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Simply Shapes

Grade Level: First Grade

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Length of Unit: Ten Days

I. ABSTRACT

First graders will participate in a variety of hands-on activities throughout this ten-day unit on geometry. Designed as an introduction to shapes, this unit will develop the concept of geometry in an interesting manner for six and seven year olds. Through cooperative learning, the unit will provide opportunities for problem solving, classifying, graphing, patterning, and comparing basic shapes. At the conclusion of this unit, students will be able to identify and give the elements of the four basic shapes.

II. OVERVIEW

A. The specific Core Knowledge Sequence content to be covered is geometry, including plane figures and congruent shapes and designs.

B. Skills to be taught are problem solving, patterning, classifying, graphing, and comparing.

C. Students will gain an understanding of basic shapes in their everyday life.

III. BACKGROUND KNOWLEDGE

Hirsch, Jr. E.D. What Your First Grader Needs to Know: Fundamentals of a Good First-Grade Education. New York: Dell Publishing, 1991. ISBN 0-385-31026-9.

Linking Math with Literature Math Activities to Accompany 51 Pieces of Children's Literature. North Carolina: Carson-Dellosa Publishing Company Inc., 1992.

Linking Math with Literature Math Activities to Accompany 50 Works of Literature. Vol. 2. North Carolina: Carson-Dellosa Publishing Company Inc., 1994.

VanCleave, Janice. Geometry for Every Kid: Easy Activities that Make Learning Geometry Fun. Canada: John Wiley and Sons, Inc., 1994. ISBN 0-471-31141-3.

IV. RESOURCES

de Paola, Tommie. The Quilt Story. New York: G.P. Putnam's Sons, 1985. ISBN 0-399-21009-1.

Wallner, Alexandra. Betsy Ross. New York: Holiday House, 1994. ISBN 0-8234-1071-

4.

V. Lessons

A. Lesson One: Where Geometry Came From and the Square

1. Objective

The student will identify, recognize, and create a square.

2. Materials

a. A variety of different sized squares for group use

b. Yarn

c. Large square for measuring

d. Simply Shapes journal (SEE APPENDIX A)

e. Butcher paper for chart labeled SQUARES

f. Popsicle sticks

3. Prior Knowledge

At the beginning of this unit, assume the students have no prior knowledge of the subject.

4. Key Vocabulary

Square - a plane figure having four equal sides and four right angles.

5. Background Knowledge

Geometry is the part of mathematics that includes points, lines, surfaces, and solids. The word geometry derives from the Greek words for earth and measure. Geometry is divided into two different categories: plane and solid geometry. Plane geometry refers to two dimensional shapes in one plane. Solid geometry refers to three dimensional shapes.

The earliest accounts of geometric shapes have been found in artifacts dating back 15,000 years. These shapes and forms appeared on cave paintings, buildings, and pottery.

The Egyptians used geometry to solve problems that arose after the annual flooding of the Nile River. There was a need to replenish the soil due to the flood, so they used a form of geometry known as surveying. Also, the ancient pyramids were built using a variety of geometric principles.

There were several people who contributed to the development of geometry. Around the year 300 BC, a man by the name of Euclid wrote a collection of books titled The Elements. In these books, he systematized the development of plane and solid geometry.

6. Procedures/Activities

- a. Teacher discusses history of geometry.**
- b. Teacher displays various sized squares.**
- c. Teacher asks students to tell what they know about the shapes.**
- d. Teacher records students' responses on the chart made from butcher paper.**

Responses should include the following:

- 1. They have four sides.**
 - 2. They have four corners.**
 - 3. The sides are all the same.**
- e. Teacher displays a large square. (Make sure it is a true square.)**
 - f. Using yarn and a large square, teacher and students will confirm that squares do indeed have sides that are equal in length. Use the yarn to measure one side from corner and then cut the yarn. Let students use the cut piece of yarn to measure the other three sides to confirm that the shape is a true square.**
 - g. As guided practice, teacher and class make a large square using cubes**
 - h. In cooperative groups, students create a square using a set of manipulatives (cubes, blocks, bears, etc.).**
 - i. A member of each group will share with the class the manipulative they used to create the square and how their group made their square (how many manipulatives were on each side, who did what part, etc.).**
 - j. Independently, students will cut out a picture of a square in a magazine and glue it onto the chart about squares made earlier in the lesson. Have students explain their choices as needed.**
 - k. Students complete page one of their Simply Shapes journal by gluing on popsicle sticks to make a square.**

7. Evaluation/Assessment

Evaluation will consist of participation, following directions, encouraging dialogue among groups, and completion of journal.

