

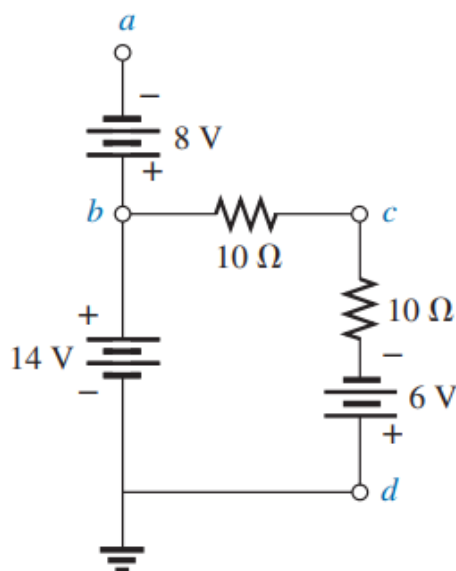
# CSE250: Circuits and Electronics

## Spring 2023

### Practice Problems Set 2

1. For the network shown below, determine,

- a.  $V_a, V_b, V_c, V_d$
- b.  $V_{ab}, V_{cb}, V_{cd}$
- c.  $V_{ad}, V_{ca}$

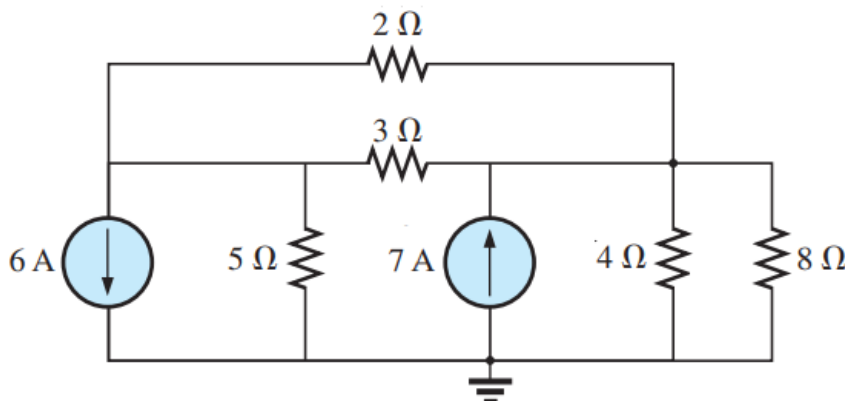


**Answer:**

- a. 6 V, 14 V, 4 V, 0 V
- b. -8 V, -10 V, 4 V
- c. 6 V, -2 V

2. For the network shown below,

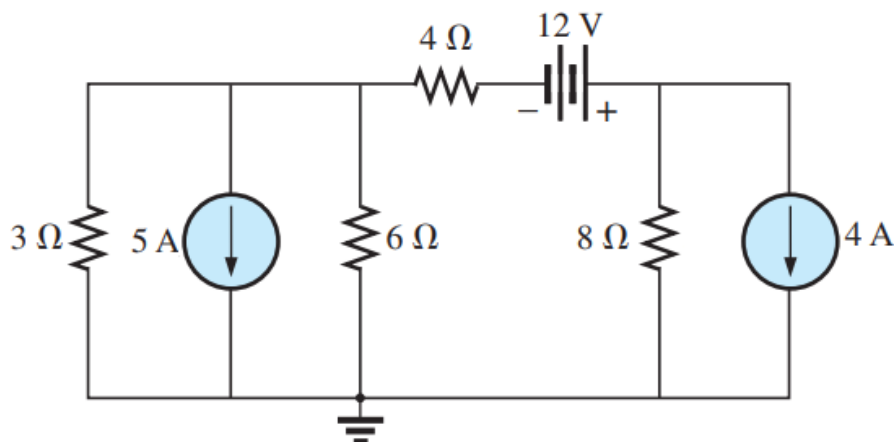
- a. Count the number of nodes.
- b. Determine the node voltages.
- c. Determine the power supplied by the current source.



