



Mirror Images

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Grade Level: 2

Time Allotment: 2 hours

Overview: In this lesson students will explore vertical and horizontal symmetry. After watching the Cyberchase episode and reading a book on symmetry in everyday things, students will make their own unique collages using symmetrical shapes that they have created from construction paper and will also get a chance to practice making symmetrical shapes on the Internet via the “Cyberchase” Symmetrizer game.

Subject Matter: Math

Learning Objectives:

- Students will show they understand the difference between symmetrical and non-symmetrical items by creating symmetrical shapes to use in their collages.
- Students will be able to identify lines of symmetry.
- Students will demonstrate their knowledge of vertical and horizontal symmetry by putting together a symmetrical collage.

Standards: Montana State Mathematics Standard 4.3: *Students demonstrate understanding of shape and an ability to use geometry. Identify lines of symmetry, congruent and similar shapes, and positional relationships.* (Source: <http://www.opi.state.mt.us>)

Media Component: Cyberchase #110: Secrets of Symmetria

Cyberchase Symmetrizer

<http://pbskids.org/cyberchase/games/symmetry/symmetry.html> -- this is a link to the PBS “Cyberchase” Symmetrizer game, a kaleidoscope that students may use to make all sorts of symmetrical shapes and designs.

Materials:

- Pencils, 1 per student
- Large white drawing paper (18 by 22), at least 1 per student

- Assortment of colored construction paper (large scraps are fine, students will be using this to make the shapes for their collages)
- Glue
- Rulers, at least 1 per 2 or 3 students
- Scissors, 1 per student
- 1 copy of “Let’s Fly A Kite” by Stuart J. Murphy, HarperCollins Children's Books, 2000
- Overhead projector, chart paper, or white board to write on
- Marker (for teacher to make chart)
- Butterfly worksheet, 1 copy per student
- Bookmark <http://pbskids.org/cyberchase/games/symmetry/symmetry.html>

Teacher Prep:

Get “Let’s Fly a Kite”

Obtain collage materials

Load and cue video to visual cue of the television aboard Hacker’s ship, onscreen is a physical trainer who says, “We’ll be right back after this cybermessage...”

Photocopy butterfly worksheet, 1 per student

Introductory Activity:

1. Read “Let’s Fly A Kite” aloud. Pause each time the babysitter has to solve a problem and ask students how they think she will solve the argument this time. Point out the pictures that clearly show an object being divided into two equal parts (for example, the sandwich). Point to the illustration that shows the kite being divided horizontally and ask students if the two parts are equal. (No, they are not) Tell students that dividing the kite this way will make the two pieces asymmetrical, that is, the two parts are not equal. Ask students to tell you if there is a way to divide the kite so that it is symmetrical, so that both parts are equal. (Yes, divide it vertically)
2. Ask students to tell you how the idea of symmetry helped solve the kids’ argument in the book. (Some possible answers might have to do with sharing the backseat, sharing the sandwich, or decorating the kite)
3. Go back through the book, looking only at the pictures. Ask students to share which things in the pictures look symmetrical and which do not. (Examples of symmetry and asymmetry are given in step 1)

Learning Activities:

1. Introduce and watch the Cyberchase “Secrets of Symmetria” episode. Set focus for media interaction: tell students they will have to tell you whether or not the donut divider is symmetrical and how they know. (Answer: Yes, it is. It I the exact same on both sides.) Begin playing video at teacher prep point (visual cue of the television aboard Hacker’s ship, onscreen is a physical trainer who says, “We’ll be right back after this cybermessage...”).

2. Pause video at visual cue of Hacker saying, "That symmetrizer is exactly what I've been looking for!" and ask students to answer your media interaction question.
3. Resume playing the video, set new focus for media interaction: Tell students they will have to tell you what the paper from the Motherboard says and how the kids figure it out. (The paper says AVA, they figure it out by holding it up to a mirror.)
4. Pause video again when Ava holds the paper up to the mirror and says, "Ava, that's my name!" Ask students how the mirror shows symmetry. (The mirror shows a reflection of the pattern on the paper, it is the same exact pattern, an "equal" half. So the pattern on the paper becomes symmetrical.)
5. Show your students a pocket mirror; pass it around and allow everybody to look at it. Using a symmetrical object (a block, lid, leaf, etc.), demonstrate how you can use the mirror to prove that something is symmetrical. Repeat with different objects until you are sure your students understand how a mirror can be used to show symmetry.
6. Resume watching the video. Set focus for media interaction: Students will have to tell you three things they see in this segment that are symmetrical. (Possible answers: fence, robot, door to factory, and bowl). Stop tape with kids running from Hacker's antisymmetrizer rays and a voice cue of "Run!" Ask students to answer your media interaction question.
7. Discuss the episode. Ask students to tell you about the things they saw that were exactly the same shape or size from all angles. (Picket fence, bowl, donut divider, robot, the factory building, and the door to the factory)
8. Draw a simple symmetrical object like a square and an easily detectable non-symmetrical object, for example a cloud, on the board or overhead projector. Ask your students to determine which item is symmetrical and which is not. Discuss what makes something symmetrical. Write the characteristics next to the symmetrical item. (The pattern stays the same no matter how you move the object, if you divide the object in two both parts are equal.) Draw a few more symmetrical shapes and identify the line of symmetry on one with a dashed line (For example, a triangle with a vertical dashed line down the center). Have students help you identify the lines of symmetry on the other shapes.
9. Fold a piece of construction paper in half and demonstrate how to create a symmetrical shape by drawing one half of an object on the folded paper. Be sure to point out that you are not drawing a closed object, the open parts of the object must touch the fold of the paper. Open the paper and show students the complete object.
10. Refold the paper on the same line and demonstrate cutting it out. Make a few of the exact same objects by tracing a folded shape you have already cut out onto a new folded piece of paper.
11. After you have several shapes cut out, demonstrate creating a symmetrical collage with the shapes. Place the shapes on a background that all students can see and as you place them, talk about the placement. If you put a heart on the right hand side of the paper, ask students what needs to go on the same spot on the left hand side to make the collage symmetrical. Use a ruler to show how you can be sure to put a shape along the same line of the paper as another shape, even if it is all the way

on the other side of the collage. Let your students know that it is better to place all their objects before gluing anything down, that way if they make a mistake it can be easily corrected.

12. When you are sure your students understand the activity, pass out pieces of drawing paper, scissors, glue, and pencils, and make sure the construction paper is readily available to all students.
13. As students finish their collages, allow them to log on to <http://pbskids.org/cyberchase/games/symmetry/symmetry.html> and play the Symmetrizer game. Set focus for media interaction: Tell students they will have to tell you how the kaleidoscope makes symmetrical objects. Encourage them to click on the “How?” button on the Symmetrizer game if they are unsure of the answer. (Answer: By using mirror imagery, the kaleidoscope uses reflections of an object and moves them around.)
14. When everybody has finished making their projects, allow students to share their collages and the interesting, symmetrical shapes they made.

Culminating activity:

1. Show students the Butterfly worksheet and instruct them that they are to color in (with whatever colors they choose) ONLY the symmetrical shapes, leaving the asymmetrical shapes white.
2. Hand out the Butterfly worksheets and allow students to work on them.
3. When students have completed the worksheets ask them to share any of the shapes that they were not quite sure about. Were there any shapes that looked symmetrical but weren't? Draw any of these shapes on the board and have other students help you determine whether or not these shapes are symmetrical by finding the line of symmetry. Or, have a student cut the shape out of construction paper and ask for a volunteer to fold it in half and see if it is symmetrical.

