

New Jersey Tutorials are designed specifically for the New Jersey Core Curriculum Content Standards to prepare students for the PARCC assessments, the New Jersey Biology Competency Test (NJBCT).

Biology Tutorials offer targeted instruction, practice, and review designed to help students develop fluency, deepen conceptual understanding, and apply scientific thinking skills. Students engage with the content in an interactive, feedback-rich environment as they progress through standards-aligned modules. By constantly honing their ability to explain and analyze biological scenarios, students build the depth of knowledge and higher-order skills required to demonstrate their mastery when put to the test.

In each module, the Learn It and Try It make complex ideas accessible through focused content, guided analysis, multi-modal representations, and personalized feedback as students reason through increasingly challenging problems. The Review It offers a high-impact summary of key concepts and relates those concepts to students' lives. The Test It assesses students' mastery of the module's concepts, providing granular performance data to students and teachers after each attempt. To help students focus on the content most relevant to them, unit-level pretests and posttests can quickly identify where students are strong and where they're still learning.

Unit 1: Nature of Life

• FROM ATOMS TO BIOSPHERE

- HS-LS1-2: From Molecules to Organisms: Structures and Processes Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
- HS-LS4-4: Biological Evolution: Unity and Diversity Construct an explanation based on evidence for how natural selection leads to adaptation of populations.

• CHARACTERISTICS OF LIFE

- HS-LS1-3: From Molecules to Organisms: Structures and Processes Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.
- HS-LS1-1: From Molecules to Organisms: Structures 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.
- HS-LS4-2: Biological Evolution: Unity and Diversity 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.

- HS-LS4-4: Biological Evolution: Unity and Diversity Construct an explanation based on evidence for how natural selection leads to adaptation of populations.

- **BIOMOLECULES**

- HS-LS1-6: From Molecules to Organisms: Structures and Processes 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.
- HS-LS1-1: From Molecules to Organisms: Structures 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.

Unit 2: Energy Transformations

- **PHOTOSYNTHESIS**

- HS-LS1-5: From Molecules to Organisms: Structures and Processes Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.
- HS-LS2-5: Ecosystems: Interactions, Energy, and Dynamics Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.

- **CELLULAR RESPIRATION**

- HS-LS2-5: Ecosystems: Interactions, Energy, and Dynamics Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.
- HS-LS1-7: From Molecules to Organisms: Structures and Processes 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.
- HS-LS2-3: Ecosystems: Interactions, Energy, and Dynamics Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.

Unit 3: Energy in Ecosystems

- **FOOD CHAINS AND WEBS**

- HS-LS2-4: Ecosystems: Interactions, Energy, and Dynamics Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.
- HS-LS2-2: Ecosystems: Interactions, Energy, and Dynamics Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.
- HS-LS2-6: Ecosystems: Interactions, Energy, and Dynamics 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.

- **PYRAMIDS OF ENERGY, NUMBERS, AND BIOMASS**

- HS-LS2-4: Ecosystems: Interactions, Energy, and Dynamics Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.
- HS-LS2-2: Ecosystems: Interactions, Energy, and Dynamics Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.
- HS-LS2-6: Ecosystems: Interactions, Energy, and Dynamics 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.

Unit 4: Matter in Ecosystems

• THE CARBON CYCLE

- HS-LS2-5: Ecosystems: Interactions, Energy, and Dynamics Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.
- HS-LS2-4: Ecosystems: Interactions, Energy, and Dynamics Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.
- HS-ESS2-6: Earths Systems Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.
- HS-ESS3-6: Earth and Human Activity Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity (i.e., climate change).
- HS-ESS3-5: Earth and Human Activity Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.
- HS-LS4-5: Biological Evolution: Unity and Diversity 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.
- HS-ESS2-6: Earths Systems Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.

• THE NITROGEN AND PHOSPHORUS CYCLES

- HS-LS2-4: Ecosystems: Interactions, Energy, and Dynamics Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.
- HS-ESS3-6: Earth and Human Activity Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity (i.e., climate change).
- HS-ESS3-5: Earth and Human Activity Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.

