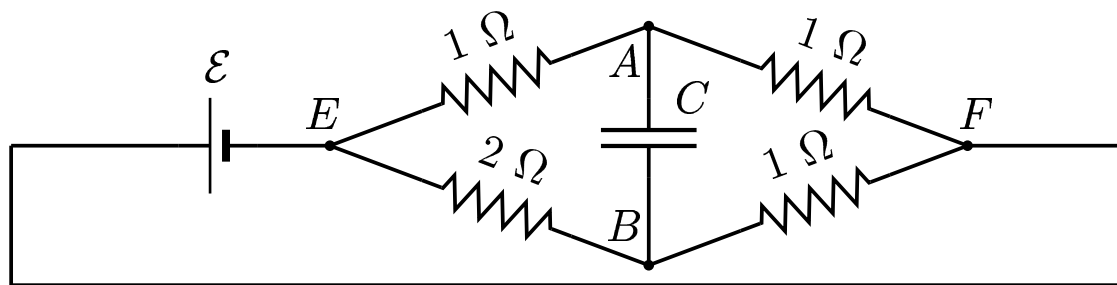
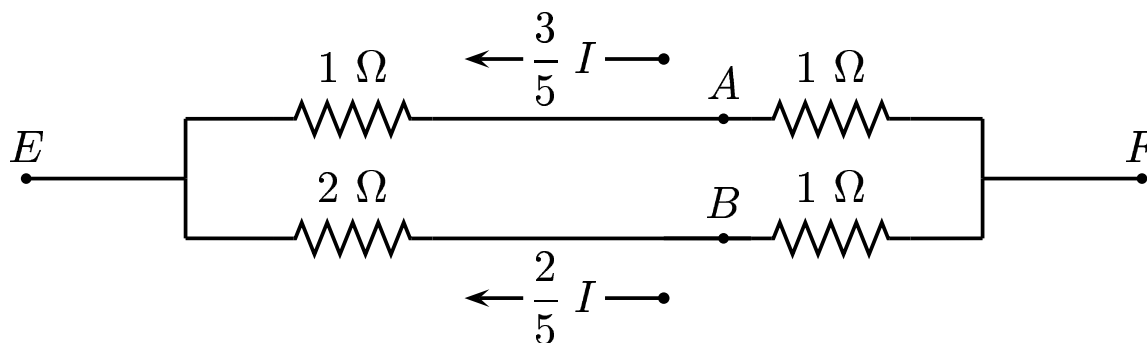


Given: The circuit is in a steady state.



Determine $\Delta V = V_{AB} = V_B - V_A$.

- A) $V_B - V_A = +\frac{1}{6} \mathcal{E}$
- B) $V_B - V_A = +\frac{1}{3} \mathcal{E}$
- C) $V_B - V_A = +\frac{1}{2} \mathcal{E}$
- D) $V_B - V_A = +\frac{2}{3} \mathcal{E}$
- E) $V_B - V_A = +\frac{5}{6} \mathcal{E}$



Given: I is the total current, $R_{top} = 2 \Omega$, $R_{bottom} = 3 \Omega$.
 Since $\mathcal{E} = V_{FE} = R_{top} I_{top} = R_{bottom} I_{bottom}$, we have

$$\frac{I_{bottom}}{I_{top}} = \frac{R_{top}}{R_{bottom}} = \frac{2 \Omega}{3 \Omega} = \frac{2}{3}, \quad \text{and} \quad \frac{\mathcal{E}}{2} = I (1 \Omega).$$

Then, $V_{AF} = I_{top} (1 \Omega)$ and $V_{BF} = I_{bottom} (1 \Omega) = \frac{2}{3} I_{top} (1 \Omega)$, so

$$V_{BA} = V_{AF} - V_{BF} = I (1 \Omega) - \frac{2}{3} I (1 \Omega) = \frac{\mathcal{E}}{2} - \frac{2}{3} \frac{\mathcal{E}}{2} = \frac{1}{6} \mathcal{E}.$$

Answer **A**.