

Accelerated Biology - Integrated (2016): 6th Grade, 7th Grade, 8th Grade

Cycling of Matter and Energy

- 1 Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy. [ABI.LS1.5](#)
- 2 Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy [ABI.LS1.7](#)
- 3 Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions [ABI.LS2.3](#)
- 4 Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem. [ABI.LS2.4](#)
- 5 Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere. [ABI.LS.2.5](#)
- 6 Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere. [ABI.ESS2.6](#)

Structure and Function

- 1 Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells. [ABI.LS1.1](#)
- 2 Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms [ABI.LS1.2](#)
- 3 Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. [ABI.LS1.3](#)
- 4 Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules. [ABI.LS1.6](#)
- 5 Develop and use a model to explain a negative feedback loop. [ABI.LS2.1AR](#)

6 Develop and use a model to demonstrate the mechanism of cell signaling as a basis of control for cell activities. [ABI.LS2.2AR](#)

7 Plan and conduct an investigation to determine the relationship between the structure of a plasma membrane and its function. [ABI.LS12.3AR](#)

Biodiversity and Population Dynamics

1 Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales. [ABI.LS2.1](#)

2 Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales. [ABI.LS2.2](#)

3 Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem. [ABI.LS2.6](#)

4 Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity. [ABI.LS2.7](#)

5 Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce. [ABI.LS2.8](#)

6 Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.* [ABI.LS4.8](#)

7 Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts [ABI3.ETS1.3](#)

8 Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem. [ABI3.ETS1.4](#)

Genetic Variations in Organisms

1 Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms [ABI.LS1.4](#)

2 Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring. [ABI.LS3.1](#)

3 Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors. [ABI.LS3.2](#)

4 Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population. [ABI.LS3.3](#)

Evolution by Natural Selection

1 Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence. [ABI.LS4.1](#)

2 Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment. [ABI.LS4.2](#)

3 Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait. [ABI.LS4.3](#)

4 Construct an explanation based on evidence for how natural selection leads to adaptation of populations. [ABI.LS4.4](#)

5 Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species. [ABI.LS4.5](#)

6 Obtain, evaluate, and communicate the claim that eukaryotic cells evolved from prokaryotic cells. [ABI.LS4.7AR](#)

7 Evaluate evidence to support the claim that viruses are subject to mutations and may have a positive, negative, or neutral impact on a species, including humans. [ABI.LS4.8AR](#)

8 Construct an argument based on evidence about the simultaneous coevolution of Earth's systems and life on Earth. [ABI.ESS2.7](#)