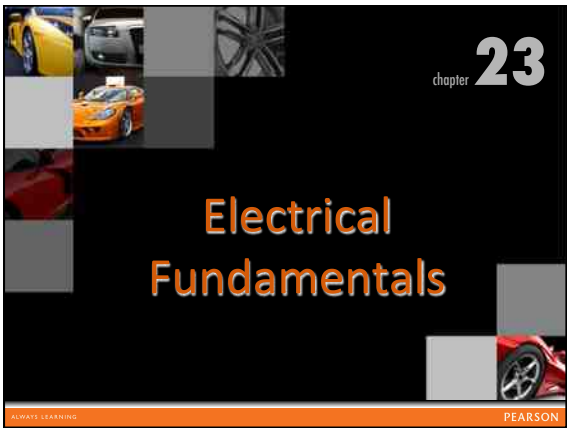

FIGURE 23.1 In an atom (left), electrons orbit protons in the nucleus just as planets orbit the sun in our solar system (right).

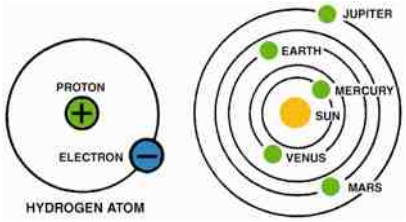

FIGURE 23.2 The nucleus of an atom has a positive (+) charge and the surrounding electrons have a negative (–) charge.

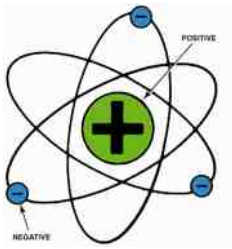

FIGURE 23.3 This figure shows a balanced atom. The number of electrons is the same as the number of protons in the nucleus.

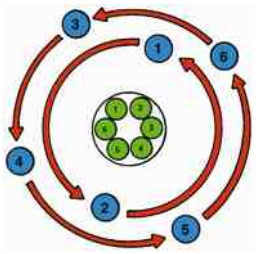

FIGURE 23.4 Unlike charges attract and like charges repel

FIGURE 23.5 A conductor is any element that has one to three electrons in its outer orbit.

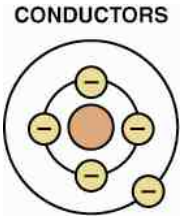

FIGURE 23.6 Copper is an excellent conductor of electricity because it has just one electron in its outer orbit, making it easy to be knocked out of its orbit and flow to other nearby atoms. This causes electron flow, which is the definition of electricity.

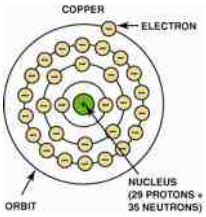

FIGURE 23.7 Insulators are elements with five to eight electrons in the outer orbit.

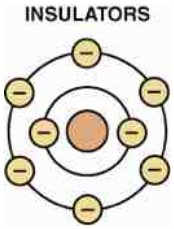

FIGURE 23.8 Semiconductor elements contain exactly four electrons in the outer orbit.

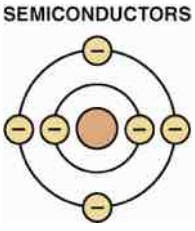

FIGURE 23.9 Current electricity is the movement of electrons through a conductor.

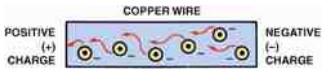

FIGURE 23.10 Conventional theory states that current flows through a circuit from positive (+) to negative (–). Automotive electricity uses the conventional theory in all electrical diagrams and schematics.

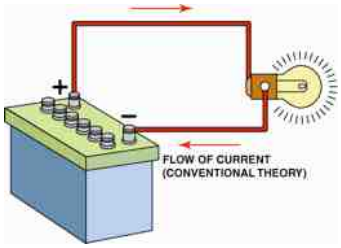

FIGURE 23.11 One ampere is the movement of 1 coulomb (6.28 billion electrons) past a point in 1 second.

FIGURE 23.12 An ammeter is installed in the path of the electrons similar to a water meter used to measure the flow of water in gallons per minute. The ammeter displays current flow in amperes.

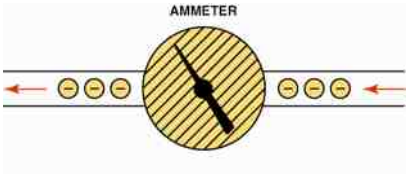

FIGURE 23.13 Voltage is the electrical pressure that causes the electrons to flow through a conductor.

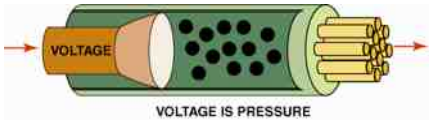

FIGURE 23.14 This digital multimeter set to read DC volts is being used to test the voltage of a vehicle battery. Most multimeters can also measure resistance (ohms) and current flow (amperes).

FIGURE 23.15 Resistance to the flow of electrons through a conductor is measured in ohms.