North Carolina NCEOC Tutorials are designed specifically to prepare students for North Carolina End-of-Course Tests.

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: The Nature and Chemistry of Life 1

- **CHARACTERISTICS OF LIFE**
  - LS.Bio.1.4: From Molecules to Organisms- Structures and Processes Analyze how the relationship between structure and function supports life processes within organisms. Construct explanations to compare prokaryotic and eukaryotic cells in terms of structures and degree of complexity.
  - LS.Bio.3.1: From Molecules to Organisms- Structures and Processes Analyze the relationship between biochemical processes and energy use. Carry out investigations to explain how homeostasis is maintained through feedback mechanisms.
  - LS.Bio.2.1: From Molecules to Organisms- Structures and Processes Analyze the growth and development processes of organisms. Use models to illustrate how cellular division results in the reproduction, growth, and repair of organisms.
  - LS.Bio.9.4: Biological Evolution- Unity and Diversity Understand natural selection as a mechanism for biological evolution. Construct an explanation to explain how natural selection leads to adaptations within populations.

Unit 2: The Nature and Chemistry of Life 2

- **BIOMOLECULES**

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- LS.Bio.1.1: From Molecules to Organisms- Structures and Processes Analyze how the relationship between structure and function supports life processes within organisms. Construct an explanation to illustrate relationships between structure and function of major macromolecules essential for life.

- **ENZYMES**
  - LS.Bio.1.2: From Molecules to Organisms- Structures and Processes Analyze how the relationship between structure and function supports life processes within organisms. Carry out investigations to illustrate how enzymes act as catalysts for biochemical reactions and how environmental factors affect enzyme activity.

Unit 3: Cell Structure and Function

- **PROKARYOTIC AND EUKARYOTIC CELLS**
  - LS.Bio.1.3: From Molecules to Organisms- Structures and Processes Analyze how the relationship between structure and function supports life processes within organisms. Use models to explain how the structure of organelles determines its function and supports overall cell processes.
  - LS.Bio.1.4: From Molecules to Organisms- Structures and Processes Analyze how the relationship between structure and function supports life processes within organisms. Construct explanations to compare prokaryotic and eukaryotic cells in terms of structures and degree of complexity.
- **PLANT AND ANIMAL CELLS**
  - LS.Bio.1.3: From Molecules to Organisms- Structures and Processes Analyze how the relationship between structure and function supports life processes within organisms. Use models to explain how the structure of organelles determines its function and supports overall cell processes.
- **PASSIVE TRANSPORT**
  - LS.Bio.3.1: From Molecules to Organisms- Structures and Processes Analyze the relationship between biochemical processes and energy use. Carry out investigations to explain how homeostasis is maintained through feedback mechanisms.
  - LS.Bio.1.3: From Molecules to Organisms- Structures and Processes Analyze how the relationship between structure and function supports life processes within organisms. Use models to explain how the structure of organelles determines its function and supports overall cell processes.
- **ACTIVE TRANSPORT**
  - LS.Bio.1.3: From Molecules to Organisms- Structures and Processes Analyze how the relationship between structure and function supports life processes within organisms. Use models to explain how the structure of organelles determines its function and supports overall cell processes.
  - LS.Bio.3.1: From Molecules to Organisms- Structures and Processes Analyze the relationship between biochemical processes and energy use. Carry out investigations to explain how homeostasis is maintained through feedback mechanisms.
  - LS.Bio.1.4: From Molecules to Organisms- Structures and Processes Analyze how the relationship between structure and function supports life processes within organisms. Construct explanations to compare prokaryotic and eukaryotic cells in terms of structures and degree of complexity.

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Unit 4: Cell Growth and Reproduction

- **CELL CYCLE**
  - LS.Bio.2.1: From Molecules to Organisms- Structures and Processes Analyze the growth and development processes of organisms. Use models to illustrate how cellular division results in the reproduction, growth, and repair of organisms.
  - LS.Bio.2.2: From Molecules to Organisms- Structures and Processes Analyze the growth and development processes of organisms. Construct an explanation to illustrate that proteins regulate gene expression resulting in cellular differentiation, specialized cells with specific functions, and uncontrolled cell growth.
- **MITOSIS**
  - LS.Bio.2.1: From Molecules to Organisms- Structures and Processes Analyze the growth and development processes of organisms. Use models to illustrate how cellular division results in the reproduction, growth, and repair of organisms.

