



Symmetry

Families create their own symmetrical mandalas, a classic Indian design.

What you'll need

For the exploration:

- Paper circles, squares, and triangles of roughly the same size (8 inches across works well)
- One compass per family (or paper clips and 2 pencils or pens to make a compass)
- 8½ " by 11" paper
- Scissors
- Markers
- A handheld mirror for each family
- Light boxes (optional)
- A collection of symmetrical objects

Icebreaker

Pass out paper circles, squares, and triangles, one set per family, and ask them to fold the shapes in half through the center as many times as they can.

Collection

Can you figure out a way to divide your body in half so that the things on one side exactly match the things on the other? If you divide yourself at your waist, the two halves are very different—a head on one side, two feet on the other, elbows on one half, knees on the other. If you divide yourself from your head to your toes right through the center, you'll have symmetrical or matching sides—nostril matches nostril, hand matches hand, foot matches foot. When you draw a line through the center on any object and both halves look the same, the object is symmetrical.

Pass out the collection of symmetrical objects and invite participants to notice the lines of symmetry in each of the objects. How many different ways can they divide the objects through the center?

Exploration: Mirror Madness

In today's activity, you'll make a mandala, a cool circular design that is also symmetrical.

- In the ancient Sanskrit language, mandala means circle, and all mandalas have radial symmetry.
- To start the mandala, invite families to make two large circles of exactly the same size, using their compasses (8 inches in diameter works well). Cut out both circles. (To make this project easier, you could have the circles pre-cut.) Fold both circles in half and then in half again. When the circles are unfolded, they should be evenly divided into four pie pieces. Cut out one of the pie pieces of one of the circles only.
- Using the pie piece, participants can make a symmetrical pattern on the second circle. To do this, fold the pie piece evenly into three sections by folding the straight sides of the pie piece toward the center. It should look like a skinnier pie piece when finished.

- As if making a snowflake, participants should cut different shapes into the folds of the pie piece.
- When the pie piece is opened up and placed on top of the second paper circle, it becomes the stencil to make a symmetrical mandala pattern. Using markers, children and their parents can color in all of the open spaces on the pie piece. After one section is finished, the pie piece can be moved to the next section of the circle.
- If there are light boxes available, participants can put the stencil section on top of the paper circle and place both on the light boxes to make the stenciling easier.
- When all four sections of the circle have been completed, check out the cool pattern that has been created!
- To check on the symmetry of the mandala, hold a handheld mirror up to one of the pie pieces. Is the mandala pattern continued around the circle? Does it look exactly the same? Invite participants to make another one with a more complicated pattern.