**Answer:**

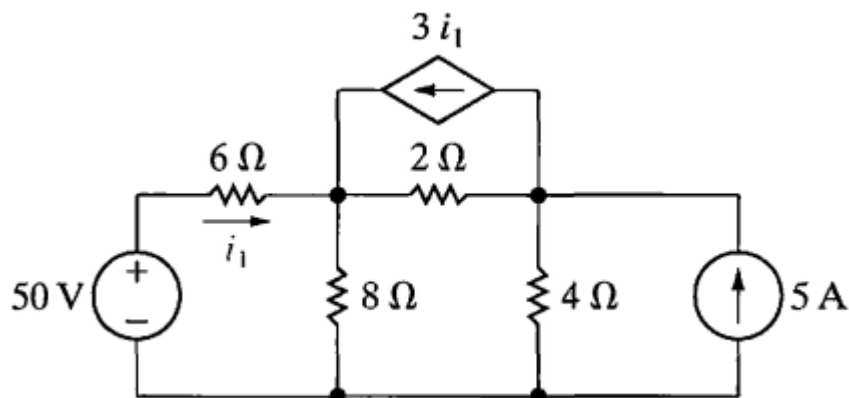
- a. Try yourself.
- b. -2.56 V, 4.03 V, 0 V

3. Use nodal analysis and determine the power of the 12 V source. **Answer:**  $-8.57 \text{ W}$

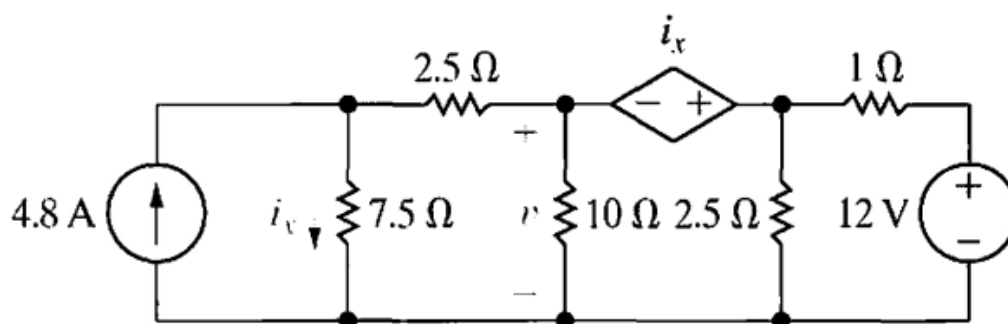


4. Use the node-voltage method to find the power associated with each source in the circuit shown. **Answer:**

$$p_{50V} = -150 \text{ W}, p_{3i_1} = -144 \text{ W}, p_{5A} = -80 \text{ W};$$

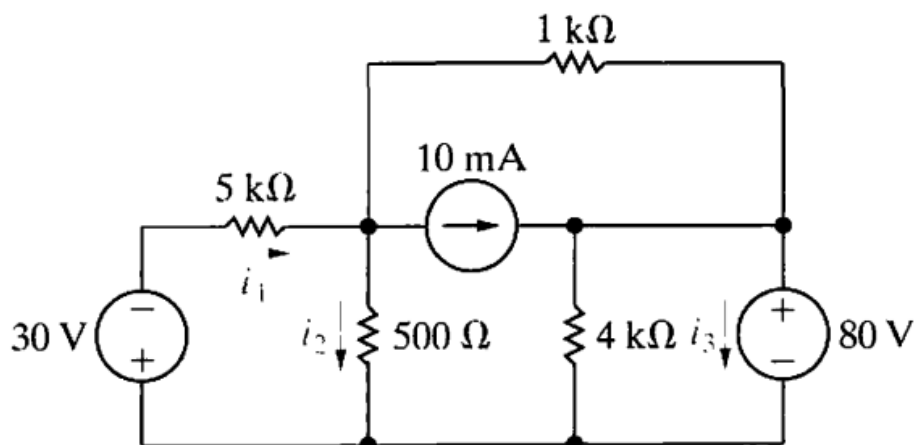


5. Use nodal analysis and find the current through the dependent voltage source. **Answer:**  $\pm 2 \text{ A}$



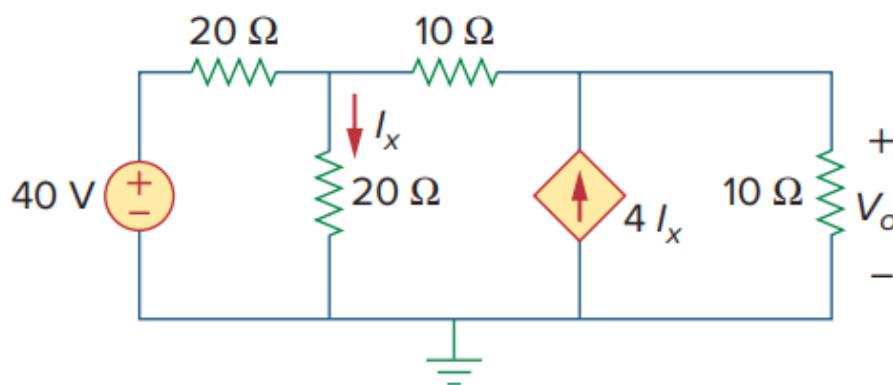
6. Use the node-voltage method to find the branch currents  $i_1$ ,  $i_2$ , and  $i_3$ .

