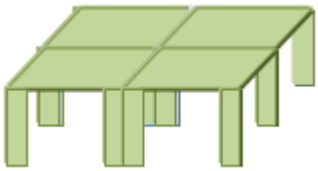
CONSTRUCTING TASK: GUESS WHO'S COMING TO DINNER?



APPROXIMATE TIME: 2-3 Days

STANDARDS FOR MATHEMATICAL CONTENT

MCC.3.MD.7 Relate area to the operations of multiplication and addition.

MCC.3.MD.8 Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.

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

In this task, students will manipulate squares to alter the perimeter of given shapes in order to maximize seating potential. Students will then determine the size table cloth needed for the table of their choice.

Student responses to the "Guess Who's Coming to Dinner?" task should reflect a variety of solutions. Student work should demonstrate that they paid close attention to the details of the problem. Work should be clearly labeled to show guests' names. Written explanation should be easily understood. Ask students to share their solutions along with highlights of their group's discussion that occurred while finding their solutions.

Students should have had experience with area and perimeter and understand the different uses for each. As students manipulate the squares, they will discover that when two separate squares (tables of four) are rearranged into a rectangle, two seating spaces are lost where the squares are joined together. Other observations about joining tables will become apparent as students manipulate the squares. Some students may recognize that as the perimeter gets smaller, the rectangle gets closer and closer to a square.

Remind students that most of the pentominos had a perimeter of 12 units, except for the one in which most of the squares shared two sides. This information may be helpful when working on this task.

ESSENTIAL QUESTIONS

- How are the perimeter and area of a shape related?
- How does combining and breaking apart shapes affect the perimeter and area?

MATERIALS

- *Spaghetti and Meatballs For All* by Marilyn Burns or similar book about perimeter
- "Guess Who's Coming to Dinner?" student recording sheet
- 8 colored squares per group (about 2-inch squares)
- 1 large paper per group (about 18 x 24)

GROUPING

Small Group Task

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Part I

As an introduction to this task, read *Spaghetti and Meatballs for All*. In the story, relatives come to dinner and begin rearranging tables which results in losing seating places. After reading the book, have groups use the squares to model some of the events in the book. Discuss changes in area and/or perimeter caused by the moves.

Part II

Students will follow the directions below from the "Guess Who's Coming to Dinner?" student recording sheet.

Pretend that four people live at your house (Your mom, dad, sister, and you). Aunt Sue, Uncle John and their six children (Jamal, Kevin, Carl, Annie, Stephanie, and Maxine) are coming for dinner. Uncle Kenny is coming, too. He is bringing his wife (Aunt Jenny) and four kids (Earl, Charles, Jasmine and Justine).

Mom has six square folding tables she can use but you don't have to use all of them. (Each folding table seats four, one on each side.) You can put two or more of the folding tables together to form a rectangle if you like.

Job #1:
Your job is to work with a partner to decide on a seating arrangement that is best for your family and guests. When finished, draw a picture of the table arrangement and label each place to show who will be sitting there. Mom has the following rules:

- There should be no empty seats.
- There must be at least one grown-up at each table.

Write a few sentences to describe what happened to the perimeter as tables were pushed together. Then explain why the arrangement you chose is the best possible arrangement.

Part III
Job #2
Next, you need to determine what size tablecloth your mom needs in order to cover the table. Each side of each square is 3 feet long. The table cloth should be a perfect fit.

FORMATIVE ASSESSMENT QUESTIONS

- How does the area compare to the perimeter of this shape?
- How does combining or pulling apart shapes affect the perimeter and area of your pieces?
- What happens when you combine squares?
- What strategies are you using to make sure each guest has a seat?

DIFFERENTIATION

Extension
- Ask students work with a total of 24 dinner guests and 8 square tables.
- Challenge students to find more than one way to solve the problem.
- Ask students to describe how area and perimeter are alike and/or different.

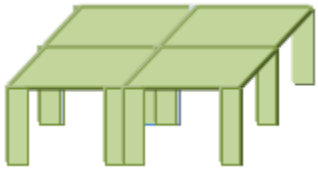
Intervention
- As students try out a possible solution, have them trace the squares on a separate piece of paper and label the area and length of sides to determine the perimeter. Continue with this until the perimeter matches the number of guests. Then have students use name cards to move the guests around until a suitable solution is found.

TECHNOLOGY CONNECTION

- http://nlvm.usu.edu/en/nav/frames_asid_169_g_1_t_3.html?open=activities&from=category_g_1_t_3.html The squares from this virtual pattern blocks web site can be used. Students can use six squares from the pattern blocks and find different arrangements of the squares that meet the required conditions.
- http://www.learner.org/courses/learningmath/measurement/session9/part_a/index.html An interactive task for ***teachers*** to explore area and perimeter.

Name _____ Date _____

Guess Who's Coming to Dinner?



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You have two jobs to make this family feast a success.

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