LESSON 8
"Is There Mystery in Measurement?"
by Nancy Lachowicz

MATH Can Take You Places

CONCEPT AREA	Measurement
GRADE LEVEL	6
TIME ALLOTMENT	60 minutes
LESSON OVERVIEW	Students will explore perimeter and area of polygons and determine how changing the dimensions of a figure affects its perimeter and area. Students will estimate the area and perimeter of an irregular figure on grid paper. Finally students will be assessed by using an interactive Web site.
LESSON ACTIVITIES OVERVIEW	Students will explore perimeter and area with index cards. They will use grid paper to create various rectangles and compare different dimensions and will trace their hand to estimate its area and perimeter.

LEARNING OBJECTIVES

Students will be able to:
- Estimate measurements and evaluate reasonableness.
- Use appropriate formulas to calculate area and perimeter.
- Work cooperatively in pairs.
- Compare and contrast similarities and/or differences of area and perimeter.
- Use technology for self-assessment.

STANDARDS (TEKS)

From the Texas Essential Knowledge and Skills for Math for grade 6:

Grade 6
6.8(A), (B), (D), 6.11(A), (B), (C), 6.12(A), 6.13(A), (B)

MEDIA COMPONENTS

Video: *Math Can Take You Places* #001 "Measurement"

MATERIALS

Per Student:
- Rulers (centimeter/customary)
- 3 x 5 index cards (3 per student)
- 5 x 8 index cards (3 per student) optional for extension activity
- Pencils
- 4 different colored pencils or crayons
- One-inch grid paper

PREP FOR TEACHERS

- Prepare materials and handouts for students.
- View Web site prior to teaching the lesson so you can choose appropriate level of assessment for each student.
- View video prior to lesson, cue for class discussion.

Note:
The following will be covered during this lesson: **length**, **width**, **area**, **perimeter and**

formula. Students may need to review the concepts prior to beginning the activities.

If your class includes students who are acquiring English as a second language (ESL), you may also need to brainstorm problem-solving strategies or offer a list of possible strategies for students to refer to while completing the activities.

INTRODUCTORY ACTIVITY: SETTING THE STAGE

1. Pass three 3" x 5" index cards and a ruler to each student. Have students measure the length and width of one card and label all three (l = 5", w = 3")

Discuss the following vocabulary terms:
Length, width, perimeter, area, dimensions, formula

Lead the following discussion:
"What do you know about perimeter?" (*It is the distance around a polygon.*)
"What do you know about area?" (*It is the space within the perimeter of the polygon.*)

2. Lay your index cards end to end on your desk. What formula would you use to find the perimeter? Area? (Offer one-inch grid paper if students need extra help calculating area and perimeter.)
What is the perimeter? (*36 in.*) Area? (*45 sq. in.*)

3. Say: "Now I want you to lay your index cards length to length."

"Based on our previous findings, estimate what you think the perimeter is? (*28 in.*) Now use the appropriate formula to compute the perimeter. What do you notice? Why is the perimeter smaller than the first model?" (*The objects are the same only some of the sides are not edges. Now, they are on the interior of the shape.*)

"Use the formula for area to compute the area. (*45 sq. in.*) Why did the area stay the same?" (*The total area of the three cards, regardless of how they are arranged, will be the same.*)

4. Have students lay their index cards with two cards stacked length to length and the third card connecting width to width to the bottom card. How do you know the area will be the same? Write two different equations to prove your reasoning:
Students should write: A = (5 x 6) + (5 x 3)
A = (10 x 6) – (5 x 3)
What is the perimeter? (*32 in.*)

5. Point out that although two or more shapes have the same area they may not have the same perimeter.

LEARNING ACTIVITY/

1. Distribute one-inch grid paper to each student. Ask students to follow the instructions they are given. Ask, "Do shapes with the same perimeter have the same area?"
Draw a 4-inch square (4 x 4) and 3 rectangles with the following dimensions 1 x 7, 2 x 6 and 3 x 5. Determine each shape's perimeter. (*16 in.*)

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Now compute the area of each. (*16 sq. in., 7 sq. in., 12 sq. in., 15 sq. in.*)

2. Allow students to create one square and three rectangles of their own with a given perimeter of 24 inches. Help students understand that although two or more shapes have the same perimeter, they may not have the same area.

CULMINATING ACTIVITY
Have the students trace their hands on grid paper. Explain how estimates are determined using area and perimeter. Instruct students to make a "key" for whole squares (one color), ¾ full squares (a second color), ½ full squares (a third color). Those squares that are barely included within the perimeter are not counted.

Students are to color their hands according to the key and then count the number of squares. Remember to discuss that two halves equal one whole. To calculate perimeter, students may use string and have a partner help them hold it down.

CROSS-CURRICULAR EXTENSIONS
Social Studies
   Research the area of different continents. Arrange in order from greatest to least. Can you figure the perimeter of each continent?

REAL-WORLD CONNECTIONS
View video: *Math Can Take You Places*, #001 "Measurement". Ask students to observe the real-world application of area and perimeter in providing comfort for basketball players.

Invite various professionals (i.e., carpenters, homebuilders, land surveyors, architects, etc.) to share how they use measurement, stressing its importance.

ASSESSMENT
Allow students to create their own area and perimeter problems. Encourage them to focus their questions on real-life situations and to create answers. Review their questions and answers for accuracy in order to check for understanding. Use the questions written by the students to create a written assessment.

STUDENT HANDOUTS
None