Arkansas Tutorials are designed specifically for the Arkansas Standards found in the Curriculum Framework documents to prepare students for the ACT Aspire in English, reading, writing, math and science tests.

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. THE NATURE OF LIFE

- **FROM ATOMS TO BIOSPHERE**
  - **MC.2.B.1** *Construct a hierarchy of life from cells to ecosystems*
  - **CDL.7.B.17.a** *roots*
  - **CDL.7.B.17.b** *stems*
  - **CDL.7.B.17.c** *leaves*
  - **EBR.8.B.1** *Cite examples of abiotic and biotic factors of ecosystems*
  - **EBR.8.B.2** *Compare and contrast the characteristics of biomes*
  - **EBR.8.B.8.a** *organism*
  - **EBR.8.B.8.b** *population*
  - **EBR.8.B.8.c** *community*
  - **EBR.8.B.8.d** *ecosystem*
  - **EBR.8.B.8.e** *biosphere*

- **CHARACTERISTICS OF LIFE**
  - **MC.1.B.1.b** *proteins*
  - **MC.2.B.2** *Compare and contrast prokaryotes and eukaryotes*
  - **EBR.8.B.8.a** *organism*
  - **MC.2.B.11** *Discuss homeostasis using thermoregulation as an example*
  - **MC.3.B.4.b** *light independent reactions*
  - **MC.3.B.5** *Compare and contrast cellular respiration and photosynthesis as energy conversion pathways*
  - **EBR.8.B.1** *Cite examples of abiotic and biotic factors of ecosystems*
  - **EBR.8.B.8.d** *ecosystem*
  - **CDL.7.B.8.a** *sexual reproduction*
  - **CDL.7.B.8.b** *asexual reproduction*

2. THE CHEMISTRY OF LIFE

- **BIOMOLECULES**
  - **MC.1.B.1.a** *carbohydrates*

- **MC.1.B.1.b** *proteins*
- **MC.1.B.1.d** *lipids*
- **MC.1.B.1.e** *nucleic acids*
- **MC.1.B.1.c** *enzymes*

- **ENZYMES**
  - **MC.1.B.1.c** *enzymes*
  - **MC.1.B.2** *Describe the relationship between an enzyme and its substrate molecule(s)*

3. CELL STRUCTURE AND FUNCTION

- **PROKARYOTIC AND EUKARYOTIC CELLS**
  - **NS.12.B.4** *Relate the development of the cell theory to current trends in cellular biology*
  - **MC.2.B.4** *Relate the function of the plasma (cell) membrane to its structure*
  - **MC.2.B.7.a** *diffusion*
  - **MC.2.B.7.b** *osmosis*
  - **MC.2.B.7.c** *endocytosis*
  - **MC.2.B.7.d** *exocytosis*
  - **MC.2.B.7.e** *phagocytosis*
  - **MC.2.B.7.f** *pinocytosis*
  - **MC.2.B.11** *Discuss homeostasis using thermoregulation as an example*
  - **MC.1.B.1.b** *proteins*
  - **MC.1.B.1.d** *lipids*
  - **MC.2.B.3.a** *organelles*
  - **MC.2.B.3.b** *ribosomes*
  - **MC.2.B.3.c** *cytoskeleton*
  - **MC.3.B.1** *Compare and contrast the structure and function of mitochondria and chloroplasts*
  - **MC.2.B.2** *Compare and contrast prokaryotes and eukaryotes*
  - **MC.2.B.6** *Compare and contrast the functions of autotrophs and heterotrophs*

- **PLANT AND ANIMAL CELLS**
  - **MC.2.B.3.a** *organelles*
  - **MC.2.B.5** *Compare and contrast the structures of an animal cell to a plant cell*
  - **MC.2.B.4** *Relate the function of the plasma (cell) membrane to its structure*
  - **MC.3.B.1** *Compare and contrast the structure and function of mitochondria and chloroplasts*

4. ACTIVE AND PASSIVE TRANSPORT

- **PASSIVE TRANSPORT**
  - **MC.1.B.1.b** *proteins*
  - **MC.2.B.3.a** *organelles*
  - **MC.2.B.4** *Relate the function of the plasma (cell) membrane to its structure*
  - **MC.2.B.7.a** *diffusion*
  - **MC.2.B.7.b** *osmosis*
  - **MC.2.B.7.c** *endocytosis*
  - **MC.2.B.7.d** *exocytosis*
  - **MC.2.B.7.e** *phagocytosis*
  - **MC.2.B.7.f** *pinocytosis*
  - **MC.2.B.11** *Discuss homeostasis using thermoregulation as an example*

