

2025-2026 Middle School - 8th Grade Science - Unit 5 - Evolutionary History Unit Framework

Unit 1 Unit 2 Unit 3 Unit 4 **Unit 5** Unit 6 Unit 7 Unit 8 Unit 9

Kentucky Academic Standards for Science

Unit Title	Estimated Time Frame
Evolutionary History: Advising a Paleontology Museum	24 Days
Unit Anchor Phenomenon (Big Idea):	
The Mystery Fossil at the Natural History Museum has similarities with both wolves and whales.	
Problem Students are Trying to Solve (Essential Question):	
Is this Mystery Fossil more closely related to wolves or to whales?	
Unit Three Dimensional Statement	
Students obtain information from science texts and analyze and interpret data from digital and physical models as they investigate the body structures of both extinct and living species (structure and function). Students identify similarities and differences, figure out how common body structures are evidence of common ancestry, and how natural selection can lead to changes in body structures and the evolution of new species over time (stability and change).	
Essential Standards (Focal Performance Expectations) (KAS for Science):	
<u>08-LS4-1.</u> Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past. Clarification Statement: Emphasis is on finding patterns of changes in the level of complexity of anatomical structures in organisms and the chronological order of fossil appearance in the rock layers. Assessment Boundary: Assessment does not include the names of individual species or geological eras in the fossil record. KILP: 6 - Collaborate with others to create new meaning. 8 - Engage in specialized, discipline specific literacy practices. 9 - Apply high level cognitive processes to think deeply and critically about text.	

08-LS4-2. Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.

Clarification Statement: Emphasis is on explanations of the evolutionary relationships among organisms in terms of similarity or differences of the gross appearance of anatomical structures.

Assessment Boundary: None provided.

KILP: 2 - Employ, develop, and refine schema to understand and create text.

3 - View literacy experiences as transactional, interdisciplinary and transformational.

8 - Engage in specialized, discipline specific literacy practices.

08-LS4-3. Analyze data to compare patterns in the embryological development across multiple species to identify relationships not evident in the fully formed adult anatomy.

Clarification Statement: Emphasis is on inferring general patterns of relatedness among embryos of different organisms by comparing the macroscopic appearance of diagrams or pictures.

Assessment Boundary: Assessment of comparisons is limited to gross appearance of anatomical structures in embryological development.

KILP: 6 - Collaborate with others to create new meaning.

8 - Engage in specialized, discipline specific literacy practices.

9 - Apply high level cognitive processes to think deeply and critically about text.

Supporting Standards (Connections to Other Performance Expectations):

08-LS4-6. Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.

Clarification Statement: Emphasis is on using mathematical models, probability statements, and proportional reasoning to support explanations of trends in changes to populations over time.

Assessment Boundary: Assessment does not include Hardy Weinberg calculations.

Connections to Kentucky Interdisciplinary Literacy Practices (KILP):

2. Employ, develop and refine schema to understand and create text.
3. View literacy experiences as transactional, interdisciplinary and transformational
6. Collaborate with others to create new meaning.
8. Engage in specialized, discipline specific literacy practices.
9. Apply high level cognitive processes to think deeply and critically about text.

Connections to Standards for Mathematical Practice:

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
5. Use appropriate tools strategically.
6. Attend to precision.
8. Look for and express regularity in repeated reasoning.

<u>Science & Engineering Practices Identified in Standards</u> (While only a subset of science and engineering practices are explicitly identified as the mechanism for how students demonstrate mastery at the end of instruction, students should still utilize all of the science and engineering practices as they develop their understanding.) <u>NGSS Appendix F</u>	<u>Priority Content</u> <u>Disciplinary Core Ideas</u> <u>NGSS Appendix E</u>	<u>Crosscutting Concepts Identified in Standards</u> (While only a subset of crosscutting concepts are explicitly identified as the mechanism for how students demonstrate mastery at the end of instruction, students should still utilize all of the crosscutting concepts as they develop their understanding.) <u>NGSS Appendix G</u>
<u>Analyzing and Interpreting Data</u> - Analyze and interpret data to determine similarities and differences in findings. - Analyze displays of data to identify linear and nonlinear relationships. <u>Constructing Explanations and Designing Solutions</u> Apply scientific ideas to construct an explanation for real-world phenomena, examples, or events.	<u>LS4.A: Evidence of Common Ancestry and Diversity</u> - The collection of fossils and their placement in chronological order (e.g., through the location of the sedimentary layers in which they are found or through radioactive dating) is known as the fossil record. It documents the existence, diversity, extinction, and change of many life forms throughout the history of life on Earth. - Anatomical similarities and differences between various organisms living today and between them and organisms in the fossil record, enable the reconstruction of evolutionary history and the inference of lines of evolutionary descent. - Comparison of the embryological development of different species also reveals similarities that show relationships not evident in the fully-formed anatomy.	<u>Patterns</u> - Graphs, charts, and images can be used to identify patterns in data. - Patterns can be used to identify cause-and effect relationships. <i>Connections to Nature of Science</i> <u>Scientific Knowledge Assumes an Order and Consistency in Natural Systems</u> - Science assumes that objects and events in natural systems occur in consistent patterns that are understandable through measurement and observation.

