

2009 TN Science Curriculum Standards for Unit 6: Animal Kingdom

* denotes standards not necessarily addressed directly in this unit, but can easily be tied in to the concepts covered in the exercises presented. Teachers of a particular grade level may also wish to examine suggestions for teachers of other grade levels for further inspiration on other standards to address.

Grades K-3

K-3.1.1 – Living things are made of smaller parts.

K-3.1.2 – Smaller parts contribute to an organism's well-being.

K-3.2.2 – Organisms use their senses to interact with their environments.*

K-3.2.3 – Recognize interactions/relationships between organisms & their environments.*

1-3.3.1 – Recognize basic requirements of living things.*

2-3.4.1 – Living things reproduce.*

2-3.4.2 – Offspring tend to resemble their parents.*

K-3.5.1 – Recognize differences among plants/animals of the same kind.

K-3.5.2 – Living things have features that help them survive in different environments.

2-3.6.1 – Some organisms are no longer found on earth.*

Suggestions for Teachers K-3

- Have students closely examine the specimens in the box, noting sensory structures of organisms. Get them to think about the sensory capabilities of these organisms, and what structures they have to acquire different kinds of sensory information, and help them interact with their environments.
- Talk to students about how very often, organisms in closely-related groups may have similar appearances and structures.
- This unit would also work well with some of the specimens in Unit 1: Fossils. Students could compare modern organisms with fossil organisms in Unit 1, noting similarities and differences.

Grades 4-5

4-5.1.1 – Organisms are made of one or more cells.

4-5.2.1 – Investigate relationships between organisms and their environment.*

4-5.2.2 – Investigate relationships among organisms in a specific ecosystem.*

4-5.3.1 – Plants and animals use food for energy.

4-5.3.2 – Investigate the function of structures used to obtain/use energy.

4-5.4.1 – Characteristics can be passed from parents to offspring.*

4-5.4.2 – Reproduction is necessary for the survival of species.*

4-5.4.3 – Investigate life cycles of organisms.

4-5.5.1 – Plants and animals can be grouped according to similarities and differences.

4-5.5.2 – Adaptations help organisms survive in their environments.

4-5.6.1 – Fossils show connections between past and present organisms.*

Suggestions for Teachers 4-5

- A sample of pond water provides a great opportunity to find and explore multiple types of animals (and other organisms). Students could try to see how many different animal phyla they could identify, as well as think about the interactions among these organisms.
- Also see suggestions for teachers K-3.

Grades 6-8

- 7.1.1 – Recognize the difference among cells, tissues, organs, and systems.
- 7.1.2 – Differentiate between the structures and functions of plant and animal cells.
- 7.1.3* – Recognize that cell division occurs in sequential stages.
- 7.1.4* – Know that materials move into and out of cells.
- 6.2.1* – Understand the nature of symbiotic relationships.
- 6.2.2* – Examine the competitive relationships among organisms within an ecosystem.
- 8.2.1* – Identify the major biomes of the world.
- 6.3.1* – Recognize relationships within food chains.
- 7.3.1* – Distinguish between photosynthesis and respiration.
- 7.3.2* – Describe the movement of oxygen and carbon dioxide between living organisms and the environment.
- 7.4.1 – Recognize the difference between sexual and asexual reproduction.
- 8.4.2 – Investigate the relationship among DNA, genes, chromosomes, and the genetic code of life.
- 6.5.1 – Understand how organisms are adapted for surviving in different environments.
- 8.5.1 – Identify characteristics used by scientists to classify organisms into different categories.
- 6.6.2 – Recognize various forms of evidence that indicate that life forms have changed over time.
- 6.6.3 – Reason how environmental changes are associated with the extinction of a species.

Suggestions for Teachers 6-8

- Focusing on form and function, the concept of adaptation is always a great approach to this unit.
- 6th grade teachers may wish to focus on relationships among animals (and other organisms) within a given ecosystem.
- 7th grade teachers may wish to emphasize the differences among prokaryotes and eukaryotes, and plants and animals at the cellular level.
- 7th grade teachers may also wish to go into detail about life cycles of the phyla represented in this unit. Which phyla reproduce sexually? Which phyla reproduce asexually? Which phyla do both?
- 8th grade teachers may wish to approach this unit from a “global biodiversity” perspective. Have students think about different biomes, and what types of representatives of the animal phyla in this unit may be found in each of them.

