

ORANGE PUBLIC SCHOOLS



ORANGE PUBLIC SCHOOLS**Science:****GRADE: 8****UNIT #: 2/7****SCOPE AND SEQUENCE**

Topic	PE's and DCI's	Discovery Education Core Interactive Text	# Blocks
Unit 1 Evidence of Common Ancestry	MS-LS4-1, MS-LS4-2, MS-LS4-3	Fossils and Studying Earth's Past	8
Unit 2 Selection and Adaptation	MS-LS4-4, MS-LS4-5, MS-LS4-6	Adaptations	10
Unit 3 Stability and Change on Earth			
Unit 4 Human Impacts			
Unit 5 Relationships among Forms of Energy			
Unit 6 Thermal Energy			
Unit 7 The Electromagnetic Spectrum			

ORANGE PUBLIC SCHOOLS

Science:

GRADE: 8

UNIT #: 2/7

September 2016

Mon	Tue	Wed	Thu	Fri
5	6	7	8 Introduction	9
12 Unit 1 Lesson 1	13	14	15	16
19	20 Unit1 Lesson 2	21	22	23
26	27	28 Lesson 3	29	30

October 2106

Mon	Tue	Wed	Thu	Fri
3	4	5	6	7
10	11	12	13	14
17	18	19	20	21

ORANGE PUBLIC SCHOOLS		
Science:	GRADE: 8	UNIT #: 2/7

Unit 1

Evidence of Common Ancestry

How do we know when an organism (fossil) was alive?

How do we know that birds and dinosaurs are related?

Other than bones and structures being similar, what other evidence is there that birds and dinosaurs are related?

In this unit of study, students analyze graphical displays and gather evidence from multiple sources in order to develop an understanding of how fossil records and anatomical similarities of the relationships among organisms and species describe biological evolution. Students search for patterns in the evidence to support their understanding of the fossil record and how those patterns show relationships between modern organisms and their common ancestors. The crosscutting concepts of cause and effect, patterns, and structure and function are called out as organizing concepts for these disciplinary core ideas. Students use the practices of analyzing graphical displays and gathering, reading, and communicating information. Students are also expected to use these practices to demonstrate understanding of the core ideas.

ORANGE PUBLIC SCHOOLS

Science:

GRADE: 8

UNIT #: 2/7

# Blocks	STUDENT LEARNING OBJECTIVES	CORRESPONDING PE's and DCIs	CURRICULAR & SUPPLEMENTAL RESOURCES	ASSESSMENT
3	<ul style="list-style-type: none"> The fossil record documents the existence, diversity, extinction, and change of many life forms throughout the history of life on Earth. The collection of fossils and their placement in chronological order as identified through the location of sedimentary layers in which they are found or through radioactive dating is known as the fossil record. Relative fossil dating is achieved by examining the fossil's relative position in sedimentary rock layers. Objects and events in the fossil record occur in consistent patterns that are understandable through measurement and observation. Patterns exist in the level of complexity of anatomical structures in organisms and the chronological order of fossil appearance in rock layers. Patterns can occur within one species of organism or across many species. 	<p>MS-LS4 Biological Evolution: Unity and Diversity</p> <p>MS-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.</p>	<p>Videos: Earth Science: Fossils</p> <p>Elements of Earth Science: Rocks, Minerals, and Soils: Fossils and Fossil Fuels</p> <p>Fossils: Windows Into the Past: How Fossils Help Us Learn About the History of the Earth</p> <p>Activity: Evidence of Evolution</p> <p>Fossils: Windows Into the Past: The Types of Fossils and How They Formed</p> <p>Exploration: Whale of a Tale</p> <p>Discovery Education Core Interactive Text: Reading Passages: How Do Fossils Form? Old-Timers The Case of the Faulty Fossil</p>	<p>Observable features of student performance by the end of the course.</p> <ul style="list-style-type: none"> Use graphs, charts, and images to identify patterns within the fossil record. Analyze and interpret data within the fossil record to determine similarities and differences in findings. Make logical and conceptual connections between evidence in the fossil record and explanations about the existence, diversity, extinction, and change in many life forms throughout the history

<p align="center">ORANGE PUBLIC SCHOOLS</p>		
<p>Science:</p>	<p>GRADE: 8</p>	<p>UNIT #: 2/7</p>

UNIT #: 2/7

				of life on Earth.
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ORANGE PUBLIC SCHOOLS

Science:

