# Chapter 26

**P26.14**

$$\sum F_y = 0: \qquad T\cos\theta - mg = 0$$

$$\sum F_x = 0: \qquad T\sin\theta - Eq = 0$$

Dividing, $\tan\theta = \dfrac{Eq}{mg}$

so $E = \dfrac{mg}{q}\tan\theta$

and $\Delta V = Ed = \boxed{\dfrac{mgd\tan\theta}{q}}$.

**P26.31** (a) $U = \dfrac{1}{2}C(\Delta V)^2 = \dfrac{1}{2}(3.00\ \mu\text{F})(12.0\ \text{V})^2 = \boxed{216\ \mu\text{J}}$

(b) $U = \dfrac{1}{2}C(\Delta V)^2 = \dfrac{1}{2}(3.00\ \mu\text{F})(6.00\ \text{V})^2 = \boxed{54.0\ \mu\text{J}}$

**P26.43** (a) $C = \dfrac{\kappa \in_0 A}{d} = \dfrac{2.10\left(8.85\times10^{-12}\ \text{F/m}\right)\left(1.75\times10^{-4}\ \text{m}^2\right)}{4.00\times10^{-5}\ \text{m}} = 8.13\times10^{-11}\ \text{F} = \boxed{81.3\ \text{pF}}$

(b) $\Delta V_{\text{max}} = E_{\text{max}}d = \left(60.0\times10^{6}\ \text{V/m}\right)\left(4.00\times10^{-5}\ \text{m}\right) = \boxed{2.40\ \text{kV}}$

**P26.61** (a) $C_1 = \dfrac{\kappa_1 \in_0 A/2}{d}$; $C_2 = \dfrac{\kappa_2 \in_0 A/2}{d/2}$; $C_3 = \dfrac{\kappa_3 \in_0 A/2}{d/2}$

$$\left(\frac{1}{C_2}+\frac{1}{C_3}\right)^{-1} = \frac{C_2C_3}{C_2+C_3} = \frac{\in_0 A}{d}\left(\frac{\kappa_2\kappa_3}{\kappa_2+\kappa_3}\right)$$

$$C = C_1 + \left(\frac{1}{C_2}+\frac{1}{C_3}\right)^{-1} = \boxed{\frac{\in_0 A}{d}\left(\frac{\kappa_1}{2}+\frac{\kappa_2\kappa_3}{\kappa_2+\kappa_3}\right)}$$

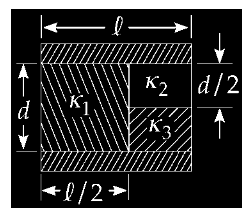


**FIG. P26.61**

(b) Using the given values we find: .