**Answer:** 2 mA, 40 mA, -70 mA



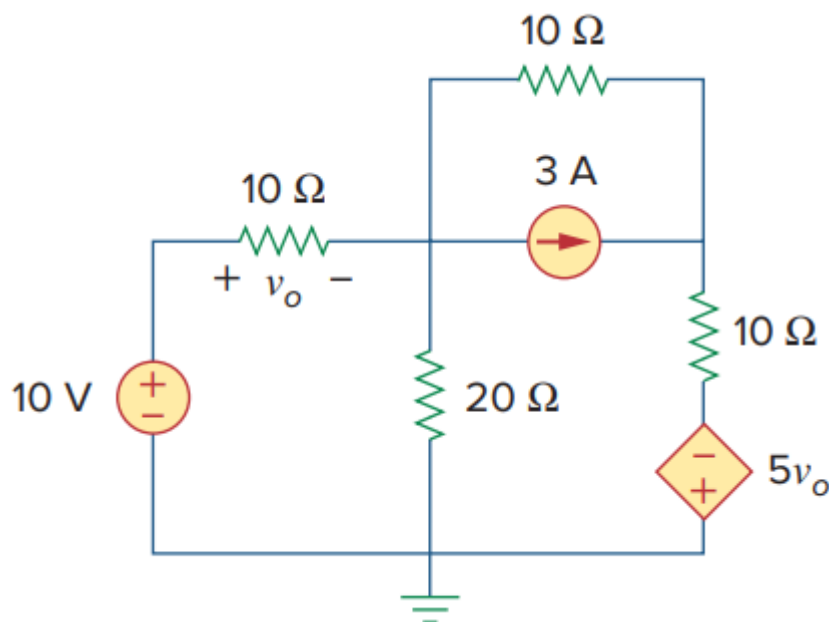
7. Using nodal analysis, determine  $V_o$  in the circuit below.

**Answer:** 60 V



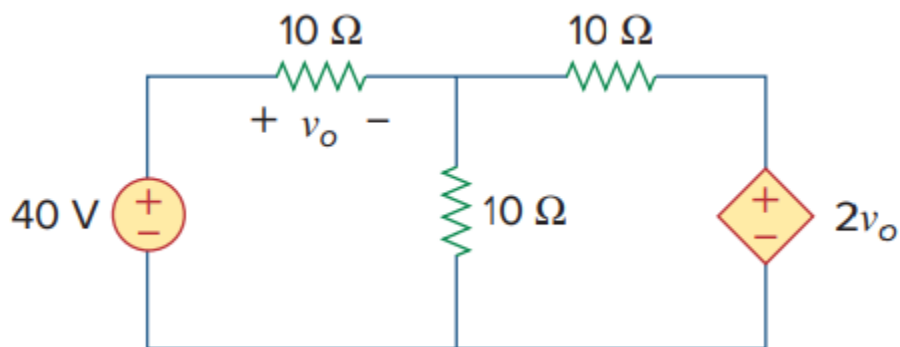
8. Using nodal analysis, determine  $v_o$  in the circuit below.

