Flipping Physics Lecture Notes:

Triple the Mass in a Mass-Spring System. How does Period Change?

Example: If the mass in a mass-spring system is tripled, how does the period change?

Knowns: $m_2 = 3m_1$ and $T_2 = ?\,T_1$

We know the equation for the period of a mass-spring system: $T = 2\pi\sqrt{\frac{m}{k}}$

So the period of the original mass-spring system is: $T_1 = 2\pi\sqrt{\frac{m_1}{k}}$

And the period of the new mass-spring system with three times the mass is:

$$T_2 = 2\pi\sqrt{\frac{m_2}{k}} = 2\pi\sqrt{\frac{3m_1}{k}} = 2\pi\sqrt{\frac{m_1}{k}}\sqrt{3} = T_1\sqrt{3} \Rightarrow T_2 = T_1\sqrt{3}$$

So tripling the mass, increases the period by the square root of 3: $\boxed{T_2 = T_1\sqrt{3}}$

Demonstration: $T_1 = 1.67\text{s}$ & $T_2 = T_1\sqrt{3} = \left(1.67\right)\sqrt{3} = 2.8925 \approx 2.89\text{s}$

However, the observed value for the period with three times the mass is 2.83 seconds.

$$E_r = \frac{O - A}{A} \times 100 = \frac{2.83 - 2.8925}{2.8925} \times 100 = \text{-}2.1608 \approx \text{-}2.16\%$$

I think we can confidently say, “The physics works!!”