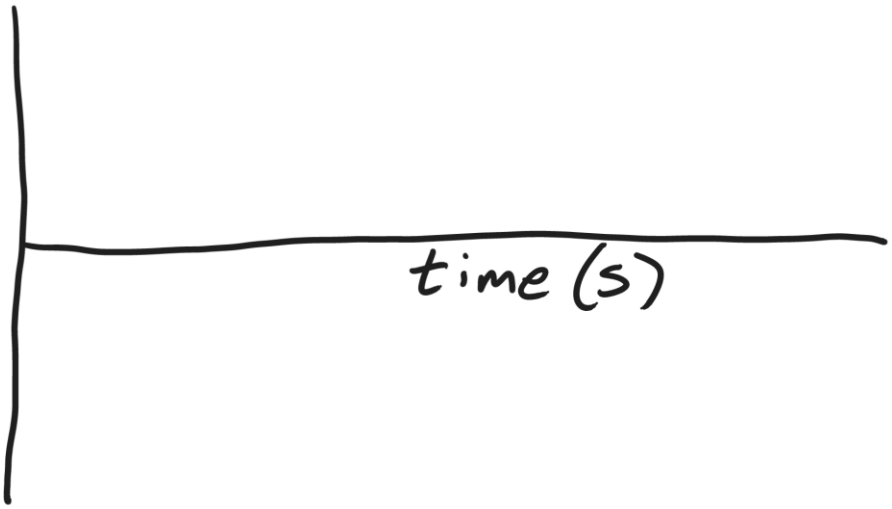
Physics 100 Name: _____

Sound and Waves Quiz #1

1. A. Draw a longitudinal wave and a transverse wave.
   B. Label each wave with its name (**longitudinal** or **transverse**)
   C. On each wave, label all of these parts that apply:
   Compression, Rarefaction, Wavelength, Crest, Trough, Amplitude

2. A. Draw two waves on the graph of time below. Make sure that their frequencies are different and that their periods are different.
   B. Label the correct wave "higher frequency."
   C. Label the correct wave "longer period."



3. In the space below, draw a wave with a higher amplitude than either of the waves that you drew in #2.

4. Fred is at the beach. He is standing in the water, 28m from the shoreline. Fred gets splashed every time a wave passes him. This happens once every 12 seconds. After a while, Fred decides to ride a wave to shore. He jumps on the wave with his boogie board, and he and the wave make the 28m trip to shore in exactly 7 seconds.

   A. What is the frequency of the waves?

   B. What is the period of the waves?

   C. What is the velocity of the waves?

   D. What is the wavelength of the waves?

Physics 100 Name: _____
Quiz 2: Sound and Waves

Match the abbreviations and units below to the correct quantities.

A. Period B. Wavelength C. Wave Speed D. Frequency

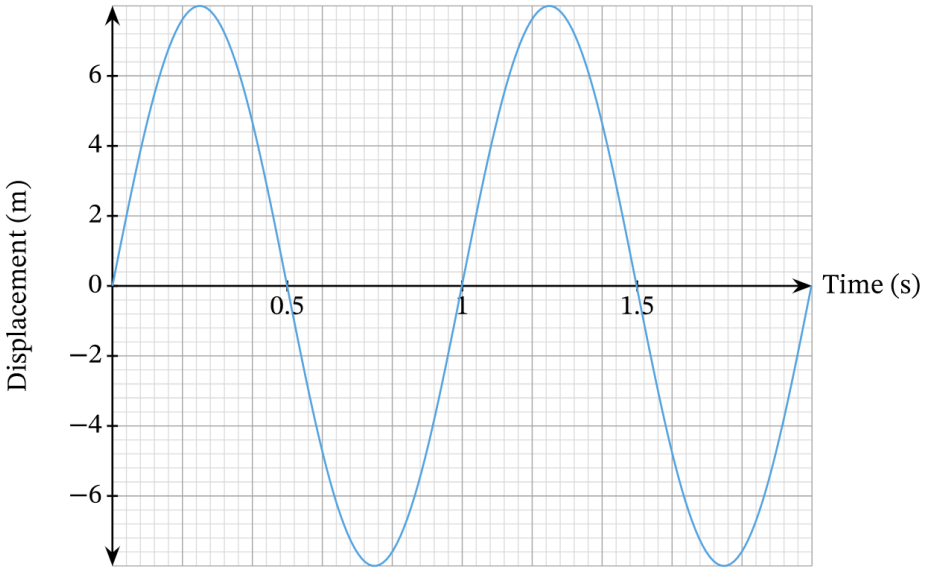
1. Hz A B C D
2. λ A B C D
3. T A B C D
4. m/s A B C D
5. v A B C D
6. m A B C D
7. s A B C D

