



March 12-14, 1998

SHAPE UP

Grade Level: Third Grade

Presented by: Donna Fernow, Barbara Jensen, Vineyard Elementary School, Templeton, CA

Length of Unit: 6 Lessons

I. ABSTRACT

This unit integrates geometry with the third grade Core Knowledge topics of quilts design and Colonial America. Students use sets of four triangles to explore shapes, making them into larger triangles, quadrilaterals, pentagons and hexagons. The concepts of congruency and right angles, as well as names of shapes (square, rhombus, trapezoid) are learned. These concepts are incorporated into designing a quilt square, which will be placed into a class quilt. Examples of quality literature will be shared, as well as a sequence for presenting the material. Participants will be able to see and make examples to take back to their classroom.

II. OVERVIEW

A. In the third grade Core Knowledge Sequence, the content relating to this unit includes an introduction to polygons. It covers triangles, rectangles, right angles, congruent figures and symmetry.

B. The skills to be taught in this unit include patterning, various polygons, right angles, congruent figures and rotating shapes.

1. The students will be able to distinguish between various types of polygons.
2. The students will learn diagonals.
3. The students will learn parallel lines and line segments.
4. The students will determine if a shape is congruent.
5. The students will form patterns.
6. The students will be able to determine figures that have right angles.
7. The students will be able to show how a trapezoid can become a triangle.
8. The students will show a line of symmetry.
9. The students will state the difference between a concave and convex shape.
10. The students will be able to make a rotating design from a vertex.

11. The students will design their own quilt pattern.
12. The students will find similarities and differences between shapes and patterns.
13. The students will be able to specify the characteristics of a quilt.
14. The students will be able to identify patterns and connect them to other objects in their environment.

III. BACKGROUND KNOWLEDGE

A. Buchberg, Wendy, Quilting Activities Across the Curriculum.. Scholastic, Inc., 1996. ISBN: 0-590-96558-1

B. Hirsch, E. D., What Your Third Grader Needs to Know.. New York, N.Y., Doubleday Dell Publishing Group, Inc. 1992. ISBN 0-385-41117-0

C. Rectanus, Cheryl, Math By All Means, Geometry, Grades 3-4, a Marilyn Burns Replacement Unit. Marilyn Burns Education Associates, 150 Gate 5 Road, Suite 101, Sausalito, CA. 94965, (414) 332-4181, or 1-800-868-9092, Fax (415) 331-1931, Math Solutions Publications, White Plains, NY 10602-5026, (800) 237-3142. ISBN: 0941355-10-1.

IV. RESOURCES

A. Books

1. Buchberg, Wendy, Quilting Activities Across the Curriculum.. Scholastic, Inc., 1996. ISBN: 0-590-96558-1
2. Burns, Marilyn, The Greedy Triangle. ISBN: Scholastic, Inc., 1994. 0-590-8991-7.
3. Coerr, Eleanor, The Josephina Quilt Story. Harper-Collins, 1986. . ISBN: 0-06-021348-5
4. Ernst, Lisa Campbell, Sam Johnson and the Blue Ribbon Quilt. ISBN: 0-88-01517-4.
5. Hirsch, E. D., What Your Third Grader Needs to Know. New York, N.Y.: ISBN: 0-385-41117-0
6. Doubleday Dell Publishing Group, Inc., 1992.
7. Flournoy, Valerie, The Patchwork Quilt. ISBN: Dial Books for Young Readers, 1985. ISBN 0-8037-0097-0.
8. Paul, Ann Whitford, Eight Hands Round: A Patchwork Alphabet Harper-Collins, 1991. ISBN: 0-06-021348-5
9. Polacco, Patricia, The Keeping Quilt. Simon and Schuster, 1988. ISBN: 0-671-64963-9.
10. Rectanus, Cheryl, Math By All Means, Geometry, Grades 3-4, a Marilyn Burns Replacement Unit. Marilyn Burns Education Associates, 150 Gate 5 Road, Suite 101,

Sausalito, CA 94965, (414) 332-4181, or 1-800-868-9092, Fax (415) 331-1931, Math Solutions Publications, White Plains, NY 10602-5026, (800) 237-3142. ISBN: 0-941355-10-1.