Cross-curricular extensions:

Art

- Make origami objects
- Make butterfly mobiles
- Make handmade kites

Science

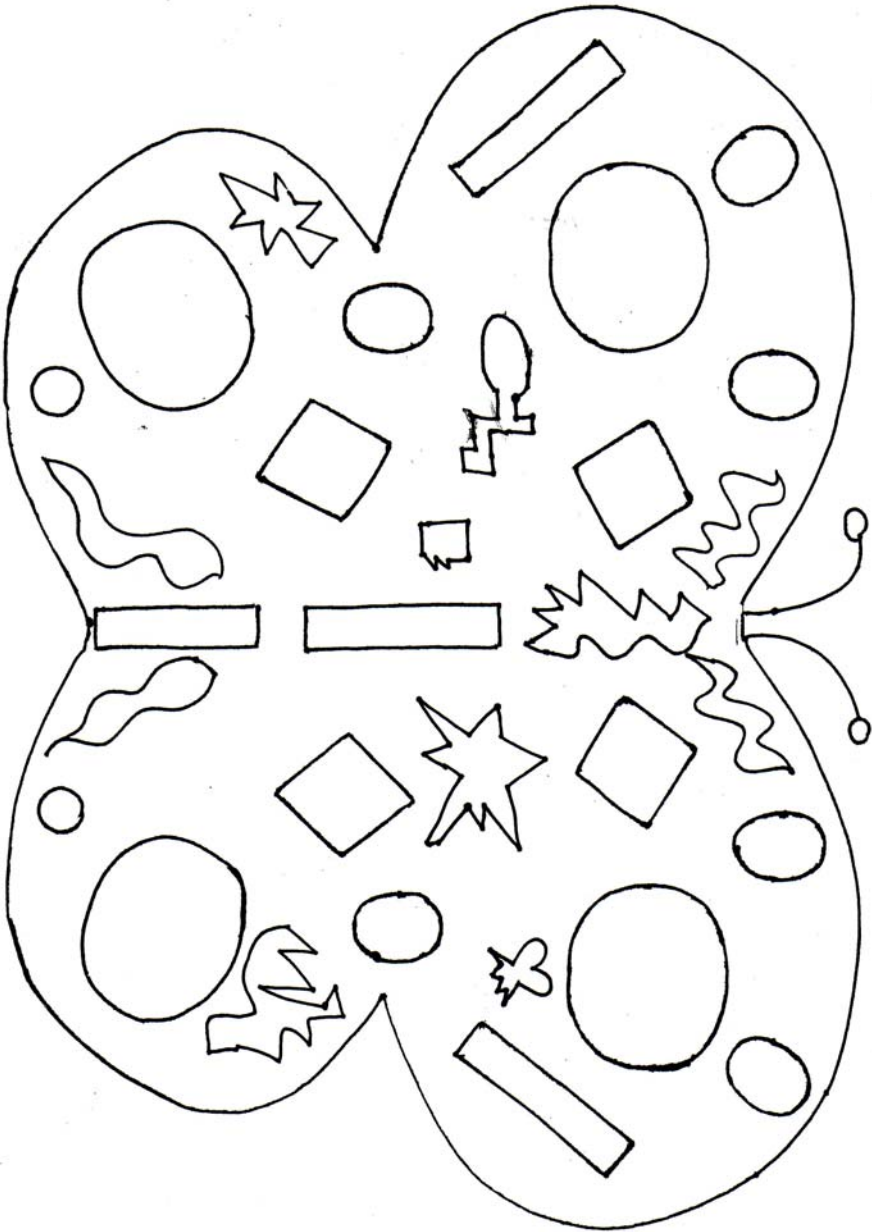
- Study the human body (pay particular attention to the balance and symmetry of the body, the face, hands, etc.)
- Study butterflies and their life cycles. Have students present reports on different butterflies

Community Connections:

- Take a field trip to a natural history museum
- Invite a lepidopterist to give a lecture in your classroom
- Have students explore symmetry in the world around them by taking a neighborhood walk (look at street signs, stop signs, houses, etc.)

A BALANCED BUTTERFLY

Help a butterfly find its true colors by coloring in only the symmetrical shapes. Leave anything that is not symmetrical white.



TEACHER COPY

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