

Homework Questions: Section 4

Name _____

1. The table at right indicates the electric pressures in the wires on each side of a bulb. Fill in the last column. Your choices are.... very bright
bright
medium-bright
dim
not lit

	Wire on one side of bulb	Wire on other side of bulb	How bright is the bulb?
a.	red	green	
b.	yellow	blue	
c.	red	yellow	
d.	blue	orange	
e.	orange	green	
f.	orange	red	
g.	green	blue	
h.	red	blue	
i.	orange	yellow	
j.	green	yellow	

NOTE: Assume all bulbs are identical.

2. Use color-coding to determine the order of brightness of bulbs A, B, and C, shown in Figure 2.

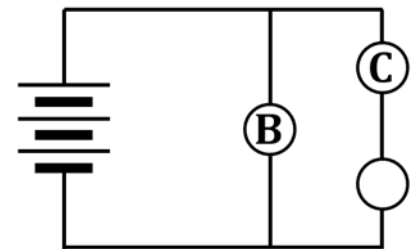
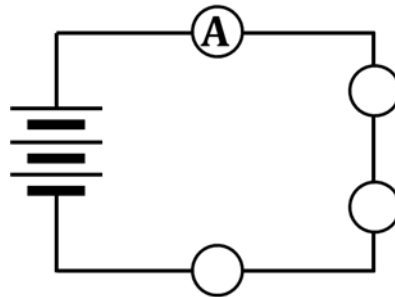


Fig. 2

BRIGHTEST _____ DIMMEST _____

3. In a circuit, CONVENTIONAL charge is always considered to flow from:

- ___ A. low pressure to high pressure
- ___ B. negative to positive
- ___ C. high pressure to low pressure

4. Color-code (or just label with the letters R/O/Y/G/B, if you want) the figures shown. The colors should indicate the electric pressure existing in each wire at the time indicated. Remember that we NEVER color-code bulbs, but that we ALWAYS color-code capacitor plates. Also, draw appropriate starbursts around any bulb that is lit, indicating the brightness of the bulb at that particular time.

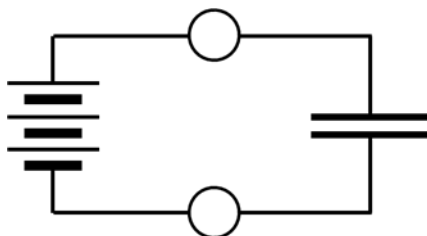


Fig. 4a

capacitor uncharged;
moment of connection

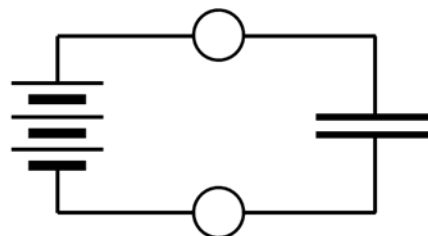


Fig. 4b

capacitor partially charged

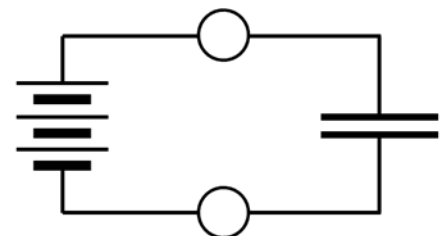


Fig. 4c

capacitor fully charged

5. A capacitor and a battery are in a circuit during charging; then the battery is removed. Using the term **ELECTRIC PRESSURE**, describe a charged capacitor. It might help to look at the color-coding you did in Q4.

