

The SHARK Packet

*Featuring multi-disciplinary ideas for classroom teachers,
plus crafts and shark birthday party ideas for families*



*Educational and family fun activities about sharks,
based on the children's film: The Shark Riddle*



This packet is intended for educational use. It was designed to be a springboard for learning, with family fun and educational activities **based on the episode of *The Riddle Solvers* called *The Shark Riddle***. Most of the activities are appropriate for elementary-aged children, from 6 to 11 years old.

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The Shark Riddle is a half-hour children's program featuring high definition footage of over 20 different shark species, original music (including a shark lullaby, a great white shark song and a whale shark song) and a truly magical look at the mysterious world of sharks.
Co-produced by Sisbro Studios, LLC and The Save Our Seas Foundation.

For more information, visit www.sisbro.com/sharks





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Article/Activity	Science	English Arts	Art	Math	Social Studies & Culture	Music & Drama	Food	Good for a Shark Birthday Party
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Did You Know?	x				x			
Shark Hats			x					x
Landshark Lawn Ornaments	x		x					x
Shark Tooth Scientific Inquiry	x	x	x					
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Whale Shark Math	x			x				
Shark Tooth Banner	x		x					x
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Magic Journal Page	x	x	x					
The Greatest Shark Debate	x	x	x					
Shark Dream Writing Exercise		x						
Shark Bookmarks		x	x					x
Shark Bingo	x							x
Shark Feeding Frenzy	x					x		x
Shark Cupcake Toppers			x				x	x
The Shark Lullaby	x	x			x	x		
The Great White Shark Song	x		x			x		
Outdoor Shark Games	x							x
Sharks, The Food Chain And You	x				x			
Ten Happy Ways to Help Sharks	x	x						
Ask a Shark Scientist	x							





Introduction: Why Sharks?



A note from Laura and Robert Sams, the Directors of The Riddle Solvers: The Shark Riddle, the inspiration for this packet of family fun and educational activities. Laura and Robert are writers, educators, musicians, filmmakers and of course, sister/brother.

When we tell people that we made a film about sharks, one question we never hear is “Why?” No one ever asks, “Why would you want to make a movie about sharks?” We think that’s because they assume they already know the answer: “Because sharks are AWESOME!” Yes. It’s a fact. Sharks are awesome. But that’s only part of the reason we decided to make a film about sharks. We had some other motivations as well.

First, sharks are awesome. We know we’ve said that already, but it bears restating: Sharks are awesome.

Second, sharks are very diverse. The smallest shark species can practically fit in your hand, while the largest sharks could not . . . unless your hand was over 50 feet long. Sharks come in a wide variety of colors – grays, blues, browns, greens, whites, stripes and spots. The lantern shark even glows in the dark! Sharks come in an amazing variety of shapes too. The saw shark has a head shaped like a saw. The angelsharks are flattened like angelic pancakes. Thresher sharks can have a tail as long as their entire body. Sharks have different mouths, and teeth and gills and fins. Of the over-400 species of sharks in the world, rarely do two look similar. They are all different!

Third, sharks are very important. They live in every corner of the ocean, and in general, sharks

are at the top of the food chain. They keep an ecosystem healthy by feeding on the sick, the weak and the old. And by doing so, they help limit populations of other animals so that the ecosystem stays in balance. Without sharks, the entire ocean would be out of balance.

Fourth, people don’t really know a lot about sharks. And it’s not just the average person - it’s the researchers too. If we walked up to an average Joe off the street and asked, “Where in the world do great white sharks breed?” That person would probably say, “I have no idea. And how did you know my name was Joe?” On the other hand, if we asked a Ph.D shark biologist that same question, we’d get the same answer: “Nobody knows!” How exciting is that?! One of the world’s

most famous predators, a giant 20-foot-long shark, still holds a few giant mysteries. Sharks will always be mysterious because they are hard to study. **They are like swimming secrets waiting to be revealed.**

So, sharks are very diverse, very important and very mysterious. But if we had to sum up why we made a movie about sharks in just one sentence, the answer would be this: Sharks are AWESOME!



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Why Sharks?

This is a note from Peter Verhoog and Georgina Wiersma, the CEOs of the Save Our Seas Foundation (SOSF), about why they believe sharks are important. Peter and Georgina are underwater photographers, writers, publishers and passionate advocates for ocean conservation and education.

Our oceans are home to many creatures of unbelievable diversity and colour. As on land, the large predators stand at the top of the food chain. In salty ocean waters, the most common large predators are sharks. In spite of their immense power and fully perfected streamline that even evolution itself has left untouched for millions of years, they are not only extremely vulnerable, but also despised and slaughtered. Sharks have long been hunted by fishers, who know how much the economic value of these animals has increased over the past twenty years. Their fins are a delicacy for the Asian markets, and millions of sharks die a miserable death as bycatch on fishing lines and in nets.

Our initial personal fears and caution (ours is the 'Jaws' generation) for sharks rapidly disappeared when we first encountered one. The creature was shy and more cautious of us than we were of it. It swam away fast, leaving us in bewildered admiration for the tip of its rapidly disappearing, slender silvery tail. **The image of a ruthless predator, always voracious and ever-attacking, was quickly transformed into that of a shy and careful hunter.**

We have encountered many species of sharks in all shapes, sizes, colours and patterns. We have seen small bottom dwellers with stripes and spots, timid vegetarians and of course, the carnivorous fast predators of the open waters. Though great white sharks are feared by so many, we dived with them without a cage, and without problems. Each encounter has been profoundly impressive and a highlight in our lives and of the many thousands of dives we have made. More and more often we choose our diving destinations for the purpose of finding these magnificent creatures.

Every diver or snorkeler who has had the privilege of swimming with sharks has experienced the same loss of words in expressing the feeling of awe, when observing their timeless beauty and elegance. These days, however, there is no escaping the fact that these magnificent creatures might very soon face extinction. Their fate is inextricably bound to the health and existence of our oceans, which only serves to intensify our urge to protect them.

We hope that this packet and the children's movie that inspired it, *The Shark Riddle*, will evoke the same emotions in its readers as we have felt in our diving experiences: admiration, respect and awe. And the sincere wish to save these wonderful creatures from extinction.





Did You Know?

Sharks with a Suntan?

A scientist named Chris Lowe discovered that hammerhead sharks can actually sun tan! He watched scalloped hammerheads swimming in a shallow pool and put thick patches on parts of the sharks' skin, to block ultraviolet light like sunscreen protects our skin. What happened? The skin around those patches got darker in the sun, but the skin under the patches did not get darker. Shark skin does tan!

Sharks in Rivers?

A few species of sharks, like the bull shark, are able to adapt to fresh water enough that they can swim up rivers. Bull sharks have been found in the Mississippi River as far upstream as Illinois. One bull shark was reportedly found in the Amazon River, about 2600 miles (4200 km) from where the river meets the sea. Other species of sharks, such as the sandbar shark, swim in estuaries (where the river meets the sea) to give birth.

Sharks as Protectors?

Many Hawaiian families believe that their ancestors' spirits can appear in animals and other objects, in order to guide them or protect them in scary times. Some families believe their ancestors appear as sharks, helping chase fish into their fishing nets or guide their boats to safety. For those families, sharks are special, spiritual animals instead of scary predators.

Miracle Hammerhead Birth?

At the Henry Doorly Zoo in Nebraska, zookeepers were very surprised to find that a female bonnethead shark gave birth to a baby, because the female had not been near a male shark in three years. Later, DNA analysis showed that the baby had genes from a mother, but no father. This means that the female shark was able to reproduce through a process called parthenogenesis, in which an egg cell becomes an embryo without help from a male. Bonnethead sharks are part of the hammerhead shark family, growing to a typical length of 3 feet (1 meter) as adults.



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Shark Hats



Laura Sams wears a great white shark hat



Robert Sams wears a hammerhead shark hat

Overview

Make a great white shark or hammerhead shark hat.

Materials

Copies of the great white and hammerhead templates, 9"x 13" construction paper, tape, stapler with staples, crayons or markers

Procedure

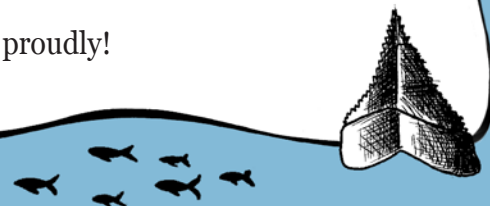
1. Cut construction paper into strips about 3 inches (7.6 cm) wide. Two strips will be used in each hat.
2. Make copies of the great white shark or hammerhead template, depending on which shark hat you wish to make.
3. Color the shark head.
4. Cut the shark head shape out of the paper.
5. To make the construction paper hat ring, tape or staple two ends of the construction paper strips together, so you have one long strip. Wrap that strip around the person's head who will be wearing the

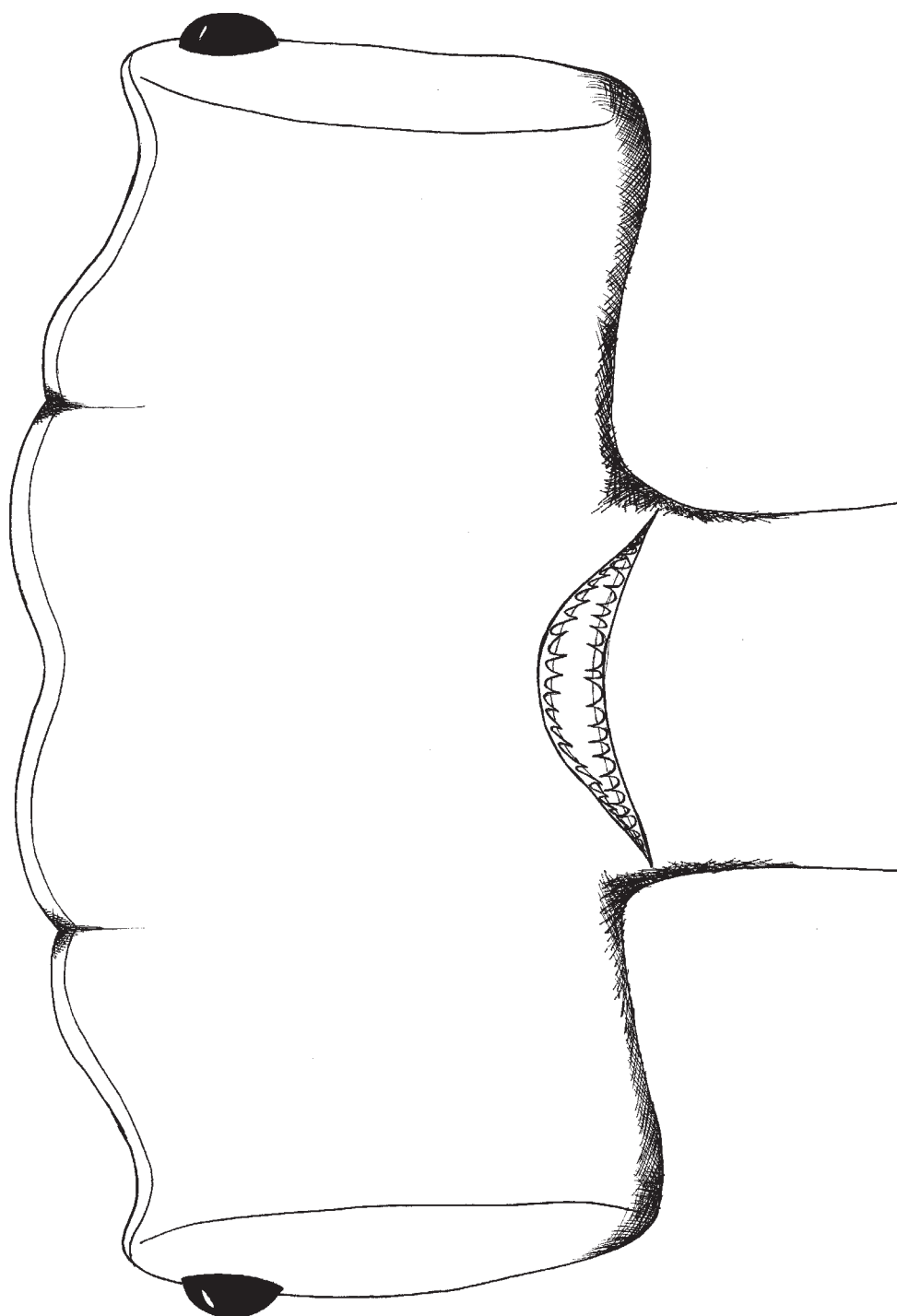


hat, to determine appropriate size. Tape or staple the remaining ends together, so that the ring will fit snugly (though not too snugly) around the person's head. If you are using staples, be careful that the rough parts of the staples are not on the inside of the ring, because they may scrape the skin of the person wearing the hat.

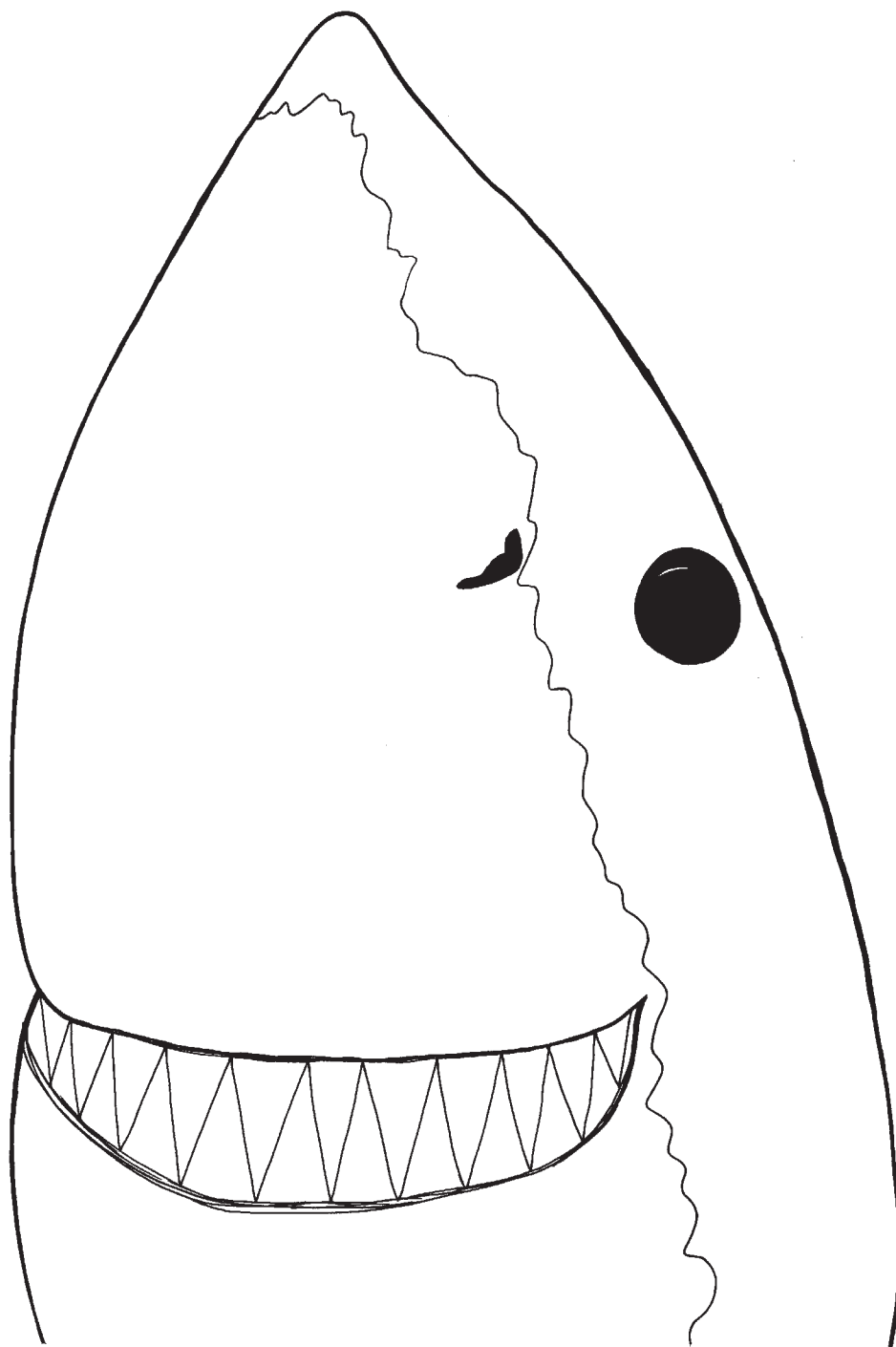


6. Tape the construction paper ring to the back side of the shark head. As a tip, try laying the shark head down flat, with the blank side up, and tape the construction paper ring to the shark that way. Be sure to make the shark head straight, so that it will face upright on the person's head. Also, the hammerhead shark neck can be a bit flimsy, so it is sturdier to tape the ring higher on the hammerhead's head.
7. Wear the hat proudly!





Hammerhead Shark Hat Template



Great White Shark Hat Template



Landshark Lawn Ornaments

And A Closer Look at Dorsal Fins



Overview

Looking for a way to shark attack your school yard, your neighbor's garden or your own flower bed? Make these shark fins, place them near amazing shark facts, and you have a funny and educational way to share your passion for sharks! This is also a great way to recycle old cardboard.

Educational Standards

Comparing and contrasting characteristics of a group of animals.

Understanding that animals have adaptations to survive in an environment.

Using observations to ask questions and study the world.

Using communication skills to share important information with others.

Materials Needed

Pieces of cardboard (used cereal boxes, old packaging boxes, etc.) or posterboard, paintbrush, washable paint (in shark colors like black, brown, gray and blue), scissors or utility knife, pencil, wooden dowels (2 to 4 feet long), duct tape

Background on Dorsal Fins

When people think of sharks, they often imagine a shark's dorsal fin suddenly slicing through the water, revealing the tip of a powerful predator lurking just below the surface.

In reality, the majority of shark species do not swim with their dorsal fins above the surface. Unlike whales, who must surface to breathe and therefore often end up with their dorsal fins above the water, sharks do not need to surface to breathe. Shark fins do break the surface when they feed on bait that people put in the water. Shark fins also break the surface when sharks enter shallow water, to breed or give birth, such as the lemon shark pupping grounds in the mangrove forests of Florida. But most of the time, as described by the Biology of Sharks and Rays Web site (www.elasmo-research.org), sharks swim far enough below the surface that we don't see the fins.

When dorsal fins do break the surface, scientists can use the fin shape to identify





Landshark Lawn Ornaments, Continued

individual sharks. For great white sharks, the shape of the dorsal fin is as unique as human fingerprints are for identification. Scientists can see slight differences in the edges of the fins. They use these differences to recognize individual sharks and study the behaviors of different sharks in the water.

