New England Aquarium
Educational Field Trip Activity Series

New England Aquarium

Protecting the blue planet

New England Marine Animal Adaptations

Learning Level
Intermediate-Advanced

Subject Areas
Science

Preparation
- Preview Aquarium feld trip orientation video
- Borrow biofacts from the Aquarium
- Review vocabulary appropriate for your students
- Divide students up into feld trip groups prior to visit

Duration of Lesson
Pre Activity
- One class period without feld trip
- Two class periods including feld trip preparation

Activity
- One class period without feld trip
- 10 to 20 minutes during feld trip

Research and Presentation
Two class periods

Lesson Standards
Common Core (ELA)
- Reading Standards: Foundational Skills
- Writing Standards
- Speaking and Listening Standards
- Language Standards

MA Science Standards
- LS. Characteristics of Living Things
- LS. Living Things in their Environment

Developed with support from
INSTITUTE of Museum and Library SERVICES

Objectives
Students will practice observation and critical thinking skills as they study local species found in the Gulf of Maine.

Students will learn about local animal adaptations through investigations of biofacts (artifacts of once-living organisms). After studying these adaptations, students will work together in groups to learn and teach about focus animals.

During an optional feld trip to the New England Aquarium, students will study exhibits related to local animals. The following guide will include information related to the feld trip. If you are unable to come to the Aquarium, you can disregard the notes about the feld trip and use it solely as a classroom activity.

Students will be able to:
- Identify marine animal adaptations
- Make observations about animals' adaptations
- Begin to infer the benefts of those adaptations
- Draw and write what they see, paying close attention to detail

Skills
Observation, communication, literacy, group work

Vocabulary
Adaptation, biofact, bone, cartilage, crustacean, fsh, Gulf of Maine, marine, New England, observation

Materials
Classroom Lesson Materials: Aquarium feld trip orientation video (**www.neaq.org/preview**), biofacts (available from Teacher Resource Center, **www.neaq.org/teachers**), animal information sheets (attached)

Field Trip Lesson Materials: Student sheets (print on card stock), journals (attached) or clipboards (if student sheets are not on card stock). Please do not allow students to use the Aquarium glass as a writing surface, as pencils and pens can damage the acrylic.

Procedure
Before your visit:
Show students and chaperones the Aquarium feld trip orientation video. Discuss expectations around the feld trip and introduce the activity the students will be responsible for during their visit. You can also download the Field Trip Planning Guide from **www.neaq.org/fieldtrips**.

Divide students up into their feld trip teams so they know who will be in their group prior to leaving for the trip. There should be four groups: 1) cartilaginous fshes, 2) bony fshes, 3) echinoderms, and 4) crustaceans. If necessary, groups may be split so that there are fve or fewer students in each group. Give the students enough time to ask questions and practice using the student sheets in class.

Biofact Observation (15 minutes)
Tell the students that they will be observing an animal when they are at the Aquarium. To practice, they are going to observe a part of an animal that was once living—a *biofact*. Ask the students "What is the difference between observing and looking at something?" Define observation (see Glossary). Write their responses on the board.

- Give each student the Marine Biofact Observation Activity worksheet or the New England Aquarium journal (attached).
- Give each student or pair of students a biofact.
- Instruct students to work individually on their worksheets, but allow them to talk to their fellow students if they are sharing a biofact, to share information.
- After the students complete their worksheets, ask the students to share their biofact with the class and present what they have found.

Tips for Good Observation:
- Remember to have the students use all of their senses, except taste.
- Give them measuring tools to assist in the observation.
- Give them crayons or paint samples to compare and use as a color-coding system.

Assessment
Ask students to present the following questions. You can grade them by giving them a point for each answer.

- What did it look like?
- What did it feel like?
- What animal do they think it is?
- Describe an adaptation it has for feeding, escaping predators or reproducing.
- Share one more interesting feature they have discovered during their observation.

During your visit:
NOTE: Plan for no more than 5 to 10 students at one exhibit at one time.

