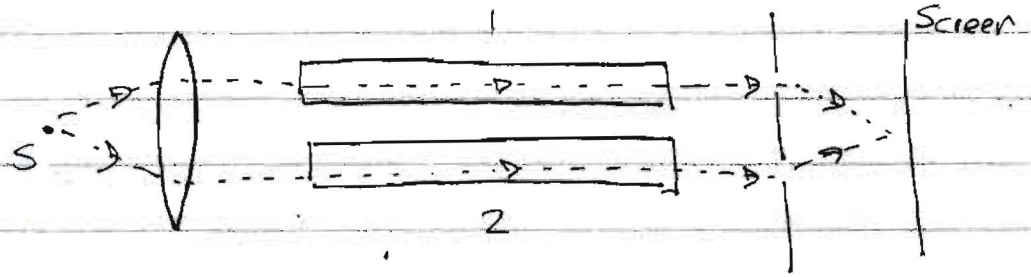
5.77)



$\lambda = 589\,nm$ $\quad n = 1.000277$

$\ell = 10.0\,cm$ $\quad N = 17$

$$|\varphi_2 - \varphi_1| = 2\pi N \qquad n_1 = \frac{\lambda}{\lambda_1} \qquad n_2 = \frac{\lambda}{\lambda_2}$$

$$2\pi \frac{\ell}{\lambda_1} = \varphi_1 \qquad \frac{2\pi\ell}{\lambda_2} = \varphi_2$$

$$\frac{2\pi\ell}{\lambda} |n_2 - n_1| = 2\pi N$$

$$n_2 = \frac{\lambda}{\ell} N + n_1$$

$$n_{ammonia} = \frac{\lambda}{\ell} N + n_{air}$$

$$\simeq 6000(17)\times 10^{-9} + 1.000277$$

$$\simeq 1.02 \times 10^{-4} + 1.000277$$

$$\simeq 1.000272 + 0.000102$$

$$\boxed{n_{ammonia} \simeq 1.000379}$$

5.81)

why $\sqrt{n}$? $n' = \sqrt{n}$

from $2d\sqrt{n^2 - \sin^2\theta_i} = \frac{1}{2}(2k+1)\lambda$

$\theta_i = 0°$ (normal reflector)

$$d = \frac{1}{4}\frac{(2k+1)}{\sqrt{n^2}}\lambda = \frac{\lambda}{4}\frac{(2k+1)}{\sqrt{n}}$$

↑ n'!