

Vertebrates in the Animal Kingdom

Strand	Living Systems
Topic	Investigating characteristics of organisms
Primary SOL	5.5 The student will investigate and understand that organisms are made of one or more cells and have distinguishing characteristics that play a vital role in the organism’s ability to survive and thrive in its environment. Key concepts include b) classification of organisms using physical characteristics, body structures, and behavior of the organism; c) traits of organisms that allow them to survive in their environment.
Related SOL	5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which a) items such as rocks, minerals, and organisms are identified using various classification keys.

Background Information

To study organisms, scientists first look at their characteristics and group the organisms based on the characteristics they share. Some animals are so small that they live on or inside other animals. Others, such as the giant squid, are many meters long and live in the depths of oceans. Animals can swim, crawl, burrow, fly, or not move at all. No matter what their size, where they live, or how they move, all animals must have some basic characteristics in common. All organisms in the animal kingdom (1) are made of cells, (2) reproduce, (3) grow and develop, (4) have a life cycle, (5) obtain and use energy, and (6) respond and adapt to their environment.

In the 18th century, a Swedish scientist named Carolus Linnaeus developed a system to organize living things. Today we are still using the essence of the system he developed, but scientists are constantly refining the system based on new knowledge. We call the classification of organisms into groups based on similarities of structure or origin the academic discipline of taxonomy.

The generally accepted levels of classification of organisms are (1)Domain,(2)Kingdom, (3)Phylum, (4)Class, (5)Order, (6)Family, (7)Genus, and (8)Species. Every animal can be classified according to this system. These levels start out broadly and get narrower and narrower as you go down the levels. By the time you get to the species, there is only one animal in the group. Students in fifth grade are not required to know these levels.

Classification of Organisms



After an organism has been classified as an animal, scientists look for other characteristics in order to place it in a phylum. Five percent of animals have a backbone and are grouped in a category called *vertebrates*. They are in kingdom Anamalia, phylum Chordata, and subphylum Vertebrata. There are five classes of vertebrates: fish, amphibians, reptiles, birds, and mammals.

The focus of the learning at this level is being able to recognize that all organisms can be classified based on characteristics. Students should be able to be familiar with animals as either vertebrates or invertebrates and to know some basic characteristics of each. Students will study the characteristics of each animal class in depth later in Life Science.

Materials

- Internet access
- Reference books
- Copies of Job Assignment Sheet
- Copies of Group Assignment Sheet
- Copies of Vertebrates Notes Sheet
- Copies of Vertebrates Gallery Walk Sheet
- White paper
- Colored pencils or markers
- Staplers
- Hole punch

Vocabulary

vertebrates

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

Introduction

1. Review with students that the Animal Kingdom is divided into many categories (phyla), two of which are informally called vertebrates and invertebrates.
2. Tell students that they will be researching the classes that vertebrates are divided into and each group will complete a book about their assigned class. Those classes are mammals, fish, amphibians, reptiles, and birds.

Procedure

1. Assign each student to work in a group of three to four students. Assign one of the five animal classes (mammal, fish, amphibians, reptiles, and birds) to each group. Give each group a Group Assignment Sheet and have them highlight the class that they will be researching.
2. Give each student a copy of the Vertebrates Notes Sheet.
3. Allow each student to research their assignment by using the Internet, textbooks, reference books, and other resources. Have the students collect information on the notes sheet that they were given. This will help guide them in their research.
4. Give each group a Job Assignment Sheet so that the group can decide which section each member of the group will complete for their book. Some students might have more than one section. The sections assignment responsibilities are:
 - a. Cover page: title with illustration and be in charge of binding the group book
 - b. Habitat page: picture of an animal in the class in its natural habitat (e.g., a cardinal in a tree to represent the birds)
 - c. Organism page: large, detailed picture of an organism in the class with its parts labeled
 - d. Poetry page: a short poem about the organism, including as many details about the defining characteristics of the class as possible

- e. Fact page: five to ten questions about the class that a reader should be able to answer after reading their book
 - f. Answer page: answers to the fact questions
5. Students will complete the assigned job using their notes sheets and compile their vertebrate book about their class.

Conclusion

1. Have each group report on their class to all the students.
2. Have each group present their books in a gallery walk, in which one member from their group remains with their book to explain it when the other groups rotate during the gallery walk. Have the students remaining with the book change after every group so all students have an opportunity to participate in the gallery walk and all students have an opportunity to present their group's book to the other students.
3. Have each student answer the questions from each book before rotating to the next book and have each student complete the Vertebrate Gallery Walk Reflection Sheet.
4. At the completion of the gallery walk, lead a class discussion regarding the common, defining characteristics of vertebrates and listing some common examples.

Assessment

- **Questions**
 - How are vertebrates classified?
 - What characteristics describe vertebrates?
 - How do the characteristics help us organize vertebrates?
 - Identify common vertebrates.
- **Journal/writing prompts**
 - Describe the classification of vertebrates, and illustrate your descriptions.
- **Other**
 - Trade vertebrate books with other groups and answer their questions.
 - Complete the Gallery Walk Reflection Sheet.

Extensions and Connections (for all students)

- Have students compare and contrast invertebrates with vertebrates.
- Have students choose a vertebrate animal and explain how its adaptations enable it to live in its environment.

Strategies for Differentiation

- Let students use the Group Assignment Sheet to learn the scientific names of the classes for the Phylum Chordata, which is the phylum for animals with backbones (since it is not required).
- Allow students time to sort pictures and other visuals of invertebrates prior to research to have clarification of similarities and differences.
- Create an electronic version of the group book using presentation software.
- Use a compare and contrast graphic organizer for comparing vertebrates and invertebrates.

Vertebrate Book – Job Assignments

Cut the strips to give each member of your group a job assignment for your Invertebrate Book. Some members of your group may need to do more than one job.

Cover page: Create the title page. Be sure to include the book title, authors, date, and an illustration of your animal class. Bind their booklet.

Habitat page: Include a picture of an animal in the animal class in its natural habitat (e.g., a cardinal in a tree to represent the birds).

Organism page: Include a large, detailed picture of an organism in the animal with its parts labeled.

Poetry page: Write a short poem about the organism, including as many details about the defining characteristics of the animal class as possible.

Fact page: Write five to ten questions about the animal class that a reader should be able to answer after reading the book.

Answer page: Write answers to the fact questions. Be sure the answers are written in sentences.

Vertebrate Groups – Group Book Animal Class Assignment

Common Name	Scientific Name
Fish	Class Binomen
Amphibians	Class Amphibia
Reptiles	Class Reptilia
Mammals	Class Mammalia
Birds	Class Aves

Vertebrate Notes Sheet

Name: _____ Date: _____

Class:
Major characteristics of this class:
Diagram of body systems (parts) that are characteristic of this class:
Names of animals in this class:
Interesting facts about this class: 1. 2. 3. 4. 5. 6. 7. 8. 9. 10.
Members in this class that are found in Virginia:

Vertebrate Gallery Walk Reflection Sheet

Name: _____ Date: _____

Other Group Members _____

Animals can be categorized as _____ (with a backbone) or _____
(without a backbone).

Name each vertebrate group	Describe two common examples of each group
	1. 2.

How can you identify each group? What characteristics does each group have that make them distinct from another vertebrate group? (Write your answer on the back of this page.)