

### Refraction Problems

- 1) Draw a rectangle. Sketch a ray entering the rectangle and show what would happen to the ray if the refractive index increased.
- 2) Draw a rectangle. Sketch a ray entering the rectangle and show what would happen to the ray if the refractive index decreased.
- 3) Find the speed of light in each of the following substances:
  - a. Diamond ( $n=2.42$ )
  - b. Crown glass ( $n=1.52$ )
  - c. Water ( $n=1.33$ )
  - d. Ice ( $n=1.30$ )
- 4) Find the index of refraction of the material if the speed of light is: ( $\times 10^8$  means move the decimal 8 places right)
  - a.  $1.58 \times 10^8$  m/s
  - b.  $2.05 \times 10^8$  m/s
  - c.  $2.00 \times 10^8$  m/s
- 5) If the angle of incidence (from air,  $n=1.00$ ) is  $30^\circ$ , find the angle of refraction in the following substances:
  - a. Water ( $n=1.33$ )
  - b. Diamond ( $n=2.42$ )
  - c. Ethyl Alcohol ( $n=1.36$ )
  - d. Zircon ( $n=1.90$ )
- 6) If the angle of incidence (from ice,  $n=1.30$ ) is  $30^\circ$ , find the angle of refraction in the following substances:
- 7) If the angle of refraction is  $10^\circ$  for the following substances find the angle of incidence:
  - a. Diamond ( $n=2.42$ ) to air ( $n=1.00$ )
  - b. Air to diamond
  - c. Air (1.00) to water (1.33)
  - d. Water to diamond
- 8) Complete the following diagrams by continuing the ray until it leaves the object

