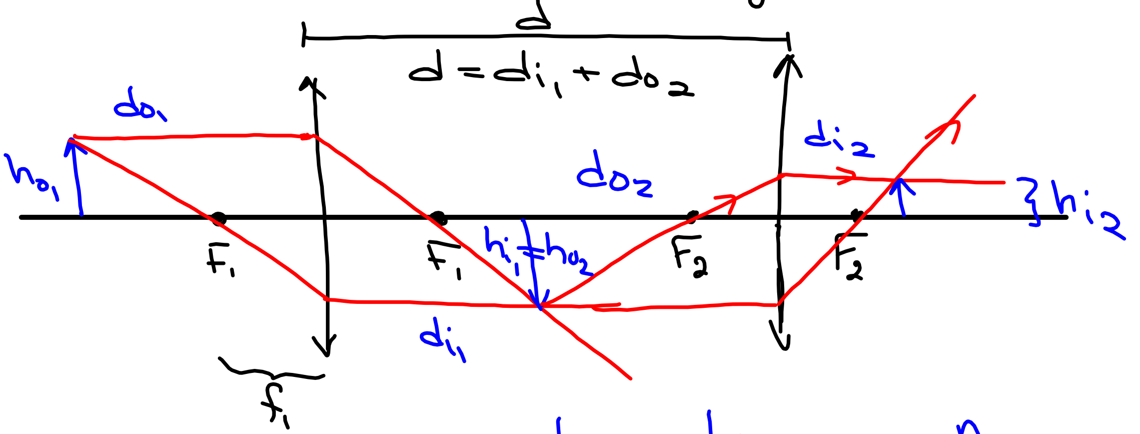
Compound Lenses

Image from 1st lens becomes the object for 2nd lens



$$m_T = \frac{h_{i_f}}{h_{o_i}} = \frac{h_{i_2}}{h_{o_1}} = \prod_{i=1}^{n} m_i$$

$$m_1 = \frac{h_{i_1}}{h_{o_1}}$$

$$m_2 = \frac{h_{i_2}}{h_{o_2}}$$

$$m_1 m_2 = \frac{\cancel{h_{i_1}}}{h_{o_1}} \cdot \frac{h_{i_2}}{\cancel{h_{o_2}}}$$

does $\cancel{m_T = -\frac{d_{i_f}}{d_{o_i}}}$?

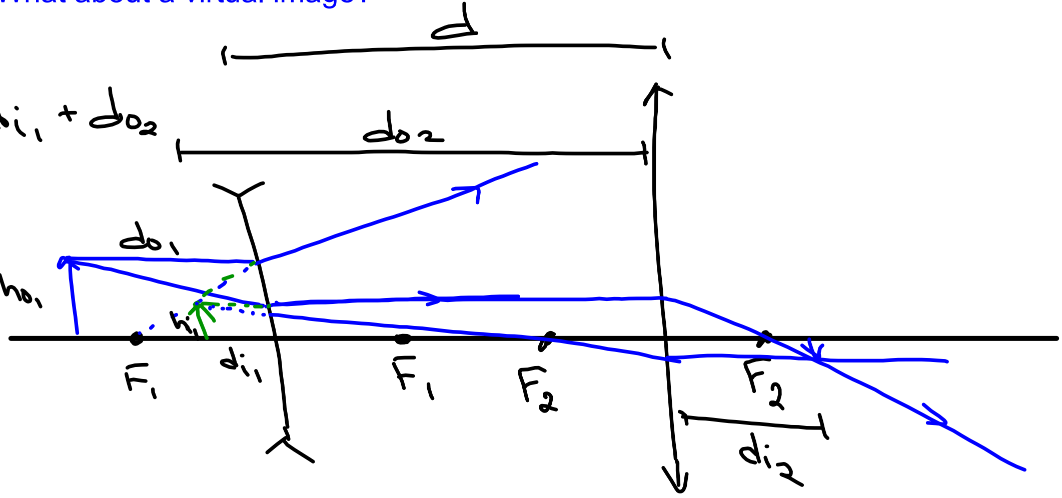
NWB!

