Name: _____

Class: _____

Due Date: _____

53 – Capacitors and Capacitance

Answer the following questions. The solutions to this worksheet can be found on the YouTube channel Go Physics Go.

1. C: **Use a pencil!** What is a capacitor? What are its uses? Draw the symbol of a capacitor.

2. C: What is the meaning of capacitance? Equation? Units?

3. C: State the equation and define each variable which gives the capacitance of a parallel plate capacitor to its physical dimensions.

4. C: What is a dielectric? What does a dielectric do to the capacitance when it is put inside a capacitor?

5. C: **Use a pencil!** Draw three capacitors in parallel and state the equation when simplifying capacitors in parallel.

6. C: Circle the correct choice in italic font: Connecting capacitors in parallel leads to a *larger/smaller* capacitance.

7. C: **Use a pencil!** Draw three capacitors in series and state the equation when simplifying capacitors in series.

8. C: Circle the correct choice in italic font: Connecting capacitors in series leads to a *larger/smaller* capacitance.

9. C: Capacitors in parallel have the same _____ while capacitors in series have the same _____.

10. C: What are some equations for the energy stored in a capacitor?

11. C: **Use a pencil!**
    a. Draw a circuit which shows a capacitor **charging**. The circuit should contain a battery, resistor, capacitor, and wires.

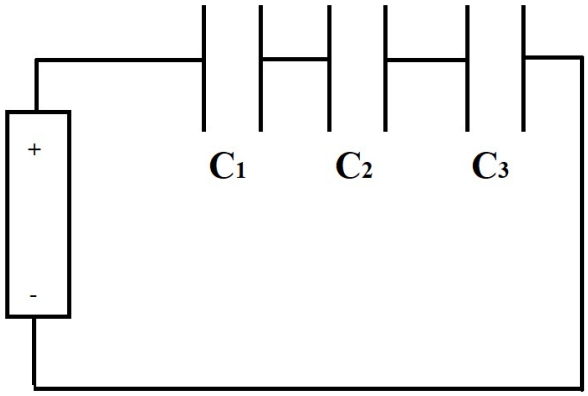
b. Draw three graphs of *voltage vs. time*, *charge vs. time*, and *current vs. time* when **charging** a capacitor. Label and give the equations of the graphs.

c. Draw a circuit which shows a capacitor **discharging**. The circuit should contain a battery, resistor, capacitor, and wires.

d. Draw three graphs of *voltage vs. time*, *charge vs. time*, and *current vs. time* when **discharging** a capacitor. Label and give the equations of the graphs.

12.C: What is the equation for the *time constant* τ? What are the units of the time constant? What does it tell us?

13. E: You are given the following circuit:



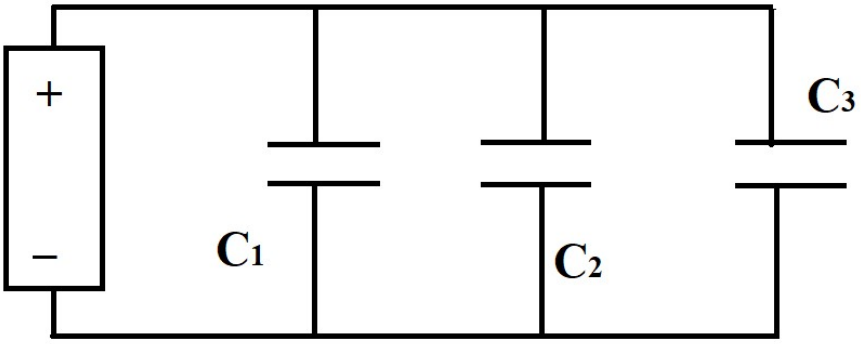
Given:

$V_{\text{battery}} = 10$ V	$C_1 = 1$ F	$C_2 = 2$ F	$C_3 = 3$ F

Solve for the following unknowns. Fractions only.

$C_{\text{equivalent}}$	Q_1	V_1
	Q_2	V_2
	Q_3	V_3

14. E: You are given the following circuit:



Given:

$V_{\text{Battery}} = 10$ V	$C_1 = 1$ F	$C_2 = 2$ F	$C_3 = 3$ F

Solve for the following unknowns. Fractions only.

$C_{\text{equivalent}}$	Q_1	V_1
	Q_2	V_2
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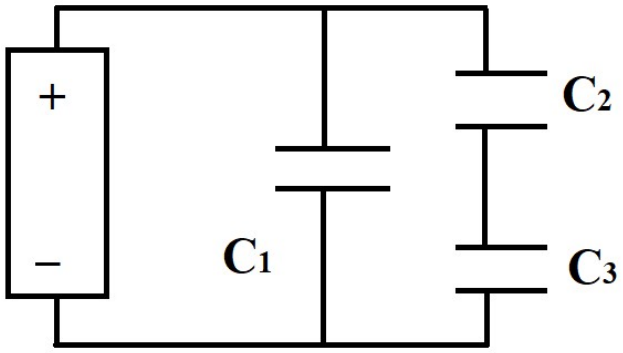
15. E: You are given the following circuit:



Given:

$V_{\text{Battery}} = 10$ V	$C_1 = 1$ F	$C_2 = 2$ F	$C_3 = 3$ F

Solve for the following unknowns. Fractions only.

$C_{\text{equivalent}}$	Q_1	V_1
	Q_2	V_2
	Q_3	V_3