81. ***REASONING*** First, we draw a current I_1 (directed to the right) in the 6.00-Ω resistor. We can express I_1 in terms of the other currents in the circuit, I and 3.00 A, by applying the junction rule to the junction on the left; the sum of the currents into the junction must equal the sum of the currents out of the junction.

$$\underbrace{I}_{\substack{\text{Current into}\\\text{junction on}\\\text{left}}} = \underbrace{I_1 + 3.00\text{ A}}_{\substack{\text{Current out of}\\\text{junction on}\\\text{left}}} \quad \text{or} \quad I_1 = I - 3.00\text{ A}$$

In order to obtain values for I and V we apply the loop rule to the top and bottom loops of the circuit.

SOLUTION Applying the loop rule to the top loop (going clockwise around the loop), we have

$$\underbrace{(3.00\text{ A})(4.00\ \Omega) + (3.00\text{ A})(8.00\ \Omega)}_{\text{Potential drops}} = \underbrace{24.0\text{ V} + (I - 3.00\text{ A})(6.00\ \Omega)}_{\text{Potential rises}}$$

This equation can be solved directly for the current; $I = \boxed{5.00\text{ A}}$.

Applying the loop rule to the bottom loop (going counterclockwise around the loop), we have

$$\underbrace{(I - 3.00\text{ A})(6.00\ \Omega) + 24.0\text{ V} + I\,(2.00\ \Omega)}_{\text{Potential drops}} = \underbrace{V}_{\text{Potential rises}}$$

Substituting $I = 5.00$ A into this equation and solving for V gives $V = \boxed{46.0\text{ V}}$.