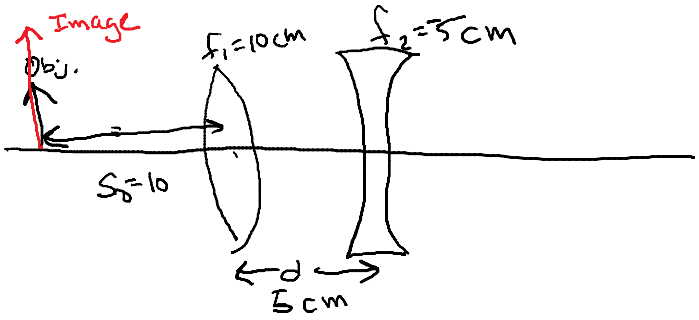
Monday, September 23, 2013
10:30 AM

HW # 3 Solutions

1)



1st lens

$$\frac{1}{10} = \frac{1}{10} + \frac{1}{S_i}$$

$$S_i = \infty$$

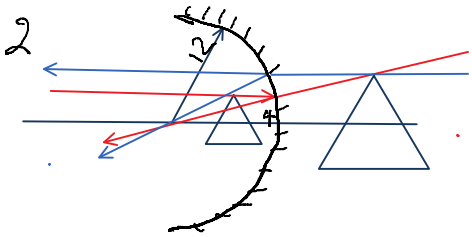
2nd lens

$$\frac{1}{-15} = \frac{1}{S_i} + \frac{1}{\infty}$$

$S_i = -15$ cm

$M = \frac{-15}{10} = \frac{3}{2}$ erect virtual

2



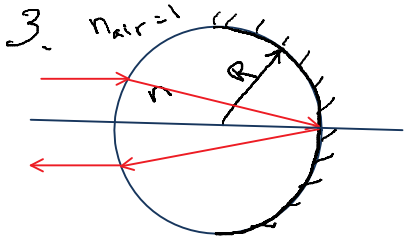
$$\frac{1}{S_o} + \frac{1}{S_i} = \frac{2}{R}$$

$$\frac{1}{4} + \frac{1}{S_i} = \frac{2}{12}$$

$$\frac{1}{S_i} = \frac{2}{12} - \frac{3}{12} = \frac{-1}{12}$$

$S_i = -12$ $\quad M = -\frac{-12}{4} = +3$

3.



Front surface

$$\frac{1}{S_o} + \frac{n}{S_i} = \frac{n-1}{R}$$

$S_o = \infty$ $\quad \frac{n}{S_i} = \frac{n-1}{R}$

$S_i = \frac{nR}{n-1} = f$

want $f = 2R$ so light focuses at back sphere

$$\frac{nR}{n-1} = 2R$$

$$n = 2n - 2$$

$n = 2$ It is independent of R