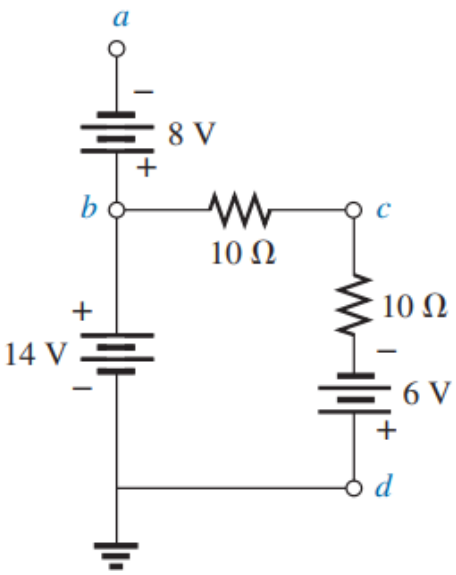
CSE250: Circuits and Electronics
Spring 2023
Practice Problems Set 2

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}

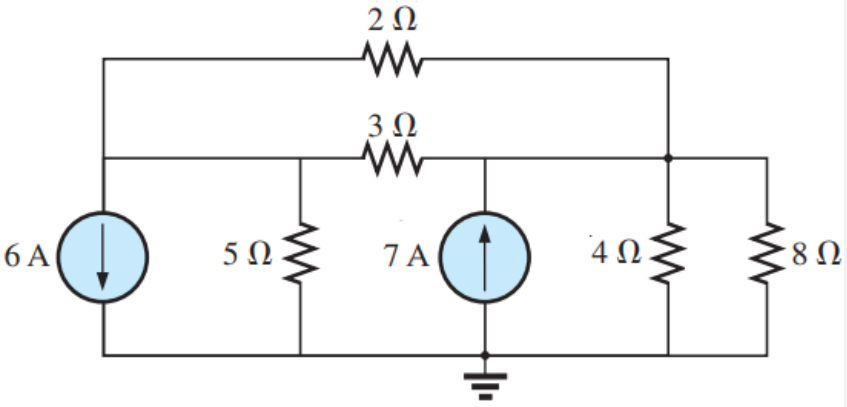


Answer:

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.

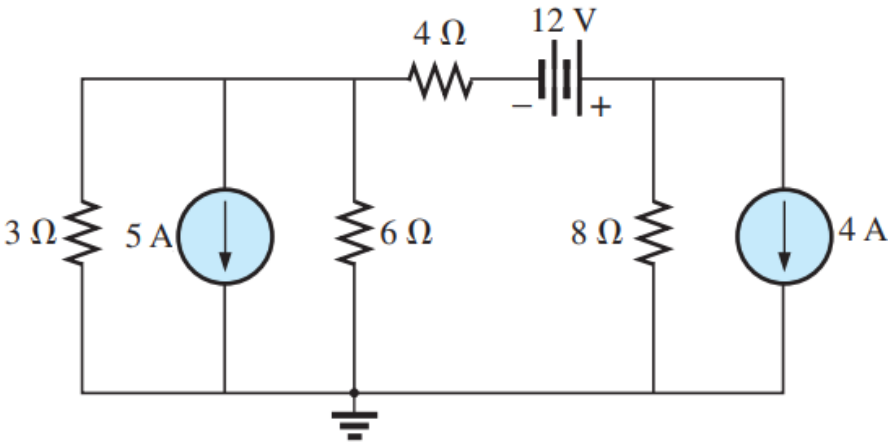


Answer:

