

MATHEMATICAL SYMMETRY MODELS

These models combine symmetry and culture

Curriculum topics:

- Symmetry and patterns
- Self-Expression
- Cultural Exploration

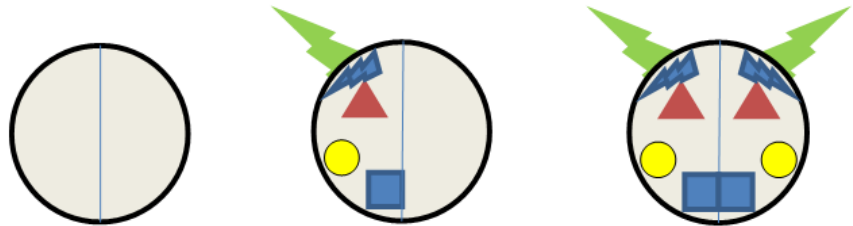
Subject:

Mathematics, Art, Social Studies, Language Arts

Grade range: K – 2

Who we are:

Resource Area for Teaching (RAFT) helps educators transform the learning experience by inspiring joy through hands-on learning.



Students create symmetrical models that are self-representational. Designing the model facilitates students' cultural exploration. Completed models can be used as the basis of a story and/or play.



For more ideas visit <https://raft.net>

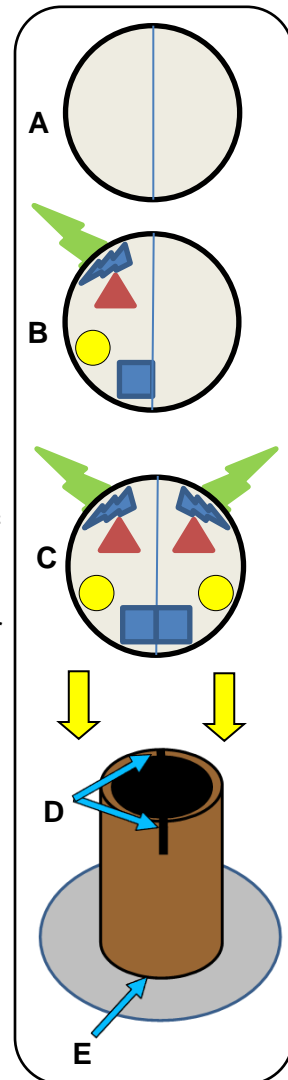
Materials required per model

- Cardboard tube or equivalent, 1-inch diameter (x1)
- CD or equivalent base-like item (x1)
- Cardstock circle, 4-inch diameter (x1)
- Various paper shapes: circles, squares, triangles, approx. ½-inch wide
- Feathers, streamers, or equivalent
- Colorful fabric scraps
- Tape or glue (not included)
- Scissors (not included)
- Markers, crayons, color pencils (not included)

WARNING: CHOKING HAZARD – Small parts not for children under 3 yrs.

Set Up (refer to diagram at right)

- 1** Use scissors to cut two ½-inch vertical slits on opposite sides of the tube (**D**). This may require adult help.
- 2** Use tape or glue to attach a CD or similar circular base to uncut end of the tube (**E**).
- 3** Draw a vertical line to divide the 4-inch cardstock circle in half (**A**).
- 4** Select an even number of assorted shapes and feathers (or equivalents) and use half of them to create a face on one side of the circle (**B**).
- 5** Use the concept of **bilateral symmetry** (see content on next page) to create a mirror image on the other side of the circle using the remaining materials (**C**).
- 6** Slide the decorated circle into the slits on the tube so that it is held in place. Optional: Use fabric pieces or other items to decorate the tube.



To do and notice

- 1** Observe the model from different angles to see if and how the symmetry changes with different perspectives. What do you see? How is it the same/different based on your perspective?
- 2** Make/write a short story about the model. Details may include name/nickname, birthday, birthplace of the model, its age, favorite color, etc.
- 3** Share the symmetry model story with another person and/or have your model “introduce” itself to other people or models.



Content Standards:

CCSS MATH

Identify and Describe Shapes
[K.G.A.2](#)

Analyze, Compare, Create, and Compose Shapes:
[K.G.B.5-6](#)

Reason with Shapes and their Attributes:
[1.G.A.1-3](#)

CCSS ELA

Presentation of Knowledge and Ideas:
[SL.1.5, 2.4, 2.6](#)

CA VISUAL ARTS

Creative Play, Materials, and Making (Creating):
[Pre-K.VA.Cr:1.1](#)
[K.VA.Cr:1.1](#)
[1.VA.Cr:1.1](#)
[Pre-K.VA.Cr:1.2](#)
[K.VA.Cr:1.2](#)
[1.VA.Cr:1.2](#)

Art, Story, and Culture (Connecting):
[PreK-1.VA.Cn:10.1](#)
[PreK-1.VA.Cn:11.1](#)

The content behind the activity

Symmetry is a foundational part of geometry. In this activity, the following aspects of symmetry are addressed: parts of a whole, reflection, and central points.

Parts of a Whole: The student draws a line to divide the circle in half. One side of the circle is the same as the other side. The dividing line is called a line of symmetry and this type of symmetry is called **bilateral symmetry**.

Reflection: The left side is the same as, or is a reflection of, the right side.

Central point of symmetry: The central point of symmetry remains the same even when observed from a different perspective.

As students use symmetry to create these models it encourages strong self and mathematical awareness in the classroom and their community.

Dolls are used as teaching models in some cultures to illustrate aspects of the culture for children. Many cultures have different ways in which they express history and play. For example, Hopi Kachina (Katsina) dolls embody the characteristics of the ceremonial Kachina, or masked spirits of the Hopi Native American Indian tribe.

In Africa, dolls are used both to teach and to entertain. The dolls are unique, handmade, and are traditionally handed down through generations as heirlooms.

Learn more

- Use yarn and beads to make necklace on the model.
- Review the parts of a play with the students. Have students use the models as characters in the play.
- Use the models to act out a story such as a nursery rhyme (e.g., *Little Bo Peep*), fairy tale (*The Three Little Pigs*), or fable (*The Tortoise and the Hare*).
- Students create stories in which two or more models interact. For example, they could go on a trip, have a celebration, or experience an adventure.

Visit <https://raft.net> to view the following related activities!

Foam Dowel People
Hinged Mirror Kaleidoscope
Kaleidoscope Explorations
Mathematical Dream Catchers

Resources

- Hopi Katsina Doll Facts - <https://bit.ly/2XyE5Wg>
- YouTube video (2:35), Introduction to Symmetry - <https://bit.ly/2V3le3L>
- YouTube video (3:08), Symmetry and Design - <https://bit.ly/2VIXKG2>