- **ACTIVE TRANSPORT**

- **MC.2.B.4** *Relate the function of the plasma (cell) membrane to its structure*
- **MC.2.B.7.c** *endocytosis*
- **MC.2.B.7.d** *exocytosis*
- **MC.2.B.7.e** *phagocytosis*
- **MC.2.B.7.f** *pinocytosis*
- **MC.2.B.11** *Discuss homeostasis using thermoregulation as an example*
- **MC.2.B.7.a** *diffusion*
- **MC.2.B.7.b** *osmosis*

5. CELLULAR ENERGETICS

- **PHOTOSYNTHESIS**
  - **MC.1.B.4.c** *endergonic reactions*
  - **MC.2.B.6** *Compare and contrast the functions of autotrophs and heterotrophs*
  - **MC.3.B.4.a** *light dependent reactions*
  - **MC.3.B.4.b** *light independent reactions*
  - **MC.3.B.5** *Compare and contrast cellular respiration and photosynthesis as energy conversion pathways*
  - **MC.3.B.1** *Compare and contrast the structure and function of mitochondria and chloroplasts*

- **CELLULAR RESPIRATION**
  - **MC.2.B.3.a** *organelles*
  - **MC.3.B.2.a** *glycolysis*
  - **MC.3.B.2.b** *citric acid cycle*
  - **MC.3.B.2.c** *electron transport chain*
  - **MC.3.B.5** *Compare and contrast cellular respiration and photosynthesis as energy conversion pathways*
  - **MC.1.B.4.b** *exergonic reactions*
  - **MC.2.B.3.c** *cytoskeleton*
  - **MC.2.B.7.c** *endocytosis*
  - **MC.2.B.7.d** *exocytosis*
  - **MC.2.B.7.e** *phagocytosis*
  - **MC.2.B.7.f** *pinocytosis*
  - **MC.3.B.1** *Compare and contrast the structure and function of mitochondria and chloroplasts*

6. CELL GROWTH AND REPRODUCTION

- **THE CELL CYCLE**
  - **MC.2.B.8.a** *interphase*
  - **MC.2.B.8.b** *mitosis*
  - **MC.2.B.8.c** *cytokinesis*
  - **CDL.7.B.8.b** *asexual reproduction*
  - **MC.2.B.9.a** *prophase*
  - **MC.2.B.9.b** *metaphase*
  - **MC.2.B.9.c** *anaphase*
  - **HE.5.B.4** *Describe and model the processes of replication, transcription, and translation*
  - **MC.2.B.9.d** *telophase.*
  - **MC.1.B.1.a** *carbohydrates*
  - **MC.1.B.1.b** *proteins*
  - **MC.1.B.1.d** *lipids*
  - **MC.1.B.1.e** *nucleic acids*

- **MITOSIS**

- **MC.2.B.8.a** *interphase*
- **MC.2.B.8.b** *mitosis*
- **MC.2.B.9.a** *prophase*
- **MC.2.B.9.b** *metaphase*
- **MC.2.B.9.c** *anaphase*
- **MC.2.B.9.d** *telophase.*
- **MC.2.B.10** *Analyze the meiotic maintenance of a constant chromosome number from one generation to the next*
- **MC.2.B.8.c** *cytokinesis*

7. DNA STRUCTURE AND FUNCTION

- **COMPONENTS OF DNA**
  - **MC.1.B.1.e** *nucleic acids*
  - **HE.5.B.1** *Model the components of a DNA nucleotide and an RNA nucleotide*
  - **HE.5.B.2** *Describe the Watson-Crick double helix model of DNA, using the base-pairing rule (adenine-thymine, cytosine-guanine)*
  - **HE.5.B.3** *Compare and contrast the structure and function of DNA and RNA*
  - **HE.4.B.5** *Analyze the historically significant work of prominent geneticists*

- **THE GENETIC CODE**
  - **MC.1.B.1.e** *nucleic acids*
  - **MC.2.B.3.b** *ribosomes*
  - **HE.5.B.2** *Describe the Watson-Crick double helix model of DNA, using the base-pairing rule (adenine-thymine, cytosine-guanine)*
  - **HE.5.B.3** *Compare and contrast the structure and function of DNA and RNA*
  - **HE.5.B.4** *Describe and model the processes of replication, transcription, and translation*
  - **MC.1.B.1.b** *proteins*

