



# *Ocean Discovery*

## FIFTH GRADE

Our Ocean Discovery field trip program helps to meet multiple Florida Standards.  
Please see Table of Contents for specific standards.

# Ocean Discovery 5th Grade Activities

## Table of Contents

### Pre Field Trip Activities

#### **A Comparison of Predators**

Science (Comparative Adaptations, Physical Structures)

Standards: SC.5.L.14.2, SC.5.L.17.1

- Students will use the provided information and images to compare and contrast physical adaptations of killer whales and sharks.

#### **That's a Whale of a Big Meal!**

Mathematics (Fractions)

Standards: MAFS.5.NF.1.2, MAFS.5.NF.2.3

- Students will use the provided information to complete a data chart and analyze the dietary intake of the whales at Shamu® stadium using calculations with fractions.

#### **What about Whales?**

English Language Arts (Various Standards)/ Science (Adaptations, Physical Structures)

Standards: LAFS.5.L.1.1, LAFS.5.L.1.2, LAFS.5.L.2.3, LAFS.5.L.3.6, LAFS.5.RF.4.4, LAFS.5.W.1.2, LAFS.5.W.2.4, SC.5.L.14.2, SC.5.L.17.1

- Students will use the provided information and illustrations to learn about four species of whales. They write a short paragraph about each whale containing at least three facts about the species. They are then asked to choose two of the species to compare and contrast.

### Field Trip Activities

#### **Pacific Point Preserve®: Which One is Which?**

Science (Comparative Adaptations)

Standards: SC.5.L.14.2, SC.5.L.17.1

- Teachers and/or chaperones will share the provided information while at Pacific Point Preserve. The information covers the distributions and adaptations of the seals and sea lions, as well as, provides images to identify differences between seals and sea lions at Pacific Point Preserve.

#### **Pole to Pole: Arctic vs. Antarctic Adaptations**

Science (Adaptation Comparison, Environmental Changes)

Standards: SC.5.L.15.1, SC.5.L.17.1

- Teachers and/or chaperones will share the provided information about the habitats and the adaptations of animals in the polar regions with their students at Wild Arctic® and Antarctica: Empire of the Penguin®.

#### **Shark Encounter®: Food for Thought**

Science (Adaptations and Eco-Diversity)

Standards: SC.5.L.15.1, SC.5.L.17.1

- Teachers and/or chaperones will share the provided information about barracudas, sharks and lionfish with their students while visiting Shark Encounter.

## **Shark Encounter®: A Break for Elasmobranchs**

Science (Scientific Investigations, Adaptation Comparison)

Standards: SC.5.L.17.1, SC.5.N.1.1, SC.5.N.1.2, SC.5.N.1.3, SC.5.N.1.5, SC.5.N.1.6, SC.5.N.2.1, SC.5.N.2.2

- At Shark Encounter, students conduct an investigational count of the sharks inside the exhibit. They review the investigation and explain why multiple, repeatable investigations are important to research studies.

## **TurtleTrek®: The Real Deal**

Science (Importance of Scientific Inquiry)

Standards: SC.5.L.17.1, SC.5.N.1.3, SC.5.N.1.6, SC.5.N.2.1, SC.5.N.2.2

- Teachers and/or chaperones will share the provided information with the students while at TurtleTrek. The information covers the common misconceptions behind manatees and sea turtles and the importance of scientific research on conservation.

## **Whales and Sharks: Shark and Killer Whale Adaptations**

Science (Comparative Anatomy, Adaptations, Environment Changes)

Standards: SC.5.L.14.2, SC.5.L.15.1, SC.5.L.17.1

- Teachers and/or chaperones will share the provided information with their students comparing killer whales and sharks adaptations while visiting the Shark Encounter and Shamu® Stadium.

## **Post Field Trip Activities**

### **A Call to ACTION!**

Visual Arts (Design to Create Awareness, Organizational Skills, Skill Development)

Standards: VA.5.F.3.1, VA.5.F.3.2, VA.5.F.3.4, VA.5.O.1.1, VA.5.O.1.2, VA.5.O.2.2, VA.5.S.2.3, VA.5.S.3.1, VA.5.S.3.3, VA.5.S.3.4

- Students are tasked with using the provided space to create a sign that could be posted at a beach, lake or park to encourage visitors to clean up after themselves. They are encouraged to consider the “who, what and why” of the assignment as they create their sign.

### **Manatees to Mermaids: How Myths are Made**

English Language Arts (Reading and Writing Comprehension)

Standards: LAFS.5.L.1.1, LAFS.5.L.1.2, LAFS.5.L.2.3, LAFS.5.L.3.4, LAFS.5.L.3.5, LAFS.5.L.3.6, LAFS.5.RF.3.3, LAFS.5.RF.4.4, LAFS.5.W.1.3, LAFS.5.W.2.4

- Students will read a short passage about the legend of the mermaid and answer some reading comprehension questions. They will then write a short legend of their own.

### **The Legend of the Killer Whale**

English Language Arts (Reading and Writing Comprehension)

Standards: LAFS.5.L.1.1, LAFS.5.L.1.2, LAFS.5.L.2.3, LAFS.5.L.3.4, LAFS.5.L.3.5, LAFS.5.L.3.6, LAFS.5.RF.3.3, LAFS.5.RF.4.4, LAFS.5.W.1.3, LAFS.5.W.2.4

