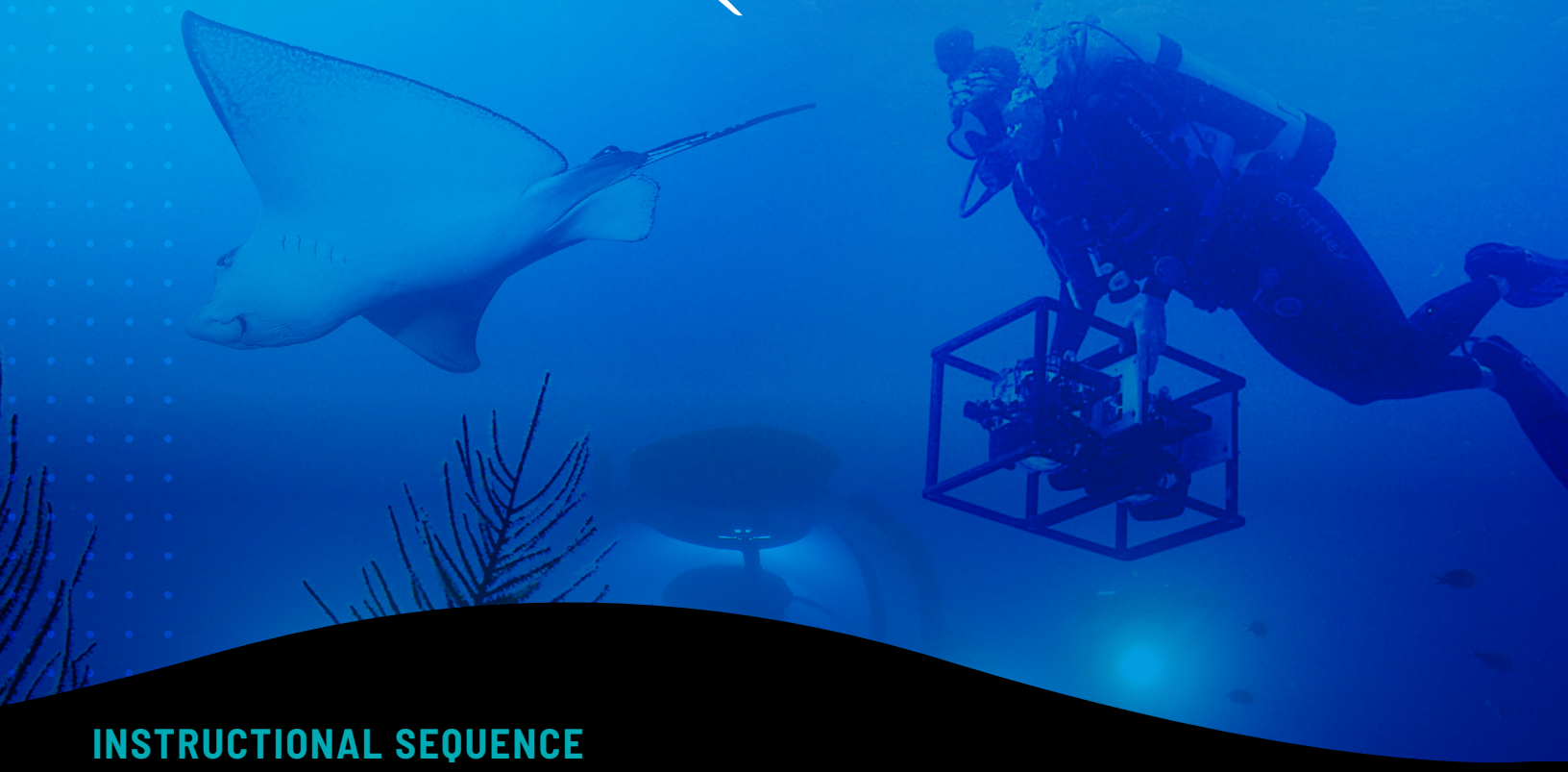
OCEANX

FLYING FISH

OCEANXPERIENCE



INSTRUCTIONAL SEQUENCE

HOW DOES A WHALE TRACK DOWN FOOD WITH SOUND?

Sound Vibrations

GRADE LEVEL: PP-2

ARIZONA SCIENCE CENTER

Never stop wondering.
Never stop imagining.™

Presented for Australian audience by:

WAM WESTERN AUSTRALIAN MUSEUM

PURPOSE

In this lesson, students will investigate how animals communicate underwater. They will experience the power of vibrations firsthand.

