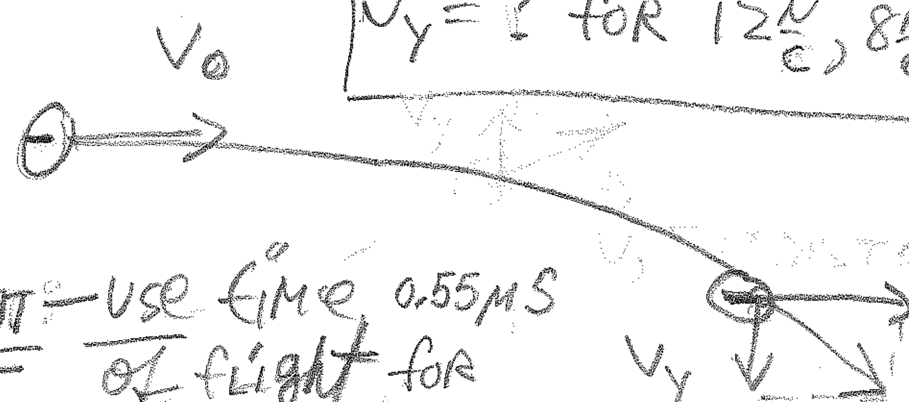
Lab 1 Discussion: Hints.

Question 3 Find V_y for $E_y = 12, 8, 4 \frac{N}{C}$.

$V_y = ?$ for $12\frac{N}{C}, 8\frac{N}{C}, 4\frac{N}{C}$



Hint — use time 0.55 μs of flight for either of 2 methods:

(A.) use Δy (B.) use e, E and m.

↑ CH 2 — m = mass, e = |charge|

Question 3, 4, 5 on Friday 1-31-14

Format:

Question 1 Explain } use diagrams
Question 2 Explain }

Question 3 Show calculations.

$12 = 12.00 \frac{N}{C}$
$8 = 8.00 N/C$
$4 = 4.00 N/C$

Sig. figs!

$m = 9.11 \times 10^{-31}$ kg.

$e = 1.60 \times 10^{-19}$ C.

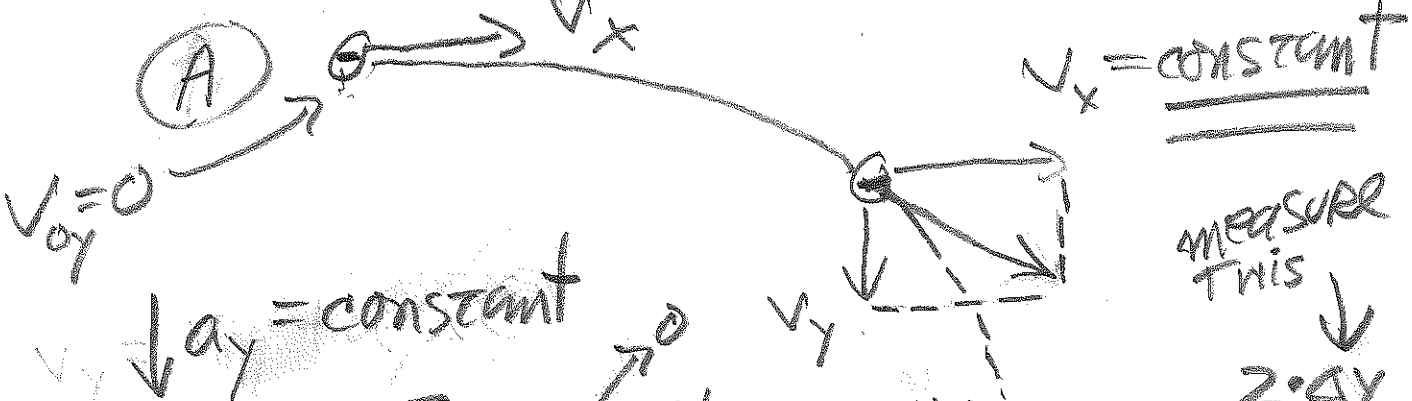
$t = 0.550 \times 10^{-6}$ (s).

