Ch26 (Homework)
Current Score : – / 36 **Due :** Monday, August 27 2018 02:16 PM CDT

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1. –/2 pointsSerPSE9 26.P.002.WI.

Two conductors having net charges of +12.0 μC and -12.0 μC have a potential difference of 12.0 V between them.

(a) Determine the capacitance of the system.
[ ] F

(b) What is the potential difference between the two conductors if the charges on each are increased to +144.0 μC and -144.0 μC?
[ ] V

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2. –/2 pointsSerPSE9 26.P.004.MI.

An air-filled spherical capacitor is constructed with an inner-shell radius of 7.10 cm and an outer-shell radius of 13.2 cm.

(a) Calculate the capacitance of the device.
[ ] pF

(b) What potential difference between the spheres results in a 4.00-μC charge on the capacitor?
[ ] kV

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3. –/2 pointsSerPSE9 26.P.005.MI.

A 45.0-m length of coaxial cable has an inner conductor that has a diameter of 2.58 mm and carries a charge of 8.10 μC. The surrounding conductor has an inner diameter of 7.27 mm and a charge of −8.10 μC. Assume the region between the conductors is air.

(a) What is the capacitance of this cable?

C = [ ] nF

(b) What is the potential difference between the two conductors?

ΔV = [ ] kV

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4. –/3 pointsSerPSE9 26.P.008.

An air-filled parallel-plate capacitor has plates of area 2.10 cm^2 separated by 1.00 mm. The capacitor is connected to a 9.0-V battery.

(a) Find the value of its capacitance.

[ ] pF

(b) What is the charge on the capacitor?

[ ] pC

(c) What is the magnitude of the uniform electric field between the plates?

[ ] V/m

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5. –/5 pointsSerPSE9 26.P.013.WI.

Two capacitors, C_1 = 6.00 μF and C_2 = 13.0 μF, are connected in parallel, and the resulting combination is connected to a 9.00-V battery.

(a) Find the equivalent capacitance of the combination.

[ ] μF

(b) Find the potential difference across each capacitor.

V_1 = [ ] V

V_2 = [ ] V

(c) Find the charge stored on each capacitor.

Q_1 = [ ] μC

Q_2 = [ ] μC

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6. –/5 pointsSerPSE9 26.P.014.WI.

Two capacitors (C_1 = 3.00 μF and C_2 = 16.0 μF) are now connected in series and to a 9.00-V battery.

(a) Find the equivalent capacitance of the combination.

[ ] μF

(b) Find the potential difference across each capacitor.

V_1 = [ ] V

V_2 = [ ] V

(c) Find the charge on each capacitor.

Q_1 = [ ] μC

Q_2 = [ ] μC

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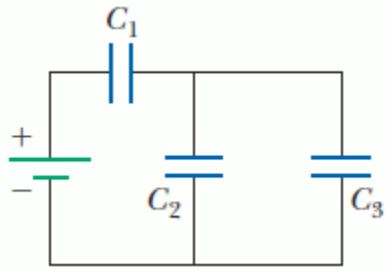
7. –/6 pointsSerPSE9 26.P.020.

Three capacitors are connected to a battery as shown in the figure below. Their capacitances are $C_1 = 3C$, $C_2 = C$, and $C_3 = 5C$.



(a) What is the equivalent capacitance of this set of capacitors? (Use the following as necessary: C.)

C_{eq} =

(b) State the ranking of the capacitors according to the charge they store from largest to smallest.

---Select--- > ---Select--- > ---Select---

(c) Rank the capacitors according to the potential differences across them from largest to smallest.

- $\Delta V_1 = \Delta V_2 < \Delta V_3$
- $\Delta V_1 > \Delta V_2 = \Delta V_3$
- $\Delta V_1 > \Delta V_2 > \Delta V_3$
- $\Delta V_2 > \Delta V_3 > \Delta V_1$

(d) Assume C_3 is increased. Explain what happens to the charge stored by each capacitor.

- Q_3 and Q_2 increase; Q_1 decreases.
- Q_3, Q_1, and Q_2 increase.
- Q_3 and Q_1 increase; Q_2 decreases.
- All charges stay the same.

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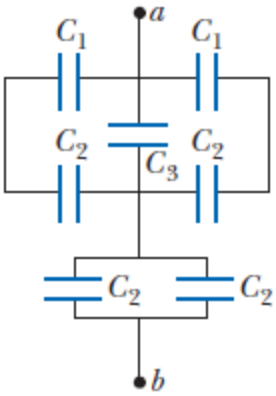
8. –/2 pointsSerPSE9 26.P.022.WI.

Consider the following figure.



(a) Find the equivalent capacitance between points *a* and *b* for the group of capacitors connected as shown in the figure above. Take C_1 = 6.00 μF, C_2 = 13.0 μF, and C_3 = 3.00 μF.

[ ] μF

(b) What charge is stored on C_3 if the potential difference between points *a* and *b* is 60.0 V?

[ ] μC

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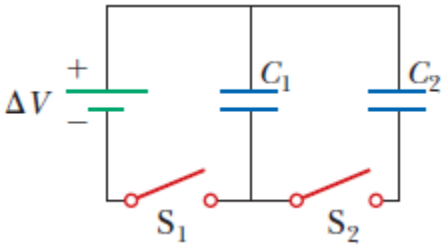
9. –/3 pointsSerPSE9 26.P.024.MI.FB.

Consider the circuit shown in the figure below, where C_1 = 8.00 μF, C_2 = 9.00 μF, and ΔV = 22.0 V. Capacitor C_1 is first charged by closing switch S_1. Switch S_1 is then opened, and the charged capacitor is connected to the uncharged capacitor by closing S_2.



(a) Calculate the initial charge acquired by C_1. (Round your answer to at least one decimal place.)

[ ] μC

(b) Calculate the final charge on each capacitor.

q_1 = [ ] μC

q_2 = [ ] μC

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10. –/4 pointsSerPSE9 26.P.035.

Two identical parallel-plate capacitors, each with capacitance 15.0 μF, are charged to potential difference 45.5 V and then disconnected from the battery. They are then connected to each other in parallel with plates of like sign connected. Finally, the plate separation in one of the capacitors is doubled.

(a) Find the total energy of the system of two capacitors *before* the plate separation is doubled.

[ ] J

(b) Find the potential difference across each capacitor *after* the plate separation is doubled.

[ ] V

(c) Find the total energy of the system *after* the plate separation is doubled.

[ ] J

(d) Reconcile the difference in the answers to parts (a) and (c) with the law of conservation of energy.

- Positive work is done by the agent pulling the plates apart.
- Negative work is done by the agent pulling the plates apart.
- No work is done by pulling the agent pulling the plates apart.

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11. –/2 pointsSerPSE9 26.P.045.WI.

(a) Determine the capacitance of a Teflon-filled parallel-plate capacitor having a plate area of 1.70 cm^2 and a plate separation of 0.080 0 mm.

[ ] pF

(b) Determine the maximum potential difference that can be applied to a Teflon-filled parallel-plate capacitor having a plate area of 1.70 cm^2 and a plate separation of 0.080 0 mm.

[ ] kV

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