



A collaborative project between the University of Louisville  
and the Jefferson County Public Schools  
visit at: [www.math.louisville.edu/gems](http://www.math.louisville.edu/gems)

**Prepared by Fellow Melissa Baker and Teacher Vanessa Moore**

[mebake01@louisville.edu](mailto:mebake01@louisville.edu)

[vmoore1@jefferson.k12.ky.us](mailto:vmoore1@jefferson.k12.ky.us)

**Investigation/Lesson: Finding perimeter with fixed areas**

**Grades: 4th and 5th**

**Content Vocabulary:**

Previously:

Factors  
Factor pairs  
Rectangular (arrays)

New: Area

Perimeter  
Square unit  
Dimensions  
Linear unit

**Concepts/Skills/Core Content:**

- Distinguish between perimeter and area
- To develop relationships between area and perimeter of shapes with fixed areas.
- To compare and contrast the units used to measure perimeter and those used to measure area.
- Students should come up with ways to move to formulas.

Which core content bullet(s) is addressed in this lesson?

MA 05-2.1.1; MA 05-2.1.2

**Materials:**

0.5 centimeter grid paper (2 sheets) (Van De Walle BLM 9)  
Square tiles  
Recording sheet (Van De Walle BLM L-4)  
White boards  
H.W. sheet

Preparation necessary:

Photo copies  
Square tiles counted out and ready for lesson  
Getting homework sheet together  
Typing up an objective/vocabulary sheet

**Classroom/Materials Management:**

How will students be grouped? Students will work with a partner

How will materials be distributed/returned? Designated students will distribute materials

### Thinking Through the Lesson:

#### Introduction-

- Have each student make a rectangle with 12 tiles (filled in, not just the border).
- Ask for a volunteer to describe their rectangle, then model sketching it on the overhead using square centimeter transparency.
- Ask: *What do we mean by the perimeter of the rectangle? How do we measure perimeter?* After students arrive at a definition, ask a student to model the calculation on the overhead. Emphasize the units used are one-dimensional (linear).
- Ask: *What do we mean by the area of the rectangle? How do we measure area?* After students arrive at a definition, point out that the units are two-dimensional, and that area counts the tiles needed to cover the region completely. Have a student determine the area by counting and by multiplying, making connection to array model for multiplication.

#### The Lesson - How many different rectangles can be made with 36 tiles? What are there perimeters? What patterns do you notice?

- Students record their rectangles on the 0.5 centimeter grid paper, and determine the perimeter and area of each. (For this lesson, it is not important whether we consider 4x9 and 9x4 rectangles as the same or different.)
- Observe whether students are systematic in their search, how they measure perimeter (counting around, or adding  $2L + 2W$ ), whether students understand that area remains fixed while perimeter varies,

#### Closure-

- Ask the students what they have discovered about perimeter and area. *Did the perimeter stay the same? When is perimeter big and when is it small? Did the area stay the same?*
- Ask students how they know they have all the possible rectangles. Have the class decide on a systematic procedure for finding all of them.

#### Assessment:

- During the lesson: Are students confusing perimeter and area? Are they looking for patterns as they generate new rectangles? Have they found all possible rectangles?
- Using the white boards on grid side - state a fixed area (e. g. 24) and ask the students to find a rectangle having that area.
  - How do we know this figure has an area of \_\_\_?
  - What's the perimeter of your figure?
  - Anyone have a larger/smaller perimeter?

**Literacy Connections:** "Bigger, Better, Best" by Stuart J. Murphy