Shark Investigation Unit

Use your imagination to take yourself on a virtual field trip with Ocean Connectors!

	As we drive towards the entrance of SeaWorld, notice beautiful Mission Bay around you. Mission Bay is a human-made saltwater bay that flows into the Pacific Ocean. It is a popular spot for outdoor recreation and watercraft. Photo credit: wallpaperflare.com
	We've arrived! Welcome to SeaWorld San Diego. SeaWorld has marine animals both big and small for us to learn about today. Let's join our chaperone group and head inside.
	We will start at the very front of the park at an exhibit called Explorer's Reef. Reach out your hand and touch any of the animals that you see here! SeaWorld Animal Care Ambassadors will be here to welcome you and share fun facts about these awesome animals. Try asking them some questions. Do you see the bamboo sharks? Sting rays? Horseshoe crabs? Each animal feels different.

	Horseshoe crabs have been around for over 300 million years, making them even older than dinosaurs. They look like prehistoric crabs, but are actually more closely related to scorpions and spiders. The horseshoe crab has a hard exoskeleton and 10 legs, which it uses for walking along the seafloor. They have blue blood, which has been used for medicinal purposes. Photo credit: wallpaperflare.com
	Check out the cleaner fish next. Gently place your hand in the water and wait. Slowly, fish will come over and start nibbling at your skin. Don't worry, it doesn't hurt. It may tickle – but try to stay calm! The more still you hold your hand in the water, the more cleaner fish will come over to visit you. What are they doing? They are "cleaning" the dead skin cells off your body. **Worksheet Question:** What type of consumer is the cleaner fish?
	After washing our hands, we walk down the path to Otter Outlook. Sea otters are a keystone species (just like sharks!). This means that they play an important role in the ecosystem and the presence of sea otters is a good indication of the health of other species and habitats nearby.

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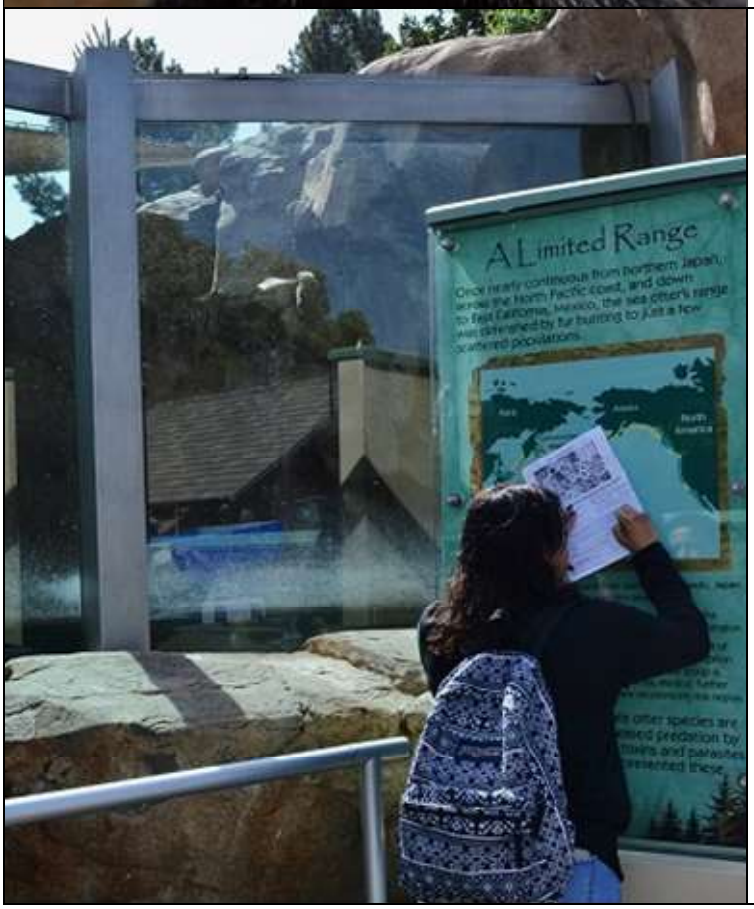
	Sea otters eat sea urchins and other animals that graze on giant kelp. With sea otters helping to keep the urchin populations under control, kelp forests and their inhabitants can thrive. Because they have an extremely fast metabolism, California sea otters eat about 20 to 25 percent of their body weight each day. Photo credit: seaworld.org
	Unlike other marine mammals, California sea otters do not have a blubber layer, so how do they stay warm? Otters are covered in dense fur that keeps them warm. In fact, they have the densest fur of any mammal, with up to 1 million hairs per square inch! They were almost hunted to extinction back in the 1800's because of this unique fur. This greatly affected their range. A sea otter spends many hours a day cleaning and grooming their fur. They blow bubbles into it for insulation and use natural oils from their skin to keep their coat waterproof. **Worksheet Question:** How does the sea otter's historic range compare to its present range?