Lab 1

More Hints:

Question 3: $a_y = \frac{-eE_y}{m} = \text{constant}$

(A)



$v_x = \underline{\text{constant}}$

$a_y = \text{constant}$

measure this

THUS: $\bar{v}_y = \frac{v_{oy}^{\,0} + v_y}{2} = \frac{\Delta y}{\Delta t} \Rightarrow v_y = \frac{2 \cdot \Delta y}{\Delta t}$

MEASURE Δy FOR $E_y = 4, 8, 12 \frac{N}{C}$.

(B)

$$v_y = v_{oy}^{\,0} + a_y \cdot \Delta t$$

$$a_y = \frac{-eE_y}{m}$$

$$v_y = \frac{-eE_y}{m} \cdot \Delta t$$

WHERE $E_y = 4\frac{N}{C}, 8\frac{N}{C}, 12\frac{N}{C}$

HINTS:

Question 3, 4 5 issues:

comment on "JUST Before" collision w. the detector.

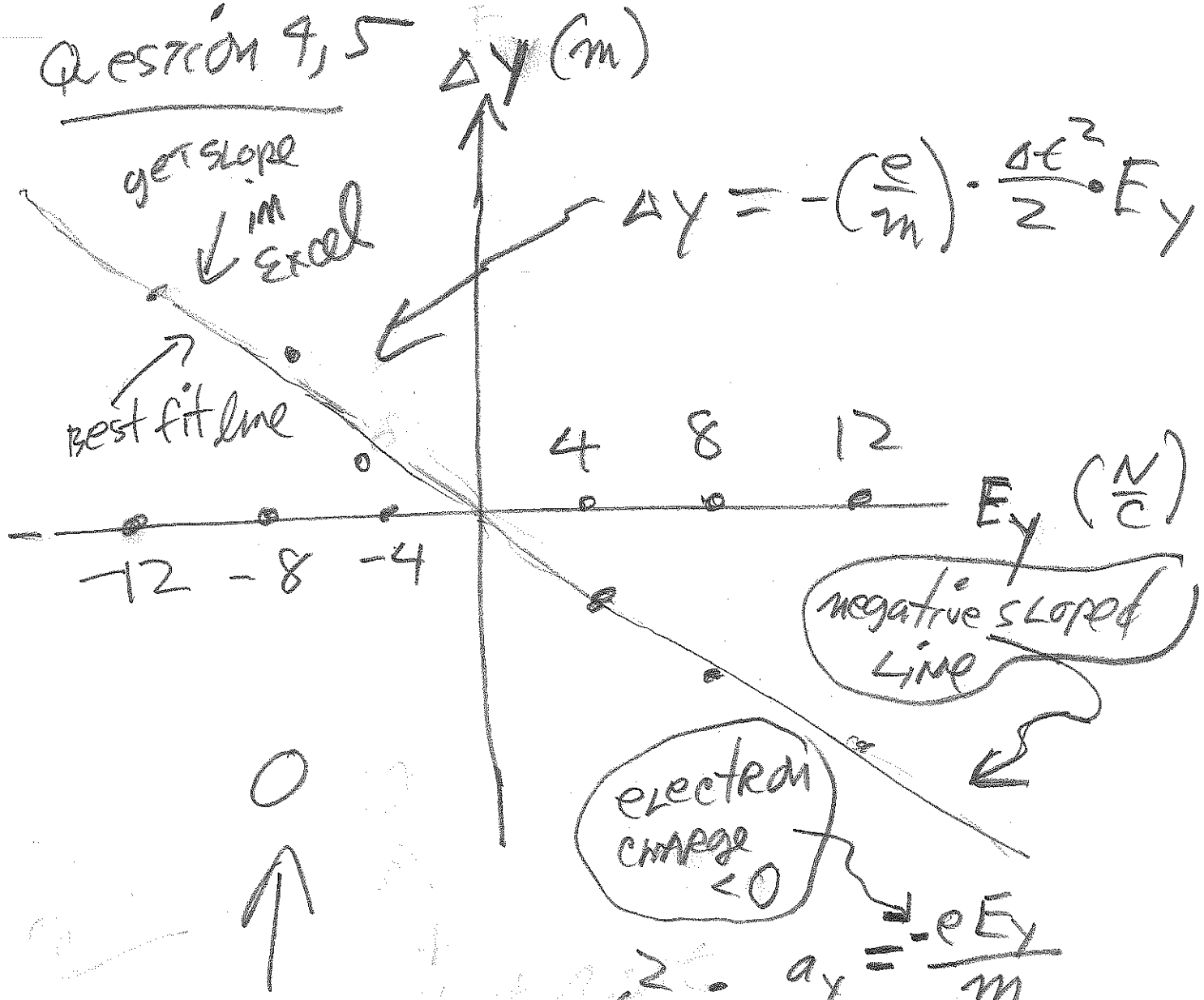
(i) It's ok to define the "JUST Before" as the point where the electron is HALf-exposed AT the End.

