

Science: Spectroscope!

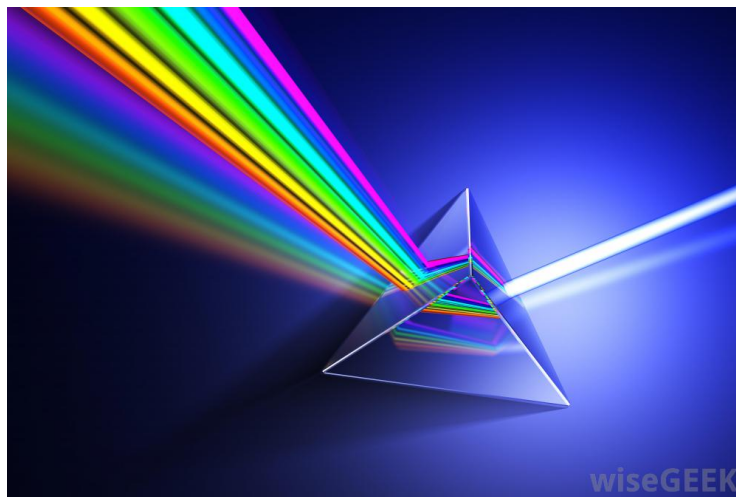
Ages: 9 - 13

Hello everyone. This is Bill from the Okanagan Regional Library System. Welcome to the fun and inventive world of making STEAM projects in your own home. Each week, I will share a fun and interesting project that you can make using materials commonly found in your own home.

Even though we can't be together right now, we can still learn how to make exciting projects each week!

This week's project: How to Make your own Spectroscope.

Spectroscope



It might look white, but light is actually a mix of different colours. You can see these colours in a rainbow, because each colour bends at a different angle as it bounces off raindrops. Scientists use a device known as a spectroscope to study the range of colours (the spectrum) in different kinds of light. In this activity, you will make your own spectroscope.

In order to clearly see the spectrum of colours that make up white light, you'll need a shiny CD for the light to bounce off. A slit is the top of a dark tube lets a small amount of light into the tube and onto the CD. You'll need to use a protractor to measure the angle at which you place the CD. You'll also need black electrical tape to block out unwanted light.

Materials Needed:

- Protractor
- Black Electrical Tape
- Flashlight
- Scissors
- Pencil
- Black Card Stock
- Old CD
- Cardboard Tube
- Ruler



Time: 30 minutes

Steps:

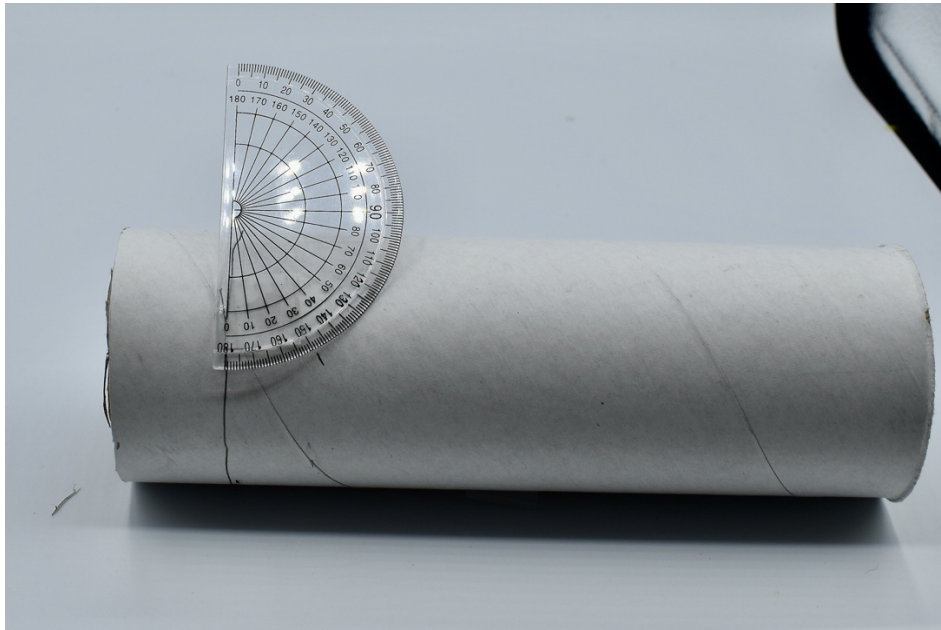
1. Using the pencil, make a mark 3 cm from one end of the tube.



