



Manatee Anatomy and Physiology

Grade level: Elementary 5

Subject Area: Biology, Anatomy and Physiology, Marine Biology

Duration: Teach: 15 minutes, Activity: 20 minutes, Discussion: 20 minutes.

Setting: Classroom

Next Generation Sunshine State Standards:

Reading: LAFS.5.RI Reading standards for Information text Cluster 3 LAFS.5.RI.3

Writing: LA.B.2.1, LA.B.1.2

Speaking and Listening: Cluster 2 LAFS.5.SL.Z Presentation of Knowledge and Ideas

Science: Body of Knowledge Life Science: SC.5.L.14, SC.5.L.15, SC.5.L.17, Body of Knowledge Nature of Science Supporting Idea 1: SC.5.N.1 Practice of Science, Supporting Idea 2: SC.5.N.2 Characteristics of Scientific Knowledge

Earth Systems and Patterns: 7SC.E.E.7

Statewide Science Assessment Prompt: *How might humans help manatees survive?*

Objectives: Students will learn about manatee bodies and explain some anatomical and physiological differences between manatees, humans and other animals.

Materials: Handouts of basic manatee anatomy, dolphin anatomy & human anatomy, crayons or markers, coloring direction sheet, question worksheet, Quiz sheet

Vocabulary: Mammal, endangered species, habitat, conservation, vibrissae, nares, blowhole, flipper, herbivore, omnivore, carnivore.

Background/Preparation: Handouts of manatee, dolphin, and human anatomy. Fact sheets comparing and contrasting specific and unique anatomical aspects of each species. Basic manatee fact sheet highlighting personality, limited habitat, endangered status and conservation efforts.

Teachers can review the manatee fact sheets, and select points of interest they would most like to incorporate into a lesson. This activity may fit best into the week where the human anatomy lessons are addressed. Teachers can present the information via traditional lecture, group discussion, question and answer session, or doing the coloring activity as the lesson points are addressed, etc.

Teach/Activities:

Activity 1: Color the anatomy handouts for each species using a single color for key organs or body part. (Ex. Lungs- red, Large Intestine- yellow, diaphragm-blue, heart-orange, Fluke-green)

Discussion 1: Use these color-coded handouts to stimulate discussion about the differences between the species and why these differences exist from a biological point of view.

Activity 2: Place students in groups to complete the Manatee worksheets using the colored anatomy handouts and fact sheets.

Discussion 2: Break out of groups and discuss the worksheet answers with students. Discuss manatee or ocean conservation efforts that are relative to your community.

Assessment: Quiz students on a “blank” manatee for major anatomical parts.

Resources: <http://www.volusiamanatees.org/> <http://myfwc.com/manatee/>

Manatee Fact Sheet

- Florida manatees are marine mammals. Mammals share 6 common traits: they are warm-blooded, breathe air, have defined teeth, have at least some hair, give birth to live young, and produce milk to feed their young.
- Manatees are generally herbivores and depend on fresh water, which is obtained through the vegetation they eat.
- Florida Manatee habitat is restricted primarily to the Florida peninsula and southern Georgia. They live in slow moving rivers, canals and coastal areas. They can live in fresh or salt water. Manatees need to be in water that is no colder than 68 degrees Fahrenheit in order to maintain a safe internal body temperature. If they are in water that is any colder than this for an extended period of time, they become susceptible to “cold stress,” which makes them vulnerable to disease and death.
- Manatees are an endangered species, meaning unless appropriate action is undertaken to conserve their population, they are in danger of becoming extinct. Because of this, there are strict laws set to protect them. This includes enforcement of speed zones along the waterways of Florida and rules against human interaction with them. Human interaction includes touching, harassing, feeding or watering.

- ***Similarities to Other Mammals***

- Manatees, like horses, are called hind-gut digesters. This means that the majority of food nutrients are extracted further along in the digestive tract, namely in the large intestine and cecum.

- Manatees are most closely related to elephants. Manatees have a large, muscular flexible prehensile upper lip that acts in many ways like a shortened trunk.

- Manatees have nails on their flippers, like finger nails, and similar to the nails seen on elephant hoofs. These are another indicator of their evolutionary relation to elephants.

- Manatees have vibrissae or tactile hairs distributed over the entire body and concentrated in the snout. This information would be useful for the detection of approaching animals, objects in the environment, and tidal flows. All mammals have hair at some point. Dolphins are born with small vibrissae on their rostrum, which fall out in the first few days of life.

- Like dolphins and seals, manatees have reticulated kidneys. This means the kidneys are composed of small segments that each functions like a tiny individual kidney. Human beings do not have reticulated kidneys.

- ***Differences with Other Mammals***

- Manatees exhibit “tooth-replacement” that occurs throughout their lifetime (polyphyodont). This is different from other mammals that replace their teeth once in a lifetime (diphyodont). The teeth are replaced from the back of the jaw and are called “Marching Molars”.

- Manatee nostrils are on the upper surface of their snout, as opposed to dolphins, which have blowholes located on the top of their heads. Manatees often raise just their nostril above water to breathe and breathe every 10-15 min while resting.

