Name_____ **Pd**____

Electric Potential ws 4

1) Three point changes have identical magnitudes, but two of the changes are positive and one is negative. These changes are fixed to the corners of a square, one to a corner. No matter how the charges are arranged, the potential at the empty corner is positive. Explain why.

2) What point charges, all having the same magnitude, would you place at the corners of a square (one charge per corner), so that both the electric field and electric potential (assuming a zero reference value at infinity) are zero at the center of the square? Account for the fact that the charge distribution gives rise to both a zero field and a zero potential.

3) The electric field at a single location is zero. Does this fact necessarily mean that the electric potential at the same place is zero? Use a spot on the line between two identical point charges as an example to support your reasoning.

4) An electric force moves a charge of $+1.80 \times 10^{-4}$ C from point A to point B and performs 5.30×10^{-3} J of work on the charge. (a) What is the difference ($EPE_A - EPE_B$) between the electric potential energies of the charge at the two points? (b) Determine the potential difference ($V_A - V_B$) between the two points. (c) State which point is at the higher potential.

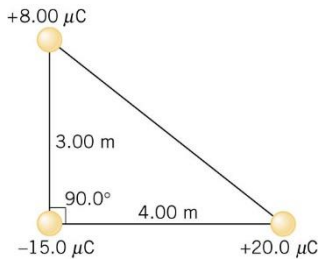
5) In a television picture tube, electrons strike the screen after being accelerated from rest through a potential difference of 25 000 V. The speeds of the electrons are quite large, and for accurate calculations of the speeds, the effects of special relativity must be taken into account. Ignoring such effects, find the electron speed just before the electron strikes the screen.

6) An electron and a proton are initially very far apart (effectively an infinite distance apart.) They are then brought together to form a hydrogen atom, in which the electron orbits the proton at an average distance of 5.29×10^{-11} m. What is $EPE_{final} - EPE_{initial}$, the change in the electric potential energy?

7) Location A is 3.00 m to the right of a point charge q. Location B lies on the same line and is 4.00 m to the right of the charge. The potential difference between the two locations is $V_b - V_a = 45.0$ V. What is the magnitude and sign of the charge?

8) Two identical point charges are fixed to diagonally opposite corners of a square that is 0.500 m on a side. Each charge is $+3.0 \times 10^{-6}$ C. (a)How much work is done by the electric force as one of the charges moves to an empty corner? (b) What is the electric potential at the center of the square when the charges are in this arrangement?

9) Determine the electric potential energy for the array of three charges shown in the picture, relative to its value when the charges are infinitely far away.



10) An equipotential surface that surrounds a $+3.0 \times 10^{-7}$ –C Point charge has a radius of 0.15 m. What is the potential of this surface?