Substitute that equivalent resistance value in the equation for current.

$$I = \frac{\Delta V_{tot}}{R_{eq}} = \frac{9.0\ \text{V}}{0.917\ \Omega}$$

$$\boxed{I = 9.8\ \text{A}}$$

4. EVALUATE For resistors connected in parallel, the equivalent resistance should be less than the smallest resistance.

$$0.917\ \Omega < 2.0\ \Omega$$

CALCULATOR SOLUTION

The calculator answer is 9.814612868, but because the potential difference, 9.0 V, has only two significant digits, the answer is reported as 9.8 A.

PRACTICE B

Resistors in Parallel

1. The potential difference across the equivalent resistance in Sample Problem B equals the potential difference across each of the individual parallel resistors. Calculate the value for the current in each resistor.
2. A length of wire is cut into five equal pieces. The five pieces are then connected in parallel, with the resulting resistance being 2.00 Ω. What was the resistance of the original length of wire before it was cut up?
3. A 4.0 Ω resistor, an 8.0 Ω resistor, and a 12.0 Ω resistor are connected in parallel across a 24.0 V battery.
   a. What is the equivalent resistance of the circuit?
   b. What is the current in each resistor?
4. An 18.0 Ω, 9.00 Ω, and 6.00 Ω resistor are connected in parallel to an emf source. A current of 4.00 A is in the 9.00 Ω resistor.
   a. Calculate the equivalent resistance of the circuit.
   b. What is the potential difference across the source?
   c. Calculate the current in the other resistors.

Parallel circuits do not require all elements to conduct

What happens when a bulb burns out in a string of decorative lights that is wired in parallel? There is no current in that branch of the circuit, but each of the parallel branches provides a separate alternative pathway for current. Thus, the potential difference supplied to the other branches and the current in these branches remain the same, and the bulbs in these branches remain lit.