**Answer:** -50 V



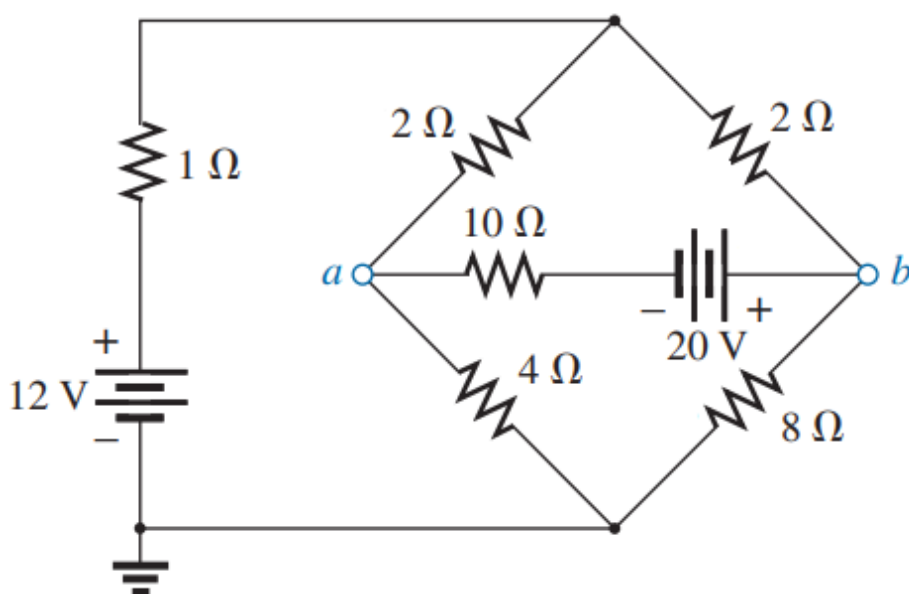
9. Using mesh analysis, find  $v_o$ .

**Answer:** 16 V



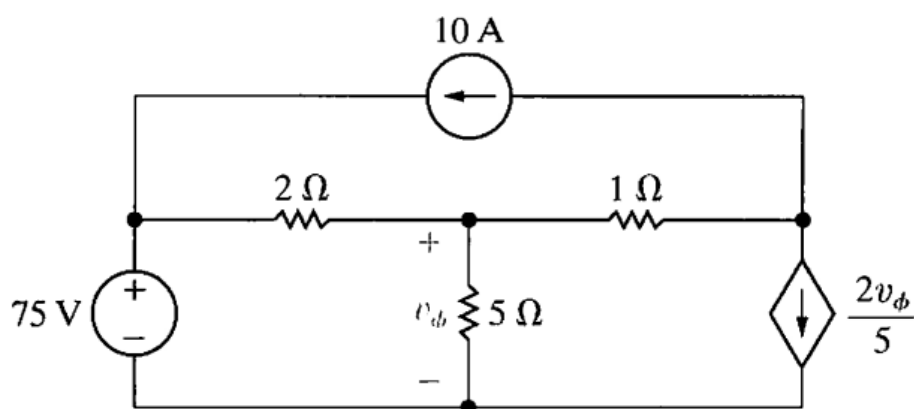
10. Use mesh analysis and determine  $V_{ab}$ .