Unit 5: Cellular Energetics

- **PHOTOSYNTHESIS**
  - LS.Bio.3.2: From Molecules to Organisms- Structures and Processes Analyze the relationship between biochemical processes and energy use. Use models to illustrate how photosynthesis transforms light energy into chemical energy.
- **CELLULAR RESPIRATION**
  - LS.Bio.3.3: From Molecules to Organisms- Structures and Processes Analyze the relationship between biochemical processes and energy use. Use models to illustrate how cellular respiration aerobic and anaerobic transforms chemical energy into ATP.

Unit 6: DNA Structure and Function 1

- **COMPONENTS OF DNA**
  - LS.Bio.1.1: From Molecules to Organisms- Structures and Processes Analyze how the relationship between structure and function supports life processes within organisms. Construct an explanation to illustrate relationships between structure and function of major macromolecules essential for life.
  - LS.Bio.1.5: From Molecules to Organisms- Structures and Processes Analyze how the relationship between structure and function supports life processes within organisms. Construct an explanation to summarize how DNA and RNA direct the synthesis of proteins.
- **THE GENETIC CODE**
  - LS.Bio.1.5: From Molecules to Organisms- Structures and Processes Analyze how the relationship between structure and function supports life processes within organisms. Construct an explanation to summarize how DNA and RNA direct the synthesis of proteins.
  - LS.Bio.2.2: From Molecules to Organisms- Structures and Processes Analyze the growth and development processes of organisms. Construct an explanation to illustrate that proteins regulate

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gene expression resulting in cellular differentiation, specialized cells with specific functions, and uncontrolled cell growth.

Unit 7: DNA Structure and Function 2

- **DNA REPLICATION**
  - LS.Bio.6.1: Heredity- Inheritance and Variation of Traits Understand genetic mechanisms for variation. Use models to explain how DNA is passed from parents to offspring through the processes of meiosis and fertilization in sexual reproduction.

Unit 8: Gene Expression

- **TRANSCRIPTION**
  - LS.Bio.1.5: From Molecules to Organisms- Structures and Processes Analyze how the relationship between structure and function supports life processes within organisms. Construct an explanation to summarize how DNA and RNA direct the synthesis of proteins.
- **TRANSLATION**
  - LS.Bio.1.5: From Molecules to Organisms- Structures and Processes Analyze how the relationship between structure and function supports life processes within organisms. Construct an explanation to summarize how DNA and RNA direct the synthesis of proteins.

Unit 9: Mutations

- **GENETIC CHANGES IN DNA**
  - LS.Bio.6.2: Heredity- Inheritance and Variation of Traits Understand genetic mechanisms for variation. Construct an explanation to summarize how inheritable genetic variations may result from: new genetic combinations in meiosis, mutations during replication, or mutations caused by environmental factors.
- **GENETIC CHANGES IN CHROMOSOMES**
  - LS.Bio.6.2: Heredity- Inheritance and Variation of Traits Understand genetic mechanisms for variation. Construct an explanation to summarize how inheritable genetic variations may result from: new genetic combinations in meiosis, mutations during replication, or mutations caused by environmental factors.

Unit 10: Heredity

- **MENDELIAN LAWS OF HEREDITY**
  - LS.Bio.7.1: Heredity- Inheritance and Variation of Traits Understand types of inheritance and how the environment can influence traits. Use mathematics and computational thinking to predict the variation and distribution of expressed traits based on: Mendelian inheritance, co-dominance, incomplete dominance, multiple alleles, and sex-linked inheritance.
- **MULTIPLE ALLELES AND ALLELES WITHOUT DOMINANCE**
  - LS.Bio.7.1: Heredity- Inheritance and Variation of Traits Understand types of inheritance and how the environment can influence traits. Use mathematics and computational thinking to predict the

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variation and distribution of expressed traits based on: Mendelian inheritance, co-dominance, incomplete dominance, multiple alleles, and sex-linked inheritance.

