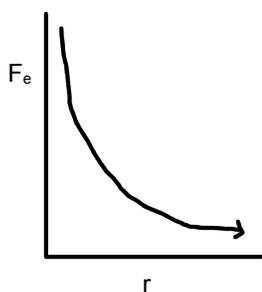


L02 - Linearizing Graphs

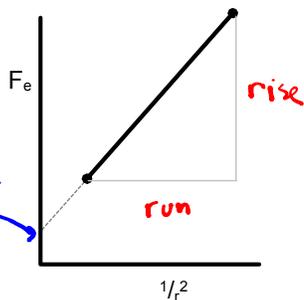
Common Question - Electrostatic Force



$$F_e = \frac{kq_1q_2}{r^2} + 0$$

$$F_e = (kq_1q_2) \frac{1}{r^2}$$

"Should" be zero.

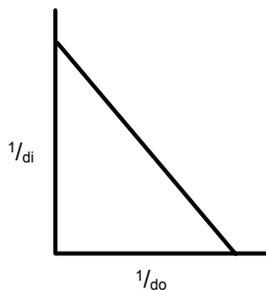
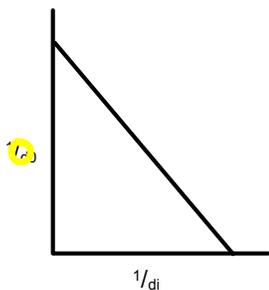


$$y = (m)x + b$$

$$F_e = (kq_1q_2) \frac{1}{r^2} + 0$$

$$\text{Slope} = \frac{\text{rise}}{\text{run}} = kq_1q_2$$

Common Question - Optics Rails



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

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

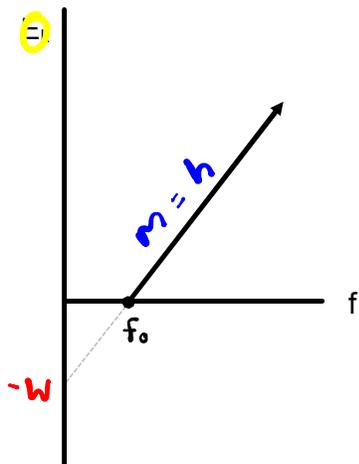
$$y = (m)x + b$$

$$\frac{1}{d_o} = (-1) \frac{1}{d_i} + \frac{1}{f}$$

$$y\text{-int}('b') = \frac{1}{f}$$

$$\boxed{f = \frac{1}{b}}$$

Common Question - Photoelectric Effect



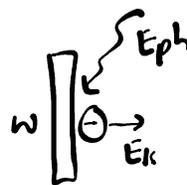
$$E_{ph} \rightarrow W + E_k$$

$$E_{ph} - W = E_k$$

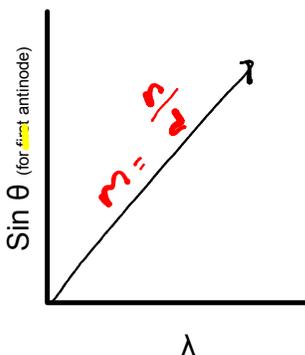
$$E_k = E_{ph} - W$$

$$E_k = hf - W$$

$$y = (m)x + b$$



Uncommon Question - Double-Slit Diffraction



$$\lambda = \frac{d \sin \theta}{n}$$

$$y = mx + b$$

$$\sin \theta = (\text{slope}) \lambda + (b)$$

$$\Downarrow$$

$$\sin \theta = \frac{n \lambda}{d}$$

$$\Downarrow$$

$$\sin \theta = \left(\frac{n}{d} \right) \lambda + 0$$

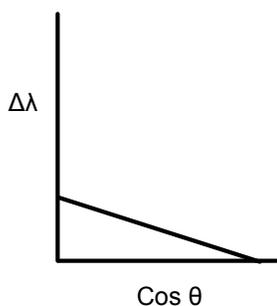
$$y = (m)x + b$$

$$\text{Slope} = \frac{n}{d}$$

$$\text{Slope} = \frac{n}{d}$$

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Uncommon Question - Compton Scattering



$$\Delta\lambda = \frac{h}{mc}(1 - \cos\theta)$$

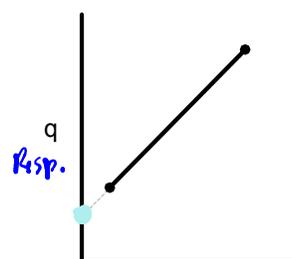
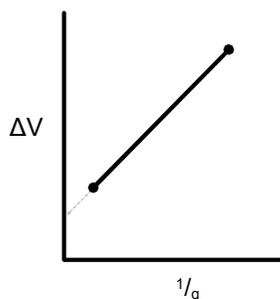
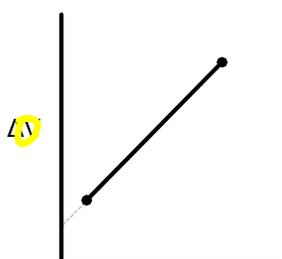
$$\Delta\lambda = \frac{h}{mc} - \frac{h}{mc}\cos\theta$$

$$\Delta\lambda = \left(-\frac{h}{mc}\right)\cos\theta + \left(\frac{h}{mc}\right)$$

$$y = (\text{slope})x + (b)$$

Slope = $-\frac{h}{mc}$ y-int = $\frac{h}{mc}$

Uncommon Question - Millikan Oil Drop



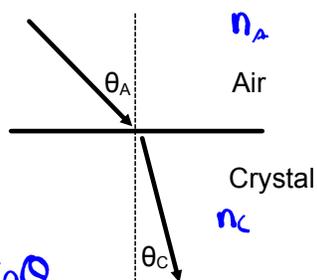
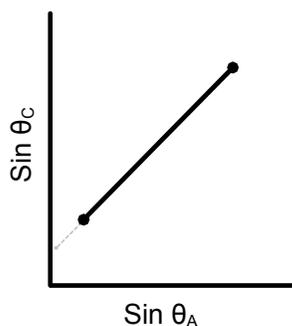
$F_e = q|E| = \frac{q\Delta V}{\Delta d}$
 $F_g = mg$
 $F_e = F_g$
 $\frac{q\Delta V}{\Delta d} = mg$
 $\Delta V = \frac{mg\Delta d}{q}$
 $y = (\text{slope})x + b$
 $\Delta V = \left(\frac{g\Delta d}{q}\right)m + 0$
 $\text{Slope} = \frac{\text{rise}}{\text{run}} = \frac{g\Delta d}{q}$

$\Delta V = mg\Delta d$
 $y = (\text{slope})x + b$
 $\Delta V = (mg\Delta d)m + 0$
 $\text{Slope} = mg\Delta d$

$F_e = F_g$
 $\frac{q\Delta V}{\Delta d} = mg$
 $q = \frac{mg\Delta d}{\Delta V}$
 $y = (\text{slope})x + b$
 $q = \left(\frac{g\Delta d}{\Delta V}\right)m + 0$

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Uncommon Question - Refraction



$$n_A \sin \theta_A = n_C \sin \theta_C$$

$$\sin \theta_C = \frac{n_A \sin \theta_A}{n_C}$$

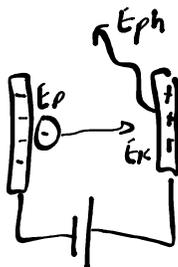
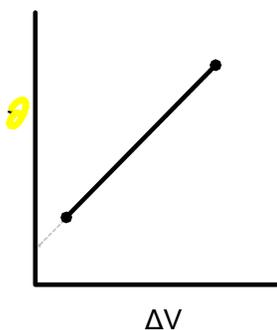
$$\sin \theta_C = \left(\frac{n_A}{n_C} \right) \sin \theta_A + 0$$

$$y = (\text{slope}) x + b$$

Slope = $\frac{n_A}{n_C}$

 or Slope = $\frac{1}{n_C}$

Uncommon Question - X-Ray Production



$$E_p \rightarrow E_k \rightarrow E_{ph}$$

$$q\Delta V \rightarrow hf$$

$$q\Delta V = hf$$

$$f = \frac{q\Delta V}{h}$$

$$y = (\text{slope}) x + b$$

$$f = \left(\frac{q}{h} \right) \Delta V + b$$

$$\text{Slope} = \frac{q}{h}$$

$$= \frac{(1.60 \times 10^{-19})}{(6.63 \times 10^{-34})}$$

$$= 2.4 \times 10^{14}$$

2.4/14

 $a.b \times 10^{cd}$