

Question

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## 1. Question Details

SerCP9 13.P.018. [1588633]

An object-spring system oscillates with an amplitude of 3.4 cm. If the spring constant is 290 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.022. [1588611]

An object moves uniformly around a circular path of radius 18.0 cm, making one complete revolution every 1.90 s.

(a) What is the translational speed of the object?

 m/s

(b) What is the frequency of motion in hertz?

 Hz

(c) What is the angular speed of the object?

 rad/s

## 3. Question Details

SerCP9 13.P.024. [1642382]

The period of motion of an object-spring system is  $T = 0.474$  s when an object of mass  $m = 290$  g is attached to the spring.

(a) Find the frequency of motion in hertz.

 Hz

(b) Find the force constant of the spring.

 N/m

(c) If the total energy of the oscillating motion is 0.267 J, find the amplitude of the oscillations.

 m

## 4. 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 **11.5 s**.

(a) How tall is the tower?

 m

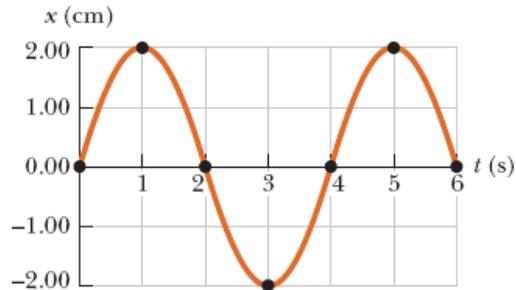
(b) If this pendulum is taken to the Moon, where the free-fall acceleration is  $1.67 \text{ m/s}^2$ , what is the period there?

 s

## 5. Question Details

SerCP9 13.P.042. [1594416]

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.

  $\text{cm/s}^2$ 

(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.)

## 6. Question Details

SerCP9 13.P.044. [1588594]

The distance between two successive minima of a transverse wave is **2.71 m**. Five crests of the wave pass a given point along the direction of travel every **13.5 s**.

(a) Find the frequency of the wave.

 Hz

(b) Find the wave speed.

 m/s

## 7. Question Details

SerCP9 13.P.050. [1642377]

A circus performer stretches a tightrope between two towers. He strikes one end of the rope and sends a wave along it toward the other tower. He notes that it takes the wave  $0.905$  s to reach the opposite tower,  $20.0$  m away. If a  $1.00$ -m length of the rope has a mass of  $0.330$  kg, find the tension in the tightrope.

 N

## 8. Question Details

SerCP9 13.P.054.WI. [1588556]

An astronaut on a small planet wishes to measure the local value of  $g$  by timing pulses traveling down a wire which has a large object suspended from it. Assume a wire of mass  $3.90$  g is  $1.60$  m long and has a  $3.00$ -kg object suspended from it. A pulse requires  $55.8$  ms to traverse the length of the wire. Calculate  $g_{\text{planet}}$  from these data. (You may neglect the mass of the wire when calculating the tension in it.)

 $g_{\text{planet}} =$    $\text{m/s}^2$ 

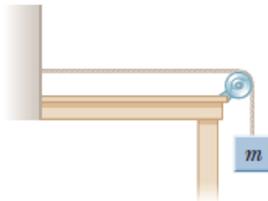
## 9. Question Details

SerCP9 13.P.057.MI.SA. [1740216]

*This question has several parts that must be completed sequentially. If you skip a part of the question, you will not receive any points for the skipped part, and you will not be able to come back to the skipped part.*

#### Tutorial Exercise

Tension is maintained in a string as in the figure below. The observed wave speed is  $v = 25.5$  m/s when the suspended mass is  $m = 3.00$  kg. (You may assume that the length of the vertical portion of the string is negligible compared to the length of the string.)



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

(b) What is the wave speed when the suspended mass is  $m = 2.25$  kg?

## Assignment Details

Name (AID): HW#10 - Due Monday Dec. 2, 2013 (5060139)

Submissions Allowed: 5

Category: Homework

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