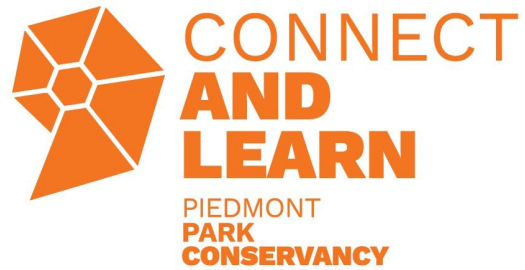# DIY Kaleidoscope

Make your own kaleidoscope using recycled household items!

Key Terms

<u>Reflection</u>- change in direction of a light wave, caused by a collision with a reflective surface, usually something smooth and shiny, like a mirror or metal

<u>Visible light</u>- the portion of the electromagnetic spectrum that is visible to the human eye, which includes the colors of the rainbow

<u>Absorb</u>- to take in or soak up

<u>Transmit</u>- to allow to pass through

<u>Translucent</u>- permitting the passage of light

Materials

A cardboard tube (paper towel tube is perfect)
Mirror card (or aluminum foil glued onto thick paper like cardstock. Be sure shiny side of aluminum foil is facing out)
Ruler
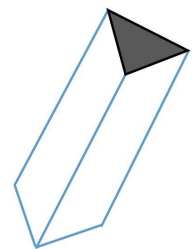Scissors
Small colorful translucent beads (about 10-15)
Clear plastic cup or sheet
Tape
Colorful paper, markers, crayons, etc to decorate

Procedure

1. Decorate the outside of your cardboard tube however you like. Be sure to leave 1 inch at the bottom of your tube undecorated; this area will be covered up with tape.
2. Cut your mirror card, or thicker paper into three strips. Each strip should be 8 ¼ inches long, and 1 ½ inches wide.
3. Create a triangular shape with your strips of paper by taping together the long sides of each piece, creating a 3-dimensional triangular tube. The shiny sides of the mirror card or tin foil should be facing in towards each other. The tube should look something like the photo.
4. Slide the triangle shape into the cardboard tube so that the end of the triangle tube is flush with the decorated end, and tape it into place so it does not move.
5. Cut your discs out of the clear plastic cup or sheet. To do this, use the cardboard tube to trace the correct size and shape onto the plastic. Each disc should be the same size and shape as the opening to the cardboard tube.
6. Turn your kaleidoscope upside down, so the non-decorated end is up in the air and place one of your plastic discs on top of the triangle and tape into place.

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7. Time to add your beads! Carefully pour your beads on top of the plastic disc, they should be able to move around, not packed in tightly.
8. Place your second plastic disc at the very end of the cardboard tube and tape into place. Your kaleidoscope is complete!

How does it work?

When you look through the open end of your kaleidoscope, you see beautiful patterned images. How does that happen?

Kaleidoscopes operate using the visible light spectrum and reflection. When the light comes through the end of the kaleidoscope, it is passed through the colorful translucent beads. Most of the colors in that ray of light are absorbed by the bead, except the color that the bead is. For example: Let's say we used pink, green, and purple translucent beads in our kaleidoscope. When light enters the tube, it first passes through the beads, and all the colors are absorbed except the pink beads allow pink to pass through, the green beads allow green to pass through, and the purple beads allow purple to pass through. This is where the beautiful colors come from in the kaleidoscope. Adding beads of different colors will increase the number of colors you see in your kaleidoscope!

Once those colors pass through the beads, they reach our reflective surface: the mirror card or tin foil. This surface causes the light to change direction, and hit another side of our prism inside the kaleidoscope. Because the light is constantly hitting one side of the prism, it is constantly changing direction. This produces the patterns we see in the kaleidoscope.