Homework Discussion, Week 3

Physics 1302   Dr. Andersen

Chapter 20

20.) a) Must use conservation of energy to find the potential energy difference equal to the total initial kinetic energy of the proton: $\Delta U = q\Delta V = \frac{1}{2}mv^2$, and then solve for ΔV. b) The same as in (a), but need to find difference equal to 3/4 the total kinetic energy. c) Same as (b), but find difference equal to 1/2 the initial kinetic energy.
Answer: a) 840 V, b) 630 V, c) 420 V.

31.) The work done to bring the charge to infinity is equal to the minus the potential energy at that point (see equation 8-1, and realize that the work done to bring the particle to infinity is *minus* the work done by the electric force on the charge, since we must apply an outside force to move the charge outward.) So, the work done is $W = qV$. Just calculate V due to the other charges, and there you go.

45.) a) Calculate the capacitance from $C = \kappa C_0$, where C_0 is the capacitance of a parallel plate capacitor $C_0 = \frac{\epsilon_0 A}{d}$, and then use $C = Q/V$ to find V. b) If C increases (because κ increases), and Q stays constant, V must decrease.

59.) a) Plug and chug in $V = Q/C$. b) Plug and chug in $U = \frac{1}{2}CV^2$.