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

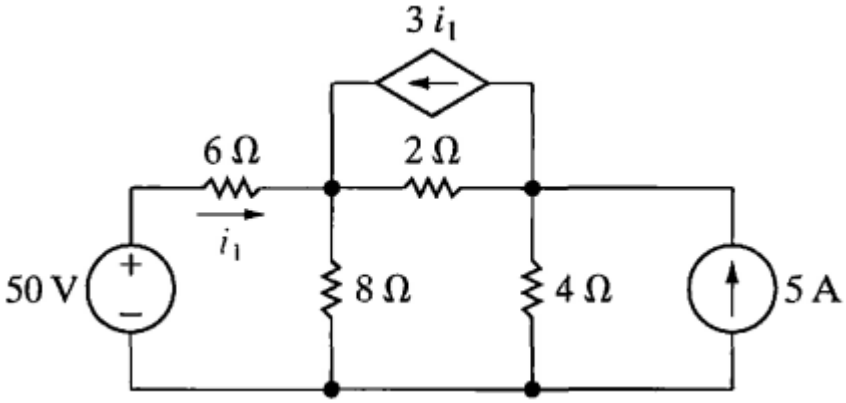
3. Use nodal analysis and determine the power of the 12 V battery.

Answer: $-29.14\ W$



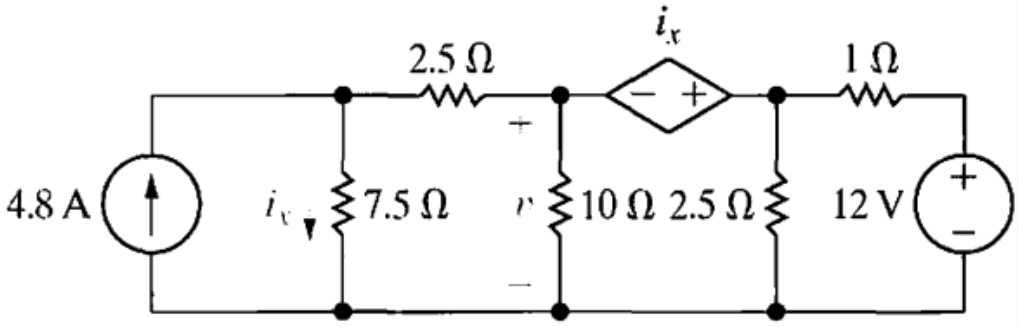
4. Use the node-voltage method to find the power associated with each source in the circuit shown.

Answer:
$p_{50v} = -150\ W, p_{3i_1} = -144\ W,\ p_{5A} = -80\ W$;



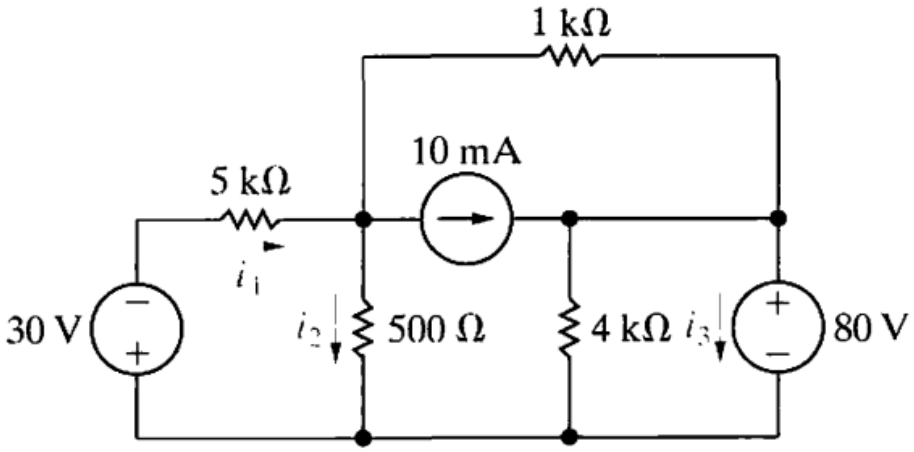
5. Use nodal analysis and find the current through the dependent voltage source.

