Name Answer Key Date _____

Honors Physics Electrostatics WS #8H

Period _____ Mrs. Nadworny

Potential Difference

Directions: Solve the following problems using the GUESS method and proper significant figures. Be sure to show ALL work.

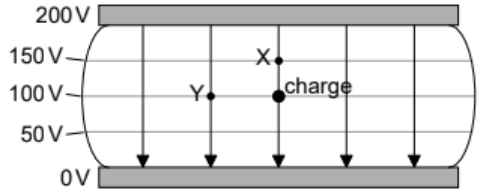
1. Compared to insulators, metals are better conductors of electricity because metals contain more free

   (A) protons (B) electrons (C) positive ions (D) negative ions

2. The work per unit charge required to move a charge between two points in an electric circuit defines electric

   (A) force (B) power (C) field strength (D) potential difference

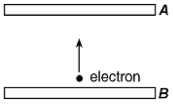
3. The diagram shows the electric field and the electric equipotential surfaces between two charged parallel plates. The potential difference between the plates is 200 V.



What is the work done, in nJ, by the electric field in moving a negative charge of magnitude 1nC from the position shown to X and to Y?

	To X	To Y
A.	50	0
B.	–50	0
C.	50	100
D.	–50	–100

4. An electron placed between oppositely charged parallel plates A and B moves toward plate A, as represented in the diagram below. What is the direction of the electric field between the plates?



   (A) toward plate A (B) toward plate B (C) into the page (D) out of the page

5. Which object will have the greatest change in electrical energy?

   (A) an electron moved through a potential difference of 2.0 V
   (B) a metal sphere with a charge of 1.0×10^{-9} C moved through a potential difference of 2.0 V
   (C) an electron moved through a potential difference of 4.0 V
   (D) a metal sphere with a charge of 1.0×10^{-9} C moved through a potential difference of 4.0 V

Continued on next page

6. The potential difference between two points, A and B, in an electric field is 2.00 volts. The energy required to move a charge of 8.00×10^{-19} coulomb from point A to point B is

   (A) 4.00×10^{-19} J (B) 1.60×10^{-18} J (C) 6.25×10^{17} J (D) 2.50×10^{18} J

7. What is the unit of electrical energy in fundamental SI units?

   (A) kg m^2C^{-1} s (B) kg m s^{-2} (C) kg m^2s^{-2} (D) kg m^2s^{-1} A

8. It takes 5.0×10^{-3} J of work to move a positive charge of 2.5×10^{-4} C from point X to point Y of an electric field. What is the difference of potential between X and Y?

$$\Delta V = \frac{W}{q} = \frac{5.0\times10^{-3}\,J}{2.5\times10^{-4}\,C} = 20.V$$

9. How much work does it take to move a positive charge of 5.0×10^{-5} C from a point of lower potential to a point of higher potential when the voltage between the points is 65 Volts?

$$W = \Delta V \bullet q = (65V)(5.0\times10^{-5}C) = {}^{+}3.3\times10^{-3}\,J$$

10. Two large, charged parallel plates are 9.5 cm apart. The magnitude of the electrical field between the plates is 415 N/C.
    a. What is the electrical potential difference between the plates?

$$\Delta V = Ed = (415\ \tfrac{N}{C})(0.095\ m) = 39\ V$$

    b. What work will you do to move a charge equal to that of one proton from the negative to the positive plate?

$$W = q\Delta V = (1.60 \times 10^{-19}\ C)(39\ V) = {}^{+}6.2 \times 10^{-18}\ J$$

11. Two charged plates are separated by a distance of 2.5 cm. If there is an electric potential difference of 925 V between the plates, what is the magnitude of the electric field in the middle?

$$E = \frac{\Delta V}{d} = \frac{925V}{.025m} = 3.7x10^{4}\ \tfrac{N}{C}$$

Answers in size order: 6.2×10^{-18}, 3.3×10^{-3}, 20., 39, 3.7×10^{4}