

EE202 – Electric Circuits I

Lecture 2 – Introductory Concepts

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Topics

- Introduction
- Ideal Voltage Source
- Ideal Current Source
- Open Circuit
- Short Circuit

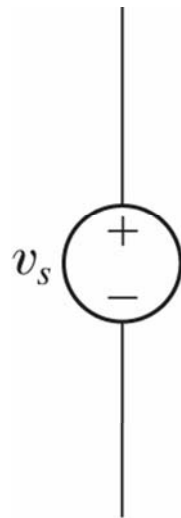
Objectives

- Recognize the symbols of ideal voltage and current sources
- Find voltage polarity
- Find current direction
- Calculate voltage and current in simple resistive circuits
- Recognize invalid connections to the ideal voltage and current sources

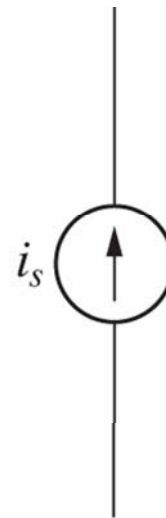
Chapter 2

Voltage and Current Sources

Circuit symbols for (a) an ideal independent voltage source and (b) an ideal independent current source.

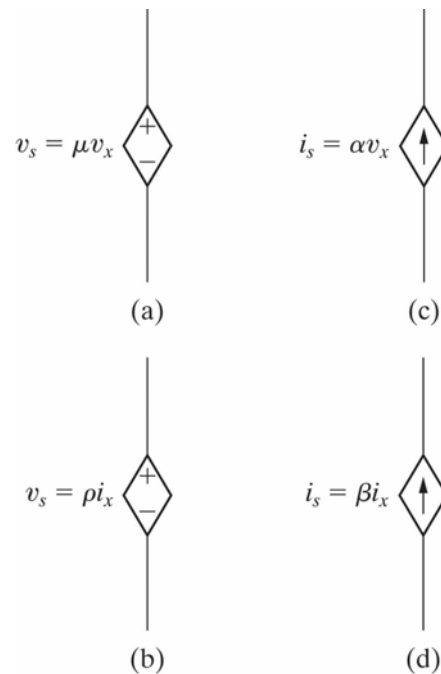


(a)

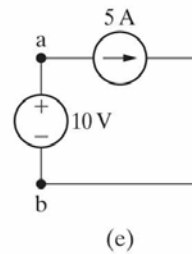
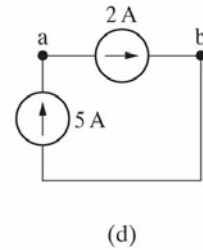
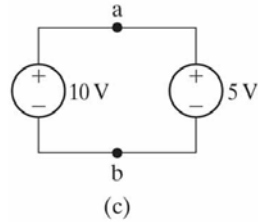
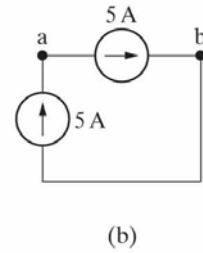
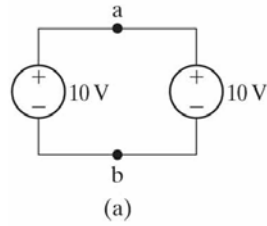


(b)

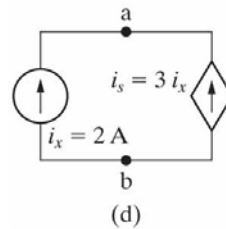
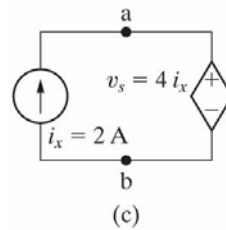
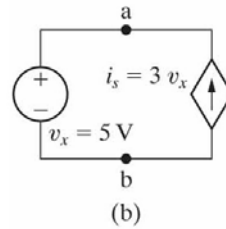
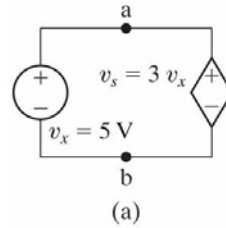
Circuit symbols for (a) an ideal dependent voltage-controlled voltage source, (b) an ideal dependent current-controlled voltage source, (c) an ideal dependent voltage-controlled current source, and (d) an ideal dependent current-controlled current source.



The circuits for Example 2.1.



The circuits for Example 2.2.

