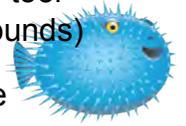


Echolocating with Dolphins (Seated Game)

Name: _____ Date: _____

Instructions:

1. Gather your other materials to use echolocation! (Colored Markers, Blindfold, Measuring tool (such as ruler or tape measure), Timer, *Optional*: Internet access and speaker to play sounds)
2. Animals have senses (such as the use of sound, sight, smell, taste, and touch) that have adapted to the environment where they live. Discuss and answer with your classmates:
 - a. How do you use your senses in your daily life?
 - b. How do animals use these senses differently than humans? (*Hint: think about observations you've made of your own pets*).



3. Read the background information below:

Animals receive information through their senses, process information in their brain, and then respond. The better an animal can sense and respond to its environment, the more likely it is to survive and reproduce.

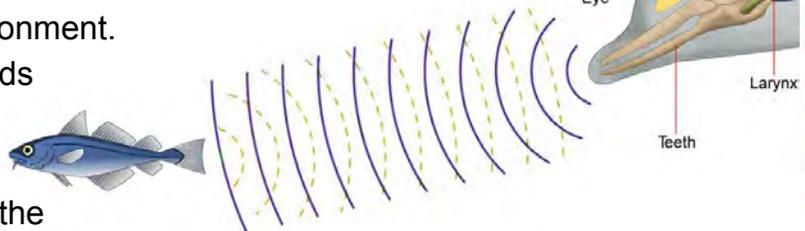
The use of sound is a powerful sense underwater.

Sound actually travels faster in water than it does in air!

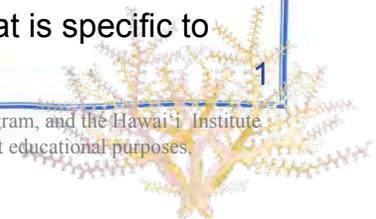
Toothed whales, like dolphins, use echolocation to receive sound information about their environment.

To use echolocation, a dolphin sends out a series of clicks. The sound vibrations then bounce off of an object and return, or echo, back to the dolphin (Fig. 2).

These echoes are processed in the dolphins brain to create an 'image' that gives information about the distance, shape, and characteristics of the object. This allows dolphins to 'see' further than their eyes are able.



Dolphins rely on echolocation to find prey, but they also produce and use other sounds to communicate with one another. Dolphins can make a range of sounds that differ in frequency and pitch. The sounds dolphins use to communicate are generally lower pitched whistles. Individual dolphins have their own signature whistle that is specific to them—sort of like a name!

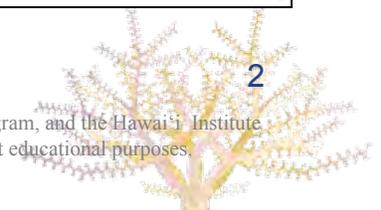
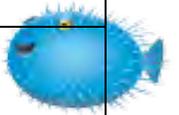


4. *Optional:* Go to the [NOAA Fisheries Sounds in the Ocean](http://www.fisheries.noaa.gov/national/science-data/sounds-ocean#humpback-whale) page and listen to sample dolphin (or other toothed whale) sounds. Discuss what you hear with your classmates.
(<http://www.fisheries.noaa.gov/national/science-data/sounds-ocean#humpback-whale>)
5. In teams of two, choose one person to be the 'dolphin' and the other to be the 'echo.'
Note: You will switch roles, and each student will get to be both the dolphin and the echo.
 - a. The role of the **dolphin** will be to locate, while blindfolded, the center of the target (to capture the fish) using echolocation.
 - b. The role of the **echo** will be to respond to the sounds of the dolphin to help guide them to capture the fish.
6. Come up with your own signature sound or whistle that is unique to you as the dolphin. Write it out here: _____
7. As a pair, come up with the different echo sounds that signal directions (left, right, forward, backward, and on target) to help find your target fish. Fill in the table below to help you remember.

Some helpful tips:

- *You will have to remember what direction your sounds represent, so choosing sounds that are similar to the direction will make it easier. For example, left could be "lah" and right could be "rah."*
- *Each sound indicates one small movement, such as an inch. For example, one "lah" from the echo tells the dolphin to move their arm one inch to the left.*
- *Sit side-by-side so you can give directions from the same perspective.*

Sound Direction	Sound Description
Left	
Right	
Forward	
Backward	
On Target!	



8. Practice making and listening to your sounds.
9. Clear a space on your desk to represent an area of the ocean.
10. Your role as the **echo**:
 - a. When the dolphin is blindfolded, place their target somewhere on the desk (your ocean area) within arm's reach.
Note: For a harder challenge, fold or cut the paper to reveal only the target fish.
 - b. Tell them to extend their arm above the worksheet and hand them the uncapped marker with the tip pointing down.
 - c. Let the dolphin know you are ready and listen for their call.
 - d. When they make their call, respond with the appropriate echo (refer to your table) that directs them closer to the center of the target fish.
 - e. Continue for up to one minute or until they are above the target.
 - f. When the dolphin is above the target (or after one minute), indicate that they should lower their arm and remove the blindfold.
 - g. Repeat the whole process for at least three trials. Be sure to move the target before the next trial!



11. Your role as the **dolphin**:

- a. Read the instructions b-h before you put on the blindfold.
- b. Extend your arm directly in front of you and hold the marker that the echo hands you.
- c. Make your signature sound and wait for the echo's response.
- d. Move your arm in the direction indicated by the echo's call.
- e. Repeat for up to one minute (or until you reach the target).
- f. When the echo indicates that you have reached the target (or after one minute), lower your arm so the marker tip touches the paper.
- g. Remove your blindfold and measure how close you were to the center of the target and record the distance and your observations in your table below.
- h. Repeat this process for at least three trials. Number each trial position with your marker.
- i. Now that you know what to do, put on your blindfold and follow steps i-v above. No peeking!



12. Switch roles and repeat!

Trial	Distance to Target	Observations
Trial #1		
Trial #2		
Trial #3		

