PRACTICE B

Capacitance

1. A 4.00 μF capacitor is connected to a 12.0 V battery.
- **a.** What is the charge on each plate of the capacitor?
- **b.** If this same capacitor is connected to a 1.50 V battery, how much electrical potential energy is stored?

2. A parallel-plate capacitor has a charge of 6.0 μC when charged by a potential difference of 1.25 V.
- **a.** Find its capacitance.
- **b.** How much electrical potential energy is stored when this capacitor is connected to a 1.50 V battery?

3. A capacitor has a capacitance of 2.00 pF.
- **a.** What potential difference would be required to store 18.0 pC?
- **b.** How much charge is stored when the potential difference is 2.5 V?

4. You are asked to design a parallel-plate capacitor having a capacitance of 1.00 F and a plate separation of 1.00 mm. Calculate the required surface area of each plate. Is this a realistic size for a capacitor?

SECTION REVIEW

1. Assume Earth and a cloud layer 800.0 m above the Earth can be treated as plates of a parallel-plate capacitor.
- **a.** If the cloud layer has an area of 1.00×10^6 m^2, what is the capacitance?
- **b.** If an electric field strength of 2.0×10^6 N/C causes the air to conduct charge (lightning), what charge can the cloud hold?
- **c.** Describe what must happen to its molecules for air to conduct electricity.

2. A parallel-plate capacitor has an area of 2.0 cm^2, and the plates are separated by 2.0 mm.
- **a.** What is the capacitance?
- **b.** How much charge does this capacitor store when connected to a 6.0 V battery?

3. A parallel-plate capacitor has a capacitance of 1.35 pF. If a 12.0 V battery is connected to this capacitor, how much electrical potential energy would it store?

4. **Critical Thinking** Explain why two metal plates near each other will not become charged until connected to a source of potential difference.