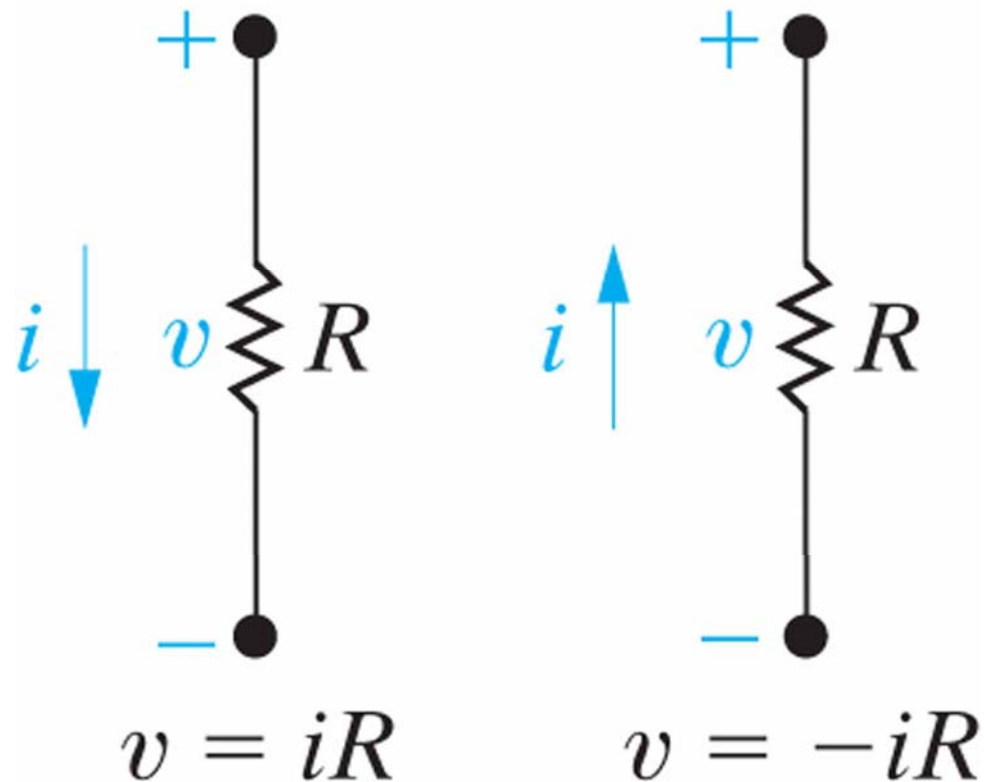


The circuit symbol for a resistor having a resistance R .



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Two possible reference choices for the current and voltage at the terminals of a resistor, and the resulting equations.

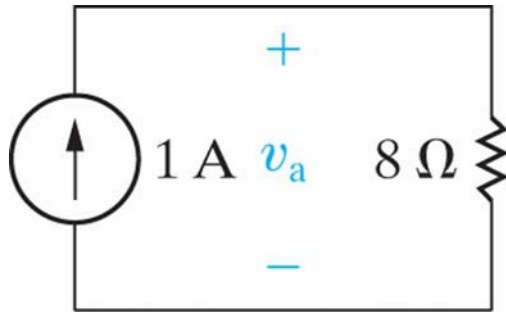


The circuit symbol for an 8 Ω resistor.

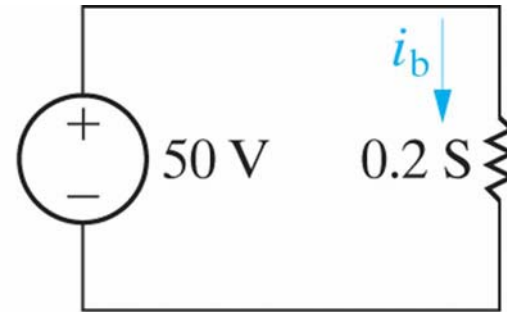


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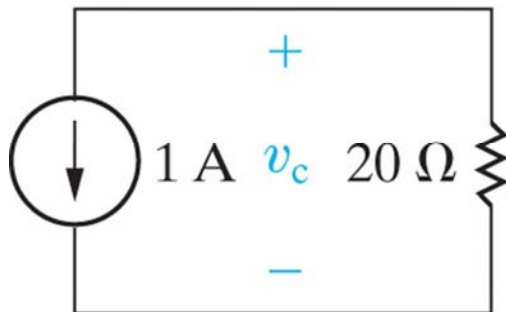
The circuits for Example 2.3.



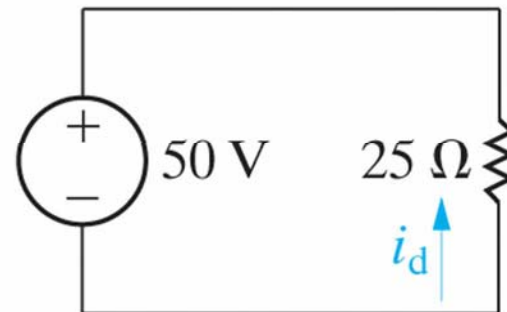
(a)



(b)



(c)



(d)

A flashlight can be viewed as an electrical system.



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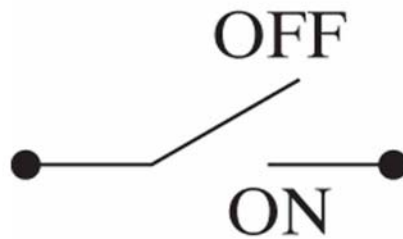
Circuit symbols. (a) Short circuit.
(b) Open circuit. (c) Switch.



(a)

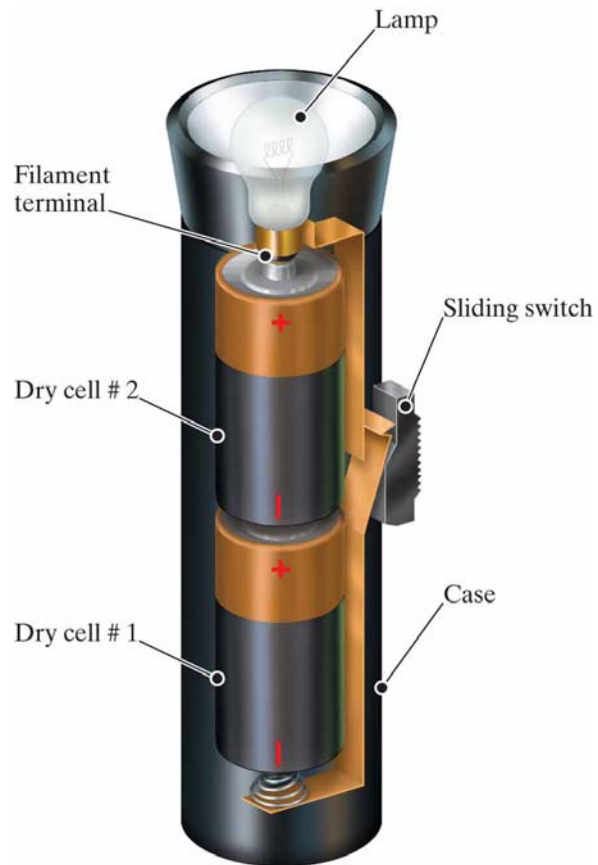


(b)

