

36. (a) We use $C = \varepsilon_0 A/d$ to solve for d :

$$d = \frac{\varepsilon_0 A}{C} = \frac{\left(8.85 \times 10^{-12} \frac{\text{C}^2}{\text{N} \cdot \text{m}^2}\right) (0.35 \text{ m}^2)}{50 \times 10^{-12} \text{ F}} = 6.2 \times 10^{-2} \text{ m} .$$

(b) We use $C \propto \kappa$. The new capacitance is $C' = C(\kappa/\kappa_{\text{air}}) = (50 \text{ pf})(5.6/1.0) = 280 \text{ pF}$.