Name: _____

Standing Waves & Beats

1. The wavelength of a sound wave in air is 2.52 m. What is the wavelength of this sound in fresh water where the sound travels at 1482 m/s? (Hint: The frequency is the same in air and in water.)

Ans:

2. A bat emits an ultrasonic wave whose frequency is 92 kHz. It's a hot day, so the speed of sound in the air is faster than normal—345 m/s. Find the distance between adjacent crests.

Ans:

3. The lowest note on a piano has a fundamental frequency of 28.0 Hz and is produced by a wire that has a length of 1.20 m. Determine the wavelength of sound in the air and the wavelength of the wave on the string.

Ans:

Ans:

4. A string of length 2.50 m is fixed at both ends and when it vibrates at 95.0 Hz a standing wave of five loops is formed. Find the wavelength of waves on string, the velocity of the waves and the fundamental frequency of the string.

Ans:

Ans:

Ans:

5. A stretched rubber band has a length of 0.12 m and a fundamental frequency of 440 Hz. What is the speed at which the waves travel on the rubber band?

Ans:

6. When a tuning fork is sounded together with a 492 Hz tone from a speaker, a beat frequency of 3 Hz is heard. Then a small piece of putty is stuck to the tuning fork and the tuning fork is again sounded with the 492 Hz tone. If the beat frequency decreases under these circumstances, what is the frequency of the tuning fork?

Ans:

7. Two strings are adjusted to vibrate at exactly 200 Hz. Then the tension in one string is increased slightly. Afterward, two beats per second are heard when the strings vibrate at the same time. What is the new frequency of the string that was tightened?

Ans:

8. The fundamental frequency of a bass violin string is 205 Hz and occurs when the string is 0.700 m long. How far from the lower fixed end of the bass violin should you place your fingers to allow the string to vibrate at a fundamental frequency 3 times as great?

Ans:

9. Melody puts a fret on her guitar string, causing it to vibrate with a fundamental frequency of 250 Hz as a wave travels through at 345 m/s. How long is the guitar string from the lower fixed end to the fret? How far and in what direction must the fret be moved in order to produce a fundamental frequency that is twice as high (i.e. one octave higher)?

Ans:

Ans: