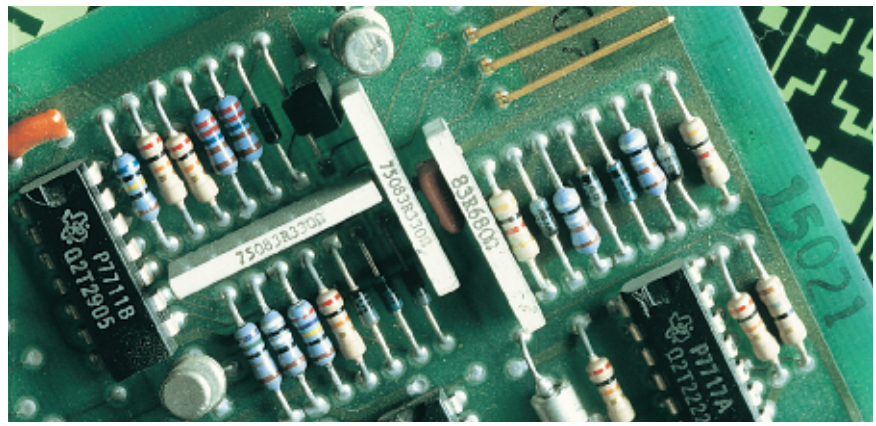

Figure 12
Resistors, such as those shown here, are used to control current. The colors of the bands represent a code for the values of the resistances.

Resistors can be used to control the amount of current in a conductor

One way to change the current in a conductor is to change the potential difference across the ends of the conductor. But in many cases, such as in household circuits, the potential difference does not change. How can the current in a certain wire be changed if the potential difference remains constant?

According to the definition of resistance, if ΔV remains constant, current decreases when resistance increases. Thus, the current in a wire can be decreased by replacing the wire with one of higher resistance. The same effect can be accomplished by making the wire longer or by connecting a *resistor* to the wire. A resistor is a simple electrical element that provides a specified resistance. **Figure 12** shows a group of resistors in a circuit board. Resistors are sometimes used to control the current in an attached conductor because this is often more practical than changing the potential difference or the properties of the conductor.

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SAMPLE PROBLEM D

Resistance

PROBLEM

The resistance of a steam iron is 19.0 Ω. What is the current in the iron when it is connected across a potential difference of 120 V?

SOLUTION

Given: $R = 19.0\ \Omega \qquad \Delta V = 120\ \text{V}$

Unknown: $I = ?$

Use Ohm's law to relate resistance to potential difference and current.

$$R = \frac{\Delta V}{I}$$

$$I = \frac{\Delta V}{R} = \frac{120\ \text{V}}{19.0\ \Omega} = 6.32\ \text{A}$$