

Texas Tutorials are designed specifically for the Texas Essential Knowledge and Skills (TEKS) to prepare students for the State of Texas Assessment of Academic Readiness (STAAR)® end-of-course assessments.

*State of Texas Assessment of Academic Readiness® and STAAR® are registered trademarks of the Texas Education Agency.*

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.

## 1. NATURE OF LIFE

### ● FROM ATOMS TO BIOSPHERE

- **10.C** analyze the levels of organization in biological systems and relate the levels to each other and to the whole system.

### ● CHARACTERISTICS OF LIFE

- **4.A** compare and contrast prokaryotic and eukaryotic cells;
- **7.G** analyze and evaluate scientific explanations concerning the complexity of the cell.
- **4.B** investigate and explain cellular processes, including homeostasis, energy conversions, transport of molecules, and synthesis of new molecules; and
- **5.C** describe the roles of DNA, ribonucleic acid (RNA), and environmental factors in cell differentiation; and
- **6.A** identify components of DNA, and describe how information for specifying the traits of an organism is carried in the DNA;
- **11.A** describe the role of internal feedback mechanisms in the maintenance of homeostasis;
- **4.C** compare the structures of viruses to cells, describe viral reproduction, and describe the role of viruses in causing diseases such as human immunodeficiency virus (HIV) and influenza.
- **5.A** describe the stages of the cell cycle, including deoxyribonucleic acid (DNA) replication and mitosis, and the importance of the cell cycle to the growth of organisms;
- **12.B** compare variations and adaptations of organisms in different ecosystems;

## 2. CHEMISTRY OF LIFE

### ● BIOMOLECULES

- **9.A** compare the structures and functions of different types of biomolecules, including carbohydrates, lipids, proteins, and nucleic acids;
- **9.D** analyze and evaluate the evidence regarding formation of simple organic molecules and their organization into long complex molecules having information such as the DNA molecule for self-replicating life.

### ● ENZYMES

- **9.C** identify and investigate the role of enzymes; and

### 3. CELL STRUCTURE AND FUNCTION

- **PROKARYOTIC AND EUKARYOTIC CELLS**

- **3.F** research and describe the history of biology and contributions of scientists.
- **4.B** investigate and explain cellular processes, including homeostasis, energy conversions, transport of molecules, and synthesis of new molecules; and
- **4.A** compare and contrast prokaryotic and eukaryotic cells;

- **PLANT AND ANIMAL CELLS**

- **4.B** investigate and explain cellular processes, including homeostasis, energy conversions, transport of molecules, and synthesis of new molecules; and

- **PASSIVE TRANSPORT**

- **4.B** investigate and explain cellular processes, including homeostasis, energy conversions, transport of molecules, and synthesis of new molecules; and
- **11.A** describe the role of internal feedback mechanisms in the maintenance of homeostasis;

- **ACTIVE TRANSPORT**

- **4.B** investigate and explain cellular processes, including homeostasis, energy conversions, transport of molecules, and synthesis of new molecules; and
- **11.A** describe the role of internal feedback mechanisms in the maintenance of homeostasis;

### 4. CELLULAR ENERGETICS

- **PHOTOSYNTHESIS**

- **4.B** investigate and explain cellular processes, including homeostasis, energy conversions, transport of molecules, and synthesis of new molecules; and
- **9.B** compare the reactants and products of photosynthesis and cellular respiration in terms of energy and matter;

- **CELLULAR RESPIRATION**

- **4.B** investigate and explain cellular processes, including homeostasis, energy conversions, transport of molecules, and synthesis of new molecules; and
- **9.B** compare the reactants and products of photosynthesis and cellular respiration in terms of energy and matter;

### 5. CELL GROWTH AND REPRODUCTION

- **THE CELL CYCLE**

- **4.B** investigate and explain cellular processes, including homeostasis, energy conversions, transport of molecules, and synthesis of new molecules; and
- **5.A** describe the stages of the cell cycle, including deoxyribonucleic acid (DNA) replication and mitosis, and the importance of the cell cycle to the growth of organisms;
- **5.C** describe the roles of DNA, ribonucleic acid (RNA), and environmental factors in cell differentiation; and
- **5.D** recognize that disruptions of the cell cycle lead to diseases such as cancer.

