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<b>Lesson Plan Title:</b> Leatherback Sea Turtles and their Special Compasses	<b>State:</b> GA
<b>Lesson Time Frame:</b> 2-3 hours	<b>Inspired by an Earthwatch Expedition:</b> Saving the Leatherback Turtle
<b>Student Level:</b> High School	

**Overview:**

Leatherback sea turtles migrate long distances through the world's oceans but lay their eggs on tropical and subtropical beaches. Recent research suggests that sea turtles use some sort of internal compass to navigate the oceans. Scientists are still trying to understand how this works.

Students will learn some basic information about leatherbacks from the national geographic kids web site and open discussion. Then students will hypothesize why individual leatherbacks were able to find their way from Costa Rica to the Galápagos Islands without any obvious navigational aids. They will learn to use compasses and hear about research indicating that leatherbacks might have their own internal compasses. Finally, students will draw pictures of people and leatherbacks navigating the ocean and write paragraphs to explain their drawings.

[Note: For students to fully understand the compass activity and its implications, it would be ideal if they have been introduced to magnets prior to this lesson.]

[Note: For students to fully understand sea turtles it would be helpful if the teacher introduced the national geographic kids web site and allowed students to explore in teams or individually

<http://www.nationalgeographic.com/ngkids/9911/turtle/index.html> ]

**Connections to the National Geography Standards:**

Standard 9: "The characteristics, distribution, and migration of human populations on Earth's surface"

## Connections to the Cobb County School District Standards

### Science

#### S.2.1.1 Inferences: Observations/Predictions

The learner will be able to make observations, inferences and predictions.

#### S.2.1.5 Communication: Ideas/Observation

The learner will be able to communicate ideas and observations made elsewhere in small and large groups.

#### S.2.3.2 Animals and Plants: Habitat/Need

The learner will be able to match various animals and plants to their habitat based on needs.

### Social Studies

#### SS.2.2.1 Cardinal directions

The learner will be able to locate places in our community on a map using cardinal directions in relation to the poles, the equator, and the hemispheres.

### Visual Arts

#### VA.2.1 Direct Observation

The learner will be able to create artworks based on close observation of familiar objects (representational artworks).

### Materials Required:

- Computer with Internet access
- At least one compass, and preferably several
- World Map
- Writing and drawing materials
- A magnet and some paperclips (optional)

### Objectives:

Students will

- look at a picture of a leatherback sea turtle and describe what they see;
- read or listen to three short paragraphs about leatherbacks and answer questions about this text;
- hypothesize how leatherbacks could find their way from Costa Rica to the Galápagos Islands on their own;
- practice using a compass to find directions in the classroom;
- discuss the possibility that leatherbacks have their own internal "compasses";
- draw pictures of people and leatherbacks navigating at sea; and
- write sentence(s) describing their drawings.

**Opening:**

Ask students to imagine this scary scenario:

You are on a raft or small boat in the Atlantic Ocean(point out ocean location on world map). You cannot see the land any more. You suddenly realize that you are lost in the ocean. What do you do? How can you find your way back to land?

Ask the class how they think they or other people would handle this situation. They might say that they would use a compass to navigate or a radio or cell phone to call home, or they might say that they would just be stranded at sea and left to the sharks.

Explain that people have developed certain tools and technologies for handling situations like this one. For example, they use compasses to find out which direction is north and then maps to show them where they are. They have radios to call for help, and they have special flares to signal to other boats or ships that might be passing by. Show students a compass, and tell them that they will learn to use one a little later.

Ask the students if they can imagine an animal using a compass, radio, or flare to help them if they are ever lost at sea? They will probably realize that this notion is ridiculous. However, many animals can do things that people cannot do. For example, the leatherback sea turtle can find its way around thousands of miles of ocean without any tools or technology. Explain that people are not sure how the turtles do this, but they are trying to learn more.

**Development:**

Have students look at pictures of leatherback sea turtles on [www.leatherback.org](http://www.leatherback.org) . Can they guess why they are called leatherbacks? Explain that their backs are soft and feel a little like leather, although they are not really made from leather like we wear on our shoes.

Have students also look at the picture of leatherback hatchlings found on the same website. Can students tell where these baby turtles are? Explain that the mother turtle always lays her eggs on a beach. The babies hatch and then run to the ocean to eat, swim, and grow. (To go into more depth on this topic, see the first Extension Activity below).

Have students read these paragraphs, or read them to the class:

- Leatherback turtles are the largest sea turtles in the world. They can be as long as 6 1/2 feet (2 meters). They are also the heaviest reptiles in the world. They can weigh 1400 pounds (635 kg)!
- Leatherbacks live in the Atlantic, Pacific, and Indian oceans. Their favorite food is jellyfish. They swim to places in these oceans that have a lot of jellyfish.
- Leatherbacks swim very long distances. They never seem to get lost. Some female leatherbacks swim thousands of miles from the tropical beaches where they lay their eggs. They return to those beaches when they are ready to lay eggs.
- Leatherback turtles are endangered, which means that there are not many of them left. One day there might not be any more leatherbacks at all. They can get trapped in fishing nets, and some people hunt and eat their eggs. People also build hotels and homes on the beaches where they lay their eggs.

Ask students to answer these questions about the above paragraphs, either individually, small group or as a class:

- Where do leatherback turtles live?
- Where do leatherbacks lay their eggs?
- Do leatherbacks get lost in the ocean?
- What is happening to leatherback turtles? What do people have to do with this?

Have one or more students point out the Atlantic, Pacific, and Indian Oceans on a world map. As students have learned, leatherback turtles live in all of these oceans. Tell the class that leatherbacks have been found throughout wide stretches of these oceans—north up to Alaska, south to New Zealand, and in the tropics. Point out these places on the map as you mention them. Then explain that the turtles always return to beaches in tropical areas to lay their eggs.

Point out Costa Rica and the Galápagos Islands on the map, and make sure all students can see where this small country and island chain are located. They might need to come to the front of the room to see them. Tell the class that Costa Rica is one of the leatherback's favorite locations to lay eggs. Explain that many turtles who lay their eggs in Costa Rica swim to the Galápagos Islands after laying their eggs.

Explain that scientists studied several leatherback turtles that laid eggs in Costa Rica. They discovered that the turtles all migrated along the same route from the beach where they laid their eggs to the Galápagos Islands. The turtles did not follow each other but instead swam alone. Point out this route (shown on the map at the Web site) on the class map.

Ask students how they think the turtles could have known how to get to the Galápagos Islands. Compare this experience to the scenario of being lost at sea; how could the turtles know their way without tools or technology?

Divide the class into pairs or small groups, and give each group a compass. If this is not possible, use one compass that can be rotated throughout the class so that everyone has a turn. Show students how to locate north with the compass. They will notice how the compass needle remains fixed as they move the compass to be aligned to the north.

Once they figure out which way is north, they can also figure out the other directions. Allow groups a few minutes to practice locating north, south, east, and west in the classroom. Ask them to rotate the compass so that everyone gets a turn holding it and aligning the needle.

Ask students to describe what happens when they place a magnet near a piece of metal such as a paperclip. If you have a magnet, demonstrate this phenomenon now. Explain that the compass needle behaves sort of like the paperclips do. There's a special force at the North Pole called a "magnetic field" that attracts the metal in the compass needle to point north, like the magnet attracted the paperclips. This magnetic field is not something students could see if they went to the North Pole; it's just there, invisible but strong enough to pull a compass needle north.

Explain that using a compass is a very common, and very old, way for people to figure out where they are and how to get where they want to go. As students might imagine, turtles do not use compasses. They might, however, have a different sort of "compass" in their brains that tell them in which direction to travel.

#### **Closing:**

Show students the picture of a turtle wearing a "bathing suit." found on [http://news.nationalgeographic.com/news/2001/10/1012\\_TVanimalnavigation.html](http://news.nationalgeographic.com/news/2001/10/1012_TVanimalnavigation.html) . Explain that scientists placed this suit onto baby sea turtles to monitor where they swam. The suits

are tied to devices that send information back to the scientists about the turtles' location. Tell the class that scientists have learned from this experiment that the turtles probably find their way in the ocean using an "internal compass."

Emphasize that this does not mean there is a physical compass inside the turtles' bodies, but rather that the turtles have a special way of thinking that is sort of like the way a compass works. The turtles can therefore figure out which direction is north or south without using a plastic or metal compass as people sometimes have to do.

Review in a class discussion the reasons scientists believe leatherbacks are able to migrate long distances on their own.

#### **Suggested Student Assessment:**

Have students draw two pictures: one of a person trying to find his or her way at sea, and one of a leatherback turtle doing the same. They can draw these pictures on two pieces of paper or on one large piece of paper divided into two parts.

Ask students to write a sentence or sentences describing what their drawings show. Their paper should demonstrate:

- what the person is doing;
- what the turtle is doing; and
- how the turtle might be able to find its way without a compass.

#### **Extending the Lesson:**

- Have students go to Turtles in Trouble found on (<http://www.nationalgeographic.com/ngkids/9911/turtle/index.html> ) and click on "Learn More." Have them click on the first four photographs to see how a leatherback turtle lays her eggs and how the hatchlings run for the sea. Discuss the dangers that the eggs and baby turtles face. Have students write stories pretending that they have been lucky enough to observe the process of nesting and hatching, and have them draw pictures illustrating their stories.
- Have students color the green sea turtles from the print n' go coloring book on the Kids National Geographic web site [http://www.nationalgeographic.com/coloringbook/sea\\_turtles.html](http://www.nationalgeographic.com/coloringbook/sea_turtles.html) . Explain that this is a different sea turtle species than the leatherback but that it, too, swims long distances in the ocean.
- Have students do the Sea World sea turtle matching activity found on <http://www.seaworld.org/infobooks/SeaTurtle/followthatturtle.html>

#### **Related Links:**

Endangered in the Wild: Leatherback Sea Turtle[http://www.bagheera.com/inthewild/van\\_anim\\_turtle.htm](http://www.bagheera.com/inthewild/van_anim_turtle.htm)

Leatherback.org

National Geographic: Turtles in Trouble

<http://www.nationalgeographic.com/ngkids/9911/turtle/index.html>

Sea Turtle Survival League

<http://www.cccturtle.org>

Sea World: Sea Turtles

<http://www.seaworld.org/infobooks/SeaTurtle/home.html>

Sea Turtle Education at Sandy Point, USVI

[http://www.fws.gov/caribbean-ecoteam/SP\\_edu\\_web.htm](http://www.fws.gov/caribbean-ecoteam/SP_edu_web.htm)