



Cumberland County Schools

Objective 3.03 – Line Symmetry

Lesson Title: Line Symmetry
Curriculum Area: Mathematics
Grade: Fifth
Time: 90 minutes

I. PLAN

A. NCSCS Goal 3:

The learner will understand and use properties and relationships of plane figures.

B. NCSCS Objective:

3.03 - Classify plane figures according to types of symmetry (line).

C. CCS Task Analysis:

TLW: Create shapes with lines of symmetry.

D. CCS Pacing Guide:

Quarter: Third

Week(s): 6-9

E. Lesson Background:

Strand: Geometry

Marzano Level: Applying

F. Materials:

For each student:

- 4 different colored 9" x 12" sheets of construction paper
- Scissors
- Glue
- Pencil
- 2 small paper clips
- Pattern blocks
- Mirrors
- Pictures of Shapes (Attachment A)
- Find Someone Who (Attachment B)
- Attribute blocks (found in manipulative kits)

For the teacher:

- Overhead plain shaped figures
- Magazine pictures

G. Prerequisite Skill:

- Knowledge of basic geometric plain figures (how many sides, names, how many edges, etc.)

H. Essential Question(s):

- How can you tell if a figure has one or more lines of symmetry?

II. IMPLEMENT

A. Anticipatory Set:

Show the students magazine pictures of everyday objects or perhaps paintings by a famous artist. Demonstrate by folding the pictures (show two examples – one picture which has a line of symmetry and a second picture which does not have symmetry). The teacher says, “Notice how this picture matches on both sides – each side is an exact image of the other. When pictures or shapes can be folded and look exactly the same on each side of the fold, then the picture has a line of symmetry.” Next, show the students an example of a picture which does not have a line of symmetry. “When I fold this picture, you will notice that there is not a line of symmetry. The two sides do not look exactly alike.” (While talking with the students, be sure to constantly refer to the pictures as examples.)

B. Teacher Input:

“Now let’s review the vocabulary we need to know before we continue to investigate the idea of symmetry.” 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 orally reads the words aloud to the students. The students write the terms and definitions as the teacher writes them. (Adding these terms to a word wall would further enhance the learning.)

- Symmetrical - A term used to describe an object that can be divided in one or more areas and will be the same on each side of the division line
- Congruent - Equal in size and shape

Rehearsal: RallyRobin

Students will work in pairs. Student A will say one vocabulary word and tell the definition then Student B will say one vocabulary word and tell the definition. The activity will continue until the teacher calls time.

Teacher Input:

Put plane figure examples on the overhead (if you do not have an overhead kit, you can show examples of plane shapes on overhead transparencies). Show the children examples of symmetry by drawing lines through the shapes to see if the shapes would match on each side if cut in half. Explain to the students that the concept of being able to divide a shape evenly on both sides is called a line of symmetry. Some shapes can have more than one line of symmetry. Further, explain line symmetry by using a mirror and a square. The teacher demonstrates for the students. The teacher will show the students that by placing a mirror on a line of symmetry, the reflection within the mirror creates the complete shape.

Rehearsal:

Using pattern blocks and mirrors (you can buy reflective poster board at a craft store to make your own set of mirrors), have the students investigate using shapes and mirrors to see how many lines of symmetry each shape has.

Teacher Input:

“Some shapes are not symmetrical.” (Put up a scalene triangle that is not congruent on the overhead) “Notice that this triangle does not have a line of symmetry. I cannot divide this triangle at any point and have two sides that are exactly the same.”

Rehearsal: Pairs Discussion (Attachment A)

Propose these questions to the students: Is a circle symmetrical? Are all rectangles symmetrical? Are all triangles symmetrical? Pair students and give each pair a copy of Attachment A so that the shapes may be manipulated. Have them discuss the questions with their partner. (Circles are always symmetrical: they can be folded many ways so that the two halves are congruent. Rectangles are symmetrical because they have two lines of symmetry.) After discussing these questions in small groups, discuss and compare as a class.

Teacher Input:

While walking around the classroom and thinking aloud, say, "I am looking for everyday objects that have a line of symmetry." Walk over to the examples. Name the objects and point out the lines of symmetry. "One example may be a piece of tile on the floor." Point to the tile and show the students a line of symmetry within the tile.

Rehearsal: RallyRobin

Students work in pairs. Student B names an object in the classroom that has a line of symmetry. Student A coaches if necessary and celebrates. Student A names an object in the classroom that has a line of symmetry. Student B coaches if necessary and celebrates. The process continues until teacher calls time.

C. Guided Practice:

The teacher says, "Symmetry can be found in lots of places in the world. We are going to make a mola. Molas are brightly colored fabric designs made by Cuna Indian women in the country of Panama. The designs they create are symmetrical. Use what you know about lines of symmetry to create a beautiful design of your own." (Show an example that you have made prior to the lesson.) The following website has pictures of molas: http://www.panart.com/mola_gallery.htm.