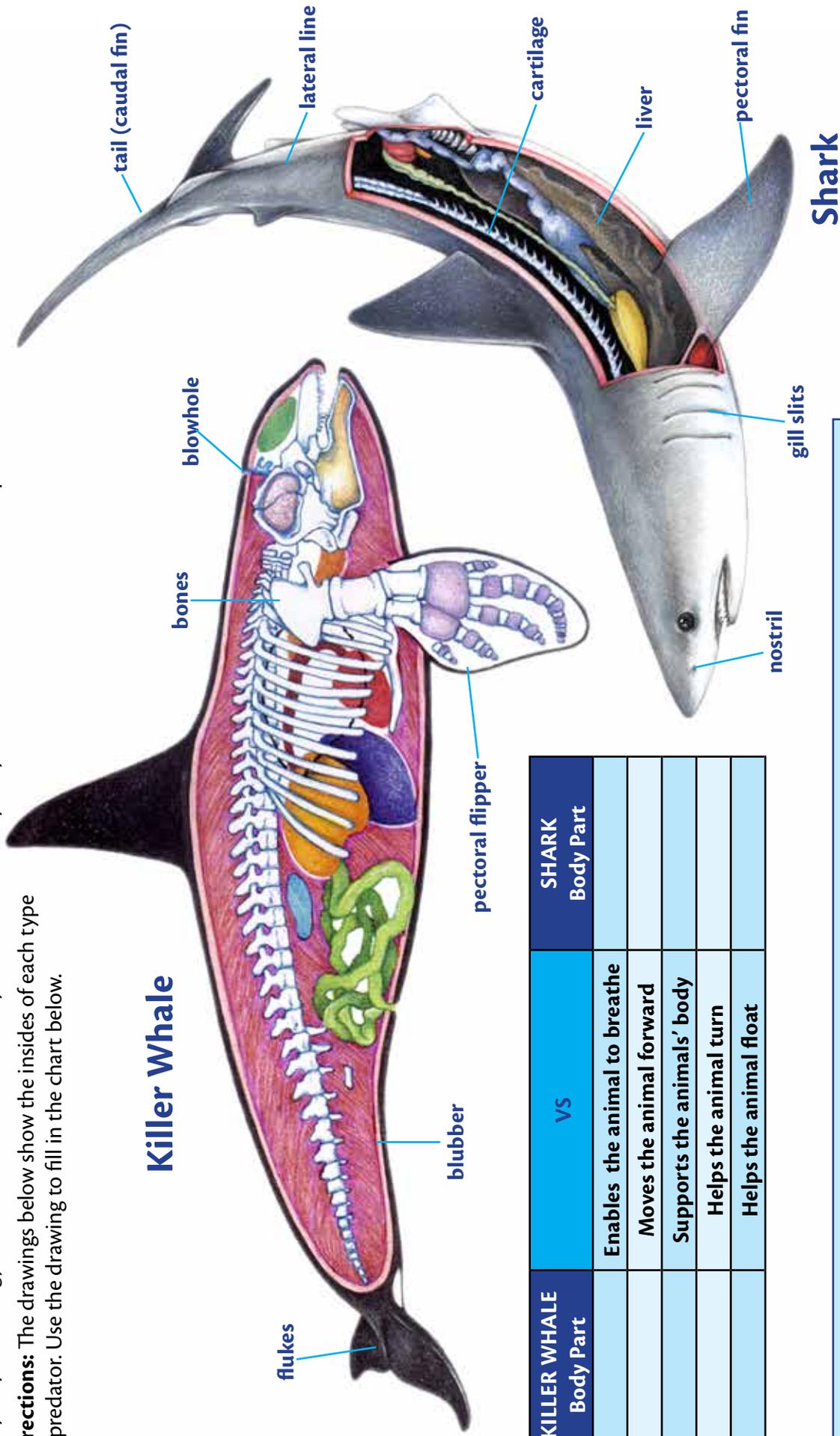
- Students will read a short story based on the legend of the killer whale as told by the native cultures of the Pacific Northwest and answer some reading comprehension questions. They will then write a short story of their own.

# A Comparison of Predators

Name: \_\_\_\_\_

Sharks and killer whales are both well suited for life in the ocean. Killer whales are the top predator of the ocean and can be found all around the world. Their thick layer of blubber provides them with buoyancy, energy and temperature control. Great white sharks are one of the best known types of shark in the ocean and are also considered a top predator. Unlike the killer whale, great white sharks are not found in all of the oceans. Sharks have a fatty liver that helps with buoyancy and energy, but without blubber or a way to warm their body, they are unable to live in the cold polar waters.

**Directions:** The drawings below show the insides of each type of predator. Use the drawing to fill in the chart below.



KILLER WHALE Body Part	VS	SHARK Body Part
	Enables the animal to breathe	
	Moves the animal forward	
	Supports the animals' body	
	Helps the animal turn	
	Helps the animal float	

## Deeper Depths

Write an essay comparing and contrasting the killer whale and shark. Use at least 3 similarities and 3 differences.

# That's A Whale of a Big Meal!

Name: \_\_\_\_\_

**Directions:** Read about the killer whales below. Then answer the questions.

The killer whales at Shamu® Stadium eat over 1000 lbs of fish every day depending on the number of whales and their dietary needs. With that amount of food being fed out each day, the food is divided into individual buckets. The buckets are kept refrigerated so that the food stays fresh throughout the day. Each bucket contains about 30lbs of fish. At the end of each day, any food leftover is weighed, noted in a logbook and disposed of. The buckets are then cleaned and ready to be refilled the next day with fresh fish. Most of the time, the whales eat all of the prepared fish. Other days, there may be some buckets leftover.

- As an example, use this information to complete the chart below and record the number of buckets left at the end of each day.

Day of the Week	Pounds of Food Leftover	Number of Buckets Leftover
Monday	00	
Tuesday	30	
Wednesday	60	
Thursday	00	
Friday	30	
Saturday	30	
Sunday	00	

- Each day there are 35 buckets of fish prepared for Shamu Stadium. Using the chart above, write the fraction of how many buckets of food the whales ate for each day.

Example:	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
35/35							

- You're almost done! Figure out the fraction of buckets of fish that were leftover at the end of the whole week!

- Alright, last question! Let's say there are 6 whales at Shamu stadium. Since each whale is a different size, and eats a different amount of food. Below is the average amount of food each whale eats every day. Write down how the buckets of fish should be divided among whales every day.

Whale 1	Whale 2	Whale 3	Whale 4	Whale 5	Whale 6
150lbs	210lbs	120lbs	150lbs	180lbs	120lbs

## Deeper Depths

Can you estimate the whales size from largest to smallest based on the given information? Why?

# What About Whales?

Name: \_\_\_\_\_

Around the world, there are over 80 types of whales. Blue whales are the largest species of whale while vaquitas are the smallest species. All whales have some things that are the same and some things that are different.

**Directions:** Read about the whales below. Write three facts about each whale in the space given. Be sure to use complete sentences and proper grammar.

