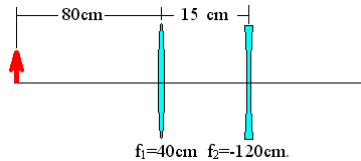


# Physics II

## Lenses

Lens and mirror equations: 
$$\frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i} \quad m = \frac{h_i}{h_o} = -\frac{d_i}{d_o}$$

**Problem 1.-** A convergent lens of focal length  $f_1=40\text{cm}$  is placed 15 cm in front of a divergent lens of focal length  $f_2=-120\text{cm}$ . Calculate the final position of the image generated by this combination if the object is 80cm to the left of the convergent lens.



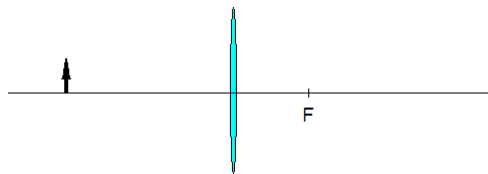
**Problem 2.-** Alice is nearsighted with a far point of 25cm (she cannot see clearly beyond this point). What kind of glasses and of what power does she need to see distant objects clearly? [Neglect eye-lens distance in this problem].

**Problem 3.-** A nearsighted person has the far point at 0.66m (only objects closer than 66cm in front of the eye are seen clearly). Calculate the focal length of a corrective lens that will put the image of a very distant object ( $d_o=\infty$ ) at the far point. Ignore the distance eye-lens.

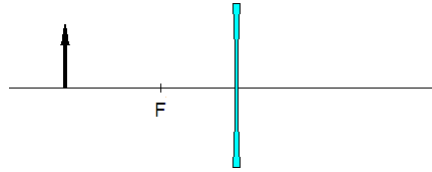
**Problem 4.-** We buy a magnifying glass that has a power of 2.5 diopters. If we place an object 30.0 cm away from the lens, where is the image formed (find  $d_i$ ) and what kind of image is it (real, virtual, upright, inverted)?

**Problem 4a.-** We buy glasses that have a power of -1.5 diopters. If we use these lenses to observe an object that is 30.0 m away, where is the image formed and what kind of image is it (real, virtual, upright, inverted)?

**Problem 5.-** In the following example of a converging lens find the image graphically and describe it (larger or smaller, virtual, or real, upright or inverted).



**Problem 5a.-** In the following example of a diverging lens find the image graphically and measure the magnification “m”.



**Problem 6.-** What is the position ( $d_i$ ) and size ( $h_i$ ) of the image of a 10-cm-high pencil located 1.2m from a lens with focal length  $f = +5\text{cm}$ ?

**Problem 7.-** What kind of lenses would you prescribe to a farsighted person, convergent or divergent? Why?

**Problem 7a.-** A farsighted person has the near point at 45cm, what power of reading glasses would you prescribe so the person could read a book at 25 cm from his eye. Neglect the distance eye-lens.