Prerequisite Skills for Focal Performance Expectations Science & Engineering Practices (from NGSS Appendix E and/or FCPS Enduring Science Skills Document)	Prerequisite Disciplinary Core Ideas (from NGSS Appendix E) (Prerequisite Content Knowledge)	Prerequisite Crosscutting Concepts (from NGSS Appendix G)
1. Input multiple data sets and label rows and columns into a teacher provided template. 2. Use data to consistently identify linear and nonlinear relationships, consistently identify temporal and spatial relationships, and inconsistently identify causal and correlational relationships. 3. Analyze and interpret data to determine similarities and differences in findings. 4. Apply concepts of statistics (mean, median, and mode) to analyze and characterize data, using digital tools when feasible. 5. Determining limitations of data analysis. 6. Construct an explanation of variables using qualitative or quantitative data from valid sources and the student's own experiments. 7. Construct an explanation and/or prediction for real world phenomenon by using models (student made or previously made) and using own arguments.	<u>LS4.A: Evidence of Common Ancestry and Diversity</u> • Some living organisms resemble organisms that once lived on Earth. Fossils provide evidence about the types of organisms and environments that existed long ago. (3-5)	1. Recognize that patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence. 2. Identify similarities and differences in order to sort and classify natural objects and designed products. Identify patterns related to time, including simple rates of change and cycles, and to use these patterns to make predictions.

Preconceptions/Misconceptions:

1. A common alternative conception about evolution arises from the difference between the use of the word *theory* in science and in everyday language. In science, the word *theory* refers to a framework of systematic and well-tested explanations about a broad range of observable phenomena. In everyday language, the word theory is often used to describe a preliminary idea that has little supporting evidence. Biological evolution is an agreed-upon theory, backed by a very large set of evidence. Although there exist many areas of ongoing research about the details of how evolution operates, scientists agree on the basics of the theory.

2. Some students may believe that evolution is primarily a theory about the origin of life. Evolution is a theory about the shared ancestry of living organisms and the mechanism by which species change over time. While evolutionary theory does encompass hypotheses about the origin of life, these are not the main foci of the study of evolution.
3. A common alternate conception is that offspring have more adaptive traits than their parents. In reality, offspring have very similar traits to their parents, and any variation is random and does not tend toward more adaptive traits.
4. A common alternate conception is that genes are not just the instructions for proteins, but they are actually directly involved in the creation of protein molecules or directly control observable traits. These alternate conceptions are addressed in the Amplify Science unit *Traits and Reproduction: The Genetics of Spider Silk*.
5. A common alternate conception is that populations can respond to selection pressures by developing the new traits they need. To address this in the unit, students learn that populations lacking organisms with adaptive traits necessary for survival in a particular environment (e.g., high amounts of fur in a very cold environment) die out completely if the selection pressure is sufficiently strong.
6. The concept of mutation is covered in the Amplify Science units *Natural Selection: Poisonous Newts* and *Traits and Reproduction: The Genetics of Spider Silk*. In the Evolutionary History unit, students learn that small changes accumulate very slowly over time, so large differences between species take a very long time to come about. In this unit, mutations are not explicitly discussed as the source of variation and changes to body structures.
7. A common alternate conception is that different species descended from a single individual, known as the common ancestor. In fact, different species descend from an entire population of individuals. This alternate conception is often encouraged by using the depiction of a single individual to represent the entire common ancestor population. For this reason, whenever possible we use the term *common ancestor population* rather than *common ancestor*.

Pedagogical Considerations:

1. In this unit, the term *selection pressure* is not used. Instead, this concept is represented by using more accessible language such as *environmental conditions or factors in the environment*.
2. In this unit, we limit our discussion of DNA to the singular mention that it is a structure that all life has in common. We also use the term body structure to refer to the structural components that give mammals the ability to birth live offspring (as opposed to laying eggs).
3. It is expected that students are familiar with the concept of fossils. For the purposes of this unit, we focus on the most familiar fossils, which are formed from bones—the fossils of vertebrates. There are a few examples of impression fossils from plants, arthropods, and even cyanobacteria included in the Evolutionary History Simulation, but they are not explicitly addressed in this unit. Students are likely to think of all fossils as being very old, but students may not have considered the relative age of fossils, which can vary by many millions of years.

