

BIOLOGY POWER STANDARDS

2013-2014

Molecules to Organisms: Structures and Processes

Students explain how individual organisms are configured and how these structures function to support life, growth, behavior and reproduction.

- a. Model the process of photosynthesis and explain its importance for all living organisms. [LS1A]
- b. Model the process of cellular respiration and explain its importance for all living organisms. [LS1B]
- c. Draw, label and describe the functions of essential cell structures. [LS1C]
- d. Describe the structure of the cell membrane and how the membrane regulates the flow of materials. [LS1D]
- e. Draw and describe the structure of DNA. [LS1E]
- f. Model and explain the process of protein synthesis. [LS1E]
- g. Explain how cells break down food molecules and use parts to synthesize other molecules cells require. [LS1F]
- h. Explain the role that enzymes play in metabolism. [LS1F]
- i. Explain how cells extract and store energy from food molecules in ATP. [LS1F]
- j. Describe that cell functions can be regulated by changing protein activity and gene expression. [LS1G]
- k. Describe and model the process of mitosis. [LS1H]
- l. Students are expected to describe a system including subsystems, boundaries, flows and feedbacks and use the systems as a dynamic model to predict changes. [SYS]
- m. Students are expected to apply their knowledge of science and technology to address societal issues. [APP]

INTERACTIONS, ENERGY AND DYNAMICS

Students are expected to explain how organisms interact with each other and their physical environment.

This includes:

- *How organism obtain resources,*
 - *How they change their environment, and*
 - *How social interactions play out within and between species.*
- a. Explain how matter and energy flow in an ecosystem. [LS2A]
 - b. Evaluate conditions needed for population growth. [LS2B]

- c. Explain factors in the environment that limit population growth. [LS2C]
- d. Calculate population density of a given organism within a community. [LS2B]
- e. Compare the biodiversity of different ecosystems. [LS2E]
- f. Explain how the concept of sustainable development may be applied to a current resource issue. [LS2F]
- g. Students are expected to describe a system including subsystems, boundaries, flows and feedbacks and use the systems as a dynamic model to predict changes. [SYS]
- h. Students are expected to apply their knowledge of science and technology to address societal issues. [APP]

Heredity: Inheritance and Variation of Traits

Students are expected to:

- Explain the role of genes and chromosomes in determining traits passed from parents to offspring.
 - Explain how variations from either replication or mutations allow an organism to adapt to a changing environment.
- a. Describe that genes are carried on chromosomes. [LS1H]
 - b. Describe that animal cells contain two copies of each chromosome. [LS1H]
 - c. Describe and model the process of meiosis and fertilization. [LS1I]
 - d. Predict the outcome of genetic crosses with two characteristics leading to variation. [LS1I]
 - e. Define genetic mutation and explain the effect on the evolution of a species. [LS3B]
 - f. Students are expected to describe a system, including subsystems, boundaries, flows and feedbacks and use the system as a dynamic model to predict changes. [SYS]
 - g. Students are expected to apply their knowledge of science and technology to address societal issues. [APP]

Biological Evolution: Unity and Diversity

Students are expected to explain the diversity of life and factors that underlie biological evolution supported by multiple lines of evidence.

- a. Explain biological evolution in terms of the factors of Natural Selection
 - o Genetic Variation
 - o Overproduction
 - o Competition for Resources
 - o Proliferation of organisms that most fit for the environment. [LS3A] [NGSS 2,3,4,5]
- b. Predict the effect on a species if one of the factors for natural selection is changed. [LS3A] [NGSS 2,3,4,5]
- c. Develop a logical argument for biological evolution based on evidence. [LS3D] [NGSS 1]
- d. Students will infer relationships among organisms based on physiological traits, genetic information, and the ability of producing fertile offspring. [LS3E] [NGSS 1]
- e. Students are expected to describe a system including subsystems, boundaries, flows and feedbacks and use the systems as a dynamic model to predict changes. [SYS]
- f. Students are expected to apply their knowledge of science and technology to address societal issues. [APP]

Inquiry

Students learn the process of asking and answering questions about the natural world through proposing hypotheses and designing, conducting and reporting investigations.

- a. Create and critique scientific questions. [INQA]
- b. Plan a scientific investigation. [INQB1]
- c. Conduct a scientific investigation. [INQB2]
- d. Draw conclusions supported by evidence. [INQC]
- e. Write a detailed lab report that includes: the question, hypothesis, a description of what was done, a summary of data, and a conclusion based on evidence. [INQD]
- f. Participate in a scientific discussion. [INQG]