
'EARS TO YOU

FOR THE TEACHER

Discipline

Biology

Themes

Scale & Structure, Diversity

Key Concept

Seals and sea lions are mammals that have special ways of surviving in the ocean (scale & structure). Seals and sea lions have many things in common, but they are not exactly the same (diversity).

Synopsis

Students work cooperatively to teach each other about the adaptations that seals and sea lions have for living in the ocean, and about the differences between seals and sea lions. Then students participate in a "game show" to check for understanding.

Science Process Skills

communicating, comparing, organizing

Social Skills

encouraging, attentive listening

Vocabulary

seal

sea lion

blubber

haul out

flipper

pinniped

adaptation

MATERIALS

INTO the activities

- pictures of seals and sea lions
- video images of seals and sea lions (e.g., from *The Monterey Bay Aquarium: A Treasury of Ten Aquarium Exhibit Videos* "Fins & Flippers" segment)
- chart paper cut into large strips for "sentence strips"

THROUGH the activities

- one EARS TO YOU card per student (copy cards onto card stock and cut up 1/student)
- pictures and/or books about seals and sea lions

Optional

- slides or video images to illustrate a talk about seals and sea lions

INTRODUCTION

Seals, sea lions and walruses make up the suborder Pinnipedia, or "fin-footed" animals. Pinnipeds are amphibious aquatic carnivores whose webbed limbs are flippers. The first pinnipeds appeared about 25 million years ago, and evolved from a bear or weasel-like land mammal. This activity deals with seals (family Phocidae) and sea lions (family Otariidae), and not with walruses (family Odobenidae). The names "seal" and "sea lion" are often confused, especially since one group of sea lions is called the "fur seals." As a result, some biologists refer to sea lions as "eared seals," and it has become acceptable to refer to both seals and sea lions generally as seals. For the sake of clarity, we refer to them separately--seals are seals, and sea lions are not!

Seals, including harbor seals, harp seals, elephant seals, and many others, do not have ear flaps. They have only a small hole leading to the ear canal just behind each eye. Their front flippers are very short. In most species, the flippers are not used at all for walking on land, and are only used for steering underwater. The hind flippers stick straight back and are the main source of propulsion when swimming. On land, seals can only haul out on gently sloping beaches, and they move by hunching along like a caterpillar, or by wriggling back and forth. They are relatively slow and cannot climb out of the water on steep rocks or cliffs.

Sea lions, including California sea lions, Steller sea lions, fur seals and others, have external ear flaps and long hairless flippers. Sea lions can rise up on their front flippers and can rotate their hind flippers forward underneath their body. This gives them great agility. They can walk and run very quickly, and can climb out of the water even onto steep, slippery rocks and cliffs.

Underwater, sea lions swim with their front flippers, using a sculling or breaststroke motion. The name sea lion refers to the thick mane and roar of adult males in many species. In Spanish, however, they are often called *lobos marinos* or "marine wolves."

Pinnipeds can be found worldwide, but the largest populations are concentrated in temperate and polar latitudes. Since they need consistently abundant sources of food, they are often associated with areas of high productivity, such as the coast of Alta and Baja California, the Arctic and Antarctic. Pinnipeds are highly adapted for life in the ocean, but they are still tied to land for resting, escaping predators, molting, mating and giving birth to their pups. Because they do not move well on land, they are at risk from terrestrial predators when they come ashore. For this reason, they typically only haul out on islands, or on remote mainland beaches. As more and more

of these areas are developed and habitat is lost, pinnipeds become increasingly threatened.

As a group, pinnipeds eat a great diversity of prey. They eat nearly every major type of marine animal living on the continental shelf, and this is one reason for their global distribution. Most pinnipeds eat several types of fish, squid, octopuses, crabs and shrimps; but crabeater seals eat krill and leopard seals eat penguins and even other seals. All pinnipeds are adapted for swimming and diving. Seals, however, are possibly better at it than any mammals, and may dive longer and deeper than even sperm whales. Elephant seals have been recorded diving 1600 meters (or over a mile) deep, and staying down for up to two hours. They stay at sea, diving continuously for weeks or months, and spend only a few minutes at the surface between dives of 20-60 minutes.

Pinnipeds have many adaptations for surviving in the ocean. To keep warm in water that can be below freezing, they have a thick blubber layer, and a coat of fur. On land, pinnipeds are extremely gregarious, and stay warm by laying on each other. They have highly sensitive whiskers that help them to feel for their prey in the dark. Their sense of smell is keen on land and helps them to avoid predators. Pinnipeds have large eyes and see extremely well underwater, but are astigmatic in the air. It is not uncommon to find healthy seals or sea lions that are blind. Vision, then, is not their most important sense--hearing is. Humans can hear sounds in frequencies up to 20 kHz. Pinnipeds can hear, in the air, sounds up to 32 kHz, and in water up to 70 kHz. No doubt, they listen rather than look for their predators and their prey underwater. In the Antarctic, seals vocalize quite a bit on land, but in the Arctic they are completely silent, probably because of the threat of polar bears and humans. Sea lions are extremely vocal on land, and their familiar bark is the sound most associated with pinnipeds.

No species of pinniped has been spared from human exploitation. Some, such as monk seals, have been driven to the brink of extinction. Pinnipeds have been hunted for food, leather, oil and fur. They have also been hunted by fishermen who think they are responsible for depleting fish populations (of course, it is humans that do the overfishing). Pollution has also taken a significant toll on some species. Like all marine mammals, pinnipeds are near the top of their food pyramid, and thus, are important indicators of the health of their ecosystems.

INTO THE ACTIVITIES

Seal and Sea Lion Images

Show students a videotape of seals and sea lions. Turn off the narration, if there is any. Let students watch in pairs or small groups so that they can

discuss their observations as the video is running. Ask them to look for differences and similarities between different types of seals and sea lions. After the video, debrief with students. What did they see? Are all seals and sea lions alike?

My Buddy Says

Group students in pairs. Pass out pictures of seals and sea lions to students to look at and share with each other. Use the following two prompts for My Buddy Says:

1) Some of you have seen seals and sea lions many times before. Some of you may have seen them for the first time today. Tell your tape recorder where you have seen seals and sea lions, and what they were doing when you saw them.

Partners switch roles.

2) Tell your tape recorder anything you know that is special about seals and sea lions.

Sentence Strips

Pass out two large paper strips to each pair. Tell each pair to write a sentence together on each strip. The first strip should answer the question, "What do we already know about seals and sea lions?" The second strip should answer the question, "What do we want to find out about seals and sea lions?"

Tape all the "What we already know" strips on a wall. Ask students to help you arrange them into clusters or categories such as: APPEARANCE, SWIMMING, MAKING NOISE, etc., Can students make up their own categories? Do the same for the "What we want to find out" strips.

THROUGH THE ACTIVITIES

Slideshow or Video

Present some new content to students using the information from FOR THE TEACHER as your guide. Cover the differences between seals and sea lions and some pinniped adaptations.

The Jigsaw

1. Arrange students in groups of four. Pass out a set of *Seals and Sea Lions* cards or *Pinniped Adaptation* cards to each group.

2. Tell students they are to: 1) divide the cards among themselves; 2) learn the information on their card; and 3) teach, in their own words, the most important thing on their card to the rest of the group. They will have 15-30

minutes to teach each other, and by that time everyone in each group will be responsible for knowing the most important information on ALL the cards. Students cannot trade cards, and they cannot read their cards aloud to one another. Emphasize how the game show will work so that students will know the importance of teaching the information to their "colleagues." Tell students you will be looking for and awarding group points for encouraging and/or attentive listening. These points will be added to their team's game show total.

The Game Show

1. Have the students pass in the cards and stop sharing information. Arrange the class so that all the groups with *Seals and Sea Lions* cards are on one side of the room and those with *Pinniped Adaptation* cards on the other. For the Game show, all the Seals and Sea Lions groups will now work together on the same team and so will the Pinniped Adaptations groups. Everyone in the Adaptation group should be able to describe several pinniped adaptations, and everyone in the Seals and Sea Lions group should be able to describe several bits of information from their cards.

2. Make a large chart with two columns, labeled "Pinniped Adaptations" and "Seals & Sea Lions." As answers are given by each team, record them on the chart along with the awarded points and the initials of the student giving the correct answer. You can use labeled sketches or sentences.

