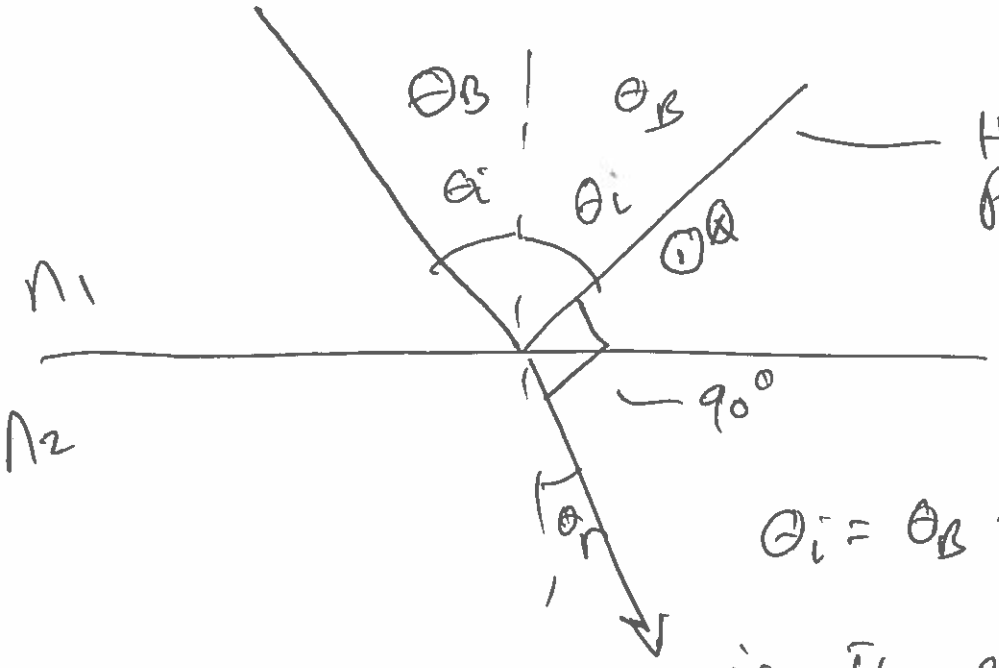


$\theta_i = \theta_B$ = Brewster's Angle is the angle of incidence where the reflected light is horizontally polarized and the angle between reflected light and refracted light = 90°.

