PRACTICE D

Resistance

1. A 1.5 V battery is connected to a small light bulb with a resistance of 3.5 Ω. What is the current in the bulb?
2. A stereo with a resistance of 65 Ω is connected across a potential difference of 120 V. What is the current in this device?
3. Find the current in the following devices when they are connected across a potential difference of 120 V.
   a. a hot plate with a resistance of 48 Ω
   b. a microwave oven with a resistance of 20 Ω
4. The current in a microwave oven is 6.25 A. If the resistance of the oven's circuitry is 17.6 Ω, what is the potential difference across the oven?
5. A typical color television draws 2.5 A of current when connected across a potential difference of 115 V. What is the effective resistance of the television set?
6. The current in a certain resistor is 0.50 A when it is connected to a potential difference of 110 V. What is the current in this same resistor if
   a. the operating potential difference is 90.0 V?
   b. the operating potential difference is 130 V?

Salt water and perspiration lower the body's resistance

The human body's resistance to current is on the order of 500 000 Ω when the skin is dry. However, the body's resistance decreases when the skin is wet. If the body is soaked with salt water, its resistance can be as low as 100 Ω. This is because ions in salt water readily conduct electric charge. Such low resistances can be dangerous if a large potential difference is applied between parts of the body because current increases as resistance decreases. Currents in the body that are less than 0.01 A either are imperceptible or generate a slight tingling feeling. Greater currents are painful and can disturb breathing, and currents above 0.15 A disrupt the electrical activity of the heart and can be fatal.

Perspiration also contains ions that conduct electric charge. In a *galvanic skin response* (GSR) test, commonly used as a stress test and as part of some so-called lie detectors, a very small potential difference is set up across the body. Perspiration increases when a person is nervous or stressed, thereby decreasing the resistance of the body. In GSR tests, a state of low stress and high resistance, or "normal" state, is used as a control, and a state of higher stress is reflected as a decreased resistance compared with the normal state.

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Keyword HF6ELCX