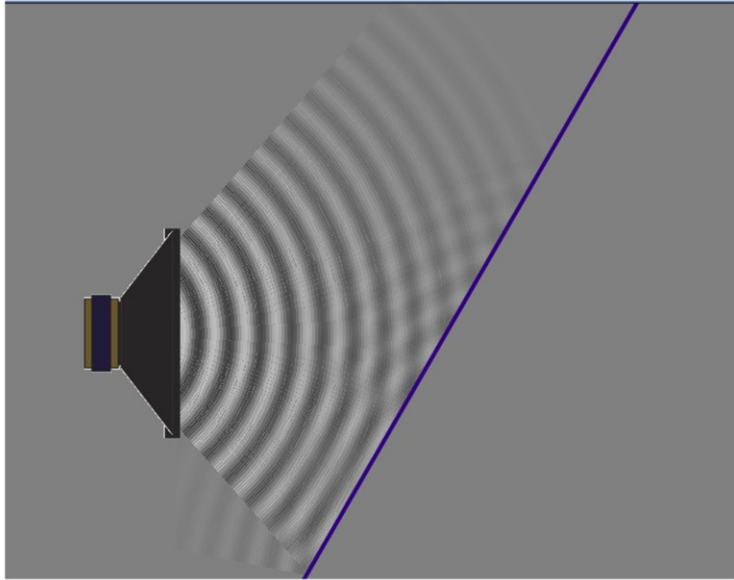


Echolocation

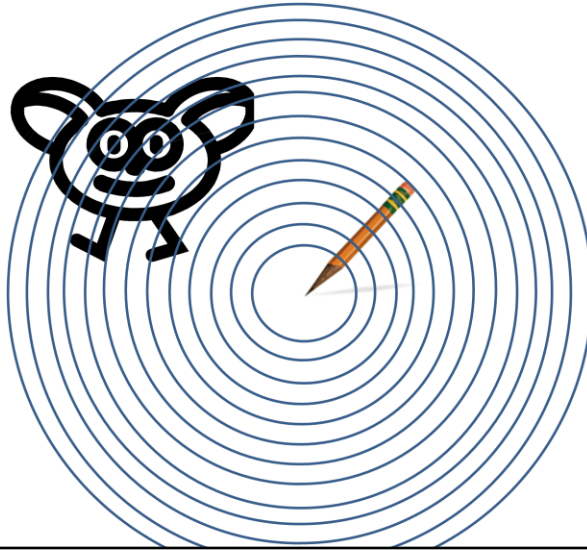
Sound bounces off of solid objects



Listen for echoes

- Echolocators listen for the sounds bouncing back
- Most produce their own sounds (such as clicks) and listen for them to come back.
- People do this subconsciously

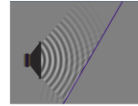
Locating sounds



Listen for the delay

- The delay tells the brain how far away an object is.
- If one ear hears it first, then it knows the object is on that side.

This is how dolphins and bats know how far away their prey is!



Speed of Sound

- 4.8 seconds to travel a mile in air
- 1.1 seconds to travel through water
- $\sim \frac{1}{4}$ of a second to travel through steel and aluminum

What did you hear?

How was the sound in the railing different from the sound you heard through the air?

When you moved further from the source (rock) of the sound, how did the sound change?

Elephants

- *Did you know that elephant babies often hang out up to a mile or so from their moms? Elephants can communicate reliably up to a mile and a half apart and they can tell how far away the other elephant is by the frequency range (itches) of sound! For example, if two elephants are close together, all sounds from low to high will be heard. If they are very far apart, only the high parts of the sound that was made will make it to the listener.*

Acousticians

- Architectural acousticians
- Instrument makers
- Concert hall designers
- Speech scientist
- Hearing specialist
- Medical acoustics
- Animal bioacousticians
- Underwater acousticians

Career Profiles

- Each person at your table should read a different career profile
- Each person in the group describes their scientist to the rest of the group.