

Algebra/Geometry Institute Summer 2005

Lesson Plan 1: Symmetry, Similar & Congruent Shapes



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School: Parks Elementary
Grade Level: 5th

1 Teaching objective(s)

- The students will discover geometric patterns and relationships by exploring symmetry.
- The students will demonstrate the difference between similar shapes and congruent shapes using various objects.

2 Instructional Activities

Set Induction

- The students will be asked to imagine they are at a magic show. They are selected out of the audience to be the person cut in half. “If the magician cuts you horizontally, will you look the same physically on both sides of your body? If the magician cuts you vertically, will you look the same physically on both sides of your body?”
- What is it called if the magician cuts you vertically and both sides of your body look exactly the same? “symmetry”

Presentation

- After discussing if your body would be symmetric if you were cut in half vertically by the magician, introduce the true definition of a symmetric figure.

Symmetric figure – a figure that can be folded so that both parts match exactly

- The teacher will then give each student 1 sheet of construction paper and scissors. The students will fold the paper so that the two parts overlap exactly. On the fold, the students will cut a triangle. Ask if any students know what they are cutting on. After discussion, introduce the line of symmetry as being the fold in the paper.

Line of symmetry – the fold between both equal parts

- Have students repeat the same steps with another piece of paper, however, they should create their own shape this time. The teacher will go around the room allowing each student to share their figure and identify the line of symmetry.

- Give each student a sheet of construction paper and a variety of symmetrical shapes to trace. For example, you could let them trace die cuts of symmetrical shapes, pattern blocks, or shapes found around the classroom. Have the students trace four shapes each and then cut them out. Each student should find the line of symmetry in each shape. Then they will cut the shape in half at the line of symmetry. This will give the students two congruent shapes for each figure.
- Correctly define congruent shapes.
 - **Congruent shapes** – figures that are the same shape and size
 - Ask students what they think a similar shape might look like without being congruent. Correctly define similar shapes.
 - **Similar shapes**– figures that have the same shape but are different sizes
- Place students in groups of 5-6 members. At each table, scatter precut construction paper shapes out. Demonstrate using a circle. Pick up the circle, and ask the students to show you a congruent shape in the pile. Check to make sure that each student is holding up a circle of the same size. Have students show you a similar shape. Allow the students to work within their individual groups to continue this game. One student will pick a shape and have the other students show them a congruent shape and a similar shape. Then, move to the next student.
- After line of symmetry, congruent shapes, and similar shapes are introduced, students will design their own symmetrical “stained glass.” (See the pictures attached) Each student should receive a thin white piece of paper and a black Sharpie marker. The students will fold the paper in half, matching the edges as they did at the beginning of this lesson. Students will draw a design on half of the paper starting at the fold. They must only draw one half of the shape, so that when they unfold, the shape will be symmetric. Depending on the age level of the students, they may want to draw their design in pencil, and then trace over it in the black marker. Within their half shape, they may draw any sort of design they want. When the students are tracing their design in black marker, they will want it to be dark and go through both sides of the thin paper.
- Once each student has completed their design, give them one sheet of transparency paper. The students will place the transparency paper on top of the white paper and trace the design with the black marker. Next, the students will use markers to color their “stained glass” design. However, they need to make sure and color each side of the line of symmetry the same for the design to remain symmetrical. Then, the students will cut out their transparency design leaving about ½ inch border on the outside of the black outline. Have the students create a construction paper or card stock frame for the design by laying their transparency cut on top on a whole piece of construction paper. Then, trace the figure and cut out the middle of the paper, leaving the outside frame in one piece. Then tape the design

so that it fits with in the frame. They may have to trim the frame down a little on the inside.

Conclusion

- The students will share their stained glass frames with one another. They will explain why they decided to draw the shape they did. They will also explain one element that we talked about that is incorporated into their design, such as symmetry, congruent shapes, or similar shapes.

