Explora SAFE (STEM Activities for Families Everywhere)

¡explora!
Ideas You Can Touch
Ideas que puedes tocar

Activity Title: Hinged Mirrors

Take Home Message:
We can use mirrors to help see in places we could not see otherwise and to see ourselves. Mirrors can also be used to explore the ideas of symmetry and reflection.

Focus Questions:
- How many reflections of yourself/an object can you make?
- How do you increase or decrease the number of reflections?
- How can you change a pattern or reflection by moving the mirrors?
- How can you use mirrors to find the line of symmetry (where the reflection matches the object)?
- Can you create a flower using only one drawn petal?
- Can you make a secret message for friends to discover using mirrors?

Materials:
Non-consumables
- Sets of 'hinged' mirrors - two mirrors taped together on one edge
- Pattern blocks of various shapes, sizes, and colors

Consumables
- Copy Paper
- Washable Markers, crayons, colored pencils or pens

Set-Up Notes:
Place 3 to 6 hinged mirror sets around the table. A supply of the pattern blocks can be kept on the table in a small container. Containers for markers, pens, and the like can be used for organizing materials at the table. Basic designs with pattern blocks set up in a few mirrors can be a starting point for a student. Underneath other hinged mirrors, white copy paper with a large dot or a bold line drawn can be an entry point for shape investigation.

Science, Technology, Engineering, and Math (STEM) Questions:
S - How does your reflection change when you move one mirror? What kinds of reflections do you make when you move both mirrors? After creating a design with the pattern blocks, how many reflections of your design do you see?
T - Where have you seen mirrors used to allow us to see in places not directly in front of us? How is symmetry used in spaceships and satellites, cars and roads, school buildings and desks? Why?
E - Can you position the mirrors so that half of your face is reflected? Can you make your reflection upside down? How can you design and reflect a pattern (using the paper/markers or pattern blocks)?

M - How many images (of yourself or an object) do you see? Encourage a systematic adjustment of the mirrors and ask, now how many images do you see? Can you find the line of symmetry in your reflection or design?

Connections to Everyday Life:

- Use of Mirrors: at home, in the car, in stores, telescopes - to see where we can not
- Symmetry: found in art, nature, music, architecture, geometry

STEM Background:

Symmetry: There are several types of symmetry; the one explored in this activity is reflectional symmetry. EasyCalculation provides the following definition and examples: "Reflectional symmetry is a kind of symmetry where one half of an image is an exact mirror of the other half. Usually we can find the objects pertaining the reflectional symmetry in the areas of mathematics, natural sceneries and man-made patterns."

Reflection: Light travels through space in straight lines. Visible objects are seen when light reflects off of them and into our eyes. Light reflected from an object can reflect off of other surfaces before it enters our eyes. When light reflects from a smooth surface, its angle of reflection from the surface is usually equal to its angle of incidence. This behavior of light makes mirrors and other reflective surfaces useful in homes and businesses for a variety of purposes.