Dragt 42 cont. Now square both sides to get

$$(Mga-ka^2)^2\cos^2\theta_0 = (kal_0)^2\cos^2(\pi/4-\theta_0/2) = (kal_0)^2[1+\cos(\pi/2-\theta_0)]/2$$

or, $$(Mga-ka^2)^2(1-\sin^2\theta_0) = (kal_0)^2(1+\sin\theta_0)/2 \Rightarrow$$

$$2(Mga-ka^2)^2(1-\sin\theta_0) = (kal_0)^2 \Rightarrow$$

$$\boxed{\sin\theta_0 = 1 - \frac{(kal_0)^2}{2(Mga-ka^2)^2}}$$

b) Suppose $\theta_0 = 0$. Then $2(Mga-ka^2)^2 = (kal_0)^2$ or

$Mga - ka^2 = \pm(kal_0)/\sqrt{2}$. But, from the earlier relation

$Mga\cos\theta_0 - ka\cos(\pi/4-\theta_0/2)[2a\sin(\pi/4-\theta_0/2) - l_0] = 0$ we get for

$\theta_0 = 0$ $\quad Mga - ka\cos(\pi/4)[2a\sin(\pi/4) - l_0] = 0$ or

$$Mga - ka\frac{1}{\sqrt{2}}\left(\frac{2a}{\sqrt{2}} - l_0\right) = 0 \quad \text{or} \quad Mga - ka^2 + \frac{kal_0}{\sqrt{2}} = 0$$