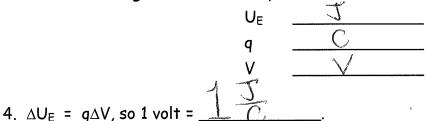
Notes - 19.1 Electric Potential Energy: Potential Difference

- 1. When a free positive charge q is accelerated by an electric field, it is acquires \_\_\_\_\_\_.
- 2. The process is analogous to an object being accelerated by a gravitational field. It is as if the charge is going down an <u>Process</u> hill where its electric potential energy is converted to kinetic energy.
- 3. The change in electric potential energy  $\Delta U_E$  is equal to  $q\Delta V$  where q is the charge and  $\Delta V$  is the change in the electric potential. The units of these parameters are:



5. Suppose you have a 12.0 V motorcycle battery that can move 5000 C of charge, and a 12.0 V car battery that can move 60,000 C of charge. How much energy does each deliver? (Assume that the numerical value of each charge is accurate to three

significant figures.)
$$\Delta U_{mc} = (5000C)(12.0V) = [6.00 \times 10^{17}]$$

$$\Delta U_{c} = (60,000C)(12.0V) = [7.20 \times 10^{5}]$$

6. The energy per electron is very small in macroscopic situations, but on a submicroscopic scale, such energy per particle (electron, proton, or ion) can be of great importance. For example, even a tiny fraction of a joule can be great enough for these particles to destroy organic molecules and harm living tissue. The particle may do its damage by direct collision, or it may create harmful x-rays, which can also inflict damage. It is useful to have an energy unit related to submicroscopic effects. An energy unit called the electron volt (eV), which is the energy given to a fundamental charge accelerated through a potential difference of