REFRACTION WORKSHEET

"Triangle" Diagram: On other pages in this set you will find a large triangle that represents a triangular prism. We want to follow the path of a light ray striking one of the surfaces as it passes through the prism and exits one of the other surfaces. Assume that $n = 1.5$ in the prism.

1. Draw an incident ray which strikes the surface of the prism, on the side marked by the asterisk, at an angle of incidence of 60°. Use a protractor to do this carefully. Include an arrow on the ray to indicate its direction of travel. (Use a blue pen or pencil if you have one.) The ray should enter the side of the prism indicated with the asterisk.

2. Use Snell's law to find the path of the ray as it passes into the prism, and then as it exits out one of the other surfaces. Put arrows on the ray as it passes through the other regions as well.

You will have to draw a normal line at the surfaces where the light ray meets the surface. Use colored pencil or pen or draw a dashed line for the normal lines; it will then be easier to distinguish them from the rays.

3. The index of refraction actually depends on the wavelength of the light, so the path you have drawn is accurate only for one particular wavelength. Assume that this is blue light. Then the index of refraction for red light will be less. Assume (unrealistically) that the index of refraction for red light is 1.0. (It would actually be about 1.48, and wavelengths between those of red and blue would have indices of refraction between the two extreme values; we are choosing a very low value of n for red light to exaggerate the difference in paths and make the difference very clear.) Draw the path the red light will take, if it comes in along the same path as the blue light when it strikes the first surface.

4. Suppose white light – a mixture of many different wavelengths of light – entered the prism along the original path. What type of pattern would you see as the light rays exited the prism? Explain in the space below. (Note: The creation of this pattern from white light is called dispersion.)

5. On the second copy of the prism diagram, draw a ray incident on the same side as before but this time with an angle of incidence of 20°. Follow this ray through the prism as before. Describe how the path differs from that of the two previous rays. What is the term used to describe this phenomenon?