## Killer Whale (*Orcinus orca*)

- Females - about 15 feet long.
- Males - about 25 feet long.
- Live in all of the oceans around the world.
- Eat fish, marine mammals, sharks and squids.
- Fun Fact - Males are bigger but females lead the group or "pod".



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## Beluga Whale (*Delphinapterus leucas*)

- Beluga whales - about 10 feet long.
- Males - usually longer.
- Only live in the ocean around the North Pole.
- Eat fish, squid and crabs.
- Fun Fact - Have a dorsal ridge instead of a dorsal fin.



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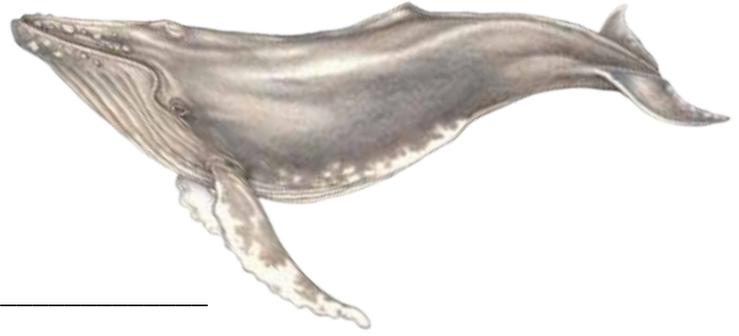
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# What About Whales? (continued) Name: \_\_\_\_\_

## Humpback Whale (*Megaptera novaeangliae*)

- Grow up to 50 feet long.
- Females - usually bigger.
- Live in all oceans around the world.
- Eat small shrimp and very small fish.
- Fun Fact - Sing to each other with special sounds



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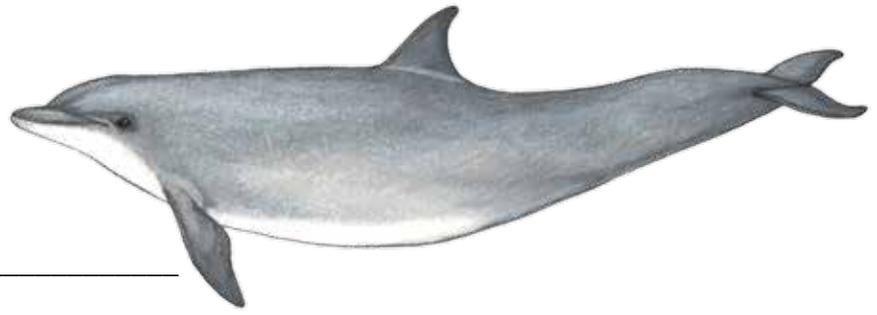
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## Bottlenose Dolphins (*Tursiops truncatus*)

- Grow up to 8 feet long.
- Males - usually bigger than females.
- Live in warm waters around the world.
- Usually eat fish and squid.
- Fun Fact - Jump up to 16 feet in the air.



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**Deeper Depths:** On a new piece of paper, pick two of the whales to compare and contrast. Write about three ways they are the same and three ways they are different. Hint: You can use the pictures next to each whale to help you.

# Pacific Point Preserve®: Which One is Which?

**Objective:** Students will be introduced to the methods scientists use to classify animals and apply that knowledge to identify harbor seals and California sea lions.

**Teacher and Chaperone Corner:** Pacific Point Preserve is home to harbor seals and sea lions. Seals and sea lions are in the Pinniped order which they share with their cousin, the walrus. Pinnipeds are characterized by feather shaped flippers, vibrissae (whiskers) and a semiaquatic lifestyle. Despite these similarities, there are many distinct differences physically, socially and behaviorally that separate the pinnipeds into three distinct families: otariidae (eared seals), phocidae (true seals) and odobenidae (walruses). Students are welcome to purchase fish at the feeder booth to feed the seals and sea lions in this habitat. **SeaWorld® Educators are located at Pacific Point Preserve if you would like additional information.**

## Share this information with your students.

- Seals and sea lions are in the same scientific order Pinnipedia. Pinnipedia means “feather footed” and refers to the shape of the flippers on the seals and sea lions. They also share this characteristic with a third member of the Pinnipedia order, the walrus. Despite this similarity, each of these animals is uniquely adapted to a specific habitat.

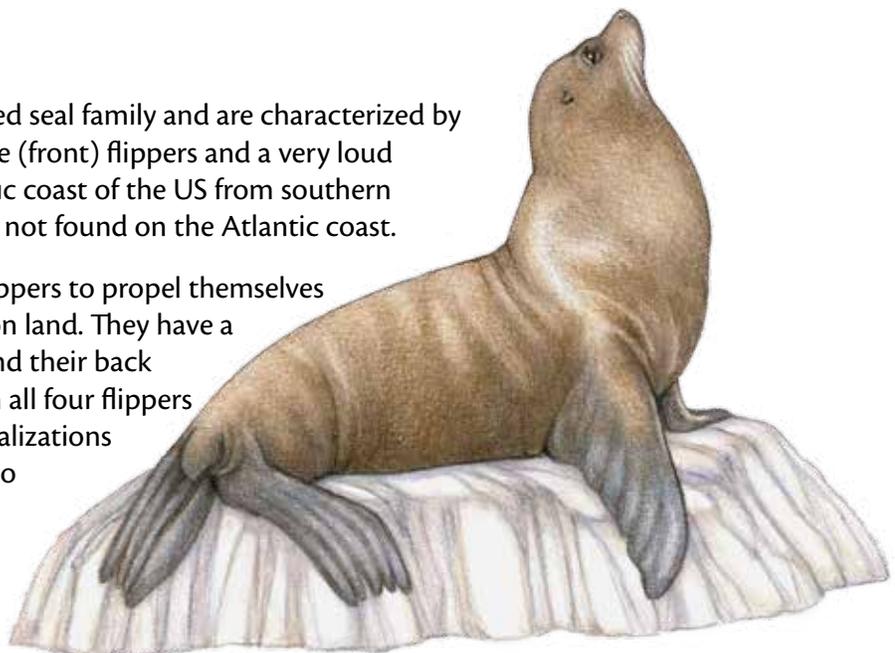
### Harbor Seals (*Phoca vitulina*)

- Harbor seals, also known as the common seal, are found in most temperate to sub-Arctic waters around the world. In the United States, they can be found along the Pacific coast from California to Washington State and occasionally on the Atlantic coast from northern Georgia through Maine. They are more commonly found in cooler waters. They are well insulated with a thick coat of blubber and small extremities.
- Harbor seals spend most of their time in the water. Their short flippers make it difficult for them to move around on land. The spotted coloration of their body helps them to blend in to the flickering sunlight and hide along the rocky bottoms they commonly visit. They also have the ability to rest or sleep underwater and can hold their breath for around 20 minutes.