- **BIOTECHNOLOGY**
  - LS.Bio.8.2: Heredity- Inheritance and Variation of Traits Understand applications of genetics and biotechnology. Obtain and communicate information that summarizes the impact of biotechnology applications on the individual, society, and the environment, including agriculture and medicine.

Unit 11: Reproduction

- **MEIOSIS**
  - LS.Bio.6.1: Heredity- Inheritance and Variation of Traits Understand genetic mechanisms for variation. Use models to explain how DNA is passed from parents to offspring through the processes of meiosis and fertilization in sexual reproduction.
  - LS.Bio.6.2: Heredity- Inheritance and Variation of Traits Understand genetic mechanisms for variation. Construct an explanation to summarize how inheritable genetic variations may result from: new genetic combinations in meiosis, mutations during replication, or mutations caused by environmental factors.
- **SEXUAL AND ASEXUAL REPRODUCTION**
  - LS.Bio.6.1: Heredity- Inheritance and Variation of Traits Understand genetic mechanisms for variation. Use models to explain how DNA is passed from parents to offspring through the processes of meiosis and fertilization in sexual reproduction.

Unit 12: Classification

- **TAXONOMY**
  - LS.Bio.10.2: Biological Evolution- Unity and Diversity Analyze evolutionary relationships among organisms. Use models (including dichotomous keys, scientific nomenclature, cladograms, phylogenetic trees) to identify organisms and exemplify relationships.
- **THE SIX KINGDOMS**
  - LS.Bio.10.2: Biological Evolution- Unity and Diversity Analyze evolutionary relationships among organisms. Use models (including dichotomous keys, scientific nomenclature, cladograms, phylogenetic trees) to identify organisms and exemplify relationships.

Unit 13: Homeostasis

- **HOMEOSTASIS AND DYNAMIC EQUILIBRIUM**
  - LS.Bio.3.1: From Molecules to Organisms- Structures and Processes Analyze the relationship between biochemical processes and energy use. Carry out investigations to explain how homeostasis is maintained through feedback mechanisms.
- **FEEDBACK MECHANISMS IN ANIMALS**
  - LS.Bio.3.1: From Molecules to Organisms- Structures and Processes Analyze the relationship between biochemical processes and energy use. Carry out investigations to explain how homeostasis is maintained through feedback mechanisms.

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Unit 14: Evolution

- **MULTIPLE LINES OF EVIDENCE**
  - LS.Bio.9.2: Biological Evolution- Unity and Diversity Understand natural selection as a mechanism for biological evolution. Construct an explanation to illustrate how common ancestry and biological evolution are supported by multiple lines of empirical evidence.
- **THE FOSSIL RECORD**
  - LS.Bio.9.2: Biological Evolution- Unity and Diversity Understand natural selection as a mechanism for biological evolution. Construct an explanation to illustrate how common ancestry and biological evolution are supported by multiple lines of empirical evidence.
  - LS.Bio.10.1: Biological Evolution- Unity and Diversity Analyze evolutionary relationships among organisms. Construct explanations to illustrate how varying environmental conditions may result in: changes in the number of individuals of a species, the emergence of new species over time, or the extinction of other species.

