**Simple Harmonic Motion Worksheet** Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Complete all assigned problems on a separate sheet of paper showing all work.

**Hooke’s Law Questions and Problems**

1. Does Hooke’s Law apply to stretch springs, compressed springs or both?

2. Examine the spring scales used in class. Which spring inside has the highest spring constant and which has the lowest?

3. a) A load of 45 N is attached to a spring that is hanging vertically. The spring is stretched 0.14 m from its equilibrium position. What is the spring constant?

b) If a 60 N weight is used instead, what would you expect the spring stretch to be instead?

4. a) A slingshot consists of a light leather cup attached between two rubber bands. If it takes a force of 32 N to stretch the bands 1.2cm, what is the equivalent spring constant of the rubber bands?

b) How much force is required to pull the cup of the slingshot 3.0 cm from the equilibrium position?

5. If a spring constant is 40 N/m and an object hanging from it stretches it 0.50 m, what is the mass of the object?

6. In problem #5, what would be the period of oscillation associated with the spring pendulum? In your work show the unit cancelation.

7. A 1.0 kg mass on a spring is stretched and released. The period of oscillation is measured to be 0.46 s. What is the spring constant?

**Pendulum Questions and Problems**

1. Describe how you would make a pendulum with a period of 1.0 sec.

2. What would be the period of a pendulum that is 1.0 m long?

3. Imagine you could travel to the moon where the acceleration due to gravity is 1.6 m/s2. What would be the period of a pendulum that is 1.0 m?

4. A trapeze artist wants a period of 3.8 s. How long should the cables be? (Do not consider the height of the trapeze artist.)

5. Is it more fun on a swing with low or high amplitude? Explain.

**Frequency, Period, Wavelength & Speed Problems**

1. Copy and complete the following table

|  |  |  |
| --- | --- | --- |
| Prefix | Abbrev | Multiplier |
| Mega | M |  |
|  |  | 103 |
| Centi |  |  |
|  |  | 10-3 |
|  |  |  |
|  | n |  |

2. A piano emits frequencies that range from a low of about 28 Hz to a high of about 4200 Hz. Find the range of wavelengths attained by this instrument. Assume speed of sound to be 340 m/s.

3. The red light of a He-Ne laser (most common laser) has a wavelength of about 633 nm. What is its frequency?

4. A tuning fork emits a frequency of 256 Hz. If the wavelength is 1.35 m, what is the speed of sound in the air that it is traveling through?

5. The smallest insects that a bat can detect are approximately the size of one wavelength of the sound the bat makes.

a) What minimum frequency of sound is necessary for the bat to detect an insect 0.57 cm long?

b) What is the period of this wave?

6. a) What is the wavelength of a radio wave that operates at 98.1 MHz?

b) What is the period of this wave?

7. In the following waveform, it takes 9 seconds for the wave to pass from point

A to point B.

A B

1. What is the period of the wave?
2. What is the frequency of the wave?
3. If the distance from A to B is 5 meters, what is the wavelength?
4. What is the wavespeed?