Snell's Law

$$n_1 \sin\theta_B = n_2 \sin\theta_r$$

$$\theta_r = 90 - \theta_B$$

$$n_1 \sin\theta_B = n_2 \sin(90 - \theta_B)$$

$$n_1 \sin\theta_B = n_2 \cos\theta_B$$

$$\frac{\sin\theta_B}{\cos\theta_B} = \boxed{\tan\theta_B = \frac{n_2}{n_1}}$$

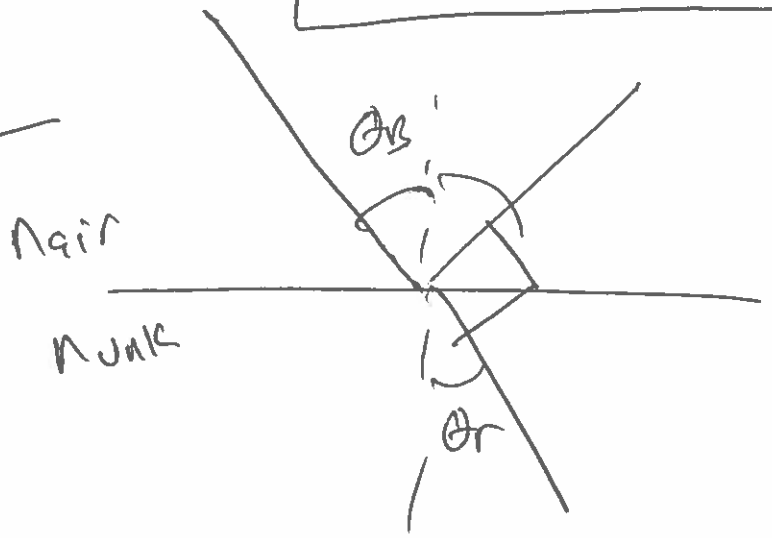
What is Brewster's Angle for water

$$\tan\theta_B = \frac{n_w}{n_{air}} = \frac{1.333}{1.000}$$

$$\theta_B = \tan^{-1}(1.333) = 53.1^\circ$$

53.1° = Brewster's Angle for water

26-42



$\theta_B + \theta_r = 90^\circ$

$$\tan\theta_B = \frac{n_{unk}}{n_{air}}$$

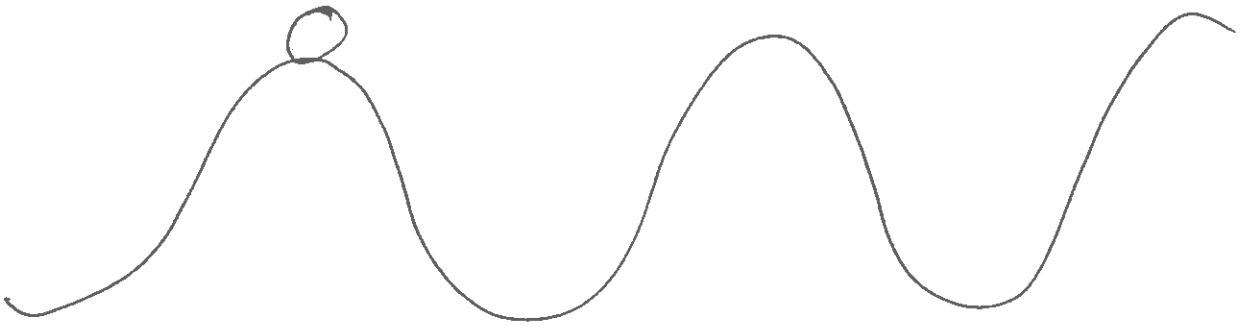
$$n_{unk} = n_{air}\tan\theta_B = (1.00)\tan(90-33.7^\circ)$$

$$n_{unk} = \tan(56.3^\circ) = 1.499$$

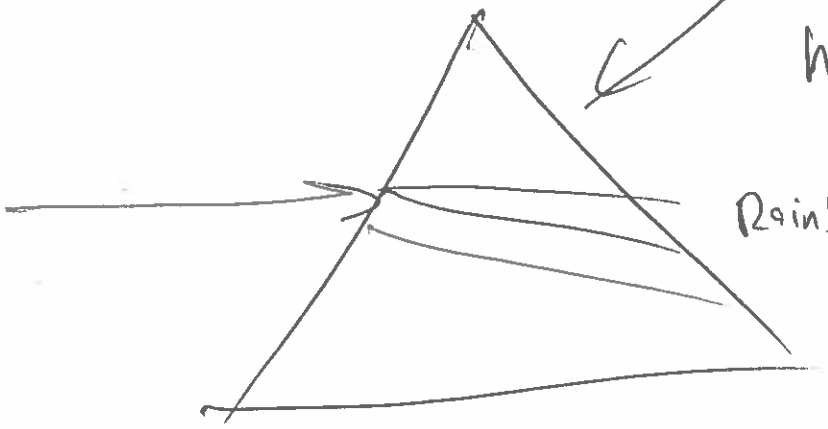
Dispersion?

Dispersion is when waves behave slightly different because of different wavelengths or frequencies.