B. Software

1. KidPix, Broderbund
2. PCQuilt/BabyMac, Nina Antze
3. Quilting Bee, MECC

V. LESSONS

A. Lesson One: What is Geometry?

1. Objective/Goal:

- a. Students will be able to state what geometry is.
- b. Students will be able to name as many shapes as they can.

2. Materials

- a. Sheet of chart paper or construction paper with the title AGeometry Words.@
- b. Felt tip markers
- c. Writing paper for each child
- d. Pencil for each child

3. Prior Knowledge for Students

Students should have worked with pattern blocks to see many different shapes.

4. Key Vocabulary

geometry

5. Procedures/Activities

- a. Ask children if they have ever heard of the word Ageometry." What does it mean to them.
- b. After discussion, ask students to write down what geometry is.
- c. After writing, have students read what they wrote, if desired. Save the papers for an end of the unit assessment.
- d. Have students name as many shapes as they can think of and write them on the butcher paper or construction paper.
- e. Demonstrate how to draw these shapes and have students draw shapes on a piece of

paper.

6. Evaluation/Assessment: teacher observation

B. Lesson Two - A Four-Triangle Problem (possibly a two or three day lesson)

Adapted from Math By All Means: Geometry (Grade 3-4) by Cheryl Rectanus, page 16-25. © 1994 Math Solutions Publications. Used with permission.

1. Objective/Goal

a. Students will continue to identify shapes, will be able to see shapes in relation to one another and to learn about diagonals, parallels and congruency. They will experience sorting and classifying.

2. Materials

a. About 20 2-inch construction paper squares for each child, with additional squares available.

b. Large sheet of butcher paper titled APolygons. @

c. Previous chart titled AGeometry Words. @

d. Scissors for each child

e. Tape for each child or table

3. Prior Knowledge for Students

a. Students will build from Lesson One.

4. Key Vocabulary

a. Parallelogram

b. Congruency and congruent

c. Quadrilateral

d. Pentagon

e. Hexagon

5. Procedures/Activities

a. Explain to students that they will make shapes from construction paper triangles. Show how to fold a square on a diagonal to make a triangle and cut it on the fold.

b. Explain that they will use two triangles to make a shape, following the rule that the sides that touch must be the same length and match exactly. They are to find all the ways to put these triangles together.

c. The students may work in groups and tape together each shape they find.

d. Discuss the three possible shapes: square, triangle and parallelogram.

- e. Have each child make the shapes s(he) is missing so each child has the three shapes.
- f. Add these words to the AGeometry Words@ chart if not already there.
- g. The students may say that there are more shapes. Show them that by rotating or flipping these shapes, especially the parallelogram, that they are still the same size and shape. Introduce the word Acongruency@ or Acongruent@ and add that word to the chart.
- h. Ask the students to do the same thing with four triangles instead of two and see how many different shapes they can find.
- i. Sort these shapes into triangles, quadrilaterals, pentagons and hexagons. Add them to the large chart that has already been divided into those sections. Remind students that some are congruent and if they can be rotated or reversed they are the same as one that may have already been added to the chart.
- j. Introduce new names to the chart of geometry words and explain heptagon, octagon, nonagon and decagon.
- k. For an extension, sort the shapes into two groups: those with a right angle and those without at least one right angle. Have students try to guess your system. Add the word Aright angle@ to the word chart.
- l. Introduce the difference between a square and a rhombus. Add the word to your chart.
- m. Introduce the difference between a parallelogram, rectangle and trapezoid. Add the words to your chart.
- n. Show how a trapezoid can become a triangle.
- o. Sort shapes into different ways by placing them in groups and having students try to guess what rule you use: shapes with right angles, shapes without right angles, shapes with at least one line of symmetry and shapes without a line of symmetry, shapes with dents (concave) and shapes without dents (convex).

