 Phys 1402 2014-12-02

Last Class!
Exam Thu 12/4 11am-1:30 pm

Corrective Lenses
p = actual object dist
$|q|$ = desired viewing dist

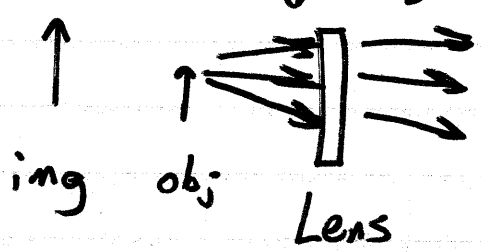
$q = -|q|$: Virtual image

Ex: near point = 59.8 cm $q = -59.8$ cm

Actual obj @ 24 cm $p = 24$ cm

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

Is f ⊕ or ⊖ ?



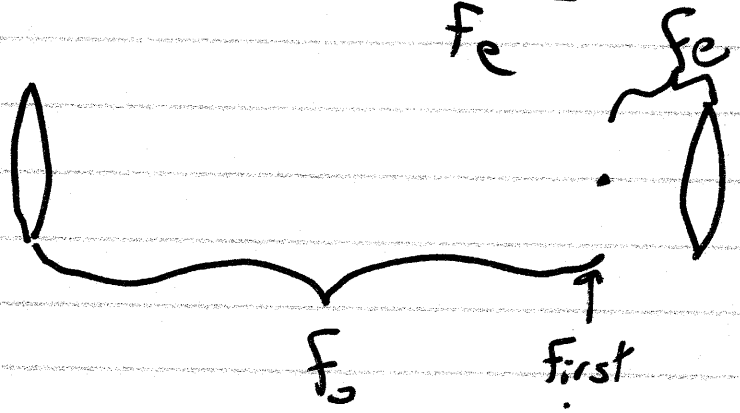
Lens makes rays less diverging = converging Lens

(2)

Telescope

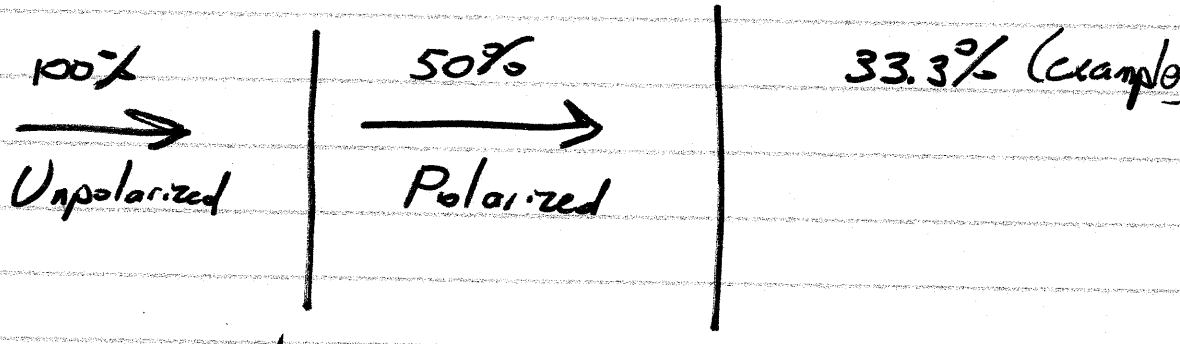
$$m = \frac{f_o}{f_e}$$

$$40 = \frac{80.5}{f_e}$$



$$L = f_o + f_e$$

HW6 #3



Analyzer absorbs 16.7%

③

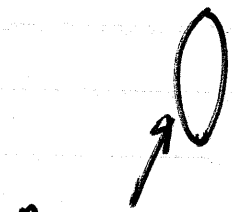
In Air
$v \approx c$
f
$\lambda = v/f$
$E = hf$

In material
$v = c/n$ = slower
f = same
$\lambda = v/f$ = smaller
$E = hf$ = same

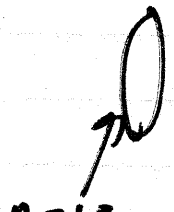
$$1eV = 1.6 \times 10^{-19} J$$

$$= (1.6 \times 10^{-19} C)(1 J/C)$$
$$= (e)(1 V)$$

Lens in Air



Lens in Oil



Smaller $\frac{n_2}{n_1}$
Less refraction
Longer f

$$m = \frac{L(25cm)}{f_o f_e}$$

(4)