water waves



Prism



different wavelengths have different indices of refraction n

⇒ different speeds

⇒ bend differently

Chromatic Abberation of lenses

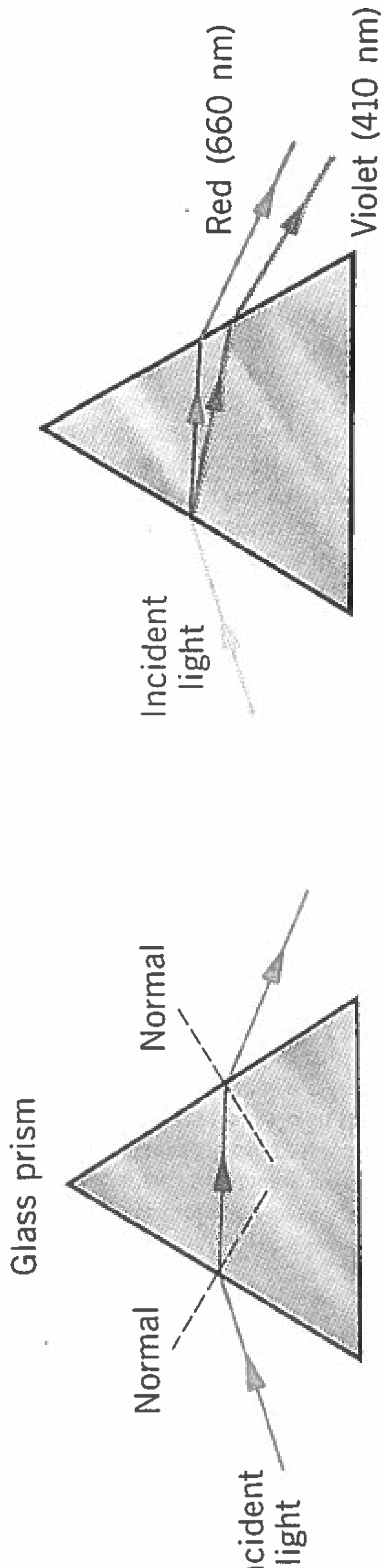


FIGURE 26.13 a, b

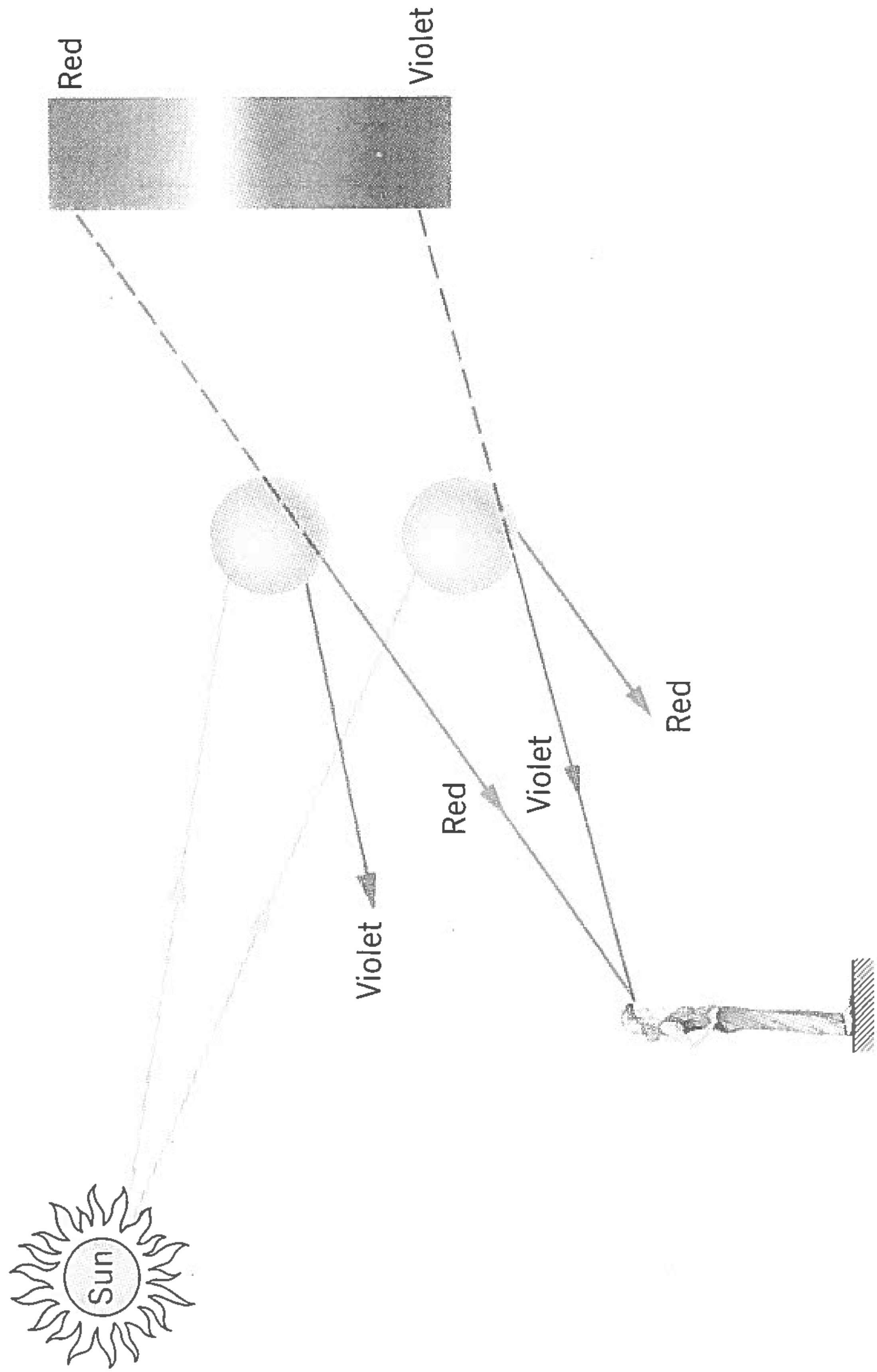
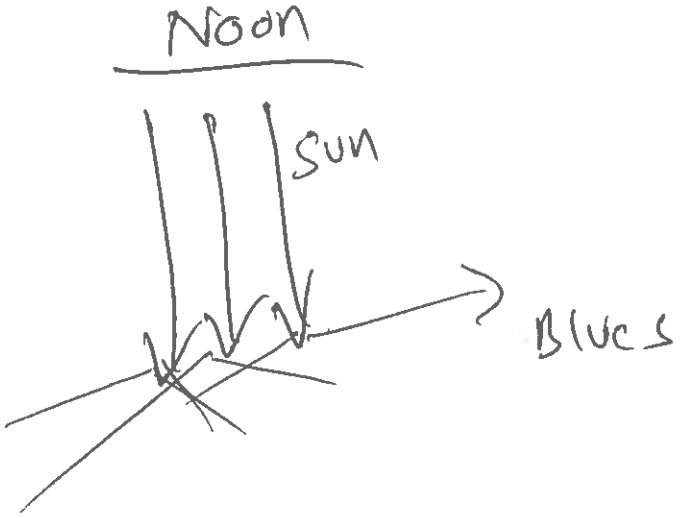
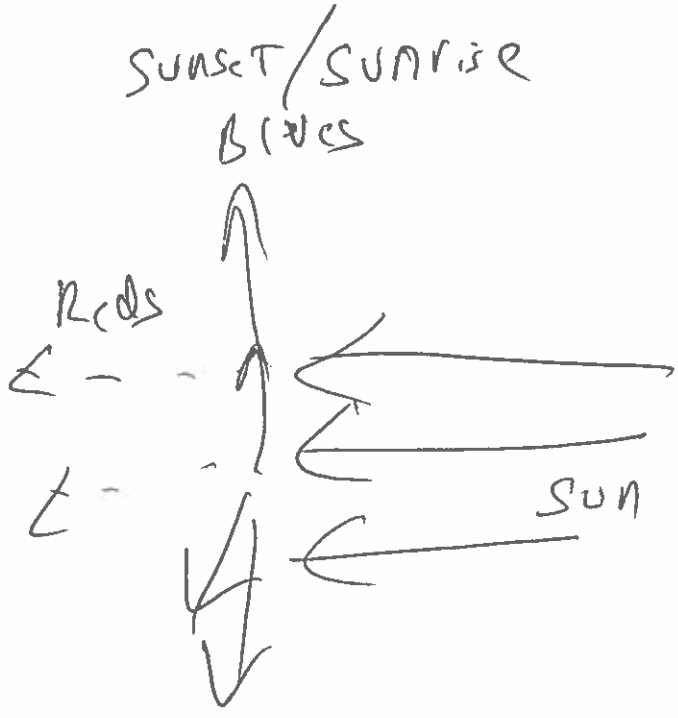


FIGURE 26.15

Why is The Sky Blue?

Rayleigh Scattering $\Rightarrow$ Shorter wavelengths are bent or scatter more than longer wavelengths.

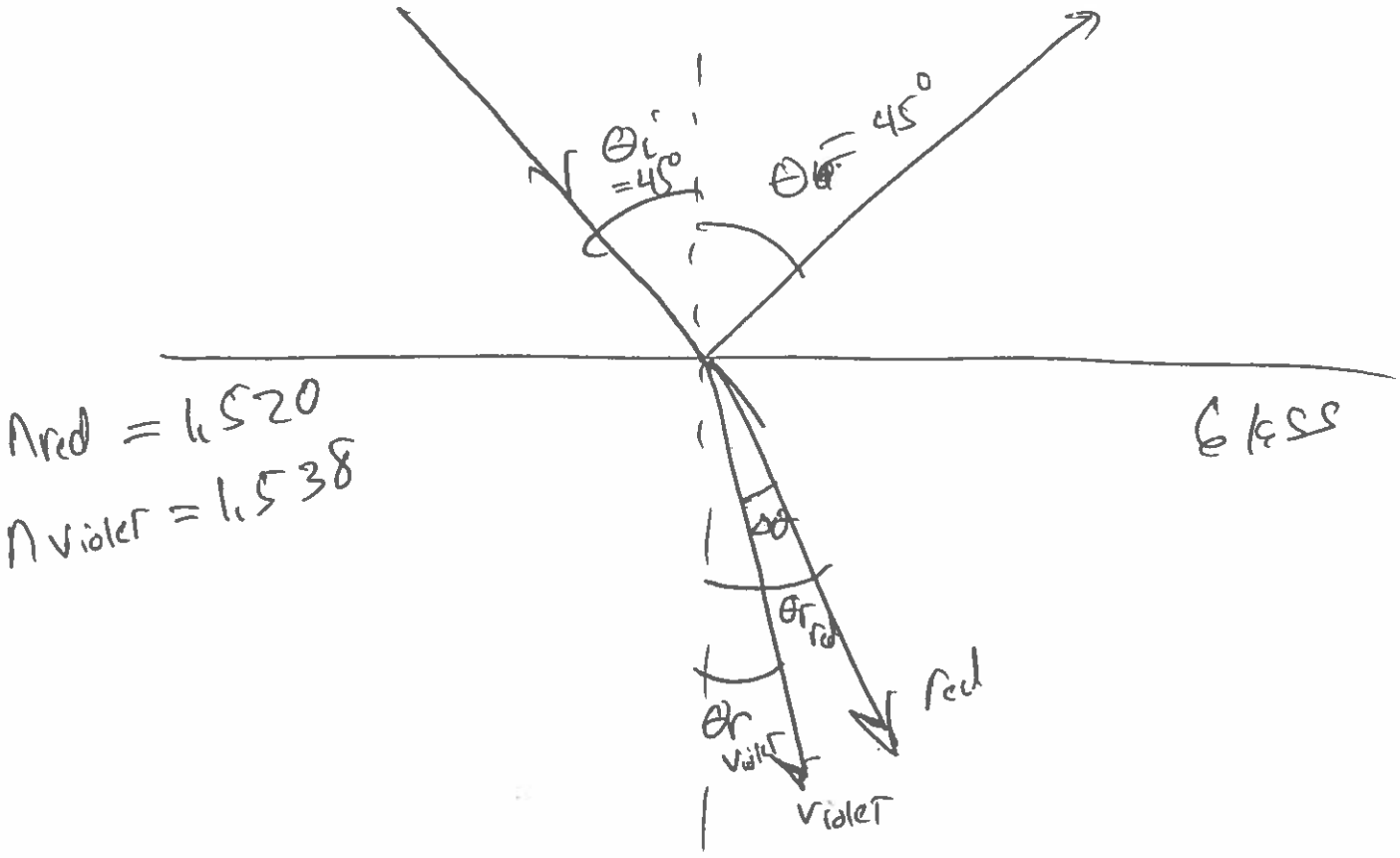




26-45

$\theta_i = 45.00^\circ$ Table 26.2 for n's

find θ between violet and red ray in Glass.



$n_{red} = 1.520$

$n_{violet} = 1.538$

$$\Delta\theta = \theta_{r_{red}} - \theta_{r_{violet}}$$

use Snell's Law

$$n_{air} \sin\theta_i = n_{red} \sin\theta_{red}$$

$$\sin\theta_{red} = \frac{n_{air}}{n_{red}} \sin\theta_i$$

$$\sin\theta_{red} = \frac{1.00}{1.520}\sin 45^\circ$$

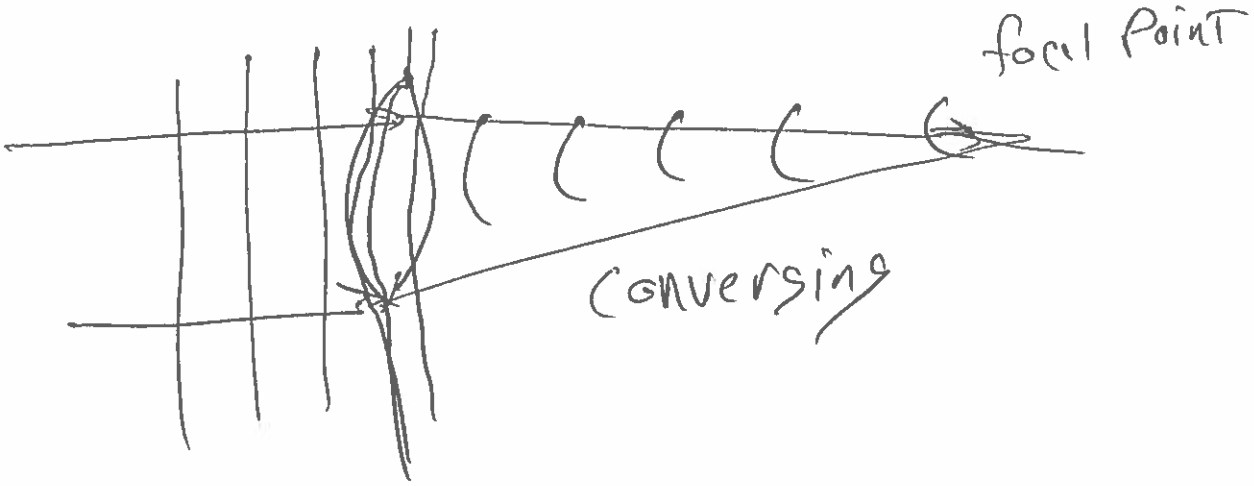
$$\theta_{red} = \sin^{-1}\left(\frac{1}{1.520}\sin 45^\circ\right) = 27.72^\circ$$

$$\theta_{violet} = \sin^{-1}\left(\frac{1}{1.538}\sin 45^\circ\right) = 27.37^\circ$$

