DOLPHIN RESEARCH CENTER

What's For Lunch?

Grade Level: 2nd-4th

Objectives: Students will be able to experience how dolphins use echolocation to find food through this activity.

Florida Sunshine State Standards:

Mathematics

MA.C.3.2.2: The student identifies and plots positive ordered pairs (whole numbers) in a rectangular coordinate system (graph).

Science

SC.G.1.2.2: The student knows that living things compete in a climatic region with other living things and that structural adaptations make them fit for an environment.

National Science Education Standards:

Content Standard C (K-4) - Characteristics of organisms: Each plant or animal has different structures that serve different functions in growth, survival, and reproduction. For example, humans have distinct body structures for walking, holding, seeing, and talking.

Content Standard C (5-8) - Diversity and adaptations of organisms: Biological evolution accounts for the diversity of species developed through gradual processes over many generations. Species acquire many of their unique characteristics through biological adaptation, which involves the selection of naturally occurring variations in populations. Biological adaptations include changes in structures, behaviors, or physiology that enhance survival and reproductive success in a particular environment.

Background: Dolphins use echolocation to find food and avoid danger. Clicks emitted by dolphins are thought to be exclusively used for echolocation, the dolphin's amazing ability to gather information about its world through sound. Clicks are produced in rapid sequence, called "click trains," that sound to us like a creaking door or loud buzz. The clicks are produced so rapidly, you have to have special equipment to hear just one. The frequency range for echolocation clicks is 0.25 to 220 kHz. Because lower frequency sounds travel farther, dolphins tend to use lower frequencies when echolocating on objects that are at a greater distance. Lower frequency clicks, however, do not deliver as much detailed information about an object as higher frequency clicks. Thus, as the dolphin moves closer, it can increase the frequency of its echolocation to learn more about the object. Dolphins have a waxy, lens-shaped structure in their forehead called the melon that focuses the clicks into a tight beam forward. When dolphins examine an object or scan their environment, their heads move rapidly from side to side as they direct the echolocation beam back and forth across the object or through the environment. Dolphins may be able to accurately echolocate on objects as far away as 100 yards. They are able to create clicks powerful enough to fall into the finite region of sound; that is, any more energy put into

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the sound would turn into heat. However, dolphin echolocation is useless in air. The clicks emitted by a dolphin strike objects in its underwater world and bounce back as echoes to be picked up through the dolphin's lower jaw. From the returning echoes, a dolphin can tell the size, shape, distance from, speed, direction of travel, and density of the object. Thus, dolphins can tell the difference between materials of different densities, even if they look the same. Dolphins are particularly good at detecting air spaces within objects. Since most fish have a swim bladder filled with air to maintain the fish's equilibrium, dolphins can easily detect fish with their echolocation. For more info see ***Acoustics*** information file and ***Acoustics*** diagram.

Key Terms

Echolocation: A sensory system in certain animals in which usually high-pitched sounds are emitted and their echoes interpreted to determine information about objects, including size, distance, and direction.

Materials:
- Graph paper.
- DRC website to see photos of Tanner, Santini, & Rainbow!
- Pencils.
- Crayons.
- Copies of the story, "What's For Lunch, Tanner?"

Teacher Prep Notes: Make copies of the story for students to either do projects on their own or in pairs.

Procedures:
1. Have students number their graph paper with points 0-10 on both the vertical and horizontal axes.
2. Read the story aloud as a class. In pairs or on their own, have students read the story again and plot the graph coordinates.
3. Once they have plotted the coordinates, have students connect the points in order. The result is a fish.

Wrap Up: Students can color their fish to create a unique species, or one they have studied that dolphins eat. Visit DRC's website to enable students to see Tanner, Rainbow, and Santini and read/ learn more about them.

Taking it Further:
- Using graph paper, design your own lunch for Tanner! What else would he eat? (i.e. squid, shrimp, herring, etc). Using graph paper, in groups or as a class, map out your own design and coordinates!

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What's For Lunch, Tanner?

Tanner is an Atlantic bottlenose dolphin. Tanner can use echolocation to find fish in his lagoon. Because of echolocation, Tanner can use clicks and sounds to detect the size, shape, and thickness, or density, of objects! Let's see what Tanner will have for lunch today.

Tanner's day began when he decided to look in his lagoon for a snack after breakfast around (1,4). He swam up to the surface, took a breath at (2,6) and explored the sea floor for crabs and shrimp near (1,8). Wow! His echolocation found a crab at (3,7)! Suddenly he heard a familiar whistle. His mom Santini swam up next to him at (5,8). Rainbow met them, too, and they swam along side by side together near (6,8). They rested for a bit at the surface at (5,9). Now it was almost lunchtime, and Tanner was hungry. He decided to look for a snack at (7,8). The others weren't hungry, so they swam off to (9,7). He first swam to (10,6), then to (8,5), and finally to (10,5)! Using echolocation, Tanner found a mangrove pod to play with at (7,4). He is very playful, so he played with some sea grass at (6,4) and finally found a minnow to snack on at (5,4). Yummy! Just then he heard his mom. Santini was all the way on the other side of the lagoon with Rainbow at (3,5). He swam to join them. All three of them swam to (1,4). What did Tanner find but his favorite lunch! Do you know what it was?