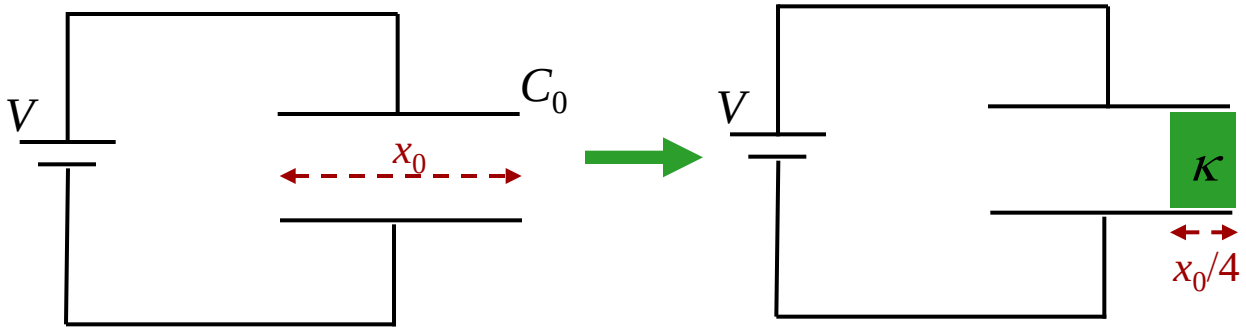
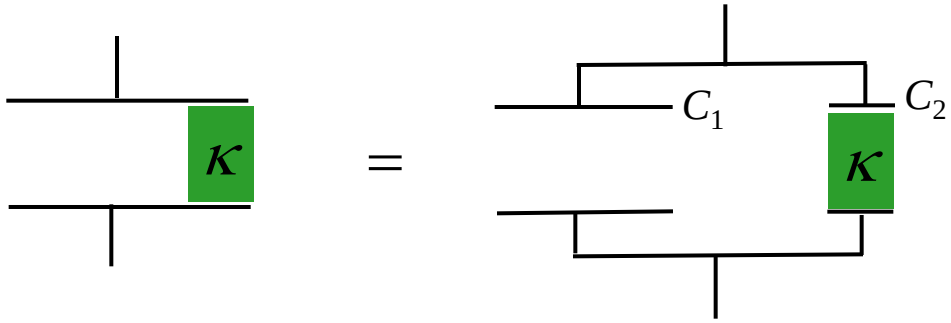
Calculation



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?



$C_1 = {}^3/_4 C_0$

What is C_2 ?

A) $C_2 = \kappa C_0$ B) $C_2 = {}^3/_4\ \kappa C_0$ C) $C_2 = {}^4/_3\ \kappa C_0$ D) $C_2 = {}^1/_4\ \kappa C_0$

In general. For parallel plate capacitor filled with dielectric: $C = \kappa\varepsilon_0 A/d$

$A = {}^1/_4 A_0$, $d = d_0$ → $C = \frac{1}{4}(\kappa\varepsilon_0 A_0/d_0)$ → $C_2 = {}^1/_4\ \kappa C_0$