Unit 5: Changes in Ecosystems

• SUCCESSION IN COMMUNITIES

- HS-LS2-6: Ecosystems: Interactions, Energy, and Dynamics 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.
- HS-LS2-2: Ecosystems: Interactions, Energy, and Dynamics Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.

• NATURAL IMPACTS ON ECOSYSTEMS

- HS-LS2-6: Ecosystems: Interactions, Energy, and Dynamics 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.
- HS-LS2-2: Ecosystems: Interactions, Energy, and Dynamics Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.
- HS-LS4-5: Biological Evolution: Unity and Diversity 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.

Unit 6: Earth Systems

• EARTH'S STRUCTURE AND CYCLES

- HS-ESS3-6: Earth and Human Activity Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity (i.e., climate change).

• FRESHWATER AND ICE

- HS-ESS3-1: Earth and Human Activity Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and climate change have influenced human activity.

• SOIL

- HS-ESS3-1: Earth and Human Activity Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and climate change have influenced human activity.

Unit 7: Natural Hazards

• EARTHQUAKES AND VOLCANOES

- HS-ESS3-1: Earth and Human Activity Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and climate change have influenced human activity.

• SEVERE WEATHER

- HS-ESS3-1: Earth and Human Activity Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and climate change have influenced human activity.

Unit 8: Impacts of Humans

• IMPACTS OF HUMANS

- HS-ESS3-6: Earth and Human Activity Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity (i.e., climate change).
- HS-ESS3-4: Earth and Human Activity Evaluate or refine a technological solution that reduces impacts of human activities on climate change and other natural systems.
- HS-ETS1-3: Engineering Design Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

• NATURAL RESOURCES

- HS-ESS3-1: Earth and Human Activity Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and climate change have influenced human activity.
- HS-ESS3-3: Earth and Human Activity Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.
- HS-ETS1-1: Engineering Design Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

• CLIMATE

- HS-ESS3-1: Earth and Human Activity Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and climate change have influenced human activity.
- HS-ESS3-5: Earth and Human Activity Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.

Unit 9: Cell Homeostasis

• PASSIVE TRANSPORT

- HS-LS1-3: From Molecules to Organisms: Structures and Processes Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

• ACTIVE TRANSPORT

- HS-LS1-3: From Molecules to Organisms: Structures and Processes Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

Unit 10: Homeostasis and Feedback Mechanisms

- **HOMEOSTASIS AND DYNAMIC EQUILIBRIUM**

- HS-LS1-3: From Molecules to Organisms: Structures and Processes Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.
- HS-LS1-2: From Molecules to Organisms: Structures and Processes Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

- **FEEDBACK MECHANISMS IN ANIMALS**

- HS-LS1-2: From Molecules to Organisms: Structures and Processes Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
- HS-LS1-3: From Molecules to Organisms: Structures and Processes Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

Unit 11: Animal and Plant Systems

- **THE NERVOUS SYSTEM**

- HS-LS1-2: From Molecules to Organisms: Structures and Processes Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
- HS-LS1-3: From Molecules to Organisms: Structures and Processes Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

- **THE IMMUNE AND LYMPHATIC SYSTEMS**

- HS-LS1-2: From Molecules to Organisms: Structures and Processes Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
- HS-LS1-3: From Molecules to Organisms: Structures and Processes Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

- **PLANT TISSUES**

- HS-LS1-2: From Molecules to Organisms: Structures and Processes Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

Unit 12: Cell Growth and Reproduction

- **THE CELL CYCLE**

- HS-LS1-4: From Molecules to Organisms: Structures and Processes Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

- **MITOSIS**

- HS-LS1-4: From Molecules to Organisms: Structures and Processes Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

Unit 13: DNA Structure and Function

- **COMPONENTS OF DNA**

- HS-LS1-1: From Molecules to Organisms: Structures 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.

- **THE GENETIC CODE**

- HS-LS3-1: 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.
- HS-LS1-1: From Molecules to Organisms: Structures 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.

