Exam Review
Problem Set 3 (Electricity)

1. A 1.5 V dry cell is connected to a small light bulb with a resistance of 3.5 Ω. How much current flows through the bulb?

2. A current of 6.25 A flows through a microwave oven. If the resistance of the circuitry in the oven is 17.6 Ω, what is the voltage drop across the oven?

3. A 12.0 V storage battery is connected to three resistors, 6.75 Ω, 15.3 Ω, and 21.6 Ω respectively. The resistors are joined in series. (a) Draw a circuit diagram. (b) Calculate the total resistance. (c) What is the current?

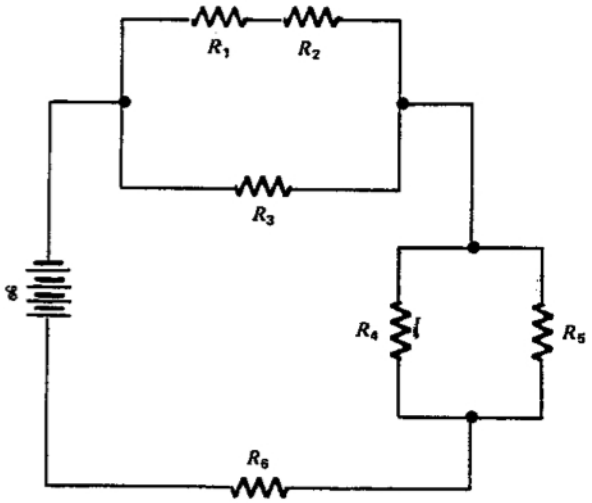
4. You have three 12 Ω resistors. What is the combined resistance if they are (a) in series and (b) in parallel. (c) Draw a diagram for each.

5. A wire 6.24 m long with a diameter of 2.00 mm has a current of 0.500 A when it is connected to a battery of five 1.50 V dry cells in series. Calculate the wire's (a) resistance (b) resistivity.

6. An 18.0 Ω, 9.0 Ω, and 6.0 Ω resistor are connected in parallel to a voltage source. A 4.00 A current flows through the 9.0 Ω resistor. (a) Draw the circuit diagram and calculate the equivalent resistance. (b) What is the voltage output of the source? (c) Calculate the current through the other resistors.

7. A 30.0 Ω resistance is connected in parallel to a 15.0 Ω resistor. These are joined in series to a 5.0 Ω resistor and a source with an emf of 30.0 V. (a) Draw a circuit diagram. Calculate (b) the total resistance (c) the voltage drop across each resistor (d) the current through each resistor.

8. Complete the chart of voltage, current, and resistance for the following circuit.

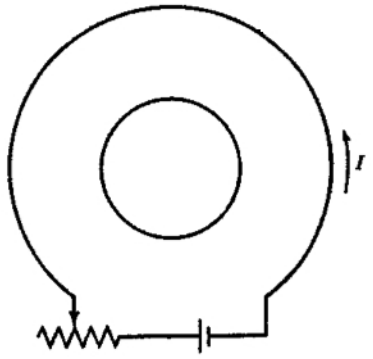


	V	I	R
Source		2.0 A	
R_1			5.0 Ω
R_2	3.5 V		
R_3		1.5 A	
R_4	4.0 V		
R_5		1.0 A	
R_6			2.0 Ω

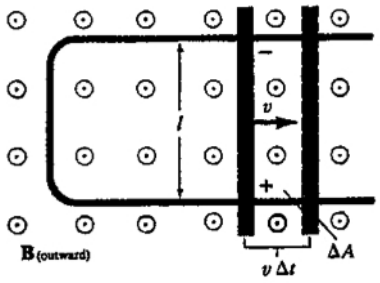
9. A coil of 325 turns moving perpendicular to the flux in a uniform magnetic field experiences a change in flux of $1.15 \times 10^{-5}\ Wb$ in $0.001\ s$. What is the induced emf?

10. A $20\ cm$ diameter circular loop of wire is in a $0.60\ T$ magnetic field. It is removed from the field in $0.10\ s$. What is the average induced emf?

11. If the resistance of the resistor in the diagram below is slowly increased, what is the direction of the current induced in the small circular loop inside the larger loop?



12. The moving rod in the diagram below is $12.0\ cm$ long and moves with a speed of $15.0\ cm/s$. If the magnetic field is $0.800\ T$, calculate the emf developed.



13. A step-up transformer is used on a $120\ V$ line to provide a potential difference of $2400\ V$. If the primary coil has 75 turns, how many turns must the secondary coil have?

14. A 5:1 step-down transformer is connected to a $120\ V$ ac source. The secondary circuit has a resistance of $15.0\ \Omega$. (a) What is the potential difference across the secondary coil? (b) What is the current in the secondary coil? (c) How much power is dissipated in the secondary resistance? (d) What is the primary current?