Essential Vocabulary:					
body structure	descendant species	evolutionary time	related	speciation	stability
common ancestor population	evolution	paleontologist	shared structure	species	
Assessment Profile:					
FCPS 8th Grade Common Unit Assessment Folder					
Pre-Unit Assessment (formative) → Lesson 1.1					
Critical Junctures (formative) → Level 2 Progress Build - end of Lesson 2.6					
End of Unit Assessment (Summative) → Lesson 4.4					
<u>Formative Assessments:</u> On-the-Fly Assessment 1: Summarizing Main Ideas from the Text (Lesson 1.3, Activity 2) On-the-Fly Assessment 2: Insight from Student Annotations (Lesson 1.3, Activity 3) On-the-Fly Assessment 3: Understanding Ancestor-Descendant Relationships (Lesson 1.4, Activity 3) On-the-Fly Assessment 4: Modeling Shared Structures in a Common Ancestor (Lesson 1.5, Activity 4) On-the-Fly Assessment 5: Practice with Summarizing Main Ideas in the Text (Lesson 2.2, Activity 2) On-the-Fly Assessment 6: Insight from Student Annotations (Lesson 2.2, Activity 3) On-the-Fly Assessment 7: Stability and Change in Body Structures (Lesson 2.3, Activity 2) On-the-Fly Assessment 8: Modeling How Differences Evolve (Lesson 2.5, Activity 2) On-the-Fly Assessment 9: Modeling Structures (Lesson 3.1, Activity 2) On-the-Fly Assessment 10: Explaining Evolutionary Relationships (Lesson 3.2, Activity 3) On-the-Fly Assessment 11: Analyzing Data About the Mystery Fossil Lesson 3.3, Activity 3 On-the-Fly Assessment 12: Sorting Evidence About Body Structures (Lesson 4.2, Activity 3)					
Other High Quality Resources					
Next Generation Science Standards - Quality Examples of Science Lessons and Units Open SciEd Classroom Resources					
FCPS Resources					
FCPS Achievement & Trauma-Informed Strategies in the Classroom					

Individual lesson information to be completed at the school level based on pre-unit assessment data and formative assessment data.

Chapter 1 Problem Students are Trying to Solve: (Supporting Question)

Where in the museum does this new fossil belong?

Chapter 1 Three Dimensional Statement:

Students ask questions and make observations about a mystery fossil, use the digital model, and obtain and interpret information from science texts to discover how similar patterns in body structures of organisms are evidence of common ancestry (patterns).

		Anchor Resource Connections		
Lesson Learning Intention (describes clearly what the students will know and/or be able to do as a result of learning and teaching.)	Lesson Success Criteria (based on lesson sequence and connections to Learning Intention)	Learning Progression (from “Evidence sources and reflection opportunities” AND “Application of key concepts to problem” on the Coherence Flowchart)	Key Concepts (from Key Concepts section on the Coherence Flowchart)	Amplify Progress Build Level (these are found in Planning for the Unit on the Unit Landing Page in Progress Build)
The Pre-Unit Assessment is diagnostic and designed to reveal students’ understanding of the unit’s core content, both unit-specific science concepts and crosscutting concepts, prior to instruction by indicating, for formative purposes, where students initially fall along the levels of the Progress Build (PB). The Pre-Unit Assessment also measures students’ understanding of important supporting content not explicitly included in the PB. As such, it offers a baseline from which to measure growth of understanding over the course of the unit.				
I am learning to analyze and interpret images of organisms so that I can group them based on similar body structures.	I know I am successful when I can: - make and record observations of a fossil. - describe what a paleontologist does. - group species based on structural similarities. - define body structures	Examine body structures of different species and group species based on similarities (1.2)		Progress Build Level 1: Body structures shared between species are evidence that these two species inherited the shared structures from a common ancestor population. Different species can share body structures. When two species share structures, it is evidence that these species may be descended from a common ancestor population that also had those structures. This is because species inherit their body structures from their ancestor populations.