	Right next to Otter Outlook is Dolphin Point! These are bottlenose dolphins, which are known to swim into San Diego Bay. Let's see how many dolphins we can count swimming around.
	Dolphins can create a series of clicks, squeaks and whistles. They find their food using echolocation – projecting high-frequency sound waves and then listening for echoes as the sound waves reflect off nearby objects. They have a fusiform-shaped body (round in the middle and tapered at both ends), which reduces drag. Many of the other animals we will be learning about today have this same body shape, like whales, seals and sharks.
	Now we are entering the Shark Encounter exhibit. Think back to your Ocean Connectors lessons about sharks. What do you remember? As sharks are our case study species this year, try to spend around 30 minutes in this area learning about sharks. Here we see an adult zebra shark swimming by.

	Take a look at all the different types of sharks you see, and notice their similarities and differences. Most sharks (but not all!) have 5 gill slits on each side of their head. Try to use the signs around you to figure out what species you see. **Worksheet Question:** Approximately how many species of sharks exist?
	Sharks have "placoid scales" on their skin, which are also known as dermal denticles (dermal=skin, denticles=teeth). As a shark grows, the scales do not grow with them. Instead, they grow more scales. The unique shape of the placoid scales makes sharks more hydrodynamic and maneuverable in the water. Photo credit: seaworld.org
	As we step onto the moving walkway and enter a tunnel that goes right through the shark tank, imagine yourself swimming in the ocean with these majestic creatures. Remember that sharks are a type of fish. Notice that sharks have vertical tail fins and they move them from side to side. This is different from marine mammals, which move their tail fins up and down.

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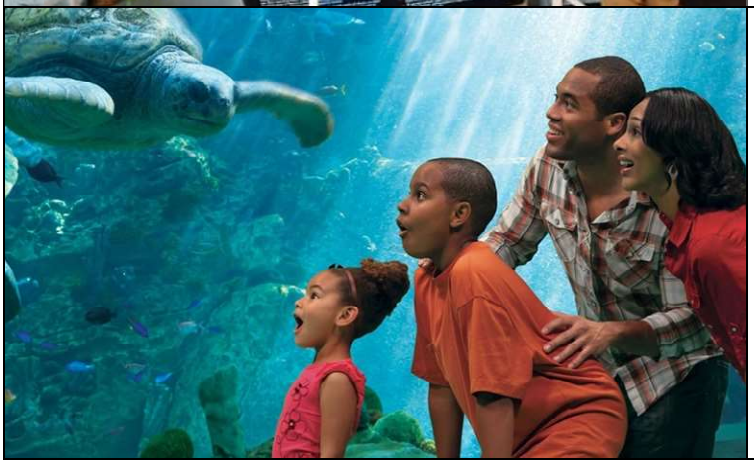
	Sharks have all 5 senses that we have, **smell**, **taste**, **touch**, **eyesight**, and **hearing,** but they have a 6th sense too **– electromagnetism!** This means they can sense electricity and vibrations in the water. Photo credit: Mike Price
	Sharks come in all shapes and sizes, and they are all an important part of the ocean ecosystem. Take a look at this massive jaw replica from the extinct megalodon shark. These magnificent teeth mark the end of our time in the Shark Encounter exhibit. Take one last look before stepping out the door, back into the park.
	Next we'll visit Turtle Reef, where you'll see loggerhead, hawksbill and green sea turtles. If you look closely, you can see some hybrid sea turtles. A hybrid occurs when two different species (like a green and a hawksbill) have offspring. Photo credit: seaworld.com

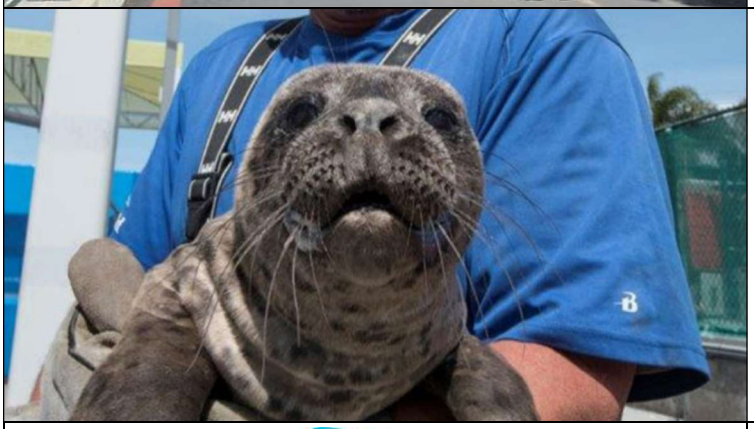
	Did you know all sea turtles have a beak? They use their beak to consume prey. Different types of sea turtles have different diets, and their diets can change as they grow up. Here we see a green sea turtle with a serrated beak. This helps it cut through kelp and seagrasses. **Worksheet Question:** Explain how sea turtle jaws are "adapted" for their diets. Photo credit: seaworld.org
	Orcas, which are actually a type of dolphin, usually travel in pods, or family units. They often hunt together in a cooperative group. There are several different types of killer whales, called ecotypes, found all over the world. Each ecotype is known to emit different sounds, consume different prey, and travel to different regions. **Worksheet Question:** What makes the orca a top predator in the ocean? Photo credit: needpix.com
	Just next to the rollercoaster is a large pool for viewing and feeding bat rays. Reach your hand into the water to touch one of the bat rays. To feed them, hold your hand out flat with a piece of fish or squid tucked between your fingers. A bat ray will swim by and suck up the food like a vacuum cleaner. **Worksheet Question:** How do bat rays eat? What is their prey?