### California Sea Lion (*Zalophus californianus*)

- California sea lions are a member of the eared seal family and are characterized by having small earflaps on their head, long fore (front) flippers and a very loud vocalization. They are found along the Pacific coast of the US from southern California up to Washington State. They are not found on the Atlantic coast.
- California sea lions rely on their long fore flippers to propel themselves through the water and for moving around on land. They have a flexible pelvic girdle that allows them to bend their back flippers under their body to walk around on all four flippers as they navigate the shoreline. The loud vocalizations and the earflaps of the sea lion allow them to communicate over long distances and help to identify mothers to pups during the breeding season.



# Pole to Pole: Arctic vs. Antarctic Adaptations

**Objective:** Students will compare and contrast the environmental differences between the Arctic and Antarctic environments and the adaptations of the plants and animals that survive in both habitats.

**Teacher and Chaperone Corner: Wild Arctic®** is located next to Shamu® stadium and is home to beluga whales, harbor seals and walrus. Entry to Wild Arctic may be gained in one of two ways. Students who are at least 42 inches (106.68cm) in height may ride White Thunder, a helicopter flight simulation ride. Students who are uncomfortable or unable to experience the ride may enter the attraction via the Walking entrance.

**Antarctica: Empire of the Penguin®** is located next to Journey to Atlantis® and Kraken®. There are three modes of entry through the same line. Students who are at least 42 inches (106.68cm) may ride the Wild experience. Students who are uncomfortable or unable to ride the Wild experience may enter via the Mild experience or the Non-Riders entrance. **SeaWorld® Educators are located in the penguin viewing area near the exit to the ride as well as the underwater viewing area if you would like additional information.**

## Share this information with your students.

### The Antarctic

- Antarctica is a continent surrounded by ocean. Other than scientists living at research stations, no humans make their homes on Antarctica.
- Antarctica is the coldest, driest and windiest place on Earth. Average winter time temperature is -76°F with the coldest recorded temperature verified as -129°F in July 1983. In August 2010, a temperature of -135.8°F was detected by satellite on Antarctica. Summertime temperatures never get above freezing.
- Annual precipitation is less than 6 inches of snow or rainfall each year and wind speeds up to almost 200 mph have been recorded in Antarctica.
- Because of the harsh climate, the largest animal that lives on the continent year round is a tiny insect (a wingless midge ½ inch long). Most animals that we think about when we picture Antarctica use it as a nesting and rest location before returning, like penguins, back to the ocean.
- There are 18 different species of penguins. All penguins are found in the Southern Hemisphere, but only 4 actually live in the Antarctic area: Emperor, Adélie, Gentoo and Chinstrap penguins. Other penguin species live in areas around Australia, New Zealand, South Africa, South America, the Galapagos Islands and other sub-Antarctic islands.
- Most animals that live in the frigid waters around Antarctica have a thick layer of blubber to help keep them warm. Some Antarctic animals, like sea stars, have a type of biological antifreeze that keeps them from freezing solid in the icy water.
- Despite being so far away from most populated areas on the planet, Antarctica is still affected by human pollution and overfishing. Practice earth-friendly actions like using a reusable water bottle and walking or biking, instead of driving short distances to protect our polar populations.

# Pole to Pole: Arctic vs. Antarctic Adaptations

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## Share this information with your students.

### The Arctic

- The Arctic is the area around the North Pole at the top of the Earth. It is actually an ocean surrounded by landmasses. The average temperature varies from summer to winter. Summertime temperatures can reach as high as 90°F whereas winter temperatures could reach as low as -90°F.
- During the Arctic summer, the sun may never set. The plants that survive the winter take advantage of this and grow as quickly as possible during the summer season. This is also true for any producers (the base of the food web) that live in the ocean as well.
- Animals take advantage of this growing period to fatten up after a long winter with potentially very little to eat.
- Animals in this region that live near the poles show adaptations that follow **Allen's Rule**. Allen's Rule states that the farther north or south towards the poles an animal lives, the smaller its extremities will be. (e.g. Arctic rabbits have very small ears compared to rabbits that live in the hot desert.)
- Animals that live in the Arctic environment must be able to survive a wide range of conditions and be able to move around or migrate as necessary to find food and mates.
- Beluga whales try to stay ahead of the ice sheets each winter to avoid becoming trapped in the ice. While a beluga can use its **dorsal ridge** to break ice up to 6 inches thick, the ice floes in the Arctic winter can potentially be much thicker.
- Walruses have a thick layer of insulating fat called blubber. Their blood vessels can **dilate** (open up) or **constrict** (close down) in order to maintain a proper body temperature without getting too hot or too cold.
- Some animals will display long periods of **lethargy**, or resting periods, as a way of conserving energy. By not moving unless they have to, they don't burn as many calories and are able to go longer periods between hunting for food. This calorie conservation method is important in the winter time when there may not be a lot of food to be found.

# Shark Encounter®: Food for Thought

**Objective:** Students will discover some of the adaptations of predators and the dangers of non-native animals in a habitat where they don't belong.

**Teacher and Chaperone Corner:** At Shark Encounter, students will encounter some of the most mysterious and misunderstood animals of the sea. Barracudas and sharks have frightening reputations, but they play an important role in the ecosystem. Lionfish are beautiful, but deadly and don't belong in the Florida environment.

The Shark Shallows, located near the front of the building, is an excellent place to observe sharks and other species. This area also provides a convenient meeting spot for your group for further discussion or instruction.

## Share this information with your students.

- Every plant, animal and other organism on the planet is uniquely adapted to the habitat in which it belongs. For example, humans are well adapted with binocular vision (able to tell how far away things are from us), opposable thumbs (useful for grabbing objects) and the ability to talk (helpful to tell others about food or danger).
- Barracudas are adapted as **ambush predators**. They sneak up on their prey and attack quickly before the other animal can escape. Their long, narrow body shape helps them to move quickly through the water. The silvery color blends well with the flickering light around a coral reef. The sharp pointy teeth quickly catch and hold onto slippery fish.
- Barracudas occasionally swim alongside SCUBA divers and swimmers so that the prey they are sneaking up on doesn't see them. This might be a little scary for the diver but barracudas do not eat people. They may occasionally bite a person if we are acting aggressively or if they mistake us for food.
- Many ambush predators are attracted to shiny objects like rings, sparkles and other jewelry. If you're nervous about barracudas or sharks, leave the sparkly objects on the shore. Those glittering jewels and shiny metals can be mistaken for the scales of an injured fish!
- Lionfish are native to the Indo-Pacific. They are normally found in water around Indonesia, Southeast Asia and Australia. Unfortunately, they have found their way into waters around the Southeastern United States and the Caribbean. When animals invade into an area they don't belong, they are known as an **invasive species**. They can disrupt the natural balance of the habitat by eating food that other animals need and taking over important nursery locations.
- Lionfish are beautiful, but deadly. They have venomous spines that contain a powerful toxin. This makes it impossible for other animals to eat them. With nothing to control their population, they are quickly out numbering and out competing other animals in the environment.
- There are over 450 species of sharks around the world. Each species has unique adaptations that help it to hunt, find a mate and survive in its habitat. Despite all these adaptations, sharks are disappearing at an alarming rate. Pollution, overfishing and fear contribute to the loss of millions of sharks every year. Learn more about sharks and ways you can help them at **SeaWorld.org**.

# Shark Encounter®: A Break for Elasmobranchs

Name: \_\_\_\_\_

**Objective:** Students will participate in a simple research project and learn why multiple, repeatable investigations are important to research studies.

**Teacher and Chaperone Corner:** Use the following directions to guide your students through a survey of the sharks at Shark Encounter. Before entering Shark Encounter, read through part one and the descriptions of the sharks with your students. Split into teams and give each team a copy of this worksheet. Shark Encounter: A Break for Elasmobranchs Part Two is to be completed after your group exits the Shark Encounter or in your classroom.

**Share this information with your students.**

## Part One

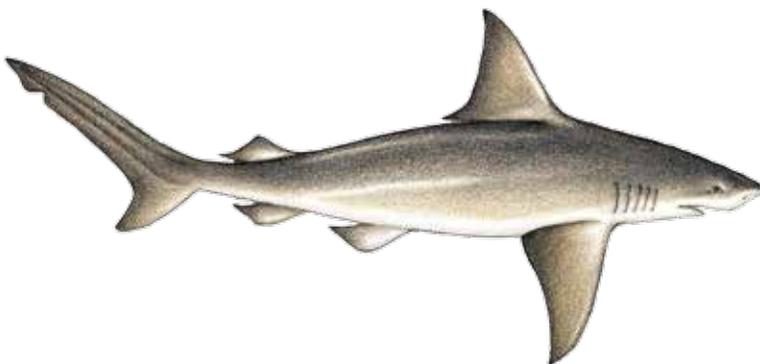
Congratulations! For the next few minutes, all of you are going to be honorary elasmobranchologists! (That is what you call people who study sharks.) Your assignment is to conduct a survey (aka count) of the sharks from inside of the Shark Encounter tunnel. Below are the descriptions and images of three types of sharks found inside of Shark Encounter. You and your group should record the count for each shark listed below as you move through the tunnel. After exiting the exhibit, show your worksheet to your teacher/chaperone.

Sand Tiger Shark (*Carcharias taurus*) – Sand Tiger sharks have thick bodies with two dorsal fins that are about the same height. They have 2 to 5 rows of long, skinny teeth that appear to be sticking out of the mouth.



Total Count: \_\_\_\_\_

Brown/Sandbar Shark (*Carcharhinus plumbeus*) – Brown (or Sandbar) sharks have a streamlined body with a pointed snout. They have a tall first dorsal fin with a smaller second fin. The teeth are not visible when the mouth is relaxed.



Total Count: \_\_\_\_\_

Nurse Shark (*Ginglymostoma cirratum*) – Nurse sharks have a flatter body with two whisker-like barbels on the sides of their mouth. They are often found resting along the bottom.



Total Count: \_\_\_\_\_

# Shark Encounter®: A Break for Elasmobranchs

## Part Two

1. How many sharks did your team count? How many sharks did another team count? Record the information in the table below.

Species	Your Teams Count	Other Teams Count
Sand Tiger Shark		
Brown Shark		
Nurse Shark		
Total		

2. Were your counts close? What would happen if you went through the tunnel at a different time? Do you think you would get the same numbers? Was it easy to count the sharks as you moved through the tunnel?

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### Scientific Note:

Everyday scientists and researchers have to conduct surveys on animals in the ocean and it can be very tricky. Repeated studies are important because it allows a more accurate count to be found which can help figure out how many animals there are in that area.

3. Do you think somebody else could repeat your count and get close to the same numbers?

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### Scientific Note:

The ability to have someone else repeat your experiment or study and get almost the same result is important since it means that your experiment worked properly and was not flawed or incorrectly done.

Thanks for taking part in our research! We hope you enjoyed your time as an elasmobranchologist! Being a scientist is fun, but it requires patience and the ability to take part in long-term, detailed research. We hope you consider the science field as a future career. For more information on careers, visit [SeaWorld.org](http://SeaWorld.org).

# TurtleTrek®: The Real Deal

**Objective:** Students will learn some of the misconceptions behind manatees and sea turtles and why accurate scientific investigations are important to the survival of a species.