B. Lesson Two: The Triangle

1. Objectives

- a. The student will identify, recognize, and create a triangle.**
- b. The student will compare triangles and squares.**

c. The student will extend a given pattern.

2. Materials

a. Triangle cut out of corrugated cardboard

b. Shopping bag

c. Various sized triangles (See appendix B)

d. Simply Shapes journal (See appendix A)

e. Butcher paper for chart labeled Triangles

f. Q-tips

3. Prior Knowledge

Students will have a basic understanding of a square.

4. Key Vocabulary

a. Triangle - A plane figure having three angles and three sides.

b. Square - A plane figure having four equal sides and four right angles.

5. Procedures/Activities

a. Prior to the lesson teacher places a triangle cut out of corrugated cardboard into a large shopping bag.

b. Teacher allows students to feel the triangle in the bag without seeing it.

c. After everyone has felt it, the teacher asks students to tell about the object in the bag.

d. After discussion, teacher shows the triangle from the bag and the class discusses the elements while teacher records on butcher paper chart.

e. Teacher displays various sizes of triangles and discusses how the sides do not have to be equal. Refer back to square to compare.

f. In cooperative groups, students are given a pattern of triangles and they work to extend the pattern with given pieces. Suggestion: Make some patterns change in color while others change in size. Vary the patterns among the groups and have students rotate through all groups if time allows. Use a variety of materials for your triangles (wallpaper samples, felt, fur, cardboard, etc.).

g. Students complete page two of their Simply Shapes journal by making a triangle out of Q-tips.

h. Students cut out a picture of a triangle from a magazine and glue onto the butcher paper chart from earlier. Discuss while students glue why their shape is indeed a triangle.

i. In conclusion of the lesson, give each child four triangles and let them work to

form a square out of the triangles. Compare the triangle and square.

6. Evaluation/Assessment

Evaluation will consist of participation, following directions, encouraging dialogue among groups, and completion of journal page.

C. Lesson Three: Symmetry

1. Objective

The student will identify and create a symmetrical shape.

2. Materials

- a. Butterfly pattern (See appendix C)**
- b. Various symmetrical and non symmetrical shapes**
- c. Various small designs for decoration of butterfly**

3. Prior Knowledge

The student will have a basic understanding of squares and triangles.

4. Key Vocabulary

- a. Symmetry - similarity of form or arrangement on either side of a dividing line.**
- b. Line of Symmetry - a straight line on which a figure can be folded so that the two parts fit exactly.**

5. Procedures/Activities

- a. Refer to charts from Lesson One and Two to review squares and triangles.**
- b. Teacher passes out one shape to each child. Some are symmetrical and some are not. These can be cut from a die cut machine if available or traced from a variety of patterns.**
- c. Teacher asks students to fold their shape in half and place in the middle of the circle for everyone to see.**
- d. Teacher asks students to group the objects into two different groups and explain their reasoning. Possible groups: Squares and other shapes, triangles and other shapes, and symmetrical and non-symmetrical. The end result is to be symmetrical and non-symmetrical. If students do not come to this, the teacher will need to ask some leading questions.**
- e. Teacher introduces and discusses the word symmetrical and the line of symmetry.**
- f. With the symmetrical shapes, teacher demonstrates by cutting on the line of symmetry that the shapes are indeed symmetrical.**

g. Brainstorm classroom objects that are symmetrical and discuss.

h. In partners, students create a symmetrical butterfly. Each group will be given a butterfly pattern and the pieces needed to decorate the wings. One person will glue one piece onto a wing and their partner will glue the matching pieces onto the other wing in the same location.

6. Evaluation/Assessment

Evaluation will consist of participation, following directions, and completion of final project.

D. Lesson Four: Making a Quilt

1. Objective

The student will design a symmetrical quilt square and help to arrange the squares to form a symmetrical quilt.

2. Materials

- a. Quilt square pattern (See appendix D and E)**
- b. Large butcher paper for assemble of class quilt**
- c. Crayons and glue**
- d. The Quilt Story by de Paola**

3. Prior Knowledge

The students will have a basic understanding of squares and triangles.

