

# Life Science Strand

## Grades K-8

### KINDERGARTEN

#### Structures and Functions of Living Organisms

K.L.1: Compare characteristics of animals that make them alike and different from other animals and nonliving things.

- K.L.1.1: Compare different types of the same animal (i.e., different types of dogs, different types of cats, etc.) to determine individual differences within a particular type of animal.
- K.L.1.2: Compare characteristics of living and nonliving things in terms of their structure, growth, changes, movement, and basic needs.

### FIRST GRADE

#### Ecosystems

1.L.1: Understand characteristics of various environments and behaviors of humans that enable plants and animals to survive.

- 1.L.1.1: Recognize that plants and animals need air, water, light (plants only), space, food, and shelter and that these may be found in their environment.
- 1.L.1.2: Give examples of how the needs of different plants and animals can be met by their environments in North Carolina or different places throughout the world.
- 1.L.1.3: Summarize ways that humans protect their environment and/or improve conditions for the growth of the plants and animals that live there (e.g., reuse or recycle products to avoid littering).

#### Molecular Biology

1.L.2: Summarize the needs of living organisms for energy and growth.

- 1.L.2.1: Summarize the basic needs of a variety of different plants (including air, water, nutrients, and light) for energy and growth.
- 1.L.2.2: Summarize the basic needs of a variety of different animals (including air, water, and food) for energy and growth.

### SECOND GRADE

#### Structures and Functions of Living Organisms

2.L.1: Understand animal life cycles.

- 2.L.1.1: Summarize the life cycle of animals: birth; developing into an adult; reproducing; aging and death.
- 2.L.1.2: Compare life cycles of different animals such as, but not limited to, mealworms, ladybugs, crickets, guppies, or frogs.

## **Evolution and Genetics**

2.L.2: Remember that organisms differ from or are similar to their parents based on the characteristics of the organism.

- 2.L.2.1: Identify ways in which many plants and animals closely resemble their parents in observed appearance and ways they are different.
- 2.L.2.2: Recognize that there is variation among individuals that are related.

## **THIRD GRADE**

### **Structures and Functions of Living Organisms**

3.L.1: Understand human body systems and how they are essential for life: protection, movement, and support.

- 3.L.1.1: Compare the different functions of the skeletal and muscular systems.
- 3.L.1.2: Explain why skin is necessary for protection and for the body to remain healthy.

### **Ecosystems**

3.L.2: Understand how plants survive in their environments.

- 3.L.2.1: Remember the function of the following structures as it relates to the survival of plants in their environments:
  - ✓ Roots – absorb nutrients
  - ✓ Stems – provide support
  - ✓ Leaves – synthesize food
  - ✓ Flowers – attract pollinators and produce seeds for reproduction
- 3.L.2.2: Explain how environmental conditions determine how well plants survive and grow.
- 3.L.2.3: Summarize the distinct stages of the life cycle of seed plants.
- 3.L.2.4: Explain how the basic properties (texture and capacity to hold water) and components (sand, clay, and humus) of soil determine the ability of soil to support the growth and survival of many plants.

## **FOURTH GRADE**

### **Ecosystems**

4.L.1: Understand the effects of environmental changes, adaptations, and behaviors that enable animals (including humans) to survive in changing habitats.

- 4.L.1.1: Give examples of changes in an organism's environment that are beneficial to it and some that are harmful.
- 4.L.1.2: Explain how animals meet their needs by using behaviors in response to information received from the environment.
- 4.L.1.3: Explain how humans can adapt their behavior to live in changing habitats (e.g., recycling wastes, establishing rain gardens, planting trees and shrubs to prevent flooding and erosion).
- 4.L.1.4: Explain how differences among animals of the same population sometimes give individuals an advantage in surviving and reproducing in changing habitats.

### **Molecular Biology**

4.L.2: Understand food and the benefits of vitamins, minerals, and exercise.

- 4.L.2.1: Classify substances as food or non-food items based on their ability to provide energy and materials for survival, growth, and repair of the body.
- 4.L.2.2: Explain the role of vitamins, minerals, and exercise in maintaining a healthy body.

## **FIFTH GRADE**

### **Structures and Functions of Living Organisms**

5.L.1: Understand how structures and systems of organisms (to include the human body) perform functions necessary for life.

- 5.L.1.1: Explain why some organisms are capable of surviving as a single cell while others require many cells that are specialized to survive.
- 5.L.1.2: Compare the major systems of the human body (digestive, respiratory, circulatory, muscular, skeletal, and cardiovascular) in terms of their functions necessary for life.

### **Ecosystems**

5.L.2: Understand the interdependence of plants and animals with their ecosystem.

- 5.L.2.1: Compare the characteristics of several common ecosystems, including estuaries and salt marshes, oceans, lakes and ponds, forests, and grasslands.
- 5.L.2.2: Classify the organisms within an ecosystem according to the function they serve: producers, consumers, or decomposers (biotic factors).
- 5.L.2.3: Infer the effects that may result from the interconnected relationship of plants and animals to their ecosystem.