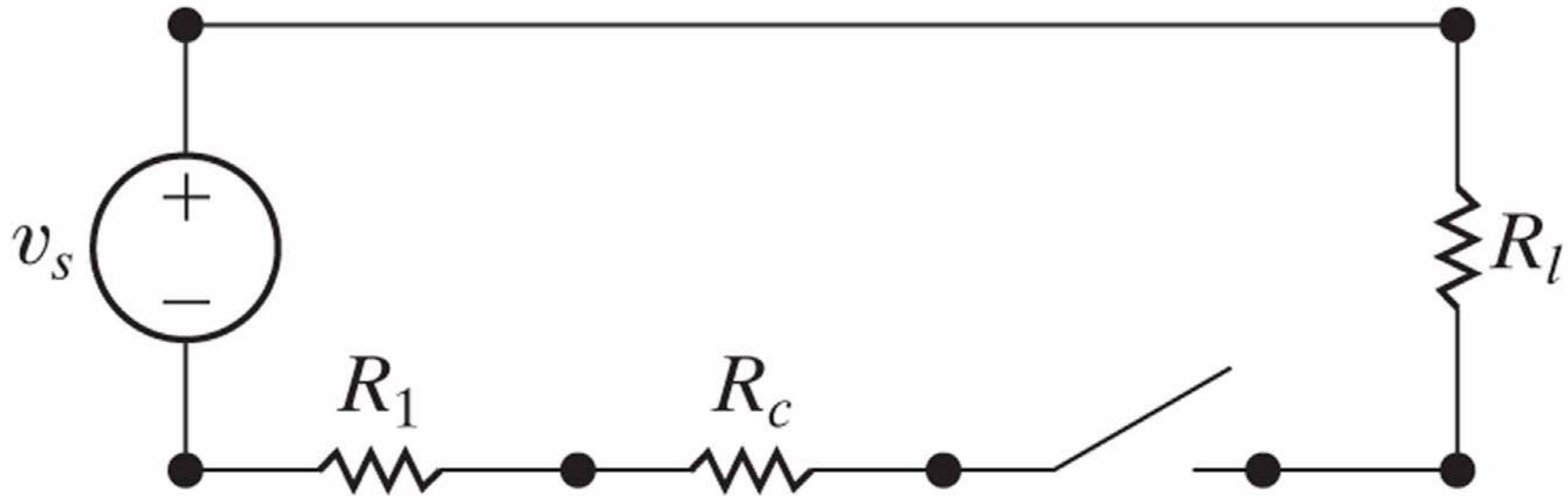


(c)

The arrangement of flashlight components.

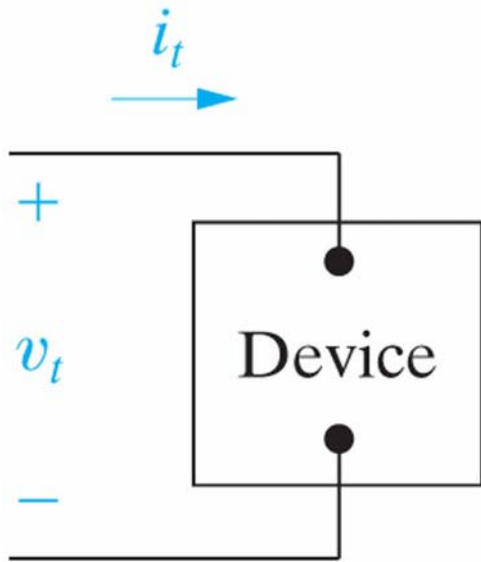


A circuit model for a flashlight.



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The (a) device and (b) data for Example 2.5.

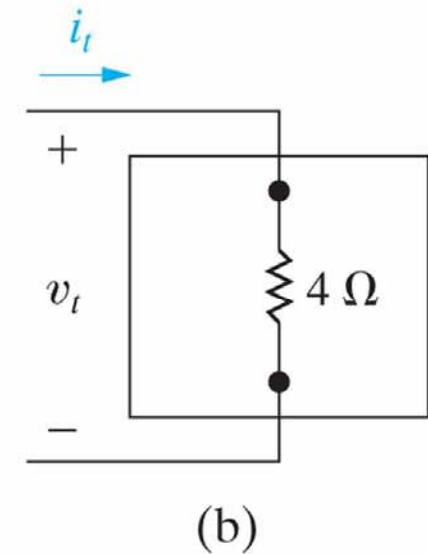
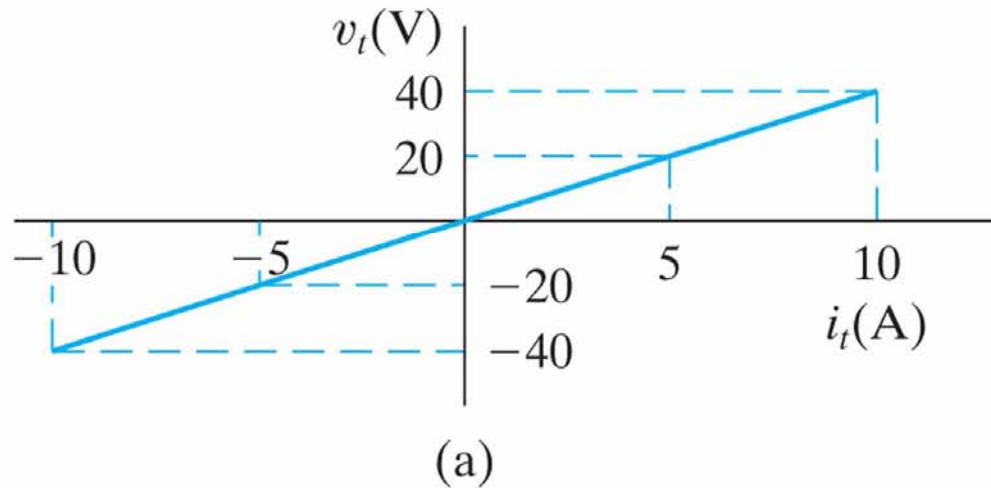


(a)

