



Cumberland County Schools

Objective 2.01 – Area

Lesson Title: Area
Curriculum Area: Mathematics
Grade: Fourth Grade
Time: 60 minutes

I. PLAN

A. NCSCS Goal 2:

The learner will understand and use perimeter and area.

B. NCSCS Objective:

2.01 - Develop strategies to determine the area of rectangles and the perimeter of plane figures.

C. CCS Task Analysis:

TLW - Define vocabulary related to geometry within given tasks.

TLW - Define and calculate the area of rectangles and squares.

TLW - Find the area of regular and irregular figures, using a grid.

TLW - Show that the area of a square or rectangle, when determined by counting the number of square units, is the same as the area when determined by using a formula.

D. CCS Pacing Guide:

Quarter: Third

Week(s): 5-9

E. Lesson Background:

Strand: Geometry

Marzano Level: Applying

F. Materials:

- One piece of floor tile (to use as an opening hook)
- Attachment A – Vocabulary Cards
- Attachment B – Grid Paper
- One transparency of Attachment B – Grid Paper
- One ruler for teacher demonstration
- TI-15 calculator for each student
- Attachment C
- Dice (2 for each student pair)
- Centimeter cubes

G. Prerequisite Skills:

- Fluency with multiplication from 1x1 to 12x12
- Knowledge of 2-dimensional figures and their properties (especially rectangles and squares)

H. Essential Question(s):

How can using a counting strategy to determine the area of a square and/or a rectangle lead to the understanding that the formula ($l \times w$) can also find the area of a square or rectangle?

II. IMPLEMENT

A. Anticipatory Set:

The teacher will hold up a piece of floor tile and say, "I want to change the floor in my kitchen. I chose the particular tile I want, but I have a problem. I have to purchase the tile and I don't know how many pieces to buy. I know I need to cover every bit of the floor from wall to wall. I need to cover the area of the floor. I need your help to figure out how much tile I need to buy. That's exactly what we are going to do today; we're going to learn how to figure the area of a square or a rectangle."

B. Teacher Input:

"First, let's review the vocabulary we need to know before we begin to find the area of squares and rectangles." The teacher will write the vocabulary words listed below on the board or overhead for the students to copy into their math journals. As the teacher writes, she/he will read the words aloud to the students. The students will write the terms and definitions at the same time the teacher writes them. (Adding these terms to a word wall would further enhance the learning.)

- **area** – the number of square units needed to cover a region or figure
- **square unit** – the unit used when measuring area
- **rectangle** – a quadrilateral with two pairs of congruent, parallel sides and four right angles
- **square** – a parallelogram with four congruent sides and four right angles
- **formula** – a guideline used in math, which helps solve a problem

Rehearsal: RallyCoach (Attachment A)

The teacher will pair the students as Student A and Student B and will give each pair a set of vocabulary cards (Attachment A). Student A will match each term with the definition first. If Student A is correct, Student B will celebrate the correct answer. If needed, Student B will coach and then celebrate. Reversing roles, the students will shuffle the cards and Student B will match the terms with the correct definition. Student A will celebrate if Student B is correct. If necessary, Student A will coach and then celebrate.

Teacher Input: Transparency (Attachment B)

"Now that we have looked at our vocabulary, we know that *area* is the number of square units needed to cover a figure. Today we are going to examine two different ways to find the area of a figure. The first way is to count the number of squares within the figure. Let's look at how I can figure out the number of square units in my kitchen." The teacher will place a transparency on the overhead (Attachment B) with a 14 x 14 portion outlined (196 cm²). He/she will tell the students that the grid shows an outline of the kitchen that needs tile and to find the area of the square. The teacher will demonstrate the process for students by counting aloud each square. He/she will say, "Wow! There are 196 units; therefore, the area of this square is 196 square centimeters." The teacher will place emphasis on the unit *square centimeters* so students use correct terminology when finding area.

Rehearsal: RallyCoach (Attachment B)

Each student will be given a sheet of grid paper. The teacher will instruct the students to use the lines on the grid paper to draw a square. After each student has drawn a square, he/she will work with a partner to find the area of each square. Students will trade papers, and Student B will find the area of his/her partner's square by counting. If Student B is correct, Student A will celebrate the correct answer. If needed, Student A will coach and then celebrate. The roles are then switched and Student A will find the area of his/her partner's square by counting. If Student A is correct, Student B will celebrate the correct answer. If needed, Student B will coach and then celebrate.

