



## I Can...

### **High School Life Sciences From Molecules to Organisms: Structure and Processes**

- 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.
- develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
- plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.
- use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.
- use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.
- 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.
- 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.

### **High School Life Sciences Ecosystems: Interactions, Energy, and Dynamics**

- use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.
- use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.
- construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.
- use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.
- develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.
- 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.
- design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
- evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.

### **High School Life Sciences Heredity: Inheritance and Variation of Traits**

- ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.



- 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.
- apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.

### **High School Life Sciences Biological Evolution: Unity and Diversity**

- communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.
- 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.
- 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.
- construct an explanation based on evidence for how natural selection leads to adaptation of populations.
- 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.
- create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.