Work It

$$Work = \Delta E_p$$

We can do work on a charge by changing its Electric Potential Energy.

This is VERY similar to Gravitational Potential Energy…

$$E_p = \frac{kq_1q_2}{r}$$

Ask yourself… is the ‘r’ squared?
Is it? Check again…

Just like with gravitational potential we have $E_p=0$ @ ∞.

We add the negative sign through logic. If the charges are opposite - there will be an attraction - the charges will move towards each other - add the negative.

What is the electric potential energy (E_p) of an electron that is ½ an angstrom from a proton?

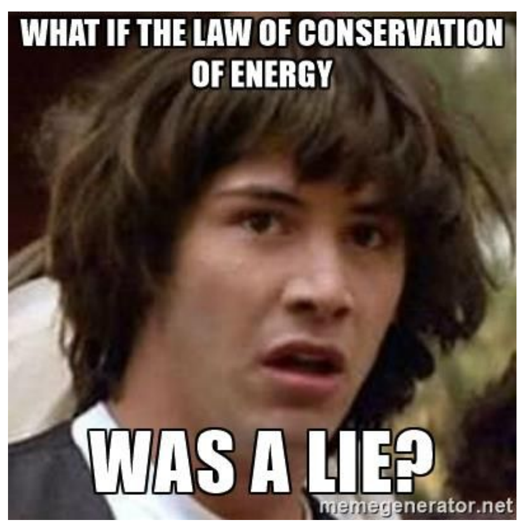
Hint: -4.6×10^{-18}J

Determine the work done to a 2.0μC charge which is moved from 3.0m to 5.0m away from a -3.0μC charge.

$$\begin{aligned} W = \Delta E &= E_{pf} - E_{p0} \\ &= \frac{kq_1q_2}{r_f} - \frac{kq_1q_2}{r_0} \\ &= kq_1q_2\left(\frac{1}{r_f} - \frac{1}{r_0}\right) \end{aligned}$$

Hint: $7.2\text{x}10^{-3}$J

Does the Law of Conservation of Energy apply to this scenario?



$$E_{p0} + E_{k0} = E_{pf} + E_{kf} + Q$$

For sub atomic particles we can assume Q=0. Its contribution is so small that it can safely be considered negligible. Its effect is lost in Sig Figs.

An electron is .20m away from a second electron. The first is fired at $3.0\times10^{7}\ \frac{m}{s}$ directly toward the second. Calculate how close it can get.

Hint1: $v_f=0$
Hint2: 5.61×10^{-15}m

A $6.0\mu C$ charge is at rest 1.2m from a similar charge and is released. What speed will the first charge have when 2.0m from the second charge, if the mass is $5.0\mu kg$?

Hint: $v_f=208\ \frac{m}{s}$