

**31.29. Model:** Assume ideal connecting wires.

**Visualize:** Please refer to Figure Ex31.29.

**Solve:** The resistance  $R$  is given by Ohm's law,  $R = \Delta V_R / I_R$ . To determine  $I_R$  we use Kirchhoff's junction law. The input current  $I$  splits into the three currents  $I_{10}$ ,  $I_{15}$ , and  $I_R$ . That is,

$$2.0 \text{ A} = I_{10} + I_{15} + I_R = \frac{8 \text{ V}}{10 \Omega} + \frac{8 \text{ V}}{15 \Omega} + I_R \Rightarrow I_R = 2.0 \text{ A} - 0.8 \text{ A} - 0.533 \text{ A} = 0.667 \text{ A}$$

Using this value of  $I_R$  in Ohm's law,

$$R = \frac{8 \text{ V}}{0.667 \text{ A}} = 12.0 \Omega$$