



Stackable Instructionally- embedded Portable Science (SIPS) Assessments Project

Grade 8 Science Unit 3 Range Performance Level Descriptors Understanding Earth History and the Origin of Species September 2023

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SIPS Grade 8 Unit 3 Range Performance Level Descriptors

Grade 8 Unit 3 Assessment Performance Expectations

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. *[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.]*

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. *[Clarification Statement: Emphasis is on using simple probability statements and proportional reasoning to construct explanations.]*

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. *[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.]*

MS-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 on the structure and function of the organism. *[Clarification Statement: Emphasis is on conceptual understanding that changes in genetic material may result in making different proteins.]* *[Assessment Boundary: Assessment does not include specific changes at the molecular level, mechanisms for protein synthesis, or specific types of mutations.]*

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. *[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.]*

MS-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. *[Clarification Statement: Emphasis is on how analyses of rock formations and the fossils they contain are used to establish relative ages of major events in Earth's history. Examples of Earth's major events could range from being very recent (such as the last Ice Age or the earliest fossils of homo sapiens) to very old (such as the formation of Earth or the earliest evidence of life). Examples can include the formation of mountain chains and ocean basins, the evolution or extinction of particular living organisms, or significant volcanic eruptions.]* *[Assessment Boundary: Assessment does not include recalling the names of specific periods or epochs and events within them.]*

SIPS Unit 3 Range Performance Level Descriptors

SIPS tasks require students to apply and transfer their science learning through engagement with science and engineering practices (SEPs) and application of the crosscutting concepts (CCCs) to demonstrate their understanding of disciplinary core ideas (DCIs) to make sense of and explain phenomena and/or to design solutions to phenomena-rooted engineering problems.

Level 1	Level 2	Level 3 (Target)	Level 4
<p>A student performing at this level produces evidence of three-dimensional science learning by their ability to:</p> <ul style="list-style-type: none"> use a provided model to support a simple explanation of a mutation. 	<p>A student performing at this level produces evidence of three-dimensional science learning by their ability to:</p> <ul style="list-style-type: none"> use a provided model to support an incomplete description of the relationship between a mutation and the resulting protein. 	<p>A student performing at this level produces evidence of three-dimensional science learning by their ability to:</p> <ul style="list-style-type: none"> use models to create accurate and complete explanations of how structural changes to genes (i.e., changes in the amino acid sequence) can affect observable structures and functions in organisms. 	<p>A student performing at this level produces evidence of three-dimensional science learning by their ability to:</p> <ul style="list-style-type: none"> use models to create scientifically accurate and complete explanations of how structural changes to genes (i.e., changes in the amino acid sequence) can affect observable structures and functions in organisms.
<ul style="list-style-type: none"> partially complete a model to show organisms and their changes over time. 	<ul style="list-style-type: none"> develop and use a graphical display of the fossil record to identify a pattern in a change to an anatomical structure as evidence to support a claim related to organisms and their changes over time. 	<ul style="list-style-type: none"> develop and use an accurate and complete graphical display of the fossil record to identify patterns in changes to anatomical structures to provide accurate and complete evidence to support a claim related to organisms and their changes over time. 	<ul style="list-style-type: none"> develop and use an accurate and complete graphical display of the fossil record to identify patterns in changes to anatomical structures to provide scientifically accurate and complete evidence to support a claim related to organisms and their changes over time.
<ul style="list-style-type: none"> identifies a similarity or difference in one anatomical structure of an extinct and modern organism as evidence of an evolutionary relationship. 	<ul style="list-style-type: none"> construct an explanation of evolutionary relationships based on a similarity or difference in the gross appearance of an anatomical structure(s) of extinct and modern organisms. 	<ul style="list-style-type: none"> construct an accurate and complete explanation of evolutionary relationships evidenced by similarities and differences in the gross appearance of anatomical structures by comparing anatomical features of extinct and modern organisms. 	<ul style="list-style-type: none"> construct a scientifically accurate and complete explanation of evolutionary relationships evidenced by similarities and differences in the gross appearance of anatomical structures by comparing anatomical features of extinct and modern organisms.

<ul style="list-style-type: none"> identify an environmental change over time that benefits some individuals in a population over others due to their traits. 	<ul style="list-style-type: none"> construct an explanation of how an environmental change over time is more advantageous to some individuals in a population given the environmental change. 	<ul style="list-style-type: none"> construct an accurate and complete explanation of how an environmental change over time results in an increase in some individuals' probability of surviving and reproducing that leads to different frequencies of traits in a population over many generations. 	<ul style="list-style-type: none"> construct a scientifically accurate and complete explanation of how an environmental change over time results in an increase in some individuals' probability of surviving and reproducing that leads to different frequencies of traits in a population over many generations.
<ul style="list-style-type: none"> use some data to describe how natural selection leads to the predominance of certain traits in a population over time. 	<ul style="list-style-type: none"> analyze and interpret data to develop graphical displays to develop conclusions using some evidence related to how natural selection leads to increases or decreases of certain traits in populations over time. 	<ul style="list-style-type: none"> analyze and interpret data to develop accurate and complete graphical displays to identify patterns to develop accurate and complete conclusions with evidence related to how natural selection leads to increases or decreases of certain traits in populations over time. 	<ul style="list-style-type: none"> analyze and interpret data to develop accurate and complete graphical displays to identify patterns to develop scientifically accurate and complete conclusions with evidence related to how natural selection leads to increases or decreases of certain traits in populations over time.
<ul style="list-style-type: none"> identify changes to Earth's ecosystems through geologic time using fossil evidence. 	<ul style="list-style-type: none"> construct an incomplete explanation of changes to Earth's ecosystems through geologic time using fossil evidence 	<ul style="list-style-type: none"> construct an accurate and complete explanation of Earth's history using fossil evidence in rock layers at different locations to describe changes to Earth's ecosystems through geologic time. 	<ul style="list-style-type: none"> construct a scientifically accurate and complete explanation of Earth's history using fossil evidence in rock layers at different locations to describe changes to Earth's ecosystems through geologic time.