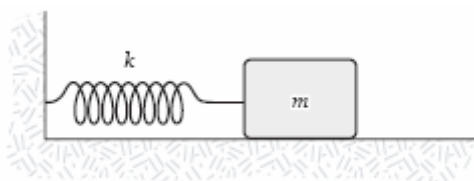


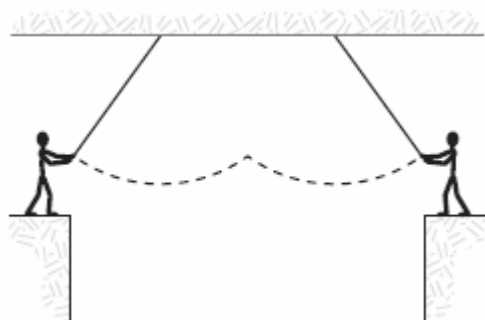
AP Physics – Simple Harmonic Motion / Oscillations Practice Test

Multiple Choice: Identify the choice that best completes the statement or answers the question.

- _____ 1. A body of mass 5.0 kg is suspended by a spring which stretches 10 cm when the mass is attached. It is then displaced downward an additional 5.0 cm and released. Its position as a function of time is approximately
- $y = .10 \sin 9.9t$
 - $y = .10 \cos 9.9t$
 - $y = .10 \cos (9.9t + .1)$
 - $y = .10 \sin (9.9t + 5)$
 - $y = .05 \cos 9.9t$
- _____ 2. The motion of a particle connected to a spring is described by $x = 10 \sin (\pi t)$. At what time (in s) is the potential energy equal to the kinetic energy?
- 0
 - 0.25
 - 0.50
 - 0.79
 - 1.0
- _____ 3. A mass $m = 2.0$ kg is attached to a spring having a force constant $k = 290$ N/m as in the figure. The mass is displaced from its equilibrium position and released. Its frequency of oscillation (in Hz) is approximately

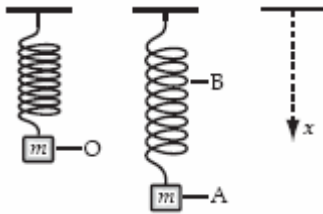


- 12
 - 0.50
 - 0.01
 - 1.9
 - 0.08
- _____ 4. Two circus clowns (each having a mass of 50 kg) swing on two flying trapezes (negligible mass, length 25 m) shown in the figure. At the peak of the swing, one grabs the other, and the two swing back to one platform. The time for the forward and return motion is



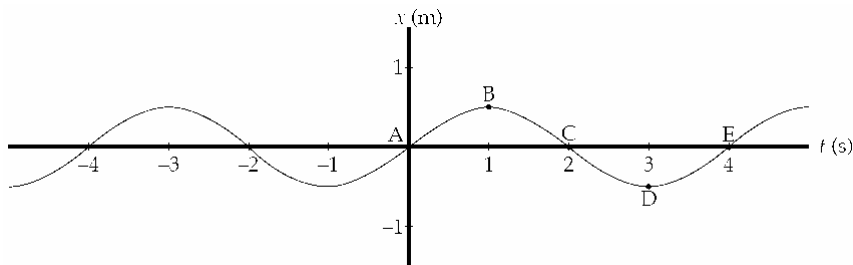
- 10 s
- 50 s
- 15 s
- 20 s
- 25 s

5. A weight of mass m is at rest at O when suspended from a spring, as shown. When it is pulled down and released, it oscillates between positions A and B. Which statement about the system consisting of the spring and the mass is correct?



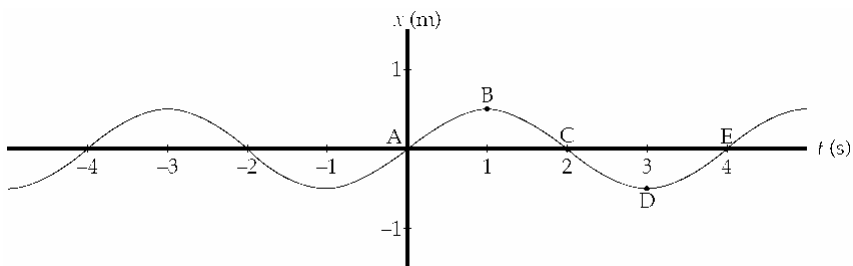
- The gravitational potential energy of the system is greatest at A.
- The elastic potential energy of the system is greatest at O.
- The rate of change of momentum has its greatest magnitude at A and B.
- The rate of change of gravitational potential energy is smallest at O.
- The rate of change of gravitational potential energy has its greatest magnitude at A and B.

6. A graph of position versus time for an object oscillating at the free end of a horizontal spring is shown below. A point or points at which the object has positive velocity and zero acceleration is(are)



- B
- C
- D
- B or D
- A or E

7. A graph of position versus time for an object oscillating at the free end of a horizontal spring is shown below. The point at which the object has zero velocity and positive acceleration is



- A
- B
- C
- D
- E

- _____ 8. Suppose it were possible to drill a frictionless cylindrical channel along a diameter of the Earth from one side of the Earth to another. A body dropped into such a channel will only feel the gravitational pull of mass within a sphere of radius equal to the distance of the mass from the center of the Earth. The density of the Earth is $5.52 \times 10^3 \text{ kg/m}^3$ and $G = 6.67 \times 10^{-11} \text{ N} \cdot \text{m}^2/\text{kg}^2$. The mass will oscillate with a period of
- 84.4 min.
 - 169 min.
 - 24.0 h.
 - 1130 h.
 - 27.2 d.

MULTIPLE CHOICE

1. E
2. B
3. D
4. A
5. C
6. E
7. D
8. A