GRADE: 8

UNIT #: 2/7

3	<ul style="list-style-type: none"> • Similarities and differences exist in the gross anatomical structures of modern organisms. • There are anatomical similarities and differences among modern organisms and between modern organisms and fossil organisms. • Similarities and differences exist in the gross anatomical structures of modern organisms and their fossil relatives. • Similarities and differences in the gross anatomical structures of modern organisms enable the reconstruction of evolutionary history and the inference of lines of evolutionary decent. • Patterns and anatomical similarities in the fossil record can be used to identify cause-and-effect relationships. • Science assumes that objects and events in evolutionary history occur in consistent patterns that are understandable through measurement and observation. 	<p>MS-LS4 Biological Evolution: Unity and Diversity</p> <p>MS-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.</p>	<p>Videos: Crystal Geyser Rock formation</p> <p>Fossils: Windows Into the Past Biodiversity: How Fossils Illustrate the Past</p> <p>Discovery Education Core Interactive Text: Reading Passages - Bye Bye Birdy - Early Birds - Begin at the Beginning - A Mammoth Lumbering Through the Ages</p> <p>Activity 1: Constructing a Cladogram</p> <p>Activity 2: Relative Dating</p> <p>Activity 3: Fossil Formation</p>	<p>Observable features of student performance by the end of the course:</p> <ul style="list-style-type: none"> • Apply scientific ideas to construct explanations for evolutionary relationships. • Apply the patterns in gross anatomical structures among modern organisms and between modern organisms and fossil organisms to construct explanations of evolutionary relationships. • Apply scientific ideas about evolutionary history to construct an explanation for evolutionary relationships evidenced by similarities or differences in the gross appearance of anatomical structures.
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ORANGE PUBLIC SCHOOLS

Science:

GRADE: 8

UNIT #: 2/7

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2	<ul style="list-style-type: none"> Relationships between embryos of different species show similarities in their development. General patterns of relatedness among embryos of different organisms can be inferred by comparing the macroscopic appearance of diagrams or pictures. Pictorial data can be used to identify patterns of similarities in embryological development across multiple species. Similarities in embryological development across multiple species show relationships that are not evident in the fully formed organisms. 	<p>MS-LS4 Biological Evolution: Unity and Diversity</p> <p>MS-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.</p>	<p>Video: Life Science: Evolution</p> <p>First Life with David Attenborough: The Origins of Evolution</p> <p>Discovery Education Core Interactive Text: Reading Passages</p> <ul style="list-style-type: none"> - Evolution - The Evolution of Describing Evolution - Genetic Evolution 	<p>Observable features of student performance by the end of the course.</p> <ul style="list-style-type: none"> Use diagrams or pictures to identify patterns in embryological development across multiple species. Analyze displays of pictorial data to identify where the embryological development is related linearly and where that linear nature ends. Infer general patterns of relatedness among embryos of different organisms by comparing the macroscopic appearance of diagrams or pictures

English Language Arts

Cite specific textual evidence to support analysis of science and

Mathematics

Use variables to represent numbers and write expressions when

ORANGE PUBLIC SCHOOLS

Science:

GRADE: 8

UNIT #: 2/7

technical texts, attending to the precise details of explanations or descriptions. (MS-LS4-1),(MS-LS4-2),(MS-LS4-3) **RST.6-8.1**

Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). (MS-LS4-1),(MS-LS4-3) **RST.6-8.7**

Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic. (MS-LS4-3) **RST.6-8.9**

Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. (MS-LS4-2) **WHST.6-8.2**

Draw evidence from informational texts to support analysis, reflection, and research. (MS-LS4-2) **WHST.6-8.9**

Engage effectively in a range of collaborative discussions (one-on-one, in groups, teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly. (MS-LS4-2) **SL.8.1**

Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation. (MS-LS4-2) **SL.8.4**

solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. (MS-LS4-1),(MS-LS4-2) **6.EE.B.6**

Modifications

ORANGE PUBLIC SCHOOLS

Science:

GRADE: 8

UNIT #: 2/7

(Note: Teachers identify the modifications that they will use in the unit. See NGSS Appendix D: [All Standards, All Students/Case Studies](#) for vignettes and explanations of the modifications.)

- Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community.
- Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).
- Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as SKYPE, experts from the community helping with a project, journal articles, and biographies).
- Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences).
- Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings.
- Use project-based science learning to connect science with observable phenomena.
- Structure the learning around explaining or solving a social or community-based issue.
- Provide ELL students with multiple literacy strategies.
- Collaborate with after-school programs or clubs to extend learning opportunities.
- Restructure lesson using UDL principals (http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA)

ORANGE PUBLIC SCHOOLS		
Science:	GRADE: 8	UNIT #: 2/7

Unit 2: Selection and Adaptation

How can changes to the genetic code increase or decrease an individual's chances of survival?

How can the environment effect natural selection?

Are Genetically Modified Organisms (GMO's) safe to eat?

