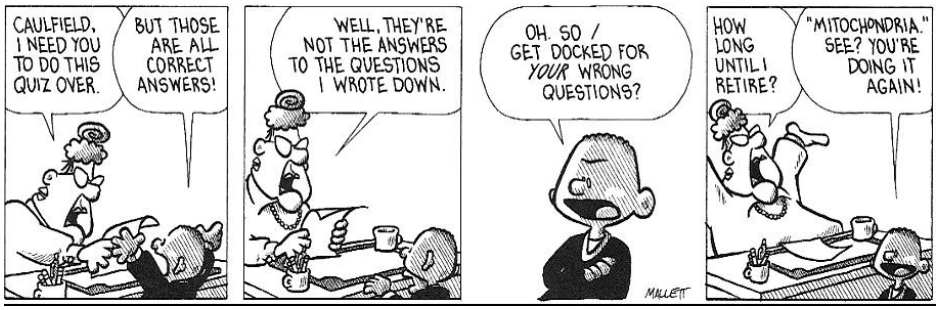
March 8, 2013 Physics 132 Prof. E. F. Redish

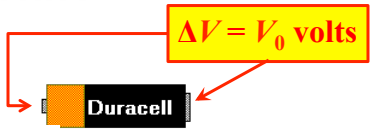
- **Theme Music: Electric Daisy Violin**
  Lindsey Stirling
- **Cartoon: Jef Mallet**
  Frazz



3/8/13 Physics 132 **1**

Some basic electrical ideas

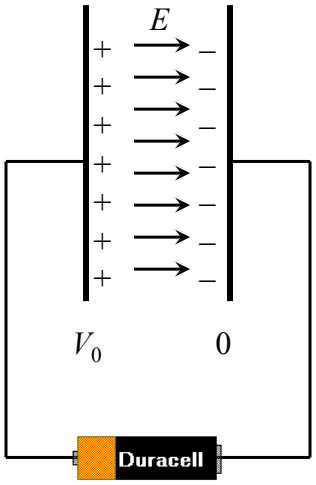
- ***Conductor*** – a material that permits some of its charges to move freely within it.
  - ***Implication***: If the charges in a conductor are not moving, the whole conductor is as the same V. Why?
- ***Insulator*** – a material that permits some of its charges to move a little, but not freely.
- ***Battery*** – a device that creates and maintains a constant potential difference across its terminals.



3/8/13 **2**

Charging a capacitor

- What is the potential difference between the plates?
- What is the field around the plates?
- How much charge is on each plate?



Capacitor Equations

$$\Delta V = E\Delta x = Ed$$

$$E = 4\pi k_C \sigma = 4\pi k_C \frac{Q}{A} \quad \Rightarrow \quad Q = \left(\frac{A}{4\pi k_C}\right) E$$

$$Q = \left(\frac{A}{4\pi k_C d}\right) \Delta V$$

$4\pi k_c$ is often written as "$1/\varepsilon_0$"

$$Q = C\Delta V$$

What does this "Q" stand for?