**Answer:** -5.53 V

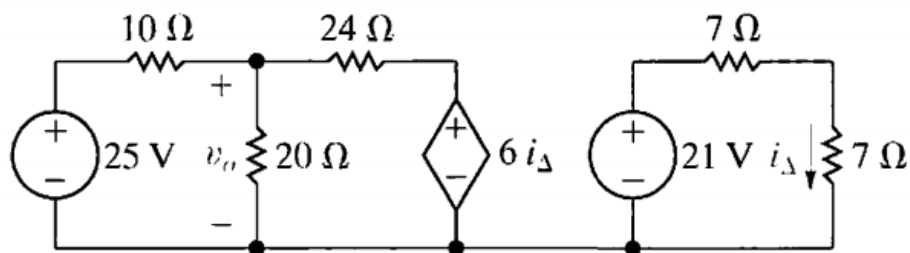


11. Use mesh analysis to determine the current supplied by the 75 V source.

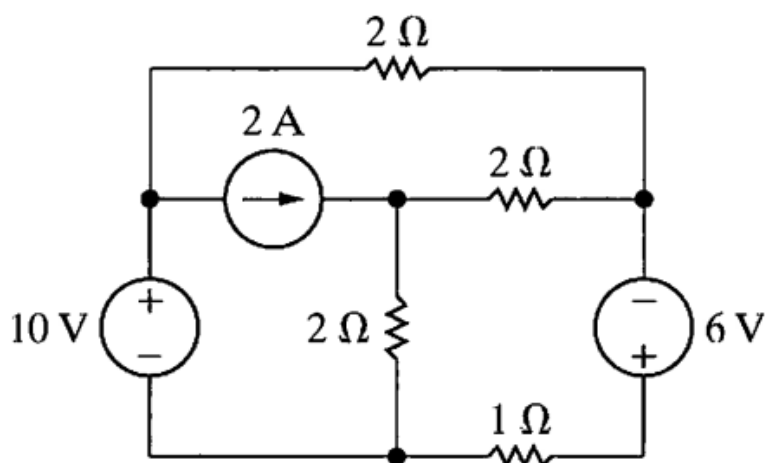
**Answer:** 15 A



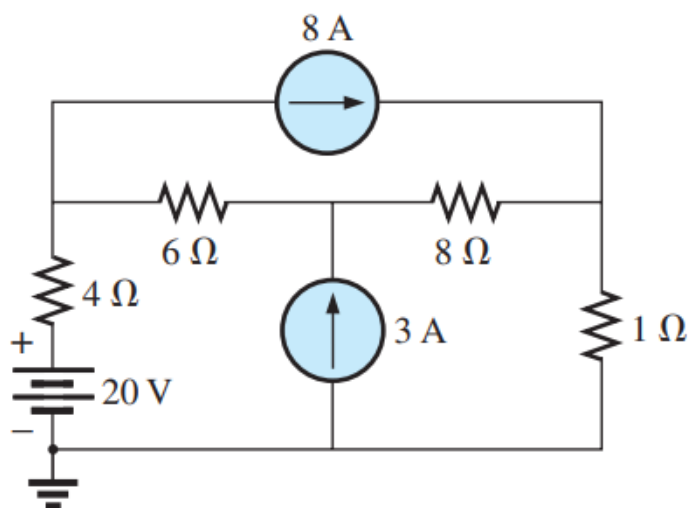
- 12.** Use mesh analysis and determine  $v_o$ . Find the power delivered by the dependent source. **Answer:** 15 V



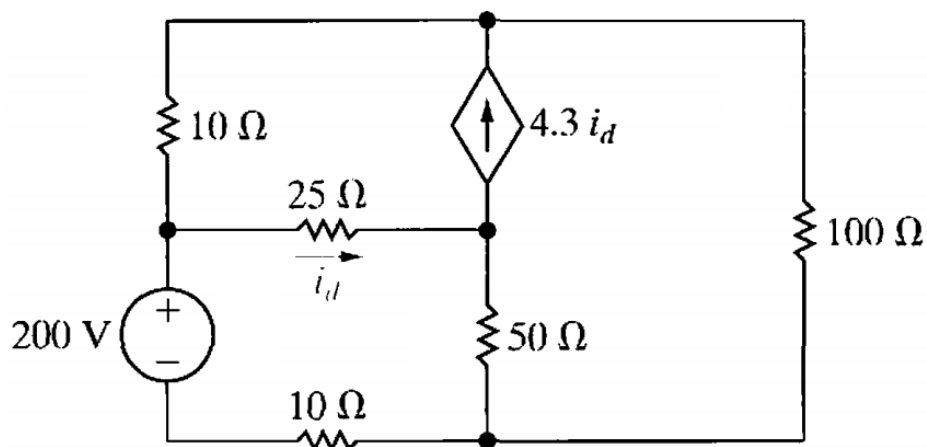
- 13.** Use the mesh-current method to find the power dissipated in the 1 Ω resistor in the circuit shown. **Answer:** 36 W.



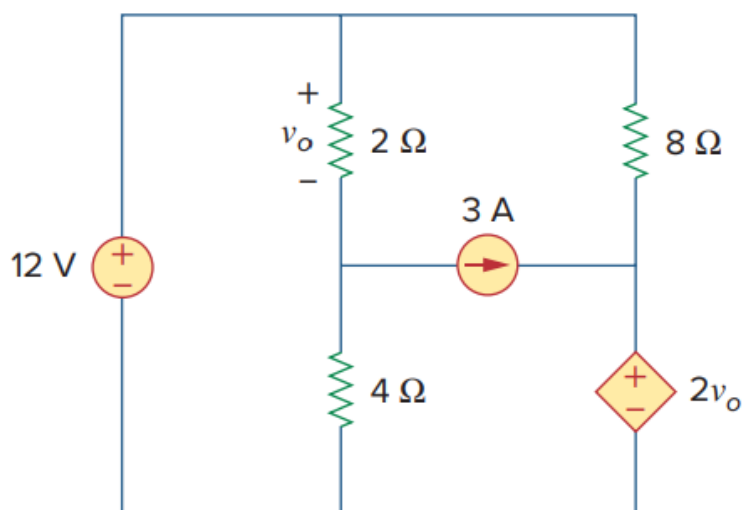
- 14.** Use mesh analysis and determine the power of the 3 A source. **Answer:** 12.74 W



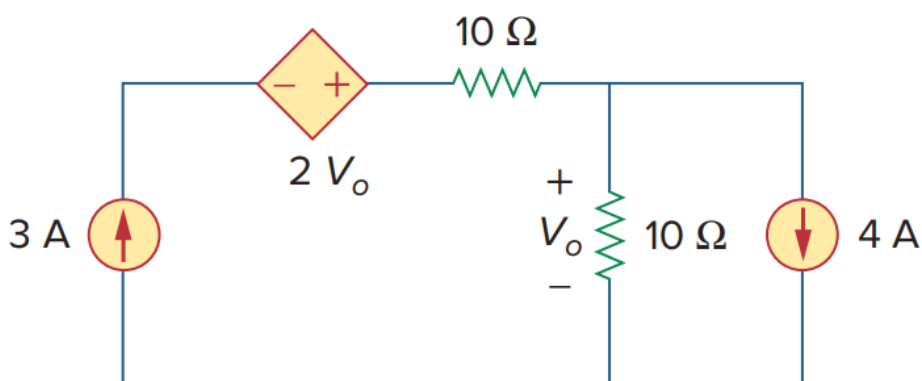
- 15.** Use mesh analysis and determine the power of the dependent source. **Answer:**  $-0.75 \text{ kW}$



- 16.** Use mesh analysis method and determine voltage across the 3 A current source. **Answer:**  $\mp 12 \text{ V}$

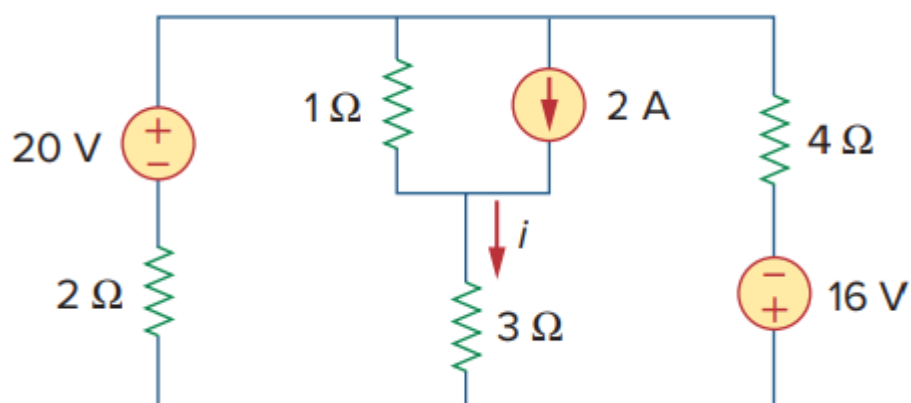


- 17.** Use superposition to solve for  $v_o$  in the following circuit. **Answer:**  
 $v_o = -10 \text{ V}$



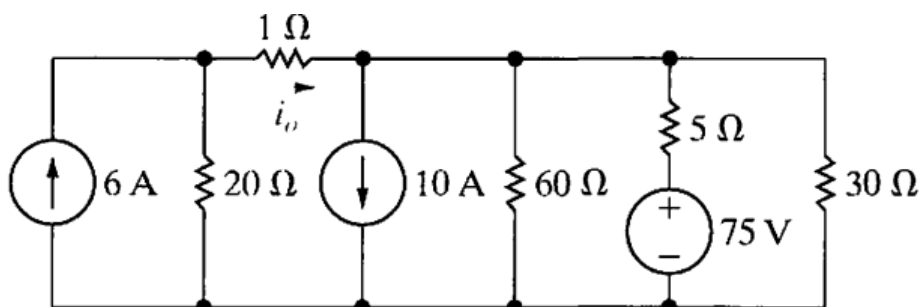
- 18.** For the circuit shown below, use superposition to find  $i$ . Calculate the power delivered to the 3- $\Omega$  resistor.

