

Learn about echolocation, sonar, and ultrasound scanning to understand how sound and soundwaves are found around us!

Standards listed on next page

Supplies:

- 2 paper towel rolls*
- Pie Pan*

***Supplies Available, order here**

- Masking Tape

Objective

Students will be able to understand the differences, similarities, and functions of echolocation, SONAR, and ultrasound scanning. Students will have meaningful discussion about how their knowledge of sound and soundwaves can be applied in the world of science.

Outline of Video

1. Do you remember when we spoke about how sound can be reflected, diffused, or absorbed. Understanding the properties of sound reflection helps us in ways that might surprise you - such as in navigating a ship or seeing inside the body.
2. Place your tubes on the table, angled towards each other, but not touching. Secure them to the table with the electrical tape. It might be helpful to place something behind it to prop it up. Once you are ready, it should look like this (See video for reference 01:19).
3. Person A will have their ear up to one of the tubes, while person B will be whispering into the other. Person B will try to whisper when they are far from the tube, and again when they are very close to the tube. You can whisper the alphabet, count up to 5, or say a sentence. Person A will then describe what they heard through their tube.
 4. After you have collected your data, switch roles with your partner.
 5. Pause to complete (02:04).
6. Have a discussion about your discoveries.
 7. How do you think the distance between the speaker and the tube affected the way the listener heard the sound?
8. There are some animals who are masters at understanding sound reflection. Can you name an animal I'm thinking of?
 9. This is a small mammal who has wings, eats insects, sleeps upside down, and is mostly seen at night... A bat!
 10. Bats do rely on a very keen sense of hearing, which helps them navigate.

11. This process is called echolocation. (Whales, dolphins, and some birds do this as well)
12. How would life be different if you had the ability to use echolocation? Pause to discuss (05:06).
13. One thing humans have figured out is how to use the principle behind echolocation for navigating ships - this is called sonar, which stands for sound navigation and ranging. Sonar uses sound waves to measure the distance, direction and speed of underwater objects.
14. Do you think it would be possible to apply our understanding of echolocation to produce an image based on soundwaves? Pause to discuss (06:15).
15. Have you ever heard of ultrasound scanning? This is a tool used in the healthcare industry that produces pictures of the inside of the body using sound waves. It's often used to check on the development of a baby before it is born.
16. As you can see, there are many applications for sound reflection that are used daily by humans as well as animals.

DIY Project: Stand with your eyes blindfolded in the middle of a room. Then, have one or more friends positioned in different parts of the room take turns making clicking sounds.

As you listen to the sounds, point in the direction of where each sound is coming from. Afterwards, your friends can let you know how accurate you were.

Keep going until each person has a turn in the middle. Through this game, you can see how well you do with detecting the direction a sound comes from!

Kentucky Standards:

K-PS2-1, K-PS2-2. Simple tests can be designed to gather evidence to support or refute student ideas about causes.

KPS2-1. Scientists use different ways to study the world.

4-LS1-2. Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.

3-LS3-2,3-LS4-2. Cause and effect relationships are routinely identified and used to explain change.

4-PS3-2. Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.

4-PS3-4. Science affects everyday life.

Ohio Standards:

K.PS.2: Some objects and materials can be made to vibrate and produce sound

3.PS.3: Heat, electrical energy, light, sound and magnetic energy are forms of energy.

5.PS.2 Light and sound are forms of energy that behave in predictable ways.