Capacitance Mastery Assignment

Rules about the Mastery Assignment & Test

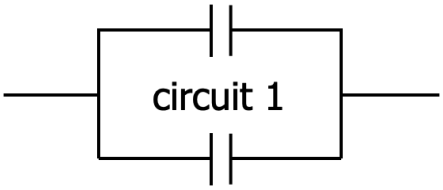
You may put your answers on this sheet or another. Completing this assignment is your ticket to taking a mastery test. You may ask other students, consult the Internet, or ask the teacher or anybody else for help. When completed, show the assignment to your teacher. Your teacher will not grade it. Instead, you will use the answer book to check your own work and ask the teacher any further questions. The answer book is not to leave the classroom. The assignment is to be completed BY THE DUE DATE. Make arrangements with your teacher before the due date if you need an extension. Late assignments are not accepted.

The mastery test is a new set of test questions covering the same set of objectives. This means that while some topics/objectives may not have been covered on the original test, they could be on the mastery test.

The teacher will count the higher of the two test scores between the original test and the mastery test.

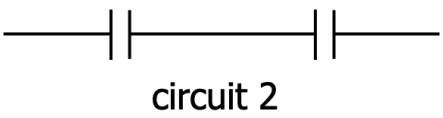
1. Two plates of the same size are separated by some distance with air. What different physical pieces of the capacitor could you adjust to change its capacitance by 0.50? It is not enough to identify what you could change. Also, SPECIFICALLY, describe how you would change it.

2. Of the concepts of charge or voltage, which stays the same and what changes for the circuits below when connected to power for a long time.



Same for each capacitor: _____

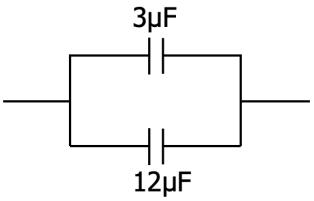
Different for each capacitor: _____



Same for each capacitor: _____

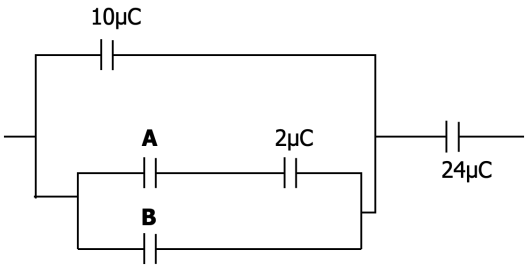
Different for each capacitor: _____

3. By what <u>factor</u> does the energy in the 3µF capacitor compare to the energy in the 12µF capacitor in the circuit below when connect to power for a long time? Express your answer like $\mathbf{E_3 = 2(E_{12})}$ or $\mathbf{E_3 = \frac{1}{2}(E_{12})}$ or etcetera.



4. By what <u>factor</u> does the energy in the 5µF capacitor compare to the energy in the 15µF capacitor in the circuit below when connect to power for a long time? Express your answer like $\mathbf{E_3 = 2(E_{12})}$ or $\mathbf{E_3 = \frac{1}{2}(E_{12})}$ or etcetera.

5. Below is a piece of a circuit. What is the charge on capacitors “A” and “B” after being connected to the power for a very long time?



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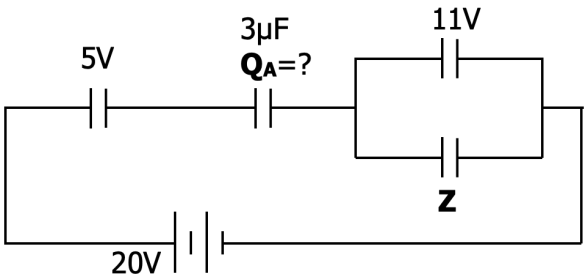
6. What is the potential difference across capacitor “Z” after being connected to the power for a very long time?
7. What is the amount of charge “Q_A” after being connected to the power for a very long time



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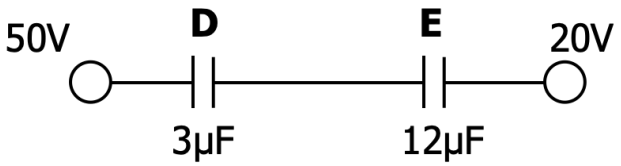
8. What is the potential difference across each of the two capacitors below after being connected to the power for a very long time?
9. What is the charge on each of the capacitors after being connected to the power for a very long time?



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10. What is the voltage on the left side of the circuit below after being connected to the power for a very long time? Use the following equation in your solution,

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11. Calculate the equivalent capacitance of the circuit, the total energy for the whole circuit, the charge on each capacitor, the potential difference for each capacitor. Clearly show every step of your analysis.

Fill out this table.
Include correct units on all answers.

Capacitor	Charge	Potential Difference
4 µF		
12 µF		
2 µF		
1 µF		
5 µF		
20 µF		
Energy in whole circuit		
Equivalent capacitance