Shark fins come in many shapes and sizes. The great hammerhead shark's fin is taller and pointier than some other species. The great white shark has a "typical" triangular fin shape, one that we have seen many times in movies. The horn shark is a small shark with a spine on its dorsal fins, which helps protect it from predators that try to bite it. Other sharks have shorter and wider dorsal fins. Some fins are basically one color. Some have spots or stripes. The oceanic whitetip shark has a white tip on its dorsal fins. The blacktip reef shark has a black tip on its dorsal fins.

Why do sharks have fins anyway? Sharks are fish, which means they have fins like fish. Dorsal fins are the fins on the back (top) of the fish, used for stabilizing the fish in the water. A dorsal fin is like a keel of a sailboat, which helps it go straight. The dorsal fin works with the pectoral fins, which are like the wings of an airplane, to keep fish from rolling over. Fish also have a tail (or caudal) fin that provides

speed and power. The tail fin of the thresher shark is actually used to stun prey.

The main dorsal fin is made mostly of cartilage and dermal collagen fibers, with little muscle tissue. Though it appears rigid, the dorsal fin can bend and warp to help with swimming.

Pre-Activity Discussion Questions

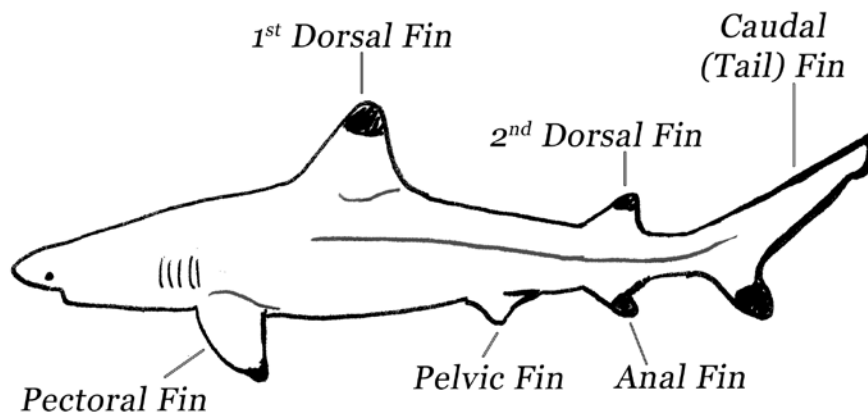
Imagine you are a marine biologist, who is seeing a shark fin for the first time. Make a list of words that come to mind when you think of shark fins. *Fear? Power?* And what do shark fins look like? *A sailboat's sail? An airplane's tail?*

Take time to research sharks or watch *The Shark Riddle*, and make sketches of different kinds of fins.

Which fins help keep a fish from rolling over? The dorsal fin and pectoral fins help fish stay upright.

Which fins give sharks their power and speed? The tail (or caudal) fin.

Compare the shape of a shark to the shape of an airplane. Compare the shape of a shark to the shape of a sailboat. Why are some parts similar?



BLACKTIP REEF SHARK



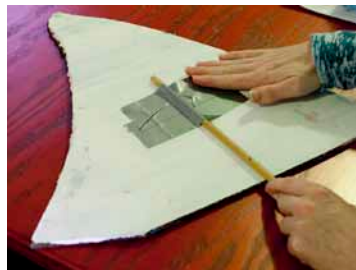
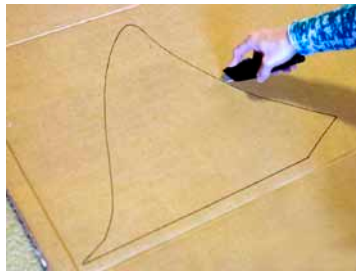


Landshark Lawn Ornaments, Continued

Procedure

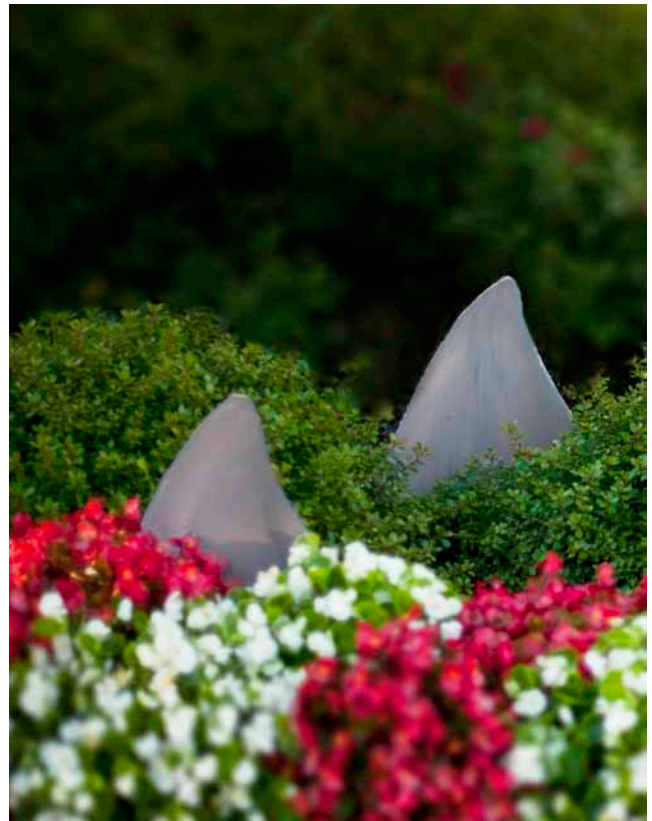
Note: It is better for an adult to cut the shape out of cardboard for safety reasons. Then children can paint and decorate the fins.

1. Choose the shape of a shark's dorsal fin to use as your guide. You may use the hammerhead or great white fin templates provided here, which you can trace, or you can use as a guide to draw a bigger version, depending on the size of your cardboard.
2. Draw the shape of the shark's fin on your cardboard sheet.
3. Using scissors or a utility knife, carefully cut out the shape of the fin.
4. Paint one side of the fin and let the paint dry.
5. After the paint dries, firmly tape a wooden dowel with duct tape to the back side of the fin.
6. Choose an interesting shark fact to feature with your fin. You can make another sign that features this fact, or you may even write the fact on the painted fin.



Choose from the shark facts in this activity, or research sharks and choose your own amazing fact.

7. Choose an interesting place outside and stick the wooden dowel in the dirt, with the fin showing as if it were swimming through some bushes, flowers, etc. If several people make fins, it looks like an entire school of sharks are swimming through someone's garden! Place your signs with shark facts near the fins, and you'll have a powerful, attention-getting tool to help people learn about sharks!



Note: Since these are made of cardboard, they can be damaged by water, like rain. If you want to make these fins last longer outside, try re-using and cutting old plastic or foam.



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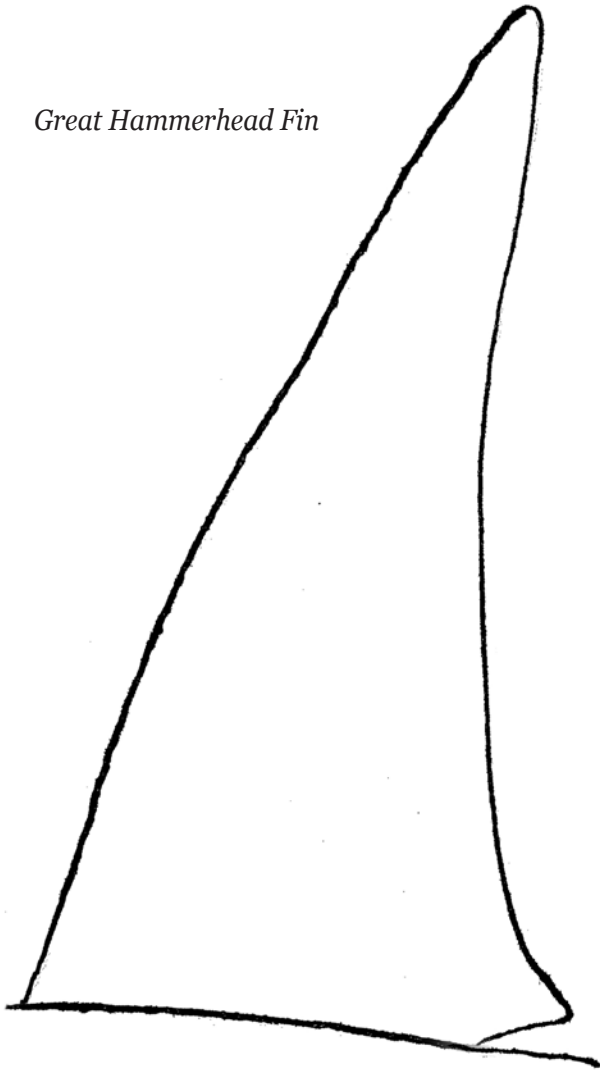
Landshark Lawn Ornaments, Continued

AMAZING SHARK FACTS

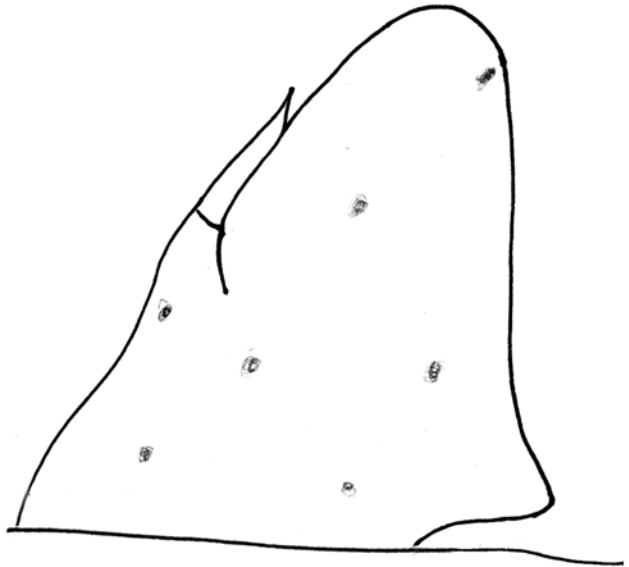
-  Sharks keep the ocean food chains healthy, so that people have enough fish to eat.
-  People kill over 100 million sharks each year.
-  On average, sharks kill less than 5 people per year.
-  Sharks appeared on Earth 400 million years ago. That makes them twice as old as dinosaurs.
-  There are over 400 different species of sharks in the world, and most of them are smaller than 4 feet (1.2 meters) long.
-  One of the smallest sharks in the world is the dwarf lanternshark, growing to about 8 inches (21 centimeters) long.
-  The largest shark in the world is the whale shark, which eats tiny plankton and grows up to 50 feet long (15 meters).
-  The shortfin mako shark can swim 31 miles per hour (50 kilometers).
-  A nurse shark can lose up to 30,000 teeth in its lifetime!
-  The thresher shark uses its tail like a whip to stun its prey underwater.
-  In one year, 791 people were killed by defective toasters. Only four people were killed by sharks.
-  Only about 5% of the ocean is explored by humans. We have much to learn about sharks!
-  The biggest organ in a shark's body is the liver.
-  The megamouth shark was discovered in 1976 by the U.S. navy, when a male shark was accidentally caught in a ship's parachute anchor off the coast of Hawaii.
-  Lanternsharks are small, deepwater sharks that produce their own light with photophores on their bodies.
-  The epaulette shark is a small shark that sometimes uses its fins to walk along the ocean bottom.
-  Shark skeletons are made of cartilage, not bone.
-  Many shark species populations have declined 90% due to overfishing and shark finning.
-  Several sharks can live in Arctic waters, including the Greenland, porbeagle and salmon shark.
-  The biggest predatory shark that ever lived was the megalodon shark, which grew to 50 feet (15 meters). It is now extinct.
-  People are designing new swim suits to mimic shark skin, since the dermal denticles help sharks swim faster.
-  Great white sharks and mako sharks can regulate their body temperature so they are warmer than the surrounding cold water.
-  Scientists believe that great white sharks have good eyesight, and they rely on eyesight while hunting.
-  Great white shark fins are as unique as human fingerprints, so scientists can use the fins for identification.



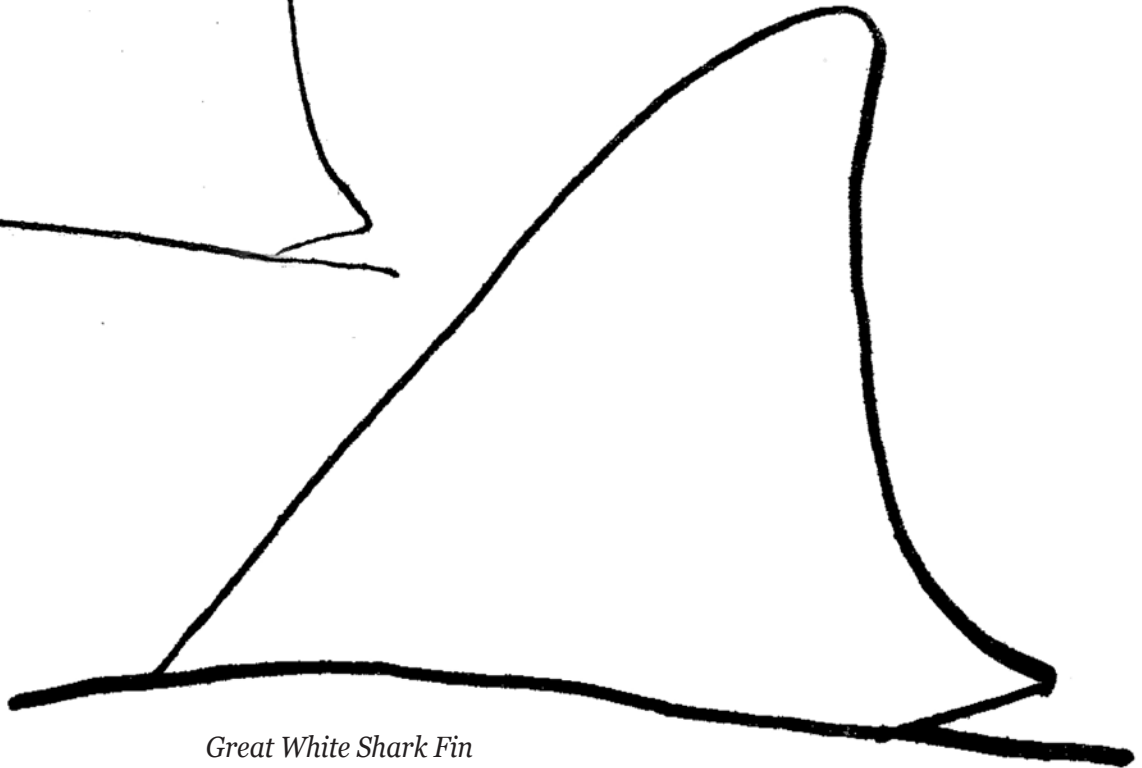
Great Hammerhead Fin



Horn Shark Fin



Great White Shark Fin



Shark Fin Shapes



Shark Tooth Scientific Inquiry



Overview

This activity is a great introduction to the concept of scientific inquiry, a process used to explore the natural world using evidence from observations. First, children will become scientists and dig for shark teeth. After finding a tooth, each student will use observations and measurements to formulate a hypothesis about what the shark eats. To investigate, students will reach into “shark stomachs” to learn about the diet of each shark, and ultimately, will find out whether their hypotheses were correct. Inspired by the “Shark Dentist” scene in *The Shark Riddle*.

Educational Standards

Practicing scientific inquiry, the process used to explore the natural world using evidence from observations and investigations.

Investigating how animals have adaptations that help them survive in an environment.

Observing, measuring and recording properties of objects.

Summarizing the results from a scientific investigation and using the results to respond to the question being tested.



Preparation

1. Make copies of the “Shark Teeth for Digging” sheet, so that you have a variety of teeth for children to find. As a variation, you may want to simplify the process and ask all the students to investigate the same type of tooth.
2. Cut out the shark teeth and hide them in a large tray of sand. To protect the table or floor, you may want to place a tarp underneath the tray, to collect extraneous sand. The paper can be flimsy in the sand, so you may want to laminate the copies before you cut out the shark teeth.
3. Find four bags to represent four different shark stomachs: 1) raggedtooth shark, 2) great white shark, 3) horn shark, 4) tiger shark. Label each bag with the name of one of the shark species. Eventually children will reach inside these shark stomachs to discover what each shark eats. Pinkish-red bags work well, since they are colored like a stomach. Also, red pillowcases or old santa hats (with the white fuzzy lining cut off) make great shark stomachs.
4. Write the diet of each shark on index cards and place the index cards in the corresponding shark’s stomach. Write each food item on a separate index card.





Raggedtooth shark: fish

Great white shark: marine mammals (sea lions, seals, dolphins, etc.) and fish

Horn shark: molluscs (snails, clams), echinoderms (sea stars) and crustaceans (crabs, shrimp, lobsters)

Tiger shark: fish, marine mammals (sea lions, seals, dolphins), sea turtles, birds, sea snakes, trash

5. Show students the 2 minute scene called "Shark Dentists" from *The Shark Riddle*. This will introduce students to different shapes of shark teeth, as well as how shark teeth are used. This clip is available online for free at www.sisbro.com/sharks

Variations

Use real shark teeth. Then you can ask students several other observation questions, since the teeth are multidimensional, rather than a photocopy of a tooth. What does it feel like? Hard? Soft? Sharp? Dull? What color is it?

Procedure

1. Tell children they are going to be scientists searching for shark teeth. For other examples of shark scientists and their research, read the examples in "Shark Science in Action" in this packet.

Guiding Questions:

What is a scientist? (Scientists use their senses while observing things. They also ask lots of questions. To find out the answer to those questions, they observe things and conduct experiments. In summary, a scientist is a person who uses evidence from observations to test and learn about the world.)

Shark Tooth Scientific Inquiry, Continued

What is observation? (A way of gathering information about the world using our senses: eyes, ears, smell, taste and touch.)

How do scientists learn about sharks? (They study their teeth, they watch them swimming, they tag sharks and keep track of where they go, etc.)

Why do sharks lose so many teeth? (Sharks have rows and rows of teeth, so if one falls out, another will move into place.)

Why do scientists find more fossil shark teeth than fossil shark skeletons? (Shark skeletons are made of cartilage, which is much softer than bone. Therefore the cartilage skeletons don't last long enough to fossilize. Tooth enamel is the hardest surface in the body, so teeth last a long time!)

How many teeth can a shark lose in a lifetime? (As said in The Shark Riddle, 30,000.)

2. Ask each child to carefully sift through the sand until he/she finds a shark tooth. You may let children just use their hands, or you can use a window screen as a sifting tool. As a variation, you may want to have children work with a partner (and study only one tooth between them), since scientists often work as teams.

Guiding questions:

How would a scientist look through sand for a tooth? By flinging huge bunches of sand? Or by carefully searching through the sand little by little, in order not to miss anything?

Are there any tools the students can use to look for a shark tooth like a scientist? (magnifying glasses, hands, a sifting screen)





Shark Tooth Scientific Inquiry, Continued

3. Guide children as they fill out their "Shark Tooth Observation Sheet." For young children, they may want to draw more pictures and write simple words, instead of sentences. For upper elementary students, they may make more detailed descriptions.

