Chapter 11

A mass vibrates back and forth from the free end of an ideal spring (k =20 N/m) with an amplitude of 0.30 m. What is the kinetic energy of this vibrating mass when it is 0.30 m from its equilibrium position?

A) Zero
B) 1.80 J
C) 0.90 J
D) 0.45 J
E) It is impossible to know without knowing the object's mass.

A mass vibrates back and forth from the free end of an ideal spring (k = 20 N/m) with an amplitude of 0.30 m. What is the maximum kinetic energy of this vibrating mass?

A) Zero
B) 1.80 J
C) 0.90 J
D) 0.45 J
E) It is impossible to know without knowing the object's mass.

Doubling only the amplitude of a vibrating mass and spring system produces what effect on the system's mechanical energy?

A) It decreases the energy by a factor of four.
B) It decreases the energy by a factor of two.
C) It increases the energy by a factor of two.
D) It increases the energy by a factor of four.
E) It produces no change.

A mass is attached to an ideal spring. When it is stretched a distance *x*, the system vibrates with a frequency *f*. In order to increase the frequency, one would have to

A) reduce the spring constant.
B) increase the length of the spring.
C) decrease the mass on the end of the spring.
D) reduce the distance that the spring is intially stretched.
E) increase the distance that the spring is initally stretched.

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Simple pendulum *A* swings back and forth at twice the frequency of simple pendulum *B*. Which statement is correct?

A) Pendulum *B* is twice as long as pendulum *A*.

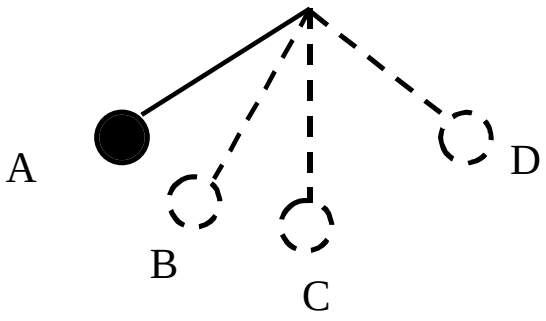
B) Pendulum *B* is twice as massive as pendulum *A*.

C) The length of *B* is four times the length of *A*.

D) The mass of *B* is four times the mass of *A*.

E) The length of *B* is half the length of *A*.

A mass on the end of a massless string undergoes simple harmonic motion. Where is the instantaneous acceleration of the mass greatest?



A) A B) B C) C
D) A and C E) A and D

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A simple pendulum of length 1 m has a period of roughly 2 s on the surface of the earth. If the same pendulum were placed in a satellite that orbits the earth at an altitude of one earth radius,

A) its period is unchanged.
B) its period is half as large.
C) its period is twice as large.
D) its period would decrease to 0.
E) its period would be infinitely as large.

Resonance occurs in harmonic motion when

A) the system is overdamped.
B) the system is critically damped.
C) the energy in the system is a minimum.
D) the driving frequency is the same as the natural frequency of the system.
E) the energy in the system is proportional to the square of the motion's amplitude.

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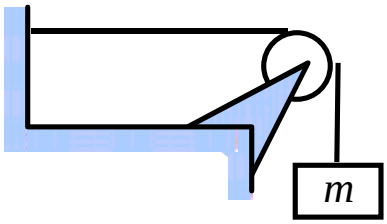
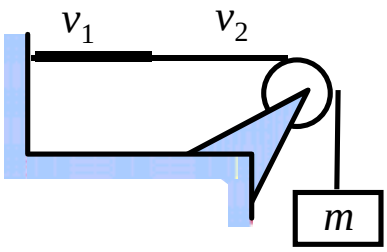
A mass m is hanging on the end of a pulley as shown. If the mass is doubled to $2m$, what happens to the frequency of the wave produced when the string is plucked?



A) The frequency is increased by 4
B) The frequency is increased by 2
C) The frequency is increased by $\sqrt{2}$
D) The frequency is not changed
E) The frequency is deceased by 1/2

A weight is hung over a pulley as shown. The string is composed of two parts, each made of the same material. Part 1 has four times the diameter as part 2. What is the ratio of the velocity of the wave in part 1 (v_1) to that in part 2 (v_2)?



A) 4
B) 2
C) 1
D) 1/2
E) 1/4

The string shown below is fixed at each end and vibrating at 12 Hz.

What is the fundamental frequency of this string?

A) 48 Hz B) 24 Hz C) 8 Hz
D) 6 Hz E) 3 Hz

The string shown below is fixed at each end and vibrating at 12 Hz.

If the string is then vibrated so that it produces the new pattern below, what is the frequency of vibration?

A) 48 Hz B) 36 Hz C) 16 Hz
D) 12 Hz E) 8 Hz