* **Mirror Image**

**Grade Level:** Fourth

**Objectives:**

Students will be able to develop an understanding of line symmetry by finding the line of symmetry in the various objects that are presented.

Students will be able to communicate how to determine a line of symmetry and how it makes an object look balanced through class discussion.

**Common Core Standards Addressed:**

MCC.4.G.3*Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.*

**Materials:**

* Mira or transparent mirrors
* scissors
* a piece of paper for each student
* Copies of the *Nature*, *World Flags*, and *Shapes* handout for each student
* pattern blocks

**Procedure:**

1. Provide students with a plain sheet of paper and a pair of scissors.
2. Ask students to fold the sheet of paper in half and cut out a shape of their choosing along the fold.
3. Next, ask students to open the paper. The fold line will be a line of symmetry.
4. Ask students to discuss each half of their figure. *\*Students may also use transparent mirrors or MIRAS to further explore line symmetry.*
5. Use these discussions to allow your students to construct an understanding of line symmetry. Students should understand that half of the figure is a mirror image of the other half and together they re-create the original figure. If the figure is symmetrical, one side of the figure will fall on top of the other side of the figure. This demonstrates that one side of the figure is reflected onto the other side. Students should also explore figures that are asymmetrical.
6. Provide students with the *Nature* handout.
7. Ask students to respond to the following question:

*What characteristics does each object have that makes it look balanced or symmetrical?*

1. Instruct students to draw all lines of symmetry on each figure.
2. Have them cut out the shapes and fold along those lines of symmetry to prove their thinking. \**Ask students how they determined each line of symmetry and what it tells them. Ask students to respond to the following question: Where can you find other examples of symmetry in your environment?*
3. Provide students with the *World Flags* handout.
4. Ask students to respond to the following question:

*What characteristics does each flag have that makes it look balanced?*

1. Instruct students to draw all lines of symmetry on each flag.\**Students benefit from folding each flag or using a Mira to determine a line of symmetry. Ask students to respond to the following question: Where can you find other examples of symmetry in other areas such as architecture or art?*
2. Provide students with the *Shapes* handout.
3. Ask students to respond to the following question:

*What characteristics does each shape have that makes it look balanced?*

1. Instruct students to draw all lines of symmetry on each shape.
2. Ask students to discuss how they determined each line of symmetry and what it tells them.
3. Place an envelope with one of the following questions written on the outside of it will be placed in the center of each group of desks. Each student should write their answer on a piece of paper, with their name on it, and place it in the envelope. After all have finished, collect the envelopes.

* How do you determine lines of symmetry? What do they tell us?
* How is symmetry used in areas such as architecture and art? In what areas is symmetry important?

**Assessment:**

The responses collected from the envelope answers should be collected by the teacher and reviewed. Take these responses into consideration when revising groups that students are working in. If follow-up is needed make note of it and do so when time allows, but make sure it happens. A great follow-up for students is using paper pattern blocks to fold and drawing lines of symmetry directly on the paper blocks. If the student seems to need more of a challenge, present them with an extension activity (seen under “Differentiation.”)

**Differentiation:**

* Students may use Geometer’s Sketchpad or the “draw tool” in word processing software or a “paint” program in order to draw quadrilaterals with a specified number of lines of symmetry. Students may work in pairs and then report to the whole class.
* Ask students to draw the second half of a given symmetrical figure with only one line of symmetry.
* Ask students to draw the second half of a given symmetrical figure with two lines of symmetry.

**Integration Activities:**

Integrating science into this lesson would be a fun component. Show students the anatomy of insects that display symmetrical organs such as a butterfly and its wings. Students can see that the butterfly displays symmetry internally and externally. On the other hand, students should then see the anatomy of another insect that may be symmetrical on the outside, but is asymmetrical on the inside.

**Lesson Justification:**

This lesson meets the Common Core Standard *MCC.4.G.3* because students will be discovering lines of symmetry in various two-dimensional objects as well as making their own. Allowing students to cut out their own shape and find the line of symmetry will model the problem solving strategy of “making a diagram”. I will be looking for the CCSSM Practice Standard- reasoning throughout the lesson when I ask students what the line of symmetry means and what characteristic each shape has that makes it look balanced.

**Credits:**

*This lesson has been modified from its original version created by the Georgia Department of Education, Dr. John D. Barge, State School Superintendent*