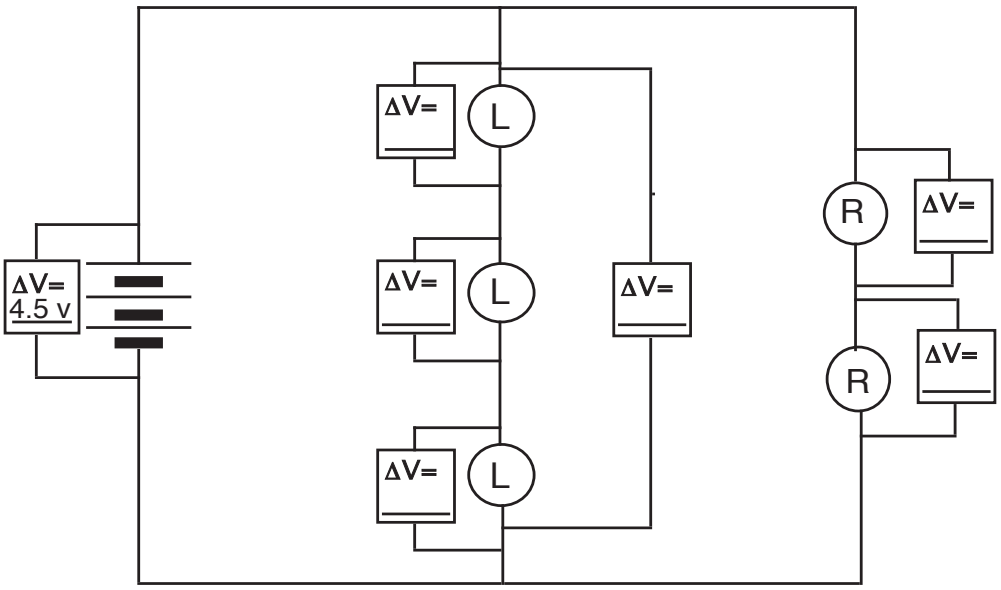
Homework Questions – Section 6

1. Why is it necessary to connect a voltmeter *in parallel* with a circuit component?

2. Why is it not a good idea to connect an ammeter in parallel with a circuit component?

3. Complete the diagram below with the correct pressure-difference values for each component by recording them in the spaces provided. Note that the voltmeter placed around the battery has a readout of 4.5 V.



4. Based on your experiments, describe how you know that a battery is generally a source of <u>constant</u> electric pressure difference.

5. Based on experiments you have done, how do you know that an ammeter is a device that can be used to measure flow rate?

6. Consider what happens when you are riding a bicycle. Identify the following, and state the analogous part of an electric circuit:

a) The source of the energy that makes the bike move forward –

b) What receives the energy input?

c) The mobile substance that enables energy transfer to occur –

d) Is this mobile substance used up during the bicycle ride?

7. An old string of Christmas tree lights has twenty bulbs connected in series. Each bulb is labeled 1.5 watts. (At one time Christmas lights were wired in series; however, if <u>one</u> bulb burned out, <u>all</u> bulbs went out, so modern lights are no longer wired in series.)

a) Describe the energy transformations occurring in the circuit when the bulbs are lit.

b) What is the rate at which energy is being supplied to the set of bulbs when they are all lit?

c) Describe what happens to the current and rate of energy transfer in the circuit if the 15^{th} bulb in the string burns out.

8. Imagine that the circuit in question #7 is re-wired so that the original 20 bulbs are reconnected in parallel.

a) Compare the pressure difference across each bulb in the parallel circuit with what it was in the previous series circuit.

b) Compare the current through any one of the bulbs with the current in the previous series circuit.

c) Compare the power supplied to the parallel circuit with the power to the previous series circuit.

9. Two bulbs are connected in series. Bulb A is receiving energy at the rate of 15 watts and Bulb B at 40 watts. Indicate which bulb is described:

_____ a. The light from the bulb is brighter

_____ b. The current through the bulb is greater.

_____ c. The resistance of the bulb is larger.

10. You are given two circuits with identical batteries. In one circuit (S), a round and a long bulb are in series. In the other (P), the same bulbs are in parallel.