Guiding Questions:

What shape is your shark tooth? Have students draw the basic shape.

What is the tooth's size? Ask children to describe the tooth in terms of big or small. Ask them to use rulers to measure the height and width of the tooth.

What color is the tooth? If you use photocopies, they will be black and white. However, shark teeth are usually white, with slightly colored bases. Fossil shark teeth are darker.

What kind of human tool is the tooth shaped like? Compare the tooth to the human tools on the observation sheet.

4. Give children the "Shark Tooth Research Sheet." To fill in the first blank, tell the children they will be answering the following question: What does this shark eat?

Guiding questions:

Scientists ask questions based on their observations. What questions might a scientist have, after looking at a tooth? (What kind of shark tooth is it? How old is the shark who lost this tooth? How long has the tooth been out of the mouth? Where else in the world have people found this kind of shark tooth? Will the tooth's color change over time? Does a shark feel pain when a tooth falls out?)

5. Help children write a hypothesis on their research sheet.

Guiding questions:

What is a hypothesis? (An educated guess about what you will find in an experiment. It is more than a question. It is a guess about what the answer to the question will be.)

Can different students' hypotheses be different? (Yes, especially if they have different shark teeth. Also, scientists may have different ideas. Even if one child has the same shaped tooth as another child, the children may interpret those teeth differently. A hypothesis may be different, but hopefully the investigation will reach similar conclusions.

6. Give each student a chance to view the "Student Shark Tooth Guide" to determine what kind of shark tooth he/she has.
7. Begin the shark stomach investigation. Each student should reach into the stomach of his/her determined shark species and write the different food items on his/her research sheet.
8. Guide children as they write a conclusion based on their findings.

Guiding questions:

What is a conclusion? (It is a description of a scientists' research, including the initial hypothesis, the method of investigation and of course, whether the results matched the hypothesis. It basically says whether the hypothesis was right. Also, scientists often suggest future areas of study.





Shark Tooth Scientific Inquiry, Continued

SHARK TEETH FOR DIGGING



Raggedtooth Shark Teeth



Great White Shark Teeth



Horn Shark Teeth



Tiger Shark Teeth





Shark Tooth Scientific Inquiry, Continued

TEACHER SHARK GUIDE



RAGGEDTOOTH SHARK *Carcharias taurus*
(also called grey nurse or sandtiger shark)

Tooth shape: Needles for spearing and holding fish

Diet: Fish (such as small bony fish, small sharks and small rays)

Behavior: Gentle sharks that bite only rarely, when human divers provoke or touch the shark

Range: Warm to temperate waters of the Atlantic, Mediterranean and Western Pacific basins



GREAT WHITE SHARK *Carcharodon carcharias*

Tooth shape: Saws for cutting (marine mammal blubber), also a knife-shape for stabbing (fish and marine mammals)

Diet: Marine mammals (sea lions, seals, dolphins), fish

Behavior: Actually very picky eaters, not the frenzied eating machines shown in Hollywood movies. However, they are responsible for the most unprovoked attacks on humans in colder water.

Range: Worldwide except the cold waters of the Arctic and Antarctic



HORN SHARK *Heterodontus francisci*

Tooth Shape: Mallet (or round) for crushing hard shells; These are the back teeth, as the front teeth are pointy

Diet: Mostly bottom-dwelling invertebrates, such as molluscs (snails, clams), echinoderms (sea stars) and crustaceans (crabs, shrimp)

Behavior: Not dangerous to humans, they are bottom-dwelling sharks that wait to ambush small prey

Range: Off the western coast of North America, between California and Mexico



TIGER SHARK *Galeocerdo cuvier*

Tooth shape: Hook/can-opener for piercing (sea turtle shells), saw for cutting (marine mammals), knife for stabbing

Diet: Very diverse - fish, sea turtles, marine mammals (sea lions, seals, dolphins), birds, sea snakes, trash, dead animals; one of the true shark scavengers

Behavior: Tiger sharks are sometimes called “the garbage cans of the sea.” As their teeth show many different functions, they are able to eat many different prey items. They are potentially dangerous to humans.

Range: Worldwide warm and temperate seas





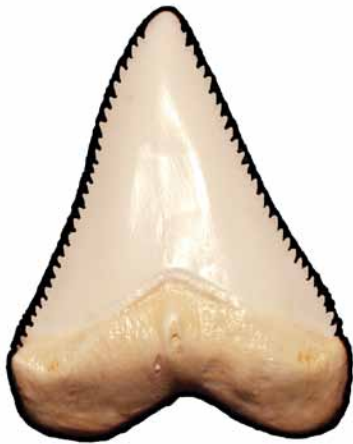
Shark Tooth Scientific Inquiry, Continued

STUDENT SHARK GUIDE

What kind of shark tooth do you have? Find the shape of your shark tooth on this page to find out.



Raggedtooth Shark (*Carcharius taurus*)



Great White Shark (*Carcharodon carcharius*)



Horn Shark (*Heterodontus francisci*)



Tiger Shark (*Galeocerdo cuvier*)



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My name: _____

Shark Tooth Observation Sheet

Draw the shape of the shark tooth.

How big is the shark tooth? Is it big? Small? Take measurements with a ruler.

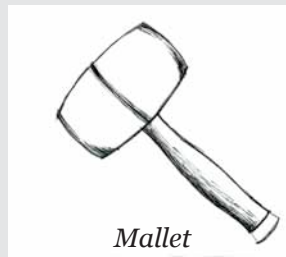
Different shapes of teeth are adapted for eating different things. Sharks use their teeth like tools to eat food. Look at the tools below. Which of these human tools does your tooth look like? (Circle any that look like your tooth. There may be more than one).



Needle



Saw



Mallet



Can opener

Needle-shaped teeth

Needle-shaped teeth are good for holding prey like fish. Sharks with long, sharp teeth can easily catch, stab and hold a fish before swallowing it.

Saw-shaped teeth

Saw-shaped teeth have edges that are good for cutting through tough skin or blubber. Sharks that have saw-shaped teeth often eat marine mammals, like sea lions and seals.

Mallet-shaped teeth

Mallet-shaped teeth are rounded, but good at crushing things. Much like human molars (our back teeth), some sharks have rounded teeth in the back of the jaw. These teeth are good at smashing and crushing food like shells of shellfish and invertebrates (clams, sea stars, crabs, snails, etc.).

Hook/Can-Opener Teeth

Curved teeth are good at gripping and cracking tough shells, like sea turtle shells. Sharks with hooked teeth may be better able to grab fish, much like we use fishing hooks.





My name: _____

Shark Tooth Research Sheet

Question

What is the basic question I want to answer?

Hypothesis

Based on the shape of this shark's tooth, I think this shark eats _____

_____.

Shark Stomach Investigation

Compare your tooth to the Shark Tooth Guide. What kind of shark tooth do you have?
(raggedtooth shark, great white shark, horn shark or tiger shark)

Find the stomach of your shark species. Reach inside to find out what the shark eats. What food does the shark eat?

Conclusion

After doing an investigation, scientists write down their conclusions, so other people can learn from what they learned. Was your hypothesis right? In other words, did the shark eat food that you guessed it would eat?

Did the shark also eat different foods than you guessed? What foods were different?

Future Questions to Answer

What other question do you want to answer about this shark?



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Shark Science in Action

Overview/Educational Standards: *These are three examples of real-life studies about sharks, broken down into the steps of scientific inquiry.*

Great White Sharks: Is mistaken identity a reason for great white shark attacks on surfers?

The scientist: Dr. Scott Anderson, with other scientists at the Point Reyes Bird Sanctuary on Southeast Farallon Island, California.

Scientists have spent years watching great white shark feeding behavior off the Farallon Islands, recording attacks on elephant seals, fur seals, sea lions and other prey.

Observation: Scientists observed that the shape of a swimming sea lion or seal looks like the shape of a surfboard.

Question: Are great white sharks attracted to the shape of a sea lion, and therefore a surfboard, in the water?

Hypothesis: Great white sharks use visual search cues (such as the shape of a sea lion) when determining whether to attack.

Investigation: Dr. Anderson attached a video camera to the bottom of a surfboard and dragged it behind a boat. He recorded great white shark attacks on that surfboard and found that most sharks stalked their prey from the bottom, then suddenly launched upward to attack the surfboard at the surface.

Conclusion: Great white sharks use visual search cues, looking for the shape of a sea lion



or seal. Since the view of a surfboard from underneath mimics that shape, attacks on surfers could be a case of mistaken identity.

Future questions to answer: After this experiment, Dr. Peter Klimley continued to investigate whether the amount of blubber (or energy-rich fat) contributes to great white shark attacks. He observed that great white sharks would eat sea lion carcasses, but they ignored sheep carcasses in the water. Do the great white sharks prefer creatures with lots of blubber? This could factor into why great white sharks, who rarely attack humans, often bite humans once but never return to actually feed.



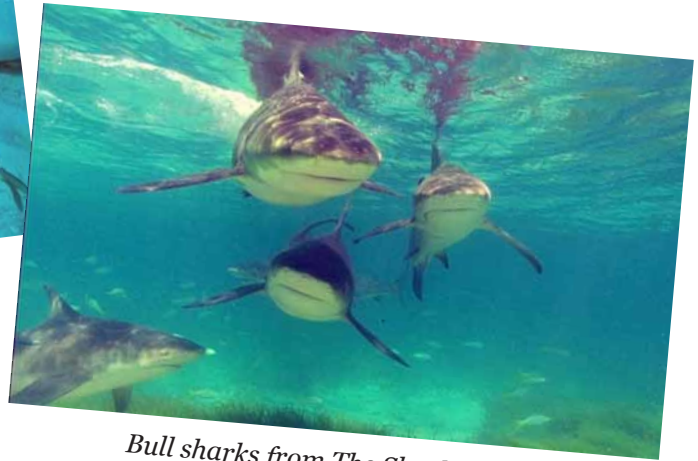


Shark Science in Action, Continued

Shark Smell: Do sharks really have an amazing sense of smell?



Blacktip reef sharks from The Shark Riddle



Bull sharks from The Shark Riddle

The scientist: Tricia Meredith, who is studying sharks at Florida Atlantic University

Observation: People have observed that sharks are quick to show up when chum (odors of dead animals, such as fish parts, oil and blood) are in the water.

Question: Do sharks approach chum because they have an especially sensitive sense of smell?

Hypothesis: Tricia hypothesized that sharks show up quickly when chum is in the water because they have an especially sensitive sense of smell.

Investigation: Tricia put odors into sharks' noses and recorded whether or not they could smell them to figure out their sensitivity to

odors. By testing whether they could smell odors that were more and more dilute (harder and harder to smell), she could determine how well they could really smell certain odors.

Conclusion: Contrary to what many people think, sharks are no more sensitive to odors than other fish. That means they do not smell any better than other fish.

Future Questions to Answer: Which odors do sharks smell better than others? Do sharks use their sense of smell more than their sense of sight?





Shark Science in Action, Continued

Whale Sharks: How much does a whale shark eat?

The scientists: A team of scientists led by Philip J. Motta, including Michael Maslanka, Robert E. Hueter, Ray L. Davis, Rafael de la Parra, Samantha L. Mulvany, Maria Laura Habegger, James A. Strother, Kyle R. Mara, Jayne M. Gardiner, John P. Tyminski, Leslie D. Zeigler

Observations: Off the coast of Mexico, whale sharks were observed eating zooplankton, which are tiny animals drifting in the water. These whale sharks ate by swimming around with their mouths open to filter plankton from the water through their gill rakers, in a process called “ram filter feeding.” Scientists observed that these whale sharks ate, on average, 7.5 hours a day.

Question: How much does a whale shark eat during a day?

Investigation: By following whale sharks with the boat, scientists timed how fast a whale shark was swimming.

By taking pictures and filming a shark while it was eating, scientists measured the size of the whale shark’s mouth and how much water could fit in its mouth. They estimated how much water passed through the whale shark’s mouth per hour.

Then scientists estimated how much plankton was in the water, by taking water samples to determine average plankton density in that part of the ocean.



Conclusion: A young, 14.5 foot (443 cm) long whale shark ate an average of 3567 calories of plankton per day. That is about the same as eating two Whoppers®, two large fries, two large soft drinks and one small vanilla milkshake from Burger King®.

Another whale shark, which was about 20 feet (622 cm) long, ate an average of 6718 calories of plankton in a day. That is about the same as eating four Whoppers®, four large fries, four large soft drinks and one small vanilla shake from Burger King®.

Future questions to answer: How much do whale sharks eat in other parts of the world? Do whale sharks migrate to follow plankton in the ocean?





Whale Shark Math

These math questions are based on the kinds of math problems scientists did during the whale shark study in this packet titled, "Whale Sharks: How much does a whale shark eat?" These numbers may be simplified for younger students.

1. One whale shark is 20 feet long. Another whale shark is 14.5 feet long. How much longer is the 20 foot long whale shark?

$$20 - 14.5 =$$

2. A smaller, 14.5 foot whale shark eats 3567 calories each day. A medium-sized, 20 foot long whale shark eats 6718 calories a day. How many more calories per day does the 20 foot long whale shark eat than the smaller whale shark?

$$6718 - 3567 =$$

3. If a whale shark eats 500 calories of plankton in 1 hour, how many calories of plankton will the whale shark eat in 5 hours?

$$500 \times 5 =$$

4. You test the ocean water and count 1000 plankton in one gallon of water. If a whale shark can fit 10 gallons of water in its mouth, how many plankton would be in the whale shark's mouth if it filled its mouth with water?

$$1000 \times 10 =$$

5. You are driving a boat in the ocean, and you notice a whale shark is traveling as fast as your boat. If your boat traveled 3 miles in 30 minutes, how fast is the boat (and the whale shark) traveling per hour? Give your answer in miles per hour.

$$3 \text{ miles}/30 \text{ minutes} = x \text{ miles}/60 \text{ minutes}$$

6. You measure the mouth of a small whale shark and find that if it swallows a full mouthful of water, it swallows 10,000 plankton. But sometimes whale sharks swim around with part of their mouths out of the water. If a whale shark fills its mouth only 75% full of water, how many plankton does it eat?

$$10,000 \times .75 =$$





Shark Tooth Banner



Objective

Make a shark tooth banner to hang in the classroom or at home, while learning about the different shapes of shark teeth.

Educational Standards

Comparing and contrasting characteristics among individuals within one animal group.

Explaining how animal adaptations influence survival.

Making observations about the natural world.

Materials

Copies of the six different shark teeth for each person, scissors, glue sticks, a hole puncher, yarn, construction paper of different colors

Background

There are over 400 different kinds of sharks, each with a unique tooth style and structure. While most people are familiar with the triangular shape of the great white shark, they are not as familiar with the diversity of other teeth. Some sharks have teeth that are round, for crushing hard shells. Some teeth are skinny and pointy, for holding fish. Some teeth are serrated like saws.

Whale sharks, the biggest fish in the ocean at 50 feet (15 meters), have extraordinarily tiny teeth. As shown in *The Shark Riddle*, the teeth are about 1/8 inch long (3 mm) and are no longer used for feeding, since whale sharks filter the water for plankton.





Shark Tooth Banner, Continued

By contrast, the extinct megalodon shark had teeth that grew over 7 inches (18 cm) long. Its name “megalodon” actually translates to “big tooth.”

Sharks have a constant supply of teeth. When one tooth falls out, another tooth moves in to take its place. A shark can lose up to 30,000 teeth in its lifetime, giving plenty of opportunity for the teeth to wash up on beaches. People may find teeth that fell out of a living shark, or people may find fossilized shark teeth. Fossilized shark teeth are the main way that scientists can learn about ancient sharks, which have existed since before the dinosaurs. In fact, we only know about the existence of the megalodon shark, the giant whale-eating shark that was as big as a school bus, because someone found its huge fossilized tooth.

How can scientists use shark teeth to learn about the behavior of sharks? The shapes give them clues about how the sharks use their teeth, and what they might eat.

Needle-shaped teeth

Needle-shaped teeth are good for holding prey like fish. Sharks with long, sharp teeth can easily catch, stab and hold a fish before swallowing it.



Saw-shaped teeth

Saw-shaped teeth have edges that are good for cutting through tough skin or blubber. Sharks that have saw-shaped teeth often eat marine mammals, like sea lions and seals.



Mallet-shaped teeth

Mallet-shaped teeth are not sharp, but are good at crushing things. Much like human molars (our back teeth), some



sharks have rounded teeth in the back of the jaw. These teeth are good at smashing and crushing food like shells of shellfish and invertebrates (clams, crabs, snails, etc.).

Hook/Can-Opener teeth

Curved teeth are good at gripping and cracking tough shells, like sea turtle shells. Sharks with hooked teeth may be better able to grab fish, much like we use fishing hooks.



Knife-shaped teeth

Knife-shaped teeth are good at cutting prey like mammals and fish. They work like spears or other tools that cut.



This activity features six different kinds of teeth. The teeth may feature one or more of these mentioned shapes. You may also come up with other shapes. Please note that the teeth are much bigger than real life, and they are not proportionally to scale. They are all big, because that makes the finished banner look better.

Pre-activity Discussion

1. Watch the scene titled “Shark Dentists” in *The Shark Riddle*. You may also want to watch other sections of the movie, since Laura and Robert find four different kinds of teeth throughout the episode: a megalodon tooth, great white shark tooth, lemon shark tooth and whale shark tooth. The dentist clip is available for free at www.sisbro.com/sharks.
2. Give each child six different teeth, so that they may look at the different shapes.
3. Tell the children they will be scientists, who are using observations to compare the shapes of shark teeth. Sharks use teeth like tools.



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Shark Tooth Banner, Continued

Overall, what human tools do these teeth look like? (knife, spear, saw, needle, hook, hammer, mallet, etc.) Write answers on the board or a large piece of paper, as a brainstorming list.

- On that same board or paper, write the names of the six different kinds of sharks. Under each name, write which human tools the students think its tooth looks like. There may be different ideas and answers, since this is basically an observation and opinion exercise. See the “teacher list” below for a guide.
- Talk to the children about the different shapes of teeth listed in the “Background” section (needle, saw, mallet, hook, knife), as well as how sharks use those teeth. Then ask students to guess, through inference, what each shark eats. For example, “Saw-shaped teeth have edges that are good for cutting through tough skin or blubber. Sharks that have saw-shaped teeth often eat marine mammals, like sea lions and seals. Which sharks did you list as having saw-like teeth? *The great white and tiger shark*. What do you think they eat?” Add the marine mammals (seals, sea lions, dolphins, etc.) under great white shark and tiger shark. Continue with this line of questioning until you have added information for each shark.

A teacher list is provided here, to help guide the discussion. This discussion may also occur while the students are making the banner, not before.

GREAT WHITE SHARK

Shapes: saw, knife

Diet: Marine mammals (sea lions, seals), fish

Notes: The great white shark has triangular teeth with serrated edges. The saw-like edges help them tear through marine mammal skin

and blubber. Their teeth can grow to over 2 inches long.

