Constructing Task: Area and Perimeter

Adapted from "Fixed Perimeters" and "Fixed Areas" in Teaching Student-Centered MATHEMATICS Grades 3-5 by John Van de Walle and LouAnn Lovin.

STANDARDS FOR MATHEMATICAL CONTENT

MCC4.MD.2. Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.

MCC4MD.3. Apply the area and perimeter formulas for rectangles in real world and mathematical problems. For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

Students worked with area and perimeter in third grade and many can find the area and perimeter of given rectangles. Some students may even be able to state the formulas for finding the perimeter and area of a rectangle. However, many students get these formulas confused unless they have sufficient opportunity to use models as they construct their understanding.

ESSENTIAL QUESTIONS

- How is perimeter different from area?
- What is the relationship between area and perimeter when the area is fixed?
- What is the relationship between area and perimeter when the perimeter is fixed?
- How does the area change as the rectangle's dimensions change (with a fixed perimeter)?
- How are the units used to measure perimeter like the units used to measure area?

- How are the units used to measure perimeter different from the units used to measure area?

MATERIALS

- 1-inch tiles (36 per student)
- 1 ruler or tape measure (per student)
- Student Recording sheet and 2 copies of ¼ inch grid paper (grid provided has 0.3 inch squares)

GROUPING

Individual or partner task

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Task Directions
Part 1:

1. Instruct students to draw a rectangle with a perimeter measuring 12 units. (Use the grid paper.) Have a student volunteer share their rectangle for all to see (may adapt to whatever technology is available in your classroom.) Students' rectangles may be of the following whole unit dimensions: 1 x 5, 2 x 4, or 3 x 3.
2. Ask students to find the area of their rectangle and to record in a table like the one used in Part 1.
3. Direct students to draw and find the area of all the rectangles they can that have a perimeter of 12 whole units. Ask about anything they notice about the relationship between the area and perimeter.
4. Direct the students to draw and find the area of all the rectangles they can that have a perimeter of 24 units. Rectangle dimensions will be: 1 x 11, 2 x 10, 3 x 9, 4 x 8, 5 x 7, and 6 x 6.

Part 2:

You may choose to have your students complete the suggested problems using additional copies of the grid paper provided and tiles, if necessary, to support them as they construct their understanding of formula for area and perimeter.

FORMATIVE ASSESSMENT QUESTIONS

- What did you notice about the perimeter?
- How does the perimeter change as the shape of the rectangle changes?
- What did you notice about the area?
- How does the area change as the rectangle's dimensions change?

DIFFERENTIATION

Extension

- Give students more tiles and have them find the perimeter and area of all the possible rectangles they can create with the number given (possibly start with 48 tiles)

Intervention

- Start with one tile. Have the student record the dimensions of the rectangle and determine the perimeter and area. Record and sketch on the centimeter grid paper. Add one tile at a time for the students to determine the dimensions, perimeter, and area. Students should record their findings and sketch each rectangle on the centimeter grid paper.

