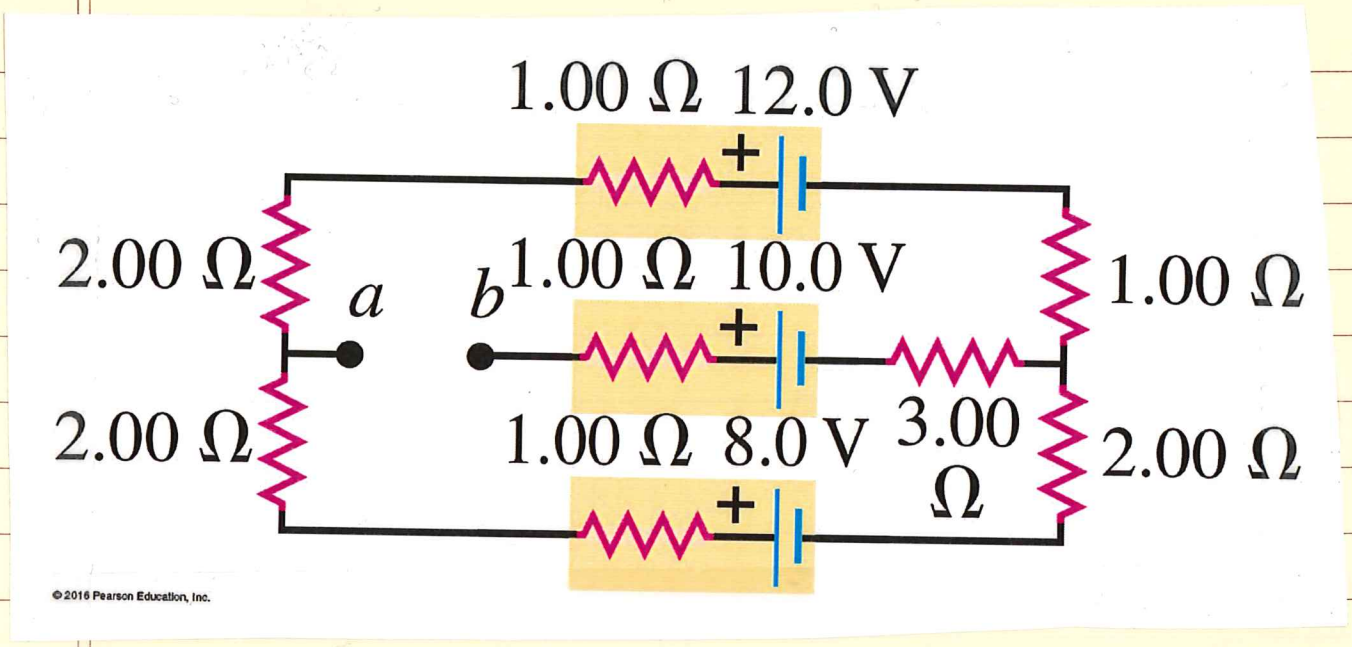
DATE

TOPIC

Chapter 26 Problem 57




a.) $V_{ab} = ?$ First, .... find the current in the outer loop.

$$\Sigma V_i = 0 \quad \Rightarrow \quad \Sigma V_i = -8V + 12V - (9\Omega) I = 0$$

$$I = \frac{4 \text{ volts}}{9\,\Omega} \qquad \boxed{I = \frac{4}{9} \text{ A}}$$

Upper Path

$$V_b - 10V + 12V - (4\Omega) I = V_a$$

$$V_a - V_b = 2V - (4\Omega)\frac{4}{9}A = \frac{2}{9} \text{ volts} \qquad \boxed{V_{ab} = \frac{2}{9} \text{ volts}}$$

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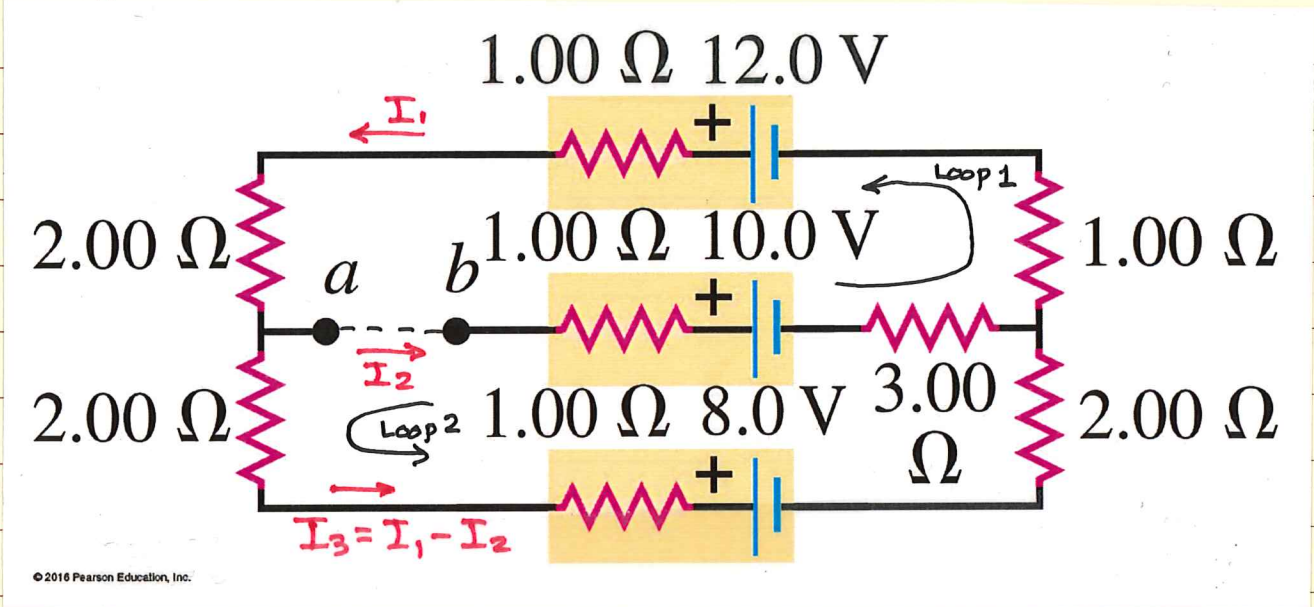
Ch. 26 Problem 57 Continued




b.) Points a and b are connected. Find $I_3 = I_1 - I_2$

① $\Sigma V_i = -10V + 12V - (4\Omega) I_2 - (4\Omega) I_1 = 0$

$2V = 4I_1 + 4I_2$

② $\Sigma V_i = -8V + 10V - (5\Omega)(I_1 - I_2) + (4\Omega) I_2 = 0$

$-(5\Omega) I_1 + (9\Omega) I_2 = -2V$

① $4I_1 + 4I_2 = 2V$ × 9 → ① $36I_1 + 36I_2 = 18V$

② $5I_1 - 9I_2 = 2V$ × 4 → ② $20I_1 - 36I_2 = 8V$

Add → $56I_1 = 26V$

$$I_1 = \frac{26\,V}{56\,\Omega} = \frac{13}{28}\,A = 0.4643\,A$$

① $$I_2 = \frac{2V - 4\left(\frac{13}{28}A\right)}{4} = 0.0357A$$

$$I_3 = I_1 - I_2 = 0.4286\,A$$