	Physics 240: UnQuiz07	Name:_____

A spring has a spring constant of 90 N/m. A mass m=10 kg is attached to the spring. Find the period of oscillations.

If the mass is initially pulled to a distance of +0.4 m from the equilibrium position, and released from rest, find the total energy of the system.

Find the maximum velocity of the system.

How fast was the mass moving when x=+A/2?

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A spring has a spring constant of 90 N/m. A mass m=10 kg is attached to the spring. Find the period of oscillations.

$$\omega=\sqrt{\frac{k}{m}}=\sqrt{\frac{90\,N/m}{10\,kg}}=\sqrt{9\,rad^2/s^2}=3\,rad/s:\omega=2\pi f\Rightarrow f=\frac{\omega}{2\pi}=\frac{3}{2\pi}=0.48\,Hz:T=\frac{1}{f}=2.1\,s$$

If the mass is initially pulled to a distance of +0.4 m from the equilibrium position, and released from rest, find the total energy of the system.

$$E=\frac{1}{2}kA^2=\frac{1}{2}x90\,N/m\,x\left(0.4\,m\right)^2=7.2\,J$$

Find the maximum velocity of the system.

$$E=K+U;\text{ if } U=0\Rightarrow E=K_{max}=\frac{1}{2}mv_{max}^2\Rightarrow v_{max}=\sqrt{2\frac{E}{m}}=\sqrt{2\,x\,7.2\,J/10\,kg}=1.2\,m/s$$

Find t

How fast was the mass moving when x=+A/2?

$$E=K+U\Rightarrow 7.2\,J=\frac{1}{2}mv^2+\frac{1}{2}k\left(0.2\right)^2\Rightarrow 7.2\,J=5v^2+1.8J\Rightarrow v=\sqrt{\frac{7.2-1.8}{5}}=1.04\,m/s$$