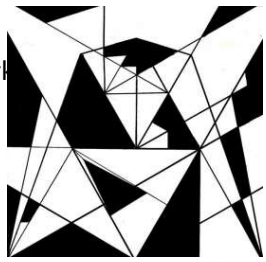

SCAFFOLDING TASK: COVER ME!

Adapted from Teaching Student Centered Mathematics, by John A. Van de Walle, 2006 pg 235

STANDARDS FOR MATHEMATICAL CONTENT

MCC3.MD.5 Recognize area as an attribute of plane figures and understand concepts of area measurement.

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.

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

Misconception- Van de Walle states that area is a measure of the space inside a region or how much it takes to cover a region. As with other attributes, students must first understand the attribute of area before measuring. Data from the seventh National Assessment of Educational Progress suggest that fourth-and eighth-grade students have an incomplete understanding of area (Martin & Strutchens, 2000).

Many conclude that the only way to teach area is by using squares since they are very nice units and easy to use for covering. However, any tile that conveniently fills up a space can be used. Even filling a region with uniform circles or lima beans provides a useful idea of what it means to measure area (Teaching Student Centered Mathematics, Van de Walle, John A., p 262).

Background Knowledge- Students should know that a rectangle is a two-dimensional plane figure.

ESSENTIAL QUESTION

What is area?

MATERIALS

tangrams (a blackline master can be found on pg 18)
math journal/learning log,
Grandfather Tang's Story by Ann Tompert,
unitedstreaming.com video entitled *Using Tangrams*

GROUPING

Partner

TASK DESCRIPTION, DEVELOPMENT, AND DISCUSSION

In this task, students will investigate area using tangrams. They will create different tangram pictures and discover that one set of tangrams can cover different shapes because it's the same area. This task is a scaffold for one product having multiple multiplication sentences.

Comments

The lesson could open with the teacher giving each student three different pictures created out of square units. However, they would all have the same area! For example, if the area is 12 square units, they would each get a picture that is a 1 X 12, 2 X 6, and a 3 X 4. Next, have the students glue each picture in their learning log/math journal and write how they are the same and how they are different. This would be a great set-up for the unit that will follow.

Once completed, the teacher should allow time for sharing. Next, read the book ***Grandfather Tang's Story***. Following the reading of the story, you might show the students the two and a half minute video from unitedstreaming. Upon completion of this, begin a discussion about tangrams asking the following questions:

Discussion Questions:

What are tangrams? ***(Answer**: A puzzle!)*
What makes the puzzle unique? (**Answer**: *It's a rectangle cut into 7 shapes.)*
After reading the book and looking at the mini video, what do you think is the puzzle's relationship to math? (**Broad answers which the teacher should record on chart paper so that she can go back and tie their thinking here with area later.)**

Task Directions: Give each student a bag of tangrams, and have them explore. Alternatively, you may allow students to create their own set of tangrams using construction paper or card stock. Directions are available here:
http://www.beaconlearningcenter.com/documents/2795_01.pdf
http://www.heckscher.org/downloads/ED08_KidsCor_ActivityPages_Tangram.pdf

You may ask them to try to make different pictures/shapes. Allot a certain amount of time for this and then give them a sheet of white paper and have them trace around their favorite picture/shape. Once finished, the students stand up, take THEIR set of tangrams, and COVER someone else's puzzle.

Once completed, the teacher will lead the students in the following discussion.

Discussion Questions:
Were all the pictures the same?
How did some of the pictures look?
What one unique trait did all of the pictures have in common? (**This is important! Someone needs to respond that they used the same 7 shapes to cover different pictures!)**

BIG QUESTION #1: What does this say about each picture? (The teacher should allow for deep reflection here. However, what she wants them to understand is although each picture is different, they are all using the same 7 pieces which were cut from the same size rectangle.)

BIG QUESTION #2: Are the pictures covering the same amount of space? (The teacher should be sure to hold up different pictures the students have created to drive this point home.)

Have the students go back to their math journal/learning log and examine the pictures they glued in their log at the beginning of the lesson closely. Tell them to think about the activity they just completed and examine each picture carefully and respond to the following questions.

FORMATIVE ASSESSMENT QUESTIONS

- What is the relationship between the pictures and the tangram activity?
- What is the relevance of studying this connection?

After listening to student responses and discussions, the teacher will introduce the vocabulary word **area.** She will go on to explain the definition and then ask them the following question: **How does area relate to the tangram lesson and the pictures that were glued in your journals?**
Once completed, the students can share their responses and the teacher will serve as facilitator during the discussion.

DIFFERENTIATION

Extension

- The teacher will give them different plane figures such as pentagons, hexagons, trapezoids, etc. and have them create their own tangram puzzle, design another picture, and have another student solve the puzzle using the pieces they created and vice-versa. However, the student who solved will then keep the pieces and create another picture and give the person back their pieces and have them solve the puzzle they created using their pieces.

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Intervention

- Having the students work in small groups will provide support for students who struggle with this concept and will enable them to develop the ability to describe their thinking.

BLACKLINE TANGRAM MASTER