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.