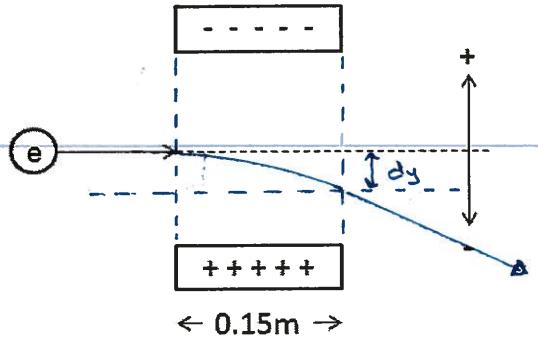
KEY

First Name:_____ Last Name:_____

L09 – FQ – Projectile Motion

Use the following information to answer Q1:

Two parallel plates are 1.35m apart, with a Potential Difference of 40.5V, as shown below.



① $|\vec{E}| = \frac{\Delta V}{\Delta d}$

② $|\vec{E}| = \frac{|\vec{F}_e|}{q}$ or $|\vec{F}_e| = q|\vec{E}|$

③ $a = \frac{F_{net}}{m}$

④ x-comp $v_x = \frac{d_x}{t}$ y-comp $d = v_i t + \frac{1}{2}at^2$ where $v_i = 0$

An electron is fired horizontally at 2.40×10^5 m/s through the plates.

Q1: Upon exiting the plates, the electron will have experienced a vertical deflection of ____ m. *(5 marks)*

*(Record your **three digit** answer in the Numerical Response boxes below)*

1	.	0	3

① $|\vec{E}| = \frac{\Delta V}{\Delta d} = \frac{40.5\,V}{1.35\,m} =$ **30 V/m or 30 N/C**

② $|\vec{E}| = \frac{|\vec{F}_e|}{q}$, $30\,N/C = \frac{|\vec{F}_e|}{1.60\times10^{-19}\,C}$, **$|\vec{F}_e| = 4.80\times10^{-18}\,N$**

③ $\vec{a} = \frac{\vec{F}_{net}}{m} = \frac{4.80\times10^{-18}\,N\ [down]}{9.11\times10^{-31}\,kg} =$ **$5.268935236\times10^{12}\,m/s^2\ [down]$**

④ $v_x = \frac{d_x}{t}$, $2.40\times10^5\,m/s = \frac{0.15\,m}{t}$, **$t = 6.25\times10^{-7}\,s$**

⑤ $d_y = v_{iy}t + \frac{1}{2}a_y t^2$, $d = (0)t + \frac{1}{2}(5.2689\ldots\times10^{12})(6.25\times10^{-7})^2$

$d_y = 1.029088913\,28\,m$

$d_y = 1.03\,m\ [down]$

MARKING:

Beginning	0.0 – 2.0
Progressing	2.5 – 3.5
Competent	4.0 – 4.5
Exemplary	5.0