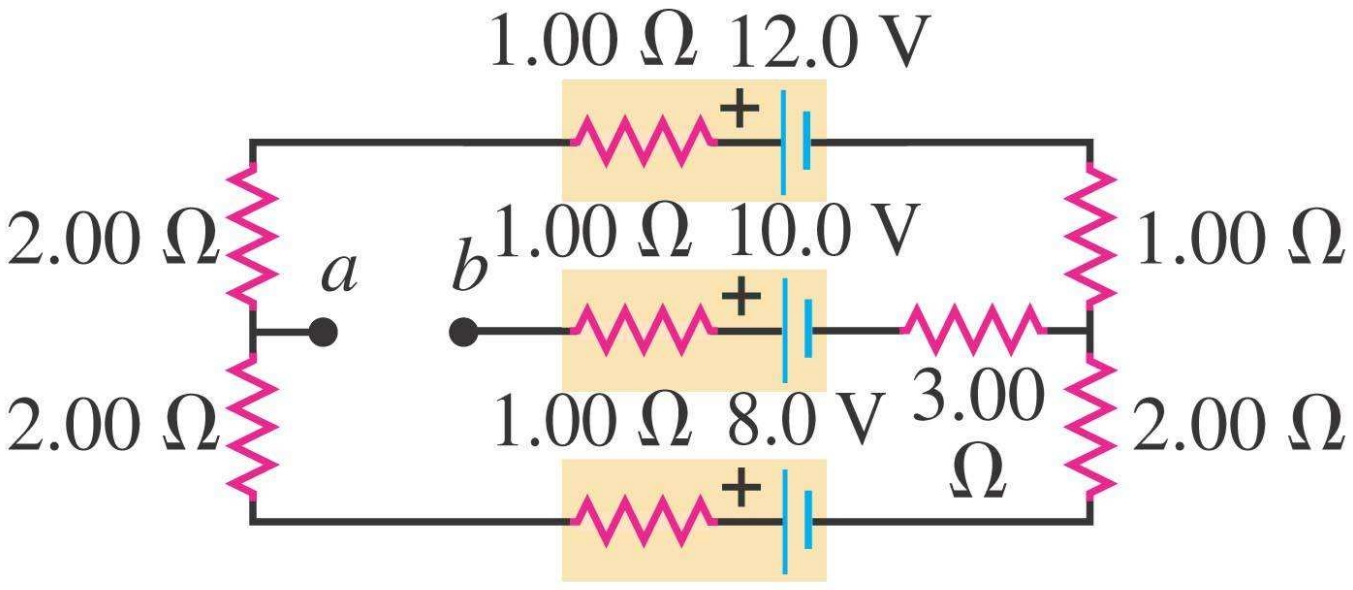
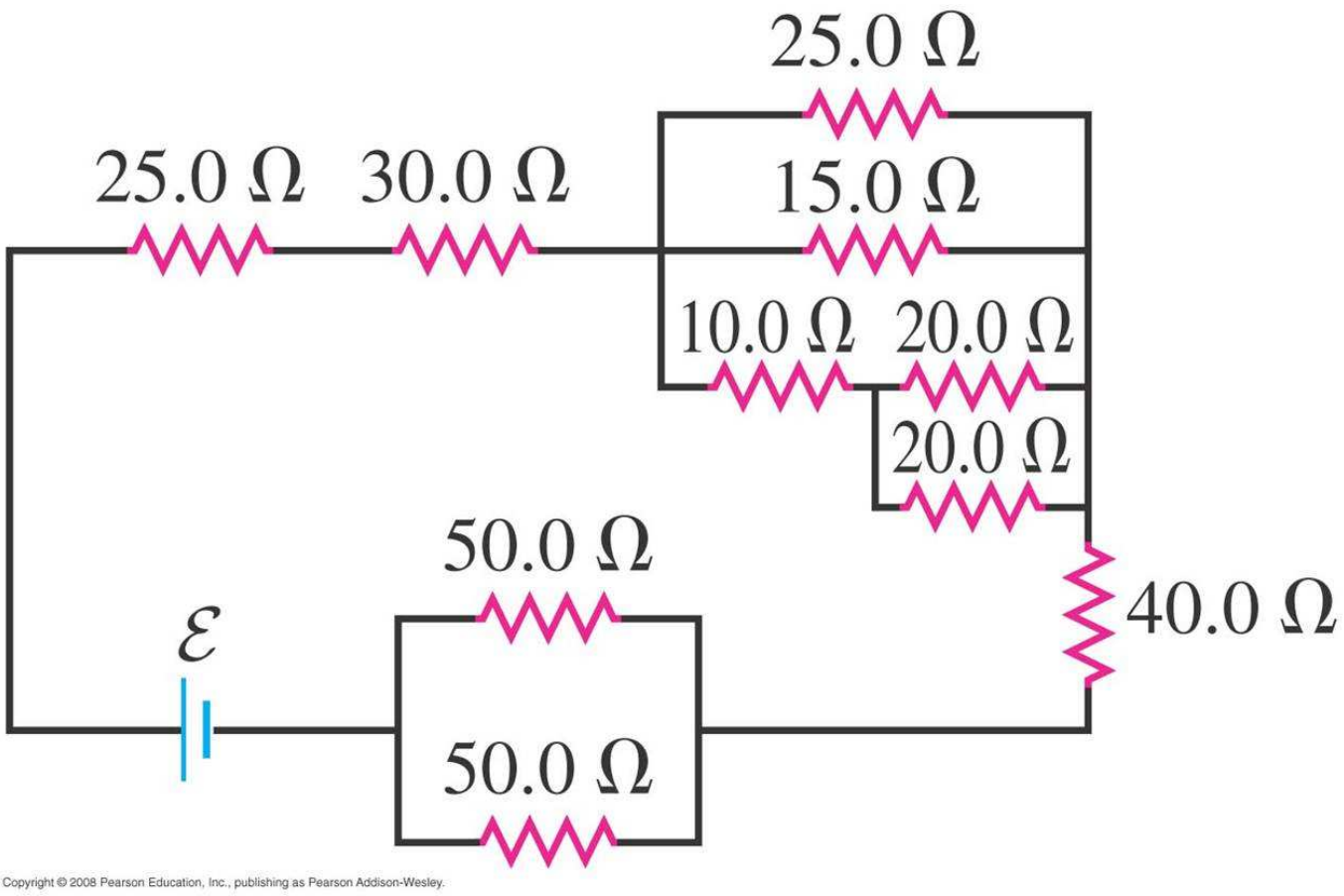
PHYS 161
Summer 2012
Homework Assignment #5
Due July 6

