

Homework Questions – Section 4

1. The 10 bulbs (indicated by —O—) in each of the following diagrams are all identical. Predict the relative brightness of each of the bulbs according to the pressure differences indicated by the colors.

Indicate brightness as one of the following: **Very Bright, Bright, Moderate, Dim, Not Lit**

	Color Difference		Brightness
a. red	—O—	green	(Example: Bright)
b. yellow	—O—	blue	
c. red	—O—	yellow	
d. blue	—O—	orange	
e. orange	—O—	green	
f. orange	—O—	red	
g. green	—O—	blue	
h. red	—O—	blue	
i. orange	—O—	yellow	
j. green	—O—	yellow	

2. Suppose you have a charged capacitor as in the circuit in Figure 2a, and then you replace the battery with an uncharged capacitor to obtain the circuit in Figure 2b. What will you observe when you make this change?

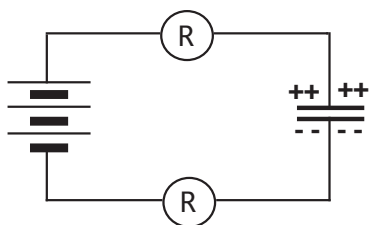


Figure 2a
BATTERY AND CHARGED
CAPACITOR

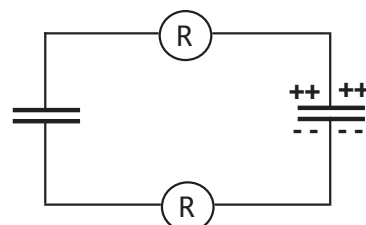
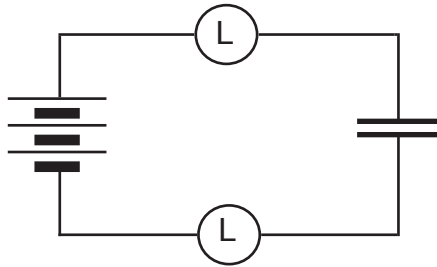


Figure 2b
BATTERY REPLACED WITH
UNCHARGED CAPACITOR

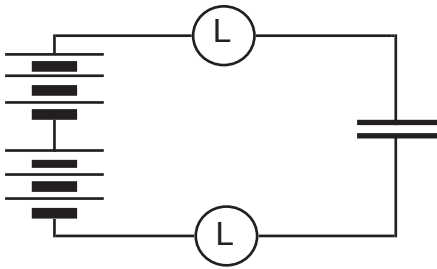
Test your predictions by constructing the actual circuits.

3. Begin with two long bulbs, a discharged capacitor and a battery, with a break somewhere in the circuit. Describe the visible events you would observe following each change as indicated in the sequence below. The sequence begins when the circuit is completed and the capacitor begins to charge.



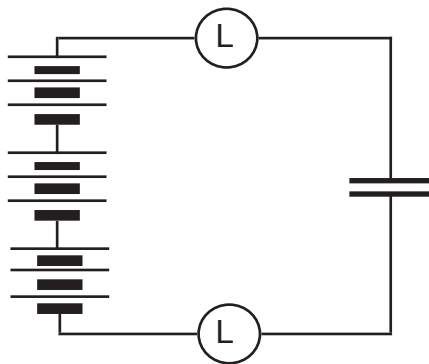
a. Circuit Connected, Charging the Capacitor

Observations:



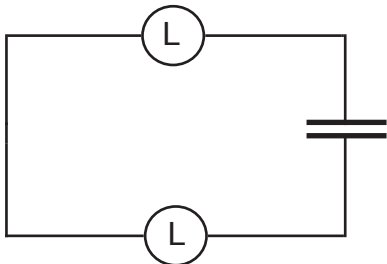
b. Adding a Second Battery

Observations:



c. Adding a Third Battery

Observations:



d. Discharging the Capacitor

Observations:

4. Label or color the terminals, plates and wires in each circuit to show the correct color code (R/O/Y/G/B) for the electric pressures in the following situations. Also, draw starbursts around each bulb to indicate its brightness if it is lit.

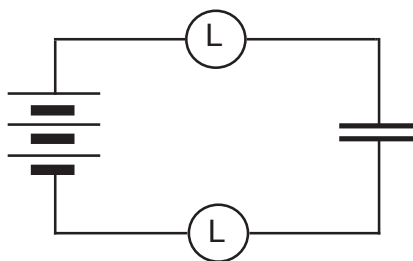


Figure 4a
CAPACITOR UNCHARGED
(Moment of connection)

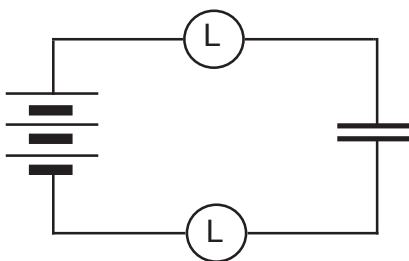


Figure 4b
CAPACITOR PARTIALLY
CHARGED

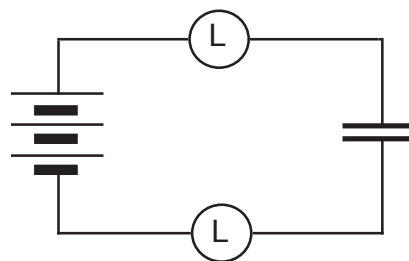
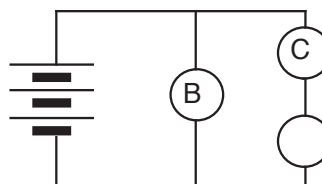
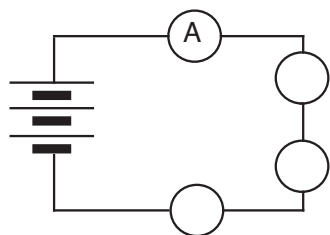


Figure 4c
CAPACITOR FULLY
CHARGED

5. Use color-coding to determine the order of brightness of the bulbs in the circuits below. Rank the three bulbs — “A”, “B”, and “C” — from brightest to dimmest. All seven bulbs are identical.



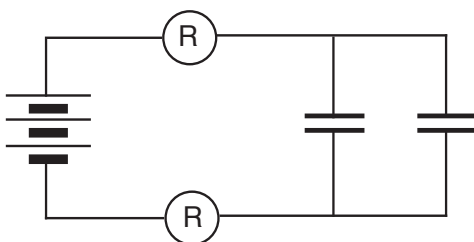
BRIGHTEST _____ **DIMMEST**

6. A capacitor and a battery are in a circuit during charging; then the battery is removed. In terms of electric pressure, describe a “charged capacitor”.

7. In what direction is the conventional flow of charge considered to be? _____

- (A) From low pressure to high pressure
- (B) From negative to positive
- (C) From high pressure to low pressure

8. Color-code the circuit diagram below, assuming that the capacitors are fully charged. The bulbs are identical and the capacitors are identical.



Based on your diagram, explain how the bulb brightness during charging compares with the bulb brightness in a similar circuit which contains only ONE capacitor. Test your reasoning by constructing the circuits and observe.