

## Homework: Ch. 17

1. How do humans “hear” sound?
2. In the 1979 film *Alien*, one of the characters says, “In space, no one can hear you scream.” Why is this statement true?
3. When a speeding ambulance, with siren blaring, passes by you when you are sitting on the side of the road you will notice a change in the frequency of the sound. Explain why this occurs.
4. How does a dolphin determine the location of a fish or an object while in the ocean?
5. An air-filled balloon has been heated 150 °F. Assuming that the air is also at 150 °F, what is the speed of sound inside the balloon?
6. The source of a sound wave has a power of 4.50 MW. If it is a point source, what is the intensity 350.0 m away and what is the sound level in decibels at that distance?
7. What frequency is received by a mouse just before being dispatched by a hawk flying at it at 25 m/s and emitting a screech of 3500 Hz? Assume that the speed of sound is 331 m/s.
8. What is the length of a tube that has a fundamental frequency of 176 Hz and a first overtone of 352 Hz if the speed of sound is 343 m/s?
9. A child has hearing loss of 60.0 dB near 5000.0 Hz, due to noise exposure, and the normal hearing elsewhere. How much more intense is the 5000.0 Hz tone than a 400.0 Hz tone if they are both barely audible to the child?
10. What frequency will a 1.80 m long tube produce in the audible range at 20.0 °C if the tube is closed at one end?
11. Two brass horns are playing simultaneously. If the first horn emits a note at 263.8 Hz and the second emits a note at 264.5 Hz, what beat frequency due they produce?
12. A bat uses ultrasound to find its way among trees. If this bat can detect echoes 1.00 ms apart, what minimum distance between objects can it detect?

13. What are the first three octaves of a bassoon that has fundamental frequency of 90.0 Hz? It is open at both ends.
14. Suppose a bat uses sound echoes to locate its insect pray, 3.00 m away. Calculate the echo times for temperatures at 5.00 °C and 35.0 °C.