4. Key Vocabulary

- a. Square - a plane figure having four equal sides and four right angles.**
- b. Triangle - a plane figure having three angles and three sides**
- c. Symmetry - similarity of form or arrangement on either side of a dividing line.**
 - a. Line of symmetry - a straight line on which a figure can be folded so that the two parts fit exactly.**

5. Procedures/Activities

- a. Teacher reads The Quilt Story by de Paola.**
- b. Teacher discusses quilt squares in story and how quilts are made.**
- c. Teacher explains to class they will be making a class quilt using quilt squares that are symmetrical.**
- d. Teacher passes out quilt squares - half of the class gets Appendix D and the other half will get Appendix E.**

e. Discuss the square and the fact that it is made up of four triangles and the fact that the square is symmetrical. (You may want to have the quilt squares already cut out for the students so they are indeed symmetrical.)

f. Students follow oral directions to color in the triangles:

Color the triangle with an "a" in it red.

Color the triangle with a "b" in it blue.

Color the triangle with a "c" in it orange.

Color the triangle with a "d" in it green.

g. Teacher and students arrange and glue the individual quilt squares onto the butcher paper to make a quilt. Glue the appendix d quilt squares onto one side of the quilt and the appendix e quilt squares onto the other side.

h. Discuss and mark the line of symmetry and discuss.

6. Evaluation/Assessment

Evaluation will be based on discussion, participation, and following directions.

E. Lesson Five: Circle

1. Objective

a. The student will identify, recognize, and create a circle.

b. The student will sort coins into similar groups.

2. Materials

a. Plastic containers/tubs

b. Sand

c. Different sized coins (pennies, nickels, dimes, quarters, half dollars)

d. Various items - some that can be shaped into a circle and some that can't

e. Circle Chart (See Appendix F for example)

f. Simply Shapes journal (See Appendix A)

g. Coffee filters

3. Prior Knowledge

- a. Students will have a basic understanding of a square and triangle.
- b. They will also have an understanding of symmetry.

4. Key Vocabulary

- a. Circle - a round figure bound by a single curved line where each point is equally distant from the center of the circle.
- b. Triangle - a plane figure having three angles and three sides.
- c. Square - a plane figure having four equal sides and four right angles.
- d. Symmetry - similarity of form or arrangement on either side of a dividing line.

5. Procedures/Activities

- a. Review previous lessons and charts on the square and the triangle.
- b. Prior to the lesson the teacher buries a variety of coins in sand in large pans.
- c. Teacher will guide children to their sand pan.
- d. Student will find the coins in the sand.
- e. Teacher leads discussion about circles and the definition of a circle. What are the objects that you found called?

Tell me more about these shapes. What geometric shape do we call these objects?

- f. After discussing coins, students will sort coins into groups depending on color or by coin.
- g. Teacher will ask students questions concerning the different groups. How many groups do we have? Why are they different?
- h. Cooperative groups will be given five different items. Two of these items will not be able to be shaped into a circle (examples: popsicle sticks, crayons, tooth picks, Q-tips). The other three items will be able to be shaped into a circle (examples: dental floss, string, yarn, rope).
- i. Groups will be given a large chart in order to complete activity. The chart will be divided into two parts. One part will be labeled with the following words: These things do not make a circle. The other part will be labeled with the following words: These things do make a circle. This part will also have three circles drawn on it.
- j. Groups will take each item out of the bag. They will decide whether or not each makes a circle, the students will glue the item on the circle pattern. If the item does not make a circle, the students will glue the item on the other side of the chart.
- k. Groups will share their charts with the class.

1. Students will complete page three in their Simply Shapes journal by gluing a coffee filter onto their page.

6. Evaluation/Assessment

Evaluation will consist of participation, following directions, and completion of group chart and journal.

F. Lesson Six: Rectangles: The American Flag

1. Objective

Students will identify, recognize, and create a rectangle.

2. Materials

a. Simply Shape journal (See Appendix A)

b. 6 ½" x 11" white rectangle

c. 4" x 5" blue rectangle

d. ½" x 11" red rectangular strips

e. Small star stickers (50 for each child)

f. Glue

g. Betsy Ross by Wallner

h. Toothpicks

3. Prior Knowledge

a. Students will have a basic understanding of a square, triangle, and a circle.

b. Students will have an understanding of symmetry.

4. Background Knowledge

At the beginning of the settlement of the United States, the flag we know did not exist. The first American flag only had thirteen stars along with thirteen stripes. Now, the flag has fifty stars and thirteen stripes. We honor our flag by saying the Pledge of Allegiance. This is a way we can promise to be true to our country.

