**Task 4 - Finding Area with Geoboards**

 (This Task builds from “Desktop Tiling” task 3)

*Adapted from North Carolina Department of Public Instruction*

**Student Objective:** “I can determine area by counting smaller regions within a shape.”

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| **Common Core Standards to Measure** | **Mathematical Practices Addressed** |
| **3.MD.5** Recognize area as an attribute of plane figures and understand concepts of area measurement.**a.** A square with side length 1 unit, called “a unit square”, is said to have “one square unit” of area, and can be used to measure area.**b.** A plane figure which can be covered without gaps or overlaps by *n* unit squares is said to have an area of *n* square units.**3.MD.6** Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).**3.MD.7** Relate area to the operations of multiplication and addition. | #1: Make sense of problems and  persevere in solving them.#3: Construct viable arguments and  critique the reasoning of others.#5: Use appropriate tools strategically.#7: Look for and make use of structure. |

**Materials:**

Geoboards (1 per student), Rubber bands, Geoboard Area Game directions sheet, Dice (2 per pair), Sticky notes

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| G**Engage Students with the Goal** | State and RateObjective: “I can determine area by counting smaller regions within a shape.” Students rate themselves to the goal (1, 2, 3, 4). | Setting Objectives and Providing Feedback |
| A**Access Prior****Knowledge** | Show students the picture of the geoboard. Ask them:“What shapes do see on the geoboard?”  “Could we find the area that they cover? If so, how?”http://www.oncoursesystems.com/images/user/957/6925/Geoboard%20jpeg.jpg | Nonlinguistic RepresentationsGenerating and Testing Hypotheses |
| N**New Information** | Explain to students that they will be finding different combinations of square units for area measurements on the geoboard. Demonstrate by showing them one correct and one incorrect representation of a shape with an area of 5 square units. Discuss what make each one correct and incorrect. (Half-units are acceptable.)Have students work in pairs to build different combinations of a figure with an area of 5 square units. Share student examples with the class.  **Ask questions such as:** How could we check these students’ work to make sure they have an area of 5 square units? Justify your reasoning. | Nonlinguistic RepresentationCooperative LearningGenerating and Testing Hypotheses |
| A**Application** | Students will now work on a new task to construct a figure with a specific area. They will check the area by counting the square units. Half-units are acceptable and will offer a challenge for students who easily grasp the counting of whole units.**Introduce the “Geoboard Area” game** (Students will work in pairs):1. Decide who will go first.2. The first student rolls two dice and adds the numbers.3. Both students build a figure on a geoboard with the area that matches the  sum.4. Students trade boards with their partners. The partners check the area.5. The second student rolls the dice to begin the next round. (Allow students  to engage in the activity for about 15 minutes.)Circulate the room during this activity to listen for possible is understandings.After students have played for 15 minutes, instruct them to stop and leave the last figure they created on their boards.Instruct students to write the area of the figure on a sticky note and place it on the back of the geoboard, or on the desk underneath the board. (Discuss how to properly notate square units as a label.) Allow students to complete a gallery walk to view and determine the area of each figure. Students should turn over or move the geoboard to check the answer.**Math Journals:** Choose 2 student geoboards to share. Students find the area in their journals. Students should write at least one sentence about how they determined each area. | Nonlinguistic RepresentationCooperative LearningGenerating and Testing HypothesesProviding FeedbackHomework and PracticeSummarizing and Note-Taking |
| G**Revisit the Goal** | Have students write a statement of learning in their interactive notebooks/journals using words and pictures. Have students share their entry with other students.State and RateObjective: “I can determine area by counting smaller regions within a shape.” Students rate themselves to the goal (1, 2, 3, 4). | Setting Objectives and Providing FeedbackSummarizing and Note-Taking |

**Math Journal (Interactive notebooks)**

Choose 2 student geoboards to share. Students find the area in their journals. Students should write at least one sentence about how they determined each area.

**Evaluation of Students**

**Formative:** While students are working, pose questions and observe students.

**Plans for Individual Differences**

**Intervention:**

Students having difficulty building figures on the geoboards should be provided with square tiles to build the figures. Students having difficulty counting or recounting spaces should be given a tool, such as a counters or

cubes to help them keep track of spaces that they have already counted. Also, using paper representations where students can draw or mark counted spaces may also help.

**Extension:** Advanced students can be challenged to find and demonstrate all possible whole square unit combinations for an area of 6, 7, or 8.

**Geoboard Area Game**

**Directions:**

1. Decide who will go first.
2. The first student rolls two dice and adds the numbers.
3. Both students build a figure on a geoboard with the area that

 matches the sum.

1. Students trade boards with their partners. The partners check the area.
2. The second student rolls the dice to begin the next round.