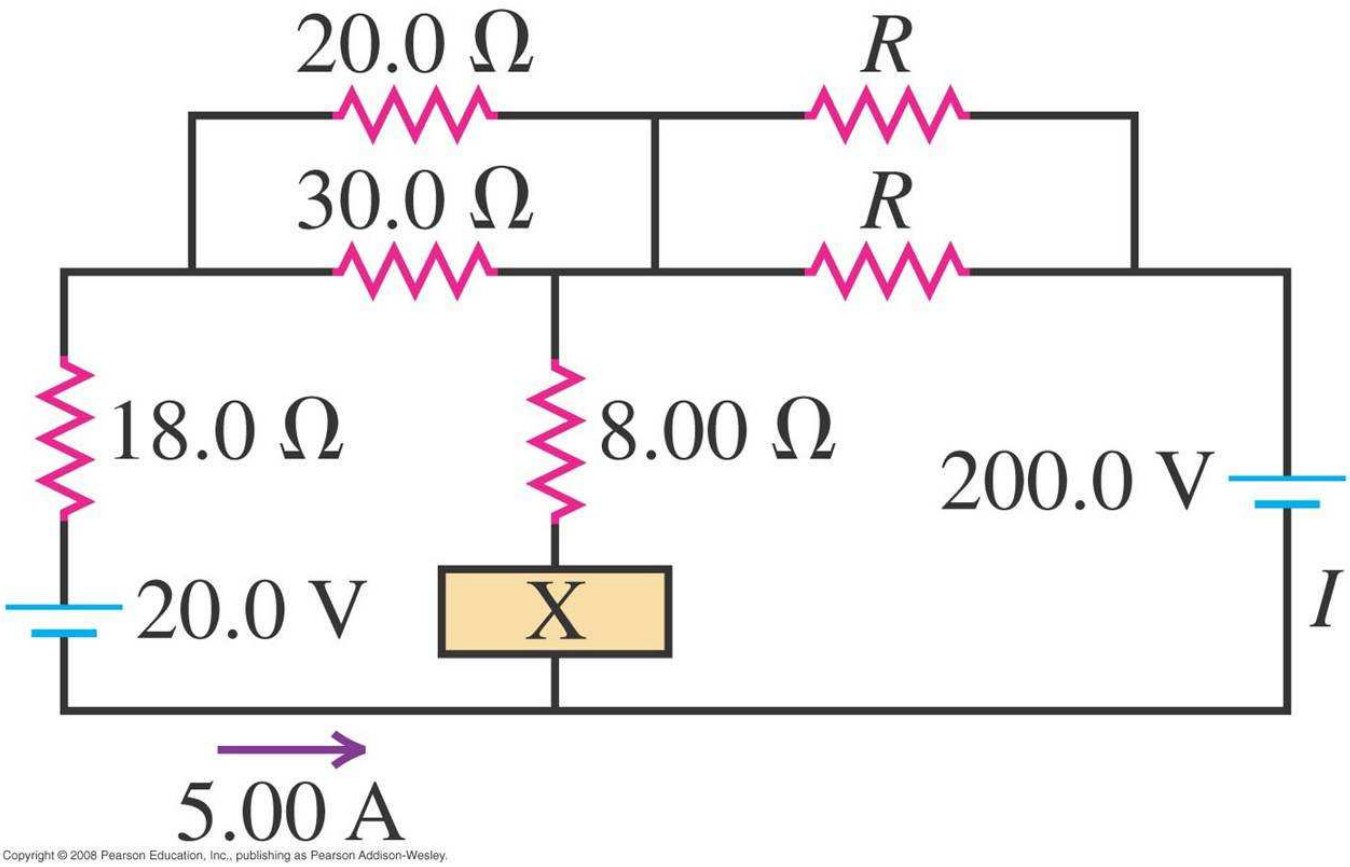
#1 (a) Find the potential of point a with respect to point b in Fig. P26.67. (b) If points a and b are connected by a wire with negligible resistance, find the current in the $12.0-V$ battery.