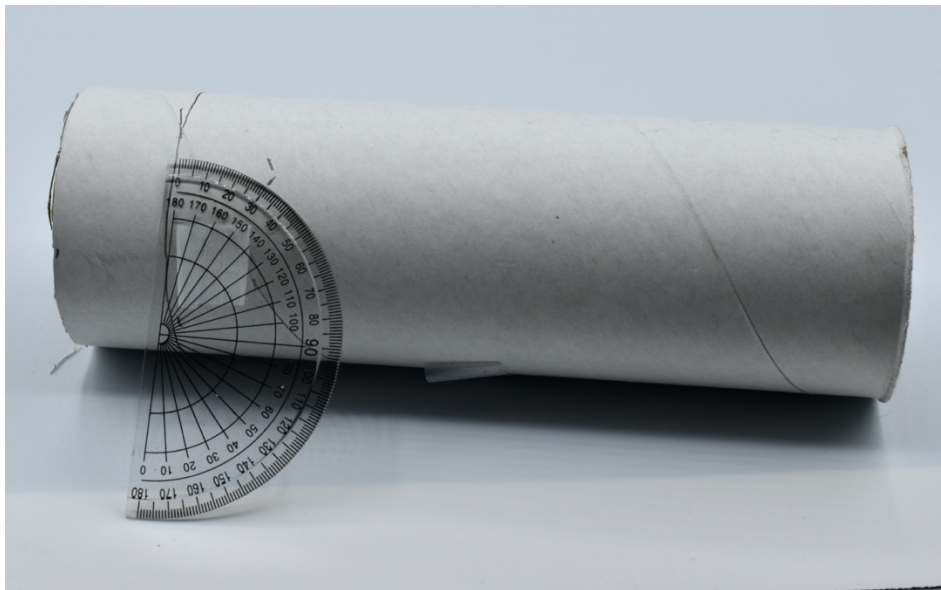
2. Wrap the black card stock around the cardboard tube at the mark. Use it as a guide to draw a line around the tube.



9. Hold the protractor on the tube so the protractor's zero line runs along the pencil line. Draw a short line angled at 30 degrees.



10. Move the protractor and draw another line, angled at 30 degrees in the other direction, so the two lines almost meet.



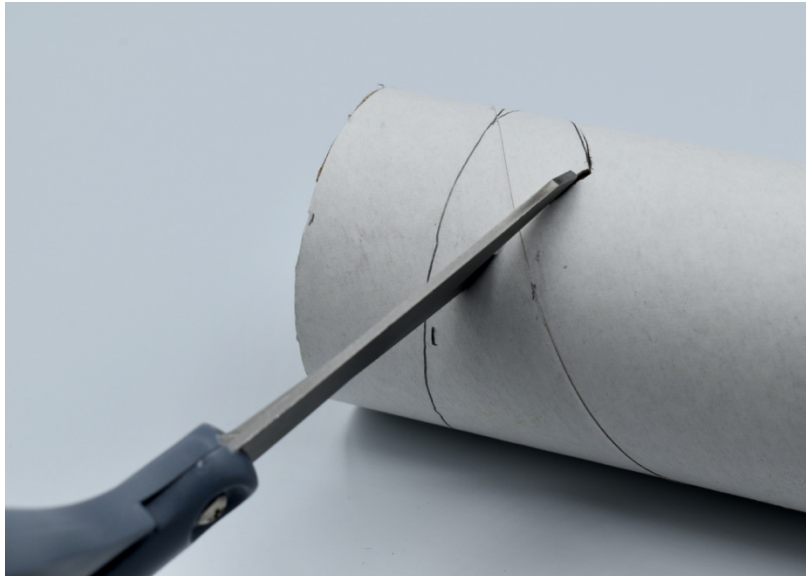
11. Using the ruler, extend both slanted lines so they meet the line that goes around the cardboard tube, forming a triangle.