Students construct explanations based on evidence to support fundamental understandings of natural selection and evolution. They will use ideas of genetic variation in a population to make sense of how organisms survive and reproduce, thus passing on the traits of the species. The crosscutting concepts of patterns and structure and function are called out as organizing concepts that students use to describe biological evolution. Students use the practices of constructing explanations, obtaining, evaluating, and communicating information, and using mathematical and computational thinking. Students are also expected to use these practices to demonstrate understanding of the core ideas.

ORANGE PUBLIC SCHOOLS

Science:

GRADE: 8

UNIT #: 2/7

# Blocks	STUDENT LEARNING OBJECTIVES	CORRESPONDING PE's and DCIs	CURRICULAR & SUPPLEMENTAL RESOURCES	ASSESSMENT
3	<ul style="list-style-type: none"> Genetic variations of traits in a population increase or decrease some individuals' probability of surviving and reproducing in a specific environment. Natural selection leads to the predominance of certain traits in a population and the suppression of others. Natural selection may have more than one cause, and some cause-and-effect relationships within natural selection can only be described using probability. 	<p>MS-LS4 Biological Evolution: Unity and Diversity</p> <p>MS-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.</p> <p>MS-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.</p>	<p>Assignments and Resources</p> <p>Discovery Education Techbook Core Interactive Text: What Is Genetic Variation and How Does It Help a Population Survive?</p>	<p>Students who understand the concepts can:</p> <ul style="list-style-type: none"> Construct an explanation that includes probability statements regarding variables and proportional reasoning of how genetic variations of traits in a population increase some individuals' probability surviving and reproducing in a specific environment. Use probability to describe some cause-and-effect relationships that can be used to explain why some individuals survive and reproduce in a specific environment. <p>Assignment 1</p>

ORANGE PUBLIC SCHOOLS

Science:

GRADE: 8

UNIT #: 2/7

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3	<ul style="list-style-type: none"> Natural selection, which over generations leads to adaptations, is one important process through which species change over time in response to changes in environmental conditions. The distribution of traits in a population changes. Traits that support successful survival and reproduction in the new environment become more common; those that do not 	<p>MS-LS4 Biological Evolution: Unity and Diversity</p> <p>MS-LS4-5 Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.</p>	<p>Assignments and Resources</p> <p>Discovery Education Techbook Core Interactive Text: Darwin and Natural Selection</p>	<p>Students who understand the concepts can:</p> <ul style="list-style-type: none"> Explain some causes of natural selection and the effect it has on the increase or decrease of specific traits in populations over time. Use mathematical representations to support conclusions about

ORANGE PUBLIC SCHOOLS

Science:	GRADE: 8	UNIT #: 2/7
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	<p>become less common.</p> <ul style="list-style-type: none"> Natural selection may have more than one cause, and some cause-and-effect relationships in natural selection can only be described using probability. Mathematical representations can be used to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time. 			<p>how natural selection may lead to increases and decreases of genetic traits in populations over time.</p> <p>Assessment</p>
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# Blocks	STUDENT LEARNING OBJECTIVES	CORRESPONDING PE's and DCIs	CURRICULAR & SUPPLEMENTAL RESOURCES	ASSESSMENT
3	<ul style="list-style-type: none"> In artificial selection, humans have the capacity to influence certain characteristics of organisms by selective breeding. In artificial selection, humans choose desirable, genetically determined traits in to pass on to offspring. Phenomena, such as genetic outcomes in artificial selection, may have more than one cause, and some cause-and-effect 	<p>MS-LS4 Biological Evolution: Unity and Diversity</p> <p>MS-LS4-4 Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals'</p>	<p>Assignments and Resources</p> <p>Discovery Education Techbook Core Interactive Text: Influencing Inheritance</p>	<p>Students who understand the concepts can:</p> <ul style="list-style-type: none"> Gather, read, and synthesize information about technologies that have changed the way humans influence the inheritance of desired traits in organisms (artificial selection) from multiple appropriate sources. Describe how

ORANGE PUBLIC SCHOOLS

Science:

GRADE: 8

UNIT #: 2/7

relationships in systems can only be described using probability.

- Technologies have changed the way humans influence the inheritance of desired traits in organisms.
- Engineering advances have led to important discoveries in the field of selective breeding.
- Engineering advances in the field of selective breeding have led to the development of entire industries and engineered systems.
- Scientific discoveries have led to the development of entire industries and engineered systems.

probability of surviving and reproducing in a specific environment.

MS-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.

information from publications about technologies and methods that have changed the way humans influence the inheritance of desired traits in organisms (artificial selection) used are supported or not supported by evidence.

- Assess the credibility, accuracy, and possible bias of publications and they methods they used when gathering information about technologies that have changed the way humans influence the inheritance of desired traits in organisms (artificial selection).

[Assessment](#)

Constructed Response

How do humans apply technology to select for certain traits in other organisms?

ORANGE PUBLIC SCHOOLS		
Science:	GRADE: 8	UNIT #: 2/7