NAME: _____

Topic 11.3 – Capacitance

Show formulas, substitutions, answers (in spaces provided) and units!

1. A 3.25-V battery is used to fully charge a 725 μF capacitor. How much charge was transferred from the negative to the positive plate? 1. _____

Three 725 μF capacitors are connected in parallel to a 3.25 V battery.

2. What is the equivalent capacitance? 2. _____

3. What is the charge on each capacitor? 3. _____

Three 725 μF capacitors are connected in series to a 3.25 V battery.

4. What is the equivalent capacitance? 4. _____

5. What is the voltage on each capacitor? 5. _____

A 725 μF capacitor will be manufactured using a dielectric having a permittivity of 4.50 ε_0 and circular plates having a diameter of 0.750 cm.

6. What should the plate separation (and the thickness of the dielectric) be? 6. _____

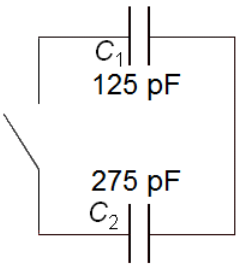
7. Is it likely that this large a capacity could be constructed using parallel plate architecture? ___ Why?
_____

The following question is about the electrical energy stored in a capacitor.

8. Find the energy stored in a 725 μF capacitor charged up to 3.25 V. 8. _____

C_1 is initially charged to 3.25 V. C_2 is initially uncharged.

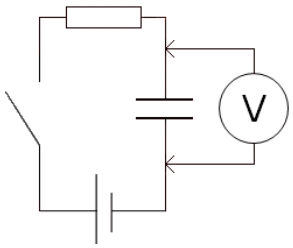
9. What is the charge on C_1's plates? 9. _____



10. The switch is closed, connecting C_1 to C_2. What is the new charge on the plates of C_1? 10. _____

The following question is about a charging RC circuit. The capacitor is initially uncharged.

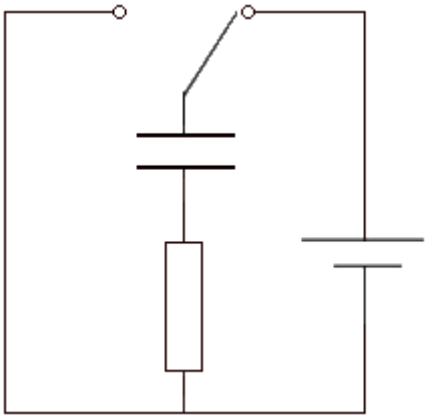
11. Make a sketch graph showing the family of curves representing the voltage across the **capacitor** after the switch is closed and as *RC* increases. Show at least three different *RC* curves, and label them "low," medium," and "high." 11. in sketch



Topic 1.1 – Measurements in physics **Formative Assessment**

NAME: _____ TEAM:__

A circuit constructed of a resistor R and a capacitor C has a switch which can be made to charge and discharge the capacitor.



12. Label the switch position which **charges** the capacitor with an "A" at the small circle in the schematic. 12. in diagram

13. Label the switch position which **discharges** the capacitor with a "B" at the small circle in the schematic. 13. in diagram

14. Draw arrows in the discharge loop showing the direction of current flow during discharge. 14. in diagram

15. What equation does Kirchhoff's rule for V produce during discharge? Your final equation should have only these variables: q, Δq, Δt, R and C.

A 725 μF capacitor is charged to 2.35 V. It is then discharged through a 15.0 MΩ resistor.

16. Find the time constant. 16. _____

17. Find the initial charge on the plates. 17. _____

18. Find the charge on the plates exactly three time constants after discharge has begun. 18. _____

19. Find the capacitor's voltage 1870 s after discharge begins. 19. _____

(CONTINUED FROM PREVIOUS PAGE)

20. Find the instantaneous current at t = 1870 s. 20. _____

21. Find the half-life of the capacitor's voltage. 21. _____

A timer using a capacitor and a resistor needs the RC circuit to have a half-life of 60.0 seconds. It will be using a capacitor of 725 μF, initially charged to a voltage of 6.25 V.

22. What should the value of the time constant be? 22. _____

23. What value should the resistor have? 23. _____

24. What will the capacitor voltage be at this time? 24. _____