EXPLORING AREA

Grade Level: Third
Presented by: Renee T. Prior
Length of Unit: Ten days

I. ABSTRACT

The focus of this ten-day unit is to introduce the geometric concept of area to third grade students by combining literature with the use of two different manipulatives: square tiles and tangrams. The unit offers teachers an alternative method of instruction, and it offers students an alternative method of learning at the concrete level.

<u>Grandfather Tang's Story</u> by Ann Tompert and <u>Pezzetino</u> by Leo Lionni are used to introduce the concept of area. Students determine the area of the animals or objects in illustrations by recreating them using square tiles or tangrams. This activity stimulates interest, and develops problem solving and perceptual abilities. The exploration of tangrams and square tiles presents students with unlimited opportunities to explore hands on activities prior to approaching the abstract level of computing area.

II. OVERVIEW

A. Students will use concrete materials such as square tiles and tangrams to find the area of picture models found in children's literature.

B. Students will compute area in square inches and square centimeters.

C. Students will compute area using measurement skills after practice with square tiles and tangrams.

III. BACKGROUND KNOWLEDGE

   A. A. Beaumont, V., Curtis, R., & Smart, J. <u>How to Teach Perimeter, Area, and Volume.</u> Reston: National Council of Teachers of Mathematics, 1986. Braddon, K. L., Hall, N. J., & Taylor, D. <u>Math Through Children's Literature.</u> Englewood: Teacher Idea Press.
   B. Students' prior knowledge should include basic understanding of inches, feet, centimeters,
   C. and prior hands on experience measuring with standard and nonstandard measuring tools.

IV. RESOURCES

<u>Connecting Math and Literature</u>, Teacher Created Materials, Inc., 1991

Grandfather Tang's Story, Tompert, Ann

Moving on with Tangrams, Creative Publications, 1988

Pezzettino, Leo Lionni

Tangramables, Judi Martschinke, Learning Resources, Deerfield, IL 60015,

1-800-222-3909 for dealer near you

V. LESSONS

A. Lesson One: Day One Introduction

1. *Objective:* **Students will use square tiles to find the area of a rectangle.**

2. *Materials:* **Two different colored transparencies or two clear transparencies of Appendix A, permanent marker, colored marker, scissors, tile paper worksheet (Appendix B), tile paper squares (cut) for each student**

3. *Key Vocabulary:* **area, polygon**

4. *Procedure:*

a. Make two transparencies from one-inch grid paper. If two different colored transparencies are not available, use two clear transparencies, and color the squares on one transparency using the permanent marker.

b. On the second grid transparency, outline a rectangle.

c. Present a hypothetical scenario to students such as: Imagine that this is the shape of your bedroom, and you want to put new carpet in your room. How would you determine how much carpet you need?

d. Allow students to discuss strategies to answer the question. Guide the discussion so that students discover that they can count the squares inside of the rectangle.

e. Select a student to cover the space inside the rectangle with colored tiles.

Generate a discussion by asking the following questions: How many squares did it take to fill the rectangle? What did we use to measure the space inside the rectangle.

f. At this point, introduce the term area, and explain that area refers to the space inside of a polygon. Ask students what the area of the rectangle is.

g. Repeat this activity several times using rectangles with different areas.

5. *Activity:* **Give each student a copy of tile paper worksheet (Appendix B), and instruct students to use the tiles to find the area.**

6. *Evaluation:* **Observe students as they find the area using the square tiles. Allow students to discuss their findings.**

B. Lesson Two: Day Two

1. *Objectives:* Students will be able to use concrete materials such as square tiles to find the area of an irregular shaped figure.

2. *Materials:* Square tiles cut from tile paper worksheet (Appendix B), tile paper transparency, copy of Appendix C for each student

3. *Procedures/Activities:*

a. Draw an irregularly shaped polygon on the tile paper transparency.

b. Lead a discussion guiding students to find the area of the irregularly shaped polygon.

c. Ask a student to cover the figure with the colored transparency tiles. Ask students to find the area of the figure.

d. Draw other irregularly shaped polygons, and allow volunteers to find the area using color tiles.

4. *Evaluation/Assessment:* Distribute and explain the reproducible "Find the Area" (Appendix C). Students are to use square tiles to find the area of the seven irregularly shaped polygons.

C. Lesson Three: Day Three

1. *Objectives:* Students will use two-centimeter square tiles to find the area of animals of objects in the story Pezzettino.

2. *Materials:* About 20 two-centimeter square tiles of various colors for each student, pictures of the animals and objects in the story, one 8x12 or similar size of construction paper for each student, Pezzettino

3. *Procedures:*

a. Read the story Pezzetino to the students pausing periodically to show and discuss the pictures and objects in the story.

b. Distribute a picture of one of the objects or animals from the story to each student.

c. Instruct students to recreate the animal or object from the story using the Pezzetino square (two-centimeter tiles).

d. Assist students in finding the area of their object or animal by counting the squares.

e. Allow students to share, compare, and discuss finding.

f. Allow students to select one animal or object from the story to recreate and glue onto construction paper

4. *Evaluation/Assessment:* Distribute additional pictures of animals and objects from the story for students to find the area.

D. Lesson Four: Day Four

1. *Objectives:* **Students will be able to use concrete materials such as tangrams to find the area of irregular shaped polygons.**

2. *Materials:* **One set of tangrams for each student, page 51 and other similar pages from Moving on with Tangrams, transparency of page 51, overhead tangrams, (or make overhead tangrams using Appendix D)**

3. *Key Vocabulary:* **tangram, tan**

4. *Procedures/Activities:*

a. Allow students a few minutes to examine and explore the tangrams.

b. Discuss the seven shapes of the tangrams. Explain that each shape is called a tan.

c. Ask students to select the small triangle, and compare its shape and size to the other six tans. Guide students to discover that two, three, or four of the small triangles put together can be used to make the other six tans.

d. Place the transparency of page 51 on the overhead and ask how the tans can be used to cover the first polygon. Select several volunteers if necessary to try to cover the polygon.

e. After the polygon is covered, ask students how they can find the area using the small triangle as one unit. Review this process thoroughly, emphasizing that the small triangle is one unit.

5. *Evaluation/Assessment:* **Choose similar pages from Moving On With Tangrams to copy for each students to practice find the area.**

E. Lesson Five: Day Five

1. *Objective:* **Students will be able to use tangrams to find the area of animals illustrated in the story Grandfather Tang's Story**

2. *Materials:* **One set of tangrams for each student, pictures of the animal illustrations in the story, Grandfather Tang's Story, Tangramables, one 8x12 sheet of colored construction paper for each student, pictures students created from Pezzetino illustrations**

3. *Procedures/Activities:*

Follow same procedures as Day Three using illustrations from Grandfather Tang's Story.

4. *Evaluation/Assessment:* **Distribute additional pictures of animals from the story for students to recreate using tangrams. Use reproducible pages from Tangramables for students to create other objects and animals. Allow students to compare their creations from both stories. Discuss differences and similarities in finding the area.**

F. Lesson Six: Day Six

1. *Objective:* **Students will be able to distinguish various units of measurement for finding area.**

2. *Materials:* **Tagboard, newspaper, scissors, rulers**

3. *Key Vocabulary:* **centimeter, decimeter, meter, inch, yard, foot,**

4. *Procedure/Activities:*

a. Demonstrate how to measure and cut a one-foot square. Make sure that all sides equal one foot.

b. Guide a discussion that helps students to understand that the square represents a region with all sides equal, and it is named by the standard unit it is measured with. Help students discover that square units come in different sizes.

c. Pair students and assist them in cutting units of one square foot, one square inch, one square centimeter, one square, decimeter, one square yard, one square meter. Keep students' square units for Lesson Seven.

5. *Evaluation/Assessment:* **Inspect students' squares for accuracy.**

G. Lesson Seven: Day Seven

1. *Objective:* **Students will learn to use a variety of square units to measure the area of different objects.**

2. *Materials:* **Students' square units cut on Day Six, small and large items that are square and/or rectangular in shape, paper, pencil**

3. *Procedure/Activities*

a. Select a rectangular or square object such as a book, and ask students which of their square units would be the best unit to use for finding the area. Accept all answers and discuss whether answers are reasonable.

b. Ask for a volunteer to find the area of the book using the square units. Discuss findings.

c. Distribute various objects so that pairs of students from Lesson Six can find the area.

d. Assist students in finding the area of the classroom, the carpet on the floor, the counter top in the room, the blackboard, and other places using the larger square units.

e. Instruct students to record the area of each object and square unit used to measure the object.

4. *Evaluation/Assessment:* **Discuss students' findings, being sure to compare units used for measuring like objects.**

H. Lesson Eight: Day Eight

1. *Objective:* **Students will learn to compute area using the algorithm length x width.**

2. *Materials:* **Rulers, pencil, paper, books of various sizes**

3. *Procedure/Activities:*

a. Discuss students' acquired knowledge about area since Lesson One. By this time, some students will have discovered that area can be computed by multiplying length x width. Capitalize on this knowledge and the algorithm.

b. Draw regular shaped polygons on the board or overhead, and demonstrate how to measure and calculate the area.

c. Allow students to find the area of various sized books, desktops, paper, etc. for practice.

4. *Evaluation/Assessment:* **Assign reproducible sheets and/or book pages from your math series for additional practice and evaluation.**

I. Lesson Nine: Day Nine

1. *Objective:* **Review the concept of area to answer any question, and dispel any misconceptions about the concept.**

2. *Procedure/Activities:* **Use any other math resources such as computer programs, book pages, or reproducibles that will offer students additional experiences with calculating area.**

J. Lesson Ten: Day Ten

1. *Evaluation/Assessment:* **Administer the assessment for achievement and problem solving. (Appendix E and F)**

2. *Standardized Test/State Test Connections:* **Any of the lessons from one to nine can be used to reinforce an area of weakness that students may be experiencing. The assessment for achievement and problem solving are adequate examples to use to prepare students for standardized testing.**

VI. CULMINATING ACTIVITY

Offer students an optional assignment of bringing an edible item that is in the shape of a rectangle or square. Students will find the area of each edible item. For example, they may bring a large pan of brownies or cake to find the amount of icing needed to cover the top, or finding the area of Jell-O in a pan. After calculating the area, students can eat and enjoy.

VII. HANDOUTS/WORKSHEETS

See Appendix

VIII. BIBLIOGRAPHY

Creative Publications, Moving on with Tangrams, 1988

Hirsch, E. D. Jr., What Your Third Grader Needs to Know. New York: Dell Publishing, 1991.

Leo Lionni, Pezzettino,

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Teacher Created Materials, Inc., Connecting Math and Literature, 1991

Tompert, Ann Grandfather Tang's Story