- **DNA REPLICATION**
  - **HE.5.B.1** *Model the components of a DNA nucleotide and an RNA nucleotide*
  - **HE.5.B.4** *Describe and model the processes of replication, transcription, and translation*

8. GENE EXPRESSION

- **TRANSCRIPTION**
  - **MC.1.B.1.e** *nucleic acids*
  - **HE.5.B.1** *Model the components of a DNA nucleotide and an RNA nucleotide*
  - **HE.5.B.3** *Compare and contrast the structure and function of DNA and RNA*
  - **MC.2.B.3.b** *ribosomes*
  - **HE.5.B.4** *Describe and model the processes of replication, transcription, and translation*

- **TRANSLATION**
  - **MC.1.B.1.e** *nucleic acids*
  - **HE.5.B.3** *Compare and contrast the structure and function of DNA and RNA*
  - **HE.5.B.4** *Describe and model the processes of replication, transcription, and translation*
  - **MC.1.B.1.b** *proteins*
  - **MC.1.B.1.c** *enzymes*
  - **MC.1.B.2** *Describe the relationship between an enzyme and its substrate molecule(s)*

9. MUTATIONS

- **GENETIC CHANGES IN DNA**

- **MC.1.B.1.b** *proteins*
- **HE.5.B.6.b** *harmful*
- **HE.5.B.6.c** *neutral*
- **HE.5.B.6.a** *beneficial*
- **HE.5.B.5** *Compare and contrast the different types of mutation events, including point mutation, frameshift mutation, deletion, and inversion*
- **HE.6.B.2** *Recognize that evolution involves a change in allele frequencies in a population across successive generations*

- **GENETIC CHANGES IN CHROMOSOMES**
  - **NS.12.B.6** *Relate the chromosome theory of heredity to recent findings in genetic research (e.g., Human Genome Project-HGP, chromosome therapy)*
  - **MC.2.B.10** *Analyze the meiotic maintenance of a constant chromosome number from one generation to the next*
  - **HE.5.B.6.b** *harmful*
  - **HE.5.B.6.c** *neutral*
  - **HE.4.B.4.c** *crossing over*
  - **HE.4.B.6.a** *monosomy*
  - **HE.4.B.6.b** *trisomy*

10. HEREDITY

- **MENDELIAN LAWS OF HEREDITY**
  - **HE.4.B.1** *Summarize the outcomes of Gregor Mendel's experimental procedures*
  - **HE.4.B.2.a** *dominance*
  - **HE.4.B.2.b** *segregation*
  - **HE.4.B.2.c** *independent assortment*
  - **HE.4.B.4.d** *incomplete dominance*
  - **HE.4.B.4.e** *multiple alleles*
  - **HE.4.B.5** *Analyze the historically significant work of prominent geneticists*
  - **HE.6.B.2** *Recognize that evolution involves a change in allele frequencies in a population across successive generations*
  - **NS.10.B.4.d** *scientific knowledge must have peer review and verification before acceptance*
  - **HE.4.B.3** *Use the laws of probability and Punnett squares to predict genotypic and phenotypic ratios*
  - **NS.13.B.1** *Collect and analyze scientific data using appropriate mathematical calculations, figures, and tables*

- **MULTIPLE ALLELES AND ALLELES WITHOUT DOMINANCE**
  - **HE.4.B.2.a** *dominance*
  - **HE.4.B.3** *Use the laws of probability and Punnett squares to predict genotypic and phenotypic ratios*
  - **HE.4.B.4.d** *incomplete dominance*
  - **HE.4.B.4.e** *multiple alleles*
  - **HE.4.B.4.b** *codominance*
  - **HE.6.B.2** *Recognize that evolution involves a change in allele frequencies in a population across successive generations*

11. REPRODUCTION

- **MEIOSIS**
  - **MC.2.B.10** *Analyze the meiotic maintenance of a constant chromosome number from one generation to the next*
  - **HE.4.B.2.c** *independent assortment*
  - **HE.4.B.4.c** *crossing over*
  - **HE.6.B.2** *Recognize that evolution involves a change in allele frequencies in a population across successive generations*
  - **HE.6.B.3** *Analyze the effects of mutations and the resulting variations within a population in terms of natural selection*

- **SEXUAL AND ASEXUAL REPRODUCTION**

- **CDL.7.B.8.a** *sexual reproduction*
- **MC.2.B.8.a** *interphase*
- **MC.2.B.8.b** *mitosis*
- **MC.2.B.9.a** *prophase*
- **MC.2.B.9.b** *metaphase*
- **MC.2.B.9.c** *anaphase*
- **CDL.7.B.8.b** *asexual reproduction*
- **MC.2.B.9.d** *telophase.*

