19. Using electron flow, the polarity of a resistor's voltage drop is

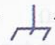
a. positive on the side where electrons enter and negative on the side where they leave.

b. negative on the side were electrons enter and positive on the side where they leave.

c. opposite to that obtained with conventional current flow.

d. both b and c.

20. The schematic symbol for earth ground is

a. 

b. 

c. 

d. 

Essay Questions

1. Show how to connect two resistances in series across a dc voltage source.
2. State three rules for the current, voltage, and resistance in a series circuit.
3. For a given amount of current, why does a higher resistance have a larger voltage drop across it?
4. Two 300-W, 120-V lightbulbs are connected in series across a 240-V line. If the filament of one bulb burns open, will the other bulb light? Why? With the open circuit, how much is the voltage across the source and across each bulb?
5. Prove that if $V_T = V_1 + V_2 + V_3$, then $R_T = R_1 + R_2 + R_3$.
6. State briefly a rule for determining the polarity of the voltage drop across each resistor in a series circuit.
7. State briefly a rule to determine when voltages are series-aiding.
8. In a series string, why does the largest R dissipate the most power?
9. Give one application of series circuits.
10. In Fig. 4–18, explain why R_T, I, V_1, V_2, and V_3 are not affected by the placement of the ground at different points in the circuit.

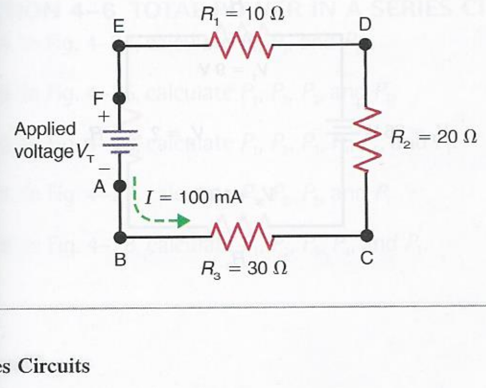
Problems

SECTION 4–1 WHY *I* IS THE SAME IN ALL PARTS OF A SERIES CIRCUIT

4–1 MultiSim In Fig. 4–23, how much is the current, I, at each of the following points?

a. Point A
b. Point B
c. Point C
d. Point D
e. Point E
f. Point F

Figure 4–23



4–2 In Fig. 4–23, how much is the current, I, through each of the following resistors?

a. R_1
b. R_2
c. R_3

4–3 If R_1 and R_3 are interchanged in Fig. 4–23, how much is the current, I, in the circuit?

SECTION 4–2 TOTAL *R* EQUALS THE SUM OF ALL SERIES RESISTANCES

4–4 MultiSim In Fig. 4–24, solve for R_T and I.

4–5 MultiSim Recalculate the values for R_T and I in Fig. 4–24 if $R_1 = 220\ \Omega$ and $R_2 = 680\ \Omega$.

Figure 4–24