Group # Names: _____

Date: _____

_____

Reflection & Refraction

Use the ray optics kit to study how light reflects off a flat, shiny surface, and how it refracts when entering a transparent medium (e.g., water, plastic, glass, etc.). You will use a light source that uses slits to create up to 5 or 6 parallel rays of light. Throughout this experiment however you should only use the setting that creates a single ray of light. You will place a flat mirror and a plastic trapezoid in front of the rays and observe/measure the reflected and refracted rays, respectively.

Note: Remember, all angles are measured with respect to the normal to the surface!

I. Reflection

Take the triangular shaped shiny piece that looks metallic – but must be plastic because it is quite light. This piece has two curved sides and a plane one. Today you'll be using just the plane mirrored side.

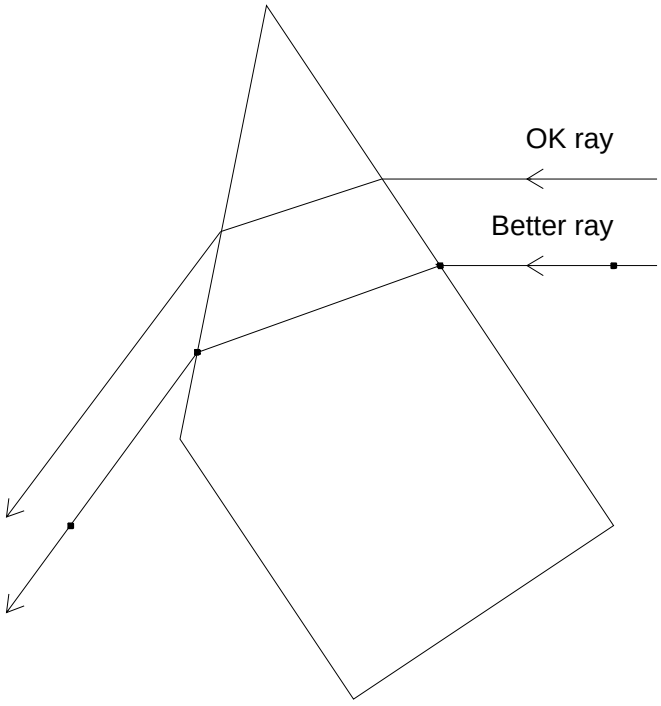
Place the mirror in front of the ray and observe the reflection. What you are to investigate is whether the angle of reflection equals the angle of incidence. This is a very simple law and it is quite easily verified, so here you are on your own. Figure out what to do, do it, and describe your technique in the space below. Verify at least 5 different angles of incidence.

Enter the results of your measurements in the table below.

Measurement	Angle of incidence	Angle of reflection
1		
2		
3		
4		
5		
6		
7		
8		

II. Refraction

Take the trapezoidal piece of plastic and let the light ray shine through it, such that it enters the pointed end. Rotate the trapezoid until the ray comes out the other side, as shown in the figure below.



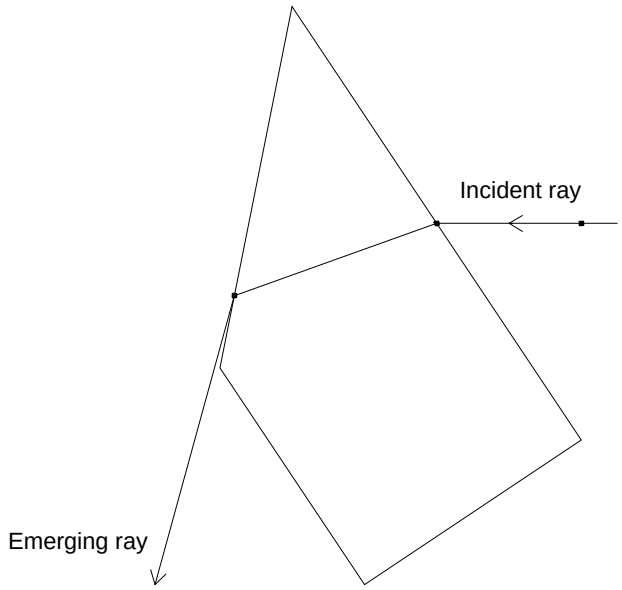
Note: Try to keep the ray through the plastic as far away as possible from the tip of the trapezoid.

Now what you need to do is to trace the rays. The best way to do this is to place a white paper under your setup and use a pencil to indicate some points on the paths of the rays. For instance, mark with a dot the point where the light ray leaves the light source, where it enters and exits the plastic trapezoid, and then 5–10 cm away from the trapezoid. Then just connect the dots to show the lines followed by the light ray. Note that you'll also need to trace the outline of the trapezoid. Finally, measure the angles and use Snell's law both at the entry and exit point.

Measurement	Angle of incidence	Angle of refraction	Index of refraction
Entry point			
Exit point			

III. Total Internal Reflection

Rotate the trapezoid slowly and watch as the emerging refracted ray gets closer and closer to the outer surface of the trapezoid. When the refracted ray disappears and only reflection takes place at the inner face, stop rotating the trapezoid (see the sketch below). Trace the light ray as you did in the previous section and calculate the index of refraction from the angle of incidence at the inner surface *only*.



Angle of incidence =	Index of refraction =

Time: 0 h 50 min.