5. Key Vocabulary

a. Rectangle - a four-sided plane figure with four right angles.

b. Circle - a round figure bounded by a single curved line where each point is equally distant from the center of the circle.

c. Triangle - a plane figure having three angles and three sides.

d. Square - A plane figure having four equal sides and four right angles.

6. Procedures/Activities

a. Review previous lessons and the elements of squares, triangles, and circles.

b. Teacher provides two square patterns for each student.

c. Teacher leads oral discussion:

Tell me about the shapes you have in front of you.

Place both squares right next to each other.

Will it still be a square?

Does it have four sides like a square?

Why is it not a square?

What do you call this shape?

Tell me facts about a rectangle.

e. Teacher asks students to locate things in the classroom that are rectangular.

f. Teacher points out that the flag is a rectangle. Have students identify the rectangles in the square.

g. Teacher discusses the history of the flag while reading Betsy Ross.

h. Students create a flag using white, red, and blue paper (see sizes above). The stars can be made using small star stickers.

j. Teacher reviews lesson by asking questions and creating a chart for the rectangle allowing students to add pictures from magazines.

k. Students complete page four in Simply Shapes journal by making a rectangle out of toothpicks.

7. Evaluation/Assessment

Evaluation will consist of participation, following directions and completion of flag and journal.

G. Lesson Seven: Reviewing Rectangles and Circles

1. Objectives

a. Students will identify and create a rectangle and a circle.

b. Students will use terms of orientation and relative positions.

2. Materials

a. Three various sized rectangles for each child (See Appendix G)

b. One circle for each child (See Appendix G)

c. Paper

d. Crayons

e. One rectangle cut from die cut machine for each child

f. One circle cut from die cut machine for each child

3. Prior Knowledge

Students will have an understanding of a rectangle and a circle.

4. Key Vocabulary

a. Rectangle - a four sided plane figure with four right angles.

b. Triangle - a plane figure having three angles and three sides.

c. Square - a plane figure having four equal sides and four right angles.

d. Circle - a round figure bounded by a single curved line where each point is equally distant from the center of the circle.

e. On/Under/Over

f. Between

g. Next to, beside

h. Far from/near

i. Above/below

j. Right/left

5. Background Knowledge

6. Procedures/Activities

a. Review previous lessons.

b. Teacher collects a variety of items from the classroom. These items need to be rectangular and round. Teacher places items in a rectangular shoebox.

c. Teacher picks up an object at a time. Students are asked questions about the objects. Students help teacher categorize them into the correct two categories.

d. Teacher passes out a pattern piece of a circle and a rectangle to each child.

e. Teacher creates flash cards for the orientation and relative position words: on, under, over, between, next to, beside, far from, near, above, below, right, and left.

f. Teacher displays words.

g. Teacher has several patterns of circles and rectangles available for students guided practice.

h. Teacher guides and assists students in correctly placing individual rectangle and circles using the questions below. After students manipulate their own shapes, the teacher will display a correct response so students can check their work.

- 1. Place the circle on the rectangle.**
- 2. Place the circle under the rectangle.**
- 3. Place the rectangle over the circle.**
- 4. With a partner, place a circle between two rectangles.**
- 5. Place a circle next to a rectangle.**
- 6. Place a rectangle beside a circle.**

Do "next to" and "beside" mean the same thing?

- 7. Place the circle far from the rectangle.**
- 8. Place the rectangle near the circle.**
- 9. Place the rectangle above the circle.**

What other word means the same as above?

- 10. Place the circle below the rectangle.**

What other word means the same as below?

- 11. Place the circle to the right of the rectangle.**
- 12. Place the circle to the left of the rectangle.**

i. Review the position words just completed.

j. Pass out needed supplies to students: paper, pencil, a small, medium and large rectangle, and one circle.

k. Students will listen to the following story and follow directions within the story. The teacher may want to make a picture at the same time as the class to help the students. See Appendix G for an example of the finished picture.

l. Teacher reads story and students trace accordingly after each direction.

Once upon a time, there was a little boy named Mikey. Mikey loved to draw pictures. He wanted to be an artist when he grew up so he worked very hard at drawing. Listen carefully and follow directions to find out what Mikey's favorite thing was to draw.