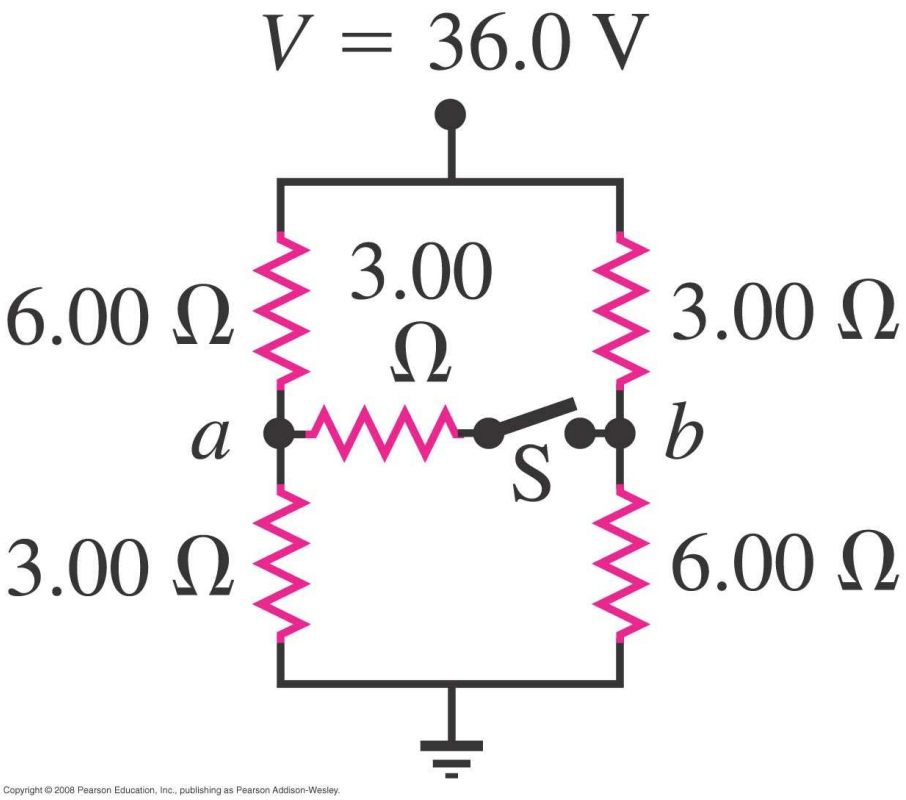
#2 In the circuit shown in Fig P26.70 all the resistors are rated at a maximum power of $1.75\,W$. What is the maximum emf that the battery can have without burning up any of the resistors?



#3 In the circuit shown in Fig P26.71, the current in the 20.0–V battery is 5.00 A in the direction shown and the voltage across the 8.00–Ω resistor is 16.0 V, with the lower end of the resistor at the higher potential. Find (a) the emf (including its polarity) of the battery X; (b) the current I through the 200–V battery (including its direction); (c) the resistance R.



#4 Figure P26.77 employs a convention often used in circuit diagrams. The battery (or other power supply) is not shown explicitly. It is understood that the point at the top, labeled "36.0 V," is connected to the positive terminal of a 36.0-V battery having negligible internal resistance, and that the "ground" symbol at the bottom is connected to the negative terminal of the battery, even though it is not shown on the diagram. (a) What is the potential difference V_{ab}, the potential of point a relative to point b, when the switch S is open? (b) What is the current through switch S when it is closed? (c) What is the equivalent resistance when switch S is closed?



#5 You wish to hit a target from several meters away with a charged coin having a mass of $2.50\,g$ and a charge of $+4500\,\mu C$. The coin is given an initial velocity of $15.2\,m/s$, and a downward, uniform electric field with field strength $3.75\,N/C$ exists throughout the region. If you aim directly at the target and fire the coin horizontally, what magnitude and direction of uniform magnetic field are needed in the region for the coin to hit the target?

#6 A straight piece of conducting wire with mass M and length L is placed on a frictionless incline tilted at an angle θ from the horizontal (Fig P27.69). There is a uniform magnetic field $\vec{\mathbf{B}}$ at all points (produced by an arrangement of magnets not shown in the figure). To keep the wire from sliding down the incline, a voltage source is attached to the ends of the wire. When just the right amount of current flows through the wire, the wire remains at rest. Determine the magnitude and direction of the current in the wire that will cause it to remain at rest. Copy the figure and draw the direction of the current on your copy. In addition show in a free-body diagram all the forces that act on the wire.