Answer: $\pm 2\ A$



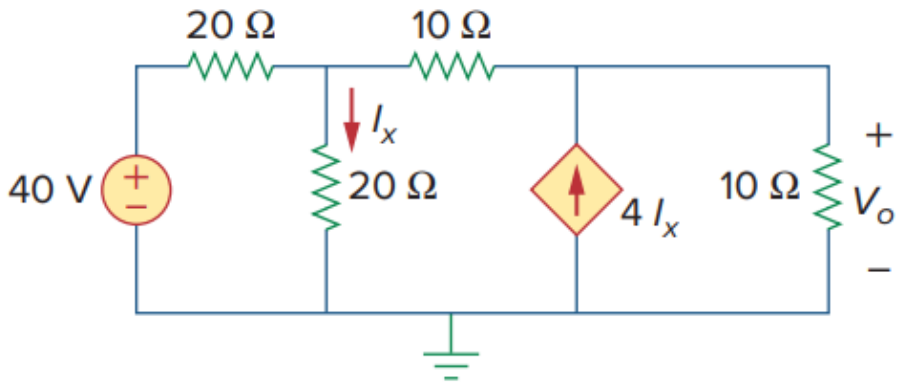
6. Use the node-voltage method to find the branch currents i_1, i_2, and i_3.

Answer: $2\ mA$, $40\ mA, -70\ mA$



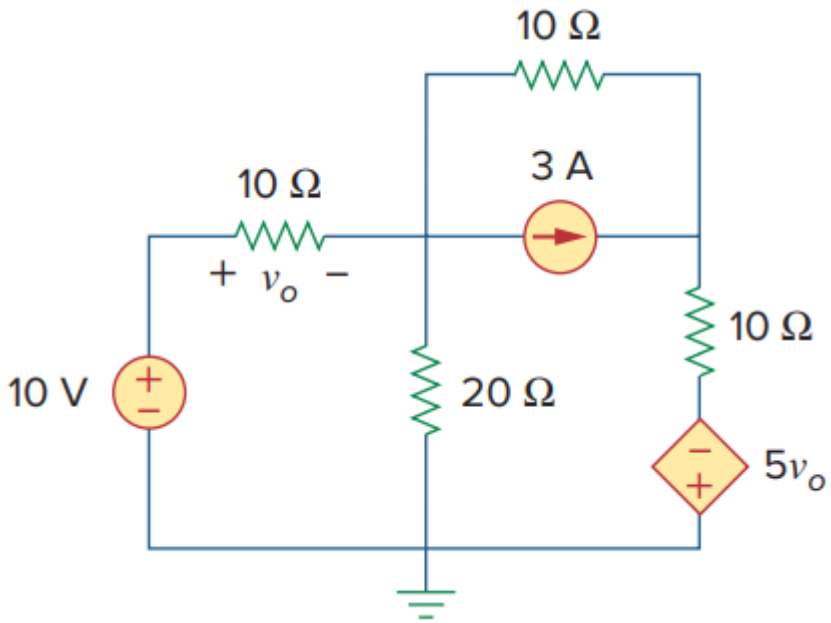
7. Using nodal analysis, determine V_o in the circuit below.

Answer: $60\ V$



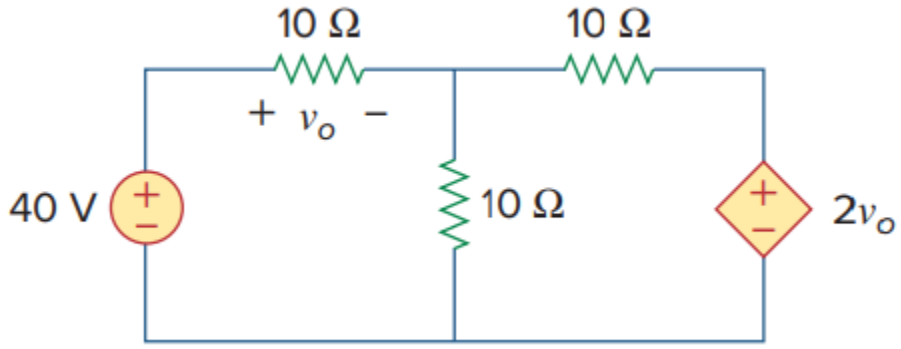
8. Using nodal analysis, determine v_o in the circuit below.

