



## Echolocation and SONAR: 3D Location<sup>1</sup>

Adams, W.K.

Students explore the idea of how it feels to use sound to locate objects and experiment with having to search for objects above and below them, not just side to side.

Science Topics	Process Skills	Grade Level
Sound	Scientific Inquiry	1-2
Echolocation	Observing	
SONAR	Measuring	
Vision impairment	Comparing	
	Inferring	
	Communicating	

Time Required			
Preparation	Set-Up	Activity	Clean-Up
None	15-20 minutes	10 minutes*	10-15 minutes

\* This activity takes 10 minutes for each group to complete.

Learning Goals
<b>Students will be able to...</b>
Explain the difference between locating food that is on the ground versus all around such as up in the air or if we were swimming; above, below and side-to-side.

Materials		
In the Kit	Not in the kit	Optional
	About 15 buttons (different shapes, sizes and colors) or other small objects	flashlights
	String	Additional supervision**
	Laser pointers*	

\*Check the packaging to make sure the laser pointer is safe for kids. Laser pointers work better than a flashlight, but a flashlight can be substituted if necessary. The narrower the beam of light, the better.

\*\*An additional adult may be useful in the students must go to another room to do the activity.

Set-Up
<ol style="list-style-type: none"> <li>1. Gather materials</li> <li>2. Attach string to the buttons. Make the strings a range of lengths.</li> <li>3. Clear out the space so that there are no obstructions on the floor.</li> <li>4. Hang the buttons from the ceiling at different places.</li> <li>5. Turn of the lights and close curtains to darken the room as much as possible</li> <li>6. Place a piece of tape or rope across the doorway so students can't enter the room</li> </ol>

<sup>1</sup> It is necessary to have another activity for other students to do while one group of students does this activity. We've done this activity in conjunction with Sound Rather than Sight for that purpose.

## Introduce the Activity

Explain that students will be using a laser point to find objects around a dark room.

## Doing the Activity

### 3D Echolocation

1. Explain that animals use echolocation in the water and in the air. Ask the class to come up with animals that use echolocation  
*Ex. bats and dolphins*
2. Explain that in our world, we are typically only concerned with 2 dimensions, but echolocators have to look up, down, left and right, so they are dealing with 3 dimensions.
3. One group of 3-5 students will enter the dark room for 10 minutes.
4. Using the laser pointer, students should identify as many buttons as possible. They should describe the size, shape, and color and location.

**NOTE:** Students should look for the buttons directly, not the string attaching them to the ceiling! Bats and dolphins don't have strings to use when searching for food.

5. After all the students have done the activity, discuss the following topics:
  - a. Animals that use echolocation are able to send out very narrowly focused sound so that they can easily pinpoint the location of objects and fish. Why do you think you used a laser pointer instead of a flashlight?
  - b. Verbally list the size and location (in all 3 dimensions) of every button identified with the laser pointer.

### Explanation

In-depth background information for teachers and interested students.

#### Key Lesson Terminology

- Echolocation – a method used to detect objects by producing a specific sound and listening for its echo.
- SONAR – Sound Navigation And Ranging, is the process of listening to specific sounds to determine where objects are located.

### Optional Extensions

- Students can try using a flashlight instead of laser pointers to compare how the task changes.
- Include small objects that the student groups must find and collect.
- Conduct the Speed of Sound activity
- Complete the rest of the Echolocation Unit

## **Modifications**

- When doing this activity with younger students, teachers can control the laser pointer while students search for buttons.