

DOLPHIN RESEARCH CENTER

Classifying Marine Mammals

Grade Level: 6th-8th

Objectives: Students will be able to develop a classification system for marine mammals by examining physical characteristics. Students will also be able to describe the marine mammal classification systems most widely accepted by the scientific community.

Florida Sunshine State Standards:

Science

SC.G.1.3.3 The student understands that the classification of living things is based on a given set of criteria and is a tool for understanding biodiversity and interrelationships.

National Science Education Standards:

Content Standard C (5-8) - Diversity and Adaptations of Organisms: Millions of species of animals, plants, and microorganisms are alive today. Although different species might look dissimilar, the unity among organisms becomes apparent from an analysis of internal structures, the similarity of their chemical processes, and the evidence of common ancestry.

Background: Scientists use a system called taxonomy to classify living things. Our current taxonomic system is based on the 18th century work of Swedish scientist Carolus Linnaeus. Prior to Linnaeus' time, it was possible for one organism to have a variety of different names. Not only this, but scientists frequently changed the names of organisms or gave them long Latin names. After a couple of different ideas, Linnaeus developed a naming system entitled binomial nomenclature. In this system, every organism has a unique two-word Latin name. The first part of this scientific name is the genus name, and the second part is the species name.

Not only did Linnaeus develop a system for naming organisms, he also developed a hierarchical method of grouping organisms based on similarities. The system we use today, based on the work of Linnaeus, places living things into five general categories called kingdoms. Organisms in each kingdom are further classified into more specific categories, beginning with phyla (singular, phylum). Phyla are then broken down into classes, classes into orders, orders into families, families into genera (singular, genus), and genera into species. Each of these categories becomes more specific, including fewer organisms, until reaching the most specific level of species, which includes only one type of organism. Students can remember the order of these categories by creating phrases such as “King Philip Came Over For Good Spaghetti”.

Key Terms

Classification: Systematic arrangement in groups or categories according to established criteria.

Taxonomy: The study of the classification of all living organisms.



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The most widely used system today is a five-kingdom system. The kingdom Monera is composed of single celled organisms that lack a nucleus. This includes bacteria and cyanobacteria. Protista is mostly comprised of unicellular organisms, but all protists are made up of cells containing a nucleus. Fungi are heterotrophic organisms that absorb nutrients from the outside environment. Plantae contains autotrophic organisms that make food through a process called photosynthesis. The final kingdom, Animalia, includes heterotrophic organisms that ingest their food.

Marine mammals are found in the kingdom Animalia, the phylum Chordata, the subphylum Vertebrata, and the class Mammalia. They branch off in all different directions from Mammalia. Manatees and dugongs belong to the order Sirenia. Dolphins, whales and porpoises are in the order Cetacea and are called “cetaceans”. Cetaceans are further divided into two suborders, Mysticeti and Odontoceti. Mysticetes are baleen whales, while odontocetes are toothed whales. Seals, sea lions, walruses, otters, and polar bears are all found in the order Carnivora. Carnivora is often divided into the two suborders Caniformia and Feliformia. Caniformia refers to “dog-like” carnivores, and includes marine species such as otters, polar bears, seals, sea lions, and walruses. Feliformia refers to “cat-like” carnivores, and this suborder is entirely comprised of terrestrial species.

It is important to realize that these classification systems can vary. Scientists do not all agree on the best way to classify organisms. For example, some scientists choose to classify organisms according to physical and behavioral characteristics, while others classify organisms according to evolutionary relationships. No matter how organisms are classified, those classifications are always subject to change. Scientists are constantly gathering new information about organisms, and this may change an organism’s place in a classification system.

Materials:

For Each Group:

- One set of laminated **Marine Mammal Species Cards**

For Each Student:

- **Classifying Marine Mammals** handout
- **Marine Mammal Taxonomy** handout

Teacher Prep Notes: Students will need to be placed in cooperative learning groups for this lesson. Prior to the lesson, marine mammal species cards will need to be assembled. Print the **Marine Mammal Species Cards** and cut along the dotted line. Laminate the cards so they can be easily reused. Each group will need one full set of cards. This lesson assumes that students have very little previous experience with taxonomy, but the classification card activity can also be used as a reinforcement activity for students who are already familiar with classification.



