

Boone County 8th Grade Science Curriculum Map

Unit 1: Energy	Duration:
<i>Key Essential Questions:</i>	
<ul style="list-style-type: none"> • How can energy be transferred from one object or system to another? • What is the relationship between kinetic energy and mass? • What is the relationship between kinetic energy and speed? 	
<i>Transfer Goals:</i>	
<i>Students will be able to use their learning to</i>	
<ul style="list-style-type: none"> • Develop a model to generate data to test ideas about designed systems making modifications in order to achieve an optimal design [in determining the relationship of kinetic energy to the mass of an object and to the speed of an object]. • Construct and interpret graphical displays of data to describe proportional relationships [of kinetic energy to the mass of an object and to the speed of object]. 	
Performance Expectation	
08-PS3-1. Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.	
MS-ETS1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.	
Notes:	

Unit 2: Reproduction, Unity and Diversity	Duration:
<i>Key Essential Questions:</i>	
<ul style="list-style-type: none"> • How do organisms change over time in response to changes in the environment? • What is the effect of asexual and sexual reproduction on offspring? • What are the similarities and differences of organisms throughout their embryological development? 	

- What is the effect of genetic mutations on an organism?

Transfer Goals:

Students will be able to use their learning to

- Develop and use a model to predict natural phenomena [to describe asexual and sexual reproduction].
- Analyze displays of pictorial data to identify relationships [of embryological development across multiple species not evident in the fully formed anatomy].
- Construct an explanation based on cause and effect relationships that can be described using probability [to predict how an organism will survive and reproduce in a specific environment].
- Use mathematical models to support natural phenomena [to support how natural selection affects populations over time].

Performance Expectation

08-LS3-2. Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.

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

08-LS4-4. Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.

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.

08-LS3-1. Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.

Notes: All of the concepts of **08-LS4-6** except natural selection that is due to changes in the environment are taught in this unit.

Unit 3: Populations and Response to Change

Duration:

Key Essential Questions:

- How do organisms respond to stimuli?
- How do physical (abiotic) and biological (biotic) components affect an ecosystem?
- What is the effect of genetic mutations on a population?

Transfer Goals:

Students will be able to use their learning to

- Synthesize information from credible sources to describe how small changes in one part of a system might cause large changes in another [such as response to stimuli].
- Construct an argument, through various media, based on evidence and reasoning [to explain how changes to an ecosystem affect populations].
- Develop and use a model to describe phenomena [such as how genetic mutations can have harmful, beneficial, or neutral effects].

Performance Expectation

08-LS1-8. Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.

08-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

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.

Notes: Some concepts in **08-LS4-6** (natural selection that is due to changes in the environment) are taught in this unit, but the remainder are in Unit 2: Reproduction, Unity and Diversity. Some ideas of **08-LS4-2** (evidence of change) might also be included in this unit.

Unit 4: History of Earth

Duration:

Key Essential Questions:

- How do organisms change over time?
- How can scaled models help explain Earth's 4.6-billion-year-old history?

Transfer Goals:

Students will be able to use their learning to

- Analyze and interpret data to identify patterns [of change in the anatomical structures in organisms and the chronological order of fossil

<p>appearance in the rock layers].</p> <ul style="list-style-type: none"> ● Construct an explanation based on scientific ideas and patterns [between modern and fossil organisms, to infer how organisms have changed over time]. ● Construct a scientific explanation based on valid and reliable evidence found in scaled models [to support Earth’s 4.6-billion-year-old history].
Performance Expectation
08-LS4-1. 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.
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.
08-ESS1-4. Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth’s 4.6-billion-year-old history.
Notes: Some ideas of 08-LS4-2 (evidence of change) might also be included in Unit 3: Populations and Response to Change.

Unit 5: Climate and Resources	Duration:
<i>Key Essential Questions:</i>	
<ul style="list-style-type: none"> ● How is the availability of needed natural resources related to naturally occurring processes? ● How can natural hazards be predicted? ● How do human activities affect Earth systems? ● How do we know our global climate is changing? 	
<i>Transfer Goals:</i>	
<i>Students will be able to use their learning to</i>	
<ul style="list-style-type: none"> ● Construct a scientific explanation based on valid and reliable evidence to describe cause and effect relationships [to predict the consequences of human activity on the environment]. ● Analyze and interpret data to identify patterns [to forecast future catastrophic events and develop technology to minimize their effects]. ● Construct an argument based on evidence of how cause and effect relationships can be used to predict [how per-capita consumption of natural resources impact Earth’s systems.] 	

<ul style="list-style-type: none"> Define a design problem, including criteria and constraints that may limit possible solutions [to the development of technologies to minimize the effect of natural hazards].
Performance Expectation
08-ESS3-1. Construct a scientific explanation based on evidence for how the uneven distributions of Earth’s mineral, energy, and groundwater resources are the result of past and current geoscience processes.
08-ESS3-2. Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.
08-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth’s systems.
MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
Notes:

Unit 6: Human Impact	Duration:
<i>Key Essential Questions:</i>	
<ul style="list-style-type: none"> How do human activities affect Earth systems? What has caused the recent rise in global temperatures? What is the impact of an increase in the human population? How has technology influenced the way that humans are inheriting traits? What is the importance of maintaining biodiversity within an ecosystem? How can we minimize the human impact on the environment? 	
<i>Transfer Goals:</i>	
<i>Students will be able to use their learning to</i>	
<ul style="list-style-type: none"> Evaluate competing design solutions based on agreed-upon design criteria to determine how small changes in one part of a system might cause large changes in another part [in order to maintain biodiversity and ecosystem services]. 	

- Synthesize information from credible sources to explain how scientific knowledge can describe consequences of certain actions but does not make decisions for the society [such as how technologies have changed the way humans influence the inheritance of desired traits in organisms].
- Design a method using scientific principles to demonstrate the relationship between technology and its limitations, driven by people's needs, desires, and values [in order to monitor and minimize human impact on the environment].
- Ask questions to clarify evidence of how stability might be disturbed either by sudden events or gradual changes that accumulate over time [such as factors that have caused the rise in global temperatures over the past century].
- Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints [of the impact that humans have had on the environment].
 - Analyze data to determine similarities and differences among several design solutions to identify a new solution to better meet the criteria [for minimizing human impact on the environment].

Performance Expectation

08-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.*

08-LS4-5. Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.

08-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.*

08-ESS3-5. Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.

MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

MS-ETS1-3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

Notes: