

Student Name: _____
Teacher Name: Botelho
Class Name/Subject: AP Physics
Period: 5
Assignment Week #: Week 1

Simple Harmonic Motion Review

Reminder: make sure your calculator is in radians!!! Numbers in () refer to the answer, problems and page number in the AP Physics 1 Essentials book, you can use as a reference and to check your work. Pictures are also scanned if you do not have an AP Physics 1 Essentials book checked out to you.

1. A horizontal oscillating system is created by releasing an object from a maximum displacement of 0.2 meters. The object makes 60 complete oscillations in one minute. Determine the object's angular frequency. (2π rad/s, 9.01 pg. 223)
 - a. determine the object's position at time $t=10$ seconds. (0.2m, 9.02 pg. 224)
 - b. determine the time when the object is at position $x=0.1$ meters. (0.167s, 9.03 pg. 224)
2. A 5-kg block is attached to a 200 N/m spring horizontally and displaced a distance 8 cm from its equilibrium position before being released. Determine the period of oscillation, the frequency, and the angular frequency of the block. (20 rad/s, 9.04 pg. 225)
3. A 2-kg block is attached vertically to an unstretched spring with a constant $k=200\text{N/m}$. (9.08 pg. 230)
 - a. Determine the period of the block's oscillation. (0.63s)
 - b. What is the maximum displacement of the block from its equilibrium while undergoing simple harmonic motion? (0.1m)
4. A grandfather clock is designed such that each swing (or half-period) of the pendulum takes one second. How long is the pendulum in the grandfather clock? (1m, 9.10 pg. 232)
5. What is the period of a grandfather clock on the moon where the acceleration due to gravity on the surface is roughly one-sixth that of Earth? (4.9s, 9.11 pg. 232)
6. The period of an ideal pendulum is T . If the mass of the pendulum is tripled while its length is quadrupled, what is the new period of the pendulum? Choose the correct answer (C, 9.13 pg. 234)
 - a. $0.5T$
 - b. T
 - c. $2T$
 - d. $4T$
7. A pendulum of length 20 cm and mass 1-kg is displaced an angle of 10 degrees from vertical. What is the maximum speed of the pendulum? (0.24 m/s, 9.15 pg. 234)
8. A pendulum of length 0.5 meters and mass 5-kg is displaced an angle of 14 degrees from the vertical. What is the speed of the pendulum when its angle is 7 degrees from vertical? Hint: use potential and kinetic energy relationship! (0.47 m/s, 9.16 pg. 234)