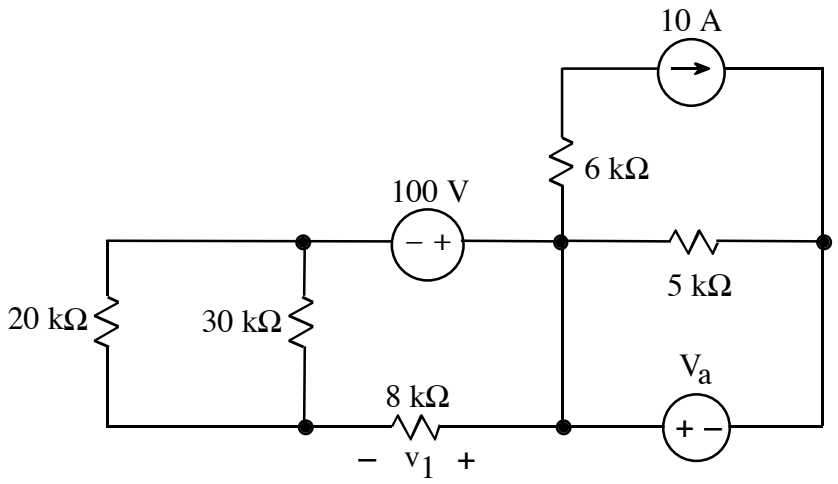
PRACTICE EXAM SOLUTION Prob 1

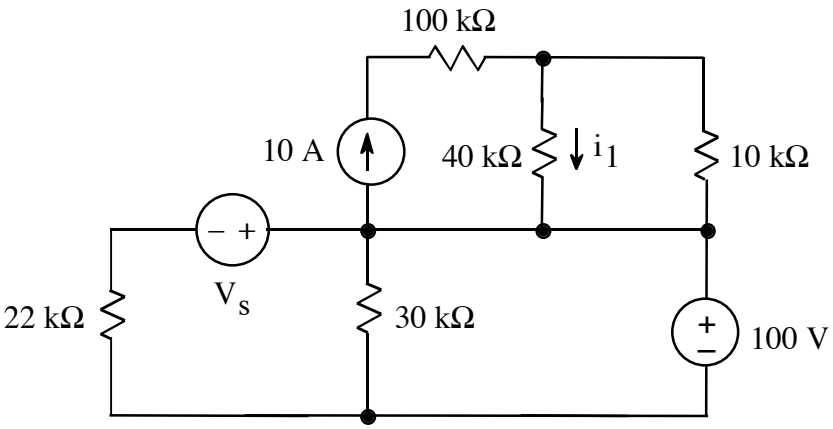
1. **a.** (5 points)

Calculate v_1.



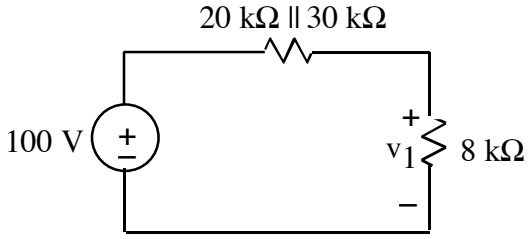
b. (5 points)

Calculate i_1.



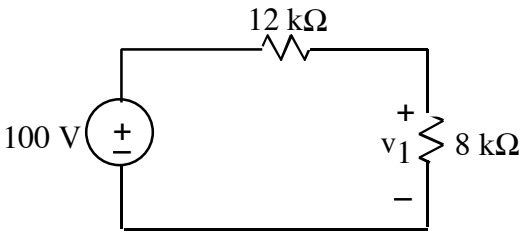
ans: a) 40 V
b) 2 A

sol'n: (a) The 100 V source is directly across 20 kΩ || 30 kΩ in series with 8 kΩ. Thus, the rest of the circuit is irrelevant in the calculation of v_1.



$$20\ \text{k}\Omega \parallel 30\ \text{k}\Omega = 10\ \text{k}\Omega \cdot 2 \parallel 3 = 10\ \text{k}\Omega \cdot \frac{2 \cdot 3}{2+3}$$

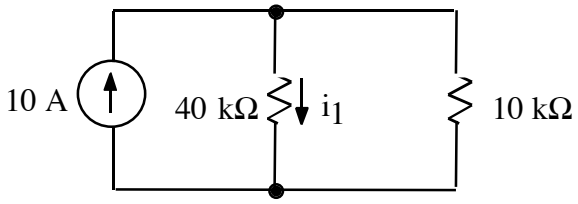
$$= 10\ \text{k}\Omega\ \frac{6}{5} = 12\ \text{k}\Omega$$



Now we have a voltage divider.

$$v_1 = 100\ \text{V} \cdot \frac{8\ \text{k}\Omega}{12\ \text{k}\Omega + 8\ \text{k}\Omega} = 40\text{V}$$

(b) The 10 A source current is in series with 40 kΩ || 10 kΩ. Thus, all of the 10 A must flow through the 40 kΩ || 10 kΩ, and the rest of the circuit is irrelevant in the calculation of i_1. We use the current divider formula, and we may ignore the 100 kΩ resistor.



$$i_1 = 10\ \text{A} \cdot \frac{10\ \text{k}\Omega}{10\ \text{k}\Omega + 40\ \text{k}\Omega} = 2\ \text{A}$$