# Constructing Task: Grandmas' Quilts
Approximately 3 Days

## STANDARDS FOR MATHEMATICAL CONTENT

**MCC.2.G.2** Partition a rectangle into rows and columns of same-size squares to find the total number of them.

## 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.

### ***Mathematical Practices 1 and 6 should be evident in EVERY lesson***

## BACKGROUND KNOWLEDGE
(Information quoted from Van de Walle and Lovin, Teaching Student-Centered Mathematics: Grades K-3, read pages 234-238, 252. Partial excerpt below.)
 "One of the purposes of early comparison activities with areas is to help students distinguish between size (or area) and shape, length, and other dimensions. A long, skinny rectangle may have less area than a triangle with shorter sides. Piagetian experiments indicate that many 8-9 year olds do not understand that rearranging areas into different shapes does not affect the amount of area. Direct comparison of two areas is nearly always impossible except when the shapes involved have some common dimension or property. For example, two rectangles with the same width can be compared directly, as can any two circles. Comparison of these special shapes, however, fails to deal with the attribute of area. Instead, activities in which one area is rearranged are suggested. Cutting a shape into two parts and reassembling it in a different shape can show that the before and after shapes have the same areas, even though they are different shapes. This idea is not at all obvious to children in the K-2 grade range."
**Suggested formative task: Activity 8.8- Two-Piece Shapes, page 234, *Teaching Student-Centered Mathematics, K-3*, VandeWalle and Lovin.**

## ESSENTIAL QUESTIONS

- What strategies can I use to count the total number of squares in a rectangle?
- How are arrays and repeated addition related?

## MATERIALS

- *A Remainder of One* by Elinor J. Pinczes (Houghton Mifflin Co., 1995) or similar book
- *Each Orange has 8 slices: A Counting Book* by P. Giganti
- Array recording sheet (per group)
- Half sheet of chart paper (per group)
- Various manipulatives (connecting cubes, counters, tiles, etc.)
- Construction paper
- Colored pencils, crayons, or markers (optional)

## GROUPING

Partners

## TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

**Part I**
Begin the lesson explaining to the students they will be creating a quilt. This task will involve the students partitioning rectangles, which will allow that students to develop a conceptual understanding of arrays. You need not focus the lesson around explicit use of this term or the repeated addition to which it leads, as discussion of these ideas will arise naturally through completion of the task and the student discussion at the close of the task. Share pictures of arrays that can be seen in the real world and discuss the difference between a row and a column, and of the role orientation plays in those names. Provide some real world examples- seats in the movie theatre, ice cube tray, egg carton, candy boxes, floor tiles, etc. Read aloud the book, *Each Orange has 8 slices: A Counting Book* by P. Giganti or a similar book. Throughout the book, discuss the number groupings and model for students the rectangles that can be created throughout the story using the illustrations. Before counting the total, have students make predictions about the total number of wheels or balloons.
Ask students if they have ever seen a quilt, or know what one is. Show a photograph of a quilt with an array structure.
Explain to students that quilts are made of fabric with squares that are stitched together. Today they will help a special Grandma decide the number of fabric pieces she needs for the quilts she will make for each of her grandchildren. Each of the squares tells a story or has a message that Grandma's wants to share. Her grandchildren are Zoe, Zachery, Cierra, and Quinton. Grandma wants to begin by creating a quilt for herself by giving each one of her grandchildren a section. Using a sheet of construction paper, have students use folding to partition the rectangular paper to leave a portion for each of her grandchildren. At this point, you may allow students to decorate each portion. Allow students to share their quilt.

## Part II

Students will create a quilt for each of the grandchildren. Zoe's quilt will have 4 rows and 5 columns. Zachery's quilt will have 3 rows and 4 columns. Cierra's quilt will have 2 rows and 4 columns. Quinton's quilt will have 4 rows and 4 columns. Allow the students to work with a partner to fold a piece of construction that resembles the quilt Grandma would create when she has sewn together the pieces. Allow students to use manipulatives or paper folding to create their quilts. Then, encourage the students to draw their quilts for each grandchild on chart paper and record the strategies they used to find the total number of squares on the recording sheet. While students are working, circulate the room and ask questions like:

- What manipulatives are you using to help solve this problem?
- How can you tell the difference between rows and columns?
- What strategies are you using to help figure out the total number of squares?
- How are you communicating the results you have found?
- What patterns are you noticing from your strategies?
- How does addition help you decide how many pieces in all, or how many rows or columns to make?
- Do any of the grandchildren have the same number of pieces?
- How did working with a partner help you?

## Part III

After students have completed the task, choose several students to share their discoveries and observations with the class. The teacher or students can record the arrays and strategies the students have found on a larger version of the array recording sheet, along with observations about arrays, creating an anchor chart about arrays and repeated addition.

## FORMATIVE ASSESSMENT QUESTIONS

- How can you tell the difference between rows and columns? Why or when does it matter?
- How did working with a partner help you?
- What do you notice about arrays? How is this arrangement helpful?
- Where else can you find arrays? (packaging, tiling) Why might they appear in these places?

## DIFFERENTIATION

### Extension

If students complete the assigned task, ask students to identify the different dimensions of the quilt (the rows and columns) if Grandma wanted to create a quilt with 36 squares.

### Intervention

Students may build a quilt using color tiles, or construction paper squares in order to visualize the arrays.

**Group Members: _____ Date: _____**

## Grandma's Quilts Recording Sheet
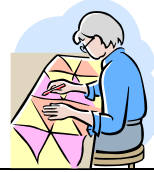
| | Dimensions | Array (record with dots or X's) | Strategies |
|---|---|---|---|
| Zoe | 4 rows and 5 columns | | |
| Zachery | 3 rows and 4 columns | | |
| Cierra | 2 rows and 4 columns | | |
| Quinton | 4 rows and 4 columns | | |