12. EVOLUTION

- **MULTIPLE LINES OF EVIDENCE**
  - **MC.3.B.2.b** *citric acid cycle*
  - **HE.6.B.4** *Illustrate mass extinction events using a time line*
  - **HE.6.B.5.a** *fossil record*
  - **HE.6.B.5.d** *morphology*
  - **NS.12.B.3** *Summarize biological evolution*
  - **HE.6.B.5.g** *geographic distribution of related species*
  - **HE.6.B.5.e** *embryology*
  - **HE.6.B.7** *Interpret a Cladogram*
  - **HE.6.B.5.b** *DNA analysis*
  - **HE.6.B.6** *Compare the processes of relative dating and radioactive dating to determine the age of fossils*

- **THE FOSSIL RECORD**
  - **HE.6.B.4** *Illustrate mass extinction events using a time line*
  - **HE.6.B.5.a** *fossil record*
  - **HE.6.B.5.d** *morphology*
  - **NS.12.B.3** *Summarize biological evolution*
  - **HE.6.B.6** *Compare the processes of relative dating and radioactive dating to determine the age of fossils*

13. MECHANISMS OF EVOLUTION

- **NATURAL SELECTION**
  - **HE.6.B.3** *Analyze the effects of mutations and the resulting variations within a population in terms of natural selection*
  - **NS.12.B.3** *Summarize biological evolution*
  - **HE.6.B.1** *Compare and contrast Lamarck's explanation of evolution with Darwin's theory of evolution by natural selection*
  - **EBR.8.B.5** *Identify and predict the factors that control population, including predation, competition, crowding, water, nutrients, and shelter*
  - **HE.6.B.5.c** *artificial selection*

- **EVOLUTION OF SPECIES**
  - **NS.12.B.3** *Summarize biological evolution*
  - **HE.6.B.3** *Analyze the effects of mutations and the resulting variations within a population in terms of natural selection*
  - **HE.6.B.5.a** *fossil record*
  - **HE.6.B.1** *Compare and contrast Lamarck's explanation of evolution with Darwin's theory of evolution by natural selection*

14. CLASSIFICATION

- **TAXONOMY**
  - **CDL.7.B.2.f** *Animalia*
  - **CDL.7.B.3.a** *kingdom*
  - **CDL.7.B.3.b** *phylum*

- **CDL.7.B.3.c** *class*
- **CDL.7.B.3.d** *order*
- **CDL.7.B.3.e** *family*
- **CDL.7.B.3.f** *genus*
- **CDL.7.B.3.g** *species*
- **CDL.7.B.4** *Classify and name organisms based on their similarities and differences applying taxonomic nomenclature using dichotomous keys*
- **HE.6.B.7** *Interpret a Cladogram*
- **CDL.7.B.2.e** *Plantae*

- **THE SIX KINGDOMS**
  - **MC.2.B.5** *Compare and contrast the structures of an animal cell to a plant cell*
  - **CDL.7.B.1.a** *Bacteria*
  - **CDL.7.B.1.b** *Archaea*
  - **CDL.7.B.1.c** *Eukarya*
  - **CDL.7.B.2.a** *Eubacteria*
  - **CDL.7.B.2.b** *Archaea*
  - **CDL.7.B.2.c** *Protista*
  - **CDL.7.B.2.d** *Fungi*
  - **CDL.7.B.2.e** *Plantae*
  - **CDL.7.B.2.f** *Animalia*
  - **CDL.7.B.3.a** *kingdom*
  - **CDL.7.B.3.b** *phylum*
  - **CDL.7.B.3.c** *class*
  - **CDL.7.B.3.d** *order*
  - **CDL.7.B.3.e** *family*
  - **CDL.7.B.3.f** *genus*
  - **CDL.7.B.3.g** *species*
  - **CDL.7.B.9** *Classify bacteria according to their characteristics and adaptations*
  - **CDL.7.B.11.a** *plant-like*
  - **CDL.7.B.11.b** *animal-like*
  - **CDL.7.B.11.c** *fungal-like*
  - **CDL.7.B.13** *Compare and contrast fungi with other eukaryotic organisms*
  - **HE.6.B.7** *Interpret a Cladogram*
  - **CDL.7.B.8.a** *sexual reproduction*
  - **CDL.7.B.8.b** *asexual reproduction*
  - **CDL.7.B.14** *Evaluate the medical and economic importance of fungi*
  - **CDL.7.B.15** *Differentiate between vascular and nonvascular plants*
  - **CDL.7.B.16** *Differentiate among cycads, gymnosperms, and angiosperms*
  - **CDL.7.B.21** *Compare and contrast the major invertebrate classes according to their nervous, respiratory, excretory, circulatory, and digestive systems*
  - **CDL.7.B.22** *Compare and contrast the major vertebrate classes according to their nervous, respiratory, excretory, circulatory, digestive, reproductive and integumentary systems*
  - **CDL.7.B.20.a** *radial*
  - **CDL.7.B.20.b** *bilateral*
  - **CDL.7.B.20.c** *asymmetrical*