6. Use the figures shown and answer the questions.

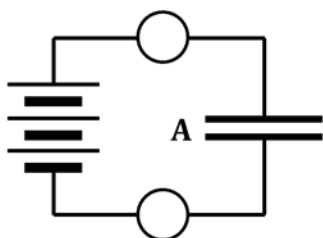


Fig. 6a

Capacitor A uncharged;
moment of connection

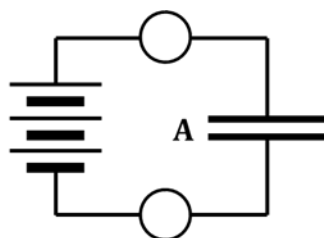


Fig. 6b

Capacitor A
fully charged

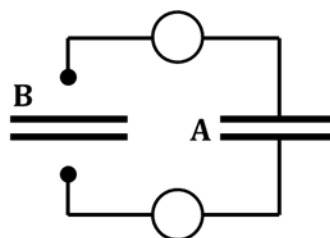


Fig. 6c

Capacitor A fully charged;
Capacitor B uncharged
and NOT YET connected

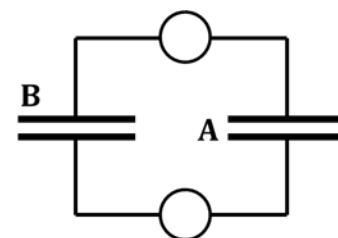


Fig. 6d

Ten seconds after
Capacitor B has
been connected

- Color-code Figure 6a, at the moment of connection. NOTE the presence of Capacitor A in Fig. 6a.
- Color-code Figure 6b, in which Capacitor A is fully charged.
- In Fig. 6c, the circuit shown in Fig. 6b has been modified, in this way: The battery has been removed and a second capacitor – Capacitor B, which is initially uncharged – is brought out but has NOT YET been connected into the circuit. Capacitor A has not been touched or discharged. In Fig. 6c, color-code the circuit that remains in place AS WELL AS the plates of the uncharged Capacitor B.
- In Fig. 6d, Capacitor B has been inserted into the circuit where the battery used to be. Given that capacitor plates can donate or accept way, WAY, WAY! more charge than wires can, color-code Fig. 6d to show the state of affairs, say, ten seconds after connecting Capacitor B into the circuit.
- What is true about the capacitors in Fig. 6d?
 - they are both uncharged
 - they are both fully charged
 - one is fully charged; the other is uncharged
 - they are both partially charged
 - one is fully charged; the other is partially charged
- How did the bulbs behave when going from Fig. 6c to Fig. 6d, compared to how they behaved when going from Fig. 6a to Fig. 6b?
- Use the idea of electric pressure difference to explain your answer to Q6f.

7. Consider Case A (Fig. 7a and 7b) and Case B (Fig. 7c and 7d).

CASE A

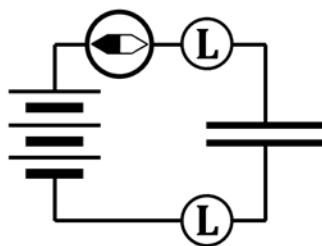


Fig. 7a
capacitor uncharged;
moment of connection

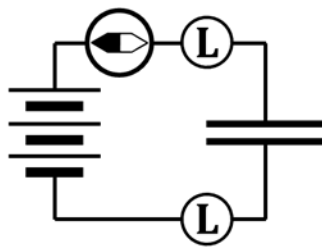


Fig. 7b
capacitor fully charged

CASE B

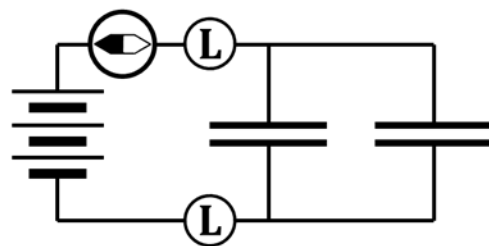


Fig. 7c
capacitors uncharged;
moment of connection

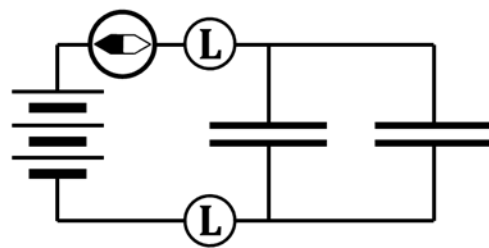


Fig. 7d
capacitors fully charged

a. Color-code all four figures.

