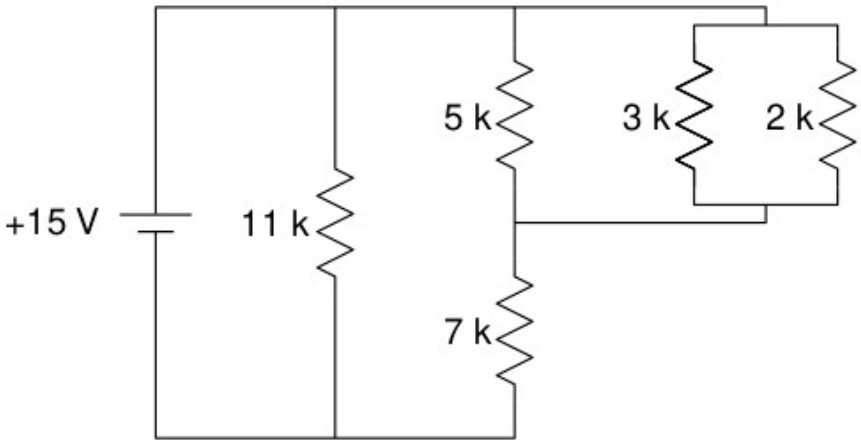
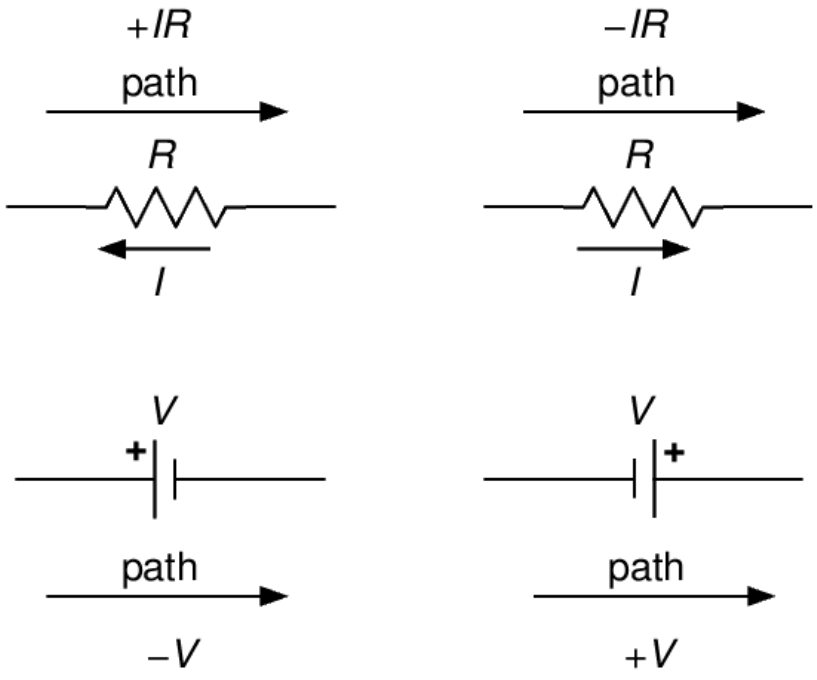
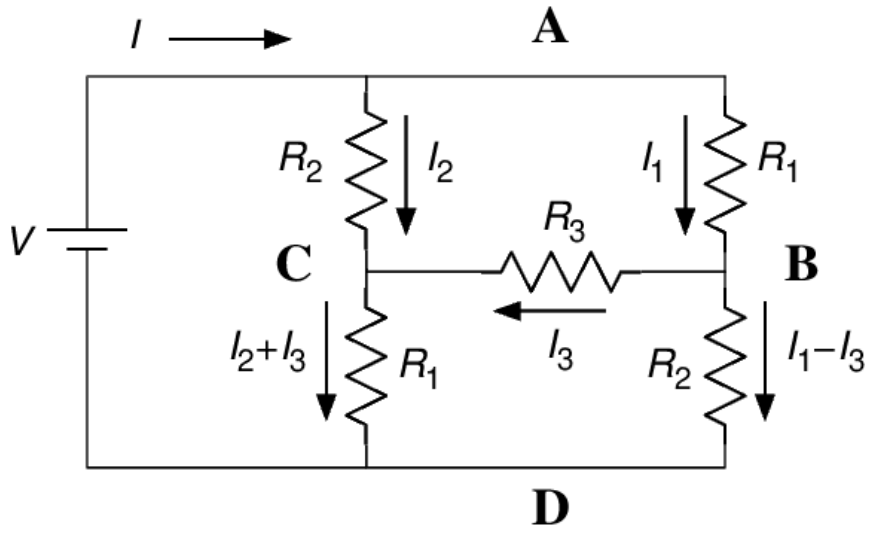
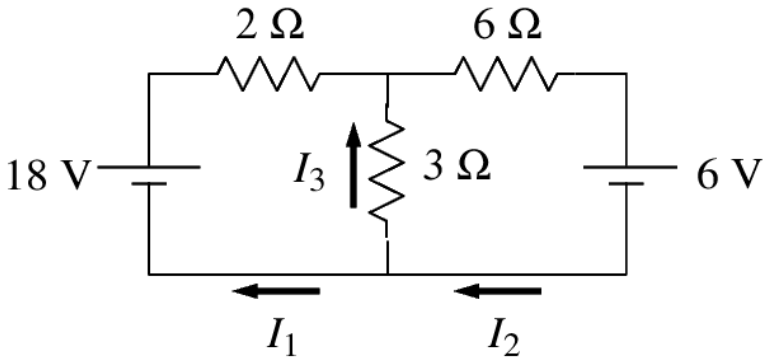
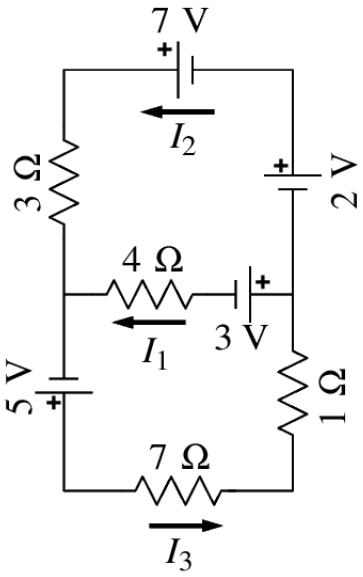
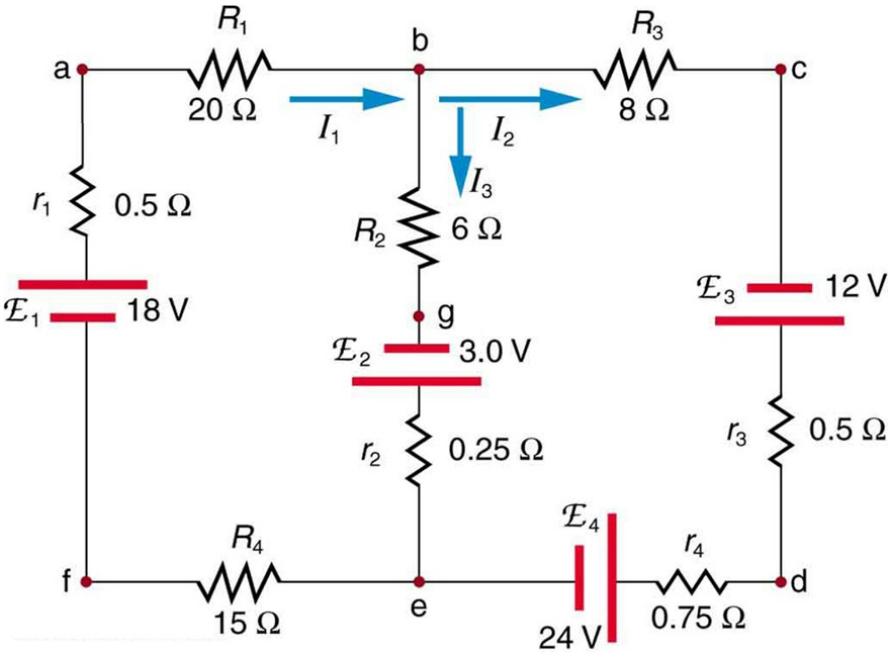

