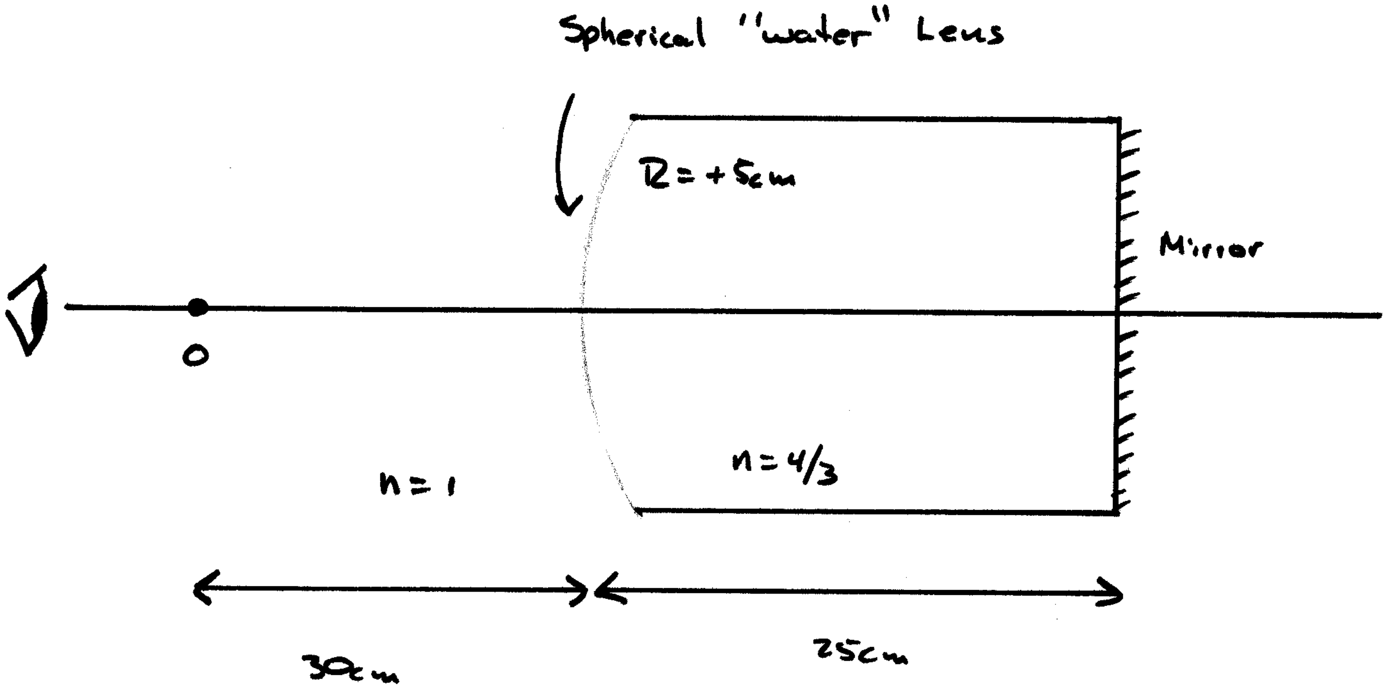
3-15



(a) $\frac{n_1}{s} + \frac{n_2}{s'} = \frac{n_2 - n_1}{R}$

$\frac{1}{30} + \frac{\frac{4}{3}}{s'} = \frac{\frac{4}{3} - 1}{5}$

$\therefore s' = +40cm$ $m = -\frac{n_1 s'}{n_2 s} = -1$

Image is: virtual, inverted, twice the size of the object located 15cm to the right of the spherical window.

