Welcome to the homework page test1. If this isn't you then please go back to the homework login page.

You may log out and return later if you wish without losing any saved data. You will have **TEN** attempts for each assigned problem. Every unsuccessful attempt will lower that part of the problem's value by 5%.

For example, if you get it right on the first try, then you will receive 100% for that problem. If you are twice incorrect and submit the correct on the third try, then you will receive a 90% for that part of the problem. You will not recieve any points for that part of the problem after 10 attempts.

You do not have to answer all the problems during a single session or in any particular order. To answer a problem simply type the numerical value in the box provided, check the box to the right of the part(s) you want to answer, and then click the submit button. You can freely log in and out of the homework page without losing any submitted information so feel free to take breaks if necessary.

LETS BEGIN!

Problem #1

While driving behind a car traveling at 5.35m/s, you notice that a tire has a hemispherical bump on its rim. The radius of the tire is approximately 22.4cm. (a) What is the bump's period of oscillation? (b) If the bump is located at a distance of 19.1cm from the axis of rotation, then what is the tangential velocity of the bump?

(a) 0.263 s ☐ Answer part (a)

(b) 4.56 m/s ☐ Answer part (b)

Submit

$T = 2\pi/\omega$ $\omega = \frac{V}{R}$ $T = \frac{2\pi R}{V}$

$T = \frac{2\pi(.224)}{5.35}$

$V = \omega R = \frac{2\pi R}{T}$

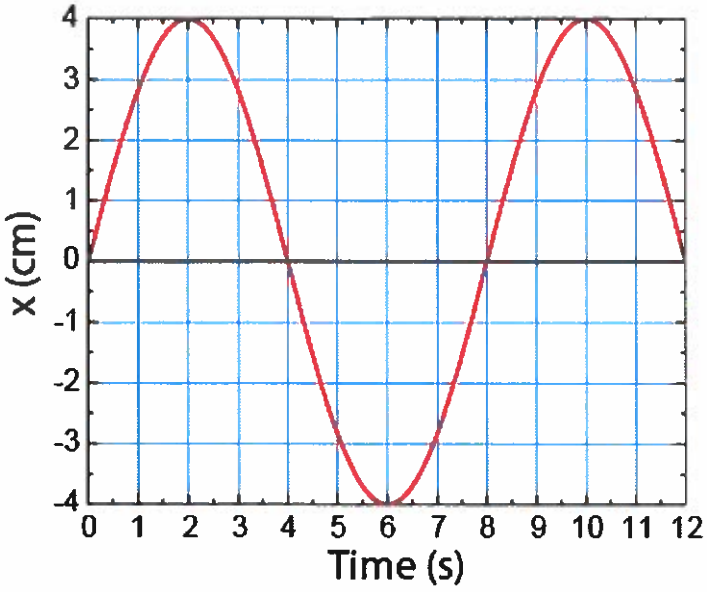
$V = \frac{\pi(.191)}{.263} =$

Attempted part (a) 1 times and part (b) 1 times.

Part (a) has been answered correctly

Part (b) has been answered correctly

Problem #2



An object attached to a spring vibrates with simple harmonic motion as described by the above graph. Find (a) the amplitude, (b) the period, (c) the maximum velocity, and (d) the maximum acceleration.

$v_{MAX} = \omega A = \frac{\pi}{T} A = 3.14\frac{6}{3}$

$|a_{MAX}| = \omega^2 A = \left(\frac{2\pi}{T}\right)^2 A =$

(a) 4 cm ☐ Answer part (a)

(b) 8 s ☐ Answer part (b)

(c) 3.14 cm/s ☐ Answer part (c)

(d) 7.96 cm/s^2 ☐ Answer part (d)

Submit

Attempted part (a) 0 times, part (b) 0 times, part (c) 0 times, and part (d) 0 times.

There have been no attempts to answer part (a)

There have been no attempts to answer part (b)

There have been no attempts to answer part (c)

There have been no attempts to answer part (d)

Problem #3

A 0.185kg block is attached to a horizontal spring and that oscillates in simple harmonic motion with a period of 0.243s. The total energy of the system is 1.95J. (a) What is the force constant of the spring? (b) What is the amplitude of the motion?

$\omega = \frac{2\pi}{T} = \sqrt{\frac{K}{M}}$ $K = \frac{4\pi^2 M}{T^2}$

(a) 123 kg/s^2 ☐ Answer part (a)

$K = 123\ N/M$

(b) 17.0 cm ☐ Answer part (b)

USE $U = \frac{1}{2}MV^2 + \frac{1}{2}KX^2$

$= \frac{1}{2}KA^2$ $A = X_{MAX}$

$\Rightarrow A = \sqrt{\frac{2U}{K}} = \sqrt{\frac{2(1.95)}{125}}$

$= 0.17M$

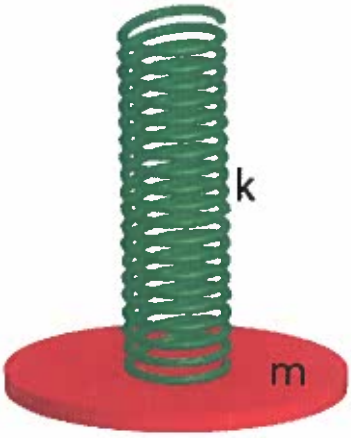
Submit

Attempted part (a) 0 times and part (b) 0 times.

There have been no attempts to answer part (a)

There have been no attempts to answer part (b)

Problem #4



a) USE $\omega = \sqrt{\omega_0^2 - (b/2M)^2} = \sqrt{\frac{K}{M} - (b/2M)^2}$

$\omega = \sqrt{\frac{1860}{10.8} - \left(\frac{2.55}{2(10.8)}\right)^2} = 13.1$

b) $x \sim Ae^{-b/2M t}\cos(\omega t - \phi)$

so $U \sim \frac{1}{2}kX_{MAX}^2 \simeq \underbrace{\frac{1}{2}kA^2}_{U_0} e^{-\frac{b}{M}t}$

$\frac{U}{U_0} = 0.9 = e^{-b/M t}$ $\ln(.9) = -\frac{b}{M}t$

$t = -\frac{M}{b}\ln(.9) = -\frac{10.8\ln(.9)}{2.55}$

$= 0.44$ SEC

As shown in the above diagram, a flat object of mass m = 10.8kg oscillates at the end of a vertical spring with a spring constant of k = 1860kg/s^2. There is air resistance due to the shape of the object at the end of the spring where the damping coefficient is b = 2.55 kg/s. (a) What is the angular frequency of oscillation? (b) How long does it take for the energy of the system to decrease by 10%?

(a) 13.1 rad/s ☐ Answer part (a)

(b) 0.446 s ☐ Answer part (b)

Submit

Attempted part (a) 1 times and part (b) 1 times.

Part (a) has been answered correctly

~~The answer for part (b) is incorrect~~

Problem #5

A pendulum with a length of L = 0.887m is released from an initial angle of $\theta_{max,0}$ = 13.2°. After 1.88s, the amplitude of oscillation has been reduced through friction,

where $\theta_{max,f} = 5.15^o$. Calculate the value of b/2m.

0.5 s^{-1} ☐ Answer the question

Submit

Attempted the problem 0 times.

There have been no attempts to answer the problem

Problem #6

An object with a mass of 0.487kg is attached to a long horizontal spring with a constant of 48.6kg/s^2. For a moment when t = 0, the object has a maximum speed of 20.3m/s. (a) What is the amplitude of oscillation? (b) For the center defined as x = 0, where in the motion is the potential energy three times the kinetic energy (take the positive x value for the input)? (c) How long does it take the the particle to move from -0.500m to 0.500m? (d) At small angles with the same object, what length is required for a pendulum to have the same period?

(a) 2.03 m ☐ Answer part (a)

(b) 1.76 m ☐ Answer part (b)

(c) .05 s ☐ Answer part (c)

(d) .098 m ☐ Answer part (d)

Submit

Attempted part (a) 0 times, part (b) 0 times, part (c) 0 times, and part (d) 0 times.

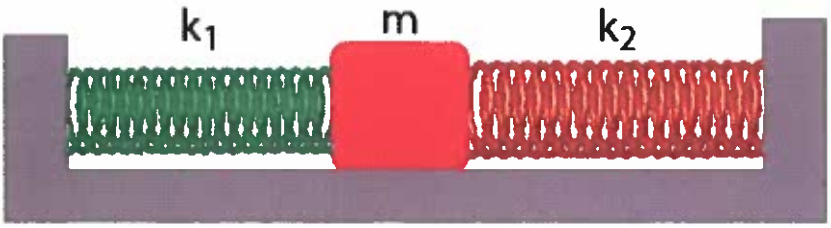
There have been no attempts to answer part (a)

There have been no attempts to answer part (b)

There have been no attempts to answer part (c)

There have been no attempts to answer part (d)

Problem #7



A block of mass m = 4.73kg is between two walls and connected by a spring to each wall as shown in the above diagram. The spring constants are $k_1 = 79.6 kg/s^2$ and $k_2 = 124 kg/s^2$. What is the period of oscillation?

$K_{EFF} = k_1 + k_2 = 203.6$

$T = \frac{2\pi}{\omega} = 2\pi\sqrt{\frac{m}{K_{EFF}}} = 2\pi\sqrt{\frac{4.73}{203.6}}$

$T = 0.9578 sec$

0.957 s ☐ Answer the question

Submit

Attempted the problem 0 times.

There have been no attempts to answer the problem

Problem #8

A 2.06kg object attached to a spring moves without friction and is driven by an external force given by the expression $F(t) = F_0 \sin(2\pi t)$, where $F_0 = 3.03N$, the time is in seconds, and the force constant of the spring is $k = 20.1 kg/s^2$. (a) What is the period of the driven system when at resonance? (b) What is the amplitude of the motion for this system that is driven at $\omega = 2\pi$?

$\omega_0 = \sqrt{\frac{k}{m}} = \sqrt{\frac{20.1}{2.06}} = 3.123$

$T = \frac{2\pi}{\omega_0} \approx 2$

(a) 2 s ☐ Answer part (a)

(b) .0495 m ☐ Answer part (b)

Submit

Attempted part (a) 1 times and part (b) 1 times.

The answer for part (a) is incorrect

The answer for part (b) is incorrect

$A = \frac{F_0/m}{|\omega_0^2 - \omega^2|} = \left|\frac{3.03/2.06}{3.123^2 - (6.28)^2}\right|$

$A = .0495$