PHYSICS 3204
UNIT 2- SECTION 1:ELECTROSTATIC
Worksheet 7 -Electric Potential Energy, Electric Potential and Electric Potential Difference

PART A: Multiple Choice

1.   How much work is done by a 9.00 V power supply in moving 8.50×10^{18} electrons?

   (A) 1.50×10^{-1} J
   (B) 1.22×10^{1} J
   (C) 9.44×10^{17} J
   (D) 7.65×10^{19} J

2.   Which refers to the work required to move a charge from one point to another in an electric field?

   (A)   charge
   (B)   electric current
   (C)   electric potential
   (D)   resistance

3.   What amount of energy is gained by a proton that moves through a potential difference of 1.0 V?

   (A) 2.7×10^{-46} J
   (B) 1.6×10^{-19} J
   (C) 1.4×10^{-9} J
   (D) 6.3×10^{18} J

4.   If the potential difference across a battery is 6.0 V, how much work is done to move 6.0×10^{2} C of charge through a circuit?

   (A) 3.6×10^{-3} J
   (B) 1.0×10^{-2} J
   (C) 1.0×10^{2} J
   (D) 3.6×10^{3} J

5.   The work required to move an electric charge between two points in an electric field is 0.0045 J. If the potential difference between these points is 12 V, what amount of charge is moved?

   (A) 3.8×10^{-4} C
   (B) 5.4×10^{-2} C
   (C) 1.2×10^{2} C
   (D) 2.7×10^{3} C

6.   An electric field has a strength of 130 N/C and exerts a 65 N force on a cluster of electrons. If the cluster of electrons is put through a potential difference of 450 V, how much work is done by the field?

   (A) 1.1×10^{-3} J
   (B) 2.3×10^{2} J
   (C) 9.0×10^{2} J
   (D) 3.8×10^{6} J

7. What is the electrical potential difference required to increase the energy of a 0.20 C charged particle by 7.0 J?

    (A)   0.028 V
    (B)   1.4 V
    (C)   3.5 V
    (D)   35 V

8. If 4.8×10^{-17} J of work is required to move an electron between two points in an electric field, what is the electric potential difference between these points?

    (A) 1.6×10^{-19} V
    (B) 4.8×10^{-17} V
    (C) 3.0×10^{2} V
    (D) 4.8×10^{2} V

9. The electric potential is

    (A)   is potential energy per unit charge.
    (B)   is electrical force per unit charge.
    (C)   is simply electrical energy.
    (D)   is simply electrical charge.

10. What is the potential difference between two points if 5.0 kJ of work is done to move 2.0 C of charge between the points?

    (A)   10.0 V
    (B)   2.5 kV
    (C)   10.0 kV
    (D)   10.0 MV

PART B:WRITTEN RESPONSE :

1. The work done on a test charge of magnitude q = $+1.0 \times 10^{-6}$ C in moving it a distance against an electric field is 5.0×10^{-5} J.

    a) What is the change in electric potential energy of the charge for this displacement?
    ANSWER IS 5.0 x 10⁻⁵J

    b) What is the potential difference between these two positions?
    ANSWER IS 50 V

2. A positive test charge of 1.5 x 10⁻⁶ C is placed in an electric field 10 cm from another charge of magnitude -5.0 x 10⁻⁶ C that is anchored in place.

   a) What is the electric potential energy of the test charge?
   ANSWER IS 0.68 J

   b) What is the electric potential 10 cm away from the negative charge?
   ANSWER IS 4.5 x 10 ⁵ V

   c) What is the potential difference between the test charge's initial position and a position 5.0 cm closer to the negative charge?   **ANSWER IS 4.5 x 10 ⁵ V**

3. 5.0 J of work is done in moving 5.0 x 10⁻⁶ C of charge from point A to point B in a uniform electric field.

   (a) How much electric potential energy is gained by this charge?
   ANSWER IS 5.0 J

   (b) What is the electric potential in this situation?
   ANSWER IS 1.0 x 10 ⁶ V

   (c) If it takes 7.0 J of work to move the same charge from point B to point C, what is the electric potential difference between points B and C?
   ANSWER IS 1.4 X 10 ⁶ V