

HW 11-4 Soln)

We can break the oscillation up into two 'half' cycles that have different periods. If the length were always L , the period would be

$$P_{\text{left}} = 2\pi[L/g]^{1/2}$$

And if the length were always $\frac{2}{3}L$, the period would be

$$P_{\text{right}} = 2\pi[(2L/3)/g]^{1/2}$$

The motion consists in half of a 'left' cycle and half of a 'right' cycle, so that the period of oscillation is

$$P_{\text{tot}} = \frac{1}{2}P_{\text{left}} + \frac{1}{2}P_{\text{right}}$$

$$P_{\text{tot}} = \pi[L/g]^{1/2} + \pi[(2L/3)/g]^{1/2} = \pi[L/g]^{1/2} \{1 + \frac{2}{3}^{1/2}\} = 5.71 [L/g]^{1/2}$$