$$\Delta\theta = \theta_{red} - \theta_{violet} = 27.72^\circ - 27.37^\circ$$

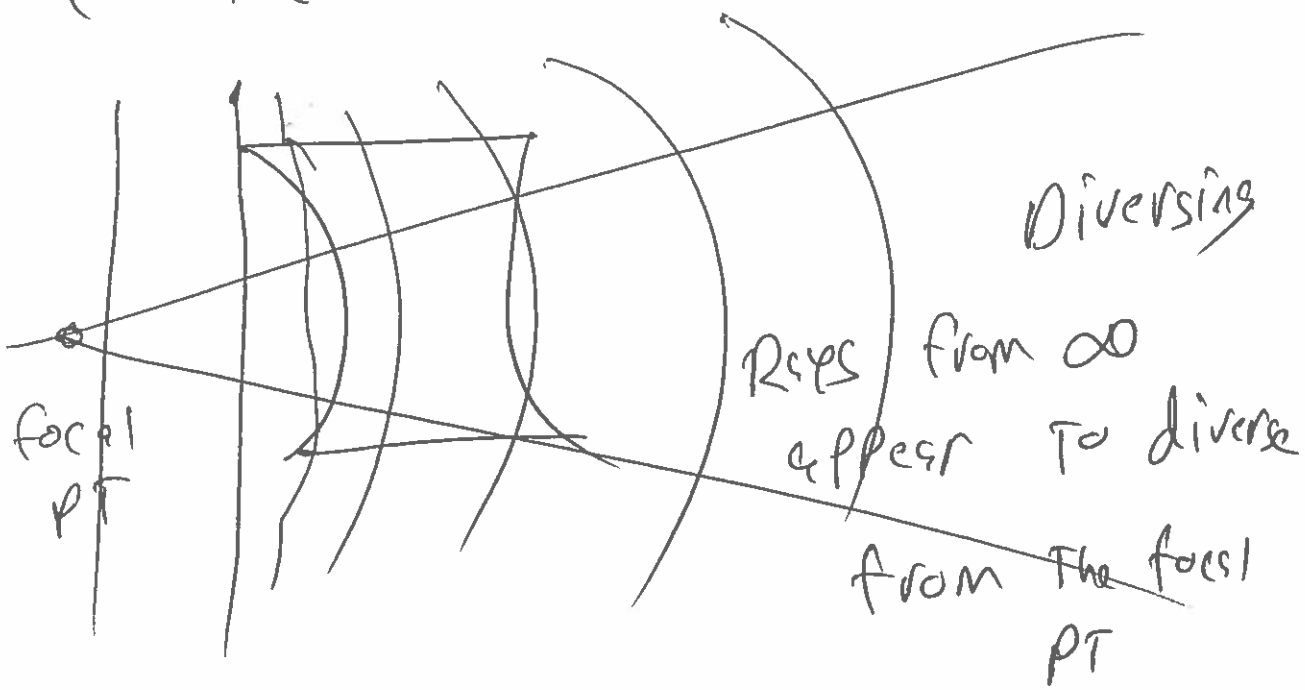
$$\boxed{\Delta\theta = 0.35^\circ}$$

lens are optical elements that bend light



Converging lenses are typically wider in the middle than on the ends

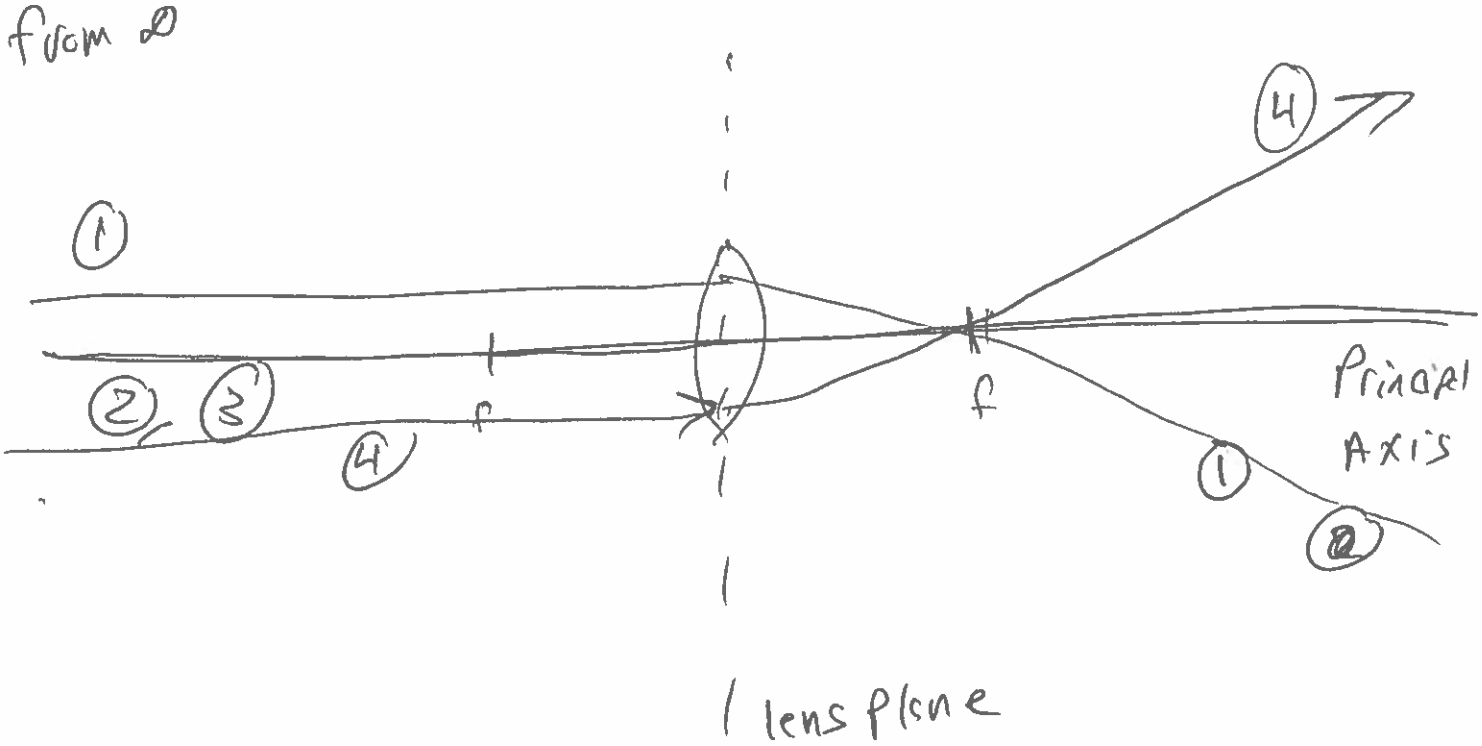
Light rays from ∞ converge at a focal pt.



Diverging lenses are typically Thicker on ends Then in the middle.

