

## ACTIVITY 3

# Underwater Sound

### ACTIVITY MISSION

Learners will discriminate differences in the sounds caused by sound waves traveling through different mediums: air and water. A quart plastic bag, with zip-able closure, is filled with air or water. The bag is held to one ear, while the other ear is plugged. A friend strikes the tuning fork and places it against the plastic bag.

**Time: 5-10 min.** (with Extension and Adaptation)

### CONCEPTS

- Sound travels in waves.
- Sound waves are affected by the medium through which they travel (e.g. air, water).

### LEARNING OBJECTIVES

- Learners will be able to demonstrate their comprehension of underwater sound transmission by explaining the properties of water.
- Learners will be able to apply their understanding of underwater sound transmission to ocean waters.

### STANDARDS AND PRINCIPLES

**U.S.:** 8.3, 9.7, 9.8

**Canada:** 307-3, 307-9, 307-10

**Ocean Literacy Principles:** 7d

### PRE-DELIVERY PREP

#### Supplies Needing a Day or More to Prepare

- Check supplies, especially plastic freezer bags

#### Hard-to-Obtain Materials

- Tuning fork, Concert A – check Music Department of local high school/college or a local physician

### SAFETY GUIDELINES

#### Safety Procedures

- None

#### Hazardous Materials

- None

#### Safety Concerns for Visitors

- Visitors should not put any materials from this activity inside the ear canal.
- Instruct visitors in techniques for using the tuning fork appropriately – striking it gently on a hard surface.
- Examine the bags for leaks or moisture, especially with extensive use. Visitors with hearing aids or cochlear implants may not want to risk getting their devices moist by holding the fluid-filled bags up to their ears. They may choose to operate the tuning fork, instead.



## SUMMARY OF SUPPLIES

### Consumable Supplies

ITEM	DESCRIPTION	QUANTITY
Plastic bag with zip closure	Freezer strength, 1 quart capacity	As needed
Water	Room temperature	As needed

### Durable Supplies

ITEM	DESCRIPTION	QUANTITY
Tuning fork	Metal, Concert A	1
Plastic container	Baking pan, 8"x 8" (20 cm x 20 cm) – to hold water-filled plastic bags	1
Towel(s)	Absorbent cloth	As needed
Slinky™	Metal or plastic (Note: Size that can be managed. Frequency of tangles tends to increase with Slinky™ length.)	2 (one for back-up)

## PROCESS AND PROCEDURE

(Note: Steps 1-3 can be done either prior to demonstration or with visitors.)

- Fill one bag with air – put the straw into the bag and zip the bag closed around it. Gently blow air into the bag until it is full, remove the straw and quickly seal the bag.
- Fill one bag with water – Water should fill the bag completely, without any air bubbles.
- Begin with “Welcome” phrase typical of your institution.
- Engage the visitors.
  - How does sound travel underwater? What does it sound like?**
- Identify the substance filling the bag. (*Air or water*)
- Show the tuning fork. Demonstrate and explain how to use the tuning fork appropriately – Gently strike the tuning fork on a hard surface (table).
- Person 1: Choose one of the bags (filled with air or water). Hold this bag against one ear, while holding the opposite ear closed. (Do not cover the bag with your hand.)
- Person 2: Strike the tuning fork on a table or hard surface. While it is vibrating, touch the contact end of the tuning fork to the bag.
  - What does the tuning fork sound like?
- Repeat Steps #7-8 with the other bag.
  - How are the sounds different from each other?
  - How would you explain this?
  - How would you apply this to seawater?

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**EXTENSIONS**

Have your audience listen to Sea Sounds: Download audio files of whales, snapping shrimp, natural phenomena and human-generated sounds from the Discovery of Sound in the Sea (DOSITS) sites (see Recommended Resources). Play them and have the audience identify the sounds.

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**FACILITATION NOTES**

Show Longitudinal Waves with a Slinky™:

*(Note: Store Slinky™ in original packing box when not in use to prevent tangles.)*

1. Recruit 1 (or 2) volunteer(s) from the audience to hold the end(s) of the Slinky™.
2. Hold the Slinky™ so it is stretched horizontally, but does not sag or uncoil rigidly.
3. While holding the ends of the Slinky™ still, start a longitudinal wave (side-to-side, not up-and-down).
4. Observe the compression and expansion of the coil. This illustrates the movement of molecules as a sound wave is transferred.
5. Return Slinky™ to box immediately after use.

Be sure to include adults and children as you extend invitations for participation. Be alert to body language cues of the group and tailor presentation accordingly. Young learners may be either very eager or reluctant to manipulate items in this demonstration. Be patient when giving instructions. Several of these items can be used simultaneously with small groups of visitors. Demonstrate proper usage and enlist the help of accompanying adults to assist young visitors.