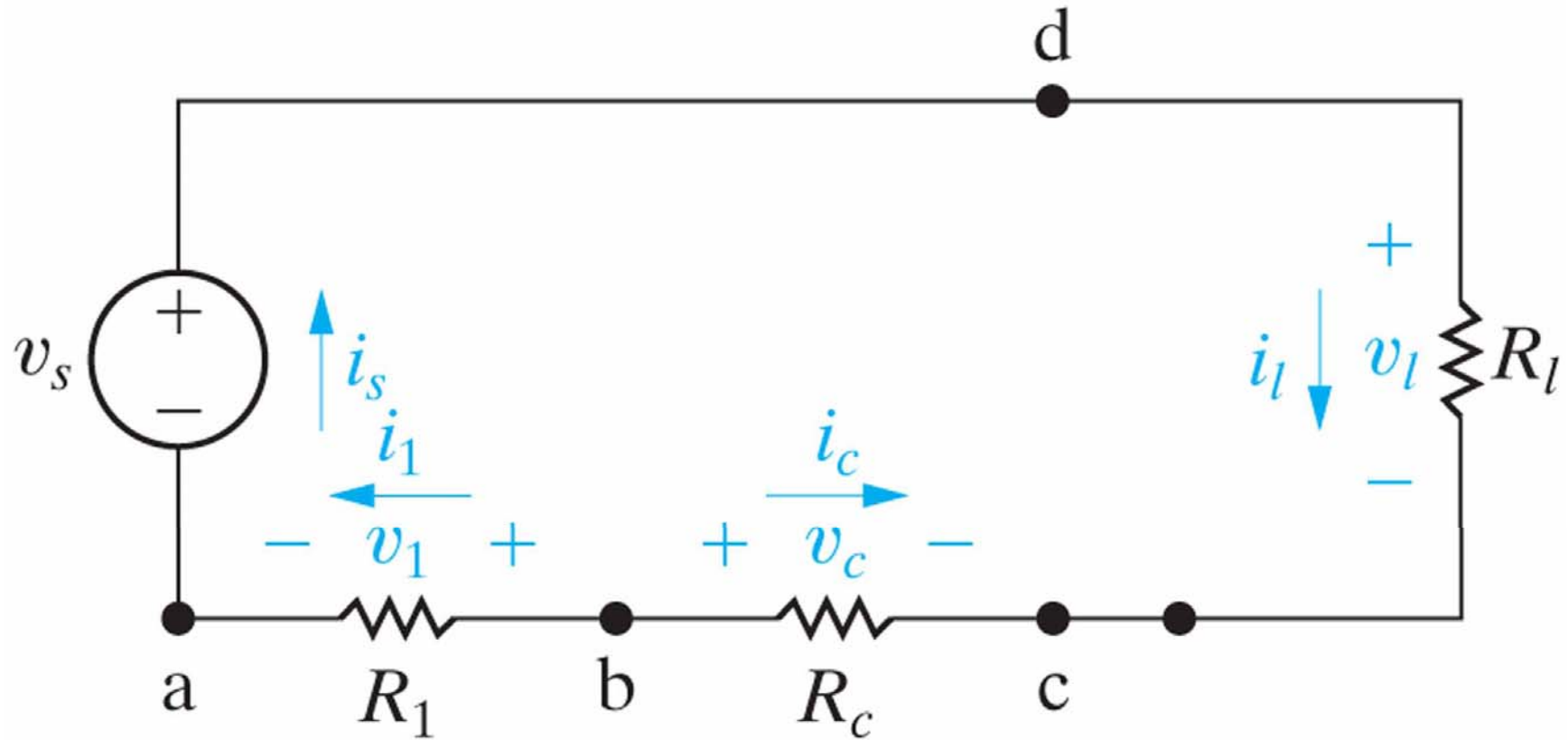
v_t (V)	i_t (A)
-40	-10
-20	-5
0	0
20	5
40	10

(b)

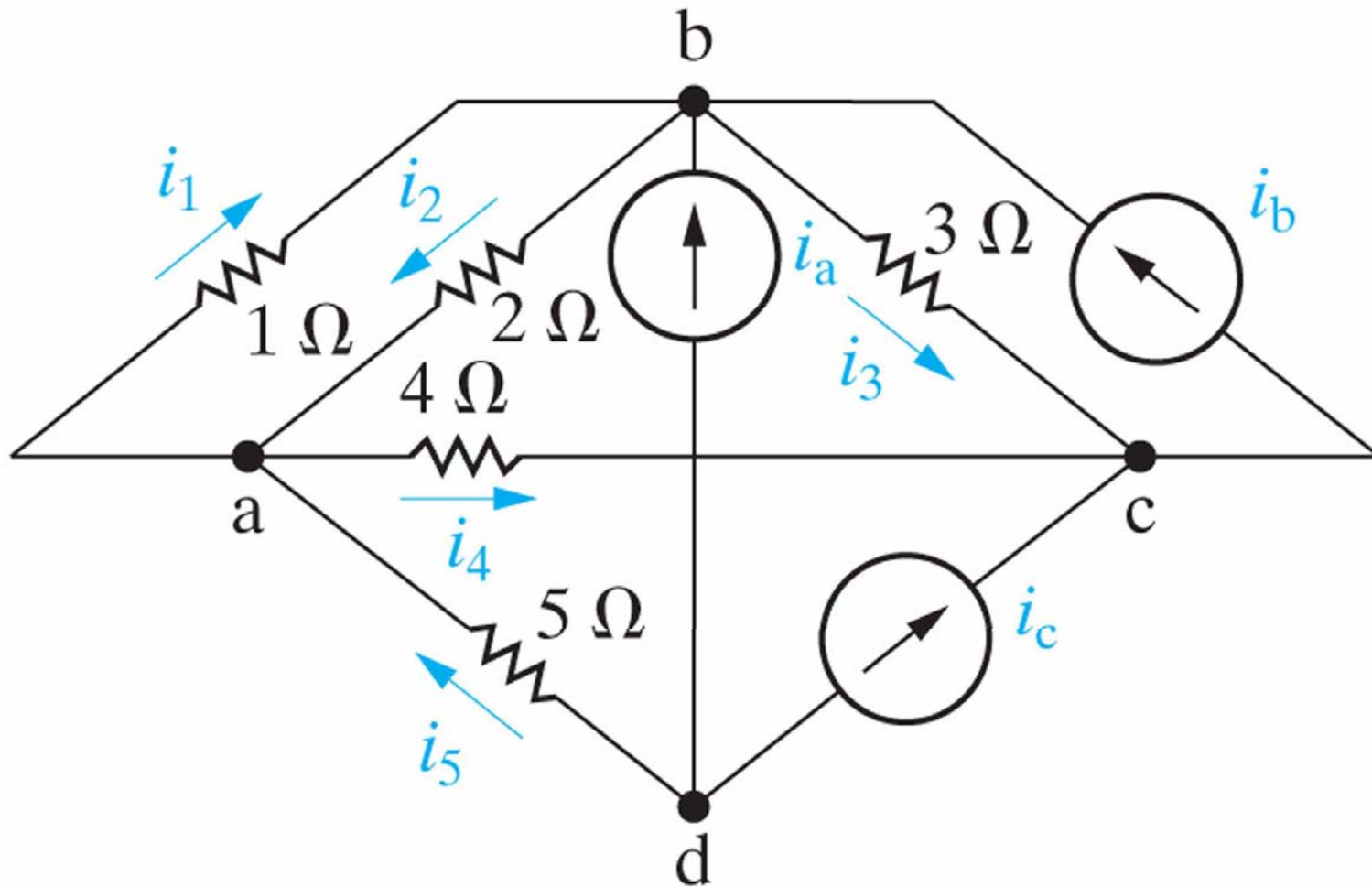
(a) The values of v_t versus i_t for the device in Fig. 2.13. (b) The circuit model for the device in Fig. 2.13.



