Electron Volts

The Joule is a very large number for dealing with the energies of electrons, atoms, and other small objects.

- You probably noticed in previous lessons that it was not uncommon to have numbers of the magnitude 10^{-18}J.
- Quite often physicists use units that are better suited to dealing with the measurements they are making.
    - It's the same as when you talk about "5 dozen eggs"… it is more convenient to think of it this way instead of as "60 eggs".

For this reason the **electron volt** (**eV**) is used.

- It is defined as the energy one electron gains by moving through a 1 V of potential difference.
- We can calculate how many Joules this is equal to…

$$\Delta E = qV$$
$$= (1.60e\text{-}19\ C)\ (1\ V)$$
$$\Delta E = 1.60e\text{-}19\ J$$

$$\therefore\ 1eV = 1.60e\text{-}19\ J$$

This number is on your data sheet of you ever need it.

Example 1: An electron is moved from positive to negative through a potential difference of 1000V. How much energy did it lose in electron volts?

$1e^{-}(1000V) = 1000\ eV$

Wow, that was done quick! I could've done that calculation in my head. This equals 1.60e-16J (see if you can confirm this).

The electron volt is NOT a metric unit.

- It is so common, though, that we still need to recognize and understand it.
- Remember to always change your energies into Joules before sticking them into the formulas, otherwise you will get the wrong answer.