Indicate in which circuit:

_____ a. the round bulb is converting energy to heat and light at a greater rate than the long bulb.

_____ b. the long bulb is converting energy to heat and light at a greater rate than the round bulb.

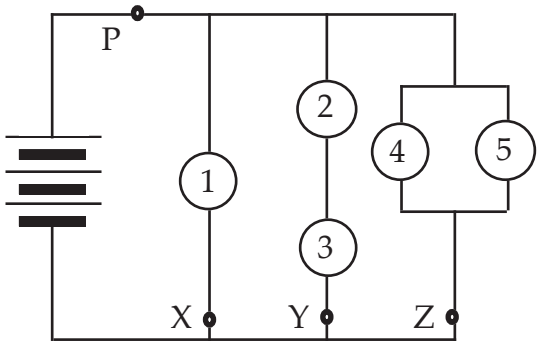
_____ c. the battery is giving out energy at a greater rate.

11. You have been asked to design a 1200-watt hair dryer for use in homes. Explain what information and calculations will be needed and how you would use them.

12. Consider the circuit at right, containing five identical bulbs.

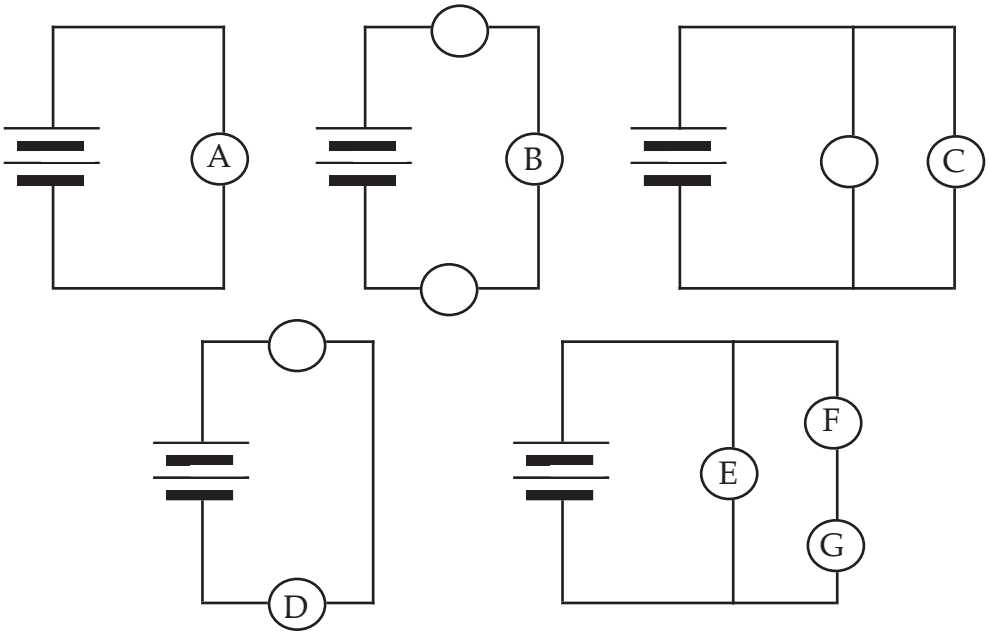
a) Is the current greatest through Point X, Y, or Z? Where is it least?

b) If a shorting wire is placed across bulb #5, what will be the effect on each of the other bulbs?



c) If a bulb is inserted at point P, what will be the effect on each of the other bulbs?

13. In the circuits below, all bulbs are identical. For each of the following pairs of bulbs, circle the letter of the bulb you predict would be the brighter of the two, or circle "nearly the same brightness".



(a)	A and C	A	C	Nearly the same brightness
(b)	D and E	D	E	Nearly the same brightness
(c)	B and D	B	D	Nearly the same brightness
(d)	D and F	D	F	Nearly the same brightness
(e)	C and G	C	G	Nearly the same brightness
(f)	B and G	B	G	Nearly the same brightness
(g)	C and E	C	E	Nearly the same brightness