BIOLOGY

Interactions with Organisms and the Environment

Priority Standards

- **Plan and carry out an investigation** to **analyze and interpret data** to determine how biotic and abiotic factors can affect the stability and change of a population.
- **Develop and use a model** to explain cycling of matter and flow of energy among organisms in an ecosystem.
- **Analyze and interpret data** to determine the effects of photosynthesis and cellular respiration on the scale and proportion of carbon reservoirs in the carbon cycle.

Supporting Standards

- **Develop an argument from evidence** for how ecosystems maintain relatively consistent numbers and types of organisms in stable conditions.
- **Design a solution** that reduces the impact caused by human activities on the environment and biodiversity.

Structure and Function of Life

Priority Standards

- **Ask questions** to **plan and carry out an investigation** to determine how (a) the structure and function of cells, (b) the proportion and quantity of organelles, and (c) the shape of cells result in cells with specialized functions.
- **Construct an explanation** about the role of mitosis in the production, growth, and maintenance of systems within complex organisms.
- **Plan and carry out an investigation** to provide evidence of homeostasis and that feedback mechanisms maintain stability in organisms.

Supporting Standards

- **Construct an explanation** based on evidence that all organisms are primarily composed of carbon, hydrogen, oxygen, and nitrogen, and that the matter taken into an organism is broken down and recombined to make macromolecules necessary for life functions.
- **Develop and use a model** to illustrate the cycling of matter and flow of energy through living things by the processes of photosynthesis and cellular respiration.
- **Plan and carry out an investigation** to determine how cells maintain stability within a range of changing conditions by the transport of materials across the cell membrane.
- **Ask questions** to **develop an argument** for how the structure and function of interacting organs and organ systems, that make up multicellular organisms, contribute to homeostasis within the organism.

Genetic Patterns

Priority Standards

- **Construct an explanation** for how the structure of DNA is replicated, and how DNA and RNA code for the structure of proteins which regulate and carry out the essential functions of life and result in specific traits.
- **Use computational thinking** and patterns to make predictions about the expression of specific traits that are passed in genes on chromosomes from parents to offspring.
- Evaluate **design solutions** where biotechnology was used to identify and/or modify genes in order to solve (effect) a problem.

Supporting Standards

- **Engage in argument from evidence** that inheritable genetic variation is caused during the formation of gametes.
- **Plan and carry out an investigation** and use **computational thinking** to explain the variation and patterns in distribution of the traits expressed in a population.

Evolutionary Change

Priority Standards

- **Obtain, evaluate, and communicate information** to identify the patterns in the evidence that support biological evolution.
- **Construct an explanation** based on evidence that natural selection is a primary cause of evolution.
- **Analyze and interpret data** to identify patterns that explain the claim that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.

Supporting Standards

- **Engage in argument from evidence** that changes in environmental conditions may cause increases in the number of individuals of some species, the emergence of new species over time, and/or the extinction of other species.
- Evaluate **design solutions** that can best solve a real-world problem caused by natural selection and adaptation of populations.