Student Lecture Notes - 9

Different kinds of energy:

Thermal   Kinetic   Gravitational   Potential   Elastic

and now...

6. Two charges $Q_1$ (positive) and $Q_2$ (negative) are a distance $d_1$ apart. Assume $Q_1$ is fixed. What is the work done on $Q_2$ when it moves to a new position $d_2 = 2d_1$?

A. Knowns: 

Unknown:

\[ W = \int F \cdot dr \]

where $F =$

* The Coulomb force (aka _____ force) is conservative.

In other words,

From the example above, $W =$

The work done by a conservative force _____ the potential energy of the system (and _____ the kinetic energy).
\[ W = -\Delta U = - (U(d_2) - U(d_1)) = \]

by inspection \[ U(d) = \] The potential energy of a pair of charges \( q + q \)

Like gravity, the location of "zero potential energy" is arbitrary. We typically say a system has zero electrical potential energy when the charges are infinitely far away.

* A ______ carries potential energy, NOT ________!

Q. Two charges \( Q_1 = Q_2 = +e \), with different masses \( m_1 \) and \( m_2 \) are forced together to start a nuclear reaction. How fast must they be moving in order to reach a minimum separation distance of \( a \)?

A. Sketch: \[
\begin{array}{c}
\text{Initial} \\
\text{Potential Energy} \quad \text{Kinetic Energy} \\
\text{Momentum} \\
\end{array}
\] \[
\begin{array}{c}
\text{Final} \\
\text{Initial} = \text{Final} \text{ because:} \\
\end{array}
\]