1. Pass out the materials for each student.
2. Guide the students through the following steps:
 - a. Lightly label construction paper sheets A-D.
 - b. Fold sheet A in half either vertically or horizontally depending on which way the mola is to hang. Draw a simple design, using one continuous line starting and ending on the fold.
 - c. Cut along that line and open the paper. Set the center cutout aside.
 - d. Place sheet A on top of sheet B. Line up the corners exactly and fold the sheets in half. Paper clip the two folded sheets.
 - e. On sheet B, draw a continuous line starting and ending on the fold. Draw the line about 1/4 inch away from the cut edge of sheet A. Cut along the new line.
 - f. Place sheet B on top of sheet C and repeat steps d and e.
 - g. Glue sheet C on top of sheet D, sheet B on top of sheet C, and sheet A on top of sheet B.

D. Closure: Find Someone Who (Attachment B)

1. Students mix in the class until they find a partner who is not a teammate.
2. In pairs, Partner A asks a question from the worksheet; Partner B answers. Partner A records the answer on his/her own worksheet.
3. Partner B checks and initials the answer.
4. Partner B asks a question; Partner A responds. Partner B records the answer on his/her worksheet.
5. Partner A checks and initials the answer.
6. Partners shake hands and then raise a hand again as they search for a new partner.
7. Students repeat steps 1-6 until their worksheets are complete.

E. Independent Practice:**Differentiated Assignment:****Advanced Learners:**

Each student is to write a letter to a friend defining the terms *symmetry* and *congruence*. The letter must include a written explanation, two illustrations, and examples of items in real-life which are symmetrical.

Proficient Learners:

The students will create a list of ten real-life items which are symmetrical. After compiling the list, select two items from the ten and illustrate. The illustration will contain the line of symmetry.

Strategic Learners:

On a sheet of paper, the students will print their first and last names in capital letters. Circle each letter that has one or more lines of symmetry. The students will also draw the line(s) of symmetry for each letter.

Intensive Learners:

Using attribute blocks, the students will trace a selected shape, fold to create lines of symmetry, and trace the line of symmetry to illustrate the concept.

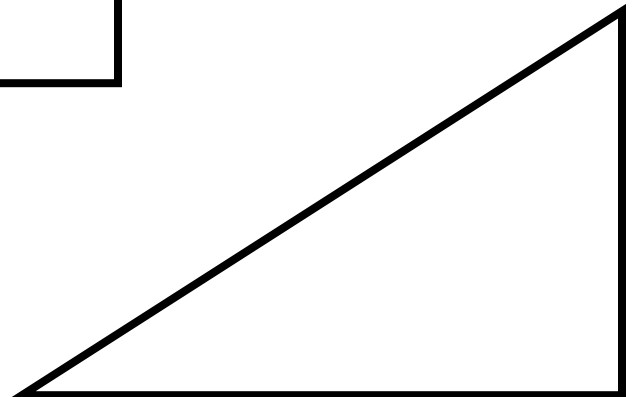
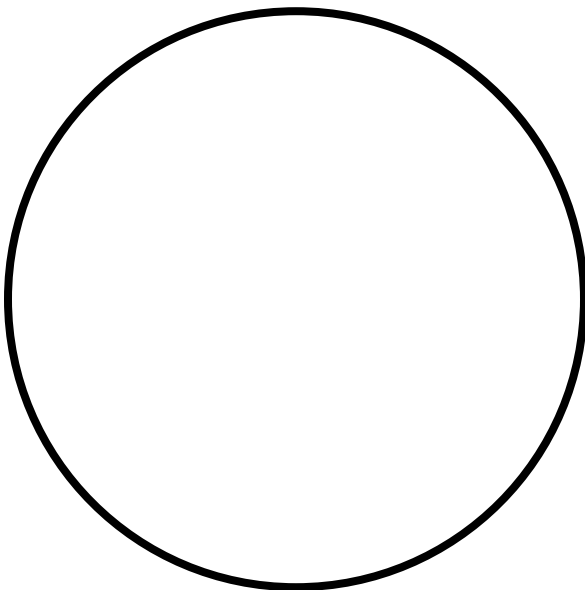
III. ASSESS:

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

IV: RESOURCES:

- A. **Websites:**
 - <http://www.cardinspirations-usa.com/demo/mola1.htm>
 - <http://www.adrianbruce.com/Symmetry/>
- B. **Materials:**
- C. **Professional Development Opportunities:**

Shapes and Symmetry



Find Someone Who

Attachment B



What does it mean for two objects to be congruent?

Name three items in the classroom that have a line of symmetry.

1. _____

2. _____

3. _____

Define symmetry.

Which shape has an infinite number of lines of symmetry?