- **MITOSIS**

- **5.A** describe the stages of the cell cycle, including deoxyribonucleic acid (DNA) replication and mitosis, and the importance of the cell cycle to the growth of organisms;

### 6. DNA STRUCTURE AND FUNCTION

- **COMPONENTS OF DNA**

- **6.B** recognize that components that make up the genetic code are common to all organisms;
- **9.A** compare the structures and functions of different types of biomolecules, including carbohydrates, lipids, proteins, and nucleic acids;
- **6.A** identify components of DNA, and describe how information for specifying the traits of an organism is carried in the DNA;
- **5.C** describe the roles of DNA, ribonucleic acid (RNA), and environmental factors in cell differentiation; and
- **3.F** research and describe the history of biology and contributions of scientists.

- **THE GENETIC CODE**

- **5.C** describe the roles of DNA, ribonucleic acid (RNA), and environmental factors in cell differentiation; and
- **6.A** identify components of DNA, and describe how information for specifying the traits of an organism is carried in the DNA;
- **6.B** recognize that components that make up the genetic code are common to all organisms;
- **9.A** compare the structures and functions of different types of biomolecules, including carbohydrates, lipids, proteins, and nucleic acids;
- **3.F** research and describe the history of biology and contributions of scientists.
- **4.B** investigate and explain cellular processes, including homeostasis, energy conversions, transport of molecules, and synthesis of new molecules; and
- **6.D** recognize that gene expression is a regulated process;

- **DNA REPLICATION**

- **5.A** describe the stages of the cell cycle, including deoxyribonucleic acid (DNA) replication and mitosis, and the importance of the cell cycle to the growth of organisms;
- **6.C** explain the purpose and process of transcription and translation using models of DNA and RNA;
- **6.A** identify components of DNA, and describe how information for specifying the traits of an organism is carried in the DNA;

## 7. GENE EXPRESSION

- **T TRANSCRIPTION**

- **6.A** identify components of DNA, and describe how information for specifying the traits of an organism is carried in the DNA;
- **6.C** explain the purpose and process of transcription and translation using models of DNA and RNA;
- **9.A** compare the structures and functions of different types of biomolecules, including carbohydrates, lipids, proteins, and nucleic acids;
- **4.B** investigate and explain cellular processes, including homeostasis, energy conversions, transport of molecules, and synthesis of new molecules; and
- **5.C** describe the roles of DNA, ribonucleic acid (RNA), and environmental factors in cell differentiation; and

- **T TRANSLATION**

- **4.B** investigate and explain cellular processes, including homeostasis, energy conversions, transport of molecules, and synthesis of new molecules; and
- **5.C** describe the roles of DNA, ribonucleic acid (RNA), and environmental factors in cell differentiation; and
- **6.C** explain the purpose and process of transcription and translation using models of DNA and RNA;
- **9.A** compare the structures and functions of different types of biomolecules, including carbohydrates, lipids, proteins, and nucleic acids;
- **9.C** identify and investigate the role of enzymes; and

## 8. MUTATIONS

- **GENETIC CHANGES IN DNA**

- **6.E** identify and illustrate changes in DNA and evaluate the significance of these changes;
- **7.F** analyze and evaluate the effects of other evolutionary mechanisms, including genetic drift, gene flow, mutation, and recombination; and

- **GENETIC CHANGES IN CHROMOSOMES**

- **6.E** identify and illustrate changes in DNA and evaluate the significance of these changes;
- **6.H** describe how techniques such as DNA fingerprinting, genetic modifications, and chromosomal analysis are used to study the genomes of organisms.
- **6.G** recognize the significance of meiosis to sexual reproduction; and
- **7.F** analyze and evaluate the effects of other evolutionary mechanisms, including genetic drift, gene flow, mutation, and recombination; and

## 9. HEREDITY

### • MENDELIAN LAWS OF HEREDITY

- **3.F** research and describe the history of biology and contributions of scientists.
- **6.F** predict possible outcomes of various genetic combinations such as monohybrid crosses, dihybrid crosses and non-Mendelian inheritance;

