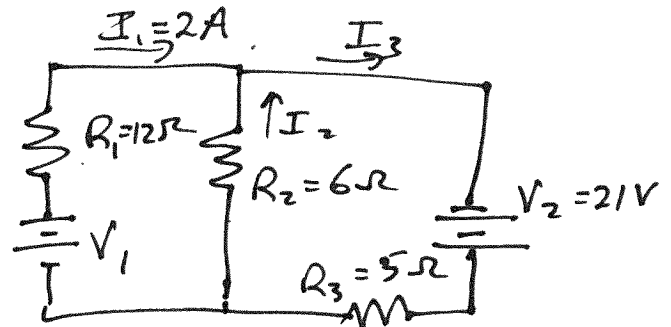


Ch. 10 Prob. 38

Find  $V_1$ ,  $I_2$ , &  $I_3$

Using Kirchhoff's Rules



Current Node

$$I_1 + I_2 = I_3$$

Voltage Loop

$$V_1 - 12I_1 + 6I_2 = 0$$

$$V_2 - 5I_3 - 6I_2 = 0$$

$I_1 = 2A$  &  $V_2 = 21$ , so the equations become

$$2 + I_2 = I_3 \quad \rightarrow \quad 2 + I_2 = I_3 \quad \textcircled{\#1}$$

$$V_1 - 12(2) + 6I_2 = 0 \quad \rightarrow \quad V_1 - 24 + 6I_2 = 0 \quad \textcircled{\#2}$$

$$21 - 5I_3 - 6I_2 = 0 \quad \rightarrow \quad 21 - 5I_3 - 6I_2 = 0 \quad \textcircled{\#3}$$

substitute  $\textcircled{\#1}$  into  $\textcircled{\#3}$

$$21 - 5(2 + I_2) - 6I_2 = 0$$

$$21 - 10 - 5I_2 - 6I_2 = 0$$

$$11 - 11I_2 = 0 \quad \rightarrow \quad 11I_2 = 11 \quad \rightarrow \quad \boxed{I_2 = 1A}$$

substitute into  $\textcircled{\#1}$

$$2 + (1A) = I_3 \quad \rightarrow \quad \boxed{I_3 = 3A}$$

substitute into  $\textcircled{\#2}$

$$V_1 - 24 + 6(1A) = 0$$

$$V_1 - 24 + 6 = 0$$

$$V_1 - 18 = 0 \quad \rightarrow \quad \boxed{V_1 = 18V}$$