Spring/Mass Oscillator

Simple Harmonic Motion – Individual Activity 1

$f = \frac{\omega}{2\pi}$ $f = \frac{1}{T}$ $T = 2\pi\sqrt{m/k}$ $x = A\sin\omega t$ $\omega = \frac{\text{radians}}{\text{second}}$

Use $x = A\sin\omega t$ when $t=0$ if the mass begins as in Figure 1.

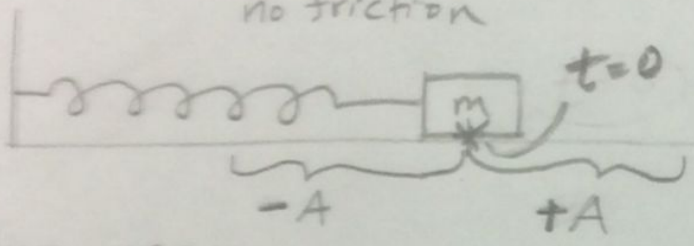
1. What is the time period for the mass on the spring?
2. What is the displacement after ____ seconds?

Spring Constant (k): _____ N/m Maximum Displacement (A): _____ m

Mass (m): _____ kg

3. What is frequency?
4. What is angular frequency? (aka 'w')

Figure 1



Answers:

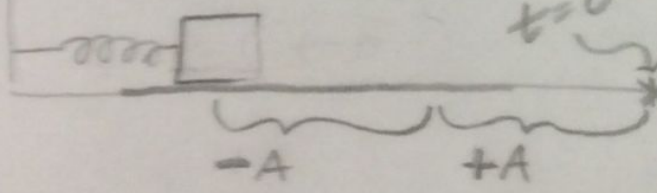
1. T = _____ seconds
2. x = _____ meters
3. f = _____ Hz
4. ω = _____ rad/sec

Carry the decimal to at least 4 places.

Your calculator should be in radian mode.

Use figure 1 for #1-4.

Figure 2



If the mass starts at +A when t=0 you can use $x = A\cos\omega t$ to find T, x, f and ω.

hint: $\cos t = \sin(t + \pi/2)$

5. x = _____ meters using cosine t=0 in Figure 1.
6. x = _____ meters using cosine t=0 in Figure 2.
7. What did you notice about #5 and #2? Why?
8. What did you notice about #5 and #6? Why?