**Answer:**  
1.875 A, 10.55 W



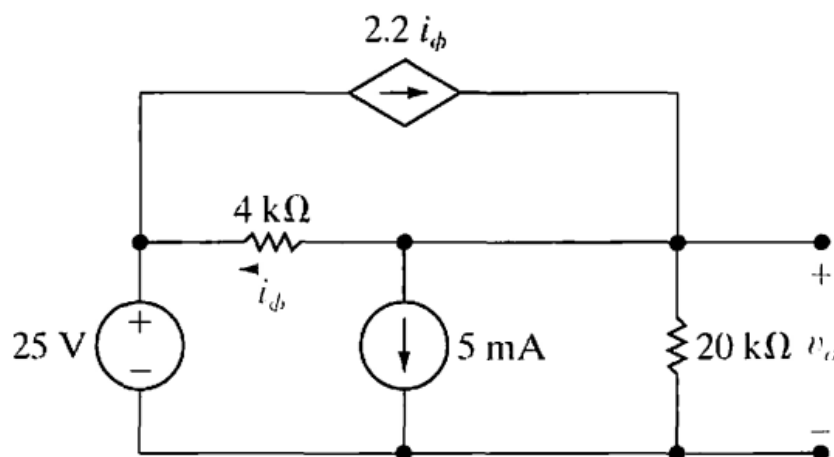
- 19.** Use the superposition principle to find  $i_0$  in the following circuit.

**Answer:**  
 $i_0 = 4.8 + 1.6 - 2.4$   
 $= 4 \text{ A}$



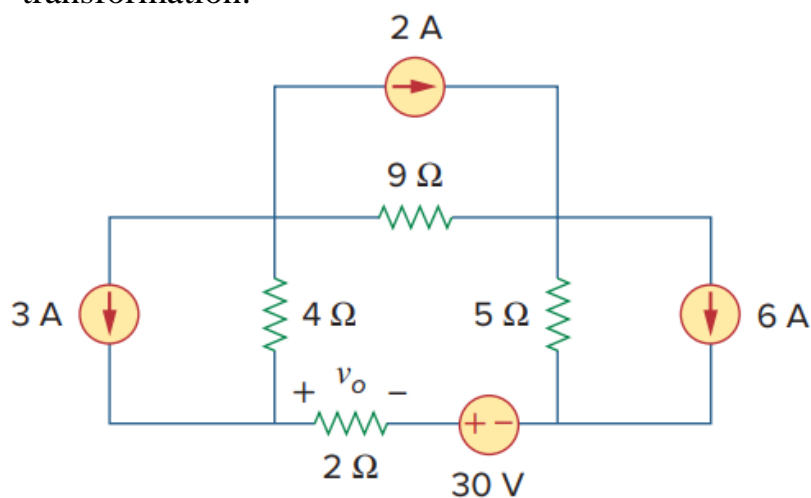
- 20.** Determine  $v_0$  using superposition principle.

**Answer:**  
 $v_0 = 30 + 20$   
 $= 50 \text{ V}$



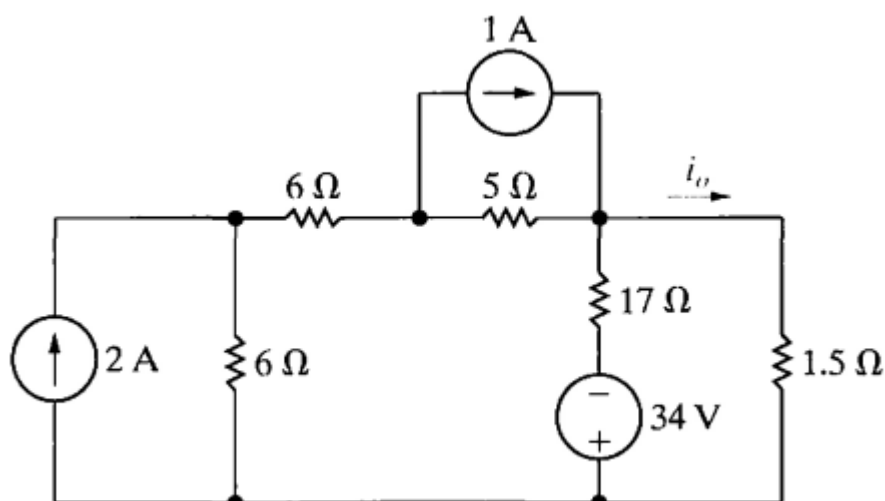
**21.** Obtain  $v_o$  in the following circuit using source transformation.

**Answer:**  $-6.6\text{ V}$



**22.** Use a series of source transformations to find  $i_o$ .

**Answer:**  $-0.85\text{ A}$



**23.** Use source transformation to find  $v_o$ .

**Answer:**  $3\text{ V}$