This activity should only last about 20 minutes when you are at the Aquarium. We do not recommend that students spend a large part of their time doing an activity. We encourage them to explore and discover other parts of the Aquarium after or before their activity. Break students up into their teams: 1) cartilaginous fishes, 2) bony fishes, 3) echinoderms 4) crustaceans.

Northern Waters: Gulf of Maine (Level 3) observation
Instruct students to choose an animal to observe in any of the following exhibits:

- Shorebirds
- Boulder Reef
- Sandy Bottom Community
- Isles of Shoals
- Eastport Harbor

Direct students to complete the Animal Observation Sheet or continue in the their New England Aquarium journal (attached).

After your visit

Divide students into groups according to which animal they focused on during their visit:
1) cartilaginous fshes, 2) bony fshes, 3) echinoderms 4) crustaceans. If necessary, groups may be split so that there are fve or fewer students in each group.

Assessment

Within each group, direct students to make a poster about their chosen animal or animal group focusing on the adaptations (movement, protection, reproduction). They may use their own notes and observations, the animal information sheets and other resources to develop their posters. Use the attached poster rubric or make your own. You can also borrow books and materials from the Teacher Resource Center. Use one class period to gather information and begin the poster. Use the second class period to fnish the poster and present it to the class. The time of presentation can be adjusted depending on the amount of class time available.

New England Marine Animal Adaptations

Poster Project

You can use a rubric like the one below, designed for free at **rubistar.4teachers.org**, to help score your students' work.

CATEGORY	4	3	2	1
Use of Class Time	Used time well during each class period. Focused on getting the project done. Never distracted others.	Used time well during each class period. Usually focused on getting the project done and never distracted others.	Used some of the time well during each class period. There was some focus on getting the project done but occasionally distracted others.	Did not use class time to focus on the project OR often distracted others.
Title	Title is descriptive, informative, can be read from 6 feet away and is quite creative.	Title can be read from 6 feet away and describes content well.	Title can be read from 4 feet away and describes the content well.	The title is too small and/or does not describe the content of the poster well.
Attractiveness	The poster is exceptionally attractive in terms of design, layout and neatness.	The poster is attractive in terms of design, layout and neatness.	The poster is acceptably attractive, though it may be a bit messy.	The poster is distractingly messy or very poorly designed. It is not attractive.
Knowledge Gained	Student can accurately answer all questions related to facts in the poster and processes used to create the poster.	Student can accurately answer most questions related to facts in the poster and processes used to create the poster.	Student can accurately answer about 75% of questions related to facts in the poster and processes used to create the poster.	Student appears to have insufficient knowledge about the facts or processes used in the poster.
Labels	All items of importance on the poster are clearly labeled with labels that can be read from at least 3 feet away.	Almost all items of importance on the poster are clearly labeled with labels that can be read from at least 3 feet away.	Several items of importance on the poster are clearly labeled with labels that can be read from at least 3 feet away.	Labels are too small to view OR no important items were labeled.
Content Accuracy	At least 7 accurate facts are displayed on the poster.	5 to 6 accurate facts are displayed on the poster.	3 to 4 accurate facts are displayed on the poster.	Fewer than 3 accurate facts are displayed on the poster.
Required Elements	The poster includes all required elements as well as additional information.	All required elements are included on the poster.	All but 1 of the required elements are included on the poster.	Several required elements were missing.

