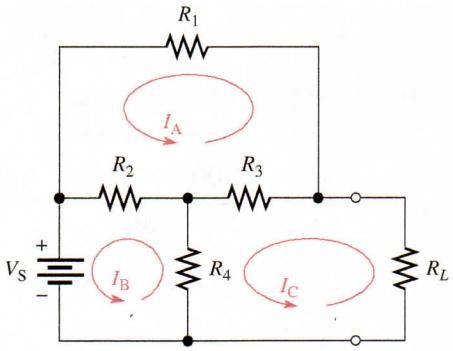
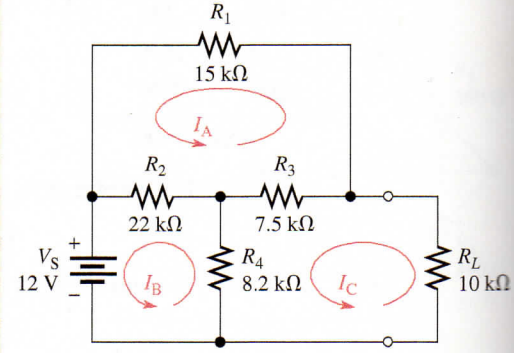
▶ FIGURE 9–13



EXAMPLE 9–10

Figure 9–14 shows a bridged-T circuit with three loops. Set up the standard form equations for the loop currents. Solve the equations with a calculator and find the current in each resistor.

▶ FIGURE 9–14



Solution

Assign three counterclockwise loop currents(I_A, I_B, and I_C) as shown in Figure 9–14. Write the loop equations, but drop the k prefix from the resistances. Current will be in mA.

$$\text{Loop A:} \quad 22(I_A - I_B) + 15I_A + 7.5(I_A - I_C) = 0$$
$$\text{Loop B:} \quad -12 + 22(I_B - I_A) + 8.2(I_B - I_C) = 0$$
$$\text{Loop C:} \quad 8.2(I_C - I_B) + 7.5(I_C - I_A) + 10I_C = 0$$

Rearrange the equations into standard form:

$$\text{Loop A:} \quad 44.5I_A - 22I_B - 7.5I_C = 0$$
$$\text{Loop B:} \quad -22I_A + 30.2I_B - 8.2I_C = 12$$
$$\text{Loop C:} \quad -7.5I_A - 8.2I_B + 25.7I_C = 0$$

Calculator Solution: A calculator solution requires entry of the number of equations (3), the coefficients, and the constants. The calculator SOLVE function produces the results as shown in Figure 9–15. Because the resistors were in kΩ, the unit for the loop currents is mA. Solve for the current in each resistor. The current in $R_1 = I_A$.

$$I_1 = \mathbf{0.512\,mA}$$

▶ FIGURE 9–15