SANTA CRUZ MUSEUM of natural history

How To Make A Spectrometer

Spectrum and spectrometer

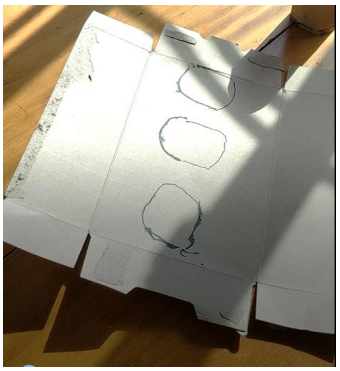
A **spectrometer** is a device used to analyze the properties of light. Below are steps in making your own spectrometer.

Tools:

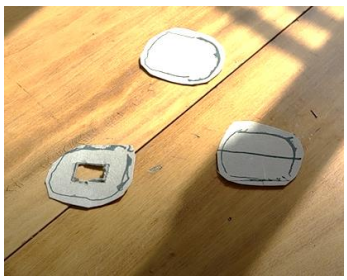
1. A marker
2. Scissors or a craft knife
3. Tape or glue
4. A CD -- used or blank. A DVD will also work.
5. Thin cardboard or thick paper.
6. An empty paper towel roll. (This is recommended over a toilet paper roll because longer tubes are better at breaking lights into their spectra.)
7. The **Light Spectra Activity Worksheet**, linked with the activity resources.

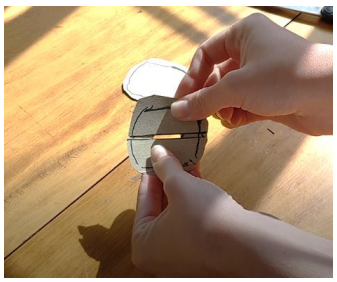
Steps:

1. Take your roll and your cardboard and outline three circles. Cut the three circles. It's a good idea to make your cuts a little bigger than the roll's circumference.

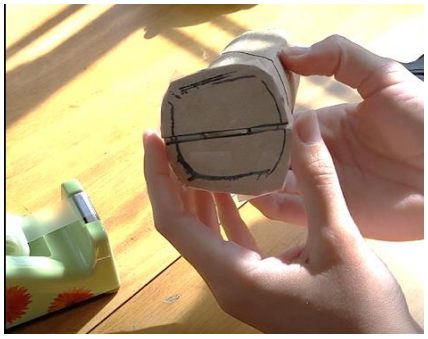


2. On one of the circles, draw a small rectangle just big enough for your eye to look through. Cut out the rectangle.
3. Take your second circle and cut it in half. Then, you'll tape or glue the halves barely spaced apart right over your first circle. The smaller the better so the rectangle is a tiny slit. This lid is what you will be looking through.





4. You'll now want to attach the lid to the roll. You can cut the lid to fit exactly over the tube. It's not needed, but it will look better. More importantly, make sure the lid is tightly attached so that no light gets through.



5. The next step is fun. Notice how CDs have a rainbow sheen? They are a perfect **diffraction gradient**, that is, they break apart light. It's the key component to our homemade spectrometer. But we do have to get rid of the paint on top.
6. Scratch at the CD until some of the paint flakes off. Then put tape right over that scratch. Peel off the tape, and you peel off the paint! You don't need to do this for the entire CD--just enough to cover the lid of the roll.

7. **optional** If you don't mind the CD being destroyed, you can cut the CD into the size of the roll. Only do this if you have adult supervision and good scissors. Plastics are very sharp when cut. If you do this, make sure the cut edges are covered in a thick tape. If you skip this step, that's fine! Just attach the CD to the end of the roll.
8. Now with your last piece of cardboard, cut a larger rectangle. This rectangle should go almost to the edge of the cardboard. Tape or glue that cardboard over your CD.

And now you have a working spectrometer! An **optional** step is to decorate it. I'm not artistic myself, but I did put patterned duct tape over my tube. The tape covers all the edges and makes the inside of the tube darker. Congratulations on making your own spectrometer!