Teacher Input: Transparency (Attachment B) and ruler

"Now we have all had a chance to find the area of a square by counting. Let's now look at a rectangle. I can also find the area of a rectangle by counting." The teacher will place a transparency on the overhead (Attachment B) with a 12 cm X 8 cm portion outlined (96 cm²). "This grid shows an outline of a rectangle—all of the units inside the rectangle make up the area of this rectangle. To find the area, I will count each of the squares." The teacher will demonstrate the process for students by counting aloud. "I can find the area of a rectangle just as I found the area of the square by counting. The area of this rectangle is 96 square centimeters. Notice that I said *square centimeters*. I knew to say *centimeters* because if I measured each of the squares on this page I would find each square to be a *centimeter*." The teacher will use a ruler to show the students that each square on the grid paper is a centimeter. "Now each of you will have a chance to find out the area of a rectangle."

Rehearsal: RallyCoach (Attachment B)

Each student will be given a sheet of grid paper. The teacher will instruct each student to use the lines on the grid paper to draw a rectangle. After each student has drawn a rectangle, he/she will work with a partner to find the area of each rectangle. Students will trade papers and Student A will find the area of his/her partner's rectangle by counting. If Student A is correct, Student B will celebrate the correct answer. If needed, Student B will coach and then celebrate. The roles are then switched. Student B will find the area of his/her partner's rectangle by counting. If Student B is correct, Student A will celebrate the correct answer. If needed, Student A will coach and then celebrate.

Teacher Input: Transparency (Attachment B)

"Now we have had a chance to find the area of a rectangle and the area of a square by counting. If you remember, at the beginning of our lesson I told you that there are two ways to find the area of squares and rectangles. You know how to find the area by counting. Let's now learn how to find the area a second way--by using a formula." The teacher will display the transparency of the square used earlier. "Boys and girls, remember that we found the area of this square earlier in our lesson. This square had an area of 196 cm^2 . We found the area by counting every single square. The problem with counting is that it takes a long time and it is easy to make a mistake. So another way to find the area is by using a formula. A formula is a guideline used in math, which helps solve a problem. It is important to remember that formulas only work in certain situations. For example, the formula for *area* is *length x width*. The formula is often written like this: $l \times w$." (Be sure to write the formula on the board so students can see.) "The formula *length x width* can be used to find the area of the square we looked at earlier today." The teacher will place the transparency used earlier in the lesson to find the area of a square ($14 \text{ cm} \times 14 \text{ cm}$ portion outlined 196 cm^2) on the overhead. "Boys and girls, this square is labeled for us 14 cm and to find the area of a square, I can use the formula *length x width* ($l \times w$), which would be $14 \text{ cm} \times 14 \text{ cm} = 196 \text{ cm}^2$. Notice the same answer as when we counted."

Rehearsal: Transparency (Attachment B) and TI-15 Calculator

The teacher will place the transparency of the rectangle used earlier in the lesson ($12 \text{ cm} \times 8 \text{ cm}$) on the overhead. Students will work individually to find the area of the rectangle. After allowing time to find the area individually, students will be asked to work in pairs. The teacher will remind the students to use appropriate terminology while explaining solutions (i.e. *formula*, $l \times w$, and *centimeters squared*). Student A will explain how he/she found the area. Student B will celebrate and/or coach as needed. Student B will explain how he/she found the area of the given rectangle. Student A will celebrate and/or coach as needed.

C. Guided Practice: Attachment C (Mix and Match)

Each student will be given one card (Attachment C). Depending on the card the student receives, he/she will do one of the following:

1. Calculate the area by either counting the square units or by using the formula.
2. Determine the size of the shape based on the given square units.

The teacher will allow students time to determine the answer for their particular card. The students will then move about the room to find the student whose card matches their own.

D. Closure: Attachment B and TI-15 Calculator

The teacher will write $8 \text{ cm} \times 3 \text{ cm}$ on the board or overhead. Using grid paper, the students will create an $8 \text{ cm} \times 3 \text{ cm}$ rectangle. Each student will use the formula $l \times w$ to find the area of the rectangle. The teacher will remind students to write the answer with the unit following. Lastly, students will count each square to determine if their answer is correct. The teacher will ask the girls to please give the answer. After the girls answer, the teacher will celebrate the learning.

