**Task 3 - Desktop Tiling**

 (This Task builds from Task 2 - “Rectangle Comparison I”)

*Adapted from North Carolina Department of Public Instruction*

**Student Objective:** “I can define and use a square unit to measure the area of a rectangle.”

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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. | #1: Make sense of problems and persevere in solving  them.#3: Construct viable arguments and critique the  reasoning of others.#6: Attend to precision.#7: Look for and make use of structure. |

**Materials:**

Square tiles (1 per pair)

Large Index Cards (5-6 per pair)

Small Index Cards (5-6 per pair)

Notebook paper (2 sheets per pair)

Scissors

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| G**Engage Students with the Goal** | State and RateObjective: “I can define and use a square unit to measure the area of a rectangle.” Students rate themselves to the goal (1, 2, 3, 4). | Setting Objectives and Providing Feedback |
| A**Access Prior****Knowledge** | http://t0.gstatic.com/images?q=tbn:ANd9GcSlDBZo0y-QO6iANUOQaU8cd4mI_uwXhNzAHbIwRZln8cWhlvvL41VjVT3_http://www.visualsupercomputing.com/wp-content/upload-images/glass-mosaic-tiles-1-500x500.jpg*(This activity deals with iteration of units and dealing with partial units. Estimation should be used to deal with partial units, and combining them to develop whole units in measuring area.)*Show these visuals to the class… https://shop.aph.org/wcsstore/APHConsumerDirect/images/catalog/products_large/1-04851-00_BL_Notebook_Paper_Punch_G.jpghttp://edufurniture.com/images/products/preview/785m.jpg(desk, notebook paper, index card, tile)**Ask:** *How could we use these items as tools to measure the area the desktop covers?* *Which one would give us the most accurate measurement? Justify your reasoning.* | Nonlinguistic RepresentationsIdentifying Similarities and Differences |
| N**New Information** | Read problem aloud to the class and show visuals to engage students in the story problem. *Alondra wants to tile her desktop. She only has index cards and notebook paper to use for measuring. How can she describe the size of her desktop using these units?*Discuss the problem to make sure all students understand what it is asking.Allow students to work in pairs to estimate, measure, and record the number of each unit it would take to cover the top of one desk.Remind students to try to avoid gaps and overlaps for the best estimates.**Discussion:** Record the number of each unit required to tile the desktop. Ask:* *How can we describe the number of index cards and sheets of notebook paper it would take to cover or tile the desk top?*
* *Why doesn’t it take the same number of each unit to cover the same desk top?*
* *Which unit of measure was most appropriate for this space?* (Which unit provided the closest estimate?)

Students are challenged to use just one square unit to measure a surface. Although they may use any of the listed strategies to complete the activity, students will soon see that a quick way to compute the number of square units it would take to cover the desk would be to measurethe index card and multiply the answer by the number of index cards they used. Other students would insist on iterating the one unit across the entire desk and count the number of times they did so. Still others may imagine the array, and measure just the top and side lengths, then multiply the numbers to find the area. The discussion of the activity will reveal the students who may need additional experiences iterating units or choosing effective strategies. | Similarities and DifferencesNonlinguistic RepresentationCues, Questions, and Advance Organizers |
| A**Application** | **Read the next problem:***Alondra knows that she needs more exact measurements before going to Lowe’s to buy tiles. She finds a square tile in her garage. How can Alondra use the square tile to measure the desktop?***Ask students to discuss in pairs:** What are some different ways we could use the square tile to measure the desktop?Have students share out with the class. Student responses may include:* Use the square tile to measure the small index card, then multiply by the number of index cards it took to cover the desk
* Use the square tile to measure the large index card, then multiply by the number of index cards it took to cover the desk
* Use the square tile to measure the sheet of notebook paper, then multiply by the number of sheets it took to cover the desk
* Use the square tile to measure the top of the desk

Tell students to utilize one of the methods to measure the desk. Ask students to share their findings. Post their measurements for the whole class to see.Students revisit the concept of area as the amount of space covered by a flat shape. Here, students express area as square units. They should be able to verbalize the number of square units that it takes to cover the desk. In order to explain why the estimates were similar although they used different methods, they may make connections to converting from one measurement unit to another. For example, if they know that there are 12 inches in a foot and that it takes four feet to measure a length, then they could multiply the number of inches in a foot by the total number of feet to find the total number of inches. If they know how many square units fit on an index card or how many square tiles fit on a sheet of paper, they can multiply the number of square tiles by the number of index cards or sheets of paper to find out the number of square units it would take to cover the desk. They have converted the number of index cards or sheets of paper to the number of square tiles needed to cover the surface.Discuss students’ findings with the class:* *Which method did you use?*
* *Did all of the ways result in similar estimates? Why or why not?*
* *Draw a representation of the desktop on the board, labeling the length and width. Then ask, how could we notate the length and width using dimensions?*
* *How much material does Alondra need to cover her desktop with tiles?*
* *How would we notate this using square units? Could we use square units to notate area if we used index cards or notebook paper to measure? Why or why not?*

We just found area when we measured the desktop with square units. *What is area*? Have students record what they think area is.*How would we describe area of the desk top?* The area is \_\_\_ square units.**To Elaborate on the Lesson:**By turning index cards and sheets of paper into square units, the importance of square units is reinforced. Students should notice that the square units allow us to describe the dimensions of the desk, and that the orientation is not a factor.Discuss the importance of square units. Ask: How can we make the index cards and notebook paper into square units? Students should talk about fold and cutting them to create squares.Allow students to create square units with the index cards and notebook paper by folding the corner across to the opposite side and removing and discarding the rectangle that is left. If desired, additional materials can be provided, or students can work in groups of 4 to explore.Allow students to re-measure the desk with square units of index cards and notebook paper.Discuss measurements and the importance of square units.* How do the new measurements compare to the original measurements?
* Why is it important to express the measurement of the desk top in square units?

Students should talk about how square units allow them to build arrays to cover the desk top and that arrays are easy to count. |  |
| 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 define and use a square unit to measure the area of a rectangle.”Students rate themselves to the goal (1, 2, 3, 4). | Setting Objectives and Providing FeedbackSummarizing and Note-Taking |

**Math Journal (Interactive notebooks)**

Possible responses: What is area? How can we use square units to find the area of a surface?

Have students share their responses. Students may refine their own answers afterwards.

**Evaluation of Students**

**Formative:**

Observe students as they work for: tiling with no gaps or overlaps and using appropriate estimates for partial units, precise explanations of their strategies.

**Plans for Individual Differences**

**Intervention:** Provide enough materials to completely cover the area for those students who have

difficulty iterating the units.

**Extension:** Allow students to use centimeter cubes to estimate the area of the desk top in square centimeters. Students should explain their reasoning for their estimates.