	Most rays have one or more venomous spines on their tail, which are used to defend them against predators. Always be sure to do the "stingray shuffle" and shuffle your feet in the sand as you enter the ocean to make sure you do not step on a ray and get stung. Photo credit: Shutterstock
	Do you hear that? Once you hear the familiar sound of barking sea lions, you know they are close by! We'll walk over to the Pacific Point exhibit to get a closer look. Is it a sea lion or a seal? How can we tell the difference? Sea lions have external ear flaps, meaning they stick out from their head, and they can use their front flippers to "walk" on land. Can you see their ear flaps here? **Worksheet Question:** How deep do different seal species dive for their food?
	As we continue to explore the park, pay attention to all the wildlife around you. There are many species of birds throughout the park, both within and outside the exhibits, such as flamingos and native species like this mallard.

	Next we'll head to the Penguin Encounter exhibit. Penguins are very unique birds – they can't fly, they are great swimmers, and they are only found in the Southern Hemisphere.
	Do you feel that? The temperature is dropping to simulate the cold weather of the Antarctic. As we walk into the Penguin Encounter, we can feel the icy cold air needed to help make the penguins feel at home. In this exhibit we can see almost 400 penguins! There are large penguin species, like the emperor and king, and smaller species, like the Adélie, gentoo, chinstrap, and macaroni penguins. Photo credit: Mike Price
	There also other birds in this exhibit. Unlike the flightless penguins, puffins can not only fly through the air, but they can also "fly" through the water as well! The puffin's beak is specialized to capture fish. The puffin has a series of spines on its upper bill and it uses its raspy tongue to hold fish there while it opens its beak to catch even more fish! Photo credit: publicdomainpitures.net

	As we exit the Penguin Encounter, we'll see more penguins outside. But it is sunny and warm outside – how do these penguins tolerate warmer temperatures? These are Magellanic and Humboldt penguins. These penguins live in South America. **Worksheet Question**: What is the difference between the penguins inside the exhibit versus the penguins outside the exhibit?
	Just like the "cool" penguins we saw, there any many different types of animals that thrive in a chilly environment. To see some of them, let's explore the animals in the Wild Arctic exhibit! Photo credit: seaworld.com
	Our first stop in the Wild Arctic is to see the beluga whales. Are there any beluga whales you see that aren't white? Beluga whales are born dark gray in color and then turn white as they grow up. Like the gray whales we learned about in 5th grade, beluga whales lack a dorsal fin. This helps them reduce heat loss and swim more easily just below ice sheets. Photo credit: wallpaperflare.com

	Harbor seals are one of the most common marine mammals in the United States. They are found all along our coast, from Alaska to California, and also on the East Coast. Their eyes are specially adapted to seeing underwater in low-light environments. The main threats to wild harbor seals are entanglement (just like sharks!), humans feeding and harassing them, habitat degradation, and pollution. Photo credit: pxhere.com
	Did you know seals and sea lions are related to dogs? You might be able to tell when you look at their whiskers. Seal and sea lion whiskers are called "vibrissae". Because they are attached to muscles and contain nerve endings, vibrissae help them detect movements in the water. Photo credit: seaworld.org
	Wow! What was that? It has tusks, and a big moustache – it is a walrus! Walrus tusks keep growing throughout their entire life. They use their tusks to help them haul out onto ice, make breathing holes in the ice, and the males use them for fighting. Walruses have been hunted commercially for their meat, skin, and ivory tusks by traders. They are also threatened by climate change and habitat loss.

	Did you know that heat loss in water is 27 times faster than in air? Walruses depend on sea ice to rest and warm up in between dives. When there is no ice, they must travel long distances to seek refuge. **Worksheet Question:** How is the reduction of sea ice affecting walruses? Photo credit: defenders.org
	Our field trip is coming to an end soon. Did you enjoy learning about all of the animals we saw today? What was your favorite? Remember that zoos and aquariums play an important role in helping to teach people about wildlife and conservation.
	SeaWorld's Rescue Teams have come to the aid of more than 36,000 sick, injured, and orphaned animals over the past 50 years. If you ever see a marine animal in trouble, you can call SeaWorld's rescue hotline at 1-800-541- SEAL (7325). Photo credit: SeaWorld.com
SeaWorld	Our partners at SeaWorld are essential to helping provide this field trip for you! You can come back anytime to visit with your family and friends.

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