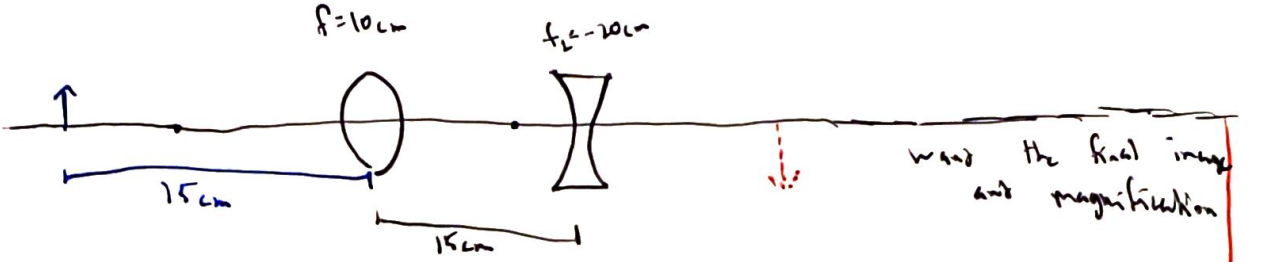
Example $\frac{1}{s} + \frac{1}{s'} = \frac{1}{f}$ ## Week 2 pt. 2 ##



$s_1 = 15\,cm \quad f_1 = 10\,cm$

$\frac{1}{s_1'} = \frac{1}{f_1} - \frac{1}{s_1} = \frac{1}{10} - \frac{1}{15} = \frac{1}{30} \Rightarrow s_1' = 30\,cm \qquad m = -\frac{s_1'}{s_1} = -2$

Lens 2: $s_2 = -15\,cm \quad f_2 = -20\,cm$

$\frac{1}{s_2'} = \frac{1}{f_2} - \frac{1}{s_2} = -\frac{1}{20} + \frac{1}{15} = -\frac{3}{60} + \frac{4}{60} = \frac{1}{60}$

$\Rightarrow s_2' = 60\,cm$

$m_2 = -\frac{s_2'}{s_2} = -\frac{60}{-15} = 4$

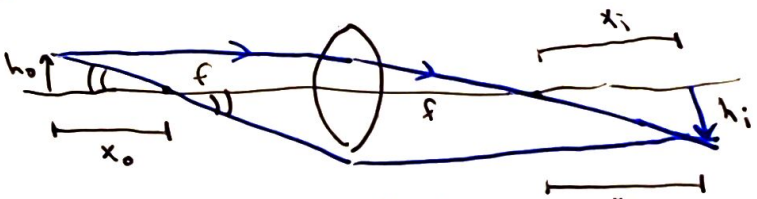
overall magnification: $m_1 \cdot m_2 = (-2)4 = -8$

Newton equation for thin lens:

$\frac{h_o}{x_o} = \frac{h_i}{f}$

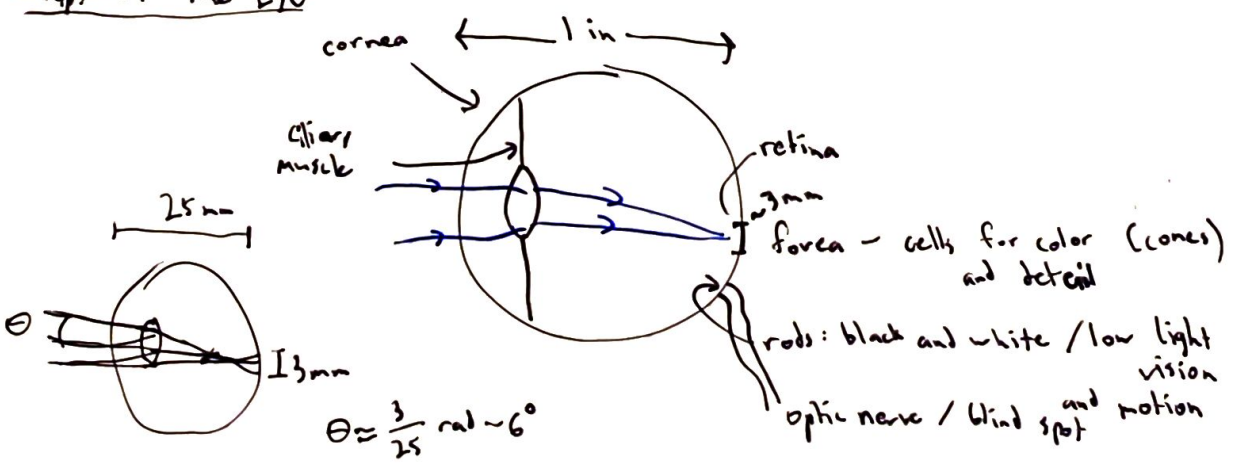
$\frac{h_o}{h_i} = \frac{x_o}{f}$

so $\frac{x_o}{f} = \frac{f}{x_i} \Rightarrow x_o x_i = f^2$



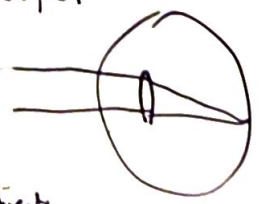
$\frac{h_i}{x_i} = \frac{h_o}{f} \qquad \frac{h_o}{h_i} = \frac{f}{x_i}$

Chapter 19: The Eye



By changing lens thickness you can change the focal length

far objects



close objects