Lab-Aids Correlations

for the

2022 Indiana Academic Standards Science: Biology

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This document is intended to show how the SEPUP *Science and Global Issues: Biology, 3rd Edition,* curriculum materials align with the Indiana Academic Standards Science: Biology.

ABOUT LAB-AIDS

Lab-Aids has maintained its home offices and operations in Ronkonkoma, NY, since 1963. We publish over 200 kits and core curriculum programs to support science teaching and learning, grades 6-12. All core curricula support an inquiry-driven pedagogy, with support for literacy skill development and with assessment programs that clearly show what students know and are able to do as a result of program use. All programs have extensive support for technology and feature comprehensive teacher support. For more information, please visit www.lab-aids.com and navigate to the program of interest.

ABOUT SEPUP

Materials from the Science Education for Public Understanding Program (SEPUP) are developed at the Lawrence Hall of Science, at the University of California, Berkeley, and distributed nationally by Lab-Aids, Inc. Since 1987, development of SEPUP materials has been supported by grants from the National Science Foundation and other public and private sources. SEPUP programs include student books, equipment kits, teacher materials, and online digital content.

ABOUT THE LAB-AIDS CITATIONS

Citations included in the correlation document are as follows:

* indicates where Performance Expectation is assessed
Unit title: Activity Number
Cells: 2, 3, 4, 5, 6*, 7*, 8

Performance Expectation	HS-LS1-1
Disciplinary Core Idea	LS1.A
Science and Engineering Practices	Constructing Explanations and Designing Solutions
Crosscutting Concept	Scale, Proportion, and Quantity

High School Biology

Performance Expectation	SGI Biology: Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
From Molecules to Organisms: Structures and Processes				
HS-LS1-1: Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins, which carry out the essential functions of life through systems of specialized cells. *[Clarification Statement: Emphasis is on how the structure of regions of DNA, called genes, determine the structure of proteins. Proteins are made and carry out the essential functions of life within different cellular organelles. Examples of essential proteins can include enzymes, membrane channels, immune proteins.]*	*Cells:* *6* *Genetics:* *2, 7, 8, 9, 10*, 15*	SEP.6: Constructing Explanations and Designing Solutions	LS1.A: Structure and Function	CC.6: Structure and Function
HS-LS1-2: Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. *[Clarification Statement: Emphasis is on functions at the organism system level such as nutrient uptake, water delivery, and organism movement in response to neural stimuli. An example of an interacting system could be an artery depending on the proper function of elastic tissue and smooth muscle to regulate and deliver the proper amount of blood within the circulatory system.]*	*Cells:* *2, 3, 4, 5, 6*, 7*, 8*	SEP.2: Developing and Using Models	LS1.A: Structure and Function	CC.4: Systems and System Models
HS-LS1-3: Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. *[Clarification Statement: Examples*	*Cells:* *1, 2, 3, 4, 5, 7, 8, 9*	SEP.3: Planning and Carrying Out Investigations *Connections to Nature of Science*	LS1.A: Structure and Function	CC.7: Stability and Change

* Performance Expectation assessment opportunity

Performance Expectation	SGI Biology: Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
of investigations could include heart rate response to exercise, stomate response to moisture and temperature, and root development in response to water levels.]		Scientific Investigations Use a Variety of Methods		
HS-LS1-4: Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.	*Genetics: 3, 8**	SEP.2: Developing and Using Models	LS1.B: Growth and Development of Organisms	CC.4: Systems and Systems Models
HS-LS1-5: Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy. *[Clarification Statement: Emphasis is on illustrating inputs and outputs of matter and the transfer and transformation of energy in photosynthesis by plants and other photosynthesizing organisms. Examples of models could include diagrams, chemical equations, and conceptual models.]*	*Cells: 11*, 12, 13, 15*	SEP.2: Developing and Using Models	LS1.C: Organization for Matter and Energy Flow in Organisms	CC.5: Energy and Matter
HS-LS1-6: Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules. *[Clarification Statement: Emphasis is on using evidence from models and simulations to support explanations.]*	*Cells: 9, 10, 11, 13, 14, 15, 16**	SEP.6: Constructing Explanations and Designing Solutions	LS1.C: Organization for Matter and Energy Flow in Organisms	CC.5: Energy and Matter
HS-LS1-7: Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed, resulting in a net transfer of energy. *[Clarification Statement: Emphasis is on the conceptual understanding of the inputs and*	*Cells: 9, 10, 14, 15*, 16*	SEP.2: Developing and Using Models	LS1.C: Organization for Matter and Energy Flow in Organisms	CC.5: Energy and Matter

