21-R-VIB-SS-51

An m=2kg block rests on a smooth surface and is connected to a long spring (k=6N/m). The mass is pulled by x=5cm, extending the spring from its natural length. What will be the deflection (Δ) of the spring 2s after being released?

Solution

$$\begin{aligned}\omega &= \sqrt{\frac{k}{m}} \\ &= 3 \quad [\text{ rad/s }]\end{aligned}$$

Using the displacement equation for simple harmonic motion with no damping, keeping in mind that the spring starts from the most extended position,

$$\begin{aligned}\Delta &= A\cos(\omega t) \\ &= 5\cos(3 \cdot 2) \\ &= 4.8 \quad [\text{ cm }]\end{aligned}$$

This is what the function looks like: