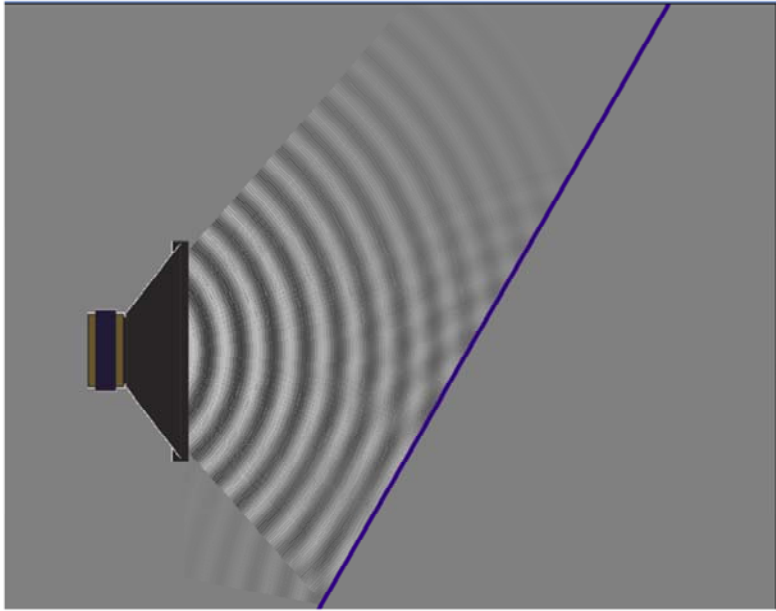


Echolocation

Sound bounces off of solid objects



Ask the class what sound does when it hits the barrier.

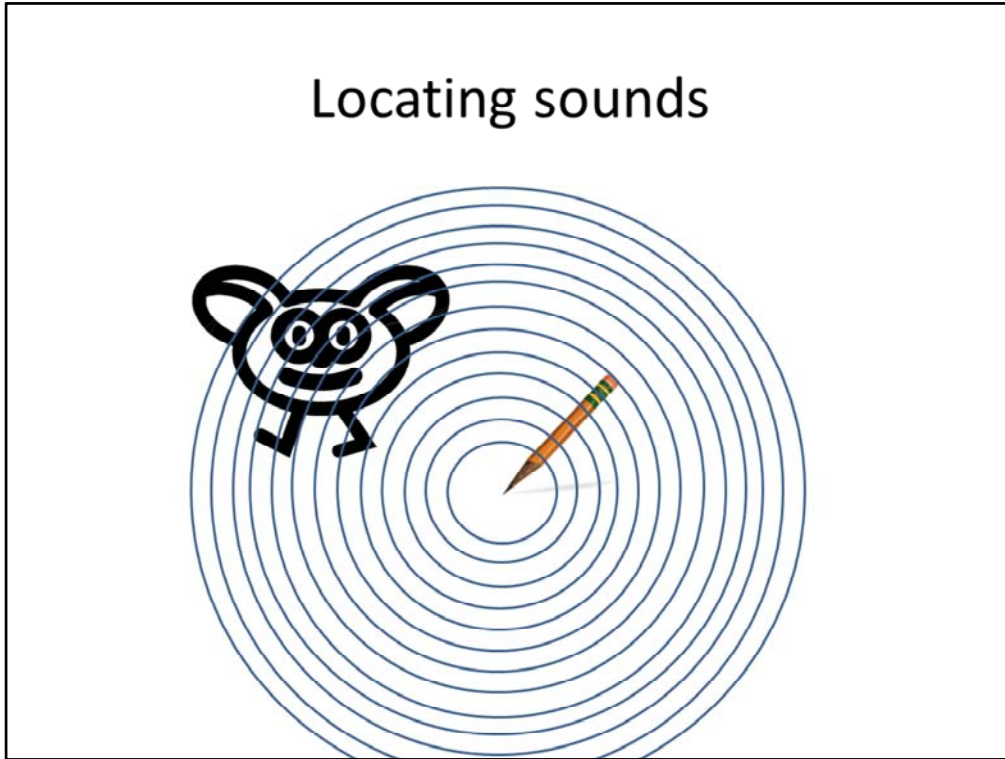
Show them the picture on this slide or the tab on the simulator where it says “barrier”

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

Before showing the next slide (slide 4), remind students about the “Sound Rather than Sight” activity. Ask students to explain how it felt to identify objects beside them vs. objects in between their feet. Ask which of these tasks was the hardest, then ask them why they think this is.

Locating sounds



This shows how sound gets to one ear before it gets to the other.

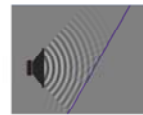
The brain automatically knows this. It tells you what side the pen dropped on because one side hears the sound first.

Show the sound simulator to demonstrate the delay. It shows how the sound waves hit one ear before they hit the other.

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!



When students watched the sound, it had to get to the barrier then come back again. The students should come to the conclusion that sound isn't instant.

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 rock

Sound travels through the air, and there's a delay between when you see something and when you hear it. Sound travels at different speeds through different things; sound is slowest through air, faster through water, and also through rock. This is why we can hear our neighbor's music through the walls.

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 (pitches) 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.

Point students to the explore sound website for definitions and people who do acoustics work