New England Marine Animal Adaptations

Glossary

Adaptation
A physical or behavioral feature that an organism is born with and that helps the organism to survive and reproduce in its habitat

Biofact
An artifact of a living organism (e.g. dried sea star, whale bones)

Bone
Hard structures of a skeleton in vertebrate animals made of calcium and other minerals

Cartilage
Firm, flexible type of tissue in animals (e.g. flexible tissue in human ear or nose)

Crustacean
Type of animal belonging to the phylum *Arthropoda,* typically covered in a hard shell (e.g. shrimp, lobster, crab, barnacles, *etc*)

Fish
An animal that lives in the water that uses gills to breathe and fins to swim and has scales covering its body

Gulf of Maine
Large bay of the North Atlantic ocean between Cape Cod and Nova Scotia

Marine
Of or relating to the ocean

New England
The Northeast region of the United States that includes the states of Connecticut, Rhode Island, Maine, Massachusetts, New Hampshire and Vermont

Observation
Detailed exploration and description using the senses

New England Marine Animal Adaptations

Marine Biofact Observation Sheet

NAME

DATE

While looking at the biofact in your classroom, answer the following questions.

1. **Draw and label** as many details as you can.

2. What **kind of animal** do you think it comes from?

3. What **part of the animal** do you think it is?

4. Describe how **the animal would use** this body part.

New England Marine Animal Adaptations

Aquarium Animal Observation Sheet

NAME

DATE

While looking an exhibit in the New England Aquarium, answer the following questions.

1. **Draw and label** as many details as possible. If you have time, draw its location in the exhibit.

2. What is the **name** of this animal?

3. Describe the body parts this animal uses for **protection.**

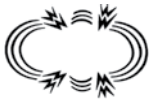
4. Describe the adaptation that this animal has that helps it **find food**.

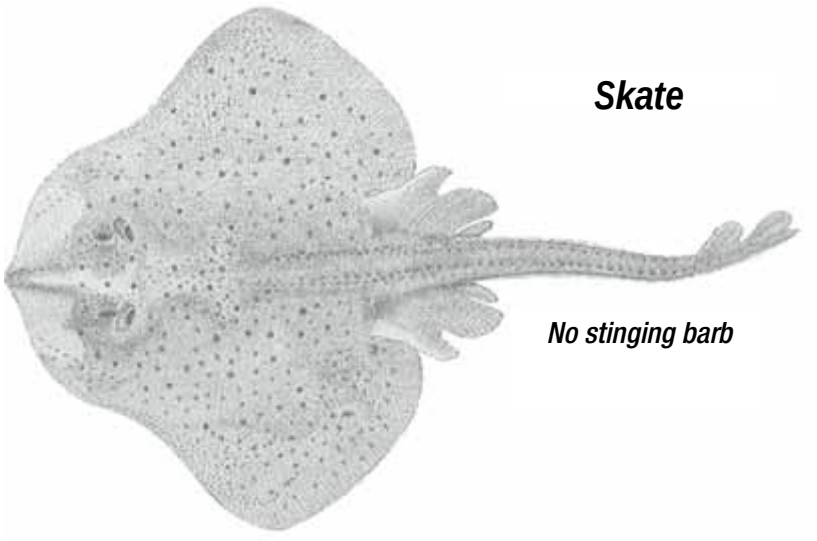
5. Where in this exhibit does the animal **live**? *(Circle one)*

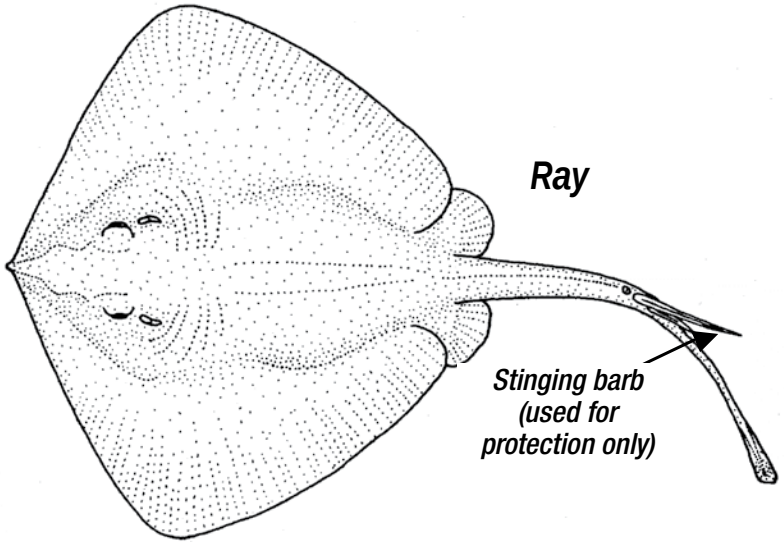
   On the rocks On the sand Always swims Other (describe)_____

