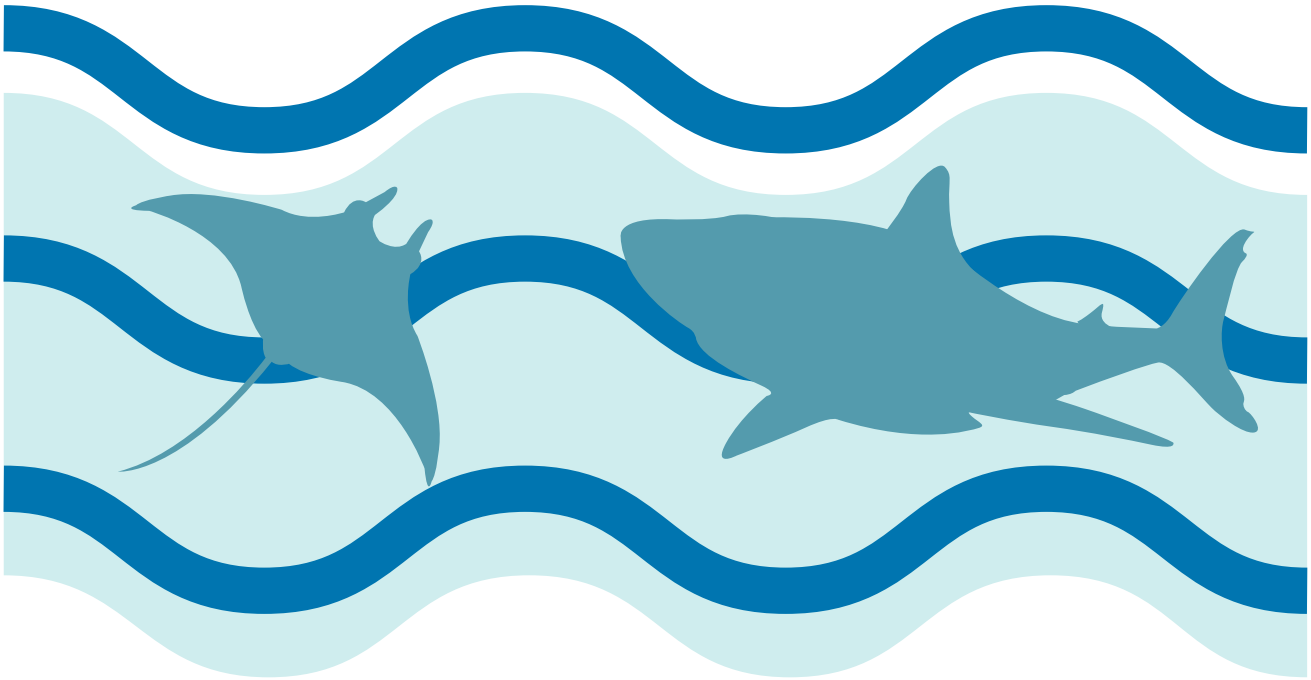


GREAT OCEAN VOYAGE:

THE SCIENCE OF SHARK SENSES

Grades
4-6

Objective
Sharks have the same 5 senses as we do but can also sense electrical currents and pressure changes. These activities give students the chance to explore the many ways that sharks use ALL of their senses to survive in the world's oceans.

What's Inside?

- Shark Hearing Activity
- Shark Sight & Smell Activity
- Shark Touch & Lateral Line Activities
- Shark Electroreception Activity

Source: https://www.sharks4kids.com
Retrieved 03.03.22

Sharks4Kids
Human vs. Shark Senses

Five Activities for Your Classroom Science Center

These activities can be used with the *Let's Investigate Sharks PowerPoint*. Vocabulary is highlighted in red and a full vocabulary list for the PowerPoint can be found within the curriculum packet.

SQ: Indicates questions you can ask the students to engage them in a discussion.

Introduction:
Sharks have the same senses we do plus an extra sense! Scientists discovered this sixth sense by blocking out the other five senses of a shark, and he/she STILL found the hidden food. Could you find your food if you even one sense blocked out? These crafts/activities explore shark senses and compare them to our senses.

Time: Each sense may take up to an hour. One/two senses can be done each day to make a full week of learning about shark senses.

1)Hearing

Introduction:

Sharks have excellent hearing. They have internal ears that can pick up which direction a sound is coming from. We can do this too, but once we get underwater, it can be very difficult to tell where a sound is coming from. This is because sound travels much faster in water. Water is denser than air so the molecules are closer together and can bounce off each other more easily.

Materials per group:

- Bucket/container to be filled with water
- Solid objects that can be safely tapped against the bucket, or in the water, to make sounds
- Empty soda bottle
- Scissors

Procedure:

1. Each group will start by cutting off the bottom of the soda bottle. Take the top of the soda bottle and remove the cap.

2. Students will take turns holding the bottle top over the empty bucket while putting their ear up to the cap. At the same time, another student will create a sound on the outside of the bucket and then on the inside.
3. On a scale of 1-10, note how loud the sound was.
4. Now fill the bucket with water and repeat the experiment with the bottom of the bottle top submerged in the water. Note how loud this sound was compared to the first trial.