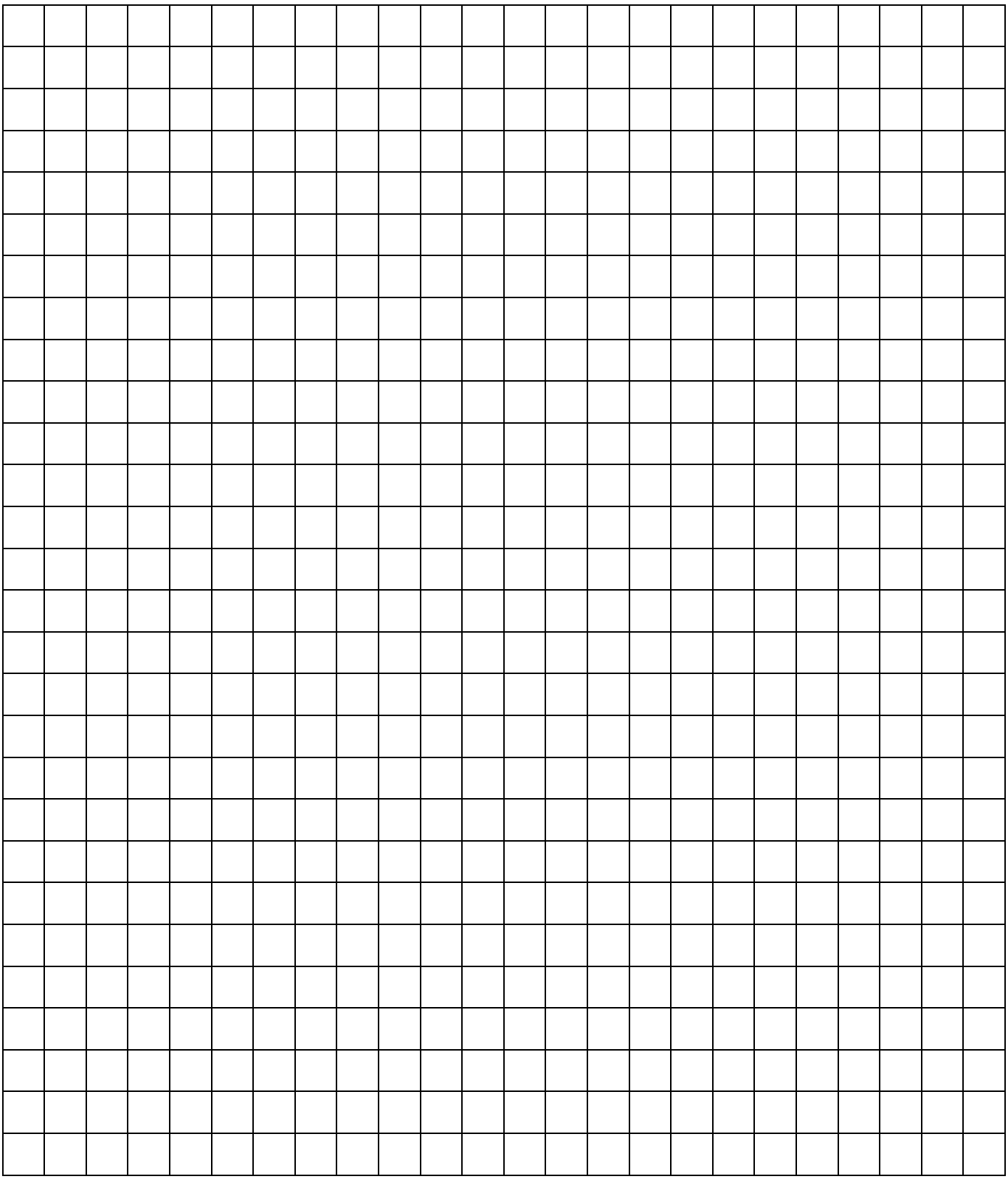
Name_____ Date _____

Perimeter and Area: Part 1

Directions:

1. On your grid paper, draw a rectangle with a perimeter of 12 units.
2. Measure the outside dimensions and record in the chart below.
3. Calculate and record the measurements for area and perimeter.
4. Repeat for all the rectangles possible having a perimeter of 24 units.

Rectangle Dimensions	Area	Perimeter



Name_____ Date _____

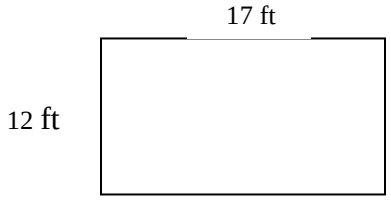
Perimeter and Area: Part 2

Solve the following problems.

1. The community center has decided to move the parking area to the back of the building and replace the front with a grass lawn. The lawn is rectangular shaped with a length of 10 yards and a width of 40 yards. A bag of grass seed covers 50 square yards at a cost of $4.99 per bag.
   What is the total area of the new lawn?
   How many bags of grass seed will they need to buy?
   What is the total cost to renovate the front lawn with the new grass?

2. Mr. Ely keeps his chickens in a square pen with an area of 100 square feet. What is the length of one side of the chicken pen?

3. Ethan's parents are re-carpeting his bedroom. The dimensions of the room are shown in the diagram.



How many square feet of carpet do they need to buy for the entire room?