

EISENHOWER PROFESSIONAL DEVELOPMENT PROGRAM

Mathematics Within: Shape, Space, and Measurement

Lesson Plan

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Broad Topic: Polygons

Specific Topic: Area and Perimeter Using Pentominoes

Aim:

This lesson is intended as an enrichment lesson that could follow the series of lessons on tetrominoes from the grade 3 unit, Flips, Turns and Area of the Investigations curriculum. The series of lessons following the enrichment would deal with finding the area of a flat surface: triangles, squares, and invented 4 unit shapes.

Objectives:

- o Create and identify 5-unit shapes known as pentominoes
- o Discuss the area and perimeter of pentominoes
- o Discover strategies to help build pentominoes that are triple the size of the original pentomino, and identify the perimeter and area of each
- o Explore pentominoes as puzzle pieces in filling in an established rectangle grid or shape

Materials/Supplies:

- o Square tiles or cubes for building the original pentomino shapes
- o Sets of foam pentominoes or cardstock pentomino pieces for student use
- o cm grid paper

Lesson:

- o This lesson needs at least two class periods.
- o Invite students to work in groups that are no larger than 4. Create shapes using 5 square units for each shape. Provide guideline that shapes can only be created with full edges touching full edges. Students use square tiles or cubes for this activity.
- o After groups have worked for several minutes, direct a large group discussion to identify the 12 possible pentomino shapes. Encourage discussion that incorporates geometry terms such as “flip, slide, turn, rotation, congruent, and similar” while identifying the pentomino shapes. Guide students towards identifying the pentominoes by the generally accepted letter names: F, I, L, P, N, T, U, V, W, X, Y, Z.
- o Distribute foam or cardstock pentominoes. Initiate the idea of perimeter by identifying the perimeter of a single square unit. Invite students (within their groups) to discover the perimeter of each individual pentomino. Guide a large group discussion in which the perimeter of each shape is charted. Explore why the “P” has a perimeter of 10, while all others have a perimeter of 12. During this whole phase, chart student strategies for finding the perimeter of each shape. (Example: Counting individual sides, adding together opposite sides, etc.)
- o Initiate a discussion of the area of each pentomino. Add to chart containing perimeters.
- o Compare one of the original pentominoes with an outline of the same pentomino shape that has been enlarged three times. Pose the question: “How might we find the area and perimeter of this pentomino that has been enlarged?” Invite students to use their shapes and strategies and guide them toward recognizing that the enlarged pentomino has an area and perimeter three times the original shape. Provide other enlarged outlines for further investigation by students, or provide cm grid paper for students to create their own enlargements.

- o Invite students to try and use pentomino shapes to fill in a 10 x 6 grid or 3 x 20 grid using all twelve pentomino shapes. This activity could be frustrating for some students.
- o Use closure strategies to assess student learning and understanding.

Websites that were helpful in my own exploration of pentominoes:

- o <http://lonestar.texas.net/~jenicek/pentomin/pentomin.html>
- o <http://pubweb.northwestern.edu/~gbuehler/index0.htm>
- o http://mathforum.org/library/drmath/results.html?textsearch=pentominoes&textsearch_bool_type=and&textsearch_whole_words=no