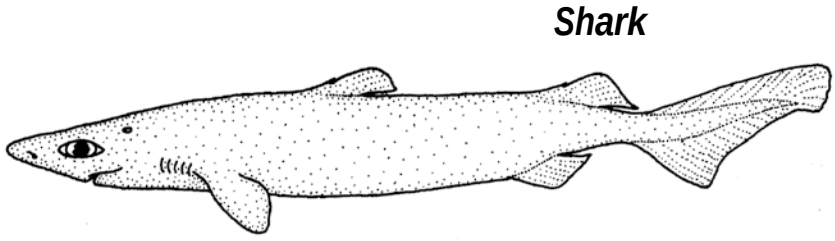
Cartilaginous Fishes

(Sharks, rays and skates have cartilage skeletons)

SENSES	
Sight 	They can see well in the dark.
Smell 	They have a very strong sense of smell.
Taste 	They can taste their food—if it is in their mouth.
Touch 	Their skin can feel whatever they touch.
Hearing 	You can't see their ears, but all fsh can hear.
Movement 	Most fsh have lateral lines, which can sense motion.
Electricity 	Most cartilaginous fsh have *ampullae of lorenzini*, which can feel electricity.



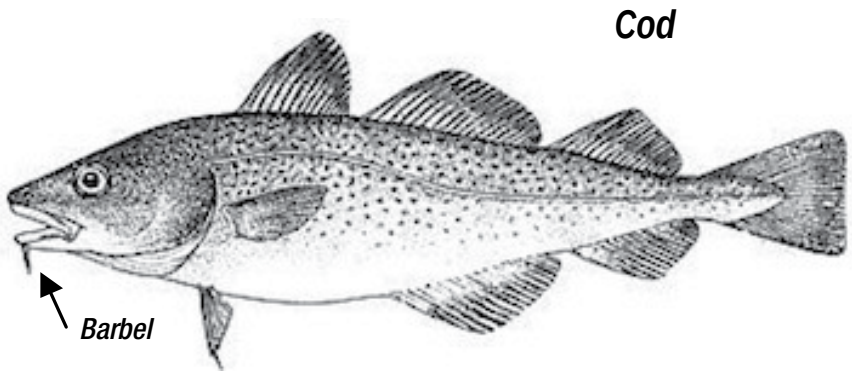


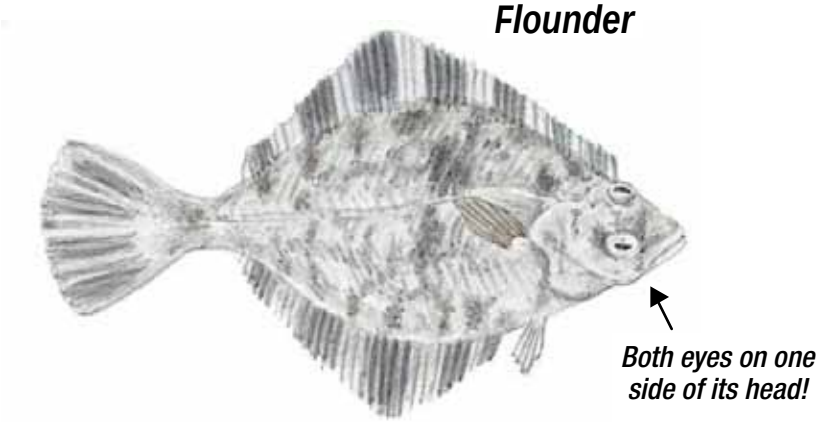


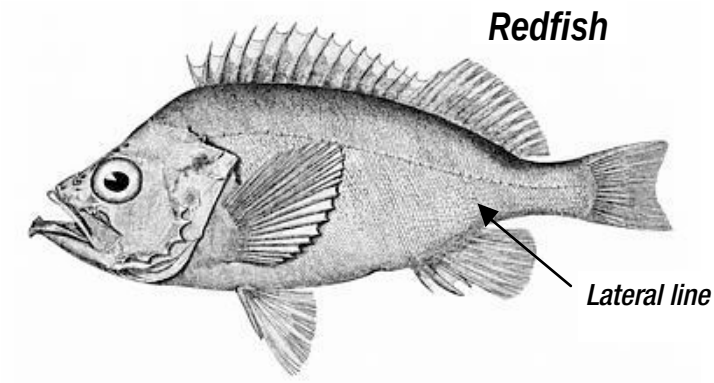
Bony Fishes

("Regular fish" have bone skeletons)

SENSES	
Sight 	Large eyes can see well. Small eyes usually cannot.
Smell 	Some fish can smell. Some cannot.
