MATH Can Take You Places

LESSON 9
"Mavericks and Measurement"
by Rhonda Bailey

CONCEPT AREA Measurement

GRADE LEVEL 4-6

TIME ALLOTMENT 60 minutes

LESSON OVERVIEW Students use area and perimeter formulas within a real-life situation.

LESSON ACTIVITIES OVERVIEW Students will design the layout of a room by investigating the measurement concepts of perimeter and area.

LEARNING OBJECTIVES Students will be able to:
- Apply their knowledge of measurement concepts to solve problems, including the application of measurement formulas.
- Apply problem-solving strategies.

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

Grade 4
4.1C, E, F; 4.5D
Grade 5
5.1C, E, F; 5.3A
Grade 6
6.8B; 6.11A, B, C, D; 6.12A, B; 6.13A, B

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

MATERIALS
- One-inch grid paper
- Snap cubes (or 1" x 1" tiles)
- Construction paper (for furniture cutouts)
- Rulers
- 7.5-foot-tall silhouette (or, teachers could also use a tape measure to mark near a doorway where a 7.5-foot-tall person would stand.)

PREP FOR TEACHERS **Note:**
The following concepts will be covered during this lesson: **area**, **perimeter**, **length**, **width and floor plan**. 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.
- Work with your campus art teacher to help you construct a 7.5-foot-tall silhouette

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PREP FOR TEACHERS (cont)

of a basketball player, so that students have a visual of exactly how tall 7.5 feet really is.

- Cue the videotape.
- Gather enough snap cubes for each group of four students to have 60 cubes. You may want to use colored tiles instead to make sure students understand that their problem relates to area, not volume. Be sure to count them out for each group in advance to avoid downtime.
- Cut out squares to represent the nightstand (approximately 2 inches by 2 inches), and rectangles to represent the dresser (approximately 2 inches by 3 1/2 inches). Each group will need one of each. Make sure they are a different color than the one-inch grid paper.
- Each group will also need a sheet of one-inch grid paper with an area of about 400 square inches. Try out the activity beforehand to make sure that the problem is the right difficulty level for your students. If it seems too easy for them to solve, try making their hotel room grid paper smaller.

INTRODUCTORY ACTIVITY: SETTING THE STAGE

1. Spark students' interest by introducing the sports-team scenario. Say: "Professional sports teams take trips and stay in hotels quite often. No big deal, right? There are plenty of hotels in almost every city. (**Cue** *Math Can Take You Places* #001 "Measurement" to the basketball players getting off the bus. **Play the video until** the classroom teacher asks, "… How we can make a bed in the room more comfortable?"

Ask students, "What are some problems that this player may have trying to use a regular size hotel room?"

2. **Resume** showing the tape to set the stage. **Stop** when the teacher says, "… you are able to explain your answer." Ask students to explain the difference between the area and perimeter of a rectangle.

LEARNING ACTIVITIES

1. Students are to use what they know about area and perimeter to design a bed and arrange the furniture in the hotel room, so that their 7.5-foot-tall basketball player can fit comfortably.

2. The grid paper will represent the space they have in the hotel room. They are to use the cubes to make a bed that has an area no greater than 60 square feet and has the smallest perimeter possible. Then, they are to arrange their bed, dresser and the nightstand in the room, so that the player can move around easily. Instruct students that they should be able to explain the solution when they're done.

Solutions will vary. Solutions must have a bed that is to be at least 7.5 feet long, so an 8-foot by 6-foot bed would meet the criteria, with an area of 48 square feet. This bed would have a perimeter of 28 feet.

3. Students will record the measurement combinations on the Mavericks and Measurement student recording sheet and answer questions related to the problem.

CULMINATING ACTIVITY

Each group should share its findings. They should discuss the reasonableness of their findings.

1. Explain the difference between how a 6-foot-by-8-foot bed would look in the room versus an 8-foot-by-6-foot bed.
2. If a person is actually 7.5 feet tall, what other items around the house might he or she have trouble using?

Resume video from last pause point (after the teacher said, "… you are able to explain your answer.") **Stop** at end of equivalency video.

Have students compare the way they solved the problem with the ways the students in the film solved it.

As an extension, ask the students to use their models of the hotel room to create a floor plan, giving the area and perimeter of each piece of furniture in the room as well as the area of the floor space left for the basketball player to walk around in.

CROSS-CURRICULAR EXTENSIONS

Science

People's heights are predetermined by a set of human codes called "genes." Students should use media resources to collect research on genes and, with the information collected, write reports to be presented to the class.