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Procedures:

1. Begin by asking students what the word “classify” means. Allow students to share their own definitions. Discuss with students that to “classify” things means to put them in groups according to similarities.
2. Ask all of the students in the class to stand at the center of the room. (If possible, push desks or tables out of the way so students can easily see each other’s feet!) Ask for one volunteer to assist in recording information on the board.
3. Ask the students how they would classify their shoes based on similarities. (Examples include tennis shoes, sandals, boots, heels, etc.) This activity will be most successful if the students select no more than three groups, so help guide them in this direction. Once the class has decided the best way to group the shoes, have the students move into the proper groups. Some of the shoes may not easily fit into the three predetermined categories, so students will have to decide the best fit—no shoe can be alone!
4. Have the recorder write the groups at the top of the chalkboard. These will represent the “Kingdoms” of shoes.
5. Select one of the categories of shoes to classify further. For example, the boot category could be broken down into boots with laces (work boots) and those without. Once the categories have been selected, ask the recorder to list them under the proper Kingdom on the board.
6. Continue this process until all of the shoes in the Kingdom are by themselves (their own species).
7. If time allows, repeat this process with the other two Kingdoms.
8. Tell students that classification is not only used for objects, but is also used to organize living things. Explain that what the students did is very similar to how scientists classify living things. Scientists start with general groups, which branch off into more specific categories. Explain to students the levels of organization, from kingdom down to species.
9. Discuss the five kingdoms (Monera, Protista, Fungi, Plantae, and Animalia), briefly describing the characteristics of each. Ask students which kingdom includes organisms like dolphins and sea lions.
10. Familiarize students with the various phyla in the kingdom Animalia (i.e. Porifera, Cnidaria, Arthropoda, etc.) Explain that this lesson will focus on marine mammals, which fall into the phylum Chordata, subphylum Vertebrata, and the class Mammalia. (Discuss these classifications in as much detail as time allows.)
11. All organisms that fall into the class Mammalia share five characteristics. Review with students the five characteristics of mammals: they are air-breathing, endothermic, nurse their young, give live birth, and have hair.
12. Students will now have an opportunity to apply their knowledge of classification to marine mammals. Distribute the **Classifying Marine Mammals** handout to each student. Have the students work independently or in their groups to answer questions #1 and #2.



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13. Each cooperative group of students should then receive one set of **Marine Mammal Species Cards**. Inform students that they will be responsible for creating a classification system for marine mammals, beginning with orders and working down.
14. Students should be instructed to examine all of the cards (both text and pictures) in order to familiarize themselves with the marine mammals pictured. After examining the cards, students will need to group the organisms into a few orders based on similarities determined by the students.
15. Students should create a name for each of their orders, and fill out the necessary information in Table 1 on the handout.
16. Once students have decided on the orders, they will need to break these orders into families and then genera. Students should complete this in their groups, following the directions on the handout.
17. Once the groups have finished developing their classification system, each student will need to pair up with a student from another group. This will allow them to compare their classification systems. It is important to emphasize that taxonomic classifications are not set in stone, and are often disagreed upon by scientists.
18. Distribute the **Marine Mammal Taxonomy** handout so students can complete Part III of the handout. This may be done independently or in groups. Alternatively, it could be assigned for homework.

Wrap Up: Have students share their classification systems with the class, as well as their responses to the accompanying questions.

Taking it Further:

- Scientists often disagree on the classification of organisms, and the order Carnivora is a great example! Have students research the various classification systems that have been used within this order.
- Have students further research the taxonomic groupings of dolphins, bony fish, and lions. Ask them to determine which two are more closely related and thoroughly explain their answer.

NOTE: Parts of this lesson were adapted from the lesson plan “Biology: Classification of . . . Shoes?”. The original lesson is found at <http://www.teachers.net/lessons/posts/1228.html>.