Answer: $-50\ V$



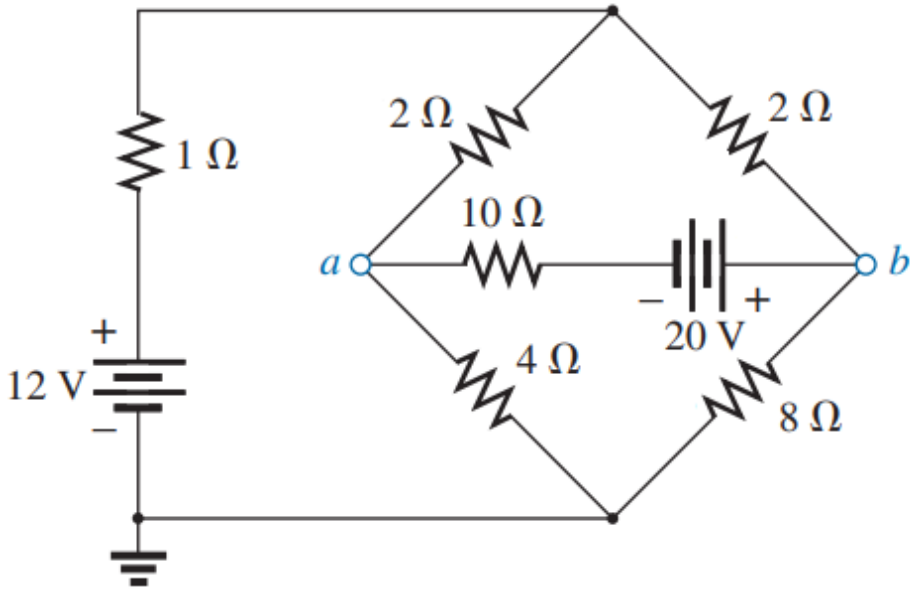
9. Using mesh analysis, find v_o.

Answer: $16\ V$



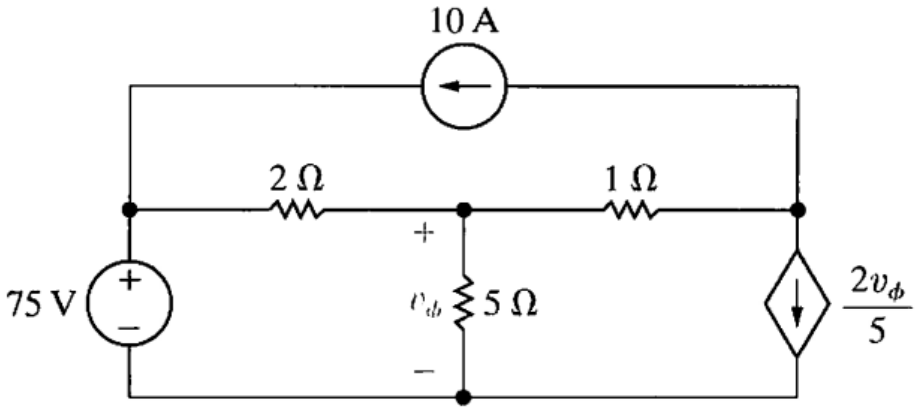
10. Use mesh analysis and determine V_{ab}.