### • MULTIPLE ALLELES AND ALLELES WITHOUT DOMINANCE

- **6.F** predict possible outcomes of various genetic combinations such as monohybrid crosses, dihybrid crosses and non-Mendelian inheritance;

## 10. REPRODUCTION

### • SEXUAL AND ASEQUAL REPRODUCTION

- **6.G** recognize the significance of meiosis to sexual reproduction; and
- **5.A** describe the stages of the cell cycle, including deoxyribonucleic acid (DNA) replication and mitosis, and the importance of the cell cycle to the growth of organisms;

### • MEIOSIS

- **6.G** recognize the significance of meiosis to sexual reproduction; and
- **7.F** analyze and evaluate the effects of other evolutionary mechanisms, including genetic drift, gene flow, mutation, and recombination; and

## 11. EVOLUTION

### • MULTIPLE LINES OF EVIDENCE

- **7.A** analyze and evaluate how evidence of common ancestry among groups is provided by the fossil record, biogeography, and homologies, including anatomical, molecular, and developmental;
- **7.B** analyze and evaluate scientific explanations concerning any data of sudden appearance, stasis, and sequential nature of groups in the fossil record;
- **6.B** recognize that components that make up the genetic code are common to all organisms;

### • THE FOSSIL RECORD

- **7.A** analyze and evaluate how evidence of common ancestry among groups is provided by the fossil record, biogeography, and homologies, including anatomical, molecular, and developmental;
- **7.B** analyze and evaluate scientific explanations concerning any data of sudden appearance, stasis, and sequential nature of groups in the fossil record;

## 12. MECHANISMS OF EVOLUTION

### • NATURAL SELECTION

- **7.D** analyze and evaluate how the elements of natural selection, including inherited variation, the potential of a population to produce more offspring than can survive, and a finite supply of environmental resources, result in differential reproductive success;
- **7.E** analyze and evaluate the relationship of natural selection to adaptation and to the development of diversity in and among species;

- **12.B** compare variations and adaptations of organisms in different ecosystems;
- **7.C** analyze and evaluate how natural selection produces change in populations, not individuals;

- **EVOLUTION OF SPECIES**

- **7.E** analyze and evaluate the relationship of natural selection to adaptation and to the development of diversity in and among species;
- **7.F** analyze and evaluate the effects of other evolutionary mechanisms, including genetic drift, gene flow, mutation, and recombination; and
- **7.A** analyze and evaluate how evidence of common ancestry among groups is provided by the fossil record, biogeography, and homologies, including anatomical, molecular, and developmental;
- **7.D** analyze and evaluate how the elements of natural selection, including inherited variation, the potential of a population to produce more offspring than can survive, and a finite supply of environmental resources, result in differential reproductive success;

## 13. CLASSIFICATION

- **TAXONOMY**

- **8.A** define taxonomy and recognize the importance of a standardized taxonomic system to the scientific community;
- **8.B** categorize organisms using a hierarchical classification system based on similarities and differences shared among groups; and
- **8.C** compare characteristics of taxonomic groups, including archaea, bacteria, protists, fungi, plants, and animals.

- **THE SIX KINGDOMS**

- **8.A** define taxonomy and recognize the importance of a standardized taxonomic system to the scientific community;
- **8.B** categorize organisms using a hierarchical classification system based on similarities and differences shared among groups; and
- **8.C** compare characteristics of taxonomic groups, including archaea, bacteria, protists, fungi, plants, and animals.

## 14. HOMEOSTASIS

- **HOMEOSTASIS AND DYNAMIC EQUILIBRIUM**

- **4.B** investigate and explain cellular processes, including homeostasis, energy conversions, transport of molecules, and synthesis of new molecules; and
- **11.B** investigate and analyze how organisms, populations, and communities respond to external factors;
- **11.A** describe the role of internal feedback mechanisms in the maintenance of homeostasis;
- **12.F** describe how environmental change can impact ecosystem stability.
- **10.A** describe the interactions that occur among systems that perform the functions of regulation, nutrient absorption, reproduction, and defense from injury or illness in animals;
- **10.B** describe the interactions that occur among systems that perform the functions of transport, reproduction, and response in plants; and
- **10.C** analyze the levels of organization in biological systems and relate the levels to each other and to the whole system.