15. HOMEOSTASIS

- **HOMEOSTASIS AND DYNAMIC EQUILIBRIUM**
  - **MC.2.B.11** *Discuss homeostasis using thermoregulation as an example*
  - **MC.2.B.1** *Construct a hierarchy of life from cells to ecosystems*

- **FEEDBACK MECHANISMS IN ANIMALS**
  - **MC.2.B.11** *Discuss homeostasis using thermoregulation as an example*
  - **MC.2.B.1** *Construct a hierarchy of life from cells to ecosystems*

16. FUNCTIONS OF PLANT SYSTEMS

- **PLANT TISSUES**
  - **CDL.7.B.17.a** *roots*
  - **CDL.7.B.17.b** *stems*
  - **CDL.7.B.17.c** *leaves*
  - **CDL.7.B.18.a** *epidermal*
  - **CDL.7.B.18.b** *ground*
  - **CDL.7.B.18.c** *vascular*
  - **CDL.7.B.17.d** *flowers*

- **PLANT RESPONSES**
  - **CDL.7.B.17.a** *roots*
  - **CDL.7.B.17.b** *stems*
  - **CDL.7.B.17.c** *leaves*
  - **CDL.7.B.18.a** *epidermal*
  - **CDL.7.B.18.b** *ground*

17. FUNCTIONS OF ANIMAL SYSTEMS

- **THE NERVOUS SYSTEM**
  - **MC.2.B.1** *Construct a hierarchy of life from cells to ecosystems*

- **THE IMMUNE AND LYMPHATIC SYSTEMS**
  - **MC.2.B.11** *Discuss homeostasis using thermoregulation as an example*

18. MATTER AND ENERGY

- **FOOD CHAINS AND WEBS**
  - **MC.2.B.6** *Compare and contrast the functions of autotrophs and heterotrophs*
  - **EBR.8.B.4** *Analyze an ecosystem's energy flow through food chains, food webs, and energy pyramids*
  - **EBR.8.B.5** *Identify and predict the factors that control population, including predation, competition, crowding, water, nutrients, and shelter*

- **PYRAMIDS OF ENERGY, NUMBERS, AND BIOMASS**
  - **MC.2.B.6** *Compare and contrast the functions of autotrophs and heterotrophs*
  - **EBR.8.B.4** *Analyze an ecosystem's energy flow through food chains, food webs, and energy pyramids*
  - **EBR.8.B.1** *Cite examples of abiotic and biotic factors of ecosystems*
  - **EBR.8.B.5** *Identify and predict the factors that control population, including predation, competition, crowding, water, nutrients, and shelter*

19. CYCLES IN NATURE

- **THE CARBON CYCLE**
  - **EBR.8.B.3** *Diagram the carbon, nitrogen, phosphate, and water cycles in an ecosystem*
  - **EBR.9.B.1** *Analyze the effects of human population growth and technology on the environment/biosphere*

- **EBR.9.B.3** *Assess current world issues applying scientific themes (e.g., global changes in climate, epidemics, pandemics, ozone depletion, UV radiation, natural resources, use of technology, and public policy)*

- **THE NITROGEN AND PHOSPHORUS CYCLES**
  - **EBR.8.B.3** *Diagram the carbon, nitrogen, phosphate, and water cycles in an ecosystem*
  - **EBR.8.B.1** *Cite examples of abiotic and biotic factors of ecosystems*

20. ECOLOGY OF SUCCESSION

- **SUCCESSION IN COMMUNITIES**
  - **EBR.8.B.1** *Cite examples of abiotic and biotic factors of ecosystems*
  - **EBR.8.B.7** *Compare and contrast primary succession with secondary succession*

- **NATURAL IMPACTS ON ECOSYSTEMS**
  - **EBR.8.B.7** *Compare and contrast primary succession with secondary succession*
  - **HE.6.B.4** *Illustrate mass extinction events using a time line*