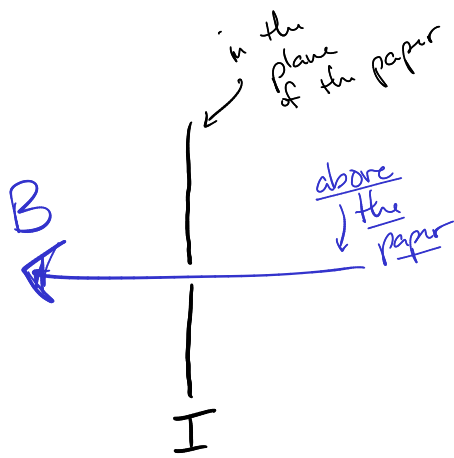
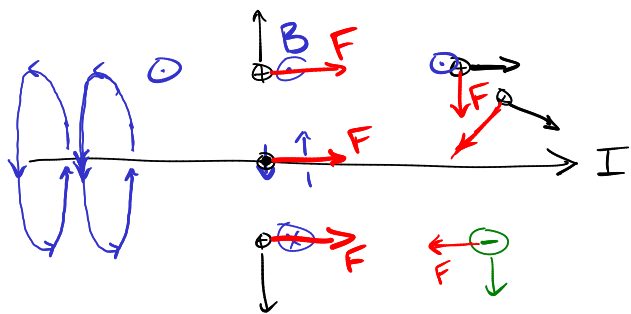


