

Did you know?

Because the potential difference provided by a wall outlet in a home in North America is not the same as the potential difference that is standard on other continents, appliances made in North America are not always compatible with wall outlets in homes on other continents.

When resistors are wired in parallel with an emf source, the potential difference across each resistor always equals the potential difference across the source. Because household circuits are arranged in parallel, appliance manufacturers are able to standardize their design, producing devices that all operate at the same potential difference. As a result, manufacturers can choose the resistance to ensure that the current will be neither too high nor too low for the internal wiring and other components that make up the device.

Additionally, the equivalent resistance of several parallel resistors is less than the resistance of any of the individual resistors. Thus, a low equivalent resistance can be created with a group of resistors of higher resistances.

SECTION REVIEW

- Two resistors are wired in series. In another circuit, the same two resistors are wired in parallel. In which circuit is the equivalent resistance greater?
- A $5\ \Omega$, a $10\ \Omega$, and a $15\ \Omega$ resistor are connected in series.
 - Which resistor has the most current in it?
 - Which resistor has the largest potential difference across it?
- A $5\ \Omega$, a $10\ \Omega$, and a $15\ \Omega$ resistor are connected in parallel.
 - Which resistor has the most current in it?
 - Which resistor has the largest potential difference across it?
- Find the current in and potential difference across each of the resistors in the following circuits:
 - a $2.0\ \Omega$ and a $4.0\ \Omega$ resistor wired in series with a $12\ \text{V}$ source
 - a $2.0\ \Omega$ and a $4.0\ \Omega$ resistor wired in parallel with a $12\ \text{V}$ source
- Interpreting Graphics** The brightness of a bulb depends only on the bulb's resistance and on the potential difference across it. A bulb with a greater potential difference dissipates more power and thus is brighter. The five bulbs shown in **Figure 14** are identical, and so are the three batteries. Rank the bulbs in order of brightness from greatest to least, indicating if any are equal. Explain your reasoning. (Disregard the resistance of the wires.)

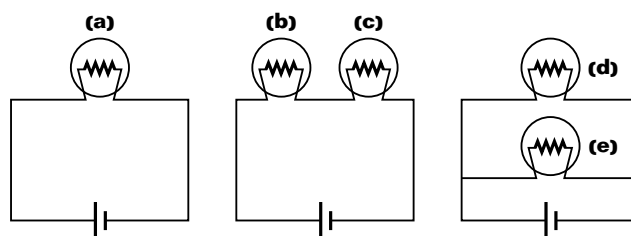


Figure 14