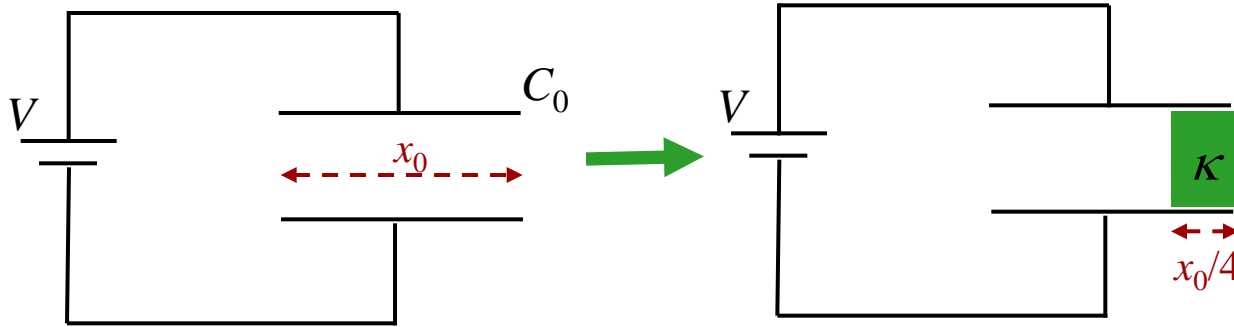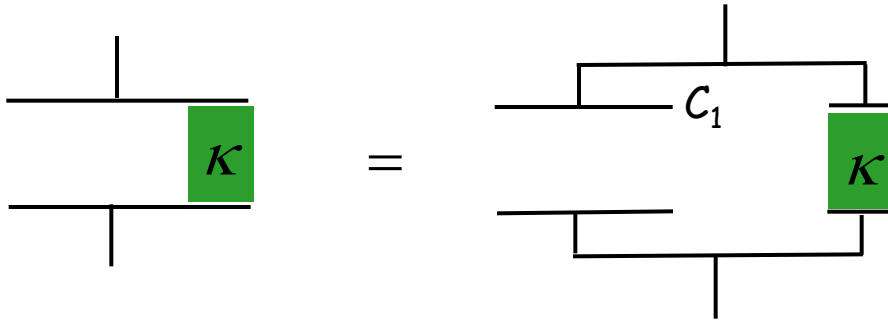# *Calculation*

An air-gap capacitor, having capacitance C_0 and width x_0 is connected to a battery of voltage V.

A dielectric (κ) of width $x_0/4$ is inserted into the gap as shown.

What is Q_f, the final charge on the capacitor?

$$C_1 = {}^3/_4 C_0 \qquad C_2 = {}^1/_4\, \kappa C_0$$

$$\longrightarrow \quad C = C_0\left({}^3/_4 + {}^1/_4\, \kappa\right)$$

What is Q?

$$C \equiv \frac{Q}{V} \quad \longrightarrow \quad Q = VC$$

$$Q_f = VC_0\left(\frac{3}{4} + \frac{1}{4}\kappa\right)$$