8. Find the period, frequency, and amplitude of the wave on the right.

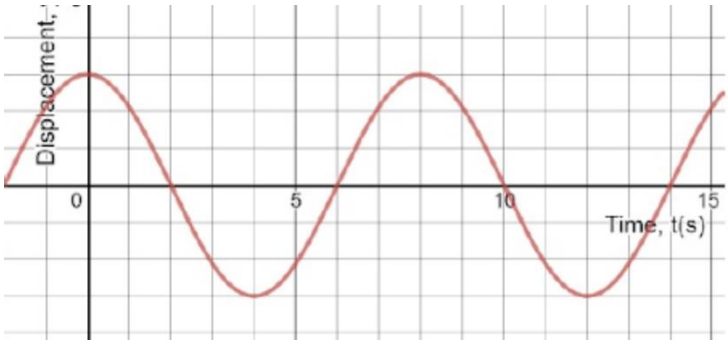
Period = _____

Frequency = _____

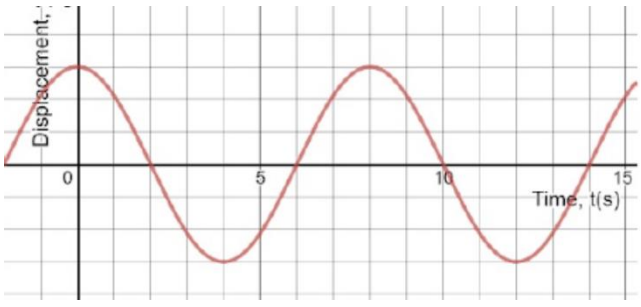
Amplitude = _____



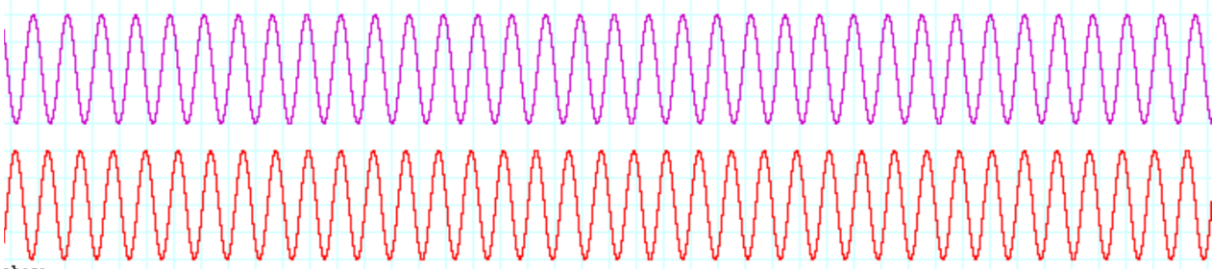
9. The graph to the right shows a wave. On the graph, draw another wave that would produce **complete destructive interference** if it were added to the wave that is already there.



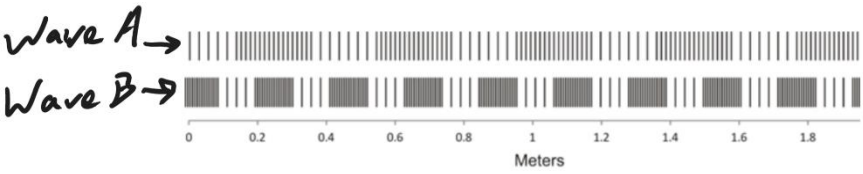
10. Now, on this next graph, draw another wave that would produce **<u>constructive</u> interference** if it were added to the wave that is already there.



11. When these two sound waves are heard together, beats occur. Draw an X at the center of each beat.



12. Which of these waves has a higher amplitude?
Wave A Wave B



13. Which of these waves is louder?
Wave A Wave B

14. If you wanted to determine the period of wave A or wave B, what additional information would you need from the diagram?

The diagram on the right shows sound waves that are given off by a noisy, moving object. On the diagram…

15. Draw an arrow showing the direction of the object's movement.

16. Draw an X showing where an observer should stand in order to hear the object's sound at the lowest possible pitch.

Physics 100 Name: _____
Quiz 3

Formulas:

$$v = \frac{d}{t} \qquad v = f\lambda$$

$$f = \frac{1}{T} \qquad T = \frac{1}{f}$$

1. Suppose something is vibrating at one of its natural frequencies. Draw the wave pattern that you would see if the object has…

   a. 2 antinodes and 1 node

   b. 4 nodes and 4 antinodes

2. What is the name for the sets of waves that you drew above (waves that are produced by alternating constructive and destructive interference)? [The required answer is <u>not</u> *harmonics* or *overtones*.]

   _____

3. There are standing waves in a **3m long** string. This wave pattern has **2 nodes and 2 antinodes**. What is the wavelength of these waves?

4. Draw the fundamental frequency and the 1st overtone frequencies for a **2m long pipe** that is **closed on both ends**. For each drawing, provide the wavelength of the sound wave that is produced.

   Fundamental (wavelength = _____meters)

   1st Overtone (wavelength = _____meters)

5. A viola's A string is **40cm** long, and its fundamental frequency is **440Hz**.

   a. Draw the string in its fundamental (1st harmonic) vibrational mode.

   b. What is the wavelength of the waves that are traveling along this 40cm string when its frequency is 440Hz?

   c. What is the speed of the waves moving along the string?

   d. To what length would you need to shorten the string in order to play a frequency of **500Hz**?