SQ:

1. On a scale of 1-10, how loud was the sound in the empty bucket?
2. On a scale of 1-10, how loud was the sound when the bucket had water?
3. Which one was louder? (If there is no noticeable difference then you may need to consider using different materials for either making the noise or the bucket.)
4. What are the natural sounds a shark might hear in the ocean?
5. What are the unnatural sounds a shark might hear in the ocean? Could any of these unnatural sounds cause them harm? If so, how?

Human vs. Shark Hearing Challenge

Procedure:
As a class, listen to the "frequencies sharks can hear" video on Sharks4kids.com. Have the students close their eyes and raise their hands when they hear something. As the teacher, record the earliest time the students start hearing the sound.

SQ and discussion:
Sharks are able to hear sounds at much lower frequencies than we can. Discuss why this would be helpful. What natural and unnatural things may make sounds at lower frequencies?

Sharks have great hearing. However, if we could give sharks earplugs, they would still find their food because they have 6 other senses to use! Could you find your food without hearing it?

2.) Sight & Smell

Introduction:
How well a shark can see depends on the SPECIES of shark and where he/she lives. The Greenland Shark *(Somniosus microcephalus)* lives in arctic waters as deep as 3,937 feet (1,200 meters). Having good eyesight in these dark waters is not very useful so this shark is practically blind! However lemon sharks (*Negaprion Brevirostris)* are considered to have very good eyesight since they live in shallow waters in the Gulf of Mexico, Caribbean, and Pacific from Baja California to Ecuador. Studies have shown they have rod and cones cells and can even see color! From this, we can hypothesize

that eyesight is important to the lemon shark. Therefore, they have to protect their eyes! They do this with a second eyelid called a NICTITATING MEMBRANE.

Sharks have a great sense of smell too. As they swim and swing their head side to side, their nostrils allow them to tell which direction a smell is coming from. For example, if a smell is coming from the right, their right nostril will pick up the scent before their left nostril! Our nostrils are so close together that we cannot tell if one nostril picks up a smell before the other one.

How far away sharks can hear, see, or smell something depends on a few environmental factors. These factors may include the frequency of the sound, the clarity of the water, and the strength and direction of water currents.

Human vs. Shark Sight and Smell Challenge

Procedure:

Sharks and people can find food without hearing it by using other senses. But what if we could give a shark ear plugs AND a blindfold? Could a shark still find food? Yes, because they can smell their food. Is your sense of smell strong enough to guide you without being able to hear or see?

Materials:

- Earmuffs (students can bring their own or they can cover their ears with their hands)
- Blindfold
- measuring tapes/rulers/meter sticks
- smelly markers
- paper fans

Procedure:

1. Give each group 2-3 different smelly markers, one measuring tape/ruler/meter stick, and a piece of paper to fold into a fan.
2. Taking turns, have one student in each group put on the blindfold and cover his/her ears. Another student can stand 10 steps away with the smelly marker. This student will take single steps towards the blindfolded student until he/she can smell the marker. Mark this distance and measure it.
3. Repeat the process but use the paper fan to waft the smell towards the blindfolded student. Did this help the student smell the marker sooner?

SQ & Discussion:

1. How far away could you smell the marker with no fan?
2. How far away could you smell the marker with the fan?
3. What are some natural and unnatural smells a shark might detect in the ocean?
4. How would smelling these odors be helpful/harmful to sharks?

3.) Touch

Sharks can feel when something touches them just as we can. However, since they don't have hands, they do not use touch the same way we do. Sharks can also feel their environment without anything touching them! They do this by using their LATERAL LINE. This sense is not unique to just sharks, all FISH have a lateral line as well.

If your ears, nose and eyes are covered, what is the next sense you will use? Touch! As soon as people are blindfolded, they will put their arms out in front of them to feel for what is around. Sharks do not have arms to feel things but they might use their head! If a shark is trying to figure out what something is, they might headbutt the object. (This helps them to use their extra sense which we'll talk about later.)

Activity One

Materials:

- Blindfold
- Earmuffs
- Random objects from your classroom

Procedure:
Have students pair up in small groups. Taking turns, blindfold one student and give them an object from the room. Using only their sense of touch, have the blindfolded student try to figure out what the object is. As an extra step, try figuring out what the object is without your hands.

SQ & Discussion:

1. Which of these five senses is most used by humans?
2. Which sense do you think is most important to sharks and why? (Think about a type of shark and its habitat for this question)
3. Could a shark find its food without these five senses?

