

Question

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1. Question Details

SerCP9 13.P.018. [1588633]

An object-spring system oscillates with an amplitude of 4.0 cm. If the spring constant is 210 N/m and object has a mass of 0.50 kg, determine each of the following values.

(a) the mechanical energy of the system

 J

(b) the maximum speed of the object

 m/s

(c) the maximum acceleration of the object

 m/s<sup>2</sup>

2. Question Details

SerCP9 13.P.034.WI. [1588829]

A man enters a tall tower, needing to know its height. He notes that a long pendulum extends from the ceiling almost to the floor and that its period is 17.5 s.

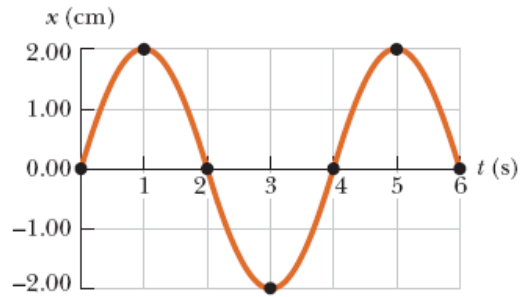
(a) How tall is the tower?

 m

(b) If this pendulum is taken to the Moon, where the free-fall acceleration is 1.67 m/s<sup>2</sup>, what is the period there?

 s

An object attached to a spring vibrates with simple harmonic motion as described by the figure below.



(a) For this motion, find the amplitude.

 cm

(b) For this motion, find the period.

 s

(c) For this motion, find the angular frequency.

 rad/s

(d) For this motion, find the maximum speed.

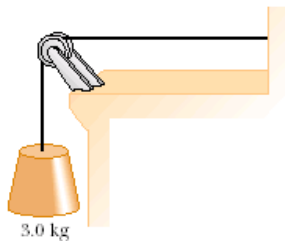
 cm/s

(e) For this motion, find the maximum acceleration.

 cm/s<sup>2</sup>

(f) For this motion, find an equation for its position  $x$  in terms of a sine function. (Do this on paper. Your instructor may ask you to turn in this work.)

Tension is maintained in a string as in the figure below. The observed wave speed is 15 m/s when the suspended mass is 3.0 kg.



(a) What is the mass per unit length of the string?

 kg/m

(b) What is the wave speed when the suspended mass is 2.4 kg?

 m/s

## 5. Question Details

SerCP9 14.P.026. [1658116]

At rest, a car's horn sounds the note A (440 Hz). The horn is sounded while the car is moving down the street. A bicyclist moving in the same direction with one-third the car's speed hears a frequency of 415 Hz.

(a) Is the cyclist ahead of or behind the car?

- ahead  
 behind

(b) What is the speed of the car?

 m/s

## 6. Question Details

SerCP9 14.P.050. [1658115]

The overall length of a piccolo is 32.0 cm. The resonating air column vibrates as in a pipe that is open at both ends.

(a) Find the frequency of the lowest note a piccolo can play.

 Hz

(b) Opening holes in the side effectively shortens the length of the resonant column. If the highest note a piccolo can sound is 4,000 Hz, find the distance between adjacent antinodes for this mode of vibration.

 cm

## 7. Question Details

SerCP9 10.P.034. [1588600]

Gas is contained in a 9.00-L vessel at a temperature of 21.0°C and a pressure of 5.00 atm.

(a) Determine the number of moles of gas in the vessel.

 mol

(b) How many molecules are in the vessel?

 molecules

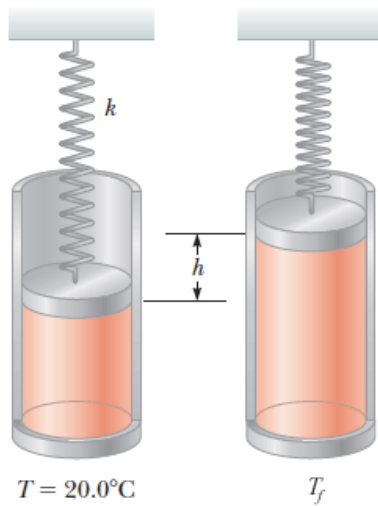
## 8. Question Details

SerCP9 10.P.046.MI.FB. [1639163]

In a period of 1.1 s,  $5.0 \times 10^{23}$  nitrogen molecules strike a wall of area 8.6 cm<sup>2</sup>. If the molecules move at 260 m/s and strike the wall head on in a perfectly elastic collision, find the pressure exerted on the wall. (The mass of one N<sub>2</sub> molecule is  $4.68 \times 10^{-26}$  kg.)

 Pa

An expandable cylinder has its top connected to a spring with force constant  $2.00 \times 10^3$  N/m (see figure below). The cylinder is filled with 4.50 L of gas with the spring relaxed at a pressure of 1.00 atm and a temperature of 20.0°C.



(a) If the lid has a cross-sectional area of  $0.0100\text{ m}^2$  and negligible mass, how high will the lid rise when the temperature is raised to  $T_f = 240^\circ\text{C}$ ?

cm

(b) What is the pressure of the gas at  $T_f = 240^\circ\text{C}$ ?

Pa

## Assignment Details

Name (AID): **HW#10-Due Monday Dec. 7, 2014**

Submissions Allowed: **5**

Category: **Homework**

Code:

Locked: **No**

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