1. Objective - very short focal length positive lens.
   Eyepiece - Converging lens, helps focus light in the eye.

2. Both lenses (lens systems) are converging.

3. A real image is formed on the retina.

4. $h_o = 1cm \quad d_o = 2.5cm \quad f = 2cm$

1st lens - objective

$$d_i = \left(\frac{1}{f} - \frac{1}{d_o}\right)^{-1} = \left(\frac{1}{2cm} - \frac{1}{2.5cm}\right)^{-1}$$

$$d_i = 10cm$$

$$\frac{-d_i}{d_o} = \frac{h_i}{h_o} \qquad h_i = \frac{-d_i}{d_o} h_o = -\left(\frac{10cm}{2.5cm}\right)(1cm)$$

$$h_i = -4cm$$

2nd lens - Eye Piece $\qquad h_o = -4cm$

$f = 2.3cm \qquad d_o = 12cm - 10cm = 2cm$

$d_i = ? \qquad d_o = \left(\frac{1}{f} - \frac{1}{d_o}\right)^{-1} = \left(\frac{1}{2.3cm} - \frac{1}{2cm}\right)^{-1}$

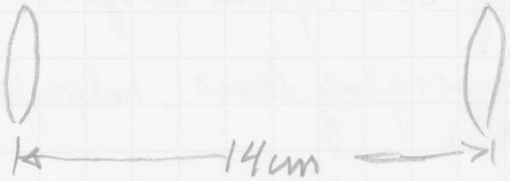
$$d_i = -15.33cm$$

$$h_i = \frac{-d_i}{d_o}(h_o) = -\left(\frac{-15.33cm}{2cm}\right)(-4cm)$$

$$h_i = -30.7cm$$

The image on the retina is inverted and about 30 x the original size.

5. $f_1 = 1.5\,cm$ $f_2 = 2\,cm$ $h_{o1} = 0.1\,cm$ $d_{o1} = 1.7\,cm$



a) $$d_i = \left(\frac{1}{f_1} - \frac{1}{d_{o1}}\right)^{-1} = \left(\frac{1}{1.5\,cm} - \frac{1}{1.7\,cm}\right)^{-1}$$

$$d_{i1} = 12.75\,cm$$

b) Real inverted, smaller $h_{i1} = -\frac{d_{i1}}{d_{o1}} h_{o1} = -\left(\frac{12.75\,cm}{1.7\,cm}\right)(0.1\,cm) = 0.75\,cm$

c) $d_{o2} = 14\,cm - 12.75\,cm = 1.25\,cm$ $h_{o2} = h_{i1}$

$$d_{i2} = \left(\frac{1}{f_2} - \frac{1}{d_{o2}}\right)^{-1} = \left(\frac{1}{2\,cm} - \frac{1}{1.25\,cm}\right)^{-1}$$

$$d_{i2} = -3.\overline{3}\,cm$$

d) Virtual Inverted Larger (20x) $h_{i2} = -\frac{d_{i2}}{d_{o2}}(h_{o2}) = -\left(\frac{-3.\overline{3}\,cm}{1.25\,cm}\right)(-0.75\,cm)$

$$h_{i2} = -2.0\,cm$$

e) 2.0 cm

f) $M = \frac{h_i}{h_o} = \frac{-2.0\,cm}{0.1\,cm}$ $M = -20$

g) Inverted