

10.4

CHECK YOUR Understanding

- Write definitions of “resistance” and “resistor” in your own words.
- An electric hot plate in a science lab uses a current of 8.5 A when it is plugged into a 120 V outlet. What is the resistance of the hot plate?
- The $2.4\ \Omega$ headlight of an automobile uses a current of 5 A. What is the voltage in the headlight?
- The resistance of dry skin is about $500\ 000\ \Omega$. How much current would go through you if you touched the terminals of a 9 V battery with dry hands?
 - The resistance of wet skin is about $1000\ \Omega$. How much current would go through you if you touched the terminals of a 9 V battery with wet hands? (Remember that electric currents can be dangerous, and it is possible to cause heart fibrillation with a current of less than 100 mA.)
- A toaster uses a current of 4 A. If the resistance of the toaster is $27\ \Omega$, what is the voltage in the toaster?
- Figure 5 shows a light bulb connected to two 1.2 V cells. When the switch is closed, an ammeter measures the current as 252 mA. What is the resistance of the bulb?

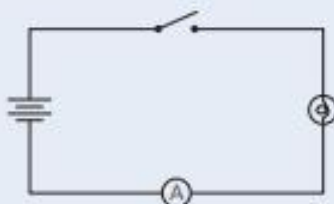


Figure 5

- If resistance is doubled and voltage is halved, what is the effect on the current?
- A student varied the voltage through a resistor and measured the current through the resistor. She recorded the information in Table 3. Draw a voltage–current graph of the data. Use the data to calculate the resistance of the resistor. (Hint: Remember to convert mA to A first.)

Table 3 Voltage and Current in a Resistor

Voltage (V)	1	2	3	4	5	6
Current (mA)	7	13	20	27	33	40

- Using Ohm’s law, calculate the current through the resistor if she raised the voltage to 1000 V. What do you think would happen to the resistor with this current?
- Many avoidable electrical fires (Figure 6) can be traced to improper use of extension cords. If you operate too many devices from an extension cord, the wire in the extension cord may become hot. Why does this happen?



Figure 6

- A 100 W light bulb is designed for use in North America where the voltage is 120 V. The resistance of the filament of the bulb is $144\ \Omega$. Calculate the current in the bulb.
 - If the bulb is taken to Europe where the voltage is 240 V, what do you think will happen to the brightness of the bulb? Explain your answer.
- Using Ohm’s law as an example, describe the difference between a theory and a law.