Answer: $-5.53\ V$



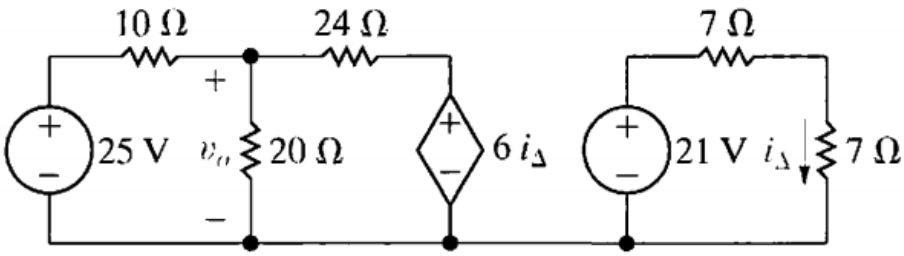
11. Use mesh analysis to determine the current supplied by the $75\ V$ source.

Answer: $15\ A$



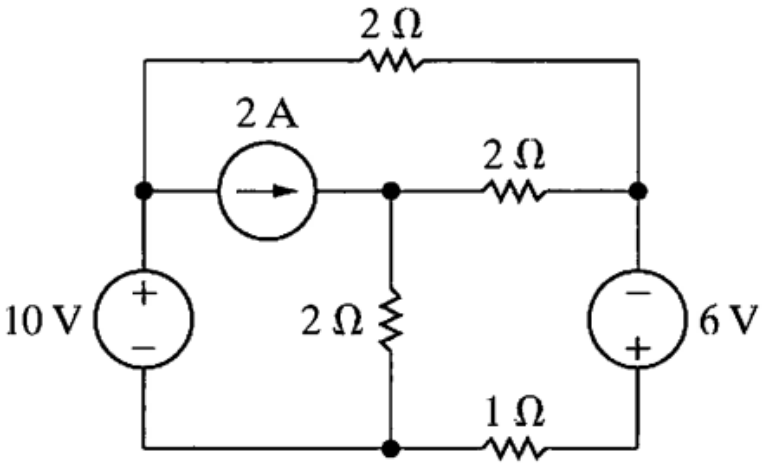
12. Use mesh analysis and determine v_0. Find the power delivered by the dependent source.

Answer: $15\ V$



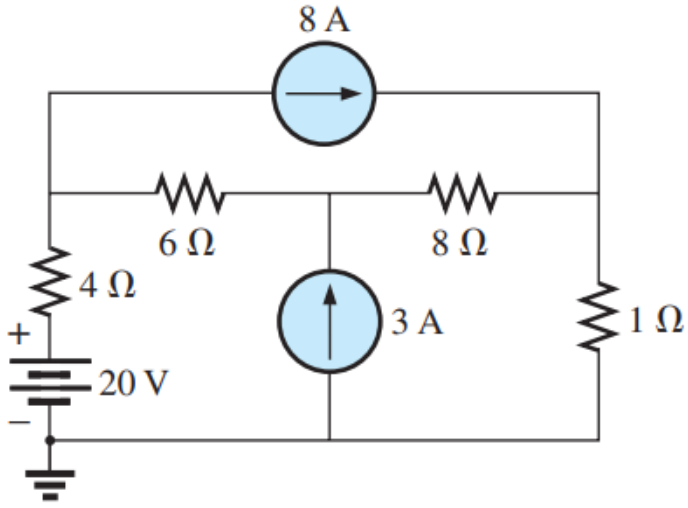
13. Use the mesh-current method to find the power dissipated in the 1 resistor in the circuit shown.

Answer: $36\ W$.