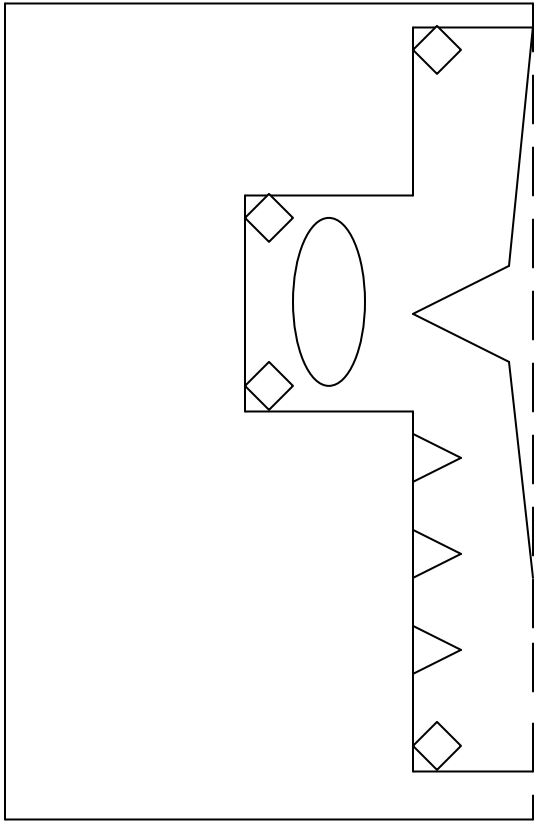
3 Materials and Resources

- Pencils
- Markers
- Construction paper
- Precut construction paper shapes
- Tape
- Thin white paper
- Scissors
- Transparency paper
- Black Sharpie markers
- Traceable shapes (die cuts, pattern blocks, etc.)
- *Mathematics for Elementary School Teachers*, Tom Bassarear, Houghton Mifflin, copyright 1997

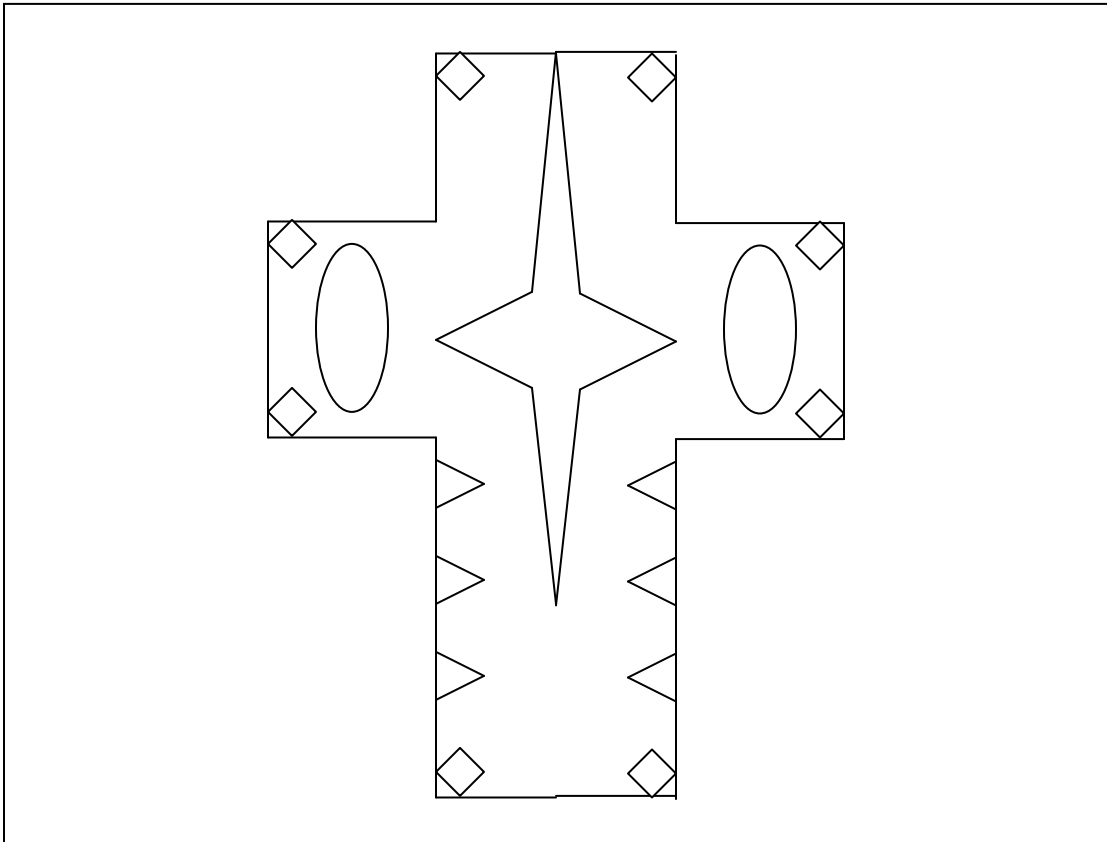
4 Assessment

- Teacher should observe the students as they work. The teacher should look to see if the students are following the directions carefully, and creating each figure as described. See that each student can identify the line of symmetry, congruent shapes, and similar shapes as they are doing each activity in the lesson.
- Performance Assessment – The teacher will make sure that the students’ “stained glass” designs are symmetric.

Symmetric "Stained Glass"



The dotted line represents the fold in the paper.



Symmetric "Stained Glass"

