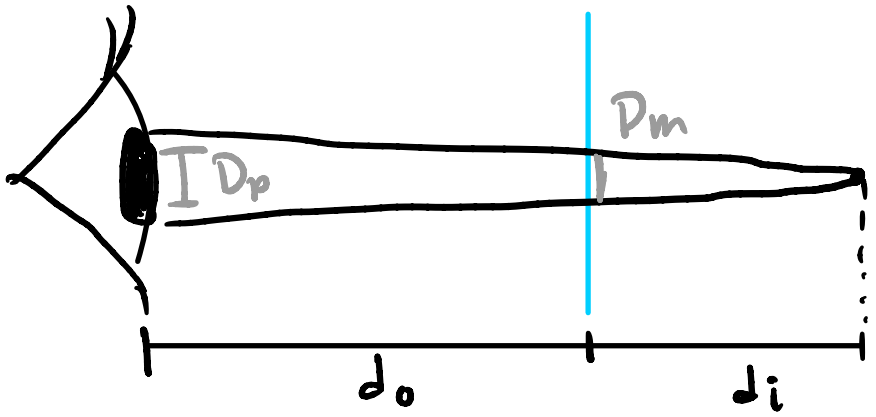
Ch. 32 – 6

6. (II) Suppose you are 88 cm from a plane mirror. What area of the mirror is used to reflect the rays entering one eye from a point on the tip of your nose if your pupil diameter is 4.5 mm?

Ch. 32 – 6



$d_o = d_i$

$$\frac{D_{mirror}}{d_i} = \frac{D_{pupil}}{d_o + d_i} \qquad D_{mirror} = D_{pupil}\ \frac{d_i}{d_o + d_i} = \frac{1}{2} D_{pupil}$$

$$A_{mirror} = \left(\tfrac{1}{2}\tfrac{1}{2} D_{pupil}\right)^2 \pi = \left(\tfrac{1}{4} D_{pupil}\right)^2 \pi = \frac{1}{16} \pi D_p^2 = \frac{\pi}{16} (4.5 \times 10^{-3} m)^2$$

$$= 4.0 \times 10^{-6}\ m^2$$