

SCIENCE IDEAS CURRICULUM FRAMEWORK: BIOLOGY (K-8)

Note: The following represents the results of a hierarchical conceptual analysis of Florida K-8 Big Ideas in Biology. In doing so, a perspective was adopted that represented the conceptual framework for biology in high school and introductory biology classes. Following this perspective, the core concepts and associated sub-concepts in biology were identified for grades K-8 in order to insure sound learning progressions from K-5 to 6-8. And, finally, this conceptual structure was applied and elaborated as necessary to provide Science IDEAS teachers with a grade-articulated curricular framework for biology instruction in grades K-5.

Core Concepts in Biology: Grade K-8 (Florida Standards- Big Ideas 14-18)

1. Living vs. non-living

- 1-1. Atoms → molecules → cells → tissues → organs → organ systems → organisms
- 1-2. Cell theory

2. Cell structure

- 2-1. Homeostasis
- 2-2. Meiosis and mitosis.

3. Physiology

- 3-1. Major body systems.
- 3-2. Infectious agents.

4. Heredity

- 4-1. DNA.
- 4-2. Genotypes vs. phenotypes
- 4-3. Theory of evolution
- 4-4. Fossils
- 4-5. Genetic variation, natural selection, adaptation
- 4-6. Classification
- 4-7. Artificial selection, genetic engineering

5. Ecosystems

- 5-1. Food webs: producers, consumers, decomposers.
- 5-2. Ecosystem factors (food, shelter, water, space, nesting sites, disease, parasitism, predation.)
- 5-3. Photosynthesis (carbon dioxide + water + energy → organic matter + oxygen), respiration (opposite process).

Core Concepts in Biology by Grade Level: K-8 (Florida Standards- Big Ideas 14-18)

Grade K

- 3. The five senses and related body parts = SC.K.L.14.1
- 3. Similarities and differences of different kinds of plants and animals = SC.K.L.14.3
- 4-6. Differences between real and fictional animals = SC.K.L.14.2

Grade 1

- 1. Living vs. non-living = SC.1.L.14.3
- 3. Major plant parts and their basic functions = SC.1.L.14.2
- 4. Offspring is similar but not exactly the same as the parents = SC.1.L.16.1
- 4-6. Plants, insects, fish, birds, reptiles, and animals including humans = SC.1.L.14.1
- 5-2. Basic necessities of life = SC.1.L.17.1

Grade 2

- 3. Plant life cycles = SC.2.L.16.1
- 3. Typical animal life cycles = SC.2.L.16.1
- 3. Atypical (e.g. frogs, butterflies) animal life cycles = SC.2.L.16.1
- 3. Major mammalian, including humans, body parts and their basic functions = SC.2.L.14.1
- 3. Major insect, bird, fish, and reptile body parts and their basic functions = SC.2.L.14.1
- 5. Living things need suitable habitats = SC.2.L.17.1 and SC.2.L.17.2

Grade 3

- 3-1. Types of plant tissues and their roles = SC.3.L. 14.1
- 4-3. Responses to changing environments (added)
- 4-5. Plant responses to stimuli = SC.3.L.14.2
- 4-5. Animal responses to stimuli (added)
- 4-5. Animal and plant responses to changing seasons = SC.3.L.17.1
- 4-6. Viruses, bacteria, lower and higher plants, arthropods, fish, amphibians, reptiles, mammals, vertebrates and invertebrates, live birth vs. eggs = SC.3.L.15.1
- 4-6. Flowering and non-flowering plants, seeds vs. spores = SC.3.L.15.2
- 5-1. Plants are producers = SC.3.L.17.2

Grade 4

- 3. Compare and contrast various plant and animal life cycles = SC.4.L.16.4
- 3-1. Sexual and asexual plant reproduction = SC.4.L.16.1

- 4. Plant and animal characteristics are both inherited and influenced by the environment = SC.4.L.16.2
- 4. Animal behavior is shaped by both heredity and learning = SC.4.L.16.3
- 4-4. Fossils (added)
- 5. Impacts of plants and animals upon their environments = SC.4.L.17.4
- 5-1. Producers, consumers, decomposers = SC.4.L.17.2
- 5-1. Flow of energy and nutrients through the food web = SC.4.L.17.3
- 5-2. Seasonal changes in Florida vs. elsewhere = SC.4.L.17.1

Grade 5

- 3-1. Insect, bird, fish, and reptile organs and their functions= SC.5.L. 14.2
- 3-1. Mammalian, including human, organs and their functions = SC.5.L. 14.1 and SC.5.L. 14.2
- 3-1. Compare and contrast various plant tissues and animal organs and their functions = SC.5.L. 14.2
- 3-1. Insect sexual and asexual reproduction. = SC.5.L.14.2
- 3-1. Bird, fish, and reptile reproduction= SC.5.L.14.2
- 3-1. Mammalian, including human, reproduction = SC.5.L.14.2
- 3-1. Compare and contrast different modes of plant and animal reproduction = SC.5.L.14.2
- 4-5. Animal and plant adaptations to various environments = SC.5.L.15.1 and SC.5.L.17.1

Grade 6

- 1-1 Atoms → molecules → cells → tissues → organs → organ systems → organisms = SC.6.L.14.1
- 1-2. Cell theory= SC.6.L.14.2
- 2. Cell structure= SC.6.L.14.4
- 2-1. Cellular homeostasis= SC.6.L.14.3
- 3-1. Human organ systems and their functions = SC.6.L. 14.5
- 3-2. Infectious agents (viruses, bacteria, fungi, and parasites) = SC.6.L.14.6
- 4-6. Domains and kingdoms = SC.6.L.15.1
- 4-6. Intermediate taxonomic divisions are based on similarities in physical characteristics = SC.6.L.15.1
- 4-6. Species are determined by successful breeding in higher organisms and DNA similarity in bacteria/viruses = SC. 6.L. 15.1

Grade 7

- 2-2. Meiosis and mitosis= SC.7.L.16.3.

- 4-1. DNA = SC.7.L.16.1
- 4-2. Genotypes vs. phenotypes (added)
- 4-2. Dominant and recessive genes(added)
- 4-2. Single gene and multigene characteristics (added)
- 4-2. Probabilities for genotype and phenotype combinations= SC.7.L.16.2
- 4-3. Genetic variation and environmental factors contribute to evolution by natural selection and diversity of organisms = SC.7.L.15.2 and SC.7.L.15.3
- 4-3. Fossil evidence = SC.7.L.15.1
- 4-7. Artificial selection and genetic engineering = SC.7.L.16.4
- 5-1. Conservation of mass and energy in a food web = SC.7.L.17.1
- 5-2. Mutualism, predation, parasitism, competition, and commensalism = SC.7.L.17.2
- 5-2. Ecosystem limiting factors = SC.7.L.17.3

Grade 8

- 5-1. Conservation of mass and energy in a food web = SC.8.L.18.3 and SC.8.L.18.4
- 5-3. Photosynthesis (carbon dioxide + water + energy → organic matter + oxygen) = SC.8.L.18.1
- 5-3. Respiration (organic matter + oxygen → carbon dioxide + water + energy) = SC.8.L.18.2