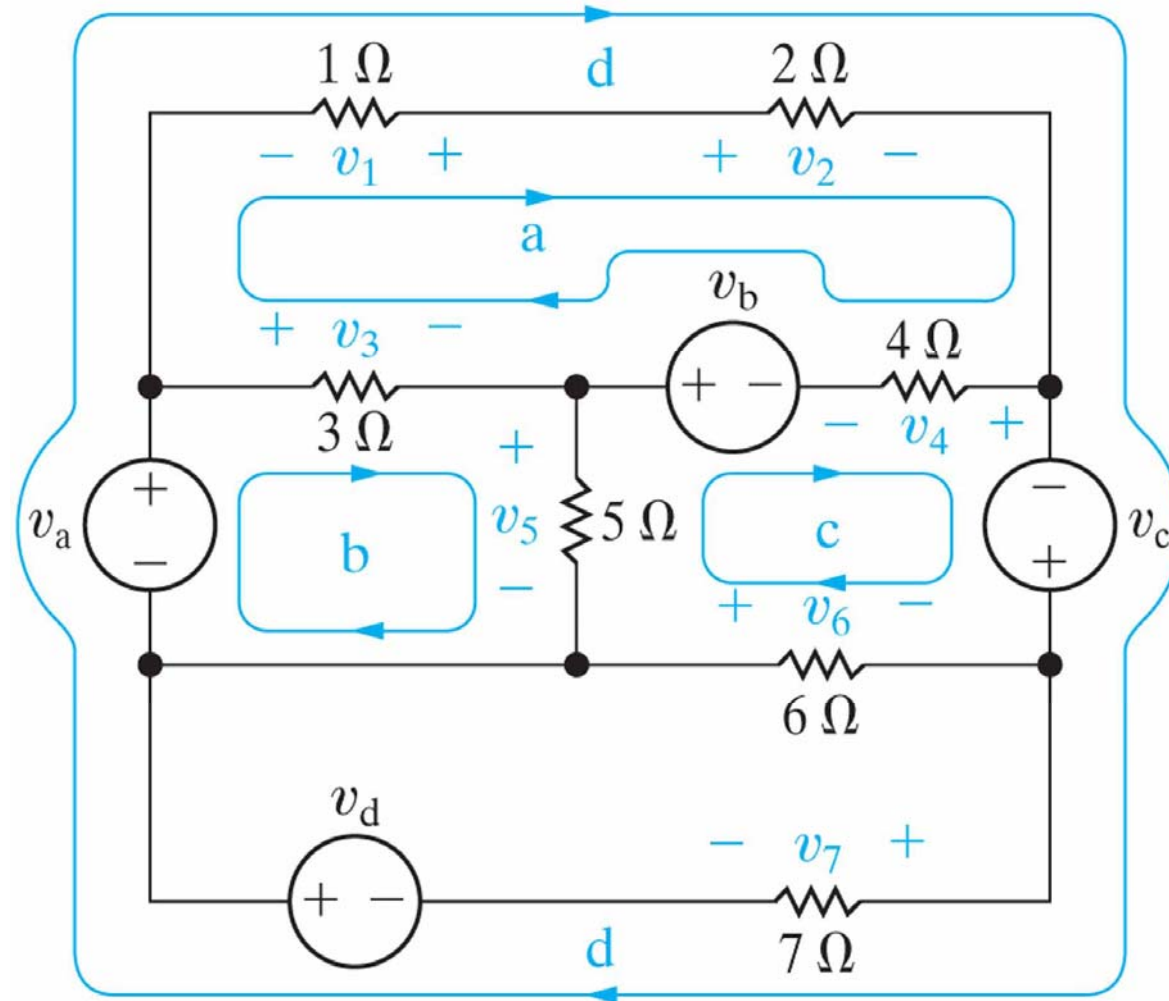
Circuit model of the flashlight with assigned voltage and current variables.



