

41. (a) In this case $m > +1$ and we know we are dealing with a converging lens (producing a virtual image), so that our result for focal length should be positive. Since $|p + i| = 20$ cm and $i = -2p$, we find $p = 20$ cm and $i = -40$ cm. Substituting these into Eq. 35-9,

$$\frac{1}{p} + \frac{1}{i} = \frac{1}{f}$$

leads to $f = +40$ cm, which is positive as we expected.

- (b) In this case $0 < m < 1$ and we know we are dealing with a diverging lens (producing a virtual image), so that our result for focal length should be negative. Since $|p + i| = 20$ cm and $i = -p/2$, we find $p = 40$ cm and $i = -20$ cm. Substituting these into Eq. 35-9 leads to $f = -40$ cm, which is negative as we expected.