+15 V
11 k
5 k
3 k
2 k
7 k


+IR
path
R
I
−IR
path
R
I
V
+
path
−V
V
+
path
+V


I
A
R2
I2
I1
R1
R3
V
C
B
I2+I3
R1
I3
R2
I1−I3
D

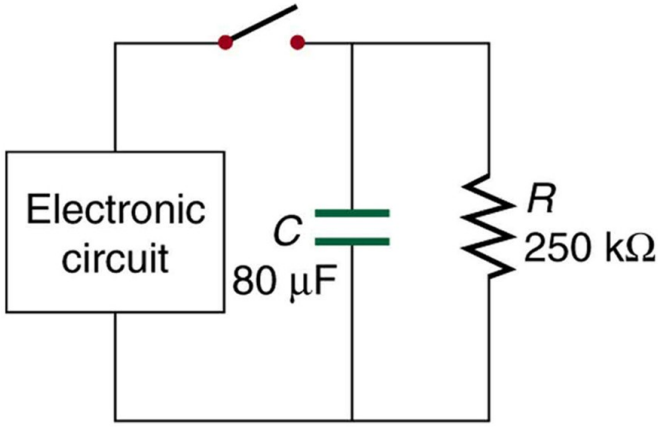

2 Ω
6 Ω
18 V
I_3
3 Ω
6 V
I_1
I_2


7 V
I_2
3 Ω
2 V
4 Ω
I_1
3 V
5 V
1 Ω
7 Ω
I_3


R_1
a
b
R_3
c
20 Ω
I_1
I_2
8 Ω
I_3
r_1
0.5 Ω
R_2
6 Ω
$\mathcal{E}_1$
18 V
g
$\mathcal{E}_3$
12 V
$\mathcal{E}_2$
3.0 V
r_3
0.5 Ω
r_2
0.25 Ω
$\mathcal{E}_4$
R_4
r_4
f
e
d
15 Ω
24 V
0.75 Ω

64. A heart pacemaker fires 72 times a minute, each time a 25.0-nF capacitor is charged (by a battery in series with a resistor) to 0.632 of its full voltage. What is the value of the resistance?

71. Figure 21.55 shows how a bleeder resistor is used to discharge a capacitor after an electronic device is shut off, allowing a person to work on the electronics with less risk of shock. (a) What is the time constant? (b) How long will it take to reduce the voltage on the capacitor to 0.250% (5% of 5%) of its full value once discharge begins? (c) If the capacitor is charged to a voltage V 0 through a 100-Ω resistance, calculate the time it takes to rise to 0.865V 0 (This is about two time constants.)



As shown right, a node is connected to three resistors (R_i). Each of the resistors connects to a known voltage (V_i). Show that the voltage at the node is:

$$V = \frac{\sum V_i G_i}{\sum G_i}$$

where the G_i are the conductances $G_i \equiv 1/R_i$. In short, the voltage at the node is the average of the voltages on the connections, weighted by conductances. (FYI: The result applies to any number of connections, not just three.)