

Biology

From Molecules to Organisms- Structures and Processes

1 Analyze how the relationship between structure and function supports life processes within organisms. [LS.BIO.1](#)

- 1 Construct an explanation to illustrate relationships between structure and function of major macromolecules essential for life. [LS.BIO.1.1](#)
 - 2 Carry out investigations to illustrate how enzymes act as catalysts for biochemical reactions and how environmental factors affect enzyme activity. [LS.BIO.1.2](#)
 - 3 Use models to explain how the structure of organelles determines its function and supports overall cell processes. [LS.BIO.1.3](#)
 - 4 Construct explanations to compare prokaryotic and eukaryotic cells in terms of structures and degree of complexity. [LS.BIO.1.4](#)
 - 5 Construct an explanation to summarize how DNA and RNA direct the synthesis of proteins. [LS.BIO.1.5](#)
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2 Analyze the growth and development processes of organisms. [LS.BIO.2](#)

- 1 Use models to illustrate how cellular division results in the reproduction, growth, and repair of organisms. [LS.BIO.2.1](#)
 - 2 Construct an explanation to illustrate that proteins regulate gene expression resulting in cellular differentiation, specialized cells with specific functions, and uncontrolled cell growth. [LS.BIO.2.2](#)
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3 Analyze the relationship between biochemical processes and energy use. [LS.BIO.3](#)

- 1 Carry out investigations to explain how homeostasis is maintained through feedback mechanisms. [LS.BIO.3.1](#)
 - 2 Use models to illustrate how photosynthesis transforms light energy into chemical energy. [LS.BIO.3.2](#)
 - 3 Use models to illustrate how cellular respiration [aerobic and anaerobic] transforms chemical energy into ATP. [LS.BIO.3.3](#)
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Ecosystems- Interactions, Energy, and Dynamics

1 Analyze the relationships between matter and energy within ecosystems. [LS.BIO.4](#)

- 1 Use models to illustrate how processes in organisms contribute to the flow of energy and the cycling of matter within an ecosystem. [LS.BIO.4.1](#)
- 2 Use models to explain the relationship between the flow of energy and cycling of matter among organisms in an ecosystem. [LS.BIO.4.2](#)

2 Understand ecosystem dynamics, functioning, and resilience. LS.BIO.5

- 1 Use mathematics and computational thinking to explain how interactions between organisms (predator/prey, competition) affect carrying capacity and maintain stability in an ecosystem. LS.BIO.5.1
 - 2 Engage in argument from evidence to evaluate various solutions to reduce the impact of human activities on biodiversity and ecosystem health. LS.BIO.5.2
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Heredity- Inheritance and Variation of Traits**1 Understand genetic mechanisms for variation.** LS.BIO.6

- 1 Use models to explain how DNA is passed from parents to offspring through the processes of meiosis and fertilization in sexual reproduction. LS.BIO.6.1
 - 2 Construct an explanation to summarize how inheritable genetic variations may result from: new genetic combinations in meiosis, mutations during replication, or mutations caused by environmental factors. LS.BIO.6.2
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2 Understand types of inheritance and how the environment can influence traits. LS.BIO.7

- 1 Use mathematics and computational thinking to predict the variation and distribution of expressed traits based on: Mendelian inheritance, co-dominance, incomplete dominance, multiple alleles, and sex-linked inheritance. LS.BIO.7.1
 - 2 Analyze and interpret data to explain how polygenic traits result in a wide range of phenotypes. LS.BIO.7.2
 - 3 Construct an explanation to summarize how traits result from interactions of genetic factors (multiple genes and/or alleles) and environmental factors. LS.BIO.7.3
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3 Understand applications of genetics and biotechnology. LS.BIO.8

- 1 Analyze and interpret data to compare DNA samples. LS.BIO.8.1
 - 2 Obtain and communicate information that summarizes the impact of biotechnology applications on the individual, society, and the environment, including agriculture and medicine. LS.BIO.8.2
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Biological Evolution- Unity and Diversity**1 Understand natural selection as a mechanism for biological evolution.** LS.BIO.9

- 1 Analyze and interpret data to summarize how various factors such as geographic isolation, pesticide resistance, antibiotic resistance can influence natural selection. LS.BIO.9.1
- 2 Construct an explanation to illustrate how common ancestry and biological evolution are supported by multiple lines of empirical evidence. LS.BIO.9.2
- 3 Use models to illustrate the conditions required for natural selection, including the overproduction of offspring, inherited variation, and the struggle to survive. LS.BIO.9.3
- 4 Construct an explanation to explain how natural selection leads to adaptations within populations. LS.BIO.9.4

2 Analyze evolutionary relationships among organisms. LS.BIO.10

- 1 Construct explanations to illustrate how varying environmental conditions may result in: changes in the number of individuals of a species, the emergence of new species over time, or the extinction of other species. LS.BIO.10.1
- 2 Use models (including dichotomous keys, scientific nomenclature, cladograms, phylogenetic trees) to identify organisms and exemplify relationships. LS.BIO.10.2