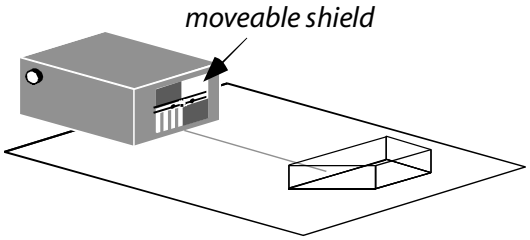
PhyzLab Springboard: Dispersion Diversion

• Apparatus •

___PASCO Basic Optics System:
- __light source (out of bracket)
- __power supply (plug)
- __trapezoidal prism (in the blue box)
- __blank sheet of paper or white metal screen



• Set-Up •

1. Attach the power supply to the light source and plug it in.

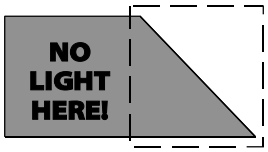
2. Arrange the light source to be a ray box and adjust the moveable plastic shield so that a single beam is emitted.

3. Place the sheet on the table. Place the ray box on the sheet.

4. Place the trapezoidal prism—**dull side down**—on the paper.

• Procedure: Creating a Spectrum •

1. Using only the triangular section of the trapezoidal prism, experiment with different arrangements (different angles of incidents on different sides of the prism) until you can produce a spectrum of colors. Your spectrum will not be wide, but you will be able to distinguish colors. Once you have it, turn up a corner of your paper or project the spectrum on the protrusion on the white metal screen to see the spectrum more clearly.



Use only the triangular section; there should be no light beams in the square section.

2. In the space below, draw a **magnified** diagram of the configuration (incident ray and any refracted rays, the prism, and the emerging spectrum) as seen from directly above. Do not draw the light source in your diagram. Pay particular attention to the arrangement of the colors in the emerging beam; label yellow, red, and violet in your diagram. Include arrows to indicate the direction of travel of the beams. MAKE IT BIG!

3. Label the following on your diagram
• incident ray (air to plastic) • internal ray (in plastic) • exit ray (with spectrum)
• normals (one at the air to plastic boundary for the first refraction, and one at the plastic to air boundary for the second refraction).

4. Put your head down on the table and arrange the apparatus so that the emerging spectrum goes into your eye directly. Move your head around so that you see different colors one at a time.

• Questions •
1. In what direction is the beam refracted as it passes from air to plastic?
___toward the normal ___away from the normal ___not at all

2. In what direction is the beam refracted as it passes from plastic back to air?
___toward the normal ___away from the normal ___not at all

3. Which color undergoes the greatest amount of refraction (is bent the most in the process) and which color undergoes the least amount of refraction?

4. Which color is slowed most in the plastic and which is slowed least?

5. Which color travels fastest in the plastic and which color travels slowest?

6. Does the index of refraction of the plastic depend on the color of the light passing through it? If so, which color gives the highest index of refraction and which gives the lowest?

7. Describe and name this phenomenon.

8. Why does _____ occur?