12. On the opposite side of the tube from the triangle, draw a rectangle 2 cm high and 1 cm wide above the pencil line.



13. Cut along the two slanted lines so that you end up with an angled slot. This is where you'll slide in your old CD.



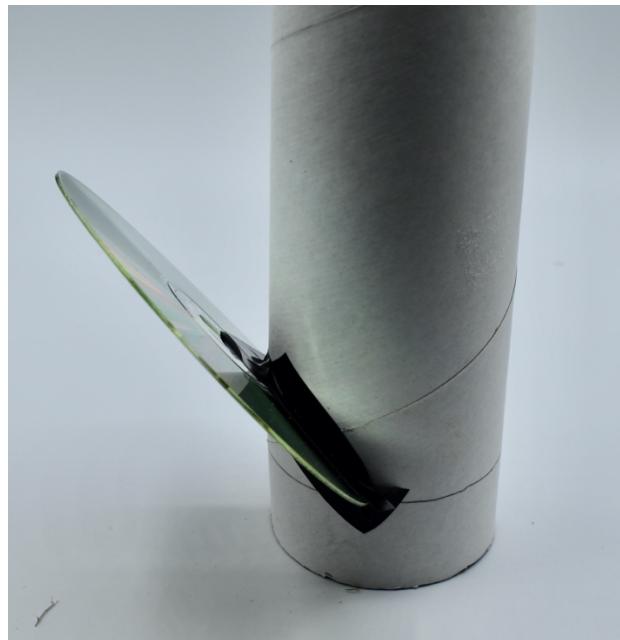
8. Now carefully cut out the small rectangle you drew to make a viewing window for your spectroscope.



9. Push the CD into the angled slot, with the shiny bottom surface facing upward.



10. Secure the CD in place inside the slot using black electrical tape.



11. Use strips of the black electrical tape to close off the end of the cardboard tube closest to the CD. Make sure that no light can get into the tube.



12. Draw around the open end of the cardboard tube onto the black piece of card stock using a pencil. Carefully cut out the circle.



13. The circle will cover the open end of the tube, but it needs a slit to let in light. To make the slit, first fold the circle in half.



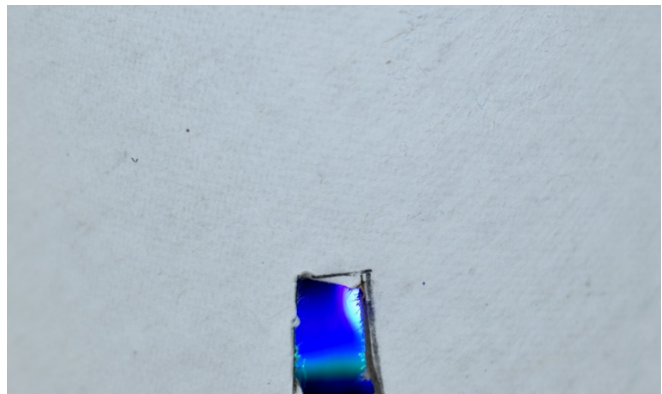
14. Carefully cut two lines close together at right angles from the middle of the fold. Cut out the thin piece between the lines.



15. Unfold the circle and tape it to the open in of the tube, using the black electrical tape. The slit should run from side to side, not front to back, so it aligns with the slot holding the CD.



16. Your spectroscope is now ready for use. Shine a flashlight into the top and look through the viewing window to see the spectrum. You can also try other light sources, such as daylight through a window, but don't point your spectroscope directly at the Sun.



The Science behind your Spectroscope

White light is a mixture of all the colours of the rainbow. When it hits a reflective object, all these colours bounce off, or reflect. Light hitting the shiny underside of the CD reflects in a different way. All the colours reflect, but each one bounces off in a different direction. The different colours spread out to form a spectrum.

STEAM

This activity includes everything you need for a comprehensive STEAM project.

Science: Understanding how light reflects to form a spectrum.

Technology: Understanding how light and angle combine to form a spectrum.

Engineering and Art: Construction of the spectroscope.

Math: Measuring and cutting out the parts needed to construct your spectroscope.