

11.1 - Batteries, Direct Current, and Circuits.

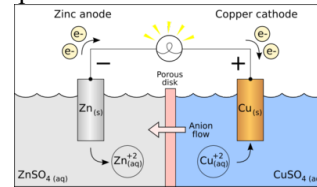


Battery Construction

A battery converts chemical potential energy to electrical potential energy (Demo: cut-away batteries). Two major components:

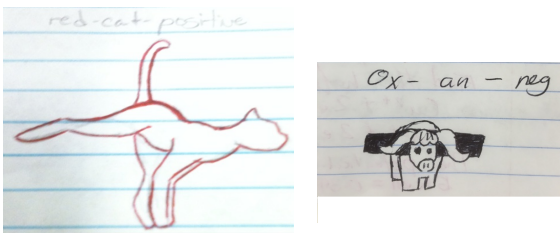
- Electrolytes – Fluid that conducts electric charge.
- Electrodes – Metals that contact the electrolyte.

Chemical reactions on the electrode surface generate the battery's potential.



Electrode Details

Anode – Negative terminal of a battery.
Cathode – Positive terminal of a battery.
 Different metals in electrolytes will have different electric potentials. (Electrochemical Cell Demo)



Voltage (Electromotive Force - EMF)

Voltage: Energy difference between battery terminals, and is often considered 'electrical pressure', analogous to water pressure in a water system.

Measure of energy per charge:

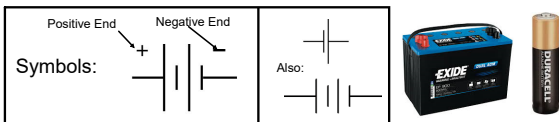
$$\text{Voltage} = \frac{\text{Energy}}{\text{Charge}} \rightarrow V = \frac{J}{C}$$

Represents maximum voltage of a battery.

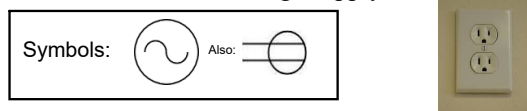
Voltage drops as battery is hooked up to circuit.
 Ever seen your lights dim when something turned on?

Battery Symbols (Resource P. 8)

Batteries - provide voltage in a direct current (DC) circuit (electrons flow only one way)

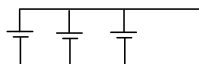


Outlet - Alternating Current (AC) (electrons go back and forth at some frequency) voltage supply

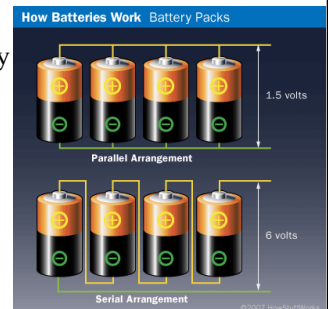
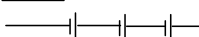


Battery Configurations

The voltage of parallel batteries equals the battery with the highest voltage.



The voltage of batteries in series is additive.



AP Phys 1 Unit 11.1 Notes - Batteries & DC

Electric Circuits

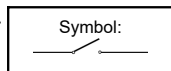
Def. A path in which electrons from a voltage or current source flow. This path can have any number of components.



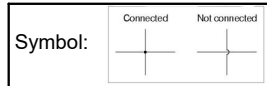
Example circuit board(s).

More Circuit Parts

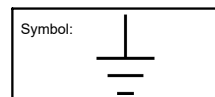
Switches - Stop or start electron flow, depending on position (on/off).



Wires - Conduct electricity.

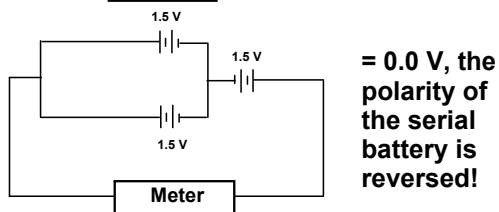
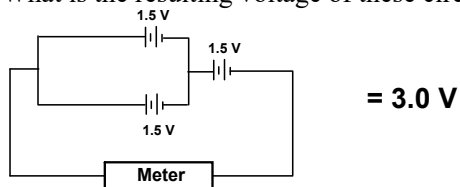


Ground - Direct connection to the Earth or machine for circuit completion without the need for wires.



1. Voltage Example

What is the resulting voltage of these circuits?



Homework

11.1 Problems
Due: Next Class.