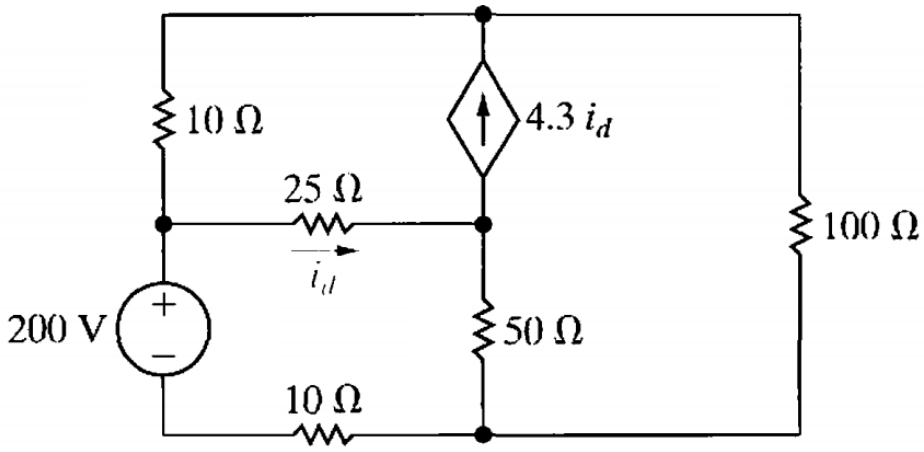
14. Use mesh analysis and determine the power of the $3\ A$ source.

Answer: $12.74\ V$



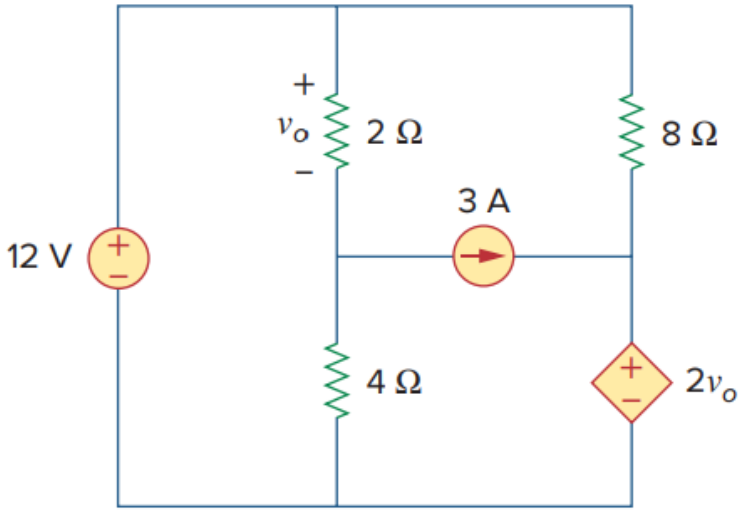
15. Use mesh analysis and determine the power of the dependent source.

