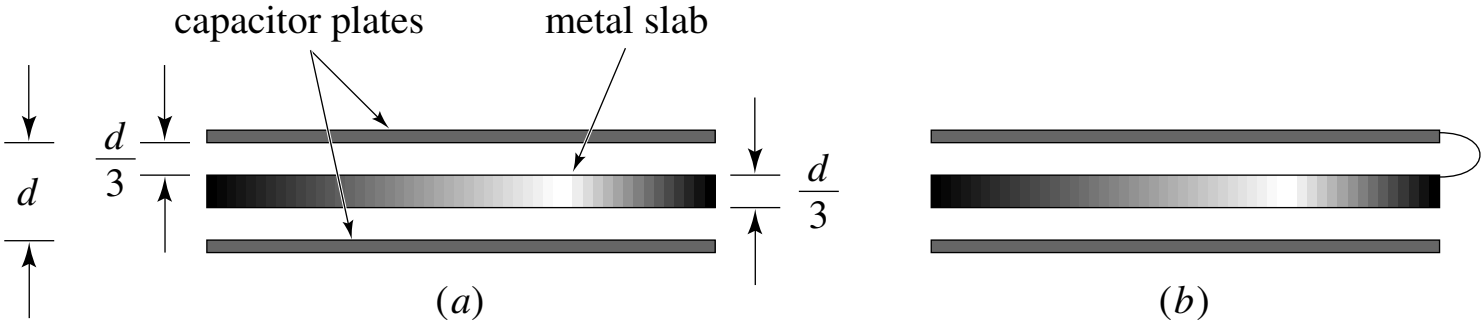
Consider two capacitors, each having plate separation d. In each case, a slab of metal of thickness $d/3$ is inserted between the plates. In case (a), the slab is not connected to either plate. In case (b), it is connected to the upper plate. The capacitance is higher for



1. case (a).
2. case (b).
3. The two capacitances are equal.

Consider a simple parallel-plate capacitor whose plates are given equal and opposite charges and are separated by a distance d. Suppose the plates are pulled apart until they are separated by a distance $D > d$. The electrostatic energy stored in the capacitor is

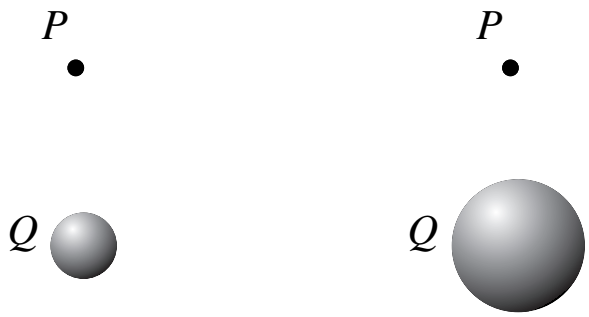
1. greater than
2. the same as
3. smaller than

before the plates were pulled apart.

Consider a simple parallel-plate capacitor whose plates are given equal and opposite charges and are separated by a distance *d*. If we increase the separation between the plates, which of the following remain(s) constant?

1. the field between the plates
2. the potential difference between the plates
3. the energy stored in the system
4. the capacitance of the system

Consider a conducting sphere carrying a charge Q. If we replace the sphere by a sphere of twice the radius, but also carrying a charge Q, which of the following change(s)? (choose all that apply)



1. The electric field at point P.
2. The potential at point P.
3. The potential of the conductor
4. The self-capacitance of the conductor
5. 1 and 2.
6. 3 and 4

A certain amount of work is required to bring two point charges q near each other until they are a distance d apart. If the magnitude of the point charges were doubled to $2q$, would the work required also double?

1. yes
2. no
3. It depends on the signs of the charges.