HORN SHARK

Shapes: mallet

Diet: mostly shelled animals such as molluscs (snails, clams), echinoderms (sea stars) and crustaceans (crabs, shrimp)

Notes: The horn shark is a small shark, around 4 feet (122 cm) or less. It is not dangerous to humans and its teeth are very small. Horn sharks have sharp, pointy teeth in the front of their jaws, and these rounded teeth in the back for crushing shells.

LEMON SHARK

Shapes: knife

Diet: mostly fish, also some crustaceans and molluscs

Notes: Lemon sharks grow to about 11 feet (3.4 meters). Their teeth are blades, rather than the saw-like edges of the great white.

TIGER SHARK

Shapes: saw, hook, knife

Diet: Very diverse - fish, sea turtles, marine mammals (sea lions, seals, dolphins), birds, sea snakes, trash, dead animals; tiger sharks are some of the true shark scavengers

Notes: Tiger sharks are sometimes called “the garbage cans of the sea.” As their teeth show many different functions, they are able to eat many different prey items. They are potentially dangerous to humans and can grow up to 18 feet long (5.5 meters).

RAGGEDTOOTH SHARK

Shapes: needle

Diet: Fish (such as small bony fish, small sharks and small rays)

Notes: These are gentle sharks that bite only rarely, when human divers provoke or touch the shark. Their teeth are good for spearing and holding fish.





Shark Tooth Banner, Continued




NURSE SHARK

Shapes: little knives

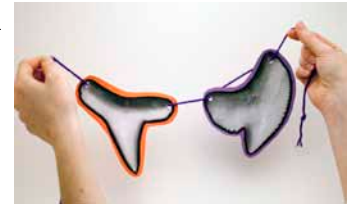
Diet: bottom-dwelling shellfish, bony fish

Notes: Nurse sharks grow to about 10 feet. They suck up their food quickly and can suck entire snails from their shells.

Banner Procedure

1. Cut out the different shark teeth.
2. Using a glue stick, glue each shark tooth to colorful construction paper. Then cut out the shape of the shark tooth, leaving a small construction paper border around the tooth.
3. Using a hole punch, punch a hole that the yarn can fit through. Clear tape can be placed on the paper before it is punched, to reinforce the hole. The placement of holes depends on how you want to hang the banner. If you hang it horizontally and upside down, you'll want to punch two holes for each tooth - one on each side of the bottom of the tooth.
4. On the back of each tooth, write the following: Name, Shape, Diet. This information should be listed on the board from the class discussion.

5. Feed a piece of yarn through the holes, so that the teeth hang well.



Extensions

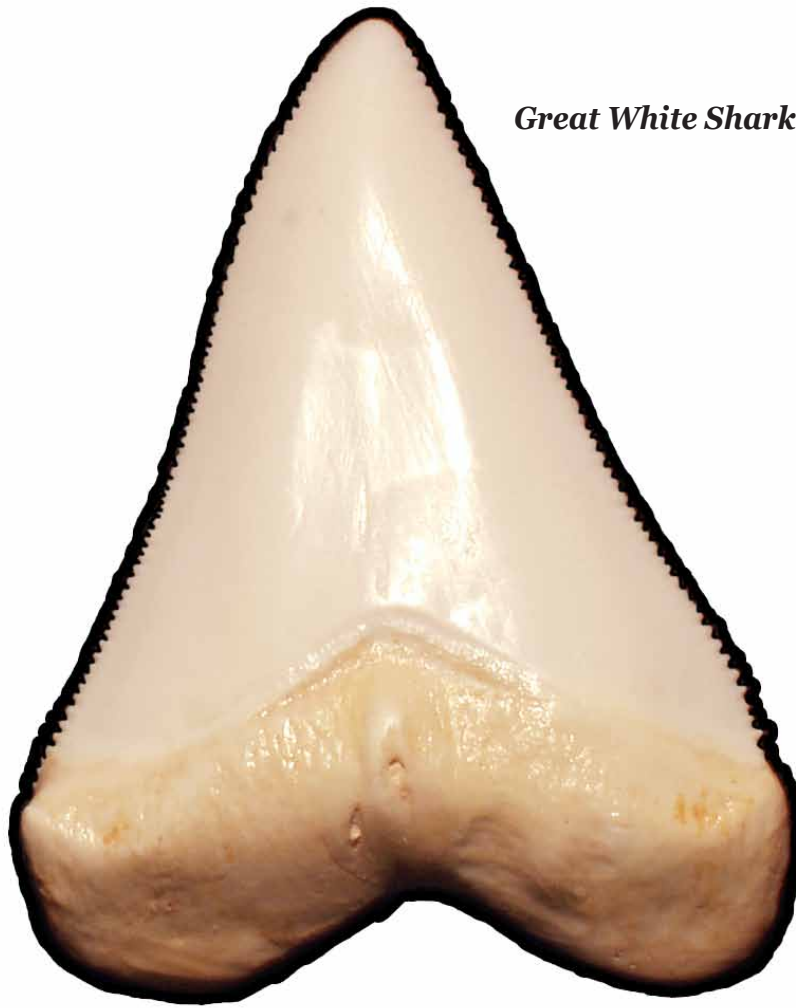
Have children create their own shark tooth from an imaginary shark. What is the tooth shaped like? How big is it? What color is it? Most importantly, how does the shape give us clues as to what the shark eats? Students can draw the shark and describe its eating patterns, based on the tooth shape. This is a great writing exercise.



Example of banner hanging vertically



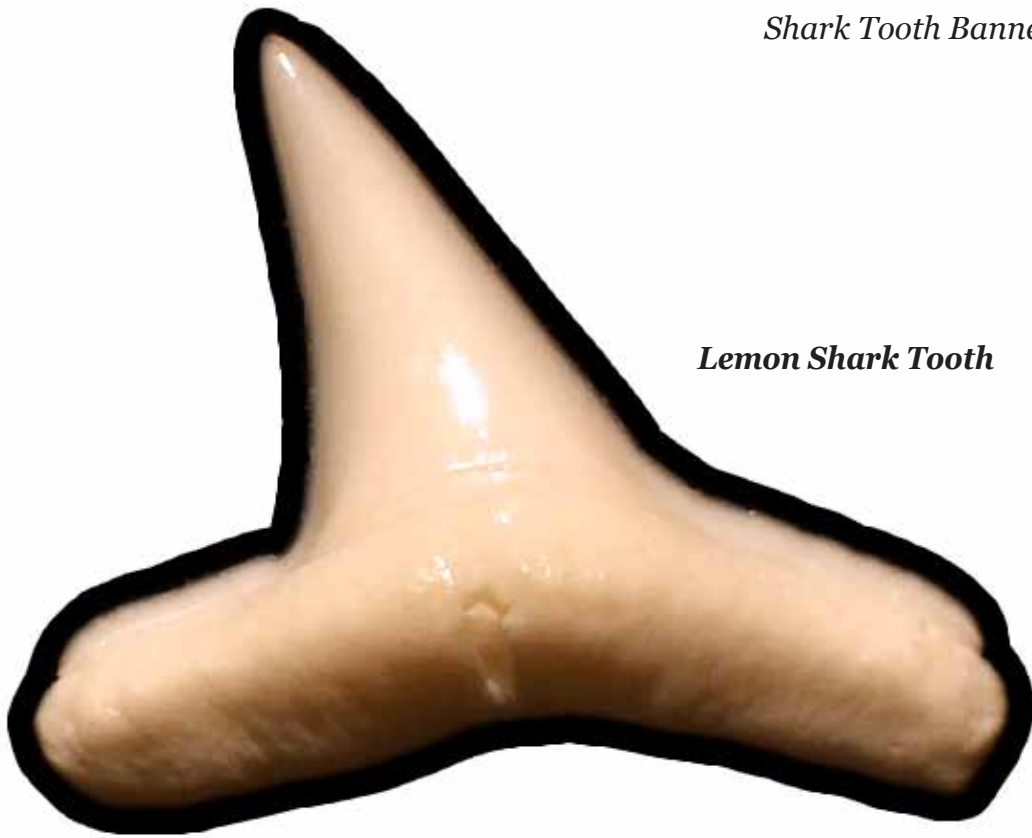
Great White Shark Tooth



Horn Shark Tooth

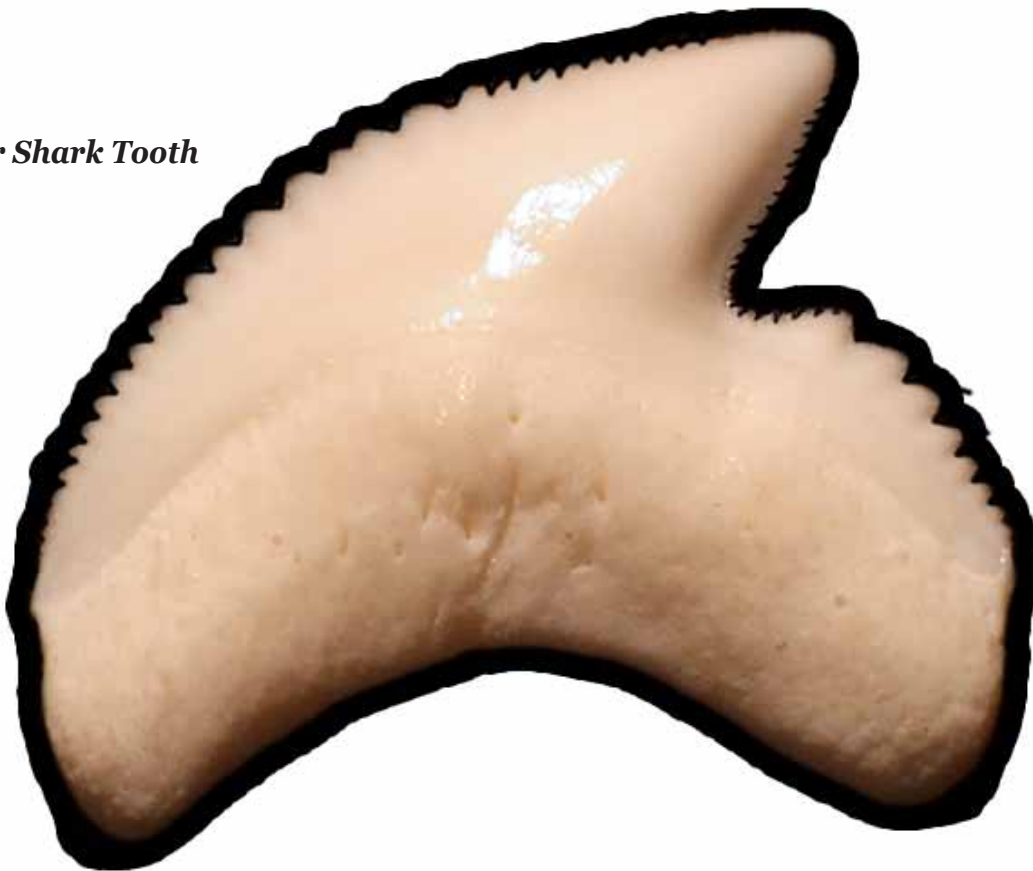


Shark Teeth



Lemon Shark Tooth

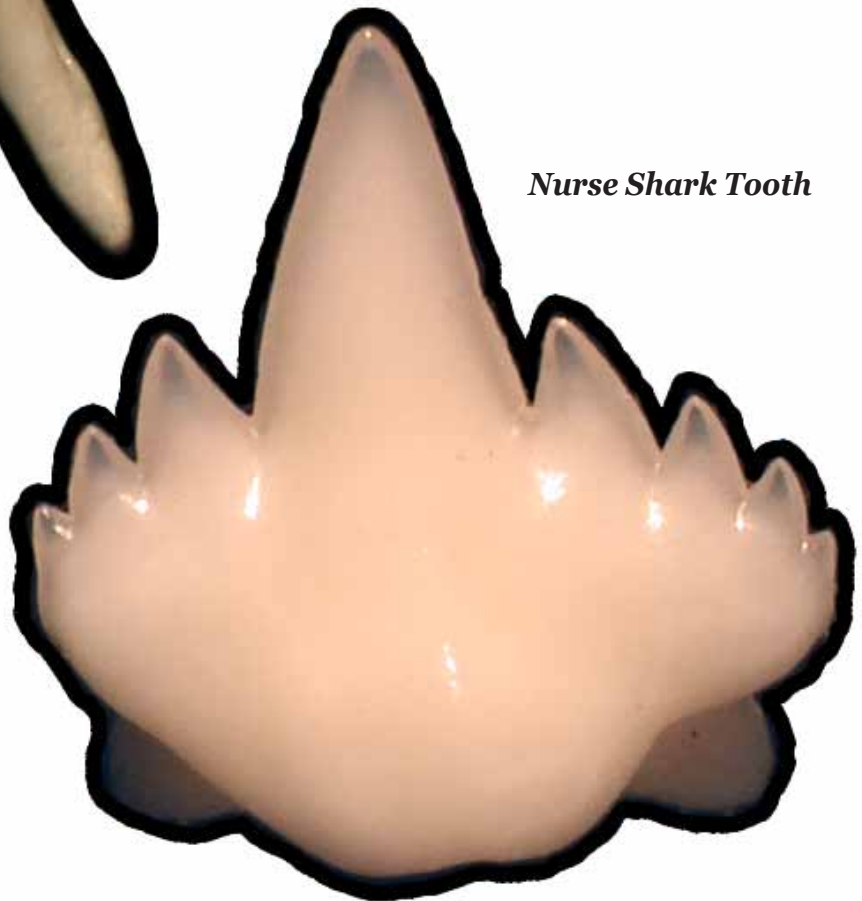
Tiger Shark Tooth



Shark Teeth

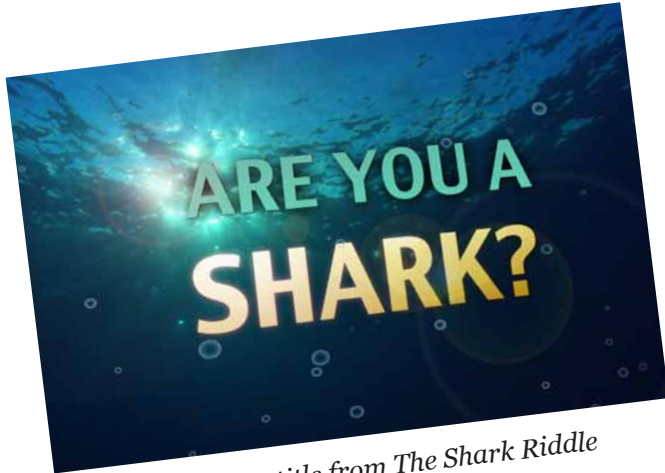


Raggedtooth (or Sand Tiger) Shark Tooth



Nurse Shark Tooth

Shark Teeth



Game show title from The Shark Riddle

Are You a Shark? (The Game Show)

Overview

This activity gives children a chance to learn four main characteristics of sharks by watching and playing a game show called “Are You A Shark?” Then children can research their own sea creatures, compare the creature’s characteristics to a shark, and finally become a contestant on the “Are You a Shark” game show.

Education Standards

Comparing and contrasting characteristics of animals in a group.

Classifying living things by characteristics.

Conducting a short research project to build and present knowledge about a topic.

Materials

Copies of the Are You a Shark Contestant Worksheet for each child, 5 copies of the “Are You a Shark” script, *The Shark Riddle* DVD, along with a DVD player, a bell, a buzzer (one from a board game like Taboo® works well). Optional: pictures of the animals for each contestant

Background

Sharks are elasmobranchs, a subclass of fish that includes sharks, rays and skates. There are

over 400 different kinds of sharks, and scientists are still discovering more. If there is one word that describes sharks, it might just be: diverse.

Their sizes range widely. The biggest shark is the peaceful whale shark, which grows up to 50 feet long (15 meters) and eats tiny plankton. One of the smallest sharks is the dwarf lantern-shark, which grows to about 8 inches (20 cm) long. Though most people know more about the big sharks, the majority of sharks are small, around 4 feet (1.5 meters) or less.

All sharks are carnivorous, though their diets are very different. Great white sharks are meat-eaters that hunt fish and marine mammals. The epaulette shark is a little shark that sucks up worms and eats shellfish on the bottom of the ocean. The basking shark filters tiny floating animals, called plankton, from the water.

Their feeding strategies are different. Whale sharks gulp water and force it out through their gill rakers, filtering out tiny planktonic animals to eat. The thresher shark has a tail as long as its body, and it swings its tail to slap and kill fish to eat.





Are You a Shark? (The Game Show), Continued

Their behaviors are very different. The angel shark hides under the sand and waits for prey to swim by, so it can suddenly lunge and grab it. The great white shark, however, often attacks its prey at the surface.

So if sharks range so widely, what is a shark?
How do sharks differ from rays?

Here are four general characteristics that identify sharks:

1. Sharks are fish.
2. Shark skeletons are not made of bones. They are made of cartilage, like our noses and ears.
3. Sharks have 5 to 7 gill slits on the sides of their heads.
4. Shark skin is covered with tiny tooth-like scales called dermal denticles (translated: "skin teeth").

Procedure

1. Watch the 3 minute scene called "Are You A Shark?" in *The Shark Riddle*. In this section, a remora fish is the host of a game show called "Are You A Shark?" He meets a lobster, a grouper, a stingray and finally, an epaulette shark. Each answers questions to determine whether it is, in fact, a shark. The epaulette shark is a small shark that actually walks on its fins!
2. After watching the scene, read the script with children. To make it easier on the first read-through, an adult can play the part of the game show host. Choose four children to be the other contestants: the lobster, the grouper, the stingray and the epaulette shark.

Read the script together. Children often have fun trying to mimic the voices from the movie. Be creative! When a contestant says "no," hit the buzzer. When a contestant says "yes," ring the bell. The bell and the buzzer add a lot of fun to the process.

3. After listening to the game show, turn each child into a new "contestant" for a future episode of the game show by assigning him/her the name of a sea animal. A list of possible animals, along with answers to the game show questions, is attached.
4. Give each child a copy of the "Are You a Shark Contestant Research Worksheet." Give children time to research their "contestant" by reading books or searching for information on the internet, in order to answer the necessary questions:

1. *Am I a fish?*

2. *Do I have a skeleton made of cartilage?*

3. *How many gills openings do I have?
Where are the openings?*

4. *Does my skin have tooth-like scales
called dermal denticles?*

If they answer "yes" to all four questions, they are sharks.

5. Host your own game show of "Are You a Shark?" Assign contestants an order to appear on the show. Once a contestant is called, ask him/her the four questions. Ring the bell after a "yes" answer and hit the buzzer after a "no" answer. You may choose to let each child answer all four questions or stop as soon as there is a "no" answer.





Are You a Shark? (The Game Show), Continued

As the game show host, you may be the one to determine whether someone is or is not a shark. Or you may want to ask the children (studio audience) after each contestant: "Is he/she a shark?" Then let the audience answer yes or no.

Children have a lot of fun acting like the studio audience and periodically shouting together the name of the game show: "Are You A Shark?"

