## Construction of a Monochromator
College for Kids

Follow these instructions to construct your monochromator.
- Fold the cardboard into the box shape.
- Be extremely careful and use the razor blade (or scissors) to cut two rectangular holes, about 1" tall by 1/2" wide, in opposite ends of the ends of the box. (See Fig. 3). Your two holes should roughly match in height. It helps to draw the desired holes in pencil and take the box apart to cut the holes.
- Tape the box together with duct tape.
- Use two pieces of black tape to make a narrow entrance slit (~1mm) at the rectangular hole on one end of the box.
- Tape the transmission grating over the viewing hole with the grating lines *vertical*.
- Cover the seams with black electrical tape to reduce the stray light.

You are ready to go!

FIG. 3   Top View
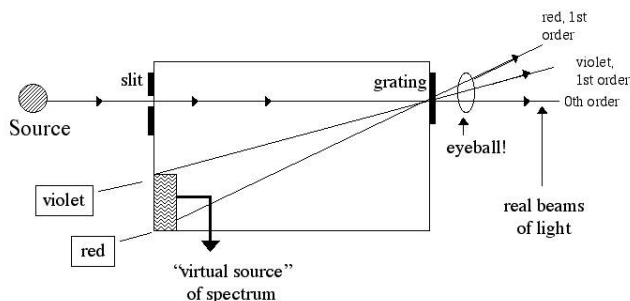
To practice, hold the monochromator in two hands, look into the box through the viewing hole (opposite the slit), and aim the slit at a source of white light. The spectrum is a rainbow of colors that appear at the left side of the box (if your viewing hole is on the right, as in Fig. 3). Make sure that the whole visible spectrum from violet (400 nm) to red (700 nm) appears from right to left within your box.

A fluorescent light provides both a continuous spectrum from the phosphor coating on the glass tube and also two sharp *lines* from Hg vapor. One line is green (546.0 nm), the other is violet (435.8 nm).

Figure 3 shows why the spectrum appears to originate from the left side of the box, even though there is no actual source of light there. The grating causes different colors to exit the box at different angles. Your eyeball sees the different colors as if they originated from different points within the box.

Turn on the computer and open a new word document. Using the Draw toolbar make a rectangle in the middle of the screen. Use the fill tool and the custom color option to create an all green box. Point your monochromator at the rectangle and record what colors you see. Change the color of the rectangle and observe again. What colors of light make up your favorite color on the display?