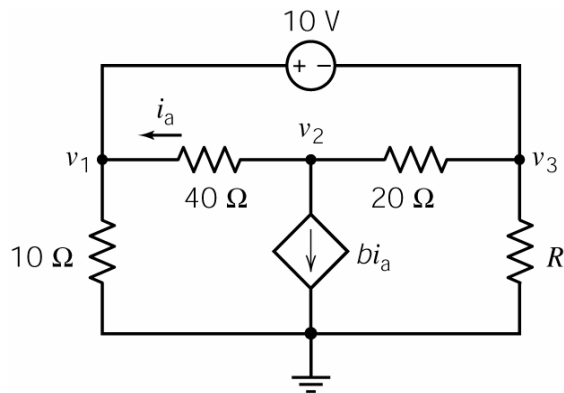
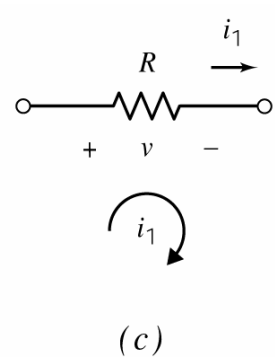
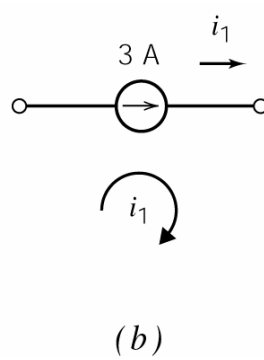
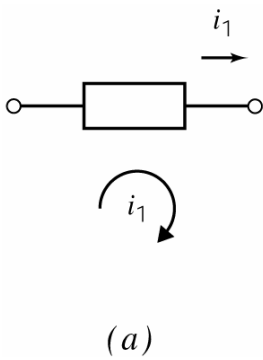
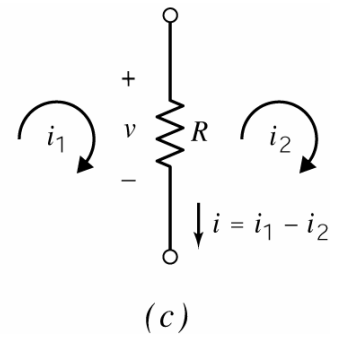
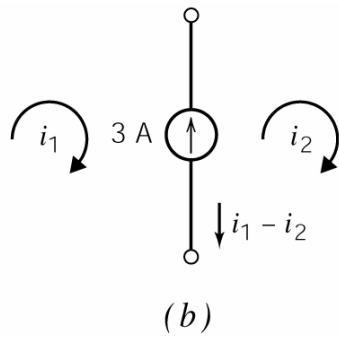
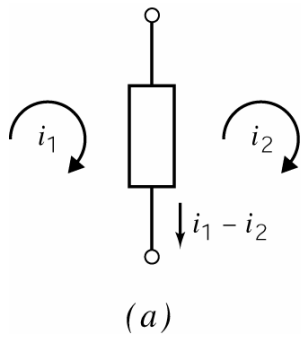


**Problem 4.4-9** The node voltages in this circuit are

$$v_1 = 4 \text{ V}, v_2 = 0 \text{ V}, \text{ and } v_3 = -6 \text{ V}$$

Determine the values of the resistance,  $R$ , and of the gain,  $b$ , of the CCCS.

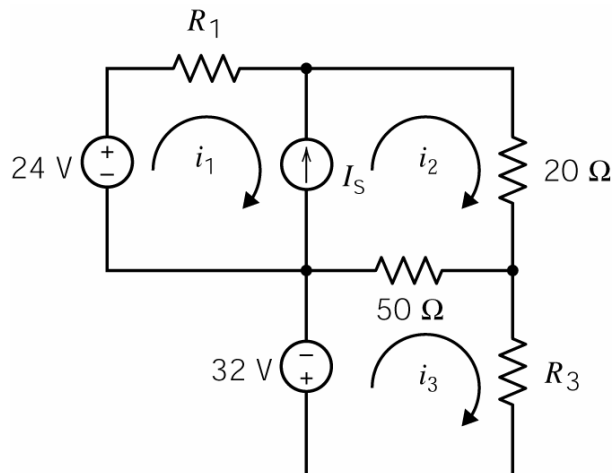




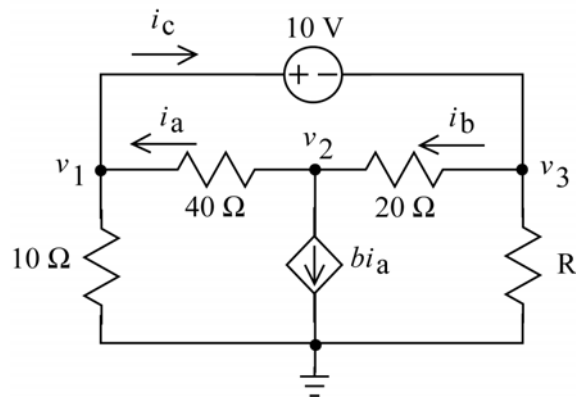
**Problem 4.6-10** The mesh currents in this circuit are

$$i_1 = -2.2213 \text{ A}, \quad i_2 = 0.7787 \text{ A}, \quad \text{and} \quad i_3 = 0.0770 \text{ A}$$

- Determine the values of the resistances  $R_1$  and  $R_3$ .
- Determine the value of the power supplied by the current source.



### Solution to Problem 4.4-9



Apply KCL at node 2:

$$i_a + bi_a = i_b = \frac{v_3 - v_2}{20} = \frac{-6 - (0)}{20} = -0.3 \text{ A}$$

but

$$i_a = \frac{v_2 - v_1}{40} = \frac{0 - 4}{40} = -0.1$$

so

$$(1+b)(-0.1) = (-0.3) \Rightarrow b = 2 \frac{\text{A}}{\text{A}}$$

Next apply KCL to the supernode corresponding to the voltage source.

$$\frac{v_1}{10} + 2i_a + \frac{v_3}{R} = 0 \Rightarrow \frac{4}{10} + 2(-0.1) + \frac{-6}{R} = 0 \Rightarrow R = \frac{6}{.2} = 30 \Omega$$

### Solution to Problem 4.6-10

(a)

$$50(i_3 - i_2) + R_3 i_3 + 32 = 0 \Rightarrow 50(0.0770 - 0.7787) + R_3(0.0770) + 32 = 0$$

$$\Rightarrow R_3 = 40 \Omega$$

$$i_1 R_1 + 20i_2 + 50(i_2 - i_3) - 24 = 0 \Rightarrow R_1(-2.2213) + 20(0.7787) + 50(0.7787 - 0.0770) = 24$$

$$\Rightarrow R_1 = 12 \Omega$$

(b)

$$I_s = i_2 - i_1 = 0.7787 - (-2.2213) = 3 \text{ A}$$

The power supplied by the current source is

$$p = I_s(24 - R_1 i_1) = 3(24 - 12(-2.2213)) = 152 \text{ W}$$