MATH Can Take You Places

LESSON 11

"Courts of Measure"

by Yvonne Garcia

CONCEPT AREA Measurement

GRADE LEVEL 4-6

TIME ALLOTMENT One to two 60-minute sessions

LESSON OVERVIEW We all use area when we are trying to fit things into a particular space. For example, how many desks can we fit into a room and still allow students to get in and out of their desks? This lesson gives intermediate-aged students the chance to explore the area and perimeter of their school gym or a nearby school gym. They then transfer this knowledge into finding the actual areas and perimeters of other places games are played.

LESSON ACTIVITIES OVERVIEW After being shown the *Math Can Take You Places* measurement video, the students will focus on the way area was used in the video and how the trainer uses math in daily duties. Students should identify the different ways of finding perimeter and area after the completion of the video.

LEARNING OBJECTIVES Students will be able to:

- Physically measure an area and its perimeter
- Transfer the information learned into a model representation and also number sentences
- Use problem-solving strategies

STANDARDS (TEKS) **From the Texas Essential Knowledge and Skills (TEKS) for Math for grades 4-6:**

Grade 4

4.1A, B, C; 4.5C, D

Grade 5

5.1A, B, C; 5.4E, F, H

Grade 6

6.8A; 6.11A, B, C, D

MEDIA COMPONENTS Video: *Math Can Take You Places* #001 "Measurement": segment with Mavericks interview**.** This video deals with students setting up the area of a room for a seven-foot-tall basketball player. It also features a Mavericks head trainer and his responsibilities.

MATERIALS Per class:

- 4 to 5 yardsticks
- 4 to 5 calculators
- 4 to 5 sheets of chart paper
- 1 to 2 pictures of basketball and volleyball courts
- 20 to 25 geo boards
- 4 to 5 sheets of grid paper
- A large bucket of tiles or cubes (approximately 200 to 250)
- Class set of computers (computer lab)

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PREP FOR TEACHERS

- Bookmark Web sites on the computers.
- Watch *Math Can Take You Places* and cue the videotape.
- Gather all materials needed for each group of students and hands-on elements of the lesson.

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

Day Two

1. Ask: How many of the students have watched professional basketball? (*You should get mostly yeses.)*

2. Ask: Who has played volleyball or basketball in a PE class or little league sports? *(You should get all yeses.)*

3. Say: "There are people who line these courts. They have to know the correct areas and perimeters in order to keep within the rules of the game. Now let's discuss some vocabulary words before we start our video about a professional basketball team that relies on the use of math."

Vocabulary: area, perimeter, length, width

4. Ask: Has anyone ever seen a seven-foot-tall person in real life?

5. Watch the *Math Can Take You Places* video.

LEARNING ACTIVITIES

Day One

1. Ask: "How would you go about finding the area of your desk? What about the perimeter? Do you remember the basic concepts and formulas for area and perimeter?"

2. Now, model the two problems with rectangles and squares on the geo boards, showing one way to figure out the area and perimeter. Next, have the students do two to four problems on the geo boards as needed. Then, review how to find missing variables, such as $x + 7 = 29$ or $37 - x = 14$.

Formulas:

$A = L \times W$ (Area equals length times width) for a rectangle

$A = s^2$ (Area equals side squared) for a square

The formula for the perimeter of a rectangle is $P = 2(l + w)$ or $P = 2l + 2w$, and the formula for the area of a square is A4 S or 2 L + 2 W.

3. Culminating Activities
a. Group activity: measuring the gym and finding its perimeter and area
b. Web sites: Practice area and perimeter on each of the sites given.
The students will focus on the way area was used in the video and how the trainer uses math in daily duties. Students should identify the different ways of finding perimeter and area after the completion of the video.

4. Activity: Visit a junior high or high school gym (if one is within walking distance) or your own school gym. Divide the students into pairs and have them physically walk around and measure the court used for basketball and the court used for volleyball to the nearest inch using a yardstick. Then have them determine the perimeters and areas of both courts. Ask each set of partners to compare the areas and perimeters of the two courts they measured. Next, ask the students to write at least two different number sentences showing the area and two different number sentences showing the perimeter for each court (using all the basic math symbols: +, -, x, and ÷). Then return to class and use mini-cubes to show a model of the area of each court. (Remind them that they can make each cube worth a certain number. For example, 1 cube = 5.) Now have them transfer the picture they made with cubes onto grid paper.
Example: Given a length of 30 feet and a width of 7 feet ….
Area:
Write a legend showing each mini-cube equaling 10 feet.
30 ft. x 7 ft. = 210 $ft.^2$
7 ft. x 30 ft. = 210 $ft.^2$
Perimeter: 30 ft. + 30 ft. + 7 ft. + 7 ft. = 74 ft.
(2 x 30 ft.) + (2 x 7 ft.) = 74 ft.
2 (30 ft. + 7 ft) = 74 ft.

5. Modifications:
a. Give the students extra practice by using a shape explorer
http://www.shodor.org/interactivate/activities/perimeter/index.html
b. Extra practice with basketball perimeters is on http://www.scienceacademy.com/BI/.
c. Give each of the students a piece of grid paper with the legend marked on it. Then ask them to shade only the spaces the cubes covered. Next, have them write the area and perimeter.

6. Extension/Enrichment:
a) Have the students make up area and perimeter problems that have missing quantities.
b) Then ask them to make a short three- to four-slide PowerPoint presentation, showing how they would solve the problem.

CULMINATING ACTIVITY

Next, use these Web sites after the video and group activity to reinforce the concepts with immediate feedback.
http://www.shodor.org/interactivate/activities/perimeter/index.html
(perimeter) http://www.shodor.org/interactivate/activities/perm/index.html (area) and/or http://www.scienceacademy.com/BI/ (click on perimeter)

http://www.aaamath.com/B/geo78_x7.htm (perimeter)
http://www.aaamath.com/B/geo78_x3.htm (area)

CROSS-CURRICULAR EXTENSIONS

History
Research and compare this to the history of basketball players and their managers.

Writing
Use the elements discovered in the video and/or measuring of the gym to write about how they can be compared. Interview an architect about the ways s/he uses area and perimeter.

REAL-WORLD CONNECTIONS

Assign students exercises for finding the perimeter and areas. Examples: Find the area of the school library. Find the area of the teacher's desk. Find the area of a classroom window.

ASSESSMENT

Evaluate your students' success by asking the following questions in the form of a quiz.
Question types for perimeter and area
1. The coaches were going to buy a mat to fit into the weight room. They needed to know the mat's length and width to see if it would fit. If the shape is a square and the area measures 196 square inches, then how long is each side of the mat? (*14 ft.*)
2. The students in your classroom figured out the area and perimeter of the room they were going to use to store collected canned foods for the holidays. They figured the area of this rectangular-shaped room to be 48 square feet with a perimeter of 32 feet. However, they forgot to write down the length and width of the room. Write a plan describing how the students can determine the dimensions of the room and then solve for the missing dimensions. (*12ft., 4 ft.*)
3. If a student wants to block off a square area on the basketball court to use for ball-handling drills and he/she needs it to be 256 square feet, then what would its length and width be? (*16 ft.*)

STUDENT HANDOUTS

None