Next, the teacher will write $3 \text{ cm} \times 3 \text{ cm}$ on the board or overhead. Using grid paper, the students will create a $3 \text{ cm} \times 3 \text{ cm}$ square. Each student will use the formula $l \times w$ to find the area of the square. The teacher will remind students to write the answer with the unit following. Lastly, students will count each square to determine if their answer is correct. The teacher will ask the boys to please give the answer. After the boys answer, the teacher will celebrate the learning.

E. Independent Practice - Differentiated Assignment:

Advanced Learners:

Using the grid paper, students will design a house (using squares and rectangles). After designing the house, the students will calculate the area of each square and rectangle. Finally, the students will write an advertisement for selling the home. The advertisement must mention the area of each shape.

Proficient Learners: Dice and Grid Paper

Students will work in pairs. Each student pair will have two dice. Student A will roll the dice. Each student will use the rolled numbers to create a square or rectangle on grid paper. Both students will calculate the area of the created shape. Student B will then roll the dice and the process will continue until the teacher calls time.

Strategic Learners: Centimeter Cubes and TI-15 Calculator

Students will be given centimeter cubes. Using the cubes, the students will create a square or rectangle. After creating the shapes, the students will draw the shape on grid paper. Lastly, the students will calculate the area by either counting or using the formula. Each creation and its area will be recorded in the students' math journal.

Intensive Learners: Centimeter Cubes, Grid Paper, and TI-15 Calculator

The teacher will work with this small group to further facilitate the understanding of *area*. The teacher will have the students count out exactly 25 cm cubes. Next, the teacher and the students will create a 5 x 5 square. While the square is being created, the teacher will bring to the students' attention that the square looks just like an array, a tool for multiplying. Each student will count the cubes to determine the area to be 25 cm². After counting, the students will use the formula $l \times w$ to find the area. Lastly, the students will draw a square with the same dimensions in their math journal. The teacher will give students a new amount of centimeter cubes to work with, and the process will continue.

III. ASSESS:

- A. Products:**
- B. Diagnostic (see background):**
- C. Pre-Assessment:**
- D. Post Assessment (EOG format plus 2 open-ended)**

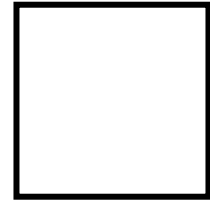
IV: RESOURCES:

- A. Websites:**
 - <http://standards.nctm.org/document/eexamples/chap6/6.3/index.htm>
 - <http://www.mathplayground.com/InteractiveGeometry.html>
 - <http://pbskids.org/cyberchase/games/perimeterarea/perimeterarea.html>
- B. Materials:**
- C. Professional Development Opportunities:**

Vocabulary

area	the number of square units needed to cover a region or figure
square unit	the unit used when measuring area
rectangle	a quadrilateral with two pairs of congruent, parallel sides and four right angles
square	a parallelogram with four congruent sides and four right angles
formula	a guideline used in math, which helps solve a problem

25 cm²



5 cm²

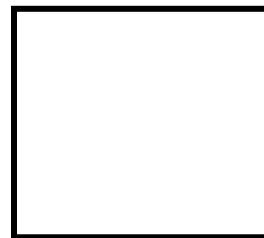
18 cm²



3 cm²

6 cm²

36 cm²



6 cm²

6 cm²

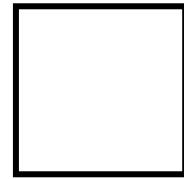
20 cm²



4 cm²

5 cm²

16 cm²



4 cm²

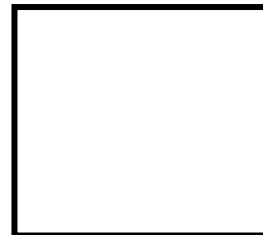
27 cm²



3 cm²

9 cm²

49 cm²



7 cm²

7 cm²

16 cm²



2cm²

8 cm²

9 cm²



3 cm²

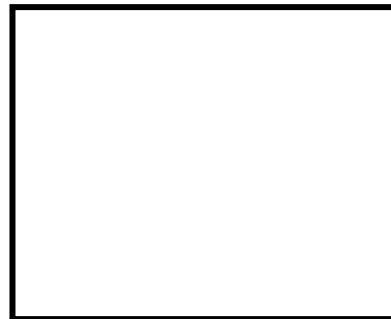
30 cm²



3 cm²

10 cm²

64 cm²



8 cm²

8 cm²

18 cm²



2cm²

9 cm²