Millikan Oil Drop

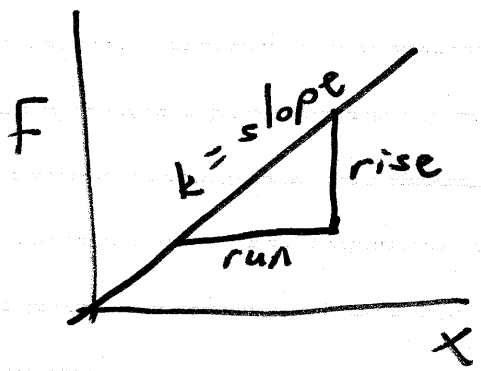
$F_E = qE$ $\quad q = e \quad E = \frac{V}{d}$

$F_g = mg$ $\quad m = \rho V$

Volume $= \frac{4}{3}\pi r^3$

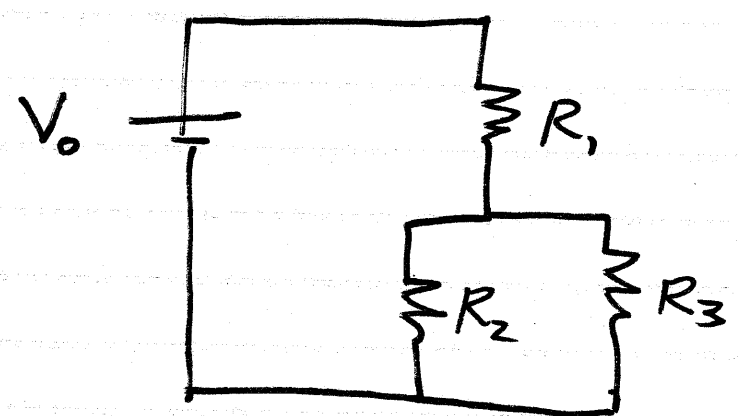
$F = kx$

$k = \frac{\Delta F}{\Delta x}$



$f = \frac{1}{2\pi}\sqrt{\frac{k}{m}}$

Circuit Example



$V_0 = 12$ v $\quad I_0 = 0.5$ A

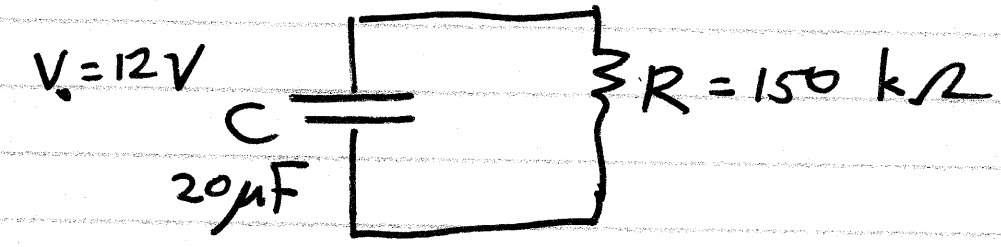
$V_2 = 4$ v $\quad I_2 = 0.2$ A

$V_1 = ? = 8$ V $\quad I_1 = 0.5$ A

$V_3 = ? = 4$ V $\quad I_3 = 0.3$ A

(5)

Capacitor Discharge



Initial $I_0 = \frac{V_0}{R}$ drains the capacitor.

$V = V_0 e^{-t/\tau}$

$\tau = RC$

$= (150 \times 10^3\,\Omega)(20 \times 10^{-6}\,F)$

$= 3000 \times 10^{-3}\,s$

$= 3.0\,s$

t	V
0	12.0 V
3.0 s	$(12.0\,V)e^{-1} = 4.4\,V$

Uses of e: $e = 1.6 \times 10^{-19}\,C$

$e = 2.718$ e^x or exp()

$e =$ "$\times 10^{\wedge}$" 1.6e-19

$t = 2.1\,s$ $\quad 6.0\,V = 12.0\,V\,e^{-t/\tau}$

$0.5 = e^{-t/\tau}$

$\ln(0.5) = -t/\tau$