**Teacher and Chaperone Corner:** TurtleTrek is a two-part experience that begins with the underwater viewing area for SeaWorld's® rescued manatees and sea turtles. Part two is optional and takes place in a one-of-a-kind, 360° domed theatre where you will experience the life of a sea turtle in a 7 minute 3D presentation. After the 3D presentation, you will exit to the above water viewing area for the manatees and sea turtles. **SeaWorld Educators are available inside of TurtleTrek and at the above water viewing area if you would like additional information.**

## Share this information with your students.

- Like many animals around the world, manatee and sea turtle populations have suffered as humans have moved into their habitats. Many of the same places that these animals need for survival are the same habitats that humans like to visit and live. Clean water, a safe place to raise young and a healthy supply of food are things that all animals need for survival.
- In the past, people hunted both manatees and sea turtles for food. Entanglement in fishing gear and watercraft injuries also commonly harmed these animals. Many people tried to excuse these actions by saying that there were so many of these animals in the wild that taking a few would not matter to the overall population.
- Today, we know that animals can become extinct if steps are not taken to protect them and their habitats. Both manatees and sea turtles are considered threatened or endangered animals and are now protected by laws like the Endangered Species Act. This act makes it illegal to bother or get too close to these animals in the wild.
- Manatees were thought to be rather unintelligent animals because they have a relatively small brain. Current research shows that manatees have a long-term memory, about the same as their cousin the elephant. Their small brain size does not indicate a lack of intelligence, but rather may have more to do with a lack of predators and an easy-to-find food source: plants!
- Research done by scientists has helped to dispel the myths or misconceptions behind some animals. For example, it was once believed that sea turtles lived to be over 200 years old, but current studies show that they probably live up to around 80 years old, about the same lifespan as humans in the United States. This research has led to the creation of laws and sanctuaries to protect these animals.
- A common misconception with sea turtles has to do with their nests. Female sea turtles can lay up to 200 eggs in a nest and 2-5 nests in a year. Unfortunately, only 10% (or 1 out of 10) of the hatchlings make it to the ocean and only 1% (1 out of 100) survive long enough to become a mature adult. This makes population recovery a very slow process for the sea turtles.
- Researchers conduct long-term studies on population growth and the effect of conservation efforts to find out more about what can be done to help endangered species. Many of these studies are published, peer-reviewed, and shared with other scientists so that they may be replicated (tried again to see if they are effective) and assist other researchers that may be studying similar situations or animals.

# Whales and Sharks: Shark Adaptations

**Objective:** Students will learn some of the adaptations that help sharks survive and what sets them apart from other predators like killer whales.

**Teacher and Chaperone Corner:** Share this information with your students while at Shark Encounter®. While most people picture the great white shark and get a shiver of fear, sharks are incredibly varied and important to the ocean ecosystem. Sharks share many adaptations amongst the species, but there is no natural protection for sharks from human impacts. Luckily, there are ways for all of us to help protect sharks and the ocean they share with us!

## Shark Adaptations

Share this information with your students.

- There are more than 450 different species of sharks. The smallest known sharks are the pygmy sharks (around 6" long) about the length of your pencil and the biggest are the whale sharks (around 40' long) about as long as a school bus. Each shark has specific adaptations that help it survive in its environment. For example, wobbegong sharks (like those in with the barracudas) have special camouflage that makes them nearly invisible to predators and prey... and the occasional SeaWorld® guest!
- All shark species share a few adaptations such as gills, that allow the shark to breathe oxygen from the water. They have a fatty liver that helps them to float. They have fins that help them to swim, steer and stay stable in the water. Fins are different than flippers. Flippers have bones inside them, like the pectoral flippers on whales, and fins do not have bones.
- Unlike killer whales, most sharks are **solitary** animals that prefer to be by themselves. Some sharks may school together in feeding or near nursery grounds, but there is very little research showing signs of cooperative hunting among sharks, although it could occur.
- Sharks are born or hatched (depending on species) fully developed and able to survive on their own. The mother shark does not take care of their baby sharks, also called pups.
- Sharks have an excellent sense of smell that allows them to detect food from far away. Sick and injured animals tend to give off irregular or erratic vibrations that the shark can feel along its lateral line, which is a fluid filled canal on the sides of the shark's body. If the animal tries to hide from the shark, the shark can use special pits on its snout, called **Ampullae of Lorenzini**, to detect electricity from the animal's muscles.
- Not all sharks are apex predators! Some sharks are seen as prey to other fish including other sharks. Whale sharks are filter feeders and prey only on plankton making them less vulnerable to bioaccumulation (buildup of toxins) but their size makes them more vulnerable to entanglement by fishing nets, lines and garbage.
- People have and continue to introduce toxins that lead to **bioaccumulation** (buildup of toxins) in the environment. The breakdown of plastics in the ocean, industrial chemicals, chemicals that we might flush down the drains or use on our lawns can lead to toxins in the environment.
- Luckily, human related problems have human related solutions. Keep your neighborhood and local environment clean, put trash in the proper place, seek out reusable options (like shopping bags and water bottles) and recycle what you are unable to re-use. This will help keep the ocean clean for sharks, whales and people!

# Whales and Sharks: Killer Whale Adaptations

**Objective:** Students will discover some of the adaptations of killer whales that help them reign as an apex predator.

**Teacher and Chaperone Corner:** Share this information at Shamu® Stadium or Shamu Up Close. Killer whales are well adapted for their life in the ocean. About 25 years ago, it was discovered that there were different varieties, or ecotypes, of killer whales around the world. Despite many of their adaptations, they are still susceptible to environmental issues that arise from human populations. **SeaWorld® Educators are located at Shamu Up Close if you would like additional information.**

## Killer Whale Adaptations

Share this information with your students.

- Killer whales are the second most widely distributed mammal on the planet. Humans are the most widely distributed. Even though all of the killer whales are scientifically named *Orcinus orca*, they are each unique and adapted to their specific diet and habitat.
- There are at least 10 different **ecotypes**, or varieties, of killer whales found around the world. Some of the best known ecotypes are the ones found in the eastern North Pacific (ENP) Ocean and include the transient, the offshore and the resident killer whales.
  - Transient killer whales are usually heavier and bulkier than resident killer whales. They spend time traveling and hunting in deeper, open water areas. They hunt other marine mammals like whales and dolphins, plus sharks. They are generally only found in pods of 2-5 individuals. They are quieter and less social than the resident pods.
  - Offshore killer whales are similar to transient killer whales in appearance but seem to behave more closely to resident whales. They are the least well studied of the three ecotypes in the ENP.
  - Resident killer whales are the best studied of the ecotypes. They are generally very social and vocal. They hunt primarily salmon and other fish. They tend to spend their whole lives in one specific geographic region and potentially with the same pod.
- All ecotypes of killer whales share a few adaptations such as a **blowhole** to breathe air, **pectoral flippers** to help them steer, a **dorsal fin** to keep them stable and **tail flukes** for movement. Their black and white coloration is **countershading** and helps them hide from prey. **Blubber** helps to keep them streamlined, **buoyant** (floating), provides them with extra energy and keeps them at a comfortable temperature.
- Killer whale pods are **matriarchal**, meaning that a dominant female is in charge of the rest of the pod and decides where they will go and when they will hunt or rest.
- Killer whales are **apex predators** at the top of the food web in all geographical locations where they can be found. Their varied diet allows them to live in nearly every ocean. This is a good reason for them being the second most widely distributed mammal on earth.
- Unfortunately, apex predators are heavily affected by **bioaccumulation**. As toxins move up the food web from **primary consumers** (like plankton) to apex predators, they can become more concentrated in the tissues at each level of the food web until they reach dangerous or deadly levels in the bodies of top predators.

