Physics AP/Dual

Name: Key Period: _____ Date: _____

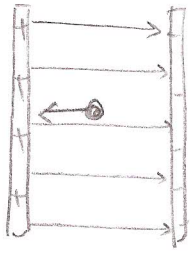
Electrostatics: Electric Field in Uniform Electric Fields Quiz

Electric Field (Plates)	Electrostatic Force	Electric Potential Energy	Electric Field
$E_{avg} = \frac{-\Delta V}{d}$	$F_E = \frac{kq_1q_2}{r^2} = qE$	$U_E = \frac{Kq_1q_2}{r} = qV$	$E = \frac{F_E}{q}$

I. Answer the following problems. Show all your work to get full credit. Show your answer in scientific notation format.

1. A proton is placed in an electric field between two parallel plates. If the plates are 8.0 cm apart and have a potential difference of 65 V, how much work is done against the electric field when the proton is moved 4.0 cm perpendicular to the plates?

-5.2×10^{-18} J



$W = F \cdot d$

$W = (1.3\times10^{-16})(.04)$

$W = 5.2\times10^{-18}$ J

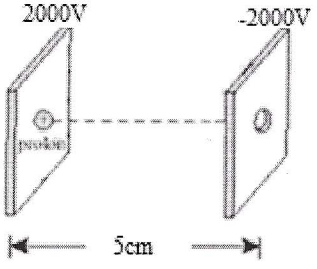
$E = \frac{F}{q}$

$E = -\frac{\Delta V}{d} = -\frac{(-65)}{.08} = 812.5$ N/C

$F = Eq = (812.5)(1.6\times10^{-19})$

$F = 1.3\times10^{-16}$

2. A proton is accelerated from rest by the charged plates as shown. At what speed does it leave the right hand plate?



$\Delta K = -\Delta U_e$

$\frac{mv^2}{2} = -q \cdot \Delta V$

$v = \sqrt{\frac{-2q\Delta V}{m}} = \sqrt{\frac{-2(1.6\times10^{-19})(-4000)}{1.67\times10^{-27}}}$

$v = 8.75\times10^{5}$ m/s

3. The electric field between two parallel plates is 4.0×10^2 N/C. If the potential difference between the plates is 3.0×10^3 V, how far apart are the plates?

$E_{AVG} = -\frac{\Delta V}{d}$

$d = -\frac{\Delta V}{E_{AVG}} = \frac{-(-3\times10^3)}{4\times10^2} = 7.5$ m