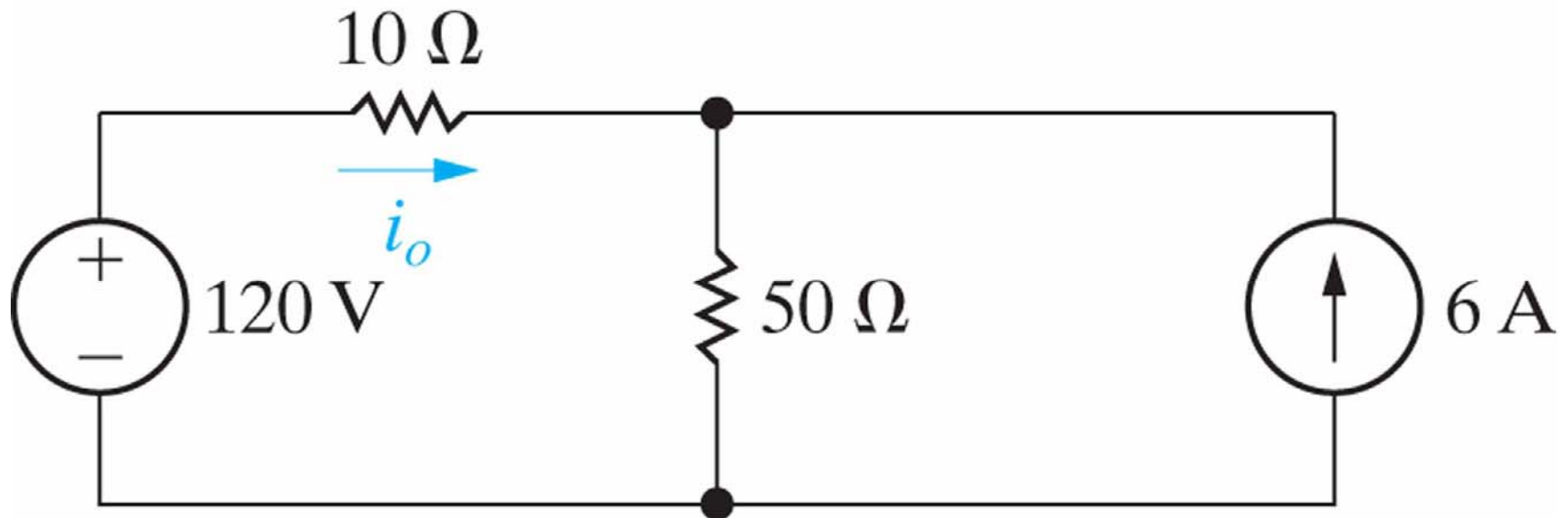
The circuit for Example 2.6.



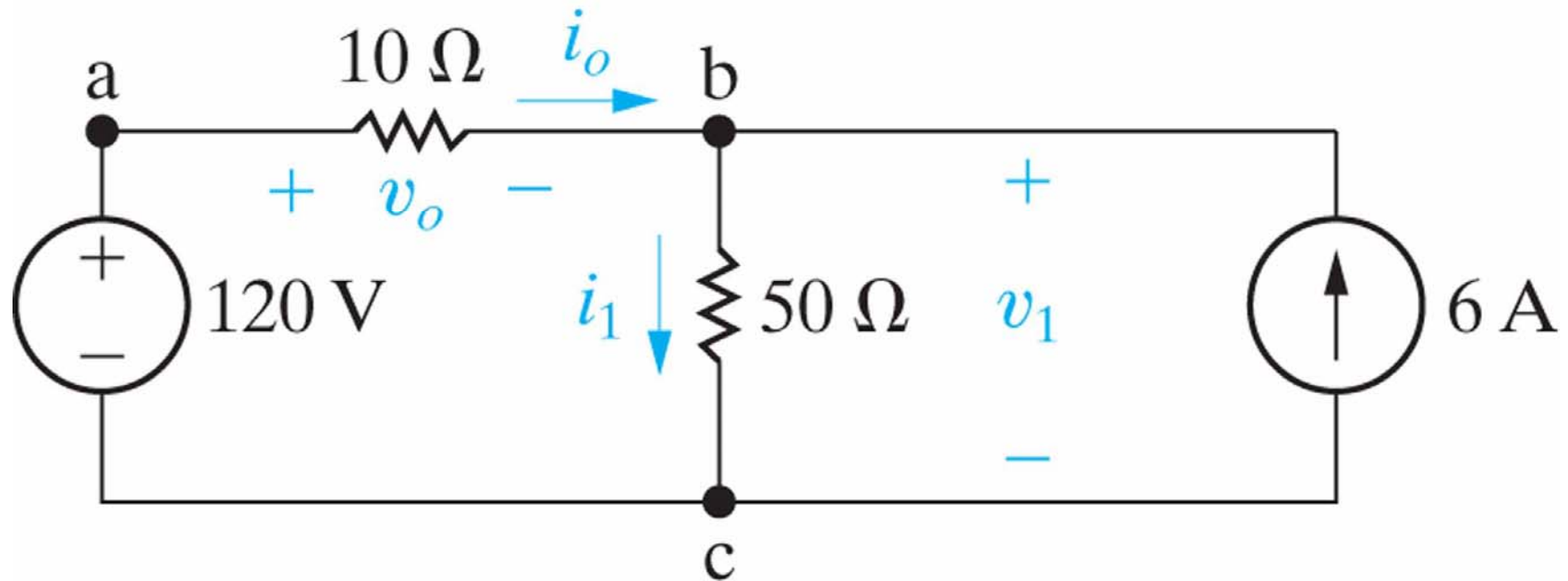
The circuit for Example 2.7.



