

Kaleidoscope

Materials

12 cm x 15 cm (5" x 6") Square of mylar or three mirrors appx 2 cm x 15 cm (0.75" x 6")

Tape

Scissors

Small clear container (similar to small pill box or cosmetic container)

Toilet paper tube

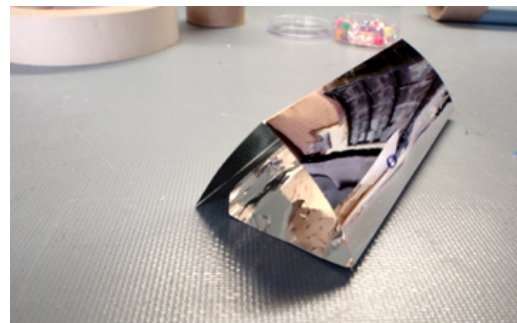
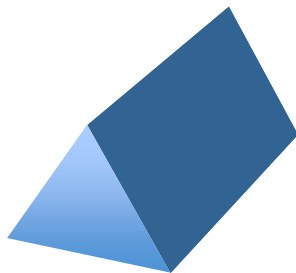
Assorted beads

Strip of cardstock, index card or recycled postcard



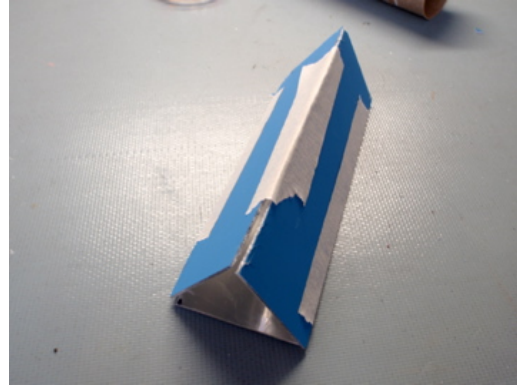
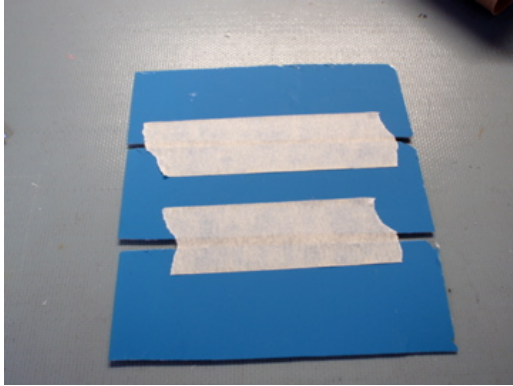
Instructions

1. Make the mirror assembly.
 - a. For mylar
 - i. Fold the mylar into an equilateral triangular prism by folding and creasing the sheet in half. Open the mylar piece and fold and crease each edge into the center fold to create 4 "panels". Overlap 2 panels to create a triangular prism shape.
 - ii. Secure the Mylar prism into shape with tape.
 - iii. Tape the two edges together.

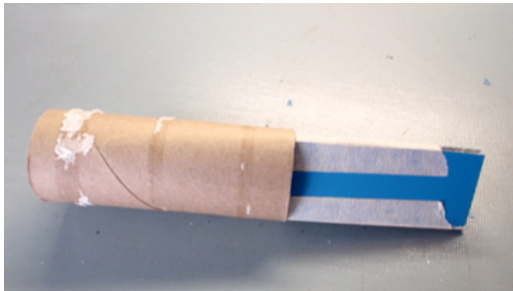


b. For mirrors

- i. Tape the back of mirror 1 to the back of mirror 2 along their long edges, leaving a small gap ($\sim 1/8$ inch) between them.
- ii. Tape the back of mirror 2 to the back of mirror 3 along their long edges, again leaving a small gap.
- iii. Fold the mirrors so that the free side of mirror 3 meets the free side of mirror 1 and the mirrors form an equilateral triangular prism. The reflective surfaces should be on the inside of the prism.



2. Slide the mirror assembly into the paper towel tube so that it is completely inside the tube.



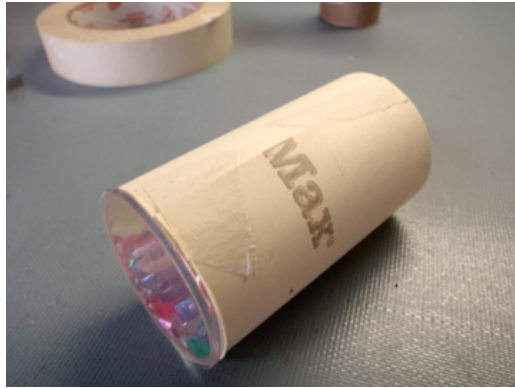
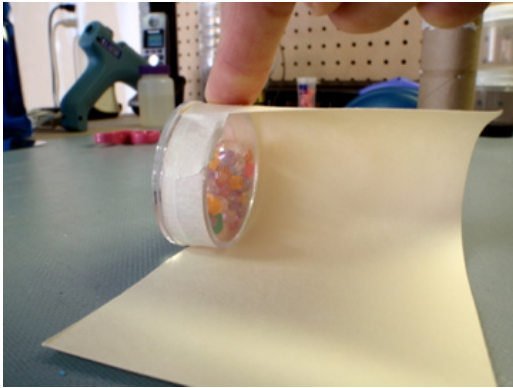
3. Fill the small clear container with beads.



4. Put the cap on the container and seal the edges with tape.



5. Roll the cardstock around the container so that it forms a tube with the container as an end cap on the tube. Secure the tube with tape.



6. Slip the cardstock-container tube over the toilet paper tube.



To Do and Notice

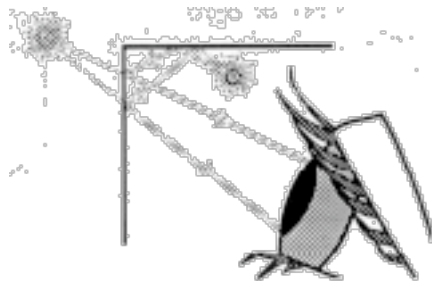
Look through the open end of the toilet paper tube and rotate the cardstock tube. Note the patterns of the beads in the tube.

What's Happening

From "Corner Reflector", The Exploratorium Snackbook,
http://www.exploratorium.edu/snacks/corner_reflector/index.html

"When you put an object between the two hinged mirrors, light from the object bounces back and forth between the mirrors before it reaches your eyes. An image is formed each time the light bounces off a mirror. The number of images that you see in the mirrors depends on the angle that the mirrors form. As you make the angle between the mirrors smaller, the light bounces back and forth more times, and you see more images.

The illustration below shows how an image is formed in the corner of two mirrors at 90 degrees. Light rays bounce off each mirror at the same angle that they hit the mirror: Physicists say that the angle of reflection is equal to the angle of incidence. Mirrors at other angles behave similarly, but the ray diagrams may get more complex.



The inside corner of a corner reflector (where the three mirrors meet) sends light back parallel to its original path. If you pointed a thin beam of laser light right near the corner, the beam would bounce from mirror to mirror and then exit parallel to the entering beam. Light from the center of your eye bounces straight back to the center of your eye, so the image of your eye seems to be centered in the corner made by the mirrors.

In a corner reflector, multiple reflections reverse the image and invert it."