CONSTRUCTING TASK: COUNT ME IN!

STANDARDS FOR MATHEMATICAL CONTENT

MCC.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.

MCC.3.MD.6. Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).

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

a. Find the area of whole number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths.

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

The students should understand that a plane figure is a two-dimensional figure that consists of length and width with no height and covers a certain amount of space. In other words, it's FLAT!

The students should understand what it means to skip-count and how skip-counting is repeated addition of the same number. Students should also be familiar with the term sum.

ESSENTIAL QUESTIONS

- What is area?
- Why are square units commonly associated with finding area?
- How does knowing the dimensions of a rectangle relate to area?
- How does knowing the dimensions of a rectangle relate to multiplication?

- How does knowing the area of a square or rectangle relate to knowing different multiplication facts?
- What makes an area model a good representation for multiplication?
- By using an area model to learn multiplication, how many number patterns of multiplication are displayed?
- How are multiplication and addition different? How are they the same?
- What is the relationship between dimensions and factors?
- What is the connection between area models and skip counting?
- How is the commutative property of multiplication evident in an area model?

MATERIALS

- sidewalk chalk
- linking cubes or color tiles
- Post-its
- dry erase boards and markers
- math journal/learning log

GROUPING

Partner

TASK DESCRIPTION, DEVELOPMENT, & DISCUSSION

In this task, students will create area models and label them with appropriate dimensions.

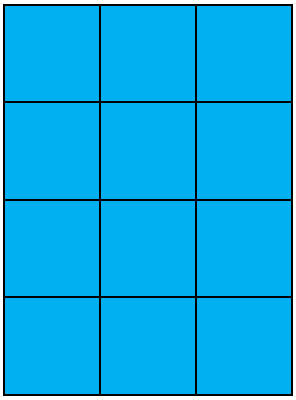
Part I

The teacher can begin with a review of area. If the extension activity from the previous lesson was completed, which required the students to think of strategies to determine how much area was being covered WITHOUT counting 1, 2, 3; the teacher can have those students discuss their findings. Otherwise, students can use color tiles or even linking cubes and create a rectangle that is a certain area. Let's say you begin with 24 square units. The teacher can walk around and have different students draw the different ways they represented 24 square units. Possible responses are a 1 X 24, 2 X 12, 3 x 8 and a 6 X 4.

The teacher then asks the following questions for depth and to lead to additions relationship to multiplication:

- While they look different, are they covering the same area? (This relates back to the Cover Me scaffolding task.)
- Let's pretend the different area models you created for 24 were on the board. Excluding counting each square one at a time, what math strategies could you use to find out quickly the area being covered?
  (This question should lead the students to saying that they could have skip counted or some may respond that they would multiply.)

The teacher will then expound on area's relationship to skip-counting/addition and multiplication. S/he will model and point out the following key concepts using an area model similar to the following, after allowing the students to watch the following video on Brainpop Jr. If your school does not subscribe to Brainpop Jr., a free trial is offered. Follow the link!
http://www.brainpopjr.com/math/measurement/area/grownups.weml



Big Ideas Teacher Should Convey To Students During Instruction:

- ☑ Area is related to addition in that the square units can be counted two ways: based on columns or length along with width or rows. This can be done using skip counting which is a form of addition.
- ☑ However, the fastest and easiest way is to do it by simply multiplying. Multiplying is repeated addition. Simply count across the top. In this case, it's three. Then, count on the side to determine how long. This is 4. Explain to students that you have four rows with three in each, when turned you can display 3 rows of 4. This is multiplication or fast adding! (This will relate to **commutative property of multiplication**.)

Part II

The students will complete the "Count Me In" task recording form. Have the students share the different rectangles created and how they are similar/different.

FORMATIVE ASSESSMENT QUESTIONS

- What is the connection between skip-counting/addition and multiplication?
- Which one is better to use and why?
- Can the same areas look different? Why or why not?
- What is the commutative property of multiplication and how does it relate to area?
- What is the relationship between a product and a sum?
- Can an area measurement have the same area but different factors? How does that relate back to the tangram task?
- What would happen if we took some of the post-its or blocks away? Would we still have an accurate area measurement of the plane figure? Explain.

DIFFERENTIATION

Extension

- The teacher could take the students outside and break them into groups of two and give them 10 index cards with different multiplication problems. Using sidewalk chalk, she will have them draw an area model representing the multiplication fact and write the problem with the area measurement or product. She will stress the importance of putting square units after the product. **This is a fun activity that kids love and allows for lots of cooperative learning!**

Intervention

- Using this task as a direct instruction strategy in small groups will provide support for students who struggle with these concepts and will enable them to develop the ability to describe their thinking.

Count Me In!

Create a rectangle with the area of 16 u^2. What is a multiplication sentence that could describe your rectangle? Find a different way to show an area of 16u^2.	Create a rectangle with the area of 30 u^2. What is a multiplication sentence that could describe your rectangle? Find a different way to show an area of 30u^2.
Draw a rectangle with the area of 36 u^2. What is a multiplication sentence that could describe your rectangle? Find a different way to show an area of 36u^2.	Draw a rectangle with the area of 48 u^2. What is a multiplication sentence that could describe your rectangle? Find a different way to show an area of 48u^2.