

7th Grade Life Science Learning Targets

From Molecules to Organisms: Structures and Processes

1. Gather and synthesize information to support claims of the cell theory and explain how cells differ in structure and function.

- a) I can distinguish between living and non-living things.
- b) I can argue the claims about of the cell theory.
- c) I can differentiate between prokaryotic and eukaryotic cells.
- d) I can contrast the methods of sexual and asexual reproduction with prokaryotic and eukaryotic cells.
- e) I can develop a cell model to demonstrate cell structures (e.g. nucleus, cell membrane, cell wall, ribosomes, mitochondria, chloroplasts, and vacuoles) and functions.
- f) I can construct an explanation of how specific organelles in eukaryotic cells are used for maintaining a stable environment.

2. Construct models and representations of organ systems to demonstrate how multiple interacting organs and systems work together to accomplish specific functions.

- a) I can describe connections between the levels of organization (cells, tissues, organs, organ systems).
- b) I can explain the basic function of each system (e.g., circulatory, digestive, muscular, respiratory, skeletal, and nervous) and identify the main organs involved.
- c) I can construct models supporting how the body systems function together.

Ecosystems: Interactions, Energy, and Dynamics

3. Examine the cycling of matter between abiotic and biotic parts of ecosystems to explain the flow of energy and the conservation of matter.

- a) I can identify abiotic and biotic factors a given environment.
- b) I can construct a model to demonstrate energy flow in a food web between producers consumers and decomposers.
- c) I can evaluate biogeochemical cycles (e.g. carbon, nitrogen) and explain how atoms in an ecosystem are cycled between the living and nonliving parts of the ecosystem.
- d) I can generate a scientific explanation based on evidence for the role of photosynthesis and cellular respiration in the cycling of matter and flow of energy into and out of organisms.

4. Analyze and interpret data to provide evidence regarding how resource availability impacts individual organisms, as well as populations of organisms, within an ecosystem.

- a) I can list the hierarchy of an ecosystem.
- b) I can analyze the impact of limited resources on a population.
- c) I can justify competition based on resource availability.
- d) I can use data to provide evidence of the impact of resource availabilities.

5. Construct an explanation to predict consistent patterns of interactions in different ecosystems in terms of the relationships between and among organisms.

- a) I can define and give examples of interspecies interactions such as competition, predation, mutualism, commensalism, and parasitism.
- b) I can determine the impacts of interspecies interactions on population growth.
- c) I can predict patterns of interactions among organisms across different ecosystems.

6. Use empirical evidence from patterns and data to demonstrate how changes to an ecosystem can lead to shifts in populations and design a solution which maintains biodiversity and ecosystem services.

- a) I can investigate the impact of disruptions (e.g. deforestation, succession, drought, fire, disease, human activities, and invasive species) on an ecosystem.
- b) I can construct an argument based on empirical evidence to support or refute that changes to physical or biological components of an ecosystem can lead to shifts in populations.
- c) I can predict how changes to biodiversity can affect an ecosystem.
- d) I can explain how an ecosystem directly or indirectly supports humans' survival and the quality of life.
- e) I can engage in an argument to defend the effectiveness of a design solution which maintains biodiversity and ecosystem services.(e.g., using scientific, economic, and social considerations regarding purifying water, recycling nutrients, preventing soil erosion).

7. Use evidence and scientific reasoning to explain factors affecting the probability of successful reproduction in both animals in plants, and interpret data to predict how various factors will affect the growth of organisms.

- a) I can identify and describe the function of the specialized plant structures which contribute to reproductive success.
- b) I can identify animal behaviors which affect the probability of reproduction (e.g., nest building to protect young from cold, herding of animals to protect young from predators, vocalization of animals, and colorful plumage to attract mates from breeding).
- c) I can use scientific reasoning to determine how specialized plant structures and animal behaviors impact the success of reproduction.
- d) I can use data to predict the impact of environmental conditions (e.g., drought decreasing plant growth, fertilizers increasing plant growth, different varieties of plant seeds growing at different rates in different weather conditions, fish growing larger in large ponds than in small ponds) on the growth of organisms.
- e) I can analyze the impact of genetic factors (e.g., selective breeding of cattle, grafting of plants) on the growth of organisms.

Heredity: Inheritance and Variation of Traits

8. Construct and use models to explain that genetic variations between parent and offspring occur as a result of genetic differences in randomly inherited genes, and that additional variations may arise from alteration of genetic information.

- a) I can define genetic variations, alleles, mutations, Punnett Squares, heterozygous, and homozygous.
- b) I can define chromosomes and identify their location in both prokaryotic and eukaryotic cells.
- c) I can develop a model to demonstrate the impact of genes on chromosomes.
- d) I can create models, such as punnett squares and pedigrees, which explain genetic differences in randomly inherited genes.
- e) I can construct an explanation from evidence to describe how genetic mutations result in harmful, beneficial, or neutral effects to the structure and function of an organism.

9. Engage in argument from evidence to evaluate the impact of genetic technologies on the inheritance of desired traits in organisms.

- a) I can explain technologies (e.g., forced pollination, selective breeding, genetic engineering, genetic modification, gene therapy) used in genetics.
- b) I can argue the benefits or cons of genetic technology being used to produce the desired traits in animals.

Unity and Diversity

10. Analyze and interpret data which supports the evolution of organisms including embryological, anatomical and fossil evidence.

- a) I can explain how the fossil record documents the existence, diversity, extinction and change of life forms throughout the history of the earth.
- b) I can use fossils and their chronological appearance in rock layers to interpret patterns of change in the level of complexity of anatomical structures.
- c) I can construct an explanation (e.g., cladogram, phylogenetic tree) based on evidence for the anatomical similarities and differences among modern organisms and between modern and fossil organisms, including living fossils (e.g., alligator, horseshoe crab, nautilus, coelacanth).
- d) I can use pictorial data to identify patterns in embryo development across multiple species and predict relationships which are not evident in adult anatomy.

11. Construct an explanation from evidence that natural selection may lead to the predominance of certain traits that support successful survival and reproduction of a population and to the suppression of other traits.

- a) I can define natural selection.
- b) I can explain how adaptations lead to natural selection over time.
- c) I can use mathematical models to demonstrate the support of natural selection.
- d) I can support with evidence how traits have supported or inhibited the survival rate.