EXHIBITION LEARNING GOAL

Visitors feel an appreciation for the majesty of the oceans and the life within them.

OBJECTIVE

Students will use models to provide evidence that vibrating matter creates sound.

Students will use their senses to collect and provide evidence of vibrations making sounds and use the collected evidence to explain how vibrating matter and sound are connected.

PRE-PRIMARY

SCIENCE

Science Inquiry Skills - Questioning and predicting:
WA1SSIQ1 - Pose questions and make predictions based on knowledge and experiences.

Science Inquiry Skills - Collaborating and applying:
WAPSSICL1 - Use the senses to learn about the natural and physical world and develop scientific ideas.

Science Inquiry Skills - Science Inquiry Skills:
WAPSSICM1 - Share questions, predictions, observations and ideas with others.

YEAR 1

SCIENCE

Science Inquiry Skills - Questioning and predicting:
WA1SSIQ1 - Pose questions and make predictions based on knowledge and experiences.

Science Inquiry Skills - Planning and conducting:
WA1SSIPL1 - Engage in guided investigations to answer questions, test predictions, and assess risks.

WA1SSIPL2 - Make and record observations, including informal measurements.

Science Inquiry Skills – Evaluating:
WA1SSIE1 - Compare observations to predictions and identify further questions for investigation.

YEAR 2

SCIENCE

Science Understanding - Physical Sciences:
WA2SSUP1 - Sound energy is produced by a range of natural and human-made sources and can be sensed.

Science Inquiry Skills – Planning and conducting:
WA2SSIPL2 - Make and record observations, including informal measurements.

Science Inquiry Skills – Communicating:
WA2SSICM1 - Communicate observations, ideas, and findings using everyday andscientific vocabulary.

VOCABULARY

SOUND
Energy heard by the ear

VIBRATIONS
A rapid motion causing a back and forth movement

ECHOLOCATION
A characteristic that enables certain animals to use echoes from sound waves to survive

ECHOES
A repetition of sound

MATERIALS

COFFEE CAN OR OATMEAL CONTAINER

BALLOON

RUBBER BAND

UNSHARPENED PENCIL

RICE

SCISSORS

CREATING THE DRUM HANDOUT

SOUND OBSERVATIONS HANDOUT

ONLINE RESOURCES

UNDERWATER ANIMALS ARE SO LOUD, THEY'D DAMAGE OUR HEARING

LITERARY CONNECTIONS

Sounds All Around: The Science of How Sound Works by Susan Hughes

Vibrations Make Sound by Jennifer Boothroyd

Rumble and Roar: Sound around the World by Sue Fliess

ENGAGE

Begin the lesson with a Q&A about sound and vibrations. Have students close their eyes. Have one student volunteer to stretch out a rubber band and let go. Have the other students give a thumbs-up when they know that the rubber band has been plucked.

- How did they know it had been plucked?

Have students observe the vibrations when the rubber band is plucked with their eyes open.

- What causes the sound?
    - Vibrations
- What kind of sounds do we hear outdoors?
    - Cars, children playing, birds, thunder, wind, airplanes, crickets, dogs barking
- What kind of sounds do we hear indoors?
    - The fan, the air conditioner, phone ring, television, music, people talking

EXPLORE

Prompt students to clear their tables/desks and discuss the activity.

- **SAY:** We are going to be engaging in an activity today in which we build something that makes sound and will help us understand vibrations a little better.
- Distribute all supplies to students: coffee can/oatmeal container/large empty tin can with lid removed, rubber balloon, rubber band, several grains of rice.
- Distribute Creating the Drum Handout to students.
- Guide and direct students through the step-by-step process of building a drum.
    - Step 1: Put your container in front of you. If it has a top/lid, take it off.
    - Step 2: Cut about an inch off the neck of the balloon.
    - Step 3: Stretch the balloon across the top of your container.
    - Step 4: Secure the balloon with the rubber band.
    - Step 5: Use the eraser end of your pencil to tap on the balloon part of your drum. What do you observe?
    - Step 6: Now put several grains of rice on the top of the balloon. Tap it with the eraser end of your pencil. What do you observe?

EXPLAIN

After students have built the drum, distribute the Sound Observations handout. Use the prompts on the handout to engage students in a discussion about what they observed. As students are engaging in discussion, prompt them to record their ideas using drawings and words.

