

# High School: Zoology II (Vertebrate)

Adopted 2018

## High School - Zoology II (Vertebrate)

### 1. Evolution Z00.1

1A. Students will develop a model of evolutionary change over time. Z00.1A

1. Develop and use dichotomous keys to distinguish animals from protists, plants, and fungi. Z00.1A.1
2. Describe how the fossil record documents the history of life on earth. Z00.1A.2
3. Recognize that the classification of living organisms is based on their evolutionary history and/or similarities in fossils and living organisms. Z00.1A.3
4. Construct cladograms or phylogenetic trees to show the evolutionary branches of an ancestral species and its descendants. Z00.1A.4
5. Design models to illustrate the interaction between changing environments and genetic variation in natural selection leading to adaptations in populations and differential success of populations. Z00.1A.5
6. Enrichment: Use an engineering design process to develop an artificial habitat to meet the requirements of a population that has been impacted by human activity. Z00.1A.6

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## 7. Phylum Chordata, Classes Chondrichthyes and Osteichthyes Z00.7

- 7A. Students will understand the structure and function of phylum Chordata, classes Chondrichthyes and Osteichthyes, and how they demonstrate the characteristics of living things. Z00.7A
1. Students will understand why evolutionary changes lead to the diversity of fish and how they have adapted to the different aquatic environments. Z00.7A.1
  2. Compare and contrast the characteristics of class Chondrichthyes and Osteichthyes. Z00.7A.2
  3. Identify specific fish species and characteristics that differentiate class Chondrichthyes (e.g., sharks, skates, and rays). Z00.7A.3
  4. Describe how the body and jaw design of sharks make them adept predators. Z00.7A.4
  5. Label and describe functions of the anatomical features of the bony fish, including internal organs, lateral line system, operculum, swim bladder, and external fins. Z00.7A.5
  6. Research, analyze, and communicate the effects of urbanization and continued expansion by humans on the biodiversity of fish species (e.g., overfishing and invasive species). Z00.7A.6
  7. Dissect representative taxa and compare their internal and external anatomy and complexity. Z00.7A.7
  8. Enrichment: Use an engineering design process to design a "balloon fish" that has neutral buoyancy (i.e., does not sink or float). Report which materials were used to create the "fish," and predict which materials should be added to make the "fish" sink and which materials would make the "fish" float. Z00.7A.8

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## 8. Phylum Chordata, Classes Amphibia and Reptilia Z00.8

- 8A. Students will understand the structure and function of phylum Chordata, classes Amphibia and Reptilia, and how they demonstrate the characteristics of living things. Z00.8A
1. Understand the evolution of tetrapods and the development of the structure and function of body systems and life cycles. Z00.8A.1
  2. Describe the constraints that require amphibians to spend part of their lives in water and part on land, including the morphological and physiological changes as they pass from one stage of their life cycle to the next. Z00.8A.2
  3. Describe adaptations that have led to reptiles living on land successfully. Z00.8A.3
  4. Define what it means to be ectothermic, and identify ways in which reptiles regulate their body temperature. Z00.8A.4
  5. Describe how snakes use chemosensory to locate and track prey. Z00.8A.5
  6. Enrichment: Use an engineering design process to model biomimicry of ectothermic temperature regulation or chemosensory detection to meet a societal need. Z00.8A.6
  7. Compare and contrast living and extinct reptiles. Z00.8A.7
  8. Explain the importance of tetrapod evolution. Z00.8A.8
  9. Identify the amniotic egg as the major derived characteristic of reptiles. Z00.8A.9
  10. Dissect representative taxa and compare their internal and external anatomy and complexity. Z00.8A.10

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## 9. Phylum Chordata, Class Aves Z00.9

- 9A. Students will understand the structure and function of phylum Chordata, class Aves, and how they demonstrate the characteristics of living things. Z00.9A
1. Trace the evolutionary history of modern birds beginning with the theropods. Relate how today's birds have adapted to changing environments. Z00.9A.1
  2. Describe the fossil evidence that indicates that birds evolved from two-legged dinosaurs called theropods. Z00.9A.2
  3. Define the term endothermic, and describe how birds regulate body temperature in extreme environments. Z00.9A.3
  4. Enrichment: Use an engineering design process to model biomimicry of endothermic temperature regulation to meet a sustainable need. Z00.9A.4
  5. Explain how birds of prey use their keen sense of sight to locate and attack prey. Z00.9A.5
  6. Describe how corvids use their intellect for problem solving and locating food storage. Z00.9A.6
  7. Explain the importance of the evolution of flight and feathers, including the morphological and physiological adaptations needed to sustain flight. Z00.9A.7
  8. Enrichment: Use an engineering design process to utilize a bird's flight adaptations in the development of a flying aircraft (e.g., glider, plane). Z00.9A.8
  9. Demonstrate how different adaptations of the bird beak and feet allow them to feed and survive in different environments. Z00.9A.9
  10. Enrichment: Based on an understanding of biomimicry, use an engineering design process to develop a tool based on a bird's beak/feet to meet a human need. Z00.9A.10
  11. Describe the parenting behavior of different birds in order to incubate their eggs and care for hatchlings. Z00.9A.11
  12. Enrichment: Use an engineering design process to design and construct an incubator for hatching abandoned eggs. Z00.9A.12
  13. Explain the reasons for bird migration and the innate behavior of migratory birds. Z00.9A.13
  14. Dissect representative taxa and compare their internal and external anatomy and complexity. Z00.9A.14

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**10. Phylum Chordata, Class Mammalia** Z00.10

- 10A.** Students will understand the structure and function of phylum Chordata, class Mammalia, and how they demonstrate the characteristics of living things. Z00.10A
1. Understand the characteristics and behaviors that distinguish mammals from other phyla, and use characteristics and behaviors to distinguish the major orders, including primates. Explain how human impact has changed the environments of other organisms. Z00.10A.1
  2. Describe the characteristics of the first true mammal. Z00.10A.2
  3. Distinguish among monotremes, marsupials, and eutherians, and describe the importance and differences in the placenta in marsupials and eutherians. Z00.10A.3
  4. Describe characteristics that make primates unique, including investigating how the center of gravity relates to the evolution of bipedalism. Z00.10A.4
  5. Dissect representative taxa and compare their internal and external anatomy and complexity. Z00.10A.5
  6. Explain how human impacts have changed the environment of aquatic and terrestrial organisms (e.g., habitat destruction, urbanization, and climate change). Z00.10A.6
  7. Enrichment: Use an engineering design process to develop a possible solution to an environmental issue that currently exists in an ecosystem. Z00.10A.7