

Honors Physics SHM HW, part 2 (Homework)

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1.

A dolphin located in seawater at a temperature of 25°C emits a sound directed toward the bottom of the ocean 145 m below. How much time passes before it hears an echo?

2.

The range of human hearing extends from approximately 20 Hz to $20\,000\text{ Hz}$. Find the wavelengths of these extremes at a temperature of 7°C .

3.

The area of a typical eardrum is about $5.0 \times 10^{-5}\text{ m}^2$. Calculate the sound power (the energy per second) incident on an eardrum at

(a) the threshold of hearing and

(b) the threshold of pain.

4.

Two sounds have measured intensities of $I_1 = 100\text{ W/m}^2$ and $I_2 = 450\text{ W/m}^2$. By how many decibels is the level of sound 1 lower than that of sound 2?

5.

A stereo speaker (considered a small source) emits sound waves with a power output of 75 W .

(a) Find the intensity 10.0 m from the source.

(b) Find the intensity level, in decibels, at this distance.

(c) At what distance would you experience the sound at the threshold of pain, 120 dB ?

6.

A skyrocket explodes 100 m above the ground (Fig. P14.15). Three observers are spaced 100 m apart, and the first (A) is directly under the point of the explosion.

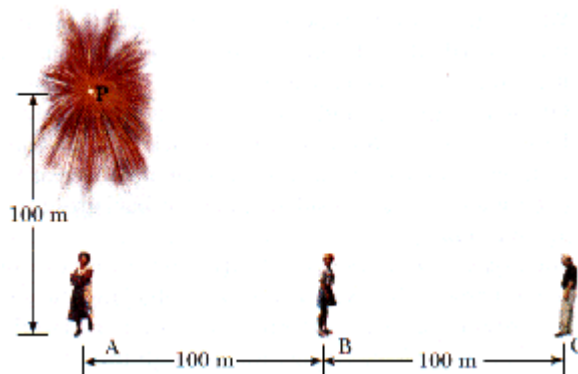


Figure P14.15.

- (a) What is the ratio of sound intensities heard by observers A and B?
(b) What is the ratio of intensities heard by observers A and C?

7.

Two trains on separate tracks move toward one another. Train 1 has a speed of 105 km/h and train 2 a speed of 70.0 km/h. Train 2 blows its horn, emitting a frequency of 500 Hz. What is the frequency heard by the engineer on train 1?

8.

A bat flying at 6.0 m/s emits a chirp at 25 kHz. If this sound pulse is reflected by a wall, what is the frequency of the echo received by the bat?

9.

An alert physics student stands beside the tracks as a train rolls slowly past. He notes that the frequency of the train whistle is 446 Hz when the train is approaching him and 442 Hz when the train is receding from him. From this he can find the speed of the train. What value does he find?