Follow up Questions:

What are four characteristics of sharks?

How are sharks different from rays? (The placement of the gills is different. Sharks' gills are on the side of the head, while rays' gills are underneath the head).

How are sharks different from mammals? (Mammals breathe air. Sharks use gills to extract oxygen from water.)

How are sharks and rays different from other

fish? (They have skeletons of cartilage, different number of gill openings and most have different scales.)

Extensions

This activity offers a great chance for children to think about how animals are classified, and about what characteristics different kinds of animals share. As an extension, write another type of game show, such as "Are You A Mammal?" or "Are You A Fish?" Help children come up with the characteristics of those animal groups.

Instead of choosing big classification groups, try classifying dogs versus cats. What is the same? What is different? What characteristics could children use to write a game show called "Are You a Cat?"

Children often like to take turns as the game show host, as well. Encourage students to play the game show in small groups, letting different children be the game show host.



Epaulette shark from The Shark Riddle





Are You a Shark? (The Game Show), Continued

ARE YOU A SHARK? THE SCRIPT

from the movie, The Shark Riddle, written by Laura Sams, Robert Sams, Dave Cain

Characters Needed

Remora fish (game show host), a lobster, a grouper, a stingray, an epaulette shark, the audience

Dialogue

Upbeat game show music begins to play, as the game show host introduces himself.

Remora: I am a remora fish, and also the host of everybody's favorite game show:

Audience: Are You A Shark?! (*yelling together like a studio audience*)

Remora: Folks, take a look at this flat head of mine. It works like a suction cup. Perfect for sticking to things, like sharks. I've ridden tiger sharks, bull sharks . . . I find a shark, and I stick my head to it. Nobody knows more about sharks than I do, which is why I'm the host of:



Remora Fish

Audience: Are You A Shark?! (*yelling together like a studio audience*)

Remora: Now let's meet our first contestant, this lobster.

Lobster: Am I a shark?

Remora: Sharks are fish. Are you a fish?

Lobster: Um, no. (*buzzer sounds*)

Remora: Then sorry, you are not a shark. You're a lobster. Moving on to the next contestant, this grouper.

Grouper: Am I a shark?

Remora: Are you a fish?

Grouper: Yes. (*bell dings*)

Remora: And is your skeleton made of cartilage?

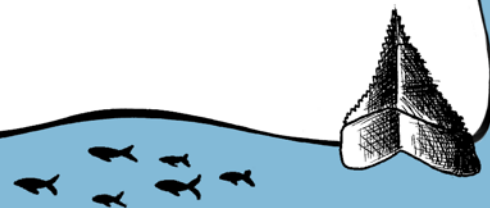
Grouper: No, my skeleton is made of bones.

Remora: Oh sorry. (*buzzer sounds*) Sharks have skeletons made of cartilage, which makes them very flexible animals and subsequently, very fun to ride if you can ever stick your head to one. Thanks for playing.

Okay, contestant number three, the stingray.



Grouper





Are You a Shark? (The Game Show), Continued

Stingray: Am I a shark?

Remora: Are you a fish?

Stingray: Yes. *(Bell dings)*

Remora: Is your skeleton made of cartilage?

Stingray: Yes. *(Bell dings)*

Remora: Hmm, interesting. Do you have 5 to 7 gill openings on the side of your head?

Stingray: Almost, but my gill openings are underneath my head. Does that count?

Remora: Oh sorry. *(Buzzer sounds)* Then you are not a shark. Sharks have at least five gill openings, right on each side of the head. But you are closely related to sharks. So close!! And now our final contestant, this little guy from Papa New Guinea.

Epaulette: Am I a shark?

Remora: Are you a fish?

Epaulette: Yes. *(Bell dings)*

Remora: Is your skeleton made of cartilage?

Epaulette: Of course. *(Bell dings)*

Remora: Do you have at least 5 gill openings on the side of your head?

Epaulette: Most definitely. *(Bell dings)*

Remora: This could be it folks. Final question. Shark skin has tiny tooth-like scales called dermal denticles. It feels very rough to the touch. Do you have rough skin?

Epaulette: Yes.

Remora: Then congratulations, you are a shark! An epaulette shark in fact. What are you going to do now that you've won?

Remora: I'm going to go eat some worms.

Epaulette: Whoah, a walking shark that eats worms! Amazing! There are so many different kinds of sharks in this world. Big and small. Someday I hope to ride the biggest one of them all, but that's for another episode of:

Audience: Are You A Shark?! *(yelling together like a studio audience)*



Underside of a stingray



Epaulette shark





Are You a Shark? (The Game Show), Continued

POSSIBLE GAME SHOW CONTESTANTS

Here are some animals that could be assigned to children for the game show, along with answers to the game show questions. Yes to all four questions means: it is a shark!

1. *Am I a fish?*
2. *Do I have a skeleton made of cartilage?*
3. *Do I have 5 to 7 gill openings on each side of my head?*
4. *Does my skin have tooth-like scales called dermal denticles?*

MAMMALS:

Bottle-nosed dolphin (no, no, no gills, no)

Killer whale (no, no, no gills, no)

Walrus (no, no, no gills, no)

RAYS:

Manta ray (yes, yes, no - 5 gills on each side underneath head, yes)

Bat ray (yes, yes, no - 5 on each side underneath head, yes)

Spotted eagle ray (yes, yes, no - 5 on each side underneath head, no)

Guitarfish (yes, yes, no - 5 on each side underneath head, yes)

Stingray (yes, yes, no - 5 on each side underneath head, yes)

SHARKS:

Spiny dogfish (yes, yes, yes - 5 on each side of head, yes)

Raggedtooth shark (yes, yes, yes - 5 on each side of head, yes)

Megamouth shark (yes, yes, yes - 5 on each side of head, yes)

Tiger shark (yes, yes, yes - 5 on each side of head, yes)

Nurse shark (yes, yes, yes - 5 on each side of head, yes)

Pajama shark (yes, yes, yes - 5 on each side of head, yes)

Sharp-nose sevengill shark (yes, yes, yes - 7 on each side of head, yes)

Whale shark (yes, yes, yes - 5 on each side of head, yes)

Blacktip reef shark (yes, yes, yes - 5 on each side of head, yes)

Lemon shark (yes, yes, yes - 5 on each side of head, yes)

OTHER FISH:

Barracuda fish (yes, no, no - 1 on each side, no)

Tuna fish (yes, no, no - 1 on each side of head, no)

Parrot fish (yes, no, no - 1 on each side of head, no)

Moray eel (yes, no, no - 1 on each side of head, no)

Marlin (yes, no, no - 1 on each side of head, no)

Clownfish (yes, no, no - 1 on each side of head, no)

Sardine (yes, no, no - 1 on each side of head, no)

Salmon (yes, no, no - 1 on each side of head, no)

Red snapper (yes, no, no - 1 on each side of head, no)

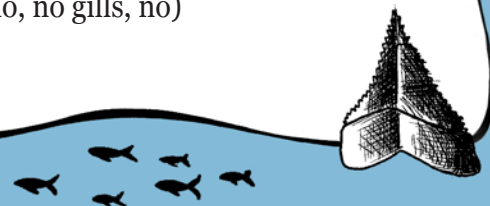
OTHER ANIMALS:

Fiddler crab (no, no, no gills, no)

Sea turtle (no, no, no gills, no)

Horseshoe crab (no, no, no gills, no)

Seagull (no, no, no gills, no)





My name: _____

Are You A Shark? Contestant Research Worksheet

My sea animal is:

Am I a fish?

Is my skeleton made of cartilage?

How many gill openings do I have? Where are they?

Is my skin rough to the touch and covered with tiny tooth-like scales?



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Magic Journal Page



Overview

Children can use the attached magic journal page as a blank slate for writing or drawing.

Materials

Copies of the attached “My Magic Journal” page, pencils, crayons or markers

Background

In *The Shark Riddle*, the Riddle Solvers found a magic journal that revealed stories about sharks. The attached magic journal page is a photograph of that journal.

Educational Standards and Procedure

Here are some educational standards and ideas about how to use the journal page.

Forming and using frequently occurring irregular plural nouns (e.g., feet, children, teeth, mice, fish).

Make a list of irregular plural nouns on one side of the journal and then use them in sentences on the other side. (The children found shark teeth and learned about fish.)

Using adjectives and adverbs, and choosing between them depending on what is to be modified.

Make a list of adjectives and adverbs that describe sharks and how sharks move. Use those adjectives or adverbs in full sentences.

Capitalizing geographic names.

Write the names of islands, cities or oceans where you might see sharks or find shark teeth.

Conducting a short research project to build and present knowledge about a topic.

Encourage students to read about sharks in order to create a journal page based on the format in the *The Shark Riddle*. 1. Draw the shape of the shark tooth. 2. Draw a sketch of the shark. 3. List the basic diet and size of the shark. 4. Write a short story about that shark.

Forming and using the simple verb tenses (e.g., I walked; I walk; I will walk).

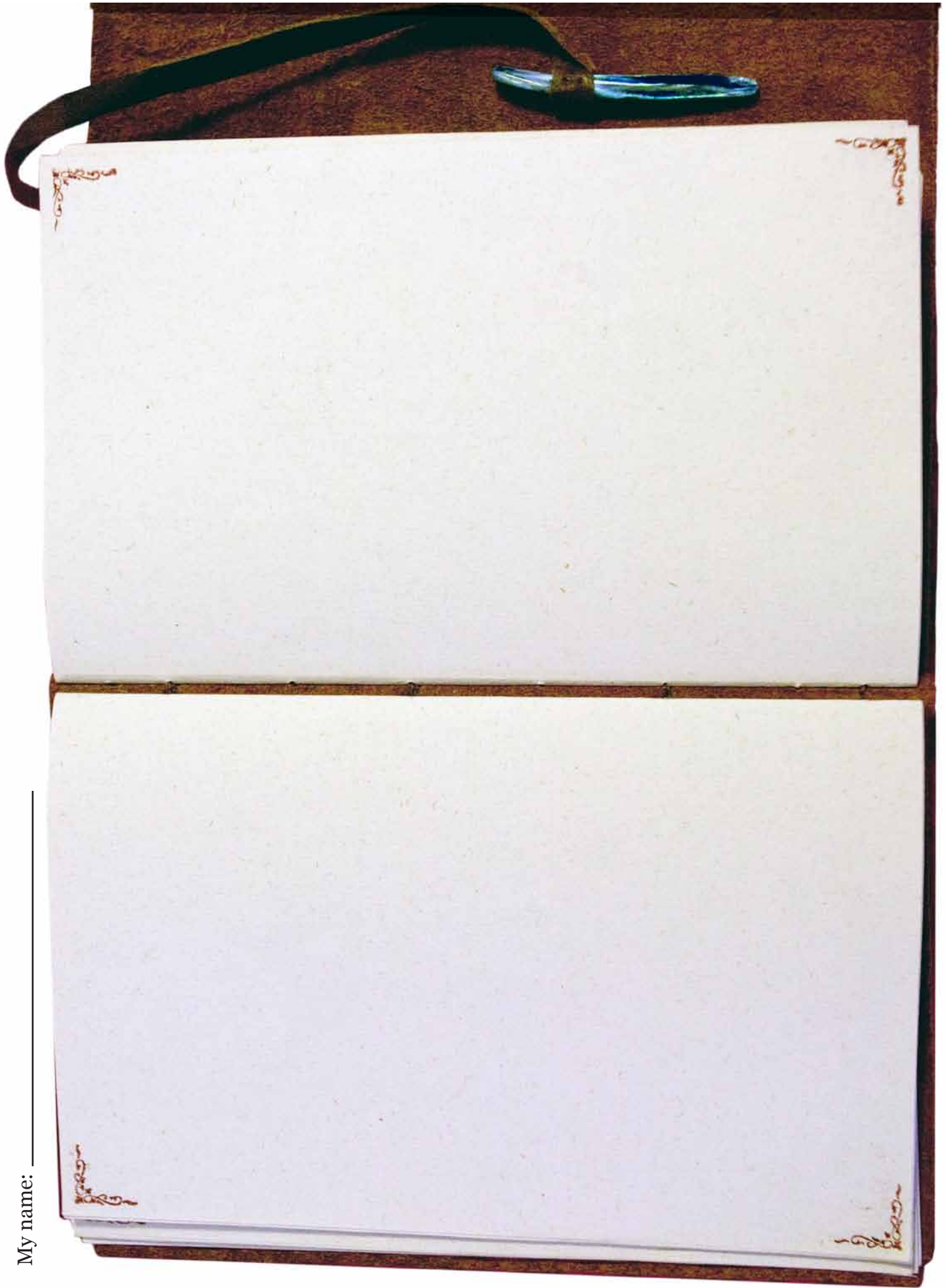
Write a story about finding a shark tooth, using past tense verbs on one side of the journal. Then write that same story using present tense verbs on the other side of the journal.

Making observations about the natural world, and using those observations to ask questions in the process of scientific inquiry.

Watch the last story in *The Shark Riddle* about the whale shark without any sound. Have students pretend they are scientists seeing that shark for the first time. What do they observe about the shark? What questions do they have about the shark? Write these observations and questions in the journal.



My name: _____



My Magic Journal



The Greatest Shark Debate



Sea lions from *The Shark Riddle*

Overview

What is the greatest shark in the ocean? Students will choose a type of shark to research. Then they will create a campaign poster and short speech about why that shark is the greatest shark in the ocean, from the viewpoint of another animal in the ocean. This is inspired by the sea lion's speech and song about the great white shark, in *The Shark Riddle*.

Materials

materials to make colorful posters, materials to write a short speech, access to research tools (books, magazines, the Internet, the movie *The Shark Riddle*)

Educational Standards

Writing opinion pieces on topics or texts, supporting a point of view with reasons.

Choosing words and phrases for effect.

Distinguishing that authors use different voices and points of view to convey meaning.



Harbor seal in *The Shark Riddle*

Distinguishing their own point of view from that of the author of a text.

Adding drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings.

Conducting a short research project to build and present knowledge about a topic.

Background

In *The Shark Riddle*, the sea lions sing a tribute to their predator, the great white shark. The song is joyous, which seems strange, since great white sharks eat sea lions. However, the sea lions sing about the need for a healthy food chain, so they can have fish to eat.





The Greatest Shark Debate, Continued

1. Read the attached speech by a sea lion, and listen to *The Great White Shark Song*. Both are written from the viewpoint of sea lions. The song is available for free at www.sisbro.com/sharks. The lyrics are available in "The Great White Shark Song Activity" this packet.
2. Lead a discussion that helps children think about how the speech and song were written from a unique point of view, the viewpoint of the sea lions.

Does it seem strange that prey would sing happily about a predator?

Does this unique viewpoint make the speech or song more interesting?

What information did the sea lions share about the great white shark?

How were the speech and the song different than a similar speech from the viewpoint of a human? Did the sea lion use any words or examples that were unique to the life of a sea lion?

What parts of the speech or song did you like? Are there certain words or phrases that helped you become interested? Excited? Curious? Surprised?

Procedure

1. Tell students they are going to make a poster and write a short speech about why a shark is the greatest shark in the ocean. But the trick is - it won't be from their own viewpoint. It will be from the viewpoint of an animal in the ocean.
2. Allow students to choose a kind of shark to research.
3. Assign each student their new animal, such as: killer whale, dolphin, fisherman, fish, crab, lobster, sea urchin, otter, baby seal, adult seal, another shark, sea turtle, plankton, remora fish, stingray, sea anemone.

As examples: What would a lobster say about a nurse shark? What would a killer whale say about a great white shark? What would a sea turtle say about a tiger shark? What would a baby seal say about an epaulette shark? What would plankton say about the great white shark? What would a fish say about a whale shark?
4. Students should research their shark. They should write down three things they think are amazing about that shark.
5. Students should research their own animal. They should write down four things: what it eats, what eats it, where it lives and how the animal might interact with that shark.
4. Using the information from their research, students should create a campaign poster about the shark from the viewpoint of their animal. The poster should include a main drawing, and something about the shark.

What would be on a poster that would convince other animals that your shark is the greatest shark?
5. Children should write a short speech to go with the poster about why their shark is the greatest shark.
6. Post the posters and speeches around the classroom. As an extension, hold a class election, where students must vote on their favorite posters/speeches.





The Greatest Shark Debate, Continued

A SEA LION SPEECH

The Great White Shark: The Greatest?

As a sea lion, I'm not supposed to like the great white shark. Great whites eat sea lions, and I don't like being eaten. However, I believe the great white shark is the greatest shark in the ocean!

This is a shark that can grow over 20 feet long and weigh over five thousand pounds. It's amazing to think that an animal that big can swim over 25 miles per hour and jump completely out of the water! And talk about teeth! Its toothy grin displays hundreds of saw-like teeth that can be nearly 3 inches long! Be glad that you humans are not on the menu. I am on the menu, and trust me, these sharks are very sneaky. It's hard to imagine an animal that large can seemingly disappear when it doesn't want to be seen. Its belly is white, but the rest of its body is dark – so dark it blends in with the dark ocean floor. And just as it swims underneath its target – BAM! It will launch straight toward the surface like a missile with teeth.

But even though these sharks are very good hunters, I'm amazed by what picky eaters they are. If the food is not full of energy rich fat, then a great white probably won't eat it. That's the catch to being a sea lion. I live in fairly cold water, and to stay warm I need a thick layer of blubber. That's what makes me so tasty. Though, I have to say that the elephant seals probably have it the worst. Being the biggest and blubberiest of the seals, they are always the great white's favorite meal. You humans have it easy. You don't have blubber, and you don't taste seafoody enough. That's why the sharks don't like to eat you.



Though they may swim in fairly cold water, great whites are one of the few warm bodied fish. A great white shark can actually keep its core body temperature and brain much warmer than the surrounding water. Maybe the warm brain is why they seem so intelligent. Anyone who tells you that great whites are mindless fish has never met one.

Here's another amazing thing: Females don't have babies until they are nearly 13 years old – a teenager! That's old for a fish. And even then, they probably have no more than ten babies at a time. This means that when populations of great white sharks die off, it takes a very long time for that population to rebound.

Great white sharks swim the waters along every continent around the world, except for maybe Antarctica. This means that nearly the entire world's ocean feels their presence. This is an animal that sits at the top of the food chain wherever it swims, and all other creatures depend on it to keep life in balance. Some of my favorite foods are fish, squid and octopus. Without the great white shark to eat us seals and sea lions, our population could grow out of control, and then all of our favorite food could disappear.

The ocean needs the great white shark, and I, for one, am very glad we have them around. Three cheers for the great white shark, the greatest shark in the ocean!





Shark Dream Writing Exercise



Overview

Children watch Robert's dream titled "The Seagull Who's Afraid of the Ocean" from *The Shark Riddle* and then write their own dream.

Educational Standards

Writing narratives to develop real or imagined experiences or events using effective technique, descriptive details and clear event sequences.

With guidance and support from adults and peers, focusing on a topic and strengthening by revising and editing.

