2.9: Derivation of Magnification

Figure II.14 shows an optical element separating media of indices n_1 and n_2. I have drawn the element as an interface, though it could equally well be a lens (or, if I were to fold the drawing, a mirror). An image of height h' is formed at a distance q of an object of height h at a distance p.

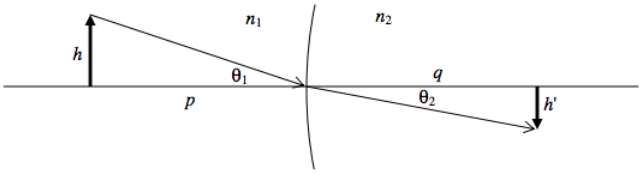

FIGURE II.14

Assuming, as ever, that angles are small, we have

$$\text{magnification} = \frac{\theta_2 q}{\theta_1 p}. \tag{2.9.1}$$

But Snell's law, for small angles, is $n_1\theta_1 = n_2\theta_2$, and therefore

$$\text{magnification} = \frac{n_1 q}{n_2 p} = \frac{C_1}{C_2}. \tag{2.9.2}$$