I am learning to obtain and evaluate information from observations and a text so that I can develop scientific questions.	I know I am successful when I can: - analyze homologous structures. - obtain information from a text using Active Reading. - share information with others to ask and answer questions.	Read “How You are Like a Blue Whale” (1.3)		Progress Build Level 1: Body structures shared between species are evidence that these two species inherited the shared structures from a common ancestor population.
I am learning to use evolutionary trees so that I can construct explanations about how to use shared structures to infer relationships between species.	I know I am successful when I can: - identify shared body structures of two species. - interpret evolutionary trees. - use shared structures to trace relationships back in time.	- Revisit “How You are Like a Blue Whale” (1.4) - Use the Sim to find two species that share a common body structure on an evolutionary tree (1.4)	- Species inherit their body structures from their ancestor populations. (1.4) - Body structures that are shared between two species are evidence that these two species inherited the shared structures from a common ancestor population. (1.4)	Progress Build Level 1: Body structures shared between species are evidence that these two species inherited the shared structures from a common ancestor population.
I am learning to analyze and interpret evidence about a fossil so that I can determine common structures which implies common ancestry and predict what a fossil looked like.	I know I am successful when I can: - evaluate claims based on new evidence. - identify structural similarities among species to determine the appearance of a fossil. - develop a model based on evidence.	- Discuss claims about where in the museum the mystery fossil belongs based on new evidence (1.5) - Analyze structural similarities among wolves, whales, and the mystery fossil and consider what a body structures a common ancestor might have had (1.5) - Use the Modeling Tool to show a likely common ancestor	Whether or not a trait is adaptive depends on the environment. (1.5)	Progress Build Level 1: Body structures shared between species are evidence that these two species inherited the shared structures from a common ancestor population.

		based on structures shared between two model species (1.5)		
Other High Quality Resources				
Next Generation Science Standards - Quality Examples of Science Lessons and Units Open SciEd Classroom Resources				
FCPS Resources				
FCPS Achievement & Trauma-Informed Strategies in the Classroom				

Individual lesson information to be completed at the school level based on pre-unit assessment data and formative assessment data.

Chapter 2 Problem Students are Trying to Solve: (Supporting Question)

How did wolves, whales, and the Mystery Fossil become so different from their common ancestor population?

Chapter 2 Three Dimensional Statement:

Students gather evidence from science texts and a digital model to investigate how different body structures with different functions can be adaptive in different environments (structure and function) and how small changes can accumulate over evolutionary time, resulting in speciation and large differences in body structures between species (stability and change).

		Anchor Resource Connections		
Lesson Learning Intention (describes clearly what the students will know and/or be able to do as a result of learning and teaching.)	Lesson Success Criteria (based on lesson sequence and connections to Learning Intention)	Learning Progression (from “Evidence sources and reflection opportunities” AND “Application of key concepts to problem” on the Coherence Flowchart)	Key Concepts (from Key Concepts section on the Coherence Flowchart)	Amplify Progress Build Level (these are found in Planning for the Unit on the Unit Landing Page in Progress Build)
I am learning to..... so that I can....	I know I am successful when I can: •			
I am learning to..... so that I can....	I know I am successful when I can: •			
I am learning to..... so that I can....	I know I am successful when I can: •			

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Chapter 3 Problem Students are Trying to Solve: (Supporting Question)

How can we tell if the Mystery Fossil is more closely related to wolves or to whales?

Chapter 3 Three Dimensional Statement:

Students construct physical models and use the digital model to investigate how structures that are shared by two species but not by a third can be used to determine relative relatedness (stability and change). Students analyze and interpret evidence about diagnostic structures and differences in shared structures to construct arguments based on evidence about whether the mystery fossil is more closely related to wolves or to whales.

		Anchor Resource Connections		
Lesson Learning Intention (describes clearly what the students will know and/or be able to do as a result of learning and teaching.)	Lesson Success Criteria (based on lesson sequence and connections to Learning Intention)	Learning Progression (from “Evidence sources and reflection opportunities” AND “Application of key concepts to problem” on the Coherence Flowchart)	Key Concepts (from Key Concepts section on the Coherence Flowchart)	Amplify Progress Build Level (these are found in Planning for the Unit on the Unit Landing Page in Progress Build)
I am learning to..... so that I can....	I know I am successful when I can: •			
I am learning to..... so that I can....	I know I am successful when I can: •			
I am learning to..... so that I can....	I know I am successful when I can: •			

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Chapter 4 Problem Students are Trying to Solve: (Supporting Question)

Is the Tometti fossil more closely related to ostriches or to crocodiles?

Chapter 4 Three Dimensional Statement:

Students analyze evidence and construct oral and written arguments, using what they have learned about shared and distinct body structures and common ancestor populations (stability and change), to determine whether a new fossil is more closely related to ostriches or to crocodiles.

		Anchor Resource Connections		
Lesson Learning Intention (describes clearly what the students will know and/or be able to do as a result of learning and teaching.)	Lesson Success Criteria (based on lesson sequence and connections to Learning Intention)	Learning Progression (from “Evidence sources and reflection opportunities” AND “Application of key concepts to problem” on the Coherence Flowchart)	Key Concepts (from Key Concepts section on the Coherence Flowchart)	Amplify Progress Build Level (these are found in Planning for the Unit on the Unit Landing Page in Progress Build)
I am learning to..... so that I can....	I know I am successful when I can: •			
I am learning to..... so that I can....	I know I am successful when I can: •			
I am learning to..... so that I can....	I know I am successful when I can: •			

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