15th square will be. The 20th? The 25th?

Assessment Plan

Observation of the students as they are working on their charts and their graphs.

- *Patterns in Measurement* worksheet.

Bibliography

Research Basis

Leinenbach, M., & Raymond, A.M. (1996) A Two-Year Collaborative Action Research Study on the Effects of a "Hands-On" Approach to Learning Algebra. <http://eric.ed.gov> ERIC # ED398081

This study was a two-year collaborative action research project that focused on the effects of the use of manipulatives in an algebra class. Findings indicates that students' confidence, interest, and ability in solving algebraic equations were very high when working with manipulatives.

Friel, S.N., & Bright, G.W. (1995) Graph Knowledge: Understanding How Students Interpret Data Using Graphs. <http://eric.ed.gov> ERIC # ED391661

This paper discusses a research study that focused on students' abilities to read and to move between graphical representations before and after instruction. Conclusions indicate that students need to talk more about graphs, and make predictions and inferences from graphs.

Authors

[Utah LessonPlans](#)