

1. A person standing in the ocean notices that after a wave crest passes by, ten more crests pass in a time of 120 seconds. What is the frequency of the wave? (0.083 Hz)
2. Sound travels at a speed of 343 m/s in air at 20 C. The wavelength of sound wave is 1.31 m. Find the period of the wave. (3.82×10^{-3} sec/wave)
3. The right-most key on a piano produces a sound wave that has a frequency of 4185.6 Hz. Assuming the speed of sound in air is 343 m/s, find the corresponding wavelength. (8.19×10^{-2} m/wave)
4. A person fishing from a pier observes that four wave crests pass in 7.0 seconds and estimates the distance between two successive crests as 4.0 m. The timing starts with the first crest and ends with the fourth. What is the speed of the wave? (1.71 m/s)
5. A transverse wave is traveling with a speed of 300 m/s on a horizontal string. If the tension in the string is increased by a factor of four, what is the speed of the wave? (2 times)
6. A 0.50 m string is stretched so the tension is 1.7 N. A transverse wave of frequency 120 Hz and wavelength 0.31 m travels on the string. What is the mass of the string? (6.14×10^{-4} kg)
7. Suppose some said: "Sound whose wavelength is larger than the size of your ear cannot be heard", (a) assume that speed of sound is 343 m/s and compute the wavelength of sound at the limits of human hearing, 20 Hz and 20 KHz. (b) Compare these values with the (estimated) width of your ear. Based on this comparison, is the statement above correct?
(a) 17.15 m/wave & 1.715×10^{-2} m/wave
(b) own answer

8. A siren can be made by blowing a jet of air through 20 equally spaced holes in a rotating disk. If the siren is to produce a 2200 Hz tone, what must be the angular speed of the disk?
(110 rev/sec or 691 rad/sec)
9. The sound intensity level of a jet engine is 138 dB above the threshold of hearing. What is the sound intensity? (63.1 W/m^2)
10. A tuning fork with a frequency of 440 Hz is sounded together with a note played on a piano. Eight beats are heard in 2 seconds. What is the frequency or pitch of the piano note?
(444 Hz or 436 Hz)
11. A tuning fork with a frequency of 440 Hz is *played* simultaneously with a fork with a frequency of 437 Hz. How many beats will be heard over a period of 10 seconds? (30 beats)
(Τηε βεατ φρεθυενχψ ωιλλ βε 3 Ηζ; τηυσ ιν 10 σεχονδς, τηερε σηουλδ βε 30 βεατσ.)
12. Why don't we hear beats when different keys on the piano are played at the same time?
Answer:
(Our ears can only detect beats if the two interfering sound waves have a difference in frequency of 7 Hz or less. No two keys on the piano are that similar in frequency.)
13. At a football game, a stationary spectator is watching the halftime show. A trumpet player in the band is playing a 784 Hz tone while marching directly toward the spectator at a speed of 0.83 m/s. On a day when the speed of sound is 343 m/s, what frequency does the spectator hear? (785.9 Hz)