

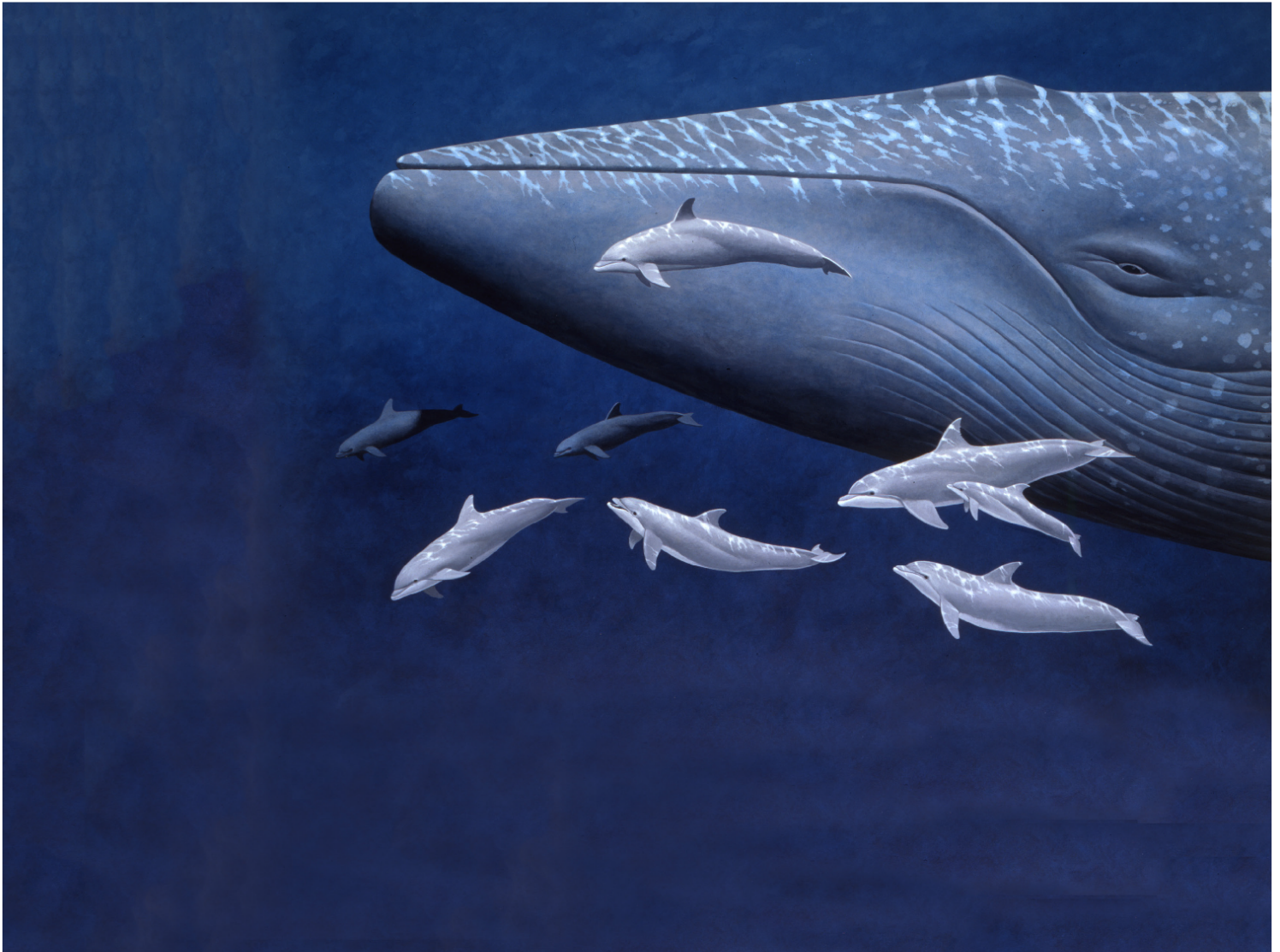
NEW BEDFORD WHALING MUSEUM

WHALES GIANTS OF THE OCEAN

Facilitator's Guide - Lesson 8.2

Echolocation: Where's That Sound?

Lesson time: 45 minutes



The previous lesson focused on sound waves. In this lesson, students will mimic the process of how certain animals use those sound waves to "see" underwater or in the dark. This process, called *echolocation*, is how they find their food and navigate.

WELCOME!

This facilitator's guide will assist you as you lead *Whales: Giants of the Ocean **Echolocation: Where's That Sound?***. It includes content and links to resources, including video, that can be used to present the material to students. All resources listed can be found on the New Bedford Whaling Museum education website at www.educators.whalingmuseum.org/

GUIDING QUESTION(s)

How do whales use sound to communicate, navigate, and find food?

BY THE END OF THIS LESSON, STUDENTS WILL BE ABLE TO:

Explain how sound energy can be used to sense things because of the way it is reflected and absorbed (echolocation).

Explain how a whale has special structures adapted to sensing sound underwater.



KEY TERMS

echolocation sound waves reflection hearing navigation



BACKGROUND INFORMATION

Animals — such whales, dolphins, and bats — use sound to locate things around them by emitting sounds that echo off other objects and then return to their ears. Depending on how long it takes the sound to reach their ears and the direction it comes from, these animals can determine the location of the object. As for their ears, these animals have evolved to have special ear structures that make them much better at echolocation than people.