First, trace two medium rectangles. Make sure these are beside each other. Under each medium rectangle, trace two circles. Next to the last medium rectangle, trace one large rectangle. On top of the large rectangle, trace one small rectangle vertically. Above the small rectangle, trace three circles, one on top of another. Finally, trace two circles below the large rectangle.

m. Discuss and review pictures and allow students to color in their picture of the train.

7. Evaluation/Assessment

Evaluation will be based on participation, following directions, discussion, and completion of picture.

H. Lesson Eight: Congruency

1. Objectives

- a. Students will identify shapes that are congruent with each other.**
- b. Students will construct a graph.**

2. Materials

- a. Previous examples used during Symmetry lesson**
- b. Numbered Grid (See Appendix H)**
- c. Example of completed grid with colors (see appendix H)**
- d. Crayons**
- e. Construction paper**

3. Prior Knowledge

- a. The ability to distinguish between the square, triangle, rectangle, and circle**
- b. The meaning of symmetry**
- c. The ability to identify the line of symmetry**

4. Key Vocabulary

Congruent - two figures that have the same size and same shape

5. Procedures/Activities

- a. Review charts from previous lessons**
- b. Teacher reviews symmetry by folding a piece of paper in half**
- c. Teacher will further the review by asking the following questions about the folded paper. Who can point to the line of symmetry? Why is this paper**

symmetrical?

d. Teacher cuts paper along the line of symmetry.

e. Teacher asks : Are these two shapes the same?

f. Teacher explains that these two shapes are now congruent because they are the same size and the same shape.

g. Teacher prepares several different shapes cut out from construction a paper.

h. Display on board and make sure some of the shapes are the same size and same shape.

i. Teacher explains to the students that things are congruent if they have the same size and same shape.

j. Students match up the shapes that are congruent.

k. Teacher reviews congruency with students by asking the question: What do objects have in common when they are congruent?

l. Teacher displays a blank grid for teacher's use.

m. Teacher passes out blank grids to students.

n. Students color grid according to the directions of the teacher while teacher colors in his or her grid at the same time. (Teacher will call out number and then will tell the students what color to color in that square.)

o. Discuss why the students pictures are congruent to the teacher's picture.

p. Teacher asks students why their picture is congruent to the teacher's.

1. Evaluation/Assessment

Evaluation will consist of participation, following directions, and completion of graph.

I. Lesson Nine: The Shape of Things

1. Objectives

a. Students will be able to identify, recognize, and create a square, triangle, circle, and a rectangle.

b. Students will be able to create a picture using only the following plane geometric shapes: square, triangle, circle, and rectangle.

2. Materials

a. The Shape of Things, by Dayle Ann Dodds

b. Zip lock bags containing a variety of die cut shapes in various sizes and colors.

c. Large piece of white construction paper

3. Prior Knowledge

Students will understand the basic shapes and their elements.

4. Key Vocabulary

a. Square - a plane figure having four equal sides and four right angles

b. Triangle - a plane figure having three angles and three sides

c. Circle - a round figure bounded by a single curved line where each point is equally distant from the center of the circle

d. Rectangle - a four sided plane figure with four right angles

5. Procedures/Activities

a. Read The Shape of Things, by Dayle Ann Dodds.

b. Discuss story by reviewing the shapes that were in the story.

c. Teacher reviews charts that have been accumulated throughout the unit.

d. Teacher passes out paper and a variety of shapes to each child.

e. Students glue the shapes onto the paper to make a picture.

f. Students share finished art work with the class.

g. In conclusion of this lesson, teacher displays finished art work so the rest of the school can enjoy The Shape of Things.

6. Evaluation/Assessment

Evaluation will be based on listening, following directions, and the completion of the final project.

VI. Culminating Activity

Students will enjoy a Shape Picnic and play Shape Bingo. (See Appendix I for gameboard, gameboard pieces, and clues for game.)

Suggestions for the day: Invite parents with a special invitation and serve foods in various shapes. For example, serve crackers topped with spread cheese to represent the circle. For the square, serve graham crackers. Cut sandwiches on the diagonal for the triangles. And for the rectangles, serve cream filled wafer cookies.

Turn your classroom into a real picnic atmosphere with checkered tablecloths, pretty plates and napkins. Have students share their group projects and their Simply Shapes journal with parents.

Play shape bingo with parents and students. Have students cut out words and pictures and glue onto bingo card. This way, each card will be different and students can trade cards if more than one game is played. Teacher will call out

clues and students will find answer on card and cover with a marker.

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