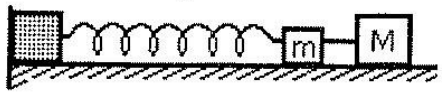
1) A 5.7 kg block attached to a spring executes simple harmonic motion on a frictionless horizontal surface. At time t = 0 s, the block has a displacement of −0.20 m, a velocity of −0.80 m/s, and an acceleration of +4.1 m/s^2. The force constant of the spring is closest to:

A) 120 N/m B) 110 N/m C) 98 N/m D) 91 N/m E) 82 N/m

5) A 0.019 kg block on a horizontal frictionless surface is attached to a spring whose force constant is 120 N/m. The block is pulled from its equilibrium position at x = 0 m to a displacement x = +0.080 m and is released from rest. The block then executes simple harmonic motion along the x-axis (horizontal). When the displacement is x = 0.051 m, the kinetic energy of the block is closest to:

A) 0.23 J B) 0.21 J C) 0.24 J D) 0.26 J E) 0.27 J

Figure 13.1



8) In Figure 13.1, two masses, M = 5 kg and m = 4 kg, are attached to a spring of spring constant 100 N/m. The system is set into oscillation with an amplitude of 74 cm. At the instant when the acceleration is a maximum the 5 kg mass separates from the 4 kg mass which then remains attached to the spring and continues to oscillate. The amplitude of oscillation of the 4 kg mass will be

A) 74 cm B) 59 cm C) 33 cm D) 93 cm E) 170 cm

24) A coin is placed on a platform attached to a spring that oscillates vertically in simple harmonic motion. The amplitude of the displacement is 1.20 cm. What is the maximum frequency for which the coin will always remain in contact with the platform?

A) 2.25 Hz B) 6.89 Hz C) 12.2 Hz D) 4.55 Hz E) 8.75 Hz

25) If both the mass of a simple pendulum and its length are doubled, the period will

A) be unchanged.

B) increase by a factor of 2.

C) increase by a factor of 4.

D) increase by a factor of 1.4

E) increase by a factor of 0.71.

3) A transverse wave is propagated in a string stretched along the x-axis. The equation of the wave, in SI units, is given by: $y = 0.009 \cos \pi(87t - 16x)$. The wave speed, including the sense of direction along the x-axis, in SI units, is closest to:

A) 5.4 B) -5.4 C) 0.18 D) -0.18 E) zero

5) A transverse wave is propagated in a string stretched along the x-axis. The equation of the wave, in SI units, is given by: $y = 0.006 \cos \pi(29t - 18x)$. The maximum velocity of a particle on the string, in SI units, is closest to:

A) 0.55 B) 0.72 C) 0.89 D) 1.1 E) 1.2

10) Which of the following is a FALSE statement?

A) In a transverse wave the particle motion is perpendicular to the velocity vector of the wave.

B) Not all waves are mechanical in nature.

C) The speed of a wave and the speed of the vibrating particles that constitute the wave are different entities.

D) Waves transport energy and matter from one region to another.

E) A wave in which particles move back and forth in the same direction as the wave is moving is called a longitudinal wave.

15) A wave on a stretched string is described by

$y = 0.004 \sin (300t - 15x)$.

What is the maximum velocity of a particle on the string?

A) 0.060 m/s

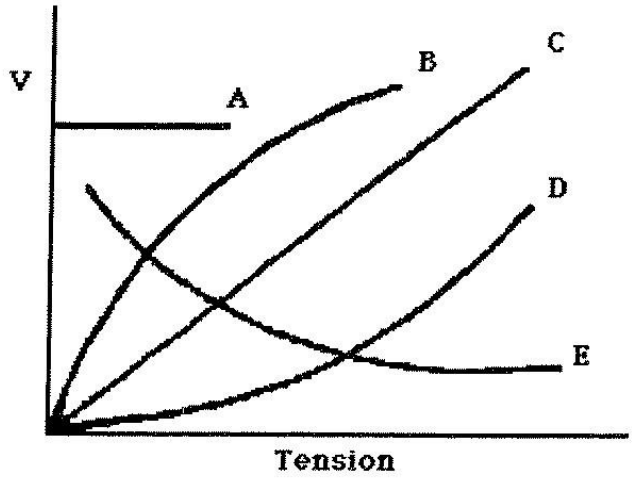
B) 1.20 m/s

C) 20.0 m/s

D) 8.37×10^{-5} m/s

E) 5.56 m/s

Figure 15.1



16) In Figure 15.1, which of the curves best represents the variation of wave speed as a function of tension for transverse waves on a stretched string?

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

18) Consider the transverse vibrational wave on a stretched string. The energy transported by such a wave is

A) zero.

B) proportional to the amplitude of the wave.

C) proportional to the square of the amplitude of the wave.

D) independent of the frequency of the wave.

E) independent of the tension in the string.