3. Use Numbered Heads Together so that all students in both groups have a number. Begin with the Adaptations Group. Ask the group to describe a particular adaptation, e.g., "Describe an adaptation that helps seals and sea lions to swim very fast." The group can discuss their answer for one minute. After you tell them to stop discussing, repeat the question, call a number or pick one out of a "hat," announce it to the class, and the student with that number then stands and gives the answer.

a. If that student can describe a "bit" of information that completely answers the question, her/his group gets 5 points. (A 5 point answer to the above question might be, "Seals have flippers to help them swim fast. Their flippers are like our arms and legs, but they have skin between their fingers and toes. This makes them work like a paddle in the water.")

b. If the student gives a partial answer that is not complete (you can decide how complete it needs to be), pick another number and call on another member of that same group. If the second student can complete the answer, that entire group gets 3 points.

c. If that student is unable to complete the answer, pick another number and call on another student from that group. If that student can give an answer, then the entire side gets 1 point.

d. If that student is unable to answer, it becomes the Seal & Sea Lion Group's turn. Ask them a question and proceed as above.

Each side gets three chances to give a complete answer and then it is the other side's turn. Play as many rounds as you have time for.

4. At the end of the game show, play a "BONUS ROUND". Put all the Adaptation and Seal and Sea Lion "bits" together in a hat. Volunteer students can draw one and act it out as a charade for their teammates. If they guess correctly what information is on the card within 2 minutes, they are awarded another 6 points. You might also play a bonus round by posing a more difficult question to both groups.

5. Remember to add in the points for social skills. You might want to provide the "winning" group with a special reward or prize--e.g., 10 extra minutes of recess. Or tell each team that if they score over a certain amount they will get a reward and that if the two teams' combined score is twice that amount or more, they will get an additional reward.

6. You can have students switch card sets and do the activity again so that every group studies both adaptations and seals and sea lions.

Seal & Sea Lion Races

Based on what they have learned and seen in the video, have students try to "walk" and "swim" like seals and sea lions. Once they have had some time to practice, create a seal team and a sea lion team. Hold a series of races, some on land and some "underwater." Students can make simple costumes, and act out some of the adaptations they have learned.

Portfolio Assessment

Transcribe individual students' answers from the game show for their portfolios. Have students make labeled drawings showing all the adaptations or differences between seals and sea lions they remember.

BEYOND THE ACTIVITIES

Mini-Drama/Genre Transformation

Read to the class a short book or story about seals and/or sea lions. Here are some suggestions:

Elephant Seal Island by Evelyn Shaw, Harper & Row, 1978.

Follow Me! (told with pictures only) by Nancy Tafuri, Greenwillow Books, 1990.

Tobias Goes Seal Hunting by Ole Hertz, Carolrhoda Books, 1984.

The Seal Mother by Mordicai Gerstein, Dial Books, 1986.

Leones Marinos by Sarah Palmer & Lois Sands, Rourke Enterprises, 1991.

Focas by The Cousteau Society, Saber, 1991.

Divide students back into their groups of four. Pass out a portion of the story written on a card or piece of paper to each group. Have each group read their portion and then quickly design a two or three minute skit to act it out. They

can create "costumes" using anything they can find in the room (jackets, construction paper, etc.). After fifteen minutes or so for "rehearsals" have the groups perform their skits in rapid succession in the order that they appear in the book.

Group Story Write

Refer back to the clusters of sentence strips that students made earlier. Let each group of four students choose a cluster (Swimming, Appearance, etc.). Have them write 2-3 new sentences to add to the cluster and then use all of the sentences to create a group story.

Group Poetry Write

Have students brainstorm all the words they can think of about seals and sea lions, and about how they use the beach. Write each word on a card and either tape them to a wall or put them on a chart with pockets. Have the group rearrange these words to create a class poem or story. After you have completed one as a class, send students back into their cooperative groups of four. Have each group create its own poem or story and present it to the class.

EARS TO YOU

Seals & Sea Lions Cards Set A

Directions: (Read this to the group) Seals and sea lions are very closely related. They have many things in common. They are not exactly the same, though. Read your card. Teach the most important thing on your card to your group. Try to learn many things that make seals different from sea lions.

Card 1: SEA LION EARS

Seals and **sea lions** both have **ears**. Their ears do not look the same, though. **Sea lions** have **little ear flaps**. They stick out from the sides of their heads--a little like yours! Ask your group if anyone knows about **seal ears**.

Card 2: SEAL EARS

Seals and **sea lions** both have **ears**. Their ears do not look the same, though. **Seal** ears look like **small holes**. Seals do not have any ear flaps. Ask your group if anyone knows about **sea lion ears**.