High School Courses

Biology I

- 3210.Inq.1 - Recognize that science is a progressive endeavor that reevaluates and extends what is already accepted.
- 3210.Inq.4 - Apply qualitative and quantitative measures to analyze data and draw conclusions that are free of bias.
- 3210.Inq.5 - Compare experimental evidence and conclusions with those drawn by others about the same testable question.
- 3210.Inq.6 - Communicate and defend scientific findings.
- 3210.Math.1 - Understand the mathematical principles associated with the science of biology.
- 3210.Math.2 - Utilize appropriate mathematical equations and processes to understand biological concepts.
- 3210.1.1 - Compare the structure and function of cellular organelles in both prokaryotic and eukaryotic cells.
- 3210.2.2 - Analyze and interpret population data, graphs, or diagrams.
- 3210.2.3* - How will climate change, human activity, geologic events, and non-native species impact an ecosystem?
- 3210.3.1* - Analyze energy flow through an ecosystem.
- 3210.4.1* - Genetic information is encoded in nucleic acids.
- 3210.5.1 - Associate structural, functional, and behavioral adaptations with the ability of organisms to survive under various environmental conditions.
- 3210.5.2 - Analyze the relationship between form and function in living things.

- 3210.5.3* - Explain how genetic variation in a population and changing environmental conditions are associated with adaptation and the emergence of new species.
- 3210.5.4* - Summarize supporting evidence for the theory of evolution.
- 3210.5.5 - Explain how evolution contributes to the amount of biodiversity.
- 3210.5.6 - Explore the evolutionary basis of modern classification systems.

Biology II

- 3216.Inq.1 - Recognize that science is a progressive endeavor that reevaluates and extends what is already accepted.
- 3216.Inq.4 - Apply qualitative and quantitative measures to analyze data and draw conclusions that are free of bias.
- 3216.Inq.5 - Compare experimental evidence and conclusions with those drawn by others about the same testable question.
- 3216.Inq.6 - Communicate and defend scientific findings.
- 3216.Math.1 - Understand the mathematical principles associated with the science of biology.
- 3216.Math.2 - Utilize appropriate mathematical equations and processes to understand biological concepts.
- 3216.1.1 - Compare prokaryotic and eukaryotic cells.
- 3216.2.1* - How is stability of an ecosystem maintained?
- 3216.2.3* - Describe varying degrees to which individual organisms are able to accommodate changes in environment.
- 3216.2.4* - Distinguish between accommodation of individual organisms and the adaptation of a population to environmental change.
- 3216.3.1 – Explore roles of biotic and abiotic factors in cycling of matter in ecosystem.
- 3216.3.2 – Explain how sunlight is captured by plant cells and converted into usable energy.
- 3216.4.1* - Mutation and sexual reproduction contribute to the amount of genetic variation in a population.
- 3216.6.1 - Investigate unity and diversity among living things.
- 3216.6.2* - Describe events associated with reproduction from gamete production through birth.
- 3216.6.3 - Compare organ systems of representative animal phyla.
- 3216.7.4 - Describe the difference between plants and fungi.

Anatomy and Physiology

- 3251.Inq.1 - Recognize that science is a progressive endeavor that reevaluates and extends what is already accepted.
- 3251.Inq.4 - Apply qualitative and quantitative measures to analyze data and draw conclusions that are free of bias.
- 3251.Inq.5 - Compare experimental evidence and conclusions with those drawn by others about the same testable question.
- 3251.Inq.6 - Communicate and defend scientific findings.
- 3251.1.2 - Investigate interrelationship between structures and functions of body systems.
- 3251.1.3 - Investigate body cavities, subdivisions of each cavity, and the organs within each area.
- 3251.1.4 - Use correct anatomical terminology when discussing body structures, sections, and regions.
- 3251.2.1 - Identify structures of integumentary, skeletal, and muscular systems, and show relationship between these structures and their functions.
- 3251.3.1 - Compare and contrast the anatomy and physiology of the central and peripheral nervous systems.
- 3251.3.4 - Investigate organs for perception of external stimuli and for the maintenance of homeostasis.
- 3251.4.2 - Explore the anatomy of the heart and describe the pathway of blood through this organ.
- 3251.5.1 - Identify organs of the digestive and urinary systems and describe their functions.