Light rays from ∞ appear to diverge from the focal pt,

Ray Diagrams



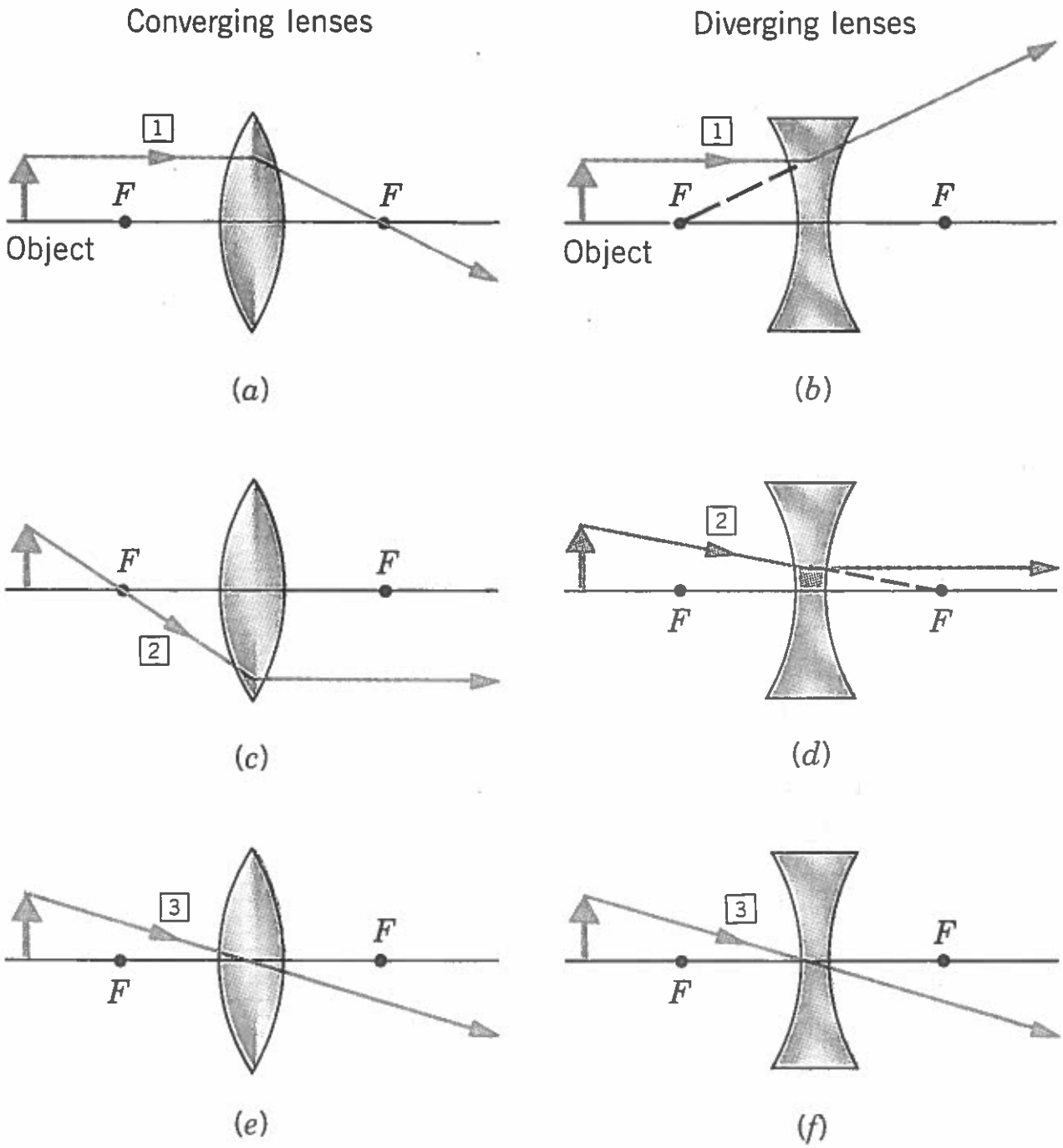


FIGURE 26.19 a, b, c, d, e, f

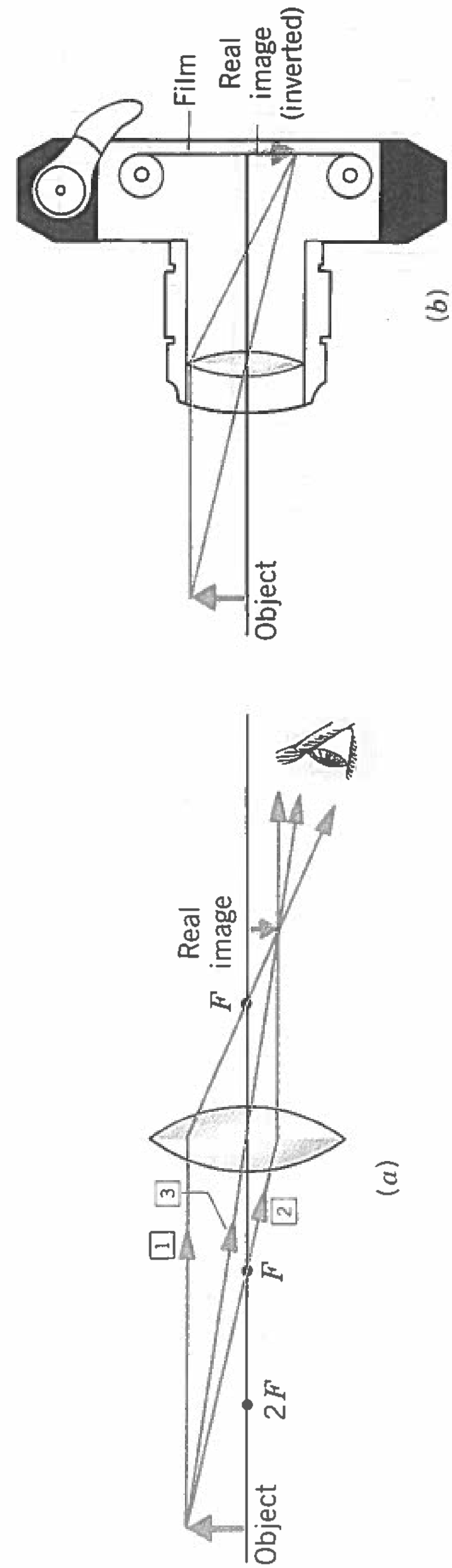