Week 9



Week 10

* 9



$$F = qvB \sin \theta$$

- or -

$$F = I\ell B \sin \theta$$

Week 12

$$|m| > 1 \text{ enlarged}$$

$$|m| < 1 \text{ diminished}$$

$$m > +1 \text{ enlarged and upright}$$

$$m < -1 \text{ enlarged and inverted}$$

image distance \rightarrow

$$q > 0 \text{ real image}$$

$$q < 0 \text{ virtual image}$$

diverging lens \rightarrow virtual, upright, diminished

$$p = 20 \text{ cm}$$

virtual image

$$q = -50 \text{ cm}$$

$$f = ?$$

if $f > 0 \rightarrow$ converging lens

$f < 0 \rightarrow$ diverging

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

$$f = \frac{1}{\frac{1}{20} + \frac{1}{-50}}$$

$$f = +12$$

$$q > 0 \leftarrow \text{inverted}$$

$$p = ?$$

$$h' = 6 \text{ cm}$$

$$h = 3 \text{ cm}$$

$$m = -2 = -\frac{q}{p}$$

\downarrow

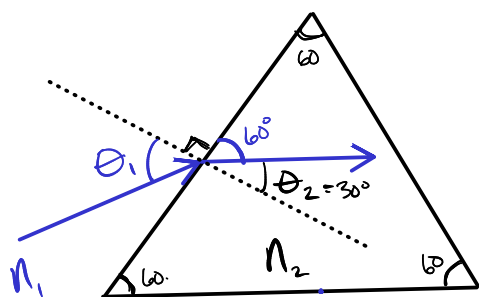
$$q = 2p$$

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

$$\frac{1}{p} + \frac{1}{2p} = \frac{1}{12}$$

solve for p

Week 13

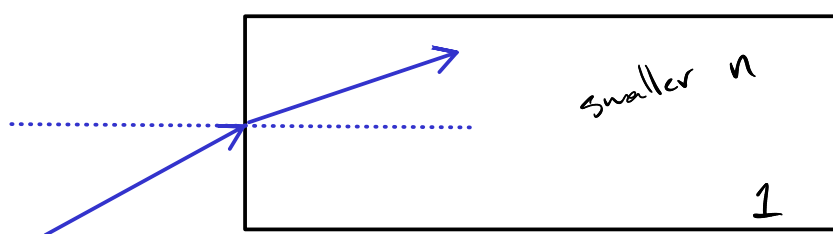


$$n_1 \sin \theta_1 = n_2 \sin \theta_2$$

$$\theta_1 = \sin^{-1} \left(\frac{n_2}{n_1} \sin \theta_2 \right)$$

$$= \sin^{-1} \left(\frac{1.7}{1} \sin 30^\circ \right)$$

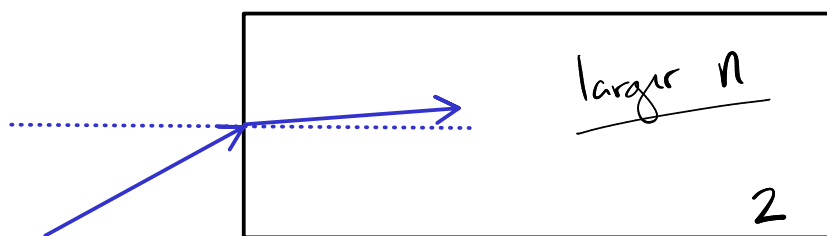
$$= 58.2^\circ$$



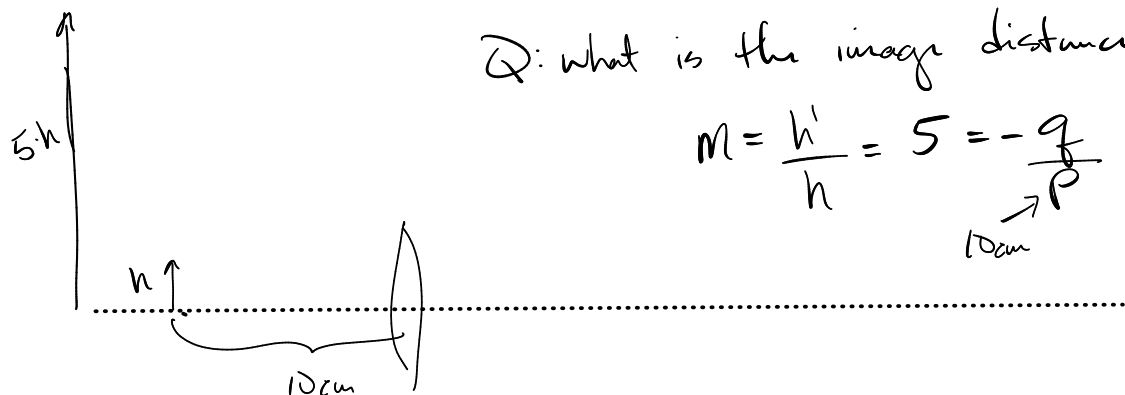
in which material is the speed of light higher?

→ larger v
✓

$$n = \frac{c}{v} \Rightarrow v = \frac{c}{n}$$



→ smaller v



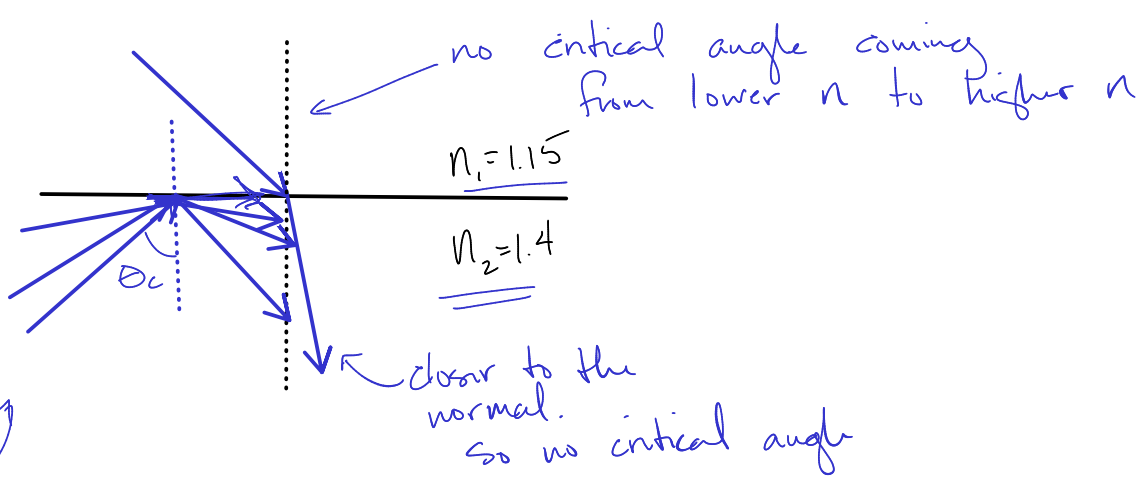
Q: what is the image distance

$$m = \frac{h'}{h} = 5 = -\frac{q}{p}$$

$$\boxed{q = -50 \text{ cm}}$$

better question: what is the focal length?

$$\frac{1}{p} + \frac{1}{q} = \frac{1}{f} \quad f = \frac{1}{\frac{1}{10} + \frac{1}{-50}} = \underline{\underline{12.5 \text{ cm}}}$$



critical angle
from higher to lower:

$$n_1 \sin \theta_1 = n_2 \sin \theta_2$$

$\underbrace{\sin 90^\circ = 1}$
 \uparrow θ_c

$$n_1 = n_2 \sin \theta_c$$

$$\theta_c = \sin^{-1} \left(\frac{n_1}{n_2} \right)$$

\swarrow smaller index

$$\theta_c = \sin^{-1} \left(\frac{1.15}{1.4} \right)$$

$$\theta_c = 55.2^\circ$$