REAL-WORLD CONNECTIONS

Take a field trip to a home-improvement store. Let students speak to a flooring expert to see how he or she uses area and perimeter.

ASSESSMENT

Have students work individually to develop a word problem where the answer is, "The area equals 80 square feet," and another where the answer is, "The perimeter equals 40 feet." Monitor their work for understanding of the concepts.

STUDENT HANDOUTS

"Mavericks Measurement Student Recording Sheet"

Mavericks and Measurement
Student Recording Sheet

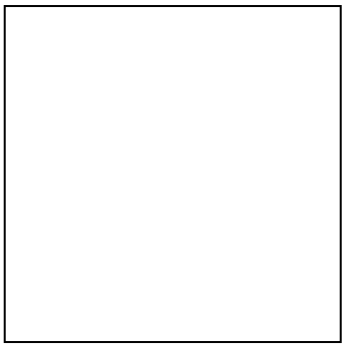
Length of bed	Width of bed	Sketch of the bed	Perimeter formula for the bed (feet)	Area formula for the bed (square feet)

1. Describe how you used the information in the problem to help you solve this problem.

2. What dimensions did you decide on for the design of the bed? Why did you choose these measurements?

3. Explain your plan for solving this problem.

4. Imagine that a bed measures 4 feet by 4 feet. Find the perimeter and the area. Are the perimeter and area of the bed the same? Why or why not? How would you explain the difference between the perimeter and the area?



5. Explain how the measurement units for perimeter and the measurement units for area are different.

6. Look at the following pairs of dimensions and the perimeter.

Length (meters)	Width (meters)	Perimeter Process $2 \cdot (l + w)$	Perimeter (meters)
1	14	$2 \cdot (1 + 14)$	30
2	13	$2 \cdot (2 + 13)$	30
3	12	$2 \cdot (3 + 12)$	30
4	11	$2 \cdot (4 + 11)$	30
5	10	$2 \cdot (5 + 10)$	30
6	9	$2 \cdot (6 + 9)$	30

What pattern do you see between the dimensions of the bed and the perimeter? *Hint:* Look at the Process column.

Explain how using the formula for perimeter would help you in finding possible dimensions for a rectangle with a perimeter of 24 feet.

MATH Can Take You Places

Te Lleva a Muchos Lugares

LESSON 9

"Medidas y Mavericks"

by Rhonda Bailey

Medidas y Mavericks
Hoja de Anotaciones del Estudiante

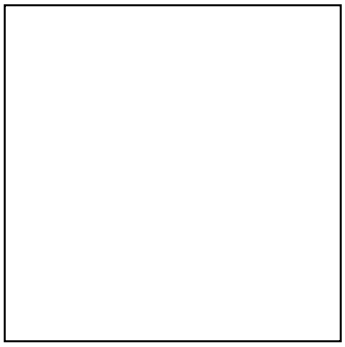
Largo de la cama	Ancho de la cama	Bosquejo de la cama	Fórmula del perímetro para la cama (en pies)	Fórmula del área para la cama (en pies cuadrados)

1. Explica cómo usaste la información del problema para ayudarte a resolverlo.

2. ¿En cuáles dimensiones te decidiste para el diseño de la cama? ¿Porqué elegiste estas medidas?

3. Explica tu plan para resolver este problema.

4. Imagina que una cama mide 4 pies por 4 pies. Encuentra el perímetro y el área. ¿Son iguales el perímetro y el área de la cama? ¿Porqué sí o porqué no? ¿Cómo explicarías la diferencia entre el perímetro y el área?



4 pies.

4 pies.

5. Explica la diferencia entre las unidades para medir el perímetro y las unidades para medir el área.

6. Mira a los siguientes pares de dimensiones y perímetros.

Largo (metros)	Ancho (metros)	Proceso del Perímetro $2 \cdot (l + w)$	Perímetro (metros)
1	14	$2 \cdot (1 + 14)$	30
2	13	$2 \cdot (2 + 13)$	30
3	12	$2 \cdot (3 + 12)$	30
4	11	$2 \cdot (4 + 11)$	30
5	10	$2 \cdot (5 + 10)$	30
6	9	$2 \cdot (6 + 9)$	30

¿Qué parecido hay entre las dimensiones de la cama y el perímetro? *Pista:* Mira en la columna Proceso.

Explica cómo el uso de la fórmula para perímetro te ayudaría a encontrar las posibles dimensiones para un rectángulo con un perímetro de 24 pies.