Procedure

1. In *The Shark Riddle*, Robert falls asleep in a bed on the beach and dreams a hilarious dream about "The Seagull Who's Afraid of The Ocean." Watch this short scene, which features amazing footage of basking sharks.
2. As a group, investigate the "who, what, when, where and why" of the dream. (A seagull on the beach does not want to

go into the ocean, because it is afraid of sharks.) Is there a plot? Does it resolve?

3. Encourage children to write their own shark-based dream, with good writing techniques. Each child should write a first draft, which is shared with a classmate and/or the teacher. After making changes, the final drafts can be shared with the class.





Shark Bookmarks



Basking shark bookmark



Tiger shark fin bookmark

Overview

Looking for a fun way to mark your place in a good book? Make your own shark fin, tooth or body bookmarks with these templates from four different shark species - hammerhead shark, basking shark, horn shark and tiger shark.

Materials Needed

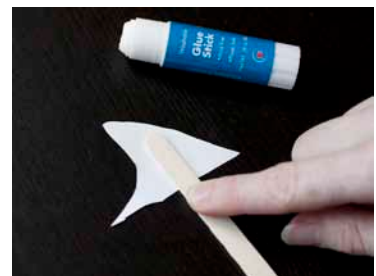
Copies of shark bookmark templates (choose between the hammerhead, basking, horn and tiger shark), crayons or markers, scissors, a glue stick, wooden craft (popsicle) sticks, and a fine-tip marker

Procedure:

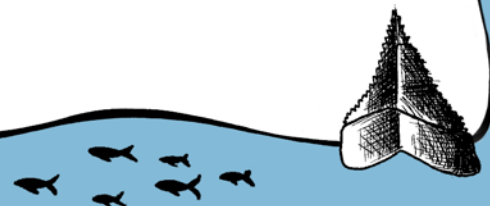
1. Color the shark fin, tooth or body shape that you want to make into your bookmark.
2. Cut out the shape.

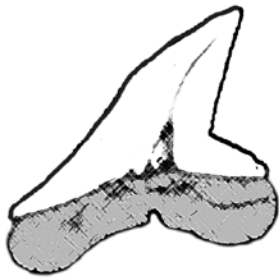
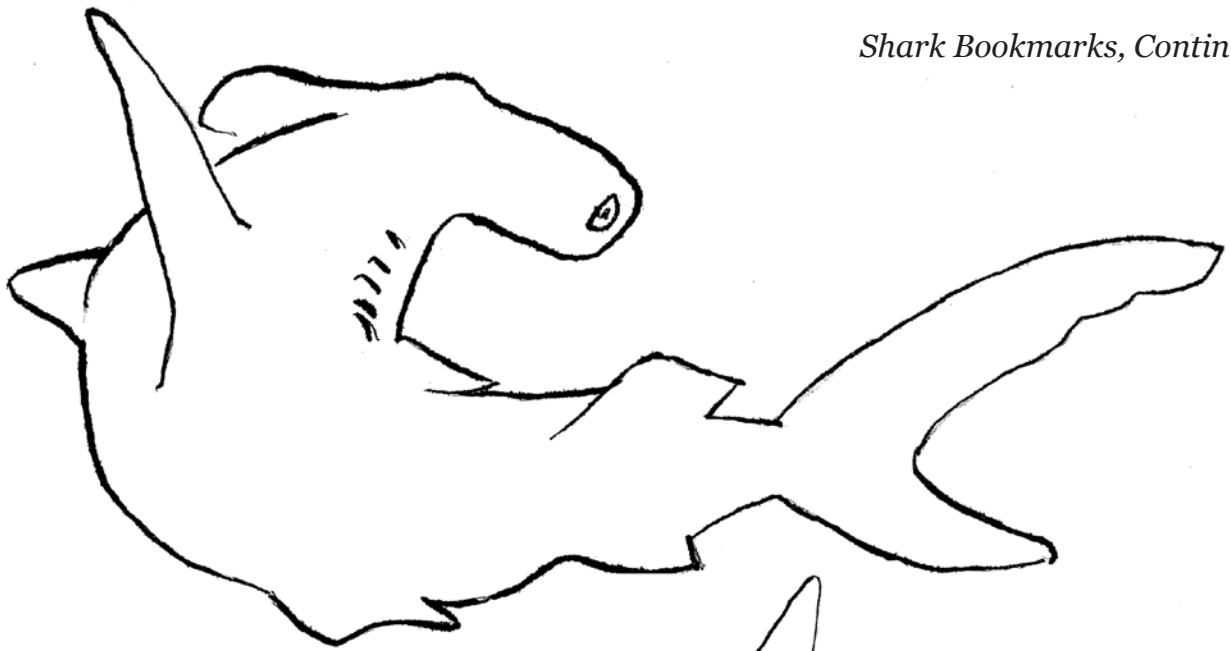


3. Using a glue stick, glue the craft stick to the back of your shape. If you are making a fin or tooth bookmark, you might want to glue just the top part of the wooden stick to your shape, so your bookmark has a handle. If you are making a shark body, you might not need the craft stick. However, if you glue the craft stick to the middle of the shark's body, the bookmark has more support.



4. Write the name of the shark species with a finely-tipped marker on the wooden stick.





TOOTH



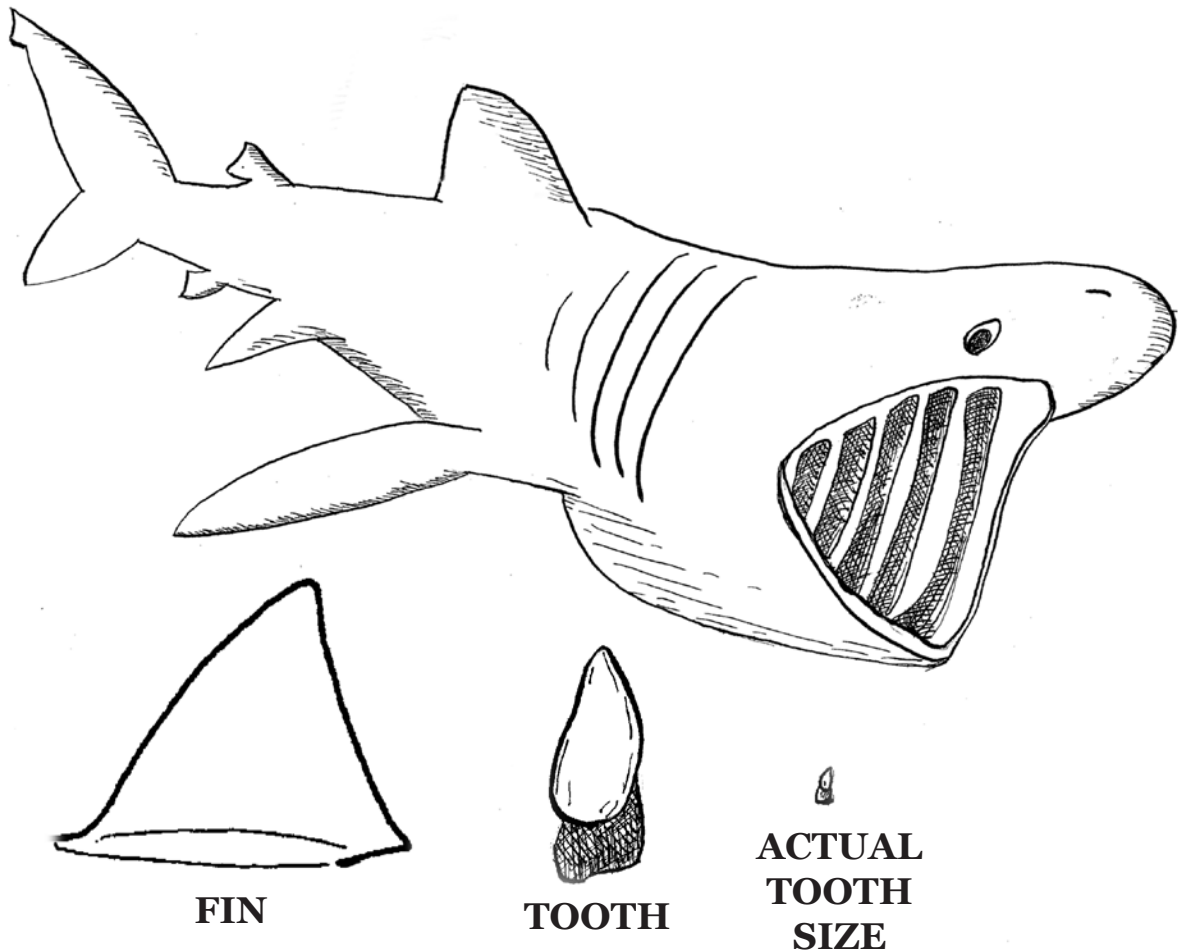
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FUN FACTS

- Great hammerhead sharks have been seen up to 20 feet (6 meters) long.
- Why do hammerhead sharks have such strangely shaped heads? Eyes that stick out to the sides help them see better, to find prey and escape predators. Dr. Michelle McComb found that hammerhead sharks have amazing stereoscopic vision, meaning their two visual fields overlap more than usual sharks (32 degrees for a scalloped hammerhead compared to 10 degrees for a lemon shark).
- To see footage of hammerhead sharks, watch *The Shark Lullaby* in *The Shark Riddle*. "I'd love you even if your eyes stuck out from your head, like a hammerhead."

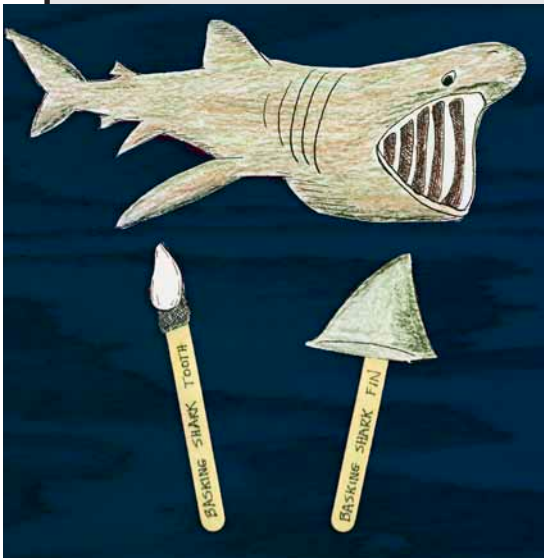


Great Hammerhead Shark

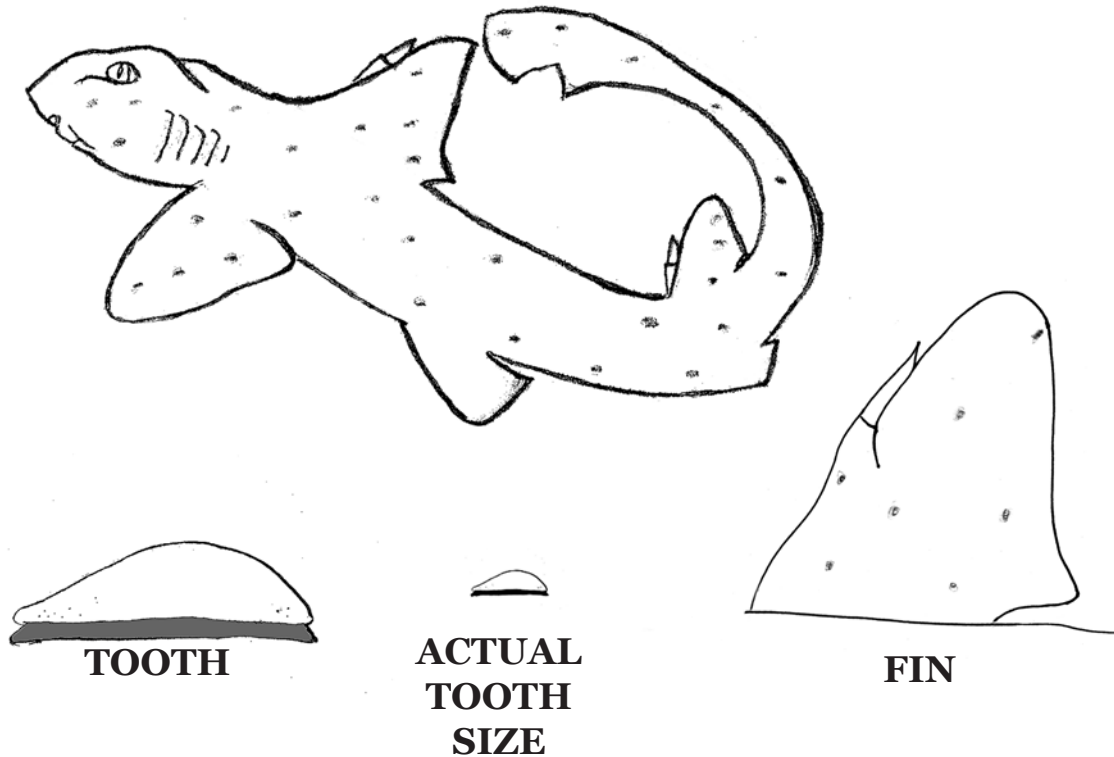


FUN FACTS

- Basking sharks are the second largest fish in the ocean. Adults can grow up to 33 feet (10 meters).
- Even though basking sharks are huge, they eat small plankton by swimming near the ocean's surface with their mouths open. As they swim, water is forced through their mouths, which forces water through their gill rakers, which strain out the plankton.
- Basking sharks are migratory. Dr. Mauvis Gore tagged a female basking shark that traveled over 5900 miles (9500 km) from Scotland to the edge of Canada, and it dove to a depth of 4146 feet (1264 meters).
- To see amazing footage of basking sharks feeding, watch the short scene when Robert dreams about "the seagull who's afraid of the ocean" in *The Shark Riddle*.



Basking Shark

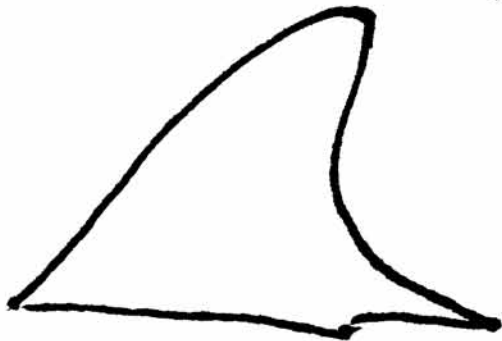
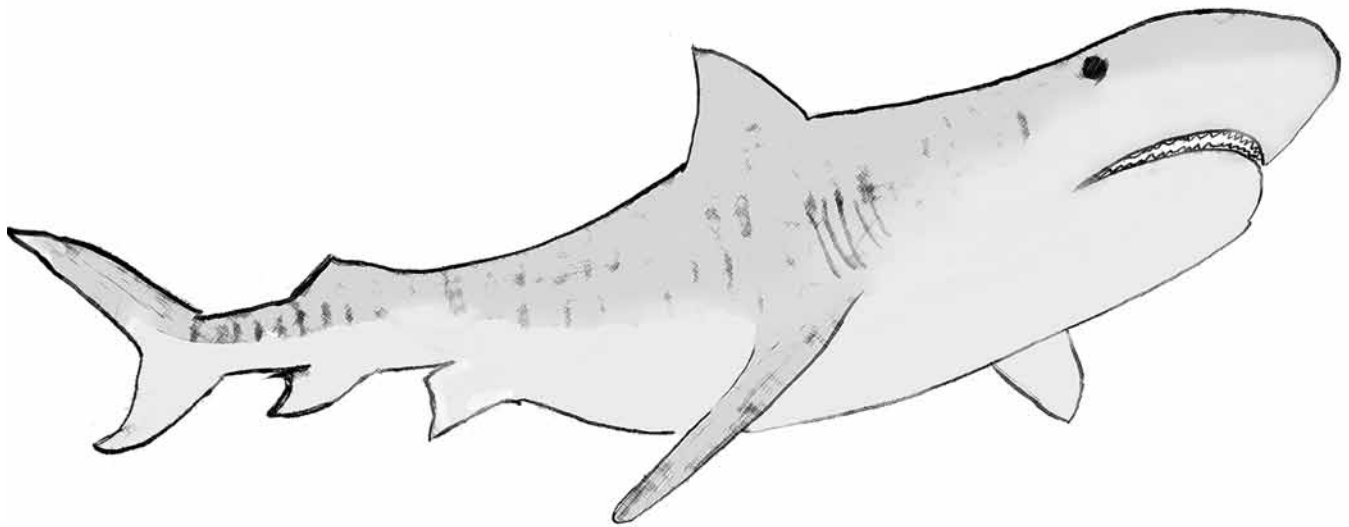


FUN FACTS

- Horn sharks are small, bottom-dwelling sharks that grow up to 4 feet (122 cm) long.
- Horn sharks are not dangerous. They spend a lot of time resting, without moving, on the ocean's bottom.
- Sometimes horn sharks use their pectoral fins to crawl (instead of swim) short distances.
- They are named for the spine (or horn) found on their dorsal fins.
- Horn sharks have small, rounded teeth in the back of the jaw for crushing shells to eat shellfish. They also have tiny, sharp teeth in the front of the jaw for sometimes grabbing and eating small fish.
- To see footage of a horn shark, watch the scene about shark dentists in *The Shark Riddle*. You'll see it when you hear the dentist say, "Whether you have round teeth for crushing hard shells."



Horn Shark

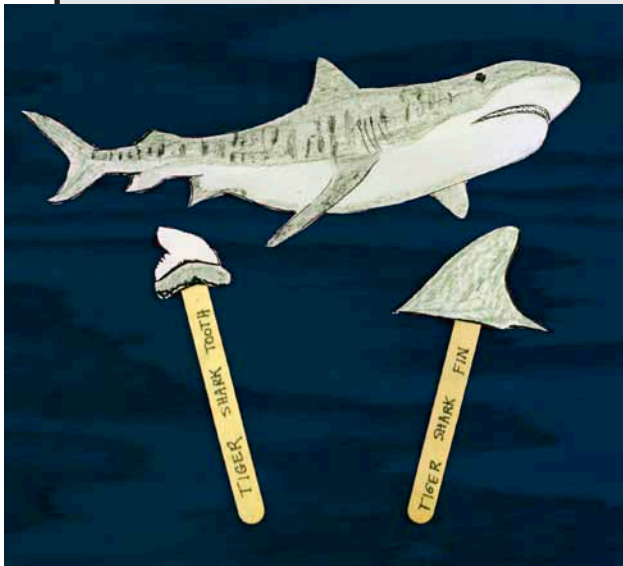


FIN



TOOTH

FUN FACTS



- Tiger sharks normally grow up to 18 feet (5.5 meters), though a world-record shark was 24 feet (7.4 meters).
- Tiger sharks are sometimes called “garbage cans with fins” because they are not picky eaters, eating fish, sea mammals, sea turtles, sea birds, other sharks, sea snakes, dead things (carrion) and also trash. Supposedly an entire 17th century suit of armor was once found inside a tiger shark’s stomach.
- Tiger sharks are ovoviviparous, so its eggs incubate and hatch inside the mother, and the mother gives live birth.
- Tiger sharks are named for the dark stripes on the back of young, which fade as they become adults.