Card 3: SEA LION FLIPPERS

Seals and **sea lions** both have **flippers**. Their flippers are not the same, though. **Sea lions** have long **flippers** that are very **strong**. On the beach, **sea lions** can **walk on their flippers**, a little like a dog.

Card 4: SEAL FLIPPERS

Seals and **sea lions** both have **flippers**. Their flippers are not the same, though. **Seals** have **short flippers**. On the beach, seals **cannot walk** on their flippers at all. They **scoot along like an inchworm** or they wiggle from side to side.

Seals & Sea Lions Cards Set B

Directions: (Read this to the group.) Seals and sea lions are very closely related. They have many things in common. They are not exactly the same, though. Read your card. Teach the most important thing on your card to your group. Try to learn many things that make seals different from sea lions.

Card 1: SEA LION FLIPPERS

Seals and **sea lions** both have **flippers**. Their flippers are not the same, though. **Sea lions** have **long front flippers** that are very **strong**. They use their long **front flippers** for swimming very fast underwater.

Card 2: SEAL FLIPPERS

In the ocean, **seals** use their **hind flippers to swim very fast**. They only use their **front flippers** to **turn** right or left. Ask your group if anyone knows about **sea lion flippers**.

Card 3: SEA LION NOISES

Most sea lions make very loud noises when they are on land. They make a loud barking sound. The barking scares other sea lions away. Sea lions make very few sounds underwater.

Card 4: SEAL NOISES

Most seals do not make much noise when they are on land. They make many sounds underwater, though. Sometimes the sounds are used by a mother and pup to find each other.

Seals & Sea Lions Cards Set C

Directions: (Read this to the group) Seals and sea lions are very closely related. They have many things in common. They are not exactly the same, though. Read your card. Teach the most important thing on your card to your group. Try to learn many things that make seals different from sea lions.

Card 1: SEALS ON LAND

Seals and **sea lions** both spend some time **on land**. They use different parts of the seashore, though. **Seals** have very **short flippers**. They cannot walk or climb onto steep rocks or cliffs.

Card 2: SEA LIONS ON LAND

Seals and **sea lions** each use different parts of the seashore. **Sea lions** have **long, powerful flippers**. They can **walk and climb** onto steep rocks and cliffs. They can also walk and run on sandy beaches.

Card 3: SEALS IN THE OCEAN

Seals and **sea lions** spend most of their lives **swimming in the ocean**. They do not both swim the same way, though. **Seals** spend most of their time holding their breath underwater. They **dive very deep**. Elephant seals can dive over a mile deep.

Card 4: SEA LIONS IN THE OCEAN

Seals and **sea lions** do not swim the same way. Sea lions spend most of their time swimming and floating near the surface of the ocean. They do not dive very deep.

Seals & Sea Lions Cards Set D

Directions: (Read this to the group) Seals and sea lions are very closely related. They have many things in common. They are not exactly the same, though. Read your card. Teach the most important thing on your card to your group. Try to learn many things that make seals different from sea lions.

Card 1: SEALS ON LAND

Seals have very **short flippers**. When they are on land they **crawl** on their bellies **like an inchworm**. They can only come ashore on **soft sandy beaches** or on flat rocks. They are very slow on land.

Card 2: SEA LIONS ON LAND

Sea lions move **very fast on land**. They have **long flippers** that help them to run almost like a dog. Can you walk or run like a sea lion?

Card 3: SEALS IN THE OCEAN

Seals do **not spend much time** at the **surface** of the ocean. They spend **most of their time underwater**. Some elephant seals can hold their breath for up to 2 hours. Ask your partners if they know anything about **sea lions in the ocean**.

Card 4: SEA LIONS IN THE OCEAN

Sea lions cannot hold their breath as long as seals can. Sea lions usually stay underwater for less than 10 minutes. Can you hold your breath as long as a sea lion?

Pinniped Adaptation Cards Set A

Directions: (Read this to the group) Seals and sea lions have many special body parts and behaviors that help them to survive in the ocean. Read your card. Teach the most important thing on your card to your group. Try to learn all the adaptations that seals and sea lions have for life at sea.

Card 1: FLIPPERS

The word for seals and sea lions is **Pinniped**. It means, "**fin-footed**." Pinnipeds have **legs** that are shaped like **fins or flippers**. The bones in their flippers look like the bones in your arm and hand.