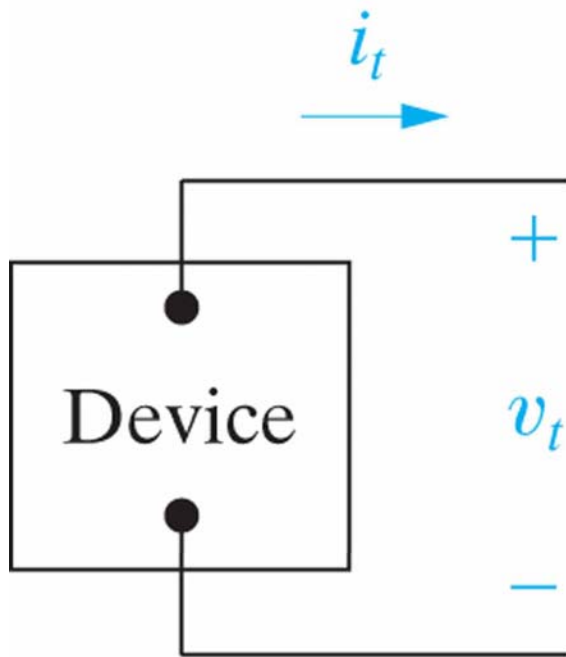
The circuit for Example 2.8.



The circuit shown in Fig. 2.18, with the unknowns i_1 , v_o , and v_1 defined.



(a) Device and (b) data for Example 2.9.

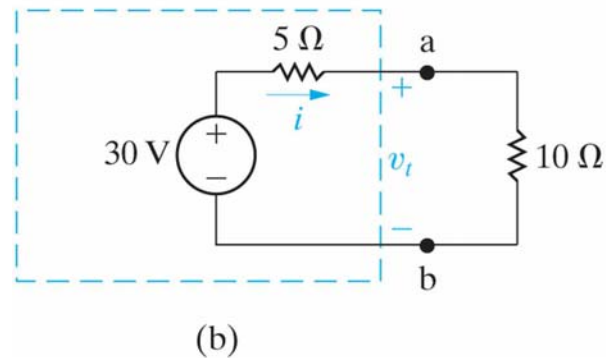
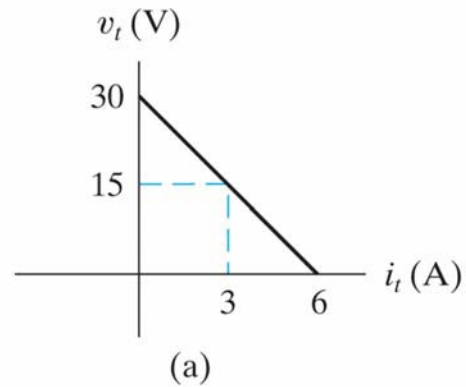


(a)

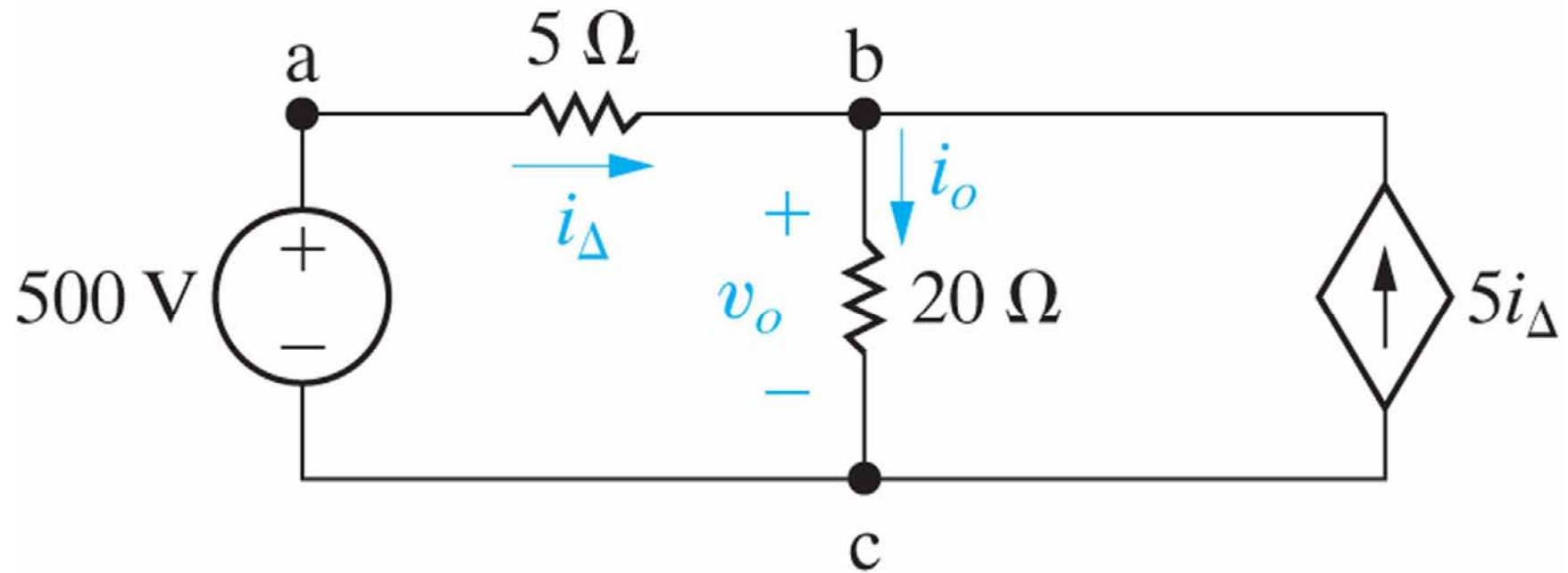
v_t (V)	i_t (A)
30	0
15	3
0	6

(b)