MATERIALS NEEDED

- 2 copies of the [Echolocation Datasheet](#)
- 2 copies of the [Echolocation Bar Graph](#)
- Clipboard and pencil
- Blindfold (optional)



ACADEMIC STANDARDS

NGSS| LS1.D, PS3.A, PS3.B, PS4.A, Cross Cutting Practices: Cause and effect: mechanism and explanation, Energy and matter: flows, cycles and conservation, Structure and function; Science and Engineering Practices: Asking questions and defining problems, Developing and using models, Analyzing and interpreting data.

COMMON CORE| **ELA** RI.4.4, RI.4.7, RL.4.7, SL.4.1, SL.4.2, W.4.1, W.4.2, W.4.3, W.4.4 | **MATH** 4.OA.A.3, 4.NBT.A.2, 4.NBT.A.3, 4.NBT.B.4, 4.MD.A.1, 4.MD.A.2, 4.MD.B.4

Mathematical Practices: Make sense of problems and persevere in solving them, Reason abstractly and quantitatively, Construct viable arguments and critique the reasoning of others, Use appropriate tools strategically, Attend to precision.

LESSON DIRECTIONS



INTRODUCTION

Ask the students: How do you know if someone is passing the door of our classroom and not walking next to the windows? How do you know if I'm talking from the front of the classroom or the back of the classroom? When I call your name, how do you know where to look with your eyes? Our brains can usually figure out the source of the sound. A more precise version of this process is echolocation.

You may choose to use this short [slide presentation](#) to introduce the concept.

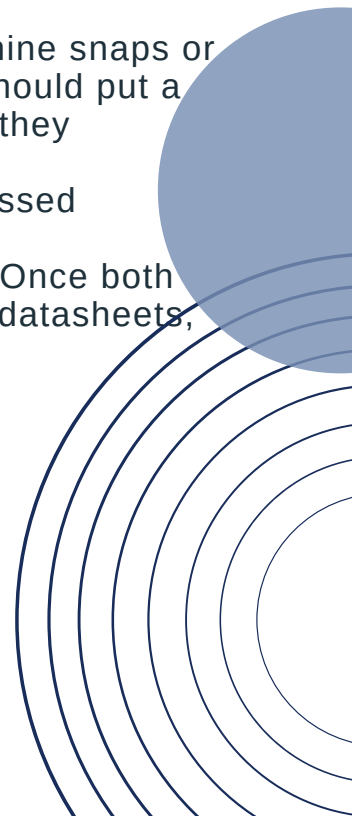


To help students visualize the process of echolocation, we recommend this [BBC video](#).

ACTIVITY

The steps for this activity are explained in this [video](#).

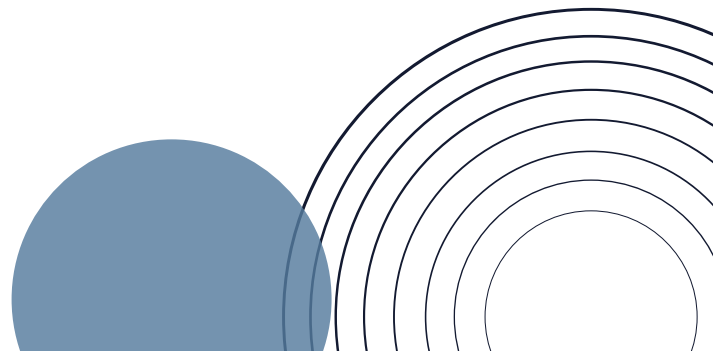
- Break the students into small groups.
- For each team, have one student sit in a chair and the other stand nearby with the [Echolocation Datasheet](#).
- Have students gently blindfold their partner so that they are unable to see. Remind them not to peek! (If there are health concerns about sharing blindfolds, then use the honor system and have students promise to keep their eyes closed.)
- Have the non-blindfolded student quietly beep, snap or clap while the other student guesses the location from where the sound came.
- Students should record their partner's response on the Echolocation Datasheet after each snap/clap.
- Have students follow the Echolocation Datasheet for all nine snaps or claps, and record all responses on the sheet. Students should put a check mark if their partner guessed correctly and an X if they guessed incorrectly.
- Ask students to write down the number of times they guessed correctly for each location (side, behind or in front).
- Have students switch places and repeat the procedures. Once both students have guessed, have them give each other their datasheets, so they can use them to create their own bar graphs.





WRAPPING UP

- Help students color in their [Echolocation Bar Graph](#) with the number of times that they guessed correctly for each location.
- Talk as a class about the results! Discuss why some locations may be harder to guess than others. (Be aware that noise from other teams will likely be a contributing factor to erroneous guesses.)
- Have your students share their reflections in the [Think About It](#) sheet.





Have more time?

Try this additional activity to help students understand further what it is like to rely on sound to navigate:

In a quiet place with few obstructions to trip over, allow the students to wear a blindfold (or close their eyes) and try walking around. They can try making noises, like clicking, or snapping their fingers. See if they can tell when they are close to a wall, another person, or a door. Several non-blindfolded students and/or adults should monitor the group to ensure no accidents occur.

Need Additional Resources?

[Sound and Light Lesson](#)



Ready for the next lesson?

Lesson 8.3

[What Sounds Do Whales Make?](#)

