Sound – Doppler Effect and Beats

Sound

* Wave energy depends on \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_ for sound is \_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Sound is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ wave
* Sound travels through air at approximately \_\_\_\_\_\_\_\_\_ (it depends on \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)
* It travels through other media as well, often much \_\_\_\_\_\_\_\_\_ than air
* Sound waves are started by vibration of some other \_\_\_\_\_\_\_\_\_, which starts the \_\_\_\_\_\_ moving

- We hear a sound as “high” or “low” depending on its \_\_\_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_\_\_

- Sounds with short wavelengths and high frequencies sound \_\_\_\_\_\_\_\_\_\_\_ to our ears, and sounds with long wavelengths and low frequencies sound \_\_\_\_\_\_\_\_\_\_

- The range of human hearing is from about \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Waves in front \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

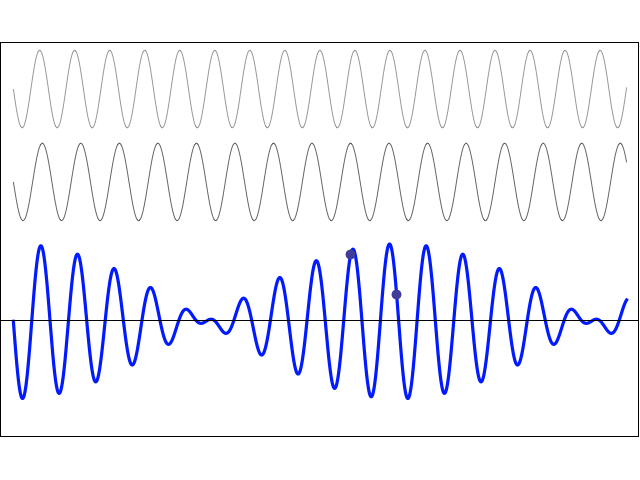
Waves in back \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The Doppler Effect

* The Doppler Effect is the raising or lowering of the perceived pitch of a sound based on the \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_ of observer and source of the sound.
* When a car blowing its horn races toward you, the sound of its horn appears \_\_\_\_\_\_\_\_\_ in pitch, since the wavelength has been effectively \_\_\_\_\_\_\_\_\_\_\_\_ by the motion of the car relative to you.
* The \_\_\_\_\_\_\_\_\_\_\_ happens when the car races away

Example

* The driver of a car blows the horn as the car approaches you. Compared to the horn’s pitch heard by the driver, will the pitch heard by you be lower, higher, or the same?
* After the car passes you, you notice the horn doesn’t sound as loud, is this observation a result of the Doppler effect?



* Resonance occurs when a vibration from one oscillator occurs at a \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_ for another oscillator.
* The first oscillator will cause the second to \_\_\_\_\_\_\_\_\_.
* \_\_\_\_\_\_\_\_ is the word physicists use to describe the characteristic loud-soft pattern that characterizes two nearly (but not exactly) matched frequencies.
* Musicians call this \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Beat frequency is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ between the frequencies of the two waves

A student tunes her guitar by striking a 100 Hz A-note on a tuning fork and simultaneously playing the 5th string on her guitar. Listening closely, she hears the amplitude of the combined sound oscillating twice per second.

What is the current frequency of the 5th string of her guitar?

Resonance and Beats