6. Evaluation/Assessment

- a. Have students explore with their shapes
- b. Have the students work with a partner to identify each others similar shapes.

C. Lesson Three - Rotating Designs (possibly two or three days)

Adapted from Math By All Means: Geometry (Grade 3-4) by Cheryl Rectanus, pages 68-76.1994 Math Solutions Publications. Used with permission.

1. Objective/Goal

Given the polygons from the previous lesson students will use one shape to create a rotating design integrating it with art.

2. Materials

- a. White drawing paper, 18 x 24 inch
- b. Three different colors of construction paper
- c. Pencils
- d. Scissors
- e. Polygon shape from previous lesson - The Four Triangle Problem
- f. Piece of tagboard for each student
- g. Glue

3. Prior Knowledge For Student

Student should have worked with the four triangle problem.

4. Key Vocabulary

- a. Polygon
- b. Rotating design

5. Procedures/Activities

- a. Choose one of the polygons, trace the shape eight on a piece of tagboard and cut it out.
- b. Using this as a pattern, trace and cut out 8 shapes from one color of construction paper and 8 from another color.
- c. Make a pencil Adot@ in the middle of the third colored piece of construction paper.
- d. Introduce the students to the term Arotating@ by choosing a point (vertex) of one of the cut out polygons and placing it in the middle of the third color of construction paper.
- e. Alternate colors of polygons and rotate them in a design placing each one on the Adot@ and overlap them to make a rotating design.
- f. After placing them as evenly as possible, have students glue the shapes onto the paper.
- g. Glue one of the shapes in one of the corners.

6. Evaluation/Assessment

- a. Have students display these in the room and guess which four triangle shape was used to make the design.
- b. Have students look for similarities and congruencies.

D. Lesson Four - Introduction to Quilt Patterns

1. Objective/Goal

Having previously worked with ARotating Designs@ students will be able to distinguish patterns in quilts and work with a basic quilt pattern to find a variety of patterns from one basic pattern.

2. Materials

- a. A sample of a finished quilt
- b. One of a variety of literature books on quilts (see bibliography)
- c. One sheet of Appendix A. (Place 4 of the same kind of pattern on one sheet and Xerox
- it. Students will chose 1 sheet to work with.)
- d. Scissors
- e. Glue
- f. Crayons or markers
- g. ABase@ piece of construction or heavier paper to glue on the patterns.

3. Prior Knowledge for students

- a. Students should have worked with patterns and/or pattern blocks

4. Key Vocabulary

- a. Quilt
- b. Pattern
- c. Rotating

5. Procedures/Activities

- a. Ask the students if they know what a quilt is and what experiences they have had with them. Ask them what patterns they see. Have them identify shapes they have learned and shapes that they have not identified yet. Tell the students that for the next few days they will be working with various types of quilt patterns. They should look for characteristics of different quilts.
- b. Read one of the literature books and ask what patterns they see.
- c. Explain to them that they may pick out one of the patterns (Appendix A).
- d. Have the student cut out four of the same pattern.
- e. Place them on the Abase@ sheet of paper in a larger pattern. Have them see how many different ways they can place them to make a different larger pattern.
- f. After working with the patterns for several minutes, have the students glue them on the Abase@ sheet.
- g. Students will color squares to make a pattern.

6. Evaluation/Assessment

- a. Observer should see a specific pattern in the finished product.
- b. Students will compare their squares for similarities and differences and record them on a large chart to be added to in further lessons.

E. Lesson Five - Making Your Own Pattern

1. Objective/Goal

Students will be able to design their own quilt pattern using two colors of construction paper.

