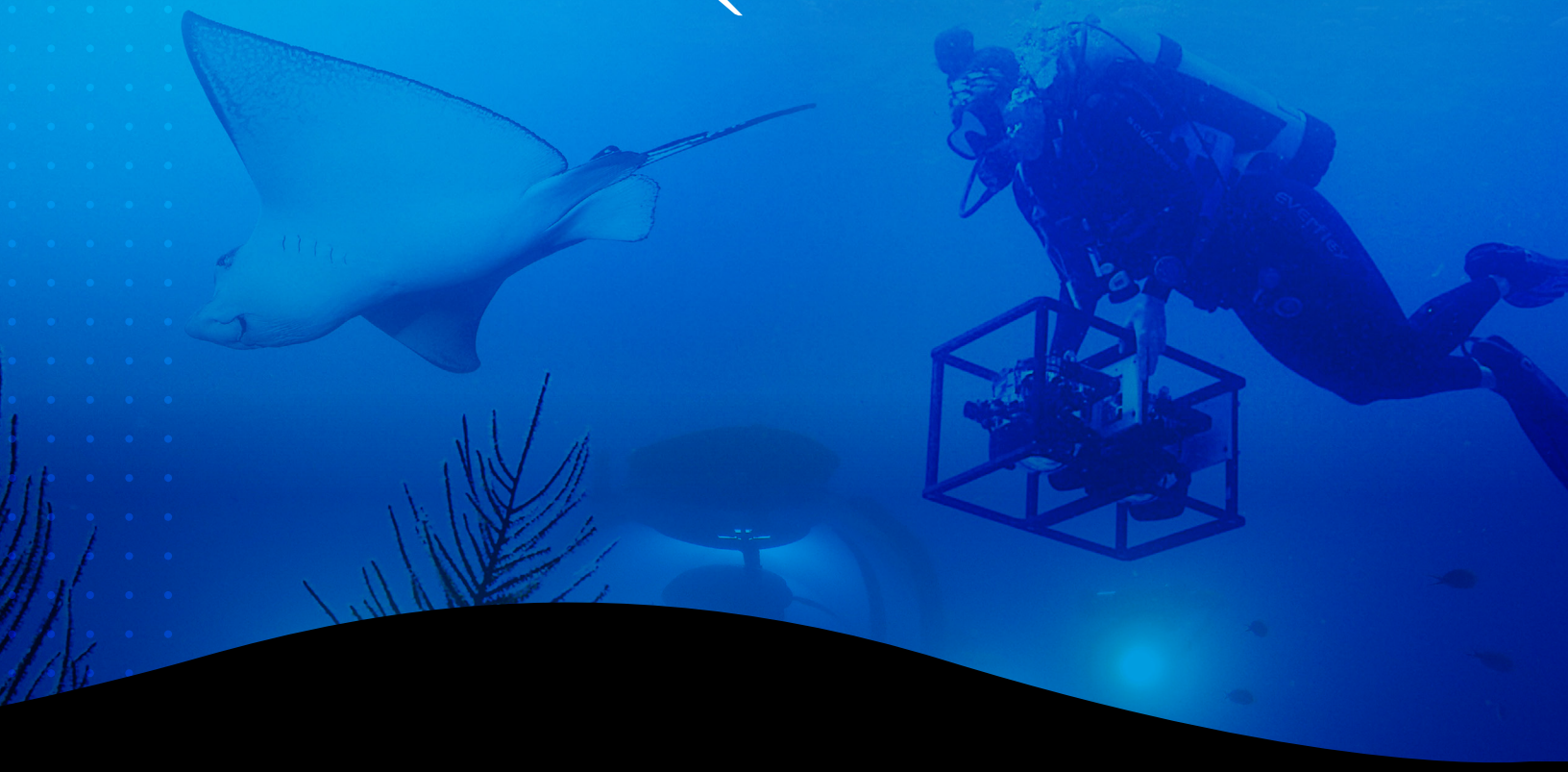
OCEANX

FLYING FISH

OCEANXPERIENCE



INSTRUCTIONAL SEQUENCE

HOW CAN WE HELP A DOLPHIN SWIM?

Structure & Function

GRADE LEVEL: PP-2

ARIZONA SCIENCE CENTER

Never stop wondering.
Never stop imagining.™

Presented for Australian audience by:

WAM WESTERN AUSTRALIAN MUSEUM

PURPOSE

Structure and Function are complementary properties. The shape and stability of structures of natural and designed objects are related to their function(s). The functioning of natural and built systems alike depends on the shapes and relationships of certain key parts as well as on the properties of the materials from which they are made (NSTA).

EXHIBITION LEARNING GOAL

Visitors leave the exhibition feeling positive about their ability to make change.

OBJECTIVE

Students will identify the structure of animals and how these structures help the animal complete functions necessary for survival.