- 3251.5.2 - Investigate mechanisms of digestion and food absorption.
- 3251.6.1 - Identify the essential and accessory organs of the male and female reproductive systems and their functions.

Ecology

- 3255.Inq.1 - Recognize that science is a progressive endeavor that reevaluates and extends what is already accepted.
- 3255.Inq.4 - Apply qualitative and quantitative measures to analyze data and draw conclusions that are free of bias.
- 3255.Inq.5 - Compare experimental evidence and conclusions with those drawn by others about the same testable question.
- 3255.Inq.6 - Communicate and defend scientific findings.
- 3255.1.1 - Analyze strategies for classifying organisms.
- 3255.1.2 - Identify organisms based on how they obtain energy.
- 3255.1.3 - Relate animal behaviors to survival.
- 3255.1.4* - Investigate approaches to maintain biodiversity.
- 3255.2.2* - Cite examples of populations limited by natural factors.
- 3255.2.3* - Summarize how natural selection influences a population over time.
- 3255.3.1* - Explain ecological niches within various habitats.
- 3255.3.2* - Relate species interactions to coevolution.
- 3255.4.1* - Describe flow of energy through an ecosystem.
- 3255.4.4* - Summarize the human impact on ecosystems.
- 3255.4.5* - Describe how biodiversity relates to stability of an ecosystem.
- 3255.6.1* - Investigate the role of public lands in sustaining biodiversity.

Environmental Science

- 3260.Inq.1 - Recognize that science is a progressive endeavor that reevaluates and extends what is already accepted.
- 3260.Inq.4 - Apply qualitative and quantitative measures to analyze data and draw conclusions that are free of bias.
- 3260.Inq.5 - Compare experimental evidence and conclusions with those drawn by others about the same testable question.
- 3260.Inq.6 - Communicate and defend scientific findings.
- 3260.2.2* - Discuss the roles of biodiversity and coevolution in ecosystems.
- 3260.2.5 - Explain biogeochemical cycling in ecosystems.
- 3260.4.4* - Evaluate the impact of human activities on natural resources.
- 3260.7.2* - Compare and contrast methods used by various governments to protect biodiversity.

Scientific Research

- 3295.1.1 - Critically examine data to determine its significance.
- 3295.1.3 - Recognize that in science one solution often leads to new questions.
- 3295.2.1 - Analyze and study classic scientific problems.
- 3295.2.3 - Recognize the limitations of scientific investigations.
- 3295.2.4 - Use technological tools and mathematical models to analyze problems or questions.
- 3295.3.1 - Formulate a working hypothesis to guide research.
- 3295.5.1 - Present a scientific report in a clear, accurate, and appropriate manner to an audience.

Suggestions for High School Teachers

- Even though this unit examines things from a higher taxonomic level (phyla), Exercise 6 presents a good opportunity to talk about speciation and natural selection.
- Stress the importance of form and function! The broad range of biodiversity represented in this unit offers a great chance to think about structures and organ systems in a comparative framework.
- An ecological perspective on biodiversity can easily be explored via a simple trip around the school grounds. How many different animal phyla can students collect or observe just on the school campus? What sort of interactions exist among these organisms? Also see the pond water suggestion for younger grades.
- This is also a great unit to incorporate a conservation slant. Talk to students about the wealth of biodiversity in our state (the ATBI link in the “Links” section of the workbook is a great place to start!), as well as global biodiversity, and the importance of biodiversity from ethical, ecological, and economic standpoints. You may also wish to talk about endangered/threatened species. Do a Google search for “IUCN Red List”, or also check out information from CITES. You may even wish to have students examine a list of endangered/threatened or invasive species here in TN, and have them do reports on them.