- **FEEDBACK MECHANISMS IN ANIMALS**

- **4.B** investigate and explain cellular processes, including homeostasis, energy conversions, transport of molecules, and synthesis of new molecules; and
- **10.A** describe the interactions that occur among systems that perform the functions of regulation, nutrient absorption, reproduction, and defense from injury or illness in animals;
- **11.A** describe the role of internal feedback mechanisms in the maintenance of homeostasis;
- **10.C** analyze the levels of organization in biological systems and relate the levels to each other and to the whole system.

## 15. FUNCTIONS OF ANIMAL SYSTEMS

- **THE IMMUNE AND LYMPHATIC SYSTEMS**

- **10.A** describe the interactions that occur among systems that perform the functions of regulation, nutrient absorption, reproduction, and defense from injury or illness in animals;
- **4.B** investigate and explain cellular processes, including homeostasis, energy conversions, transport of molecules, and synthesis of new molecules; and
- **5.B** examine specialized cells, including roots, stems, and leaves of plants; and animal cells such as blood, muscle, and epithelium;

- **THE NERVOUS SYSTEM**

- **5.B** examine specialized cells, including roots, stems, and leaves of plants; and animal cells such as blood, muscle, and epithelium;
- **10.A** describe the interactions that occur among systems that perform the functions of regulation, nutrient absorption, reproduction, and defense from injury or illness in animals;

## 16. FUNCTIONS OF PLANT SYSTEMS

- **PLANT TISSUES**

- **5.B** examine specialized cells, including roots, stems, and leaves of plants; and animal cells such as blood, muscle, and epithelium;
- **10.B** describe the interactions that occur among systems that perform the functions of transport, reproduction, and response in plants; and
- **12.B** compare variations and adaptations of organisms in different ecosystems;

- **PLANT RESPONSES**

- **10.B** describe the interactions that occur among systems that perform the functions of transport, reproduction, and response in plants; and
- **11.B** investigate and analyze how organisms, populations, and communities respond to external factors;

## 17. CYCLES IN NATURE

- **THE CARBON CYCLE**

- **9.B** compare the reactants and products of photosynthesis and cellular respiration in terms of energy and matter;
- **12.E** describe the flow of matter through the carbon and nitrogen cycles and explain the consequences of disrupting these cycles; and
- **12.F** describe how environmental change can impact ecosystem stability.
- **3.D** evaluate the impact of scientific research on society and the environment;

- **THE NITROGEN AND PHOSPHORUS CYCLES**

- **11.C** summarize the role of microorganisms in both maintaining and disrupting the health of both organisms and ecosystems; and
- **12.E** describe the flow of matter through the carbon and nitrogen cycles and explain the consequences of disrupting these cycles; and

## 18. MATTER AND ENERGY

- **FOOD CHAINS AND WEBS**

- **11.C** summarize the role of microorganisms in both maintaining and disrupting the health of both organisms and ecosystems; and
- **12.A** interpret relationships, including predation, parasitism, commensalism, mutualism, and competition among organisms;
- **12.C** analyze the flow of matter and energy through trophic levels using various models, including food chains, food webs, and ecological pyramids;
- **12.D** recognize that long-term survival of species is dependent on changing resource bases that are limited;
- **12.F** describe how environmental change can impact ecosystem stability.

---

- **DYNAMICS OF ENERGY NUMBERS AND BIOMASS**

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

- **12.C** analyze the flow of matter and energy through trophic levels using various models, including food chains, food webs, and ecological pyramids;
- **12.D** recognize that long-term survival of species is dependent on changing resource bases that are limited;

## 19. ECOLOGY OF SUCCESSION

- **SUCCESSION IN COMMUNITIES**

- **11.D** describe how events and processes that occur during ecological succession can change populations and species diversity.

- **NATURAL IMPACTS ON ECOSYSTEMS**

- **12.F** describe how environmental change can impact ecosystem stability.
- **11.B** investigate and analyze how organisms, populations, and communities respond to external factors;
- **11.D** describe how events and processes that occur during ecological succession can change populations and species diversity.