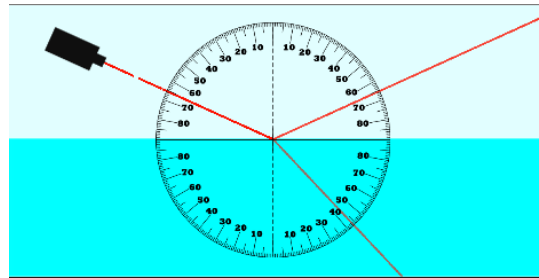


**Assumptions**

Let  $\Theta_i$  = angle of incidence,  $\Theta_r$  = angle of reflection,  $\Theta_R$  = angle of refraction

**Initial Setup**

- 1) Set up simulator as shown to the right.
- 2) Show protractor.
- 3) Top substance = vacuum Bottom substance = water



**Problems**

1. Investigate how n re-directs light.
  - a. Complete the table below

Case	Index Top, $n_{top}$	Index Bottom, $n_{bottom}$	Incident Angle, $\Theta_i$ (°)	Reflected Angle, $\Theta_r$ (°)	Refracted Angle, $\Theta_R$ (°)	The refracted ray bent [toward the normal ] [away from the normal.] [did not bend.]
1	Air 1.0003	Air 1.0003				toward / away / no bend
2	Air 1.0003	Water 1.33				toward / away / no bend
3	Air 1.0003	Oil 1.47				toward / away / no bend
4	Air 1.0003	Diamond 2.4				toward / away / no bend
5	Diamond 2.4	Air 1.0003				toward / away / no bend
6	Water 1.33	Air 1.0003				toward / away / no bend
7	Oil 1.47	Air 1.0003				toward / away / no bend
8	Diamond 2.4	Diamond 2.4				toward / away / no bend

- b. Write an evidence based explanation how differing the index of refraction, n, values affects how a light ray bends when transitioning from one medium to another. Your explanation should include the light ray traveling from 1) high index of refraction to low index of refraction and 2) low index of refraction to high index of refraction.

2. Predict what will happen to light as it travels through the following mediums. Support your prediction with a ray diagram. Check your prediction with the simulator.
  - a. Light travels from oil to diamond
  - b. Light travels from oil to water
  - c. Light travels from water to water.