WS # 1 Chapter 26 pr 5,7,8,19,20,22,23,54

Problems

5. M A 50.0-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? (b) What is the potential difference between the two conductors?

7. When a potential difference of 150 V is applied to the plates of a parallel-plate capacitor, the plates carry a surface charge density of 30.0 nC/cm^2. What is the spacing between the plates?

8. An air-filled parallel-plate capacitor has plates of area 2.30 cm^2 separated by 1.50 mm. (a) Find the value of its capacitance. The capacitor is connected to a 12.0-V battery. (b) What is the charge on the capacitor? (c) What is the magnitude of the uniform electric field between the plates?

19. For the system of four capacitors shown in Figure P26.19, find (a) the equivalent capacitance of the system, (b) the charge on each capacitor, and (c) the potential difference across each capacitor.

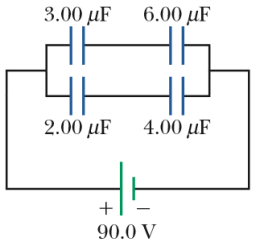

Figure P26.19
Problems 19 and 56.

20. Three capacitors are connected to a battery as shown in Figure P26.20. Their capacitances are $C_1 = 3C$, $C_2 = C$, and $C_3 = 5C$. (a) What is the equivalent capacitance of this set of capacitors? (b) State the ranking of the capacitors according to the charge they store from largest to smallest. (c) Rank the capacitors according to the potential differences across them from largest to smallest. (d) **What If?** Assume C_3 is increased. Explain what happens to the charge stored by each capacitor.

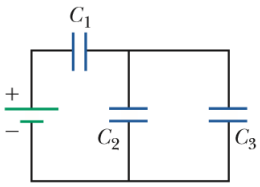

Figure P26.20

22. W (a) Find the equivalent capacitance between points a and b for the group of capacitors connected as shown in Figure P26.22. Take $C_1 = 5.00$ μF, $C_2 = 10.0$ μF, and $C_3 = 2.00$ μF. (b) What charge is stored on C_3 if the potential difference between points a and b is 60.0 V?

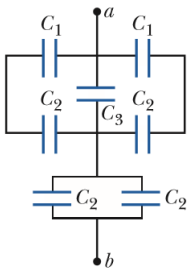

Figure P26.22

23. M Four capacitors are connected as shown in Figure P26.23. (a) Find the equivalent capacitance between points a and b. (b) Calculate the charge on each capacitor, taking $\Delta V_{ab} = 15.0$ V.

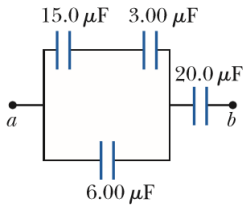

Figure P26.23

54. Find the equivalent capacitance of the group of capacitors shown in Figure P26.54.

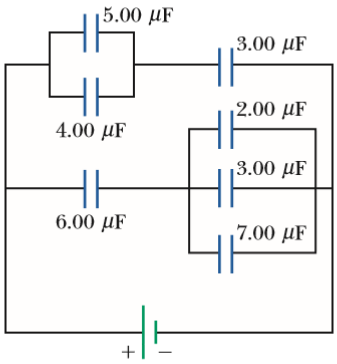

Figure P26.54

5) 3020 V, 2.68 E-9 F, 7) 4.43 E-6 m 8) 1.36 E-12 F, 16.3 pC, 8000 N/C
19) 3.3 E-6 F, 1.8E-4 C, 1.2 E-4 C, 60V 30V 20) 2C, V1>V2=V3, Q1>Q3>Q2 22) 6.05 E-6 F, 8.37 E-5 C
23) 5.96 E-6 F, 8.94 E-5 C, 6.31 E-5 C, 2.63 E-5 C 54) 6.25 E-6 F