Card 2: FEEDING

Seals and sea lions get all their **food** from the **ocean**. They eat almost everything that lives in the ocean. Some eat **fish**, some eat **squid**, some eat **shrimp**, some eat **penguins**, and some even eat **other seals!**

Card 3: STAYING WARM

The **ocean** can be very **cold**. Most mammals would freeze to death in the ocean. **Seals** and **sea lions** have a thick layer of **blubber** and a **coat of fur** all over their body. It keeps them **warm**, even in the **coldest water**.

Card 4: POLLUTION

Seals and **sea lions** are adapted to survive in the **ocean**. They **cannot survive pollution**, though. People pour **poisons**, **garbage** and **sewage** into the ocean. These things can **kill seals and sea lions**.

Pinniped Adaptation Cards Set B

Directions: (Read this to the group) Seals and sea lions have many special body parts and behaviors that help them to survive in the ocean. Read your card. Teach the most important thing on your card to your group. Try to learn all the adaptations that seals and sea lions have for life at sea.

Card 1: FLIPPERS

Seals and sea lions need to **swim very fast** so that they can catch fish and squid to eat. Their **flippers** are like **long feet with webbed toes**. Seals and sea lions use their flippers like **paddles** in the water.

Card 2: FEEDING

To catch their lunch, seals and sea lions **swim fast** and **hold their breath** for a long time. They have **powerful jaws** with sharp teeth. They can also **hear and see very well underwater**.

Card 3: STAYING WARM

When seals and sea lions are **on land**, it can be very **cold**. If it is windy, and waves are splashing on them, seals and sea lions get chilly. So, they **lay on top of each other** in big piles to stay warm. Seals and sea lions love to be touching each other when it is cold.

Card 4: HAULING OUT

Sharks and **orcas** like to eat seals and sea lions. Seals and sea lions can **escape by hauling out** on a beach. Seals and sea lions are not very fast on land. So, they only **haul out on beaches** that are hard for people, bears and other land animals to get to.

Pinniped Adaptation Cards Set C

Directions: (Read this to the group) Seals and sea lions have many special body parts and behaviors that help them to survive in the ocean. Read your card. Teach the most important thing on your card to your group. Try to learn all the adaptations that seals and sea lions have for life at sea.

Card 1: HEARING

Seals and sea lions have **great ears!** Hearing is their most important sense. They can hear much **better than people** on land and underwater. Seals and sea lions listen for **sharks or orcas** that might be chasing them. They also listen for fish they want to eat.

Card 2: SEEING

Seals and **sea lions** spend most of their time underwater. They have **eyes** that are specially **adapted to see very well underwater**. When they are **on land, though, they have blurry vision** and do not see as well.

Card 3: TOUCHING

Seals and **sea lions** have **long, sensitive whiskers** on their face. Underwater, where it is too dark to see, seals and sea lions **chase fish** by **feeling for them** with their **whiskers**.

Card 4: HEARING

Many seal and sea lion mothers give birth to their pups at the same time. Sometimes pups have trouble finding their mother. **If they are lost**, they can **find their mom** by **listening!** Each mother and pup have a **different call**. They get to know each other's voices.

Pinniped Adaptation Cards Set D

Directions: (Read this to the group) Seals and sea lions have many special body parts and behaviors that help them to survive in the ocean. Read your card. Teach the most important thing on your card to your group. Try to learn all the adaptations that seals and sea lions have for life at sea.

Card 1: HEARING

Seals and sea lions have great ears. On land, their ears warn them about **bears or people**. They also **listen** for animals that they want to **eat**. Their **ears** are **especially important underwater** where it is **too dark** to see.

Card 2: SEEING

Many **blind seals and sea lions** have **survived** in the ocean. Seeing must not be a very important sense to a seal or sea lion. Ask your partners if they know what other senses might be important to a seal or sea lion.

Card 3: STAYING WARM

Some **seals and sea lions** have very **thick, soft fur**. The fur keeps them **warm**. The fur can also keep people warm. Seals and sea lions have been **hunted by people** all over the world **for their fur coats**.

Card 4: HAULING OUT

Seals and sea lions get tired from all the swimming they do. They **haul out**, or come ashore, to **rest** on sandy beaches and rocky seashores. They also give **birth to their pups** while they are hauled out.