Tiger Shark



Shark Bingo

Objective

Play bingo with shark trivia. All the answers are found when watching *The Shark Riddle*, so you may want to watch *The Shark Riddle* first. Then ask the trivia questions while playing the game, to test whether viewers learned facts from the film.

Materials

Copies of the blank bingo card and the bingo word page, bingo questions, glue sticks, something to mark the cards (corn, beans, rocks, pieces of paper) and prizes (if you wish)

Procedure

1. Hand out the bingo word page to each player. Each player should cut the page into 25 word squares.
2. Using glue sticks, players should glue the word squares to the blank bingo card, to create their own card. Encourage players to put the words in different orders. Please note there are 25 words and only 24 blank spaces (since there is a free space). Each player will have one word that is left over, and therefore not on his/her bingo card, which will help mix up the game.
3. Give each player some playing pieces (corn, beans, rocks, pieces of paper, etc.) to cover squares while playing bingo.
4. Players should put one piece on the free

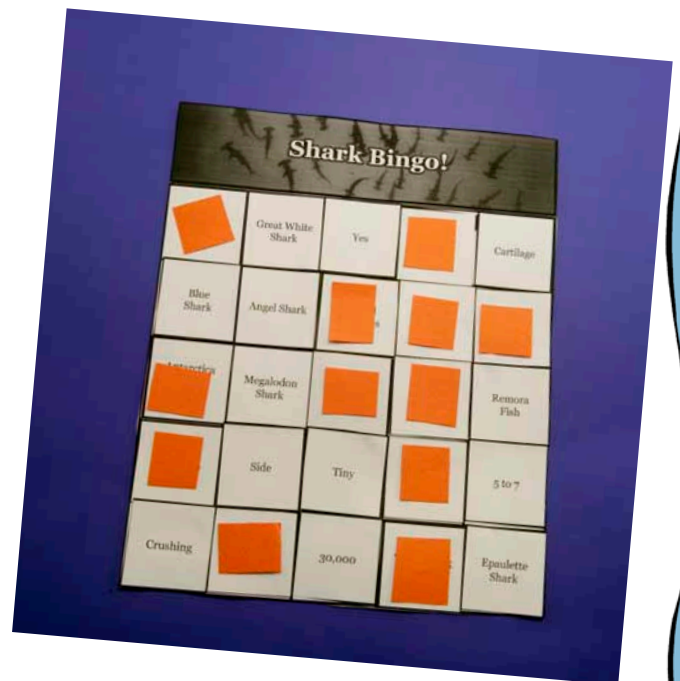


square in the middle of their cards.

5. Ask a question from the list of shark bingo questions. When someone answers it right, everyone with that answer on their card can mark that square. If no one knows the answer, the announcer can give the answer.

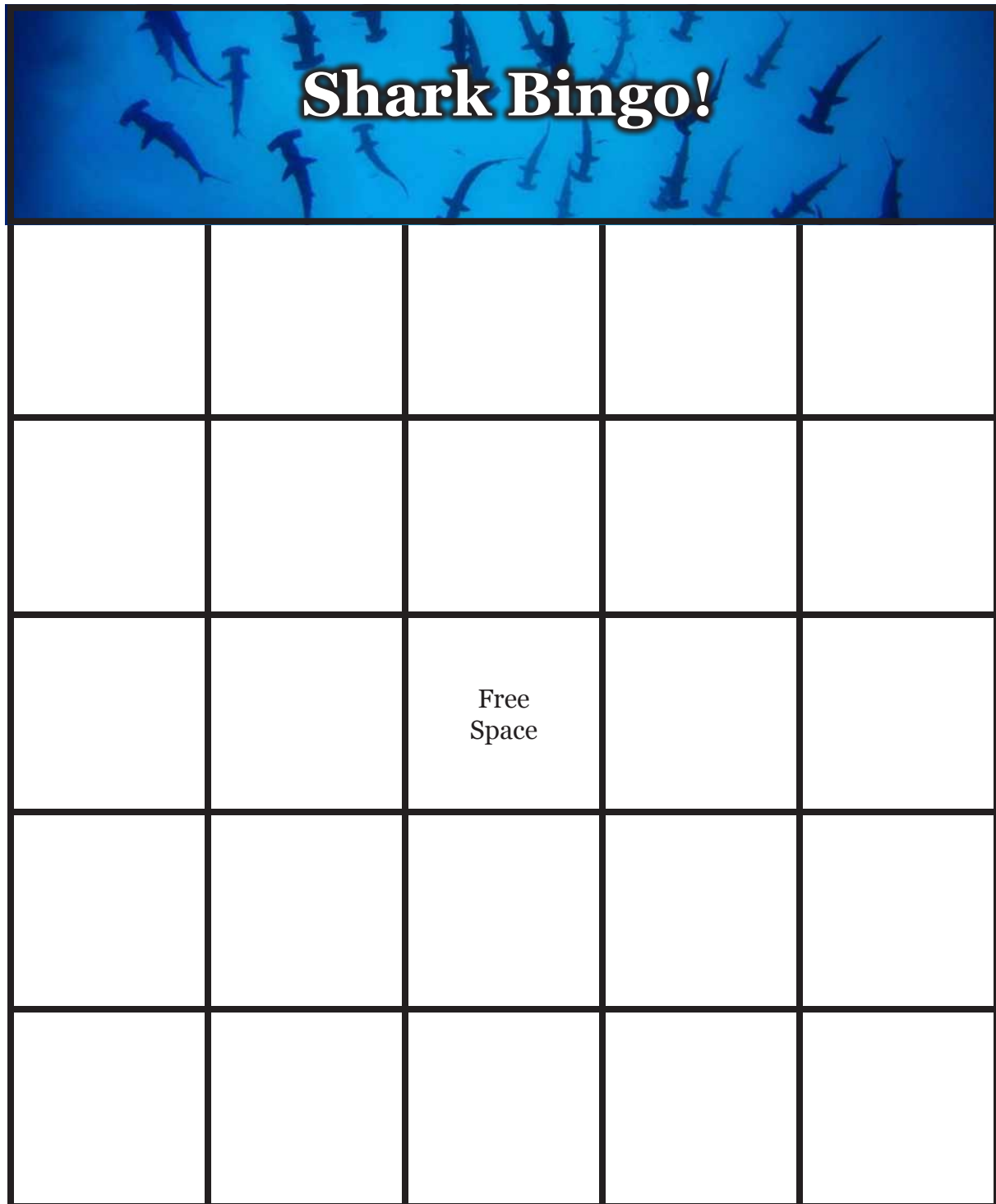
Another fun method of asking the shark questions is to cut the questions out, and drop each question into a bowl. Let players take turns pulling a question from the bowl and reading it out loud.

6. A player wins when 5 squares in a row are covered, whether in a row, column or diagonally. As a variation, you may allow players to win if they cover all four corners or black out all the squares.



Cartilage	30,000	Wobbegong Shark	Remora Fish	Side
Whales	Basking Shark	Megalodon Shark	Angel Shark	Whale Shark
Antarctica and the Arctic	5 to 7	Plankton	Dermal Denticles	Blue Shark
Great White Shark	Epaulette Shark	Over 400	Blubber	No
Predators	Tiny	Crushing	Weapons	Yes

Shark Bingo Word Page



Shark Bingo Card



Shark Bingo, Continued

SHARK BINGO QUESTIONS

All the answers to these questions are found in *The Shark Riddle*.

1. What is the biggest fish in the ocean?
Whale shark
2. Shark skin is covered with tooth-like scales called what?
Dermal denticles
3. What kind of fish sometimes suction cups its head to the sides of sharks, for a free ride?
Remora fish
4. What is the name of the extinct meat-eating shark that was as big as a school bus? Its teeth look like huge versions of great white shark teeth.
Megalodon shark
5. Sharks can lose up to how many teeth in a life-time?
30,000
6. How many gill slits do sharks have on each side of the head?
5 to 7
7. Are sharks fish?
Yes
8. Are stingrays sharks?
No
9. To stay warm, sea lions are covered with what? Hint: Sharks think it tastes good.
Blubber
10. Ancient Hawaiian people used shark teeth as part of what?
Weapons
11. Shark teeth that are rounded are good for: A) slicing, B) sawing or C) crushing food?
Crushing
12. How many kinds of sharks exist?
Over 400
13. What do whale sharks eat?
Plankton
14. What is the second biggest shark in the world?
Basking shark
15. What small shark with spots sometimes walks on its fins?
Epaulette shark
16. Shark skeletons are made of what substance?
Cartilage
17. What kind of shark has fleshy barbels that stick out on its face?
Wobbegong shark
18. Are shark gill slits on the side or underneath their heads?
Side
19. What kind of shark is flat, looks kind of like a ray, and spends most of its time hiding in the sand, waiting for prey? It was shown in *The Shark Lullaby* in *The Shark Riddle*.
Angel shark
20. Many sharks have a third eyelid, called a nictitating membrane. What shark was shown in *The Shark Riddle* with its third eyelid?
Blue shark
21. Name one thing the megalodon shark ate.
Whales
22. Great white sharks are found all over the world, except for in the waters of:
Antarctica and the Arctic
23. What kind of shark has a tooth shaped like a triangle, and looks like a smaller version of the megalodon shark's tooth?
Great white shark
24. Are whale shark teeth really big or really tiny?
Tiny
25. Great white sharks eat sea lions, so sea lions are prey and sharks are what? It is the name for animals who hunts other animals.
Predators





Shark Feeding Frenzy Dance



Whale shark from The Shark Riddle



Nurse shark from The Shark Riddle

Overview

Children dance by making movements that mimic different shark feeding strategies.

Education Standards

Examining the way different living things move. Comparing and contrasting characteristics among individuals in a group.

Procedure

1. Describe each of the following sharks and the way they eat food. Then let children pretend to make that eating motion as a dance move.

Basking sharks - Basking sharks eat tiny plankton by swimming around with their mouths kept open, filtering water through their gill slits. This is called “ram feeding.”

Movement: Keep the mouth open while walking (swimming) forward.

Whale sharks - Whale sharks are the biggest fish in the ocean, but they also eat tiny animals floating in the water. They eat by ram feeding and by gulping. They open and close their mouths over and over, forcing water through their gill rakers to filter out food.

Movement: Tilt your head up toward the ceiling (surface of the ocean). Then take big gulps by opening and closing your mouth over and over again.

Thresher shark - Thresher shark tails can be as long as their bodies. They use their tails as a weapon by swinging the tail powerfully to stun and kill fish to eat.

Movement: Hold your arm behind your body like a tail and whip the arm and pretend to slap a fish.

Great white shark - Great white sharks often attack their prey from below, by shooting upward to bite seals and sea lions swimming on the surface.

Movement: Crouch down and jump up powerfully, while pretending to bite a seal at the top of the jump.

Nurse shark - Nurse sharks live near the bottom of the ocean, and actually got their name from the sound of “sucking” snails from their shells, which sounds like a nursing baby.

Movement: Tilt your head toward the ground and pretend to slurp a big snail from a shell, making a loud slurping sound.

2. After practicing the movements, call out a kind of shark and see whether children remember the movement. Call out different sharks faster and faster, and let children laugh and giggle while trying to be sharks. This is especially fun while playing music with a rhythm.





Shark Cupcake Toppers



Objective

Decorate cupcakes with shark cupcake toppers. Choose from a hammerhead shark or a great white shark fin, head, body or tail.

Materials

Cupcakes, toothpicks, clear tape, glue stick, copies of the shark cupcake templates, markers (if you make black/white copies and want to color the sharks)

Procedure

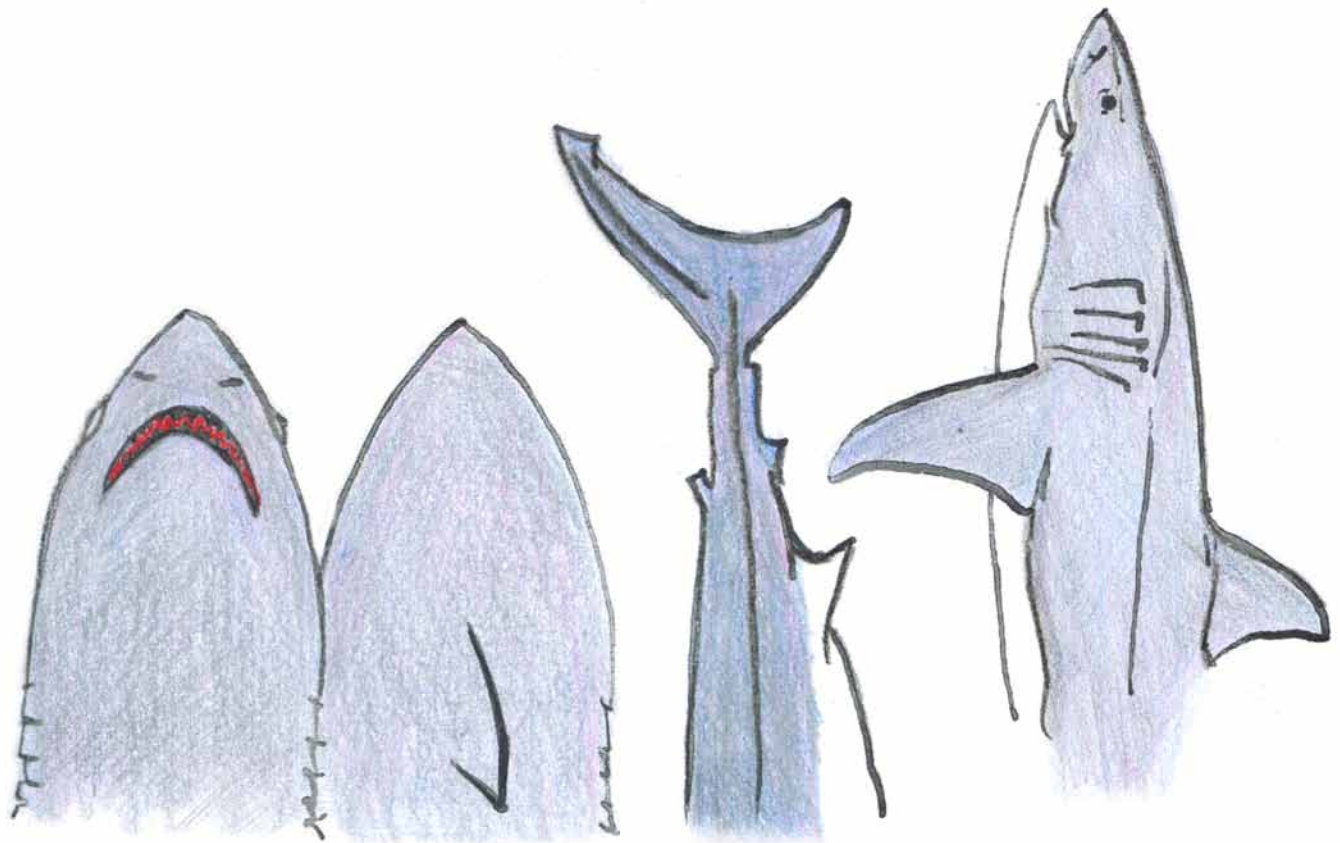
1. Copy the shark cupcake toppers. If you make black and white copies, you may want to color them with markers.
2. Cut out the shark topper shapes.
3. On the back of each one, tape a small toothpick so half of the toothpick is sticking out, and the other half is supporting



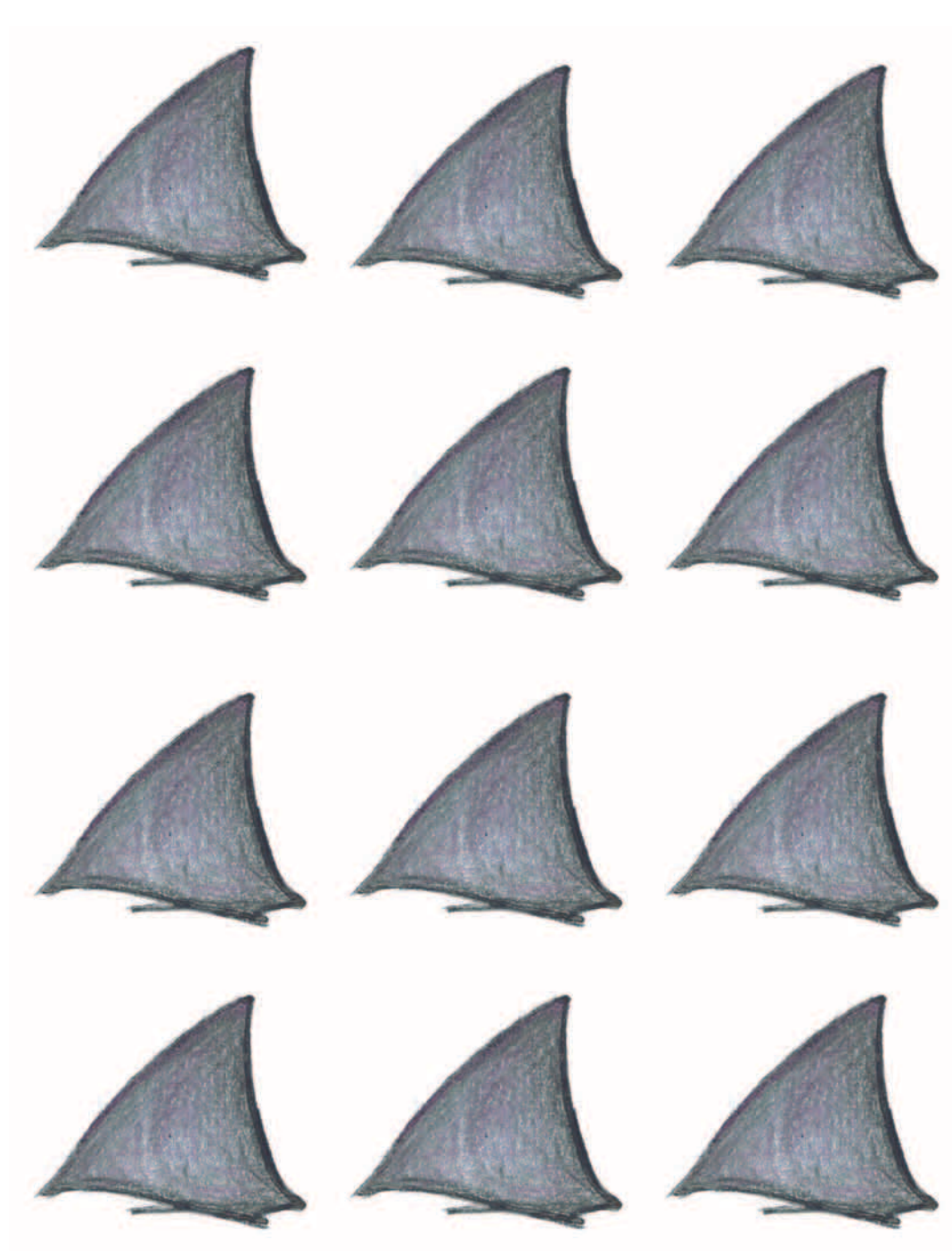
the shark shape. Note: For the great white shark head, you should fold the shape in half and tape the toothpick in between the layers, since there is a front and back to the shark. Glue or tape the front and back together.