# A Call to ACTION!

Name: \_\_\_\_\_

**Directions:** Use the box below to create a sign that you could post at the beach, lake or park to encourage visitors to clean up after themselves. While creating your design, think about: WHO are you talking to? WHAT are you asking them to do? WHY should they do this? Make it simple, clear and nice!

A large, empty rounded rectangular box with a thin black border, intended for students to draw a sign. The box is centered on the page and occupies most of the lower half of the document.

# Manatee to Mermaids: How Myths are Made!

Name: \_\_\_\_\_

A long time ago, sailors would go out on the sea in large ships. Many of these sailors were boys who learned how to sail by watching the old sailors on the ships. The boys would hear stories of sea monsters, buried treasure and pretty mermaids. The mermaids looked like half girl and half fish. The stories said that the mermaids would sing to the sailors to get them away from the boats. The boys learned that mermaids lived in warm water near seaweed. They had long hair and a big tail that they used to swim slowly in the sea. When boats got too close, the mermaids would swim away from the boats.

The myth of the mermaid turned into books and movies. Some people even tried to go look for them. They never did find a mermaid. What they did find was an animal with a large grey body, two flippers and a large tail. These strange animals ate kelp, a long type of seaweed, along with other plants. They would squeak and squeal as if they were singing a song. They were curious, but they did not like it when boats came too close. These animals are still around today, but they are not mermaids. They are called manatees and dugongs.

**Directions:** Circle the correct answer for the following questions about the story you just read:

1. True or False: The boys had to go to a special school to learn how to sail a boat.
2. The easiest way to tell a mermaid apart from other sea creatures was by:
  - a. Her big tail
  - b. Her large teeth
  - c. Her whiskers
  - d. Her "Hello, My name is Mermaid" sticker
3. What did the sailors actually hear when the "mermaids" were singing?
  - a. The radio
  - b. The manatees squeaking
  - c. The ocean waves
  - d. A sailor singing in the shower

**Answer these questions using the story:**

4. What animals were mistaken to be mermaids? \_\_\_\_\_
5. What do manatees and dugongs eat? \_\_\_\_\_
6. Manatees and dugongs have very short hair over their whole body, so what do you think the sailors saw that made them think the manatees have long hair? \_\_\_\_\_
7. Most myths have some truth to them. As people tell the stories, they add in new stuff to make it sound better. Imagine that you have forgotten your homework and you need to tell your teacher a good reason why. On the back of this paper, write a legendary story about what happened. Remember, it has to have some truth or reasonable information to it and be believable!

# The Legend of the Killer Whale

Name: \_\_\_\_\_

**Teacher Preface:** Across the world, there are stories told that explain how certain cultures believe animals, people and objects came to be. These stories are passed down from grandparents to parents to children over many years until they become legends. This legend was originally told by the Tlingit and Haida cultures of the Pacific Northwest to explain the beginning of the killer whales.

Once upon a time, there was a man named Natselane who lived in Alaska. He could make statues and hunt for food better than anybody else. All of the people liked him, so they said he would be the chief of the tribe. His brothers were jealous and wanted him gone so that they could be the leaders. One day, they asked Natselane to go on a trip with them to an island. When they got to the island and Natselane got out of the boat, the brothers rowed away. When they got home, they told a story that Natselane was lost at sea after a big wave hit the boat. The brothers said they looked for him, but could not find him. The other people were very sad but decided that the brothers would be the new chiefs.

Back on the island, Natselane was upset at his brothers. He had nothing to eat and no place to live. Then, he saw a big sea otter and was surprised when it said his name. The otter said it would take care of him and give him food to eat. It also brought him wood to make a fire. Natselane was so happy that he made a gift to the otter. He carved a whale out of wood and left it by the water. The next day, the wooden whale was gone and the first real killer whale was in the water. The whale was black and white and said it would help him get home. He climbed on the back of the whale and they swam away.

When he got home, he saw his brothers in their boat. He asked the whale to flip the boat over so they would get wet. The whale flipped the boat and Natselane laughed at his brothers. He then asked the whale not to hurt people but to help them instead.

**Direction:** Circle the correct answer to these questions about the story you just read:

- Why were the brothers jealous?
  - They wanted a new boat and someone else got it.
  - Natselane got more food than they did.
  - They wanted to be the leaders of the tribe.
  - It wasn't fair that Natselane could carve a whale.
- Natselane fell out of the boat when a wave hit the boat. True or False
- What type of animal helped Natselane on the island?
  - polar bear
  - walrus
  - killer whale
  - sea otter

**Answer the following questions using the story:**

- Where did Natselane live? \_\_\_\_\_
- What did Natselane ask the killer whale to do to his brothers boat? \_\_\_\_\_  
Why? \_\_\_\_\_
- Using separate sheet of paper, write your own legend to explain things that you see or that happen in your everyday life. For example: What happens to lost socks? Where do cloud shapes come from? Why does time fly when you're having fun?

