Electric Potential – practice problems

Ee = electric potential energy - Joules

V = electric potential - Joules / Coulomb (Volt) - energy it has compared to infinity

ΔV = electric potential difference - Joules /Coulomb (Volt)

1. Calculate the electric potential a distance of 0.40 m from a spherical point charge of +6.4 x 10-6 C.
   V = ? r = 0.40 m qm = +6.4 x 10^{-6} C

   V = kqm/r V = 1.4 x 10^5 J/C or 1.4 x 10^5 V

2. How much work must be done to increase the potential of a charge of 3.0 x 10^{-7} C by 120 V?
   W = ?? = ΔEe q = 3.0 x 10^{-7} C ΔV = 120 V

   W = ΔEe = qΔV = 3.6 x 10^{-5} J

3. In a uniform electric field, the potential difference between 2 points 10 cm apart is 80 V. Calculate the magnitude of the electric field intensity.

   r = 0.10 m ΔV = 80 V Ɛ = ?

   Ɛ = ΔV/d field intensity is 8.0 x 10^2 N/C

4. The electric field intensity in the region between 2 parallel plates is 400 N/C. If the plates are connected to a battery with a potential difference of 90 V, what is the separate of the plates?

   E = 400 N/c parallel plates ΔV = 90 V d = ? Ɛ = ΔV/d d = 0.23 m

Try these:

1. The potential at a distance of 25 cm from a point charge is -6.4 x 10^4 V. What is the sign and magnitude of the point charge? **[-1.8 x 10^{-6} C]** **V = kqm/r**

2. It takes 4.2 x 10^{-3} J of work to move 1.2 x 10^{-6} C of charge from point X to point Y in an electric field. What is the potential difference between X and Y? **[3.5 x 10^3 V] ΔEe = qΔV**

3. Calculate the magnitude of the electric field in a parallel plate apparatus whose plates are 5.00 mm apart and have a potential difference of 300 V between them. **[6.0 x 104 N/C] ε = ΔV/d**

4. What potential difference would have to be maintained across the plates of a parallel plate apparatus, if they are 1.2 cm apart, to create an electric field of intensity 1.5 x 10^4 N/C?
   [1.8 x 10^2 V] **ε = ΔV/d**