Name Answer Key Date _____

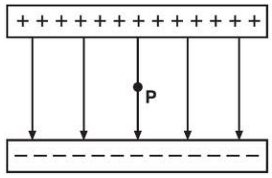
Honors Physics Electrostatics WS #9H

Period _____ Mrs. Nadworny

Capacitance and Electronvolts

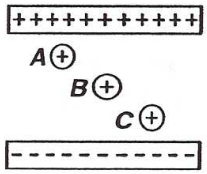
Directions: Solve the following problems using the GUESS method, dimensional analysis (when necessary) and proper significant figures. Be sure to show ALL work.

1. An electron is released at point P between two charged plates. What type of motion would the electron exhibit?



(A) constant downward velocity
(B) constant upward velocity
(C) constant downward acceleration
(D) constant upward acceleration

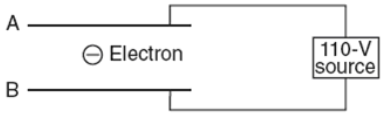
2. Identical charges A, B and C are located between two oppositely charged parallel plates, as shown in the diagram below.



The magnitude of the force exerted on the charges by the electric field between the plates is

(A) least on A and greatest on C
(B) the same on A and C, but less on B
(C) the same for A, B and C
(D) greatest on A and least on C

3. An electron is located in the electric field between two parallel metal plates as shown in the diagram below.



If the electron is attracted to plate A, then plate A is charged

(A) positively, and the electric field is directed from plate A toward plate B
(B) positively, and the electric field is directed from plate B toward plate A
(C) negatively, and the electric field is directed from plate A toward plate B
(D) negatively, and the electric field is directed from plate B toward plate A

4. The energy of 2.0×10^3 eV is equivalent to how many Joules?

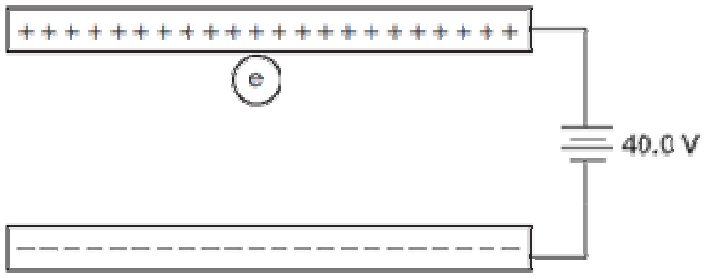
$$2.0\times10^{3}eV\left(\frac{1.60\times10^{-19}J}{1eV}\right)=3.2\times10^{-16}J$$

Continued on next page

5. A capacitor has a capacitance of 2.00 x 10^{-12} farads. Calculate the potential difference required to store 1.80 x 10^{-11} Coulombs.

$$V = \frac{Q}{C} = \frac{1.80 \times 10^{-11} C}{2.00 \times 10^{-12} F} = 9.00 V$$

6. A capacitor of capacitance 20.0 μF is comprised of two oppositely charged parallel plates that are located a distance of 2.0 centimeters from one another. There is a potential difference of 40.0 V between the plates.



a. Determine the amount of charge stored on each plate of the capacitor.

$$Q = C\,V = (20.0 \times 10^{-6}\ F)(40.0\ V) = 8.00 \times 10^{-4}\ C$$

b. Calculate the strength of the electric field between the plates.

$$E = \frac{\Delta V}{d} = \frac{40.0\ V}{0.020\ m} = 2000\ N/C = 2.0 \times 10^{3}\ N/C$$

c. If an electron were placed between the plates, how much external work would be necessary to move the electron towards the negative plate.

$$W = V\,q = (40.0\ V)(1.60 \times 10^{-19}\ C) = {}^{+}6.4 \times 10^{-18}\ J$$

Answers in size order: 6.4 x 10^{-18}, 3.2 x 10^{-16}, 8.00 x 10^{-4}, 9.00, 2.0 x 10^{3}