Unit 15: Mechanisms of Evolution

- **NATURAL SELECTION**
  - LS.Bio.9.3: Biological Evolution- Unity and Diversity Understand natural selection as a mechanism for biological evolution. Use models to illustrate the conditions required for natural selection, including the overproduction of offspring, inherited variation, and the struggle to survive.
  - LS.Bio.9.1: Biological Evolution- Unity and Diversity Understand natural selection as a mechanism for biological evolution. Analyze and interpret data to summarize how various factors such as geographic isolation, pesticide resistance, antibiotic resistance can influence natural selection.
  - LS.Bio.9.4: Biological Evolution- Unity and Diversity Understand natural selection as a mechanism for biological evolution. Construct an explanation to explain how natural selection leads to adaptations within populations.
- **EVOLUTION OF SPECIES**
  - LS.Bio.9.2: Biological Evolution- Unity and Diversity Understand natural selection as a mechanism for biological evolution. Construct an explanation to illustrate how common ancestry and biological evolution are supported by multiple lines of empirical evidence.
  - LS.Bio.10.1: Biological Evolution- Unity and Diversity Analyze evolutionary relationships among organisms. Construct explanations to illustrate how varying environmental conditions may result in: changes in the number of individuals of a species, the emergence of new species over time, or the extinction of other species.
  - LS.Bio.9.4: Biological Evolution- Unity and Diversity Understand natural selection as a mechanism for biological evolution. Construct an explanation to explain how natural selection leads to adaptations within populations.

Unit 16: Cycles in Nature

- **THE CARBON CYCLE**

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- LS.Bio.4.1: Ecosystems- Interactions, Energy, and Dynamics Analyze the relationships between matter and energy within ecosystems. Use models to illustrate how processes in organisms contribute to the flow of energy and the cycling of matter within an ecosystem.
- LS.Bio.4.2: Ecosystems- Interactions, Energy, and Dynamics Analyze the relationships between matter and energy within ecosystems. Use models to explain the relationship between the flow of energy and cycling of matter among organisms in an ecosystem.
- LS.Bio.5.2: Ecosystems- Interactions, Energy, and Dynamics Understand ecosystem dynamics, functioning, and resilience. Engage in argument from evidence to evaluate various solutions to reduce the impact of human activities on biodiversity and ecosystem health.

- **THE NITROGEN AND PHOSPHORUS CYCLES**
  - LS.Bio.4.1: Ecosystems- Interactions, Energy, and Dynamics Analyze the relationships between matter and energy within ecosystems. Use models to illustrate how processes in organisms contribute to the flow of energy and the cycling of matter within an ecosystem.
  - LS.Bio.4.2: Ecosystems- Interactions, Energy, and Dynamics Analyze the relationships between matter and energy within ecosystems. Use models to explain the relationship between the flow of energy and cycling of matter among organisms in an ecosystem.

Unit 17: Matter and Energy 1

- **FOOD CHAINS AND WEBS**
  - LS.Bio.4.1: Ecosystems- Interactions, Energy, and Dynamics Analyze the relationships between matter and energy within ecosystems. Use models to illustrate how processes in organisms contribute to the flow of energy and the cycling of matter within an ecosystem.
  - LS.Bio.4.2: Ecosystems- Interactions, Energy, and Dynamics Analyze the relationships between matter and energy within ecosystems. Use models to explain the relationship between the flow of energy and cycling of matter among organisms in an ecosystem.
- **PYRAMIDS OF ENERGY, NUMBERS, AND BIOMASS**
  - LS.Bio.4.1: Ecosystems- Interactions, Energy, and Dynamics Analyze the relationships between matter and energy within ecosystems. Use models to illustrate how processes in organisms contribute to the flow of energy and the cycling of matter within an ecosystem.
  - LS.Bio.4.2: Ecosystems- Interactions, Energy, and Dynamics Analyze the relationships between matter and energy within ecosystems. Use models to explain the relationship between the flow of energy and cycling of matter among organisms in an ecosystem.

Unit 18: Matter and Energy 2

- **NATURAL IMPACTS ON ECOSYSTEMS**
  - LS.Bio.10.1: Biological Evolution- Unity and Diversity Analyze evolutionary relationships among organisms. Construct explanations to illustrate how varying environmental conditions may result in: changes in the number of individuals of a species, the emergence of new species over time, or the extinction of other species.

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Unit 19: Test-Taking Strategies

- STUDY HABITS
- BEING PREPARED AND GETTING STARTED
- WORDING IN TEST QUESTIONS
- WORDING IN ANSWER CHOICES
- QUESTIONS WITH PASSAGES AND VISUAL DATA
- ESSAY AND SHORT ANSWER QUESTIONS
- WORD PROBLEMS

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