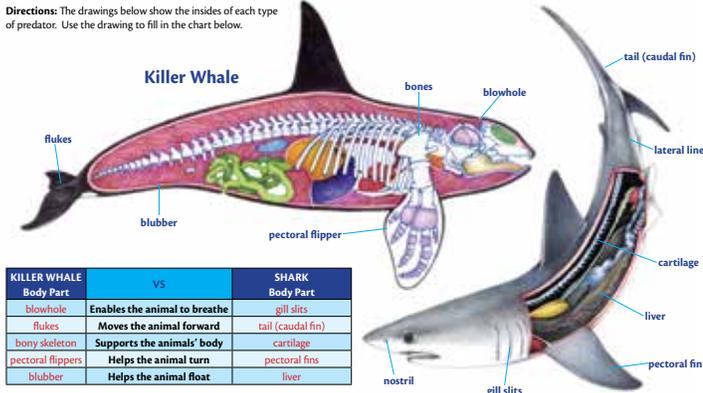
# Answer Key

## A Comparison of Predators

Sharks and killer whales are both well suited for life in the ocean. Killer whales are the top predator of the ocean and can be found all around the world. Their thick layer of blubber provides them with buoyancy, energy and temperature control. Great white sharks are one of the best known types of shark in the ocean and are also considered a top predator. Unlike the killer whale, great white sharks are not found in all of the oceans. Sharks have a fatty layer that helps with buoyancy and energy, but without blubber or a way to warm their body, they are unable to live in the cold polar waters.

**Directions:** The drawings below show the insides of each type of predator. Use the drawing to fill in the chart below.

Name: \_\_\_\_\_



KILLER WHALE Body Part	VS	SHARK Body Part
blowhole	Enables the animal to breathe	gill slits
flukes	Moves the animal forward	tail (caudal fin)
bony skeleton	Supports the animals' body	cartilage
pectoral flippers	Helps the animal turn	pectoral fins
blubber	Helps the animal float	liver

### Deeper Depths

Write an essay comparing and contrasting the killer whale and shark. Use at least 3 similarities and 3 differences.

## The Legend of the Killer Whale

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  - They wanted to be the leaders of the tribe.
  - It wasn't fair that Natselane could carve a whale.
- Natselane fell out of the boat when a wave hit the boat. True or False?  False
- What type of animal helped Natselane on the island?
  - polar bear
  - walrus
  - killer whale
  - sea otter
- Where did Natselane live? Alaska
- What did Natselane ask the killer whale to do to his brothers boat? Flip the boat over  
Why? Teach them a lesson and get them wet
- Using separate sheet of paper, write your own legend to explain things that you see or that happen in your everyday life. For example: What happens to lost socks? Where do cloud shapes come from? Why does time fly when you're having fun? Varies

## That's A Whale of a Big Meal!

Name: \_\_\_\_\_

**Directions:** Read about the killer whales below. Then answer the questions.

The killer whales at Shamu Stadium eat over 1000 lbs of fish every day depending on the number of whales and their dietary needs. With that amount of food being fed out each day, the food is divided into individual buckets. The buckets are kept refrigerated so that the food stays fresh throughout the day. Each bucket contains about 30lbs of fish. At the end of each day, any food leftover is weighed, noted in a logbook and disposed of. The buckets are then cleaned and ready to be refilled the next day with fresh fish. Most of the time, the whales eat all of the prepared fish. Other days, there may be some buckets leftover.

- As an example, use this information to complete the chart below and record the number of buckets left at the end of each day.

Day of the Week	Pounds of Food Leftover	Number of Buckets Leftover
Monday	00	0
Tuesday	30	1
Wednesday	60	2
Thursday	00	0
Friday	30	1
Saturday	30	1
Sunday	00	0

- Each day there are 35 buckets of fish prepared for Shamu Stadium. Using the chart above, write the fraction of how many buckets of food the whales ate for each day.

Example:	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
	35/35	34/35	33/35	35/35	34/35	34/35	35/35

- You're almost done! Figure out the fraction of buckets of fish that were leftover at the end of the whole week!  $5/245$
- Alright, last question! Let's say there are 6 whales at Shamu stadium. Since each whale is a different size and eats a different amount of food. Below is the average amount of food each whale eats every day. Write down how the buckets of fish should be divided among whales every day.

Whale 1	Whale 2	Whale 3	Whale 4	Whale 5	Whale 6
150lbs	210lbs	120lbs	150lbs	180lbs	120lbs
5	7	4	5	6	4

### Deeper Depths

Can you estimate the whales size from largest to smallest based on the given information? Why?

## Manatee to Mermaids:

### How Myths are Made!

Name: \_\_\_\_\_

A long time ago, sailors would go out on the sea in large ships. Many of these sailors were boys who learned how to sail by watching the old sailors on the ships. The boys would hear stories of sea monsters, buried treasure and pretty mermaids. The mermaids looked like half girl and half fish. The stories said that the mermaids would sing to the sailors to get them away from the boats. The boys learned that mermaids lived in warm water near seaweed. They had long hair and a big tail that they used to swim slowly in the sea. When boats got too close, the mermaids would swim away from the boats.

The myth of the mermaid turned into books and movies. Some people even tried to go look for them. They never did find a mermaid. What they did find was an animal with a large grey body, two flippers and a large tail. These strange animals ate kelp, a long type of seaweed, along with other plants. They would squeak and squeal as if they were singing a song. They were curious, but they did not like it when boats came too close. These animals are still around today, but they are not mermaids. They are called manatees and dugongs.

- Circle the correct answer:  
True or False? The boys had to go to a special school to learn how to sail a boat.
- The easiest way to tell a mermaid apart from other sea creatures was by:  
Circle the correct answer:  
 a. Her big tail  
 b. Her large teeth  
 c. Her whiskers  
 d. Her "Hello, My name is Mermaid" sticker
- What did the sailors actually hear when the "mermaids" were singing?  
Circle the correct answer:  
 a. The radio  
 b. The manatees squeaking  
 c. The ocean waves  
 d. A sailor singing in the shower
- What animals were mistaken to be mermaids? manatees and dugongs
- What do manatees and dugongs eat? kelp and other plants
- Manatees and Dugongs have very short hair over their whole body so what do you think the sailors saw that made them think the manatees have long hair? Kelp or seaweed that they eat.
- Most myths have some truth to them. As people tell the stories, they add in new stuff to make it sound better. Imagine that you have forgotten your homework and you need to tell your teacher a good reason why. On the back of this paper, write a legendary story about what happened. Remember, it has to have some truth to it and still be believable!

# Check out:

SeaWorld.org for more information

SeaWorldOrlando.com/Teachers for additional resources just for teachers