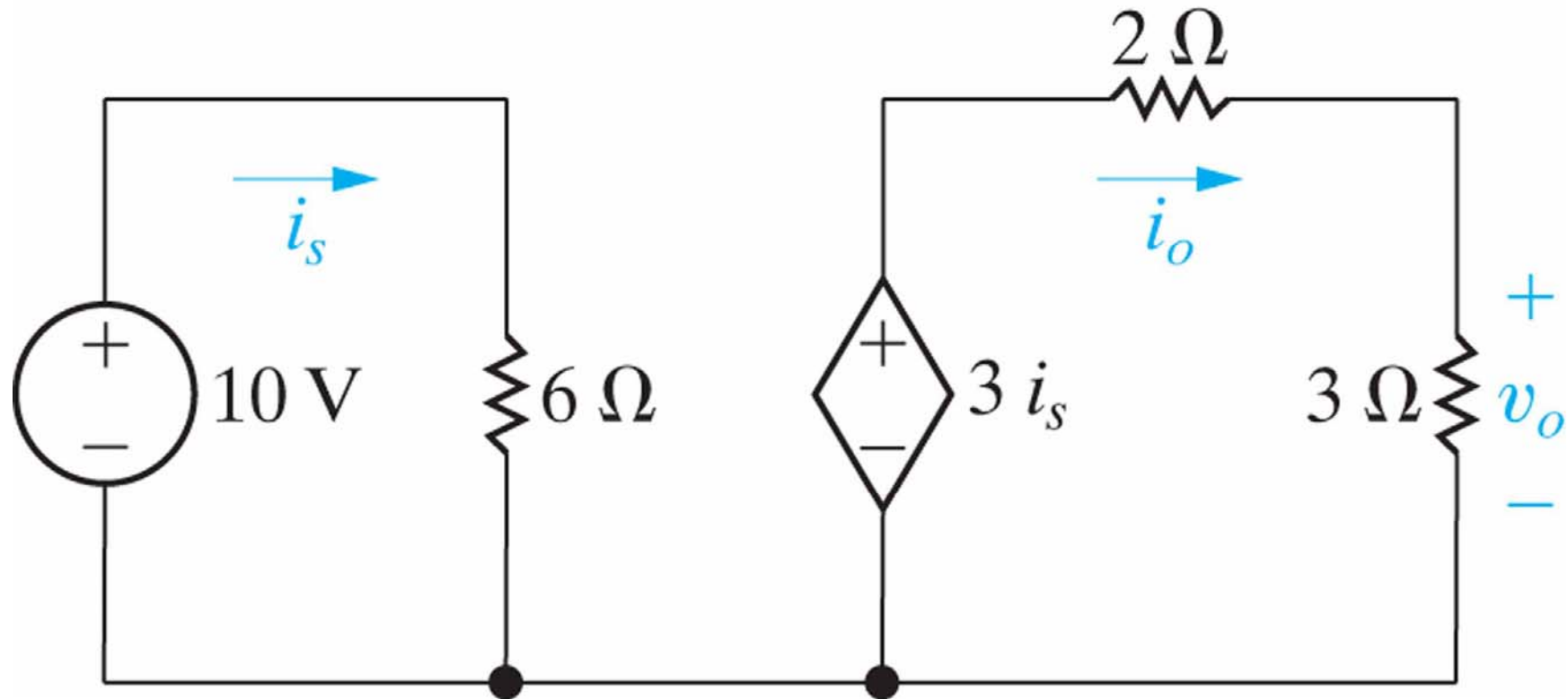
- (a) The graph of v_t versus i_t for the device in Fig. 2.20(a). (b) The resulting circuit model for the device in Fig. 2.20(a), connected to a $10\ \Omega$ resistor.



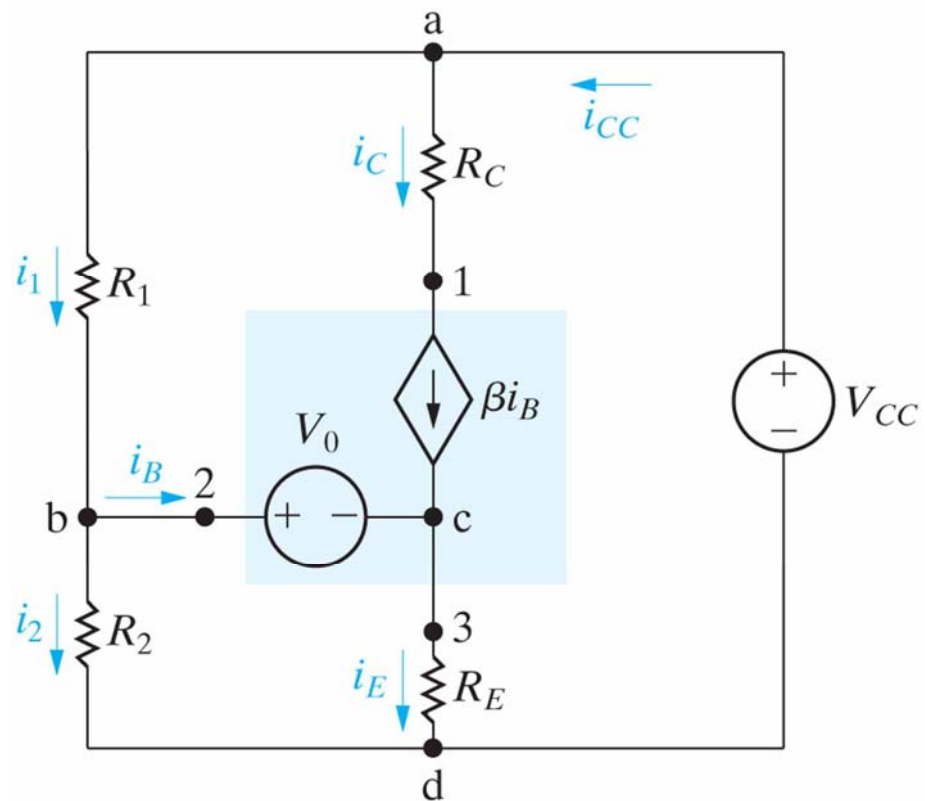
Dependent Sources.



Example 2.10.



Example 2.11.



(a) A human body with a voltage difference between one arm and one leg. (b) A simplified model of the human body with a voltage difference between one arm and one leg.

