To Your Groups…
A parallel-plate capacitor is attached to a battery that maintains a constant potential difference $V$ between the plates. While the battery is still connected, a glass slab is inserted so as to just fill the space between the plates. The stored energy

1. increases.
2. decreases.
3. remains the same.

Did we have to push in the slab, or was it pulled in?
A dielectric is inserted between the plates of a capacitor. The system is then charged and the dielectric is removed. The electrostatic energy stored in the capacitor is

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

it would have been if the dielectric were left in place.

Did we have to pull out the dielectric, or did it jump out?
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.
Problem #1

a) Determine the equivalent capacitance for the capacitor network depicted below.

b) If the network is connected to a 12-V battery, calculate the potential difference across each capacitor and the charge on each capacitor.
Problem #2

Determine the effective capacitance of the configuration shown. Each of the capacitors is identical and has a capacitance $C$. 
Consider the following group of capacitors…

- Find the equivalence capacitance between points a and b

- Determine the charge on each capacitor when the potential difference between a and b is 12-V
Problem #4

Find the equivalent capacitance between points a and b in the capacitor network shown.
Problem #5

When two capacitors are connected in parallel, the equivalent capacitance is 4 micro-F. If the same capacitors are reconnected in series, the equivalent capacitance is one fourth the capacitance of one of the two capacitors. Determine the two capacitances.
Problem #6

A parallel plate capacitor is to be constructed using Pyrex glass as a dielectric. If the capacitance of the device is to be 0.2 micro-F and is to be operated at 6000 V (for Pyrex use Kappa=5.6)

a) Calculate the minimum plate area required

b) What is the energy stored in the capacitor at the operating voltage?

Note: Each dielectric material has a characteristic dielectric strength. This is the maximum voltage per unit thickness the material can withstand without electrical breakdown or rupture. For Pyrex, the dielectric strength is $14 \times 10^6$ V/m.
Problem #7

A coaxial cable has an outer conductor of inside diameter 0.9 cm and is filled with polyethylene, which has a dielectric constant of 2.3. If the capacitance per unit length of this cable is 40 pf/m, what is the diameter of the inner conductor?
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