Performance Expectation	SGI Biology: Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
outputs of the process of cellular respiration.]				
Ecosystems: Interactions, Energy and Dynamics				
HS-LS2-1: Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales. *[Clarification Statement: Emphasis is on quantitative analysis and comparison of the relationships among interdependent factors including boundaries, resources, climate, and competition. Examples of mathematical comparisons could include graphs, charts, histograms, and population changes gathered from simulations or historical data sets.]*	*Ecology: 1, 2, 3*, 4*	SEP.5: Using Mathematics and Computational Thinking	LS2.A: Interdependent Relationships in Ecosystems	CC.3: Scale, Proportion, and Quantity
HS-LS2-2: Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales. *[Clarification Statement: Examples of mathematical representations include finding the average, determining trends, and using graphical comparisons of multiple sets of data.]*	*Ecology: 3, 4, 5**	SEP.5: Using Mathematics and Computational Thinking *Connections to Nature of Science* Scientific Knowledge is Open to Revision in Light of New Evidence	LS2.A: Interdependent Relationships in Ecosystems LS2.C: Ecosystem Dynamics, Functioning, and Resilience	CC.3: Scale, Proportion, and Quantity

Performance Expectation	SGI Biology: Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
HS-LS2-3: Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions. *[Clarification Statement: Emphasis is on conceptual understanding of the role of aerobic and anaerobic respiration in different environments.]*	*Ecology: 6, 7, 8** *Cells: 10, 15**	SEP.6: Constructing Explanations and Designing Solutions *Connections to Nature of Science* Scientific Knowledge is Open to Revision in Light of New Evidence	LS2.B: Cycles of Matter and Energy Transfer in Ecosystems	CC.5: Energy and Matter
HS-LS2-4: Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem. *[Clarification Statement: Emphasis is on using a mathematical model of stored energy in biomass to describe the transfer of energy from one trophic level to another and that matter and energy are conserved as matter cycles and energy flows through ecosystems. Emphasis is on atoms and molecules such as carbon, oxygen, hydrogen, and nitrogen being conserved as they move through an ecosystem.]*	*Ecology: 6, 7, 9, 10**	SEP.5: Using Mathematics and Computational Thinking	LS2.B: Cycles of Matter and Energy Transfer in Ecosystems	CC.5: Energy and Matter
HS-LS2-5: Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere. *[Clarification Statement: Examples of models could include simulations and mathematical models.]*	*Ecology: 11, 12**	SEP.2: Developing and Using Models	LS2.B: Cycles of Matter and Energy Transfer in Ecosystems PS3.D: Energy in Chemical Processes	CC.4: Systems and System Models

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HS-LS2-6: Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem. *[Clarification Statement: Examples of changes in ecosystem conditions could include modest biological or physical changes, such as moderate hunting or a seasonal flood; and extreme changes, such as volcanic eruption or sea level rise.]*	*Ecology:* *13, 14*, 15, 16*	SEP.7: Engaging in Argument from Evidence *Connections to Nature of Science* Scientific Knowledge is Open to Revision in Light of New Evidence	LS2.C: Ecosystem Dynamics, Functioning, and Resilience	CC.7: Stability and Change
HS-LS2-7: Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity. *[Clarification Statement: Examples of human activities can include urbanization, building dams, and dissemination of invasive species.]*	*Ecology:* *13, 14, 15, 16, 17** *Cells:* *1, 2, 3, 7, 13, 17* *Genetics:* *16, 17* *Evolution:* *10, 13, 14*, 15**	SEP.6: Constructing Explanations and Designing Solutions	LS2.C: Ecosystem Dynamics, Functioning, and Resilience LS4.D: Biodiversity and Humans ETS1.B: Developing Possible Solutions	CC.7: Stability and Change
HS-LS2-8: Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce. *[Clarification Statement: Emphasis is on: (1) distinguishing between group and individual behavior, (2) identifying evidence supporting the outcomes of group behavior, and (3) developing logical and reasonable arguments based on evidence. Examples of group behaviors could include flocking, schooling, herding, and cooperative behaviors such as hunting, migrating, and swarming.]*	*Evolution:* *1, 3**	SEP.7: Engaging in Argument from Evidence *Connections to Nature of Science* Scientific Knowledge is Open to Revision in Light of New Evidence	LS2.D: Social Interactions and Group Behavior	CC.2: Cause and Effect

