Name _____ Date _____

LESSON 9.1

Interdisciplinary Application

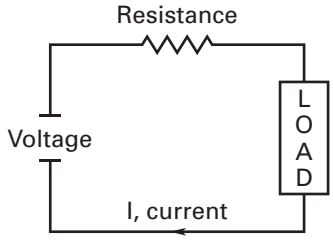
For use with the lesson "Graph $y = ax^2 + c$"

Current In An Electric Circuit

Physics There are two principal forms of electric current, direct current (dc) or alternating current (ac). In a battery circuit, the electron charge flow or current is always in one direction, from the negative terminal to the positive terminal. This type of current is direct current. Direct current is used in battery-operated devices such as laptop computers, portable CD players, and motor vehicles.

In a direct current electric circuit, the battery supplies the voltage V and the light bulb is the resistance R. Resistance is the opposition of the flow of the current in a circuit.

In an electric circuit, the power dissipated in a load is given by the equation $P = VI$ or by the equation $P = RI^2$ where P is the power used by the load (in watts), V is the voltage (in volts), R is the resistance of the circuit outside of the load (in ohms), and I is the current in the circuit (in amperes). The two equations are related by the formula $V = IR$.



Ampere is the unit used to measure the rate of flow of an electric current. A 100-watt light bulb requires about 1 ampere of current at 100 volts. Calculators and computers use currents so tiny they are measured in microamperes (millionths of amperes). Large industrial equipment use currents measured in kiloamperes (thousands of amperes).

1. Sketch a graph of the model $P = RI^2$ where the resistance of the circuit is 20 ohms.
2. Use the graph to estimate the current that will generate 80 watts of power.
3. Estimate the current that will use 180 watts of power.
4. Assume you have another circuit that has a resistance of 15 ohms. Will it take more or less current to generate 80 watts of power on this circuit than on the circuit in Exercise 1? *Explain*.

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