Which of the following statements are true? (choose all that apply)

1. The charges in a dielectric cannot move freely.
2. A dielectric cannot be charged.
3. The surface charge on an uncharged dielectric is always zero.
4. The potential difference across a dielectric is always zero.

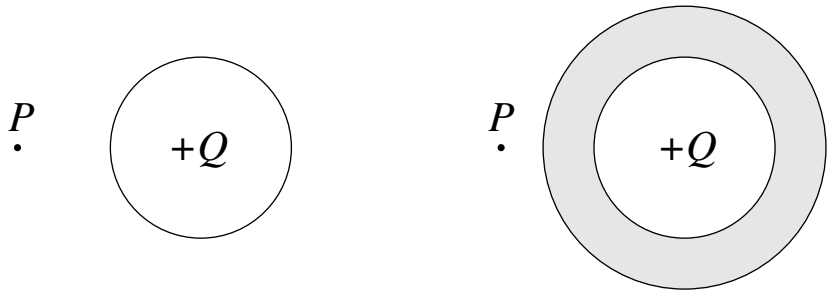
A parallel plate capacitor is charged to a potential difference of 100 V and disconnected from the source. A slab of dielectric is then inserted between the plates. Which of the following changes?

1. the potential difference
2. the capacitance
3. the charge on the plates
4. 1 and 2
5. all of the above
6. none of the above

Two experiments are carried out with a parallel plate capacitor (*a*) The capacitor is charged to a potential difference of 100 V, disconnected from the source, and then a slab of dielectric is inserted between the plates. (*b*) The capacitor is connected to a battery which maintains a potential difference of 100 V between the capacitor plates and then a slab of dielectric is inserted between the plates. In which experiment does the final configuration have the largest capacitance?

1. experiment (*a*)
2. experiment (*b*)
3. both the same
4. need more information

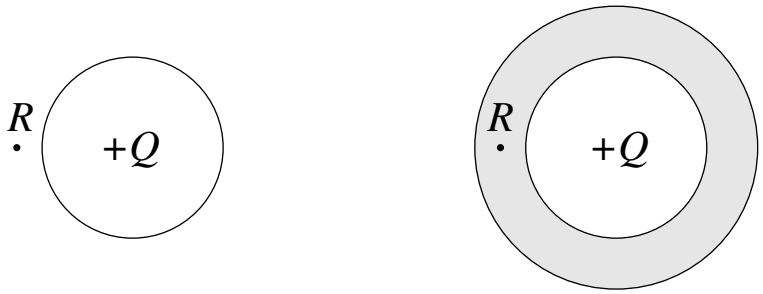
A metallic sphere carrying a charge $+Q$ is surrounded by an insulating material.



Compared to what it was without the insulator, the electric field at point P is now

1. larger.
2. unchanged.
3. smaller.
4. depends on the dielectric constant of the material.

A metallic sphere carrying a charge $+Q$ is surrounded by an insulating material.



Compared to what it was without the insulator, the electric field at point R inside the insulation is now

1. larger.
2. unchanged.
3. smaller.
4. depends on the dielectric constant of the material.