Taste 	They can taste their food – if it is in their mouth.
Touch 	Their skin can feel whatever they touch.
Hearing 	You cannot see their ears, but all fish can hear.
Movement 	Most fish have lateral lines, which can sense motion.
Electricity 	Some fish have *barbels*, which can sense electricity.





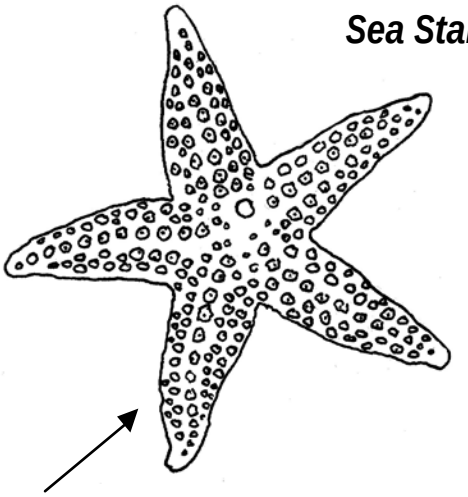


Echinoderms

(Animals with "spiny skin")

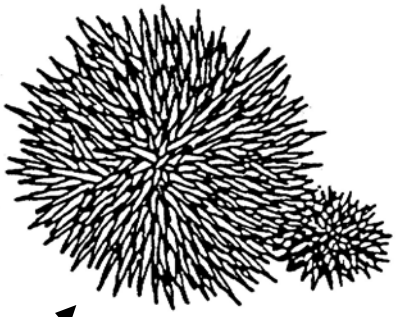
SENSES	
Sight 	Sea stars and sea urchins can sense light and dark.
Smell 	They can smell food and other things.
Touch 	Their skin can feel whatever they touch.

Sea Star



Suction cup tube feet

Sea Urchin



Suction cup tube feet

Sea Cucumber

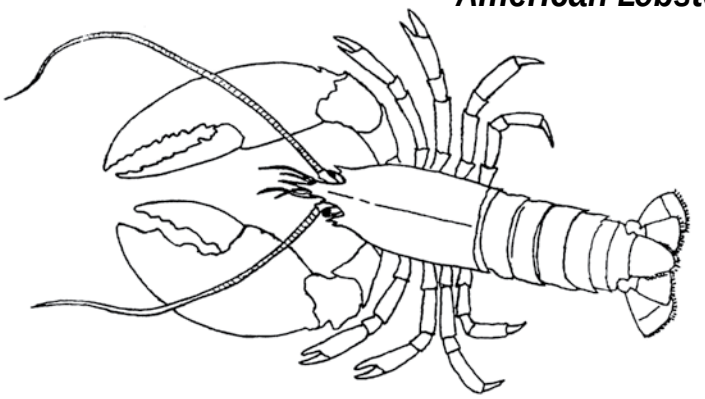
Suction cup tube feet

Crustaceans

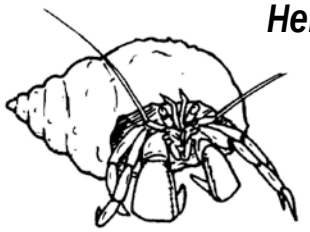
(Lobsters and crabs with many-jointed legs)

