

SECTION 1

INTRODUCTION TO ELECTRICITY

What You'll Be Learning	Lecture: Introduction to electricity and circuit diagrams. Ohm's Law, General Power Law, Power (AC vs. DC). Voltage, current, Resistance, and how to measure them. Electrical ground. Kirchhoff's Laws. Voltage and current dividers. Anode vs. cathode. Switches. Introduction to breadboarding.
What You'll Be Doing	Activity 1-1: 9V LED - resistor circuit. Measuring voltage, current, resistance. Calculating power. Adding a momentary switch. Activity 1-2: Set up a simple voltage divider circuit. Confirm the voltage divider equation by measuring the voltage difference across each resistor. Demo: Light Theremin
Files you will need	Not applicable.

What is Electricity?

Electricity, in the sense that we will be using it, can be described as the movement of electrons. Metals that have a portable, or *free* electron, can conduct electricity. Copper is one such metal, and consequently is commonly used to make wire. It has one “free” electron per atom. A *cloud* of these free electrons holds the metal together, forming metallic bonds. In any conductive metal, the free electrons move in Brownian-like random pathways. When there is a charge gradient, electrons generally move from an area of negative (–) charge to an area of positive (+) charge, or thinking about it differently, from a higher to lower concentration of negative charge.

If electrons flow into one end of a copper wire, the outer-most electron leaves the orbit and flows to adjacent copper atoms, causing a chain of

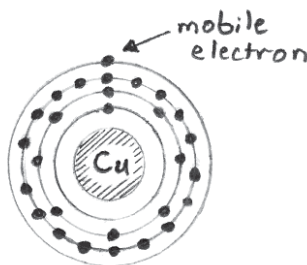


Figure 1-1. Mobile valence electron in outer shell of copper atom.