Answer: $-0.75\ kW$



16. Use mesh analysis method and determine voltage across the 3 A current source.

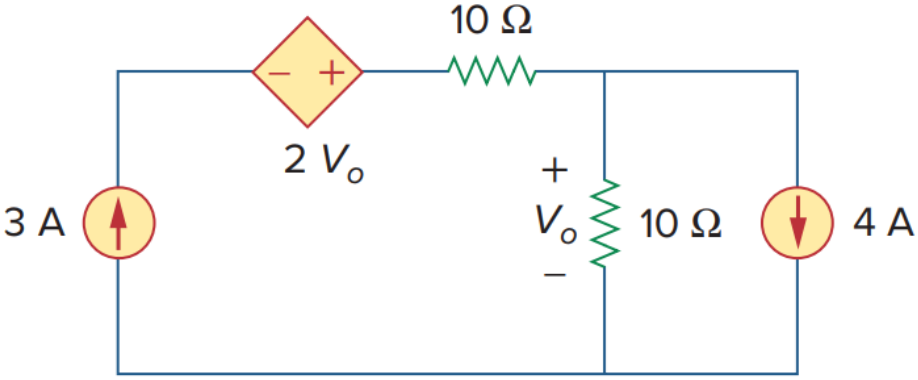
Answer: $\mp 12\ V$



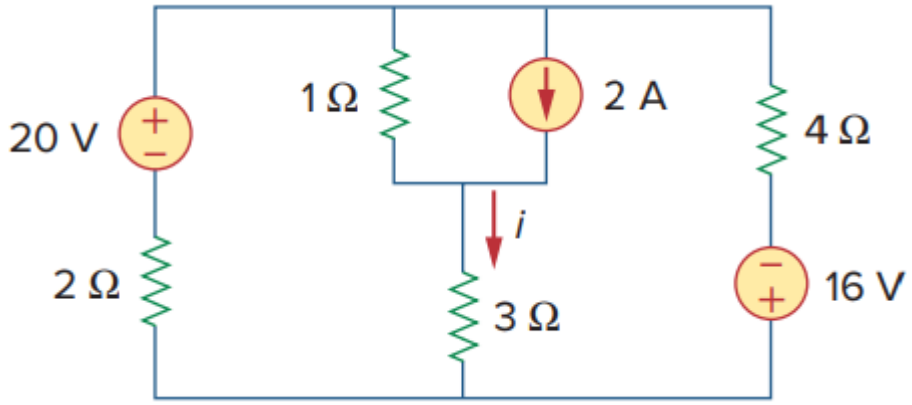
17. Use superposition to solve for v_0 in the following circuit.

Answer:

