PY 202, 4/3/17

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1 Qualitative

1. laser-box and mirrors demonstration
   (a) consider, effectively, all the light in parallel
   (b) convex mirror: they diverge out
   (c) concave mirror: they focus in
2. deflection of light entering water
   (a) moving from any material to any other material will change direction of light
   (b) *total internal reflection*
      i. determined by *index of refraction* and Snell's law:
      $$n_1 \sin(\theta_1) = n_2 \sin(\theta_2) \tag{1}$$
         A. n's are indices of refraction
3. laser light bending with water: principle behind the use of *fiberoptics*
   (a) Hits interface at an angle such that it can't escape.
   (b) if you never get any component that goes out, you always reflect everything on the inside.
   (c) ask about this!
4. Air's index of refraction changes with temperature
   (a) example: hot air rising from the ground makes objects seem to "flip"
5. bottle of water
   (a) water's full of beads, but, when together in jar, they look like water. Why?
      i. because they have the *same index of refraction as water*!

2 Quantitative

1. Index of refraction:
   $$n = \frac{c}{v} \tag{2}$$
   (a) $n_{air} = 1$
   (b) $n > 1$ (all others)
   (c) $v \leq c$
      i. $v =$ speed of light in material
2. wavelength in material
   $$\lambda_n = \frac{\lambda}{n} = \frac{\lambda}{\frac{c}{v}} = \frac{v}{c}\lambda \tag{3}$$
3. angle of incidence measured from source to *vertical*
4. angle of deflection is measured from opposite vertical (i.e. same axis)
   (a) add pic later!
5. flat mirror gives perfect reflection:
   $$\theta_1 = \theta_2 \tag{4}$$

3 Homework

Read Moodle

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