Have a class discussion:

- Look closely. What does the balloon do when it is tapped by the pencil (drumstick)?
    - It moves up and down, it bounces, or vibrates.
- What happened to the grains of rice that were on top of the drum when you tapped the drum with your pencil (drumstick)?
    - They bounced, vibrated and some fell off.
- What sound did you hear?
    - Students may say high or low sounds. They also could describe it sounding like a thump.
- What caused that sound?
    - Striking the drum with the pencil caused vibrations and we could hear it in our ears.

EXTEND

Play a **video of an echo**, ask students what they noticed. When a student uses the word "echo", work to define it together.

- What is an echo?
    - Possible answer: When the sound you hear bounces back and you hear it again.
- Some living things use echolocation. Let's break apart the word "echo" and "location" and try to predict what we think that might mean.
    - Possible answer: Finding a location of something using an echo.
- We are going to explore echolocation through the lens of an orca. Let's listen to how this might **sound**.
- As an orca, what do you think I may want to locate with my echo?
    - Possible answer: Food
- I need one volunteer to help me hold this slinky as still as possible! I also need one student to be a fish that I, as the orca, am hungry to eat!

Have one student stand a few feet away from you, hold the slinky as still as possible, indicate to the students that the slinky is representing our sound waves here (similar to the vibrations they observed earlier).

Have the other student stand in the middle of the slinky holding three coils together as still as possible, indicating that this is a fish swimming in the ocean in the path of your sound waves.

While holding your end of the slinky, begin making clicking noises similar to those heard in the audio. While clicking, send a pulse through the slinky. Once the pulses get to the "fish" it should pulse back towards you.

- Ask students to share observations on what they just witnessed.
- Have students give ideas on how the sound waves made by the orca helps them to find their food.
- Revise their initial definition of "echolocation".

EVALUATE

Have students revise their initial definition of echolocation. After there is a class definition, have students draw a labeled diagram of echolocation happening in the ocean. Check diagrams for understanding- specifically focused on the connection between vibration and sound.

CREATING THE DRUM

STEP 1	Put the container in front of you. Take the top off your container.	
STEP 2	Cut one inch off the neck of the balloon.	
STEP 3	Stretch the balloon across the top of your container.	
STEP 4	Secure the balloon with a rubber band.	
STEP 5	Use the eraser end of your pencil to tap on the balloon. Add rice and tap again.	

Name: _____

SOUND OBSERVATIONS

What does the balloon do when it is tapped by the pencil (drumstick)?

What happened to the grains of rice that were on top of the drum when it was tapped by the pencil (drumstick)?

What sound did you hear?

What caused the sound?

THIS GUIDE IS INTENDED FOR THE USE OF EDUCATORS, GROUP LEADERS, AND FAMILIES IN CONJUNCTION WITH THE *OCEANXPERIENCE* EXHIBITION. IT IS PROVIDED ON AN "AS IS" BASIS, AND FLYING FISH AND OCEANX DISCLAIM ALL WARRANTIES, WHETHER EXPRESS OR IMPLIED, REGARDING THE GUIDE. BY UTILIZING THIS GUIDE YOU RELEASE FLYING FISH AND OCEANX, ALONG WITH THEIR OFFICERS, EMPLOYEES, DIRECTORS, TRUSTEES, AGENTS, AND VOLUNTEERS, FROM ANY AND ALL LIABILITY, CLAIMS, ACTIONS, COSTS, EXPENSES, DAMAGES, ATTORNEY FEES, BREACH OF CONTRACT ACTIONS, AND ANY OTHER CAUSES OF ACTION THAT YOU MAY CURRENTLY HAVE OR MAY ACQUIRE IN THE FUTURE. THIS RELEASE PERTAINS TO ANY LOSS, DAMAGE, OR INJURY THAT MAY OCCUR TO YOU, THE INDIVIDUALS YOU ARE EDUCATING, OR ANY PROPERTY ASSOCIATED WITH YOU OR THE INDIVIDUALS YOU ARE EDUCATING AS A RESULT OF USING THE GUIDE. THE EXHIBITION, BASED ON A FORTHCOMING TELEVISION SERIES PRODUCED BY BBC STUDIOS NATURAL HISTORY UNIT AND OCEANX IN ASSOCIATION WITH EARTHSHIP PRODUCTIONS FOR NATIONAL GEOGRAPHIC, IS CREATED AND TOURED INTERNATIONALLY BY FLYING FISH.