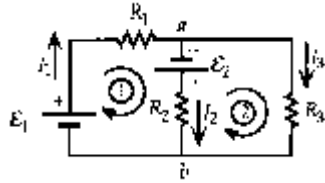


Prob28_22: Find the current that passes through the 4 Ω resistor in the circuit below:



$$R_1 = 2 \text{ ohm}$$

$$R_2 = 3 \text{ ohm}$$

$$R_3 = 4 \text{ ohm}$$

Solution:

We assume the current directions shown in the diagram above.

We use conservation of current at point a

$$I_1 = I_2 + I_3$$

We apply the loop rule for the two loops indicated in the diagram:

$$\text{Loop 1} \quad E_2 - I_2 R_2 + E_1 - I_1 R_1 = 0$$

$$\text{Loop 2:} \quad - I_3 R_3 + I_2 R_2 - E_2 = 0;$$

When we combine these equations, we get

$$I_1 = + 1.577 \text{ A}, I_2 = + 1.616 \text{ A}, \text{ and } I_3 = - 0.039 \text{ A}.$$

The negative sign means that the current is up.