### **Evolution and Genetics**

5.L.3: Understand why organisms differ from or are similar to their parents based on the characteristics of the organism.

- 5.L.3.1: Explain why organisms differ from or are similar to their parents based on the characteristics of the organism.
- 5.L.3.2: Give examples of likenesses that are inherited and some that are not.

## **SIXTH GRADE**

### **Structures and Functions of Living Organisms**

6.L.1: Understand the structures, processes, and behaviors of plants that enable them to survive and reproduce.

- 6.L.1.1: Summarize the basic structures and functions of flowering plants required for survival, reproduction, and defense.
- 6.L.1.2: Explain the significance of the processes of photosynthesis, respiration, and transpiration to the survival of green plants and other organisms.

### **Ecosystems**

6.L.2: Understand the flow of energy through ecosystems and the responses of populations to the biotic and abiotic factors in their environment.

- 6.L.2.1: Summarize how energy derived from the Sun is used by plants to produce sugars (photosynthesis) and is transferred within food chains and food webs (terrestrial and aquatic) from producers to consumers to decomposers.
- 6.L.2.2: Explain how plants respond to external stimuli (including dormancy and forms of tropism) to enhance survival in an environment.
- 6.L.2.3: Summarize how the abiotic factors (such as temperature, water, sunlight, and soil quality) of biomes (freshwater, marine, forest, grasslands, desert, Tundra) affect the ability of organisms to grow, survive, and/or create their own food through photosynthesis.

# SEVENTH GRADE

## Structures and Functions of Living Organisms

7.L.1: Understand the processes, structures, and functions of living organisms that enable them to survive, reproduce and carry out the basic functions of life.

- 7.L.1.1: Compare the structures and life functions of single-celled organisms that carry out all of the basic functions of life including euglena, amoeba, paramecium, and volvox.
- 7.L.1.2: Compare the structures and functions of plant and animal cells, including major organelles (cell membrane, cell wall, nucleus, chloroplasts, mitochondria, and vacuoles).
- 7.L.1.3: Summarize the hierarchical organization of multi-cellular organisms from cells to tissues to organs to systems to organisms.
- 7.L.1.4: Summarize the general functions of the major systems of the human body (digestion, respiration, reproduction, circulation, and excretion) and ways that these systems interact with each other to sustain life.

## Evolution and Genetics

7.L.2: Understand the relationship of the mechanisms of cellular reproduction, patterns of inheritance, and external factors to potential variation among offspring.

- 7.L.2.1: Explain how offspring that result from sexual reproduction (fertilization and meiosis) have greater variation than offspring that result from asexual reproduction (budding and mitosis).
- 7.L.2.2: Infer patterns of heredity using information from Punnett squares and pedigree analysis.
- 7.L.2.3: Explain the impact of the environment and lifestyle choices on biological inheritance (to include common genetic diseases) and survival.

# EIGHTH GRADE

## Structures and Functions of Living Organisms

8.L.1: Understand the hazards caused by agents of diseases that affect living organisms.

- 8.L.1.1: Summarize the basic characteristics of viruses, bacteria, fungi, and parasites relating to the spread, treatment, and prevention of disease.
- 8.L.1.2: Explain the differences between epidemic and pandemic as it relates to the spread, treatment, and prevention of disease.

8.L.2: Understand how biotechnology is used to affect living organisms.

- 8.L.2.1: Summarize aspects of biotechnology, including:
  - ✓ Specific genetic information available
  - ✓ Careers
  - ✓ Economic benefits to North Carolina
  - ✓ Ethical issues
  - ✓ Implications for agriculture

## Ecosystems

8.L.3: Understand how organisms interact with and respond to the biotic and abiotic components of their environment.

- 8.L.3.1: Explain how factors such as food, water, shelter, and space affect populations in an ecosystem.
- 8.L.3.2: Summarize the relationships among producers, consumers, and decomposers, including the positive and negative consequences of such interactions, including:
  - ✓ Coexistence and cooperation
  - ✓ Competition (predator/prey)

- ✓ Parasitism
- ✓ Mutualism
- 8.L.3.3: Explain how the flow of energy within food webs is interconnected with the cycling of matter (including water, nitrogen, carbon dioxide, and oxygen).

### **Evolution and Genetics**

8.L.4: Understand the evolution of organisms and landforms based on evidence, theories, and processes that impact the Earth over time.

- 8.L.4.1: Summarize the use of evidence drawn from geology, fossils, and comparative anatomy to form the basis for biological classification systems and the theory of evolution.
- 8.L.4.2: Explain the relationship between genetic variation and an organism's ability to adapt to its environment.

### **Molecular Biology**

8.L.5: Understand the composition of various substances as it relates to their ability to serve as a source of energy and building materials for growth and repair of organisms.

- 8.L.5.1: Summarize how food provides the energy and the molecules required for building materials, growth, and survival of all organisms (to include plants).
- 8.L.5.2: Explain the relationship among a healthy diet, exercise, and the general health of the body (emphasis on the relationship between respiration and digestion).