2. Materials

- a. Two 6 x 6 inch Abase@ pieces of construction paper
- b. Two inch squares of 2 different colors of construction paper.
- c. Scissors
- d. Glue
- e. A literature book on quilts from bibliography

3. Prior Knowledge for Students

Working with shapes and patterns

4. Key Vocabulary

- a. Square
- b. Triangle

5. Procedure/Activities

- a. Show more quilts and discuss patterns and/or read one of the literature books.
- b. Give each student a 6 x 6 inch Abase@ square.
- c. Have them choose 4 of one color of the 2" squares and 5 of another color.
- d. Have the students make a pattern on their square.
- e. When they have worked with the squares and have made several different patterns have them
choose one and glue on the Abase@ paper.
- f. Give each student another 6 x 6 inch square.
- g. Have them choose 4 of one color and 5 of another color and have them cut some of these pieces into triangles and design another square and glue them on to the Abase@ piece.

h. Have the student give a name to their pattern and record it on the back of the Abase@ piece.

6. Evaluation/Assessment

- a. Observer should be able to see a definite pattern on each large square.
- b. Have students show and identify similar patterns of other students.
- c. Students will then identify shapes within the patterns and enhance their knowledge by finding similar shapes in the room. Identify these shapes on the chart used in the previous lesson.

F. Lesson Six - Quilt Design

1. Objective

Students will use squares and triangles in a variety of colors to design an individual pattern and arrange all the individual squares into a class quilt.

2. Materials

- a. A literature book from the bibliography
- b. An overhead of a pattern from Appendix B
- c. An overhead projector and overhead pens
- d. An. 8 x 8 inch Abase@ of construction paper for finished pattern.
- e. 2" squares of construction paper for colors that will be used in the pattern
- f. Scissors
- g. Glue
- h. Large piece of butcher paper to be used as a background for the class quilt.

3. Prior Knowledge for Students

Working with patterns.

4. Key Vocabulary

- a. Square
- b. Triangle
- c. Diagonal

5. Procedures/Activities

- a. Read a literature book about quilts and discuss.

- b. Explain to students that today they are going to make a class quilt using one design, but different colors.
- c. Display a transparency of one of the patterns and have the students decide how many squares of each color they will need.
- d. Pass out the 8 x 8 inch square and the two-inch squares.
- e. Have the students begin at one side and place the pieces on the big square. Glue.
- f. Working with the entire class around the large piece of butcher paper, have the students begin placing their individual squares in a design leaving a small margin between each square for a border. Rearrange them several times and then have the class choose the arrangement they like best. Glue on each piece and make a border of construction paper.

6. Evaluation/Assessment

- a. Observer will see a pattern of color variations.
- b. Students will compare for similarities and differences among their patterns and shapes. New shapes may be identified, given their correct name, and placed on the chart used in the previous lesson.
- c. Students will identify the characteristics of general patterns within quilts and make connections with shapes.

VI. CULMINATING ACTIVITY (optional)

A. Lesson Activity - An Exploration of Triangles and Squares

1. Objective/Goal

Students will design their own quilt square.

2. Materials

- a. Four - 4 x 4 inch square of construction paper for a base.
- b. 8 x 8 inch square for a base construction paper
- c. Scissors
- d. Glue
- e. Eight - 2" squares of construction paper
- f. Eight - 2" squares of brightly colored wrapping paper.

3. Prior Knowledge

Design and patterning

4 Procedures/Activities

- a. Having worked with patterns in the past, students will design their own quilt square using the construction paper and wrapping paper.
- b. The students will design any combination of squares and triangles and then name their pattern.
- c. Students use 2 - 2x2 inch squares of construction paper and 2 - 2x2 inch squares of wrapping paper.
- d. Students design a block by placing these smaller squares on the 4 x 4 inch Abase@ block in squares or triangles. Glue in place.
- e. Students complete three other 4 x 4 inch Abase@ squares by using the same pattern as the first 4 x 4 inch square.
- f. Glue all 4 - 4 x 4 inch squares on the larger 8 x 8 inch square in a pattern.

5. Evaluation

- a. Have students compare and contrast their quilt squares.
- b. Have them describe what makes a Apleasing to the eye@ quilt pattern, using color, shape, congruency.
- c. Students should begin to realize that not all people like the same patterns, colors or shapes.

VII. HANDOUTS/STUDENT WORKSHEETS

A. Appendix #A - pre-made quilt patterns

B. Appendix #B - Various quilt pattern templates

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