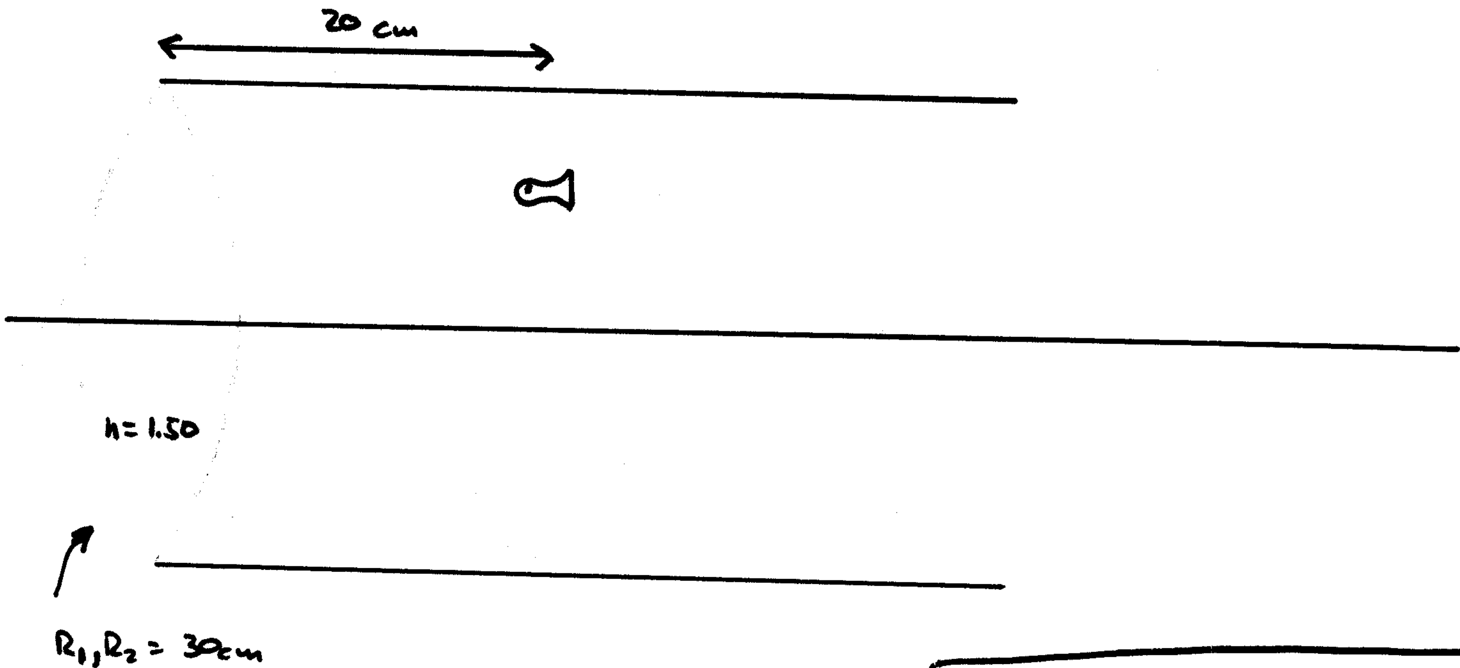
(b) $s = \underline{\underline{-15cm}}$ (a virtual object for the mirror!) Right of the mirror

$s' = -s = +15cm$, $m = +1$

(c) $\frac{\frac{4}{3}}{10} + \frac{1}{s'} = \frac{1 - \frac{4}{3}}{-5}$ $\therefore s' = -15cm$, $m = +2$

$M = m_1 m_2 m_3 = -2$

3.18



$\boxed{\text{Image is virtual, upright 1.5 times the height of the object, 22.6 cm right of the lens.}}$

(a) $$\frac{n_1}{s} + \frac{n_2}{s'} = \frac{n_2 - n_1}{R}$$

$$\frac{\frac{4}{3}}{20} + \frac{1.50}{s'} = \frac{1.50 - \frac{4}{3}}{30\text{cm}}$$

$\therefore\ s' = -24.6$ cm

$$m_1 = \frac{-n_1 s'}{n_2 s} = +1.1$$

(b) $$\frac{1.50}{24.6} + \frac{1}{s'} = \frac{1 - 1.50}{-30\text{cm}}$$

$\therefore\ s' = -22.6$cm

$$m_2 = \frac{-n_1 s'}{n_2 s} = +1.4$$

$M_T = +1.50$

One could <u>also</u> solve this problem by treating this like a thin lens.