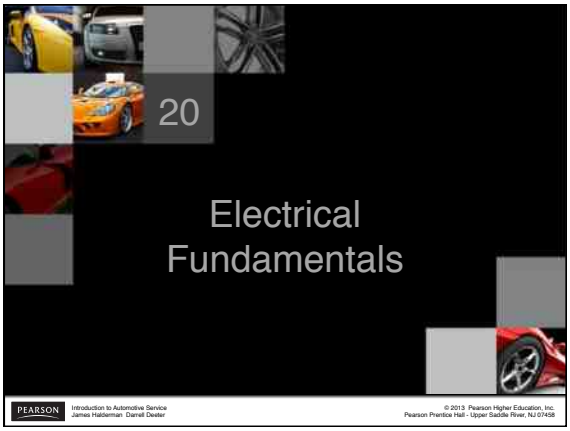


20

Electrical Fundamentals

FIGURE 20.1 In an atom (left), electrons orbit protons in the nucleus just as planets orbit the sun in our solar system (right).

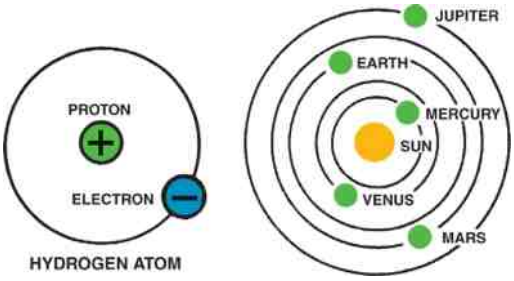


FIGURE 20.2 The nucleus of an atom has a positive (+) charge and the surrounding electrons have a negative (–) charge.

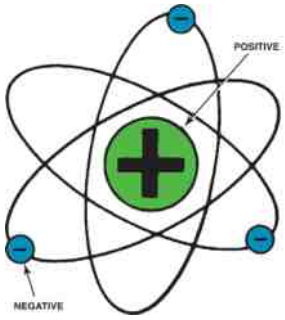


FIGURE 20.3 This figure shows a balanced atom. The number of electrons is the same as the number of protons in the nucleus.

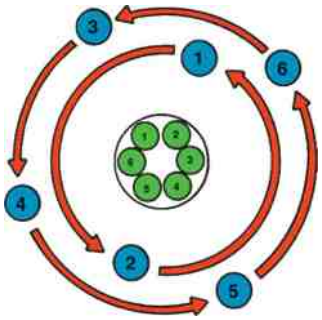


FIGURE 20.4 Unlike charges attract and like charges repel.

FIGURE 20.5 A conductor is any element that has one to three electrons in its outer orbit.

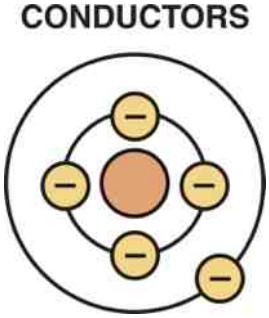


FIGURE 20.6 Copper is an excellent conductor of electricity because it has just one electron in its outer orbit, making it easy to be knocked out of its orbit and flow to other nearby atoms. This causes electron flow, which is the definition of electricity.

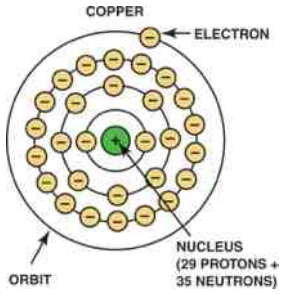


FIGURE 20.7 Insulators are elements with five to eight electrons in the outer orbit.

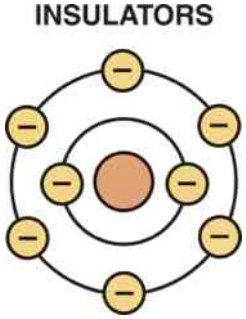


FIGURE 20.8 Semiconductor elements contain exactly four electrons in the outer orbit.

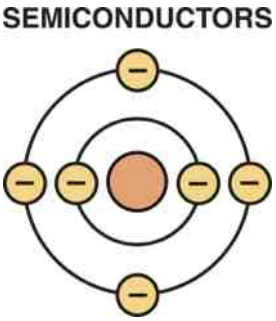


FIGURE 20.9 Current electricity is the movement of electrons through a conductor.

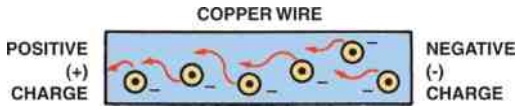


FIGURE 20.10 Conventional theory states that current flows through a circuit from positive (+) to negative (–). Automotive electricity uses the conventional theory in all electrical diagrams and schematics.

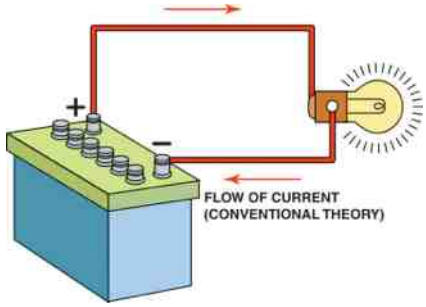


FIGURE 20.11 One ampere is the movement of 1 coulomb (6.28 billion billion electrons) past a point in 1 second.

FIGURE 20.12 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.

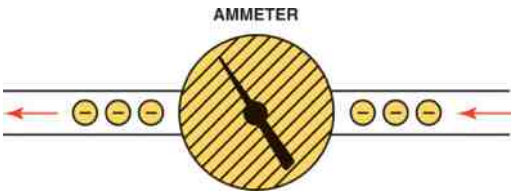
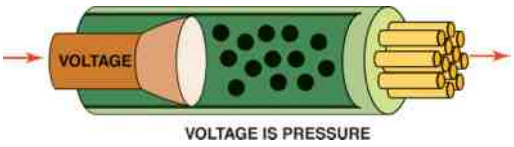


FIGURE 20.13 Voltage is the electrical pressure that causes the electrons to flow through a conductor.



VOLTAGE IS PRESSURE

FIGURE 20.14 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 20.15 Resistance to the flow of electrons through a conductor is measured in ohms.