

Practice Problem Set 9

March 21, 2017

The speed of sound is 343 m/s.

Problem 1

The equation of a wave propagating in the x direction is $y(x, t) = 25 \sin(4\pi x - 8\pi t)$

- a) What is the wavelength of this wave?
- b) What is the frequency of this wave?
- c) How fast and in which direction is this wave traveling?

Problem 2

An organ pipe is 2.4 m long, and is closed at one end and open on the other.

- a) What is the frequency of the fundamental note played by ?
- b) When played next to a ringing 392 Hz tuning fork, a faint beat is heard at 0.7 Hz. Which order harmonic of the organ pipe is responsible for the beat?

Problem 3

A car traveling at 24 km/h honks its horn as it directly approaches the side of a large building. The horn produces a sustained sound of frequency 250 Hz. The sound is reflected off the building back to the car's driver. The waves from the original sound and that reflected off the building combine to create a beat frequency. What is the frequency of the beat that the driver hears?

Problem 4

The background noise level in an office is measured to be 40 dB. When a computer is turned on, the noise level in the office is measured to be 50 dB. You put on headphones to cover up the sound of your insanely loud computer and, fearing for the health of your ears, measure the music level to be 85 dB. What is the sound intensity ratio between:

- a) The office with the computer on vs. without?
- b) The music vs. the office with the computer on?