Students will engineer a solution to a problem with an animal's structure that affects its ability to function as needed.

PRE-PRIMARY

SCIENCE

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

Science Inquiry Skills - Planning and conducting:
WAPSSIPL2 - Make observations using comparison.

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

YEAR 2

SCIENCE

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

Science Inquiry Skills - Planning and conducting:
WA2SSIPL1 - Engage in guided investigations to answer questions, test predictions, and assess risks.

WA2SSIPL2 - Make and record observations, including informal measurements.

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

YEAR 1

SCIENCE

Science Understanding - Biological Science:
WA1SSUB1 – Plants and animals have external features that serve a purpose and by which they can be grouped.

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 5

SCIENCE

Science Understanding - Biological Science:
WA5SSUB1 - Living things have structural and behavioural adaptations that enable their survival in their environment.

VOCABULARY

STRUCTURE
The arrangement of parts

FUNCTION
What a part of the body does

PREY
An animal that is hunted by another for food

PREDATORS
An animal that hunts and eats another animal for food and, ultimately, energy

DATA
A collection of information

MATERIALS

FOR EACH GROUP:

1 ALUMINUM PAN

1 SANDWICH BAG

1 PAIR OF TWEEZERS

1 PIPETTE

10 PIECES OF RICE

10 PAPER CLIPS

10 RUBBER BANDS

3 CUPS

ONLINE RESOURCES

WINTER'S STORY

WINTER'S INJURY

HOW SQUID'S EAT

LITERARY CONNECTIONS

What Do You Do With a Tail Like This? by Steve Jenkins & Robin Page

We're Not Weird: Structure and Function in the Animal Kingdom by Michael Garland

Creatures Features by Steve Jenkins & Robin Page

Animal Adaptations: Unique Body Parts by Radka Piro

ENGAGE

Read *What Do You Do With a Tail Like This?* By Steve Jenkins & Robin Page.

Hold up a photo of a whale, ask students:
- What parts of this animal's body help it survive? How?

Hold up a photo of a marine hermit crab, ask students:
- What parts of this animal's body help it survive? How?

Hold up a photo of a seahorse, ask students:
- What parts of this animal's body help it survive? How?

Record students' ideas for reference later.

EXPLORE

SAY: Typically, the structures (define structures) of an animal help the animal with a function (define function) needed to prey on food, avoid predators, or thrive in its environment (in this case a liquid environment). Let's look back at our ideas and see if we can categorize them into these three categories and add more ideas!

Draw a new chart with four columns, it may look something like this when finished:

ANIMAL	PREY ON FOOD	AVOID PREDATORS	THRIVE IN LIQUID ENVIRONMENT
HUMPBACK WHALE	Large mouth	Overall size of body	Blow hole Flippers
SEAHORSE	Long, thin snouts Vacuum-like	Camouflage	Gills
MARINE HERMIT CRAB	Claws	Shells	Antennae

SAY: Now that we have some ideas, let's investigate one more category: Prey on Food. With your partners, please number off 1-3. In this exploration, #1s are going to be our whales, #2s will be seahorses, and #3s will be our marine hermit crabs. Humpback whales will use the sandwich bag to represent the large, gulping mouth of a whale, seahorses will use the pipette to represent the long, thin, vacuum-like snouts and hermit crabs will use tweezers as the claws. You will have 20 seconds to prey on as much food as possible, you will place the food in your stomach (the cup) as you go (in front of them should be an aluminum pan with water and the other materials dispersed throughout). Whales will go first, your time starts now! When the time is up, have them empty their stomachs, count how many of each item was eaten, and have them record their answers on the recording sheet. (Repeat for other animals)

EXPLAIN

Now that our stomachs are full, let's analyze our data!

Have each whale share out the amount of each food that was eaten, repeat for all three animals. Graph the data for the whole group.

SAY: What patterns do you see in our data?

Lead a class discussion:

- Based on which animal was able to eat which type of food more easily, what type of prey do you think the paper clips represent? Why?
    - Possible Answer: Fish

- Based on which animal was able to eat which type of food more easily, what type of prey do you think the shell represents? Why?
    - Possible Answer: Animals with hard shells

- Based on which animal was able to eat which type of food more easily, what type of prey do you think the rubber band represents? Why?
    - Possible Answer: Worms, plankton, etc.

Let's research to see if our investigation matches what actually happens in the ocean food web!

Model to students how to research each animal's main sources of prey.

EXTEND

SAY: What do we think would happen to these animals if one of their structures was altered?

Read the story or watch the video about Winter the Dolphin's injury.

SAY: What could we do to help Winter swim?

Let's engineer her a new tail!
Have students brainstorm a design that would allow Winter to carry out all needed functions for survival. Allow students to use a variety of recycled material.

EVALUATE

Have students share their designs with the class, specifically look for/ask about the connections they made to structure and function.

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