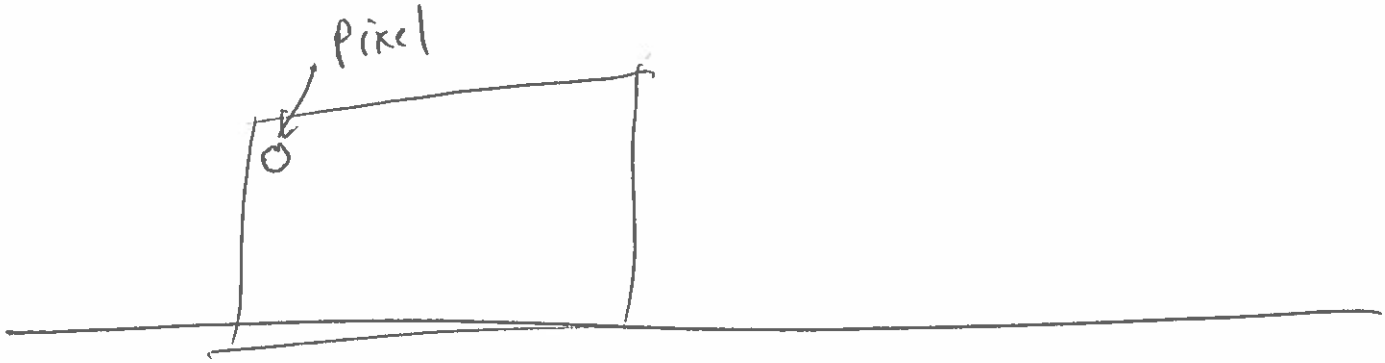


FIGURE 26.20 a, b

CCD - Charge Coupled Device



Pixels collect free charge based on intensity of light.

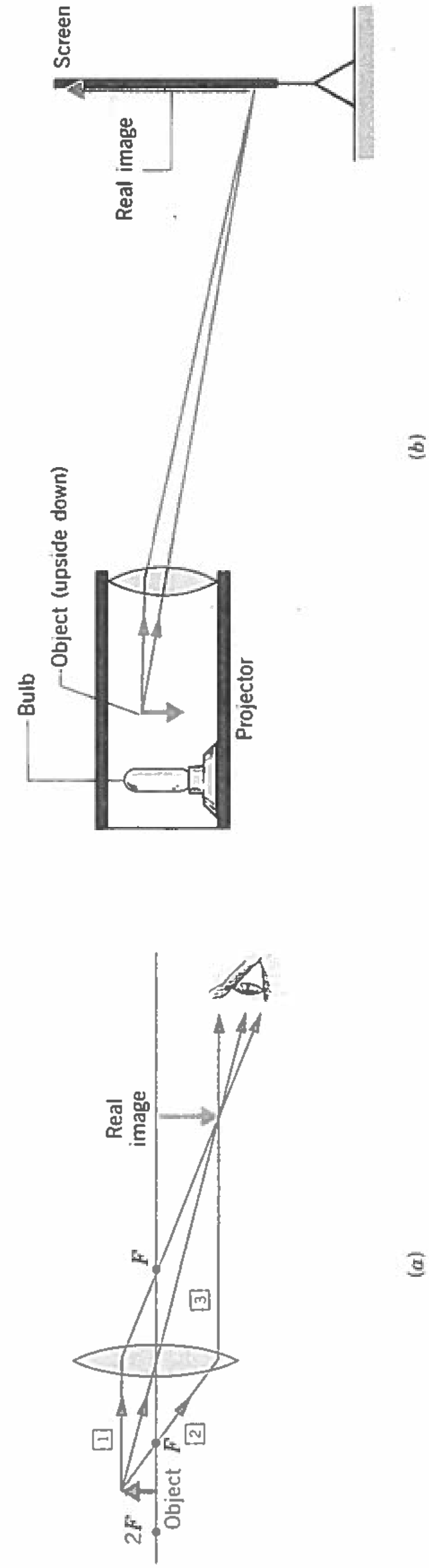


FIGURE 26.21 a, b