$$\sum_{i=1}^{n} x_i = x_1 + x_2 + \dots + x_n$$

$$\prod_{i=1}^{n} x_i = x_1 x_2 x_3 \dots x_n$$

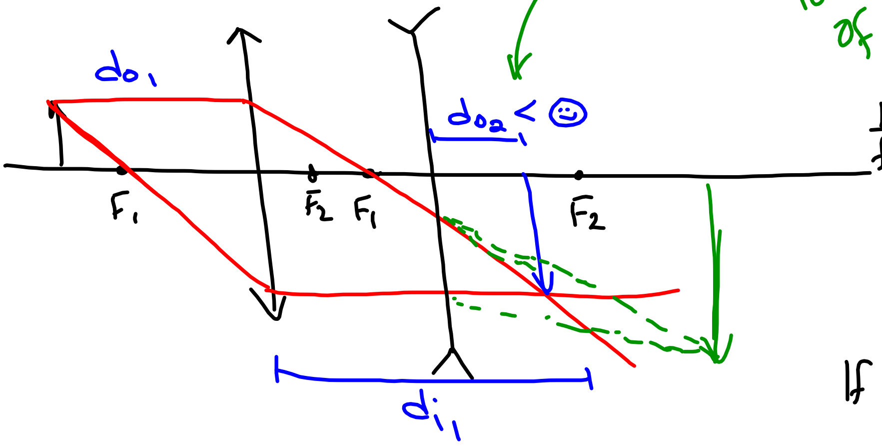
What about a virtual image?

$d = d_{i_1} + d_{o_2}$



So what is a virtual object, anyway?

virtual object never gets opportunity to form because of 2nd lens



$$\frac{1}{f_2} = \frac{1}{d_{o_2}} + \frac{1}{d_{i_2}}$$

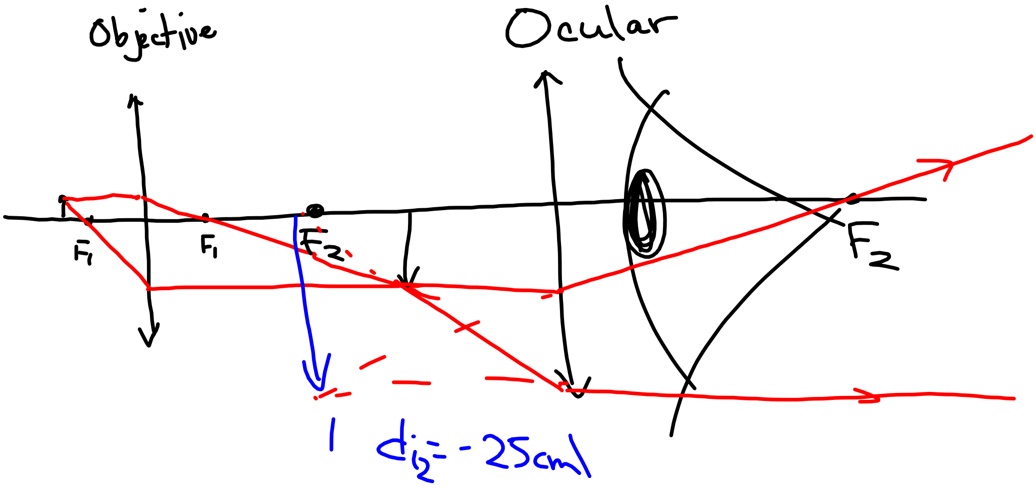
negative

If $f_2 = d_{o_2}$ $\quad d_{i_2} = \infty$

If $|d_{o_2}| < |f|$ real image

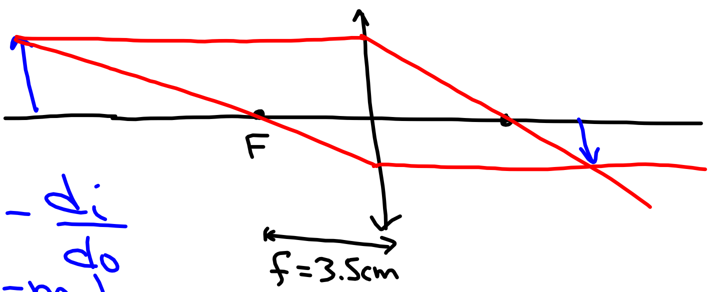
$|d_{o_2}| > |f|$ virt image

Microscope



A single lens problem. . .

Using a 35 mm lens, where would the object and image have to be to produce an image which has a magnification of -0.050 X?



$$m = -\frac{d_i}{d_o}$$

$$d_i = -m d_o$$

$$= 0.050 d_o$$

$$\frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i}$$

$$\frac{1}{3.5} = \frac{1}{d_o} + \frac{1}{0.050 d_o}$$

$$\frac{1}{3.5} = \frac{1}{d_o} + \frac{20}{d_o}$$

$$73.5 = d_o$$

$$d_o = 73.5 cm$$

$$d_i = 0.050 d_o = 3.675 cm$$