SENSES	
Sight 	Most crabs and lobsters have compound eyes, like a fy or a spider.
Smell 	They can “smell” with their short antennae.
Taste 	They can taste with their antennae—and sometimes with their feet!
Touch 	They can feel with their long antennae, and with their legs and claws.

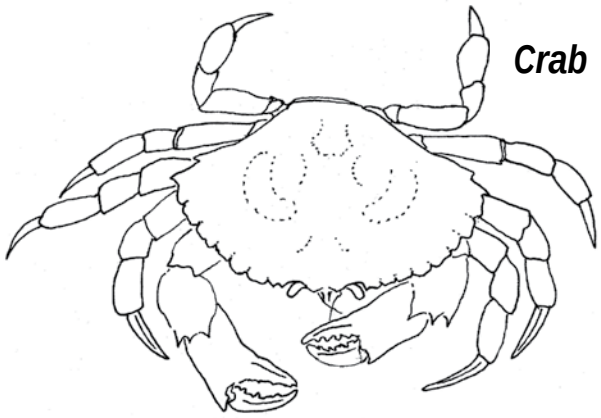
American Lobster



Hermit Crab



Crab



Cartilaginous Fishes

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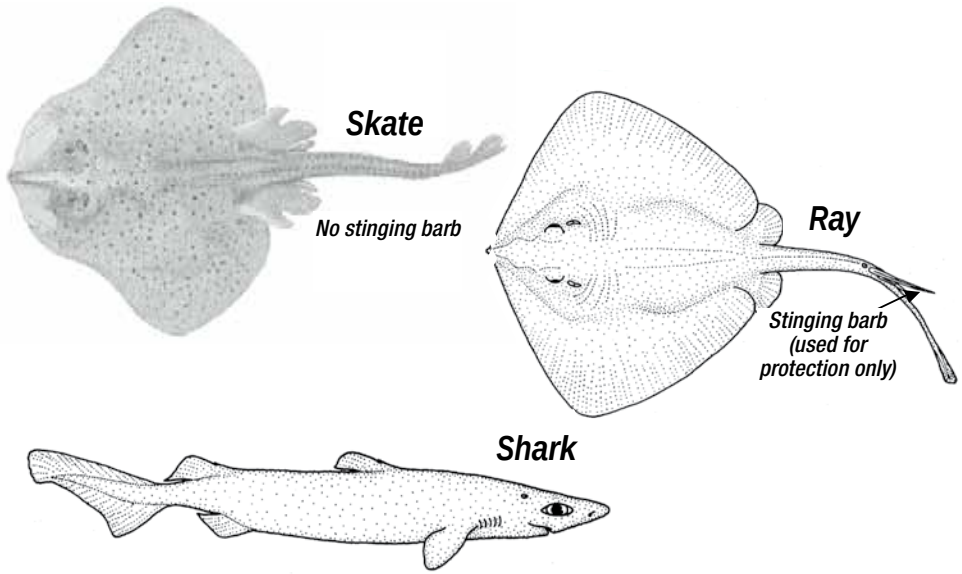

SENSES		
Sight		[illegible]
Smell		[illegible]
Taste		[illegible] their mouth.
Touch		[illegible]
Hearing		[illegible] can hear.
Movement		[illegible] sense motion.
Electricity		[illegible] *ampullae of lorenzini*, which can feel electricity.

1. What is **the name[illegible]**

[illegible] the protection[illegible]

[illegible]nd/eat food .

[illegible]ve

[illegible]

[illegible]

Always swims

[illegible]

If you have time … Draw the exhibit your animal lives in.
Label parts of the exhibit.

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