- Manatees and dolphins do not have hind limbs, where as humans and terrestrial mammals do.

- Manatees have a large paddle-like fluke whereas dolphins have a notched fluke.

- Manatee lungs have a unique shape. While other mammals have lungs that are located around the heart and extend down to the stomach, manatee lungs are long and flat. They run along approximately the entire backside (dorsal side) of the manatee and are positioned just above the diaphragm. While the location of the lungs in a manatee aid in buoyancy control, they also make the manatee prone to serious injury in the event of a boat strike. Because of the positioning of the lungs, if a boat strikes a manatee, the ribs may fracture and puncture the lungs, or the lungs may be directly punctured. Lung punctures can cause inability to breathe, air pockets that affect ability to dive, move and eat, and may even result in infection or death.

- Manatees can't turn their head sideways, they must turn their whole bodies.

- Manatees are herbivores, where dolphins are carnivores and humans are omnivores.

Created by Bryan Keller. Adapted by Allexa Bracht, Georgia Zern, Louise Chapman

Vocabulary

buoyancy- the ability of an object to float

carnivore- a flesh-eating mammal of the order Carnivora, comprising the dogs, cats, bears, seals, and weasels.

conservation- the preservation and careful management of the environment and of natural resources.

-the act of conserving; prevention of injury, decay, waste, or loss; preservation:

conservation of wildlife; conservation of human rights.

-official supervision of rivers, forests, and other natural resources in order to preserve and protect them through prudent management.

endangered species – a species of plant or animal of which numbers are decreasing at an alarming rate and is threatened with extinction by human-made or natural changes in the environment.

extinct- a form of life that no longer exists on earth.

flipper – a broad, flat limb containing bones and modified for swimming.

habitat -the natural environment of an organism; place that is natural for the life and growth of an organism, the place where a person or thing is usually found

herbivore- an animal that eats primarily plants.

mammal- Any of various warm-blooded vertebrate animals of the class Mammalia, including humans, characterized by a covering of hair on the skin and, in the female, milk-producing mammary glands for nourishing the young

omnivore- an animal that feeds on both animal and vegetable substances

vibrissae- stiff, sensitive whiskers or hairs on the head or body of an animal

Manatee Worksheet

Question 1: What are 5 things that are common to all mammals?

1.

2.

3.

4.

5.

Question 2: What are 3 major differences or similarities between the anatomy of...

A manatee and a human?

1.

2.

3.

A manatee and a dolphin?

1.

2.

3.

Question 3. How is the manatee lung different from the human or dolphin lung?

Why is this important?

Question 4. What makes the Florida Manatee special?

Questions 5. What kinds of things can you do to help the Florida Manatee?

Manatee Worksheet

Teacher Key- example answers

Question 1: What are 5 traits that are common to all mammals?

1. breathe air
2. give birth to live young
3. warm blooded
4. have hair
5. produce milk for their young.

Question 2: What are 3 major differences or similarities between the anatomy of a manatee and a human?

1. Manatees have lungs that run along their dorsal or back side of their bodies. This makes the manatee more prone to serious injury in the case of a boat strike.
2. Manatees are hind-gut digesters and use their large intestine and cecum for the majority of digestion.
3. Manatees have a muscular snout, similar to the trunk of an elephant.
4. Manatees have reniculated kidneys. Humans don't.
5. Manatees have sensory vibrissae, or hairs that help them feel the different food sources in their environment.
6. Manatees and humans are both mammals.
7. Manatees and humans both have _____(organ or bone).

A manatee and a dolphin?

1. Manatees have a muscular snout, whereas most dolphins have a pointed nose or rostrum.
2. Dolphins have a melon, or a large fatty tissue at the top of their head that they use to communicate with each other by echolocation.
3. Manatees have lungs that run along the back of their body, where dolphins' lungs are located around their heart and stomach.
4. Manatees have naris or nostrils while dolphins use blowholes to breathe.
5. Both manatees and dolphins have flukes that move up and down to propel them through the water.

Question 3. How is the manatee lung different from the human or dolphin lung? Manatee lungs run along the back (or dorsal side) of the manatee's body, whereas humans and dolphins have their lungs located around their heart, and more towards the front (ventral side) of the body.

Why is this important? While the lungs help manatees regulate their buoyancy (ability to float), their location makes them prone to injury in the event of a boat strike.

Question 4. What makes the Florida Manatee special? Manatees are endangered. Their habitat is limited to Florida and Georgia slow moving rivers and canals. Manatees are herbivores. Manatees have very gentle dispositions (Gentle Giants) and move slowly and quietly thorough the water.

Questions 5. What kinds of things can you do to help the Florida Manatee? Learn about conservation efforts in your community. Do things that preserve the manatees' environment like recycle monofilament, keep the waters, beaches and environment clean by participating in organized "clean-ups", use responsible boating habits like following speed restrictions and being aware when you are in manatee habitats. Stay educated about manatee issues and support manatee and habitat protection plans.