Now, compare Case A (which starts with Fig. 7a and ends with Fig. 7b) with Case B (which starts with Fig. 7c and ends with Fig. 7d).

- b. The initial bulb brightness will be greater for: ___ A ___ B ___ neither; it's a tie
- c. The initial (i.e., the max.) compass deflection will be greater for: ___ A ___ B ___ neither; it's a tie
- d. The bulbs will stay lit longer for: ___ A ___ B ___ neither; it's a tie
- e. The compass will stay deflected longer for: ___ A ___ B ___ neither; it's a tie
- f. The direction of compass deflection will be: ___ same dir. ___ opposite dir.

Now, we'll DISCHARGE the circuits, i.e., discharge Fig. 7b for Case A and discharge Fig. 7d for Case B.

When discharging:

- g. The initial bulb brightness will be greater for: ___ A ___ B ___ neither; it's a tie
- h. The initial (i.e., the max.) compass deflection will be greater for: ___ A ___ B ___ neither; it's a tie
- i. The bulbs will stay lit longer for: ___ A ___ B ___ neither; it's a tie
- j. The compass will stay deflected longer for: ___ A ___ B ___ neither; it's a tie
- k. The direction of compass deflection will be: ___ same dir. ___ opposite dir.

8. Suppose you begin a sequence of experiments involving two long bulbs, a discharged capacitor, and three SEPARATE three-cell battery packs.

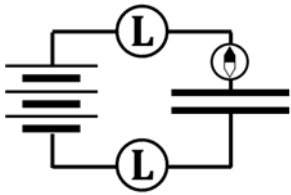


Fig. 8a

a. You build the circuit shown in Fig. 8a. Over the first, say, five-seconds after connection, describe the behavior of the:

- i. compass
- ii. bulbs

b. At the start of the scenario in Fig. 8a, the capacitor acts like ___ batteries.

c. At the end of the scenario in Fig. 8a, the capacitor acts like ___ batteries.

d. Now, WITHOUT DISCHARGING the capacitor, you add a second three-cell battery pack, as shown in Fig. 8b. Again, over the first five seconds after connection, describe the behavior of the:

- i. compass
- ii. bulbs

e. At the start of the scenario in Fig. 8b, the capacitor acts like ___ batteries.

f. At the end of the scenario in Fig. 8b, the capacitor acts like ___ batteries.

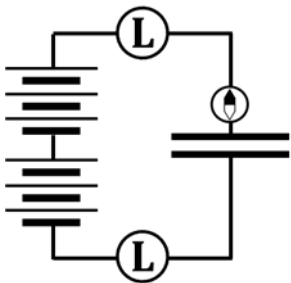


Fig. 8b

g. Now, again WITHOUT DISCHARGING the capacitor, you add a third three-cell battery pack, as shown in Fig. 8c. Again, over the first five seconds after connection, describe the behavior of the:

- i. compass
- ii. bulbs

h. At the start of the scenario in Fig. 8c, the capacitor acts like ___ batteries.

i. At the end of the scenario in Fig. 8c, the capacitor acts like ___ batteries.

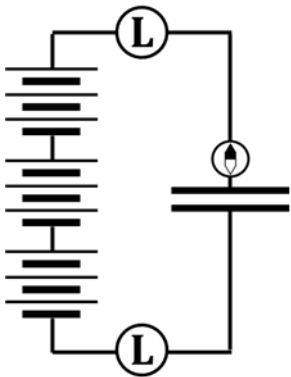


Fig. 8c

j. Finally, you REMOVE all three three-cell battery packs, as shown in Fig. 8d. You connect the free ends of the wires together. Over the first five seconds after connection, describe the behavior of the:

- i. compass
- ii. bulbs

h. At the start of the scenario in Fig. 8d, the capacitor acts like ___ batteries.

i. At the end of the scenario in Fig. 8d, the capacitor acts like ___ batteries.

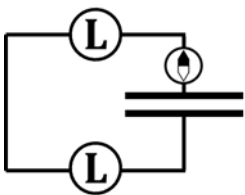


Fig. 8d