Activity Two (Lateral line)

Materials:

- Paper fan
- Blindfold
- Earmuffs

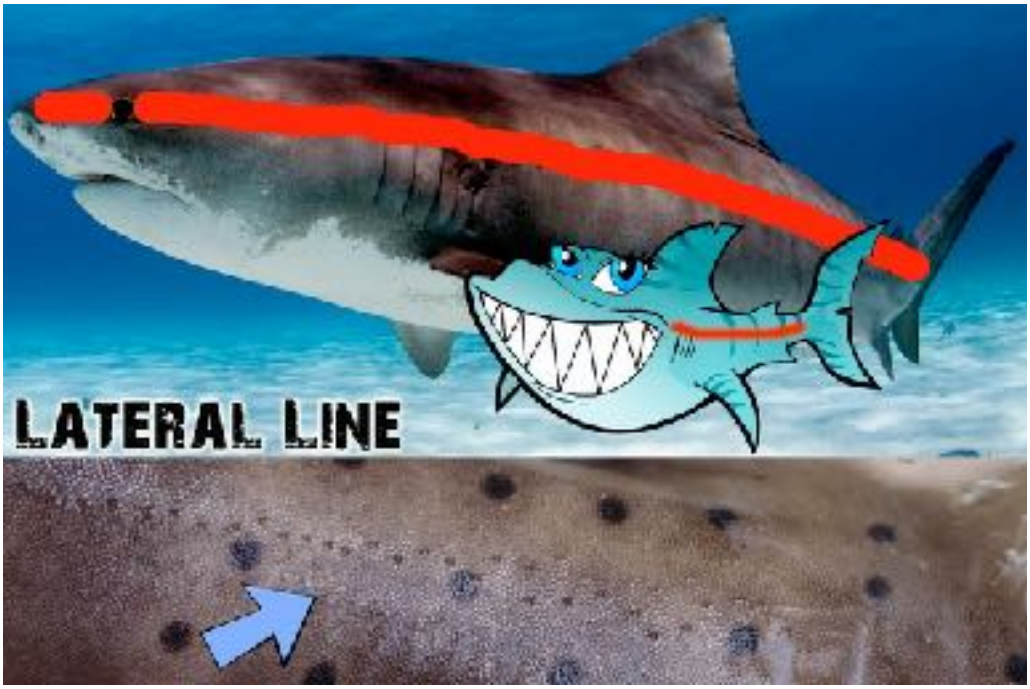
Procedure:
Have students sit in a circle with one student in the middle blindfolded with earmuffs on. Pick a few students at a time to make small, silent movements. (you may need to add music so the student in the middle cannot hear the movements from other students.) When the student in the middle thinks he/she can feel movement in the room, he/she can point in the direction of the movement. (As an option, one student

can keep score of how many times a classmate moves vs. how many times the student raised his/her hand.)

Next have a new student stand in the middle with the blindfold and earmuffs. Another student will stand as far away as possible with a fan and slowly take single steps towards the first student until he/she can feel the breeze from the fan. Measure how far away this is. To make it more difficult there can be students with fans coming from different angles at different times.

SQ & Discussion:

We can feel movements that do not touch us if the movement is strong enough to push the air around. However, the movement has to be close enough so that the air does not disperse in another direction. Air and water molecules act very differently. For example, air molecules are compressible. Water molecules do not compress very well and instead, they push into nearby water molecules. In this way, water can carry vibrations much further away than air can. Next time you go swimming, see if you can feel your neighbor kicking next to you under water. This is similar to how a lateral line works except the sense is much more sensitive! Think about a school of fish. Ever wonder how they can all change directions at almost the exact same time? It's because of their lateral line! They can feel each other moving. How is this helpful to sharks and bony fish?



Additional Craft

Materials:

- Jello Packets/cleaned tops from individual portions
- Hole puncher
- Yarn
- Streamers
- Tape

Procedure:

1. Take Jell-O packets and punch holes near the top of each one.
2. Cut a piece of yarn that is twice as long as the student and run it through each hole of the Jello packets with a tie to hold each one in place. Spacing between the Jell-O packets may be determined by how many packets each student has.
3. Next cut small, skinny, strips of streamers and tape them to the back of the Jell-O packets.
4. Drape the finished lateral line over the student's head so it runs down both sides of their body-just like a shark!

Extra optional step:
Go back and try the lateral line activity again. This time, measure the distance at which the streamers start moving from the breeze of the fan.

5.) Electromagnetism:

Introduction:

Sharks have one last sense which is called the AMPULLAE OF LORENZINI. This sense detects electrical pulses given off by a fish's heartbeat. This sense is made up of gel filled pores in the shark's head. (This is why sharks sometimes headbutt things!) The hammerhead has a large head called a cephalofoil that is covered with Ampullae of Lorenzini. Hammerheads love to eat stingrays and when one is buried in the sand this may be the only sense the shark can use to find the sting ray.

Materials:

- Small, thin magnets
- Compass
- Blanket

Procedure:

1. Before the class enters the room, spread the magnets out on the floor in a small area that your blanket can cover. Place the blanket over the magnets in a way that they are completely visually concealed.

2. Once the students are in the classroom, ask a volunteer to find the magnets under the blanket by using all their senses except touch with their hands (because sharks do not have hands.)
3. Once the volunteer(s) have tried finding them give them the compass and ask them to use it to scan over the blanket. Watch the compass for any unusual pointing.

SQ & Discussion:

1. What did the compass do when it was near a magnet?
2. When would a shark use this sense?
3. Do you think this sense can work from a long distance away? (No, this is usually the last sense a shark uses because they have to be in very close range to feel the electrical pulses.)