- **DNA REPLICATION**

- HS-LS3-1: 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.
- HS-LS1-1: From Molecules to Organisms: Structures 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.

Unit 14: Gene Expression

- **TRANSCRIPTION**

- HS-LS3-1: 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.
- HS-LS1-1: From Molecules to Organisms: Structures 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.

- **TRANSLATION**

- HS-LS1-1: From Molecules to Organisms: Structures 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.
- HS-LS3-1: 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.

Unit 15: Mutations

- **GENETIC CHANGES IN DNA**

- HS-LS3-2: Heredity: Inheritance and Variation of Traits 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.
- HS-LS4-2: Biological Evolution: Unity and Diversity 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.
- HS-LS3-1: 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.
- **GENETIC CHANGES IN CHROMOSOMES**
 - HS-LS3-1: 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.
 - HS-LS3-2: Heredity: Inheritance and Variation of Traits 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.
 - HS-LS4-2: Biological Evolution: Unity and Diversity 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.

Unit 16: Heredity

- **MENDELIAN LAWS OF HEREDITY**

- HS-LS3-3: Heredity: Inheritance and Variation of Traits Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.

- **MULTIPLE ALLELES AND ALLELES WITHOUT DOMINANCE**

- HS-LS3-3: Heredity: Inheritance and Variation of Traits Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.

Unit 17: Reproduction

- **MEIOSIS**

- HS-LS3-1: 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.
- HS-LS3-2: Heredity: Inheritance and Variation of Traits 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.

- **SEXUAL AND ASEXUAL REPRODUCTION**

- HS-LS4-4: Biological Evolution: Unity and Diversity Construct an explanation based on evidence for how natural selection leads to adaptation of populations.

Unit 18: Evolution

- **MULTIPLE LINES OF EVIDENCE**

- HS-ESS2-7: Earths Systems Construct an argument based on evidence about the simultaneous coevolution of Earths systems and life on Earth.
- HS-LS4-1: Biological Evolution: Unity and Diversity Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.
- HS-LS4-2: Biological Evolution: Unity and Diversity 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.
- HS-ESS2-7: Earths Systems Construct an argument based on evidence about the simultaneous coevolution of Earths systems and life on Earth.
- HS-ESS2-7: Earths Systems Construct an argument based on evidence about the simultaneous coevolution of Earths systems and life on Earth.

- **THE FOSSIL RECORD**

- HS-LS4-1: Biological Evolution: Unity and Diversity Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.
- HS-LS4-2: Biological Evolution: Unity and Diversity 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.
- HS-LS4-5: Biological Evolution: Unity and Diversity 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.

Unit 19: Mechanisms of Evolution

- **NATURAL SELECTION**

- HS-LS4-4: Biological Evolution: Unity and Diversity Construct an explanation based on evidence for how natural selection leads to adaptation of populations.
- HS-LS2-8: Ecosystems: Interactions, Energy, and Dynamics Evaluate the evidence for the role of group behavior on individual and species chances to survive and reproduce.
- HS-LS4-2: Biological Evolution: Unity and Diversity 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.

- HS-LS4-5: Biological Evolution: Unity and Diversity 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.
- HS-LS4-3: Biological Evolution: Unity and Diversity 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.
- **EVOLUTION OF SPECIES**
 - HS-LS4-2: Biological Evolution: Unity and Diversity 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.
 - HS-LS4-5: Biological Evolution: Unity and Diversity 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.
 - HS-LS4-1: Biological Evolution: Unity and Diversity Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.
 - HS-LS4-4: Biological Evolution: Unity and Diversity Construct an explanation based on evidence for how natural selection leads to adaptation of populations.

Unit 20: Classification

- **TAXONOMY**
 - HS-LS4-1: Biological Evolution: Unity and Diversity Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.
- **THE SIX KINGDOMS**
 - HS-LS4-1: Biological Evolution: Unity and Diversity Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.