

AP Physics C: Electricity and Magnetism

Name: _____ Score: _____

1. Inside a conductor in electrostatic equilibrium, the electric field is:
 - ☐ very large
 - ☐ zero
 - ☐ equal to the surface field
 - ☐ pointing inward
2. When two conductors are connected, charge flows until they have equal:
 - ☐ charge
 - ☐ potential
 - ☐ radius
 - ☐ mass
3. Capacitance is defined as:
 - ☐ Q/V
 - ☐ QV
 - ☐ V/Q
 - ☐ $Q + V$
4. Inserting a dielectric of constant κ changes the capacitance to:
 - ☐ C_0/κ
 - ☐ κC_0
 - ☐ $C_0 - \kappa$
 - ☐ unchanged
5. Excess charge on a solid conductor sits:
 - ☐ spread through the volume
 - ☐ at the exact centre
 - ☐ entirely on the surface
 - ☐ nowhere — it vanishes
6. At equal potential, the larger sphere holds more charge ($Q \propto R$).
 - ☐ True ☐ False

7. A dielectric polarises and weakens the field between the plates.

☐ True ☐ False

8. A hollow conductor shields its inside from external fields (a Faraday cage).

☐ True ☐ False

9. A radius- $3R$ sphere shares charge with a radius- R sphere. The big one holds how many times the charge of the small one?

10. A 2 F capacitor is charged to 3 V. Find the stored energy (in J).

_____ J

AP Physics C: Electricity and Magnetism

1. **zero**

If it were not zero, free charges would move — so at equilibrium $E = 0$ inside.

2. **potential**

Charge flows until the potentials are equal — no push remains.

3. Q/V

$C = Q/V$, charge stored per volt, in farads.

4. κC_0

$C = \kappa C_0$, and $\kappa > 1$, so capacitance rises.

5. **entirely on the surface**

With zero interior field, all excess charge must lie on the surface.

6. **True**

$V = kQ/R$ equal means $Q \propto R$ — bigger holds more.

7. **True**

Its aligned charges oppose the plates' field, weakening the net field.

8. **True**

The conductor cancels the field inside the cavity — a Faraday cage.

9. **3**

$Q \propto R$, so the $3R$ sphere holds $3\times$ the charge.

10. **9 J**

$$U = \frac{1}{2}CV^2 = \frac{1}{2}(2)(3^2) = 9 \text{ J.}$$