75. GIVEN: PROB 74 (CONT) $L = 1.5\,m$ $m = 0.010\,kg$

a) $q_1 = q_2 = 0.75\,\mu C$

b) $q_1 = 0.50\,\mu C$ $q_2 = 1.0\,\mu C$

FIND: θ

FROM PROB. 74

$$mg\tan\theta = \frac{k q_1 q_2}{(2L\sin\theta)^2}$$

$$\tan\theta \sin^2\theta = \frac{k q_1 q_2}{4L^2 mg}$$

a) $$\tan\theta\sin^2\theta = \frac{\left(9\times10^9 \frac{N\cdot m^2}{C^2}\right)(.75\,\mu C)^2}{4(1.5\,m)^2(0.010\,kg)(9.8\,m/s^2)} = .00574$$

$\theta = .179\,rad = 10.3°$ (TI) SMALLEST ANGLE APPROX

b) $$\tan\theta\sin^2\theta = \frac{\left(9\times10^9 \frac{N\cdot m^2}{C^2}\right)(.5\times10^{-6}\,C)(1\times10^{-6}\,C)}{4(1.5\,m)^2(.010\,kg)(9.8\,m/s^2)} = .0051$$

$\theta = .172\,rad = 9.85°$ (TI) SMALLEST ANGLE APPROX

NOTE: FOR ANGLES THAT ARE "SMALL" $\sin\theta = \tan\theta = \theta$

a) $\tan\theta\sin^2\theta \approx \theta^3 = .00574 \Rightarrow \theta = .179\,rad$

b) $\tan\theta\sin^2\theta \approx \theta^3 = .00510 \Rightarrow \theta = .172\,rad$

3-0235 — 50 SHEETS — 5 SQUARES
3-0236 — 100 SHEETS — 5 SQUARES
3-0237 — 200 SHEETS — 5 SQUARES
3-0137 — 200 SHEETS — FILLER
COMET