4. Insert the topper into the cupcake and eat!

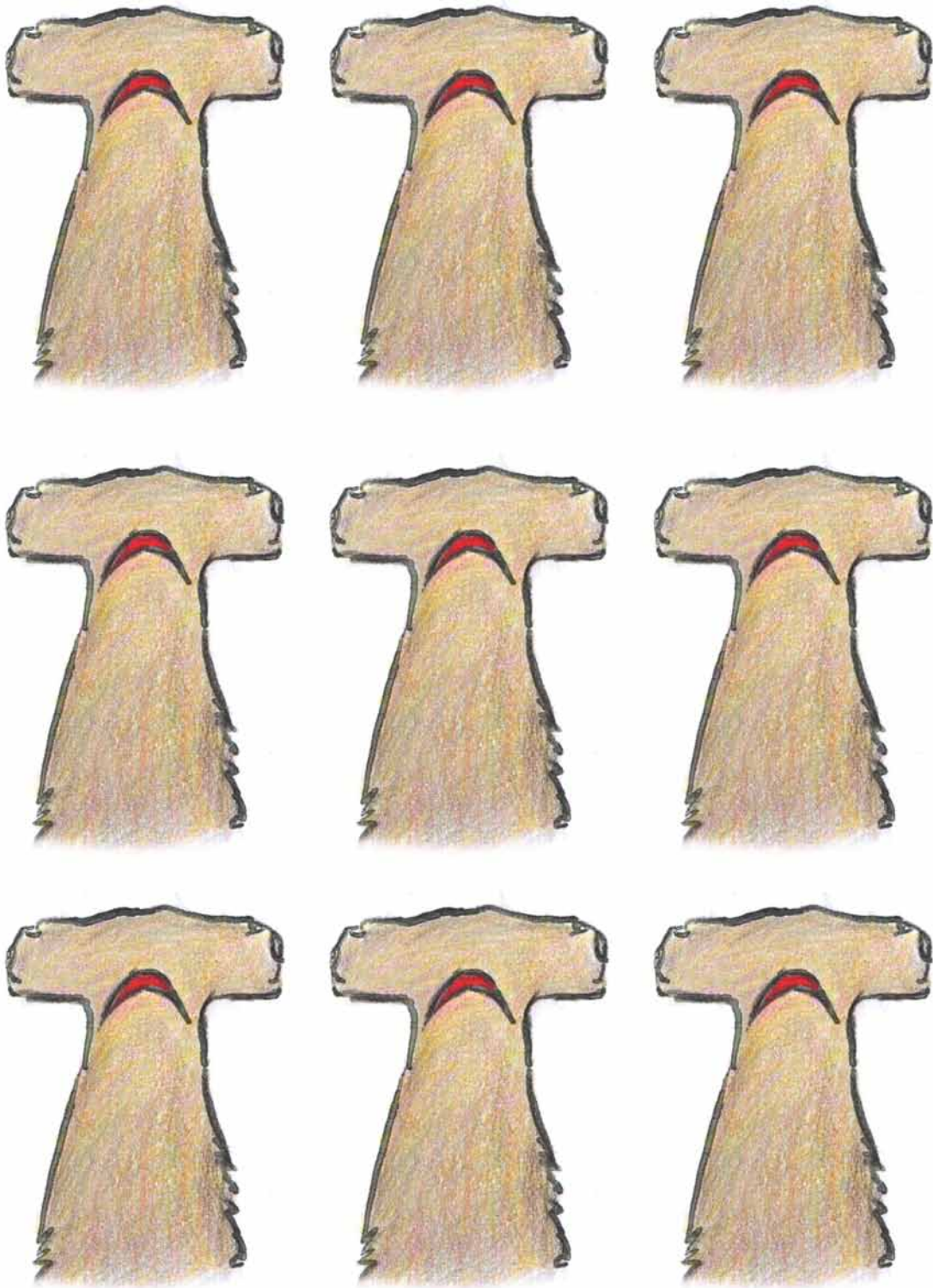




Shark Cupcake Great White Shark Shapes



Shark Cupcake Fin Shapes



Shark Cupcake Hammerhead Shapes



The Shark Lullaby



Objective

Listen to *The Shark Lullaby*, from *The Shark Riddle* and share thoughts about style, word choice and the concept of diversity.

The Shark Lullaby Lyrics

*This is a shark lullaby,
The one my mother sang to me,
'Cause if you think of shark-infested waters
you'll fall asleep.*

*Don't you know that I'd love you even if your
eyes stuck out from your head,
Like a hammerhead,
And I'd love you even if your mouth were
really wide,
Like a basking shark,
And I'd love you even if your nose had fleshy
barbels protruding all over your face,
Like a wobbegong.*

*I would love you even if you had a third eyelid,
Like a blue shark,
Or if most of your days were spent hiding in
the sand,
Like an angel shark,
Or if every time you ate, your upper jaw
detached from your skull just like a
great white.*

*There are hundreds of species of sharks,
Waiting to give you pleasant dreams,
And every one's unique and special,
Just like you are to me.
Sweet shark-infested dreams.*

Procedure

1. Listen to *The Shark Lullaby*, as featured in *The Shark Riddle*. The song is sung by Laura Sams, who pretends it was a song her mother sang to her. In real life, Laura wrote the song for the movie.
2. Encourage children to think about the word and music choices of the song's writer.

Why do you think Laura decided to write a lullaby about sharks? (Answer: She thought it would be funny because people are usually afraid of sharks. Also, she had never heard a lullaby about sharks. Finally, she wanted to create a happy, peaceful song about sharks to start changing how people think of sharks. Most sharks are small, and sharks are not deliberate man-eaters.)

What words did she use to convey emotion? Humor? Are there words you didn't know?

3. Encourage children to think about the concept of "diversity." There are over 400 kinds of sharks, with many different characteristics. Just as sharks are different from each other, people are different from each other.

Is it always easy to accept people who are different from you?

What ways are people different? (Different eye color, skin color, favorite hobbies, favorite foods, etc.)





The Great White Shark Song & The Food Chain



Great white shark, featured in the song



The food chain, as shown in the song

Educational Objectives

Understanding the food chain

Procedure

1. Watch *The Great White Shark Song*, as featured in *The Shark Riddle*. What are the parts of the food chain mentioned in the song? The song is available for free at www.sisbro.com/sharks
2. Complete the attached worksheet by drawing the animals in the food chain, from lowest to the highest animal in the chain.
3. On a separate piece of paper, write four animals in a different food chain. Then draw a new chain, representing those animals.

Special note: When recording the song, Laura and Robert Sams used the sound of a chain as percussion. They also used the sound of a slinky. Can you hear it?

The Great White Shark Song (as sung by a sea lion)

Written by Laura and Robert Sams

Living out here the breeze is breezy,
The water is wet and the fishing is easy
For our favorite dishes, the octopi and the fishes.

We're all linked together in the food chain of life,
With the plants at the bottom up to the great white,
With its great big jaws that deserve applause.

The great white shark!
(Sing your praises to the) Great white shark!
(Lift your faces for the) Great white shark!

The great white keeps our food chain complete,
So we can all have enough food to eat.

Oh seals and sea lions hate to be eaten,
But if it ever happens, at least we know the reason.
We're made of blubber, and the sharks are blubber lovers.

Oh every living thing is important in the ocean,
To keep it in balance is a complicated potion,
We need each link, or the chain will sink.

That's why we need the great white shark!
Sing your praises to the great white shark!
Lift your faces for the great white shark!
The great white shark!



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The Food Chain

My name: _____

The *Great White Shark Song* shows four parts of a food chain, from the bottom to the top of the food chain.

What is the correct order of these parts shown to the right? Your choices are: a great white shark, plants, a seal, and fish.

If the bottom part of the food chain is #1 and the top is #4, draw these four parts in the correct order, in the food chain below. Write the name of each part on the line underneath its link.

Hint: #4 eats #3, #3 eats #2, and #2 eats #1



Great white shark



Plants



Seal



Fish



#1 _____ #2 _____ #3 _____ #4 _____



Outdoor Shark Games

Basking Shark Buffet Game

Overview

Children use butterfly nets as basking shark mouths, and they try scooping up plankton (cotton balls) from the lawn in a relay race. Who can collect more plankton?

Materials

Butterfly nets, cotton balls, a stopwatch

Background

Basking sharks are the second biggest fish in the ocean, with an average size of 23 to 29 feet long (7 to 9 meters). Basking sharks eat plankton, tiny animals floating in the water, by swimming around with their mouths open. The speed of swimming forces the water through their mouths, and plankton is filtered out through their gill rakers.

Procedure

1. Sprinkle cotton balls outside on the ground. A grassy lawn works great. The cotton balls represent the plankton floating in water.
2. Give each child a butterfly net, or divide children into two teams, and give one person from each team a butterfly net. The butterfly net represents a basking shark mouth.
3. Give children a certain amount of time to go "feeding." Start the timer and let them run around, like they are swimming through the water, while scooping up plankton in their nets. They MAY NOT use their hands. They may only use their mouths, like a basking shark.
4. Count the number of plankton in each net. For teams, keep track of the team's total.



Basking shark from The Shark Riddle

Shark Food Chain Tag

The food chain in the *The Great White Shark Song* showed great white sharks, sea lions, fish and plants.

Turn children into plants, except for one fish. The plants run around until they are tagged by the fish. Once tagged, they become a fish and try to tag other plants. Keep playing until only one "plant" is left. That "plant" then becomes a sea lion. The game starts again, as the sea lion tries to tag fish. If a fish is tagged, it becomes a sea lion. Play until there is only one "fish" left. That fish becomes a great white shark. The game starts again, as the shark tries to tag sea lions. If a sea lion is tagged, it becomes a shark. Keep playing until only one sea lion is left. That child is the winner!





Sharks, The Food Chain And You

On September 12, 2010, nine shark-attack survivors gathered outside the United Nations in New York City to ask countries to protect sharks. Together with the Pew Environment Group, they asked countries to stop fishing for sharks that are endangered or threatened. They asked for sustainable fishing laws, so that fisherman will leave enough sharks to ensure there will be sharks in the future.

Why would people who have been attacked by sharks want to help them?

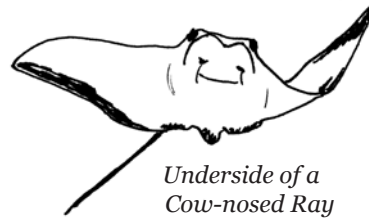
Sharks are important for a healthy ocean. As scavengers, they keep the ocean clean by eating dead, sick and old creatures. As hunters, they are at the top of the food chain, keeping the ocean in balance.

We need a healthy, balanced ocean because the ocean does so much for human beings. At least seventy percent of the oxygen we breathe actually comes from little plants, called phytoplankton, drifting in the ocean. Our weather depends on how the ocean's cold and warm currents swirl around continents. We get food from the ocean. We get medicines from the ocean. In the United States, half of people live within 50 miles of the ocean. Many people's jobs, like fishermen, depend on a healthy ocean.

What happens when sharks are not in a food chain?

On the east coast of the United States, the scallop fishing industry was devastated because people overfished big sharks.

When the food chain is healthy, big sharks, such as bull sharks, hammerhead sharks, great white sharks and dusky sharks, often eat middle-sized animals, such as cow-nosed rays. Cow-nosed rays often eat scallops, which are shelled animals similar to oysters. When



*Underside of a
Cow-nosed Ray*



Atlantic Scallop

the food chain is in balance, there is a healthy number of scallops in the ocean.

Unfortunately, there are not very many scallops left on the east coast, because large sharks were overfished. There were fewer sharks to eat the cow-nosed rays, so there were more cow-nosed rays. All those rays ate scallops, so that the scallop population was devastated. Many people like to eat scallops, and for a century, fishermen on the east coast depended on those scallops. Now those fishermen are having trouble.

If people want to eat seafood in the future, they need a healthy ocean. They need sharks.

Do sharks really need our help?

Biologists Ransom Myers and Julia Baum estimate that scalloped hammerhead and tiger shark species have declined more than 97% on the east coast of the United States. Bull sharks have declined 99%. Yes, for every 100 bull sharks that once existed, there is one left. That is an astonishing statistic.

Worldwide, much of the shark overfishing comes from the finning trade. Asian cultures eat fins, as well as other shark parts, as a delicacy. The demand for shark fins and parts is still very high. Of the estimated 100 million sharks killed by people each year, 73 million deaths are due to finning. The fins are often harvested when fishermen catch a shark, slice off its fins and throw the shark back into the water to die.



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Ten Happy Ways to Help Sharks



How Can You Help?

1. Shark Attack Day!

During Sanibel Sea School's Shark Week (as featured in the movie *The Shark Riddle*), campers visited local businesses and "attacked" them with shark facts. They used chalk to draw real-life sharks and shark facts on the sidewalk. They made posters about sharks and posted them on the doors to a grocery store. They shared their knowledge of sharks in a truly fun way!

Talk to your own local business or school and ask if you can "shark attack" them, for a fun and exciting day.

2. Landshark Lawn Ornaments

Make the shark fins featured in this packet in the Landshark Lawn Ornament activity. By placing them in your yard, along with amazing shark facts, you have a fun and educational

way to share your knowledge of sharks with neighbors.

3. Shark Sandcastles

In *The Shark Riddle*, viewers saw the campers at Sanibel Sea School building a 40 foot whale shark out of sand. When you visit the beach, try building a life-sized shark out of sand. (It might even be fun to build the world's smallest shark, the dwarf lanternshark, out of sand. Help people learn that most sharks are under four feet long!) This is a great family or group activity. Be sure to share shark facts as people walk by your amazing sculptures.

4. Shark Attack E-Cards

Visit www.sisbro.com/sharks to email your very own free Shark Attack card to friends, and surprise them with fun shark facts.



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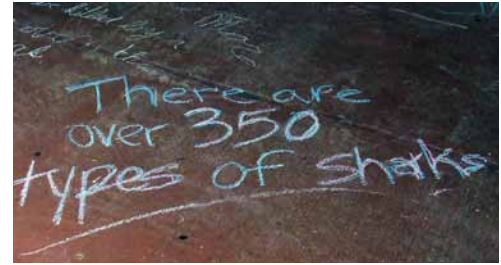
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Ten Happy Ways to Help Sharks, Continued



5. Pick up litter.

All waterways lead to the ocean. Pick up litter near rivers, ponds, sewers and of course, along the beach. This will help keep the ocean's water clean from trash, so sharks have a good place to live.

6. Thank You Letters and Posters.

Write a thank you letter to a shark, or draw a thank you poster, and post it for friends or classmates to see.

*Dear Hammerhead Shark,
Thank you for keeping the food
chains healthy so that people have
enough fish to eat. Also, I think your
head is amazing. I wish I could see
in a 360 degree vertical plane around
my head, because then I could see if
my brother was sneaking up on me.*

*Sincerely,
Laura*

7. The Shark Riddle

Share *The Shark Riddle* with friends and family. Introduce them to the diversity of sharks, including *The Great White Shark Song*

and *The Shark Lullaby*.

8. Visit www.saveourseas.com for the latest information about sharks, along with a special kids site.

9. Support the Shark Fin Ban

Hawaii is the first state in the United States to pass a law that bans anyone from having shark fins. That means restaurants cannot sell shark fins and people cannot eat shark fins, which is one of the reasons so many sharks are killed each year. Write a letter to your local politician to encourage them to adopt laws like Hawaii in your state.

10. Shark Birthday Party!

Share your passion for sharks by having a shark-themed birthday party! Use the activities in this packet to make it fun. Make shark cupcake toppers, shark tooth banners, shark bookmarks and shark hats. Play shark bingo and outdoor shark games (like food chain tag). Watch *The Shark Riddle* as part of your fun day, and encourage friends to learn more about sharks!





Ask a Shark Scientist

Dr. Jeffrey Carrier is a marine biologist who has studied sharks for more than 40 years. He taught biology at Albion College (Michigan) for more than 30 years and has written and edited four books on sharks and numerous articles in the scientific literature. He served as President of the American Elasmobranch Society for two terms and is an adjunct research scientist with Mote Marine Laboratory (Florida). He is an avid diver and photographer and continues studying sharks with his wife, Carol, who also enjoys sharks, diving, and photography.

Do you have a favorite shark encounter?

My work involves the study of nurse shark mating and reproductive behaviors. One of our observations is that female nurse sharks will often seek refuge from males in very shallow water, often 2-3 feet, or less, with their backs and dorsal fins actually out of the water. During these times they can be closely approached and don't seem to be bothered. On several occasions I have swum so close to 8-9-foot long animals that my video camera has actually touched them! Rather than swim away terrified, they simply tolerate our presence and seem to accept that we mean no harm.

What are you currently studying?

My work focuses on mating and reproductive behaviors, which is a complex process. There appears to be a social hierarchy with some males dominant to others. The less dominant males may actually "help" the "senior" males to be successful in mating. The role of the female sharks also appears to be very complex. In fact it appears that it is the female who actually "chooses" her mate and aggressively avoids males with whom she doesn't wish to mate. These complex types of behaviors suggest that these animals are far more advanced than we might have previously believed.

What do people misunderstand about sharks?

Many people still regard sharks as indiscriminate killers, attacking anything that swims in the sea. They fail to understand the sharks' role as

an apex predator and have difficulty believing that sharks have preferred tastes. Most evidence shows that not only are attacks by sharks extremely rare, but more often than not, they are cases of mistaken identity by the shark rather than targeted attacks.

What do we still need to learn about sharks?

Sharks have been in existence for more than 350 million years, and seem ideally suited for their existence as marine apex predators. For most of their existence they enjoyed a sea untainted by products of civilization, an ocean where they had few enemies and few challenges to population stability. In recent decades, not only have we altered the chemical composition of near shore ocean waters by the byproducts of an exploding human population, but we have also developed fishery techniques that have pushed many local populations of sharks to the very edge of their ability to survive. Scientists have shown us that sharks grow very slowly, often taking 10-20 years to reach sexual maturity, and that when they finally do reproduce, they produce very small litters. We must learn about the rates of natural replenishment, the ages at which sharks mature, and how much pressure a population can tolerate. In addition, we must understand to what degree sharks are affected by the endless sources of pollutants that affect water quality. It is incomprehensible that animals that have survived for 350 million years could be eliminated in less than 100 years by the foolhardy activities of humankind.



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Web sites

Save Our Seas Foundation
www.saveourseas.com

Sisbro Studios, LLC
www.sisbro.com/sharks

Biology of Sharks and Rays
<http://www.elasmo-research.org/>

International Shark Attack File
<http://www.flmnh.ufl.edu/fish/sharks/statistics/statistics.htm>

