

# Biology

## From Molecules to Organisms: Structures and Processes

- 1 Match different cell types to the specific functions they perform. (E) [HS-LS1-1A](#)
- 2 Identify evidence to support an explanation of the relationship among DNA and genes in making the different proteins needed for cells to function. (E) [HS-LS1-1B](#)
- 3 Use a model to identify a part of a multicellular organism and the process it performs. [HS-LS1-2A](#)
- 4 Identify the components in a model of interacting hierarchical systems that perform specific functions within multicellular organisms. [HS-LS1-2B](#)
- 5 Conduct an investigation and use evidence to describe how positive and negative feedback mechanisms maintain homeostasis. [HS-LS1-3A](#)
- 6 Given a model, describe that cellular division (mitosis) and/or differentiation leads to producing and/or maintaining complex organisms. (E) [HS-LS1-4A](#)
- 7 Use a model to describe how photosynthesis results in the transformation of light energy to stored chemical energy. (E) [HS-LS1-5A](#)
- 8 Use evidence or a model to show that organisms take in matter and rearrange elements and molecules for growth and/or maintenance of large carbon-based molecules. (E) [HS-LS1-6A](#)
- 9 Use a model to illustrate the chemical processes in cellular respiration. [HS-LS1-7A](#)

## Ecosystems: Interactions, Energy, and Dynamics

- 1 Use a graphical representation to explain changes in the population size of an animal species over time. [HS-LS2-1A](#)
- 2 Connect the limits of an ecosystem's carrying capacity (the number of organisms it can support) to the availability of living and nonliving resources and other challenges (e.g., predation, competition, disease). [HS-LS2-1B](#)
- 3 Use mathematical representations (e.g., trends, averages, graphs) to support how biodiversity is dependent on the resources available in its ecosystem. [HS-LS2-2A](#)
- 4 Explain the expected effect on the number and/or types of organisms in an ecosystem given a modest versus an extreme change/disturbance. [HS-LS2-2B](#)
- 5 Use evidence to explain that energy is the driving force in the cycling of matter in aerobic or anaerobic conditions. (E) [HS-LS2-3A](#)

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- 6** Identify the changes in the amount of matter (biomass) as it travels through a food web. [HS-LS2-4A](#)
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- 7** Identify the changes in the amount of energy as it travels through an ecosystem using a model (e.g., energy pyramid, food chains, food webs, and biomass pyramids). [HS-LS2-4B](#)
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- 8** Illustrate the path of carbon as it is exchanged between living and nonliving systems (biosphere, atmosphere, hydrosphere, geosphere) using a model.(E) [HS-LS2-5A](#)
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- 9** Identify relevant components (i.e., inputs and outputs of photosynthesis; inputs and outputs of cellular respiration) of a model of the exchange of carbon between organisms and the environment. [HS-LS2-5B](#)
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- 10** Explain how living things in an ecosystem are affected by changes in the environment based on provided data. [HS-LS2-6A](#)
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- 11** Support or refute a claim regarding how a modest change versus an extreme change will affect stability of an ecosystem using evidence. [HS-LS2-6B](#)
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- 12** Describe how human activity affects Earth's environment and biodiversity and how people can help reduce their impact. [Clarification Statement: Examples of human activities can include urbanization, building dams, and dissemination of invasive species.] (E) [HS-LS2-7A](#)
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- 13** Identify evidence supporting the outcome of group (flocking, schooling, herding) or cooperative (hunting, migrating, and swarming) behavior on species' chances to survive and reproduce. [HS-LS2-8A](#)
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### **Heredity: Inheritance and Variation of Traits**

- 1** Explain that DNA molecules in all cells contain the instructions (genes) for traits passed from parents to offspring. [HS-LS3-1A](#)
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- 2** Use evidence to defend a claim that parents and offspring may have different traits as a result of genetic combinations, errors during replication, or mutations caused by environmental factors. [HS-LS3-2A](#)
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- 3** Classify examples of variations of traits in a population (mutations in DNA) caused by new genetic combinations (meiosis), errors during replication, and/or mutations caused by environmental factors. [HS-LS3-2B](#)
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- 4** Calculate the probability of a particular trait in an offspring or the occurrence of a variation in a population. [HS-LS3-3A](#)
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### **Biological Evolution: Unity and Diversity**

- 1** Identify patterns of (homologous) structures (e.g., fossil records, DNA sequences, amino acid sequences, anatomical and embryological evidence) as evidence to a claim of common ancestry and biological evolution. [HS-LS4-1A](#)

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- 2 Identify evidence that biological evolution results from (1) potential for a species to increase in number, (2) heritable genetic variation of individuals in a species, (3) competition for limited resources, and (4) organisms with advantageous traits are better able to survive and reproduce in the environment. (E)** [HS-LS4-2A](#)
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- 3 Use data to explain how organisms' traits that allow them to survive better in a specific environment are more common in the population.** [HS-LS4-3A](#)
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- 4 Use calculations to explain how the population of organisms with advantageous heritable traits will increase over time to organisms without these traits.** [HS-LS4-3B](#)
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- 5 Explain the cause-and-effect relationship between natural selection due to specific biotic and abiotic differences in ecosystems (e.g., ranges of seasonal temperature, long-term climate change, acidity, light, geographic barriers, evolution of other organisms) that leads to an increasing proportion of individuals within a population with advantageous characteristics (adaptation).** [HS-LS4-4A](#)
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- 6 Use evidence to describe the cause-and-effect relationship of changes in the environment to the emergence of a new species or changes in the number, survival, or extinction of some species.** [HS-LS4-5A](#)
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- 7 Generate a solution addressing adaptation to reduce the effects of a human activity that decreases biodiversity.** [HS-LS4-6A](#)
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- 8 Determine which human actions help versus harm a threatened or endangered species.** [HS-LS4-6B](#)