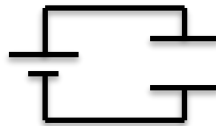
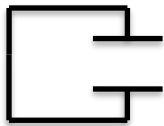


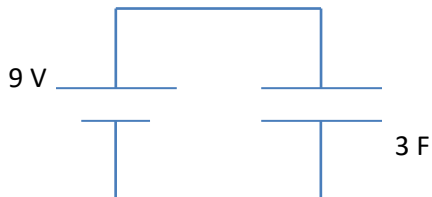
CONCEPT: INTRO TO DIELECTRICS

- **Dielectric:** Insulator between charged plates [**INCREASES** | **DECREASES**] capacitance: $C = \kappa C_0$
 - DIELECTRIC CONSTANT $\kappa \geq 1$ (no units!)
 - Always [**STRENGTHEN** | **WEAKEN**] Electric Fields $\rightarrow E = E_0/\kappa$

CONSTANT CHARGE (Q)	CONSTANT VOLTAGE (V)
- No battery connected - $Q = C \quad V \quad \rightarrow V$ _____ - $U = \frac{1}{2} Q^2 / C \quad \rightarrow U$ _____ - $u = \frac{1}{2} \epsilon_0 E^2 \quad \rightarrow u$ _____	- Inserted when battery still connected - $V = Q / C \quad \rightarrow Q$ _____ - $U = \frac{1}{2} C \quad V^2 \quad \rightarrow U$ _____ - $u = \frac{1}{2} \epsilon_0 E^2 \quad \rightarrow u$ _____



EXAMPLE: A capacitor is connected to a battery as shown below. What is the charge on the capacitor after a dielectric ($\kappa = 2$) is inserted into the capacitor while it is *still* connected to the battery?



EXAMPLE: CAPACITOR WITH A DIELECTRIC

A capacitor in a vacuum is charged to 64V between its plates, then disconnected. Initially, each plate has $32\mu\text{C}$. An insulating slab of dielectric glass with $\kappa = 3$ is placed between the plates. a) What is the capacitor's new capacitance? b) What is the new voltage across the capacitor?

PRACTICE: CIRCULAR PLATE CAPACITOR WITH DIELECTRIC

A parallel plate capacitor is formed by bringing two circular plates, of radius 0.5 cm, to a distance of 2 mm apart. The capacitor is made so that it has a dielectric of constant κ between the plates. When the charge on the capacitor is 3 nC, the voltage of the capacitor is 5000 V. What is the dielectric constant?

EXAMPLE: CAPACITORS PARTIALLY FILLED WITH DIELECTRIC

What is the new capacitance of the two capacitors that are partially filled with dielectrics shown in the following figure?