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Heredity: Inheritance and Variation of Traits				
HS-LS3-1: Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.	*Genetics: 4, 5, 7, 10, 11*, 12**	SEP.2: Developing and Using Models	LS1.A: Structure and Function LS3.A: Inheritance of Traits	CC.2: Cause and Effect
HS-LS3-2: Make and defend a claim based on evidence that inheritable genetic variations may result from (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors. *[Clarification Statement: Emphasis is on using data to support arguments for the way variation occurs.]*	*Genetics: 1, 6, 11, 12, 13**	SEP.7: Engaging in Argument from Evidence	LS3.B: Variation of Traits	CC.2: Cause and Effect
HS-LS3-3: Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population. *[Clarification Statement: Emphasis is on the use of mathematics to describe the probability of traits as it relates to genetic and environmental factors in the expression of traits.]*	*Genetics: 4, 5, 6*, 14**	SEP.4: Analyzing and Interpreting Data	LS3.B: Variation of Traits	CC.3: Scale, Proportion, and Quantity *Connections to Nature of Science* Science as a Human Endeavor
Biological Evolution: Unity and Diversity				
HS-LS4-1: Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence. *[Clarification Statement: Emphasis is on a conceptual understanding of the role each line of evidence has relating to common ancestry and biological evolution. Examples of*	*Evolution: 6, 7, 8, 9, 10*	SEP.8: Obtaining, Evaluating, and Communicating Information *Connections to Nature of Science*	LS4.A: Evidence of Common Ancestry and Diversity	CC.1: Patterns *Connections to Nature of Science* Scientific Knowledge Assumes an Order and

Performance Expectation	SGI Biology: Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
evidence could include similarities in DNA sequences, anatomical structures, and order of appearance of structures in embryological development.]		Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena		Consistency in Natural Systems
HS-LS4-2: Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment. *[Clarification Statement: Emphasis is on using evidence to explain the influence each of the four factors has on the number of organisms, behaviors, morphology, or physiology in terms of ability to compete for limited resources and subsequent survival of individuals and adaptation of species. Examples of evidence could include mathematical models such as simple distribution graphs and proportional reasoning.]*	*Evolution: 1, 2, 3, 4, 5*, 6, 12*	SEP.6: Constructing Explanations and Designing Solutions	LS4.B: Natural Selection LS4.C: Adaptation	CC.2: Cause and Effect

* Performance Expectation assessment opportunity

Performance Expectation	SGI Biology: Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
HS-LS4-3: Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait. *[Clarification Statement: Emphasis is on analyzing shifts in numerical distribution of traits and using these shifts as evidence to support explanations.]*	*Genetics: 14, 15, 16* *Evolution: 1, 2, 3, 4*, 5, 6*	SEP.4: Analyzing and Interpreting Data	LS4.B: Natural Selection LS4.C: Adaptation	CC.1: Patterns
HS-LS4-4: Construct an explanation based on evidence for how natural selection leads to adaptation of populations. *[Clarification Statement: Emphasis is on using data to provide evidence for how specific biotic and abiotic differences in ecosystems (such as ranges of seasonal temperature, long-term climate change, acidity, light, geographic barriers, or evolution of other organisms) contribute to a change in gene frequency over time, leading to adaptation of populations.]*	*Evolution: 1, 2, 3, 4, 5, 6*, 11, 12*	SEP.6: Constructing Explanations and Designing Solutions	LS4.C: Adaptation	CC.2: Cause and Effect *Connections to Nature of Science:* Scientific Knowledge Assumes an Order and Consistency in Natural Systems
HS-LS 4-5: Evaluate the evidence supporting claims that changes in environmental conditions may result in (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species. *[Clarification Statement: Emphasis is on determining cause and effect relationships for how changes to the environment such as deforestation, fishing, application of fertilizers, drought, flood, and the*	*Evolution: 6, 7, 8*, 9, 10*	SEP.7: Engaging in Argument from Evidence	LS4.C: Adaptation	CC.2: Cause and Effect

Performance Expectation	SGI Biology: Unit and Activity Number	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
rate of change of the environment affect distribution or disappearance of traits in species.]				
HS-LS4-6: Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity. *[Clarification Statement: Emphasis is on designing solutions for a proposed problem related to threatened or endangered species, or to genetic variation of organisms for multiple species.]*	*Evolution: 12, 13, 14**	SEP.5: Using Mathematics and Computational Thinking	LS4.C: Adaptation LS4.D: Biodiversity and Humans ETS1