

46. (a) We apply Gauss's law with dielectric: $q/\varepsilon_0 = \kappa EA$, and solve for κ :

$$\kappa = \frac{q}{\varepsilon_0 EA} = \frac{8.9 \times 10^{-7} \text{ C}}{(8.85 \times 10^{-12} \frac{\text{C}^2}{\text{N} \cdot \text{m}^2}) (1.4 \times 10^{-6} \text{ V/m})(100 \times 10^{-4} \text{ m}^2)} = 7.2 .$$

- (b) The charge induced is

$$q' = q \left(1 - \frac{1}{\kappa} \right) = (8.9 \times 10^{-7} \text{ C}) \left(1 - \frac{1}{7.2} \right) = 7.7 \times 10^{-7} \text{ C} .$$