

77. Using $\Delta m = 2.0$ kg, $T_1 = 2.0$ s and $T_2 = 3.0$ s, we write

$$T_1 = 2\pi\sqrt{\frac{m}{k}} \quad \text{and} \quad T_2 = 2\pi\sqrt{\frac{m + \Delta m}{k}} .$$

Dividing one relation by the other, we obtain

$$\frac{T_2}{T_1} = \sqrt{\frac{m + \Delta m}{m}}$$

which (after squaring both sides) simplifies to

$$m = \frac{\Delta m}{\left(\frac{T_2}{T_1}\right)^2 - 1} = 1.6 \text{ kg} .$$