

Physics 422 - Spring 2013 - Assignment #9, Due April 8th

1. (*Hecht, 5.30*) Write an expression for the focal length (f_w) of a thin lens immersed in water ($n_w = 4/3$) in terms of its focal length when in air (f_a).

2. (*Hecht, 5.25*) A candle that is 6.00 cm tall is standing 10 cm from a thin concave lens whose focal length is -30 cm. Determine the location of the image and describe it in detail. Draw an appropriate ray diagram. Use a ruler!

3. (*Hecht, 5.8*) Locate the image of an object placed 1.2 m from the vertex of a gypsy's crystal ball, which has a 20 cm diameter and $n = 1.5$. Make a sketch of the rays.

4. Starting from the Gaussian lens formula,

$$\frac{1}{s_o} + \frac{1}{s_i} = \frac{1}{f}$$

derive the Newtonian form of the lens formula:

$$x_o x_i = f^2$$

where the variables are indicated on the following diagram:

