Capacitor and Capacitance

1. You have two flat metal plates, each of area 1.00 m^2, with which to construct a parallel-plate capacitor. (a) If the capacitance of the device is to be 1.00 F, what must be the separation between the plates? (b) Could this capacitor actually be constructed?

2. The electric field energy density near the surface of an isolated charged conducting sphere with a radius of 5 cm is 0.1 J/m^3. What is the electric potential at the center of the conductor?

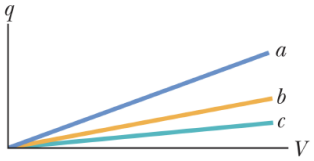
3. Suppose a parallel plate capacitor is charged to Q and then the battery is disconnected. Now suppose I pull the plates further apart so that the final separation is *dl*. How do the quantities Q, C, E, V, U change?

4. Suppose a parallel plate capacitor is charged to Q and the battery is kept connected. Now suppose I pull the plates further apart so that the final separation is *dl*. How do the quantities Q, C, E, V, U change?

5. Consider two cylindrical capacitors, each of length L. C1 has inner radius 1 cm and outer radius 1.1cm and C2 has inner radius 1 cm and outer radius 1.2cm. If both capacitors are given the same amount of charge, what is the relation between U1, the energy stored in C1, and U2, the energy stored in C2?

6. What capacitance is required to store an energy of 10kW·h at a potential difference of 1000V?

7. The figure below shows plots of charge versus potential difference for three parallel-plate capacitors that have the plate areas and separations given in the table. Which plot goes with which capacitor?



Capacitor	Area	Separation
1	A	d
2	$2A$	d
3	A	$2d$

8. A charged conducting sphere with a radius of 5 cm has a potential of 8 kilovolts relative to infinity. What is the electric field energy density (in J/m^3) at a point near the surface outside the conductor?

9. How much energy is stored in one cubic meter of air due to the "fair weather" electric field of magnitude 150V/m?

10. Capacitor #1 with capacitance C and initial charge Q is connected in parallel across an initially uncharged capacitor with capacitance 2C (#2). After the system comes to equilibrium, what is the charge on capacitor #1?