$v_0 = -10\ V$

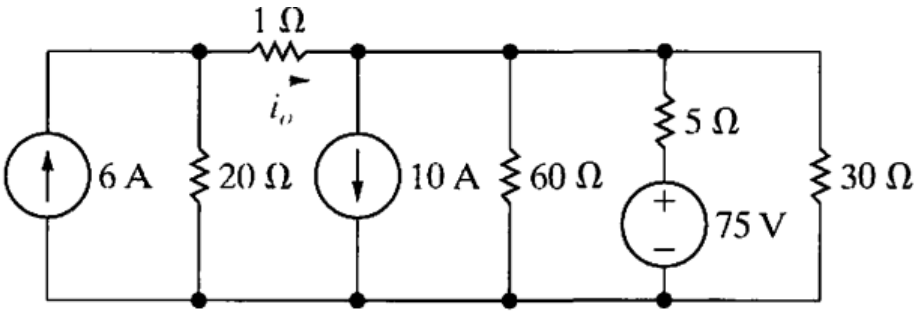


18. For the circuit shown below, use superposition to find i. Calculate the power delivered to the 3-Ω resistor.



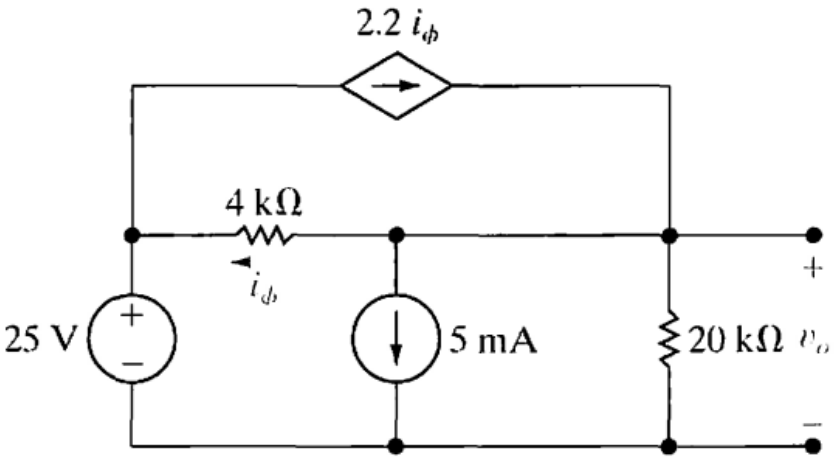
Answer:
$1.875\ A, 10.55\ W$

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



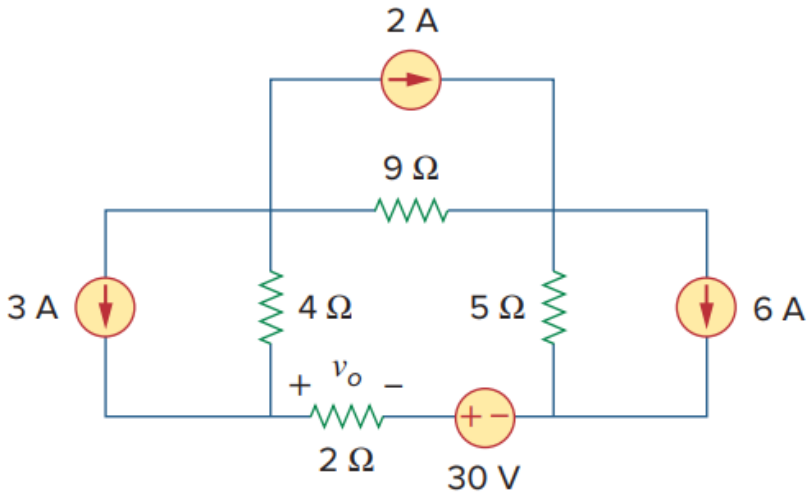
Answer:
$i_0 = 4.8 + 1.6 - 2.4$
$= 4\ A$

20. Determine v_0 using superposition principle.



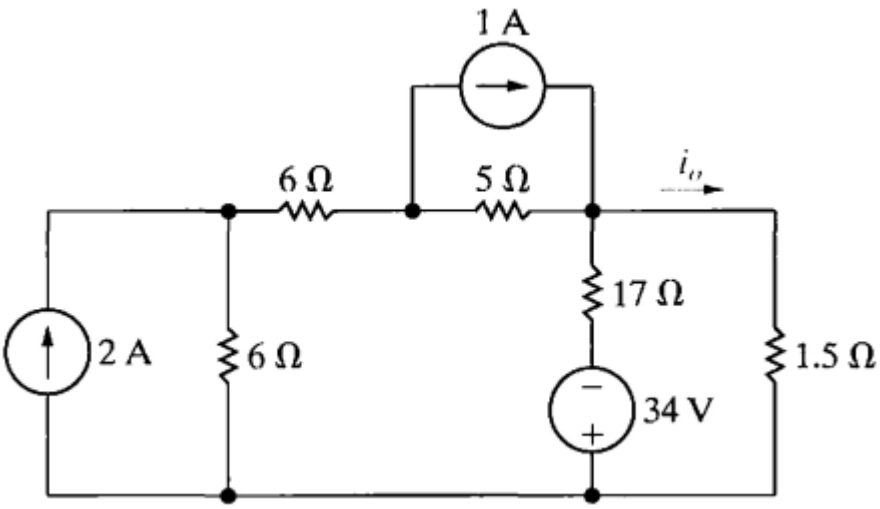
Answer:
$v_0 = 30 + 20$
$= 50\ V$

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



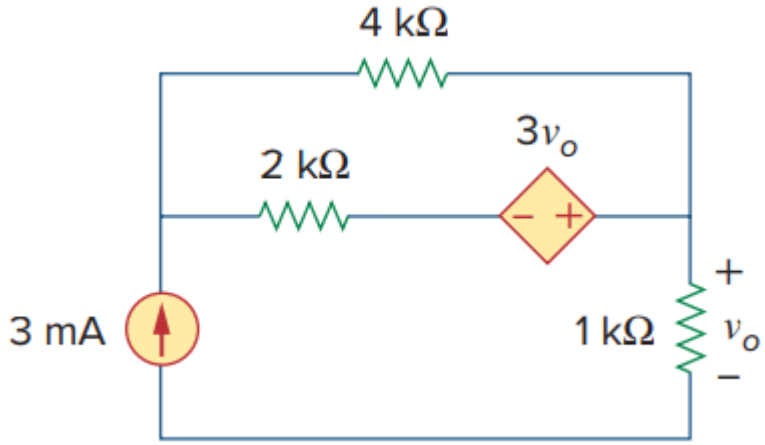
Answer: $-6.6\ V$

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



Answer: $-0.85\ A$

23. Use source transformation to find v_o.



Answer: $3\ V$