$\Delta t = 0.550\,\mu C$

(ii) IF YOU USE "JUST BEFORE" as when the front of electron TOUCHES, then make a correction in the time:

$t = 0.53\,\mu S$

Question 4, 5



$$\Delta y = v_{0y}\Delta t + \frac{1}{2}a_y\cdot\Delta t^2 \;;\quad a_y = -\frac{eE_y}{m}$$

$$\Delta y = -\frac{eE_y}{2m}\cdot\Delta t^2 \rightarrow \Delta y = -\left(\frac{e}{m}\right)\frac{\Delta t^2}{2}\cdot E_y$$

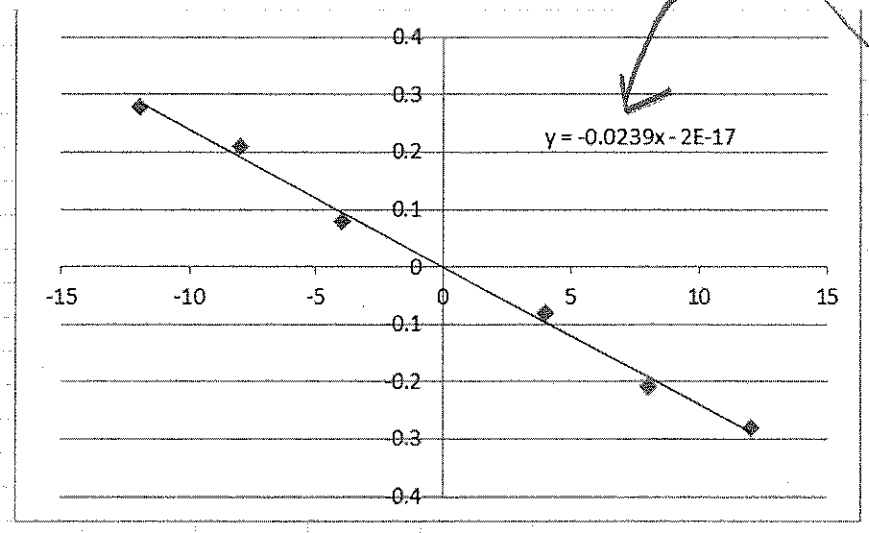
$$\Delta t = 0.550\times10^{-6}\,(s)$$

(A) FIND slope using excel.

(B) solve for $\frac{e}{m}$ using slope value in part (A): WATCH sig. figs!

Excel screenshot

E_Y	delta y
-12	0.28
-8	0.21
-4	0.08
4	-0.08
8	-0.21
12	-0.28



NOTE: Slope = -0.0239