Gen Physics Vibrations & Waves Review WS 1

Use your notes to answer the questions below.

Review the Concepts: Attributes of Waves

- 1. Define the period of a wave. What are the units of the period?
- 2. Define the wavelength of a wave. What are the units of the wavelength?
- 3. Define the frequency of a wave. What are the units of frequency?
- 4. Waves carry energy from one place to another without transferring
- 5. What's the difference between transverse and longitudinal waves? Give an example of each.

6. The diagram below depicts a standing wave. Label the following wave characteristics: amplitude, crest, trough, and wavelength. Draw x's at the nodes and dots at the antinodes.



- 7. What does it mean for waves to be in phase vs. out of phase?
- 8. What is interference? What is the difference between constructive and destructive interference?
- 9. What is a standing wave?

Review the Concepts: Simple Harmonic Motion

 10. Simple harmonic motion is _______ motion under a _______ force to the amount of displacement from equilibrium.

11. In the diagrams below, label the following: v_{max} , v = 0, a_{max} , a = 0, KE_{max} , KE = 0, PE_{max} , PE = 0



12. What is the restoring force on a simple pendulum? Draw arrows for the forces on the pendulum bob in the three positions below. Ignore air resistance and friction.



13. What is the restoring force on a mass-spring system? Draw arrows for the forces on the mass below. Ignore air resistance and friction.



14. What is the spring constant, *k*, a measure of?

Review the Math

Position of an oscillator:	$x = A\cos(\omega t)$	Period of a mass-spring system	$T = 2 \pi \sqrt{\frac{m}{k}}$
	[for $x = A$ when $t = 0$]	Frequency:	<i>f</i> = 1/T
Velocity of an oscillator:	$v = -\omega Asin(\omega t)$	Angular frequency:	$\omega = 2\pi f$
Acceleration of an oscillator:	$a = -\omega^2 A\cos(\omega t)$	Spring force:	$F_s = -kx$
Period of a <i>simple pendulum</i> :	$T = 2 \pi \sqrt{\frac{L}{g}}$	Elastic potential energy:	$PE = \frac{1}{2}kx^2$
		Velocity of a wave:	$v = \lambda/T = \lambda f$

1. Waves in a lake are 5.00 m in length and pass as anchored boat 1.25 s apart. What is the speed of the waves? *Ans. 4.0 m/s*

2. A radio station broadcasts at a frequency of 660 kHz. Knowing that radio waves have a speed of 3.0×10^8 m/s, calculate the wavelength of these waves. *Ans.* 455 m

3. A simple pendulum consists of a 510g mass on a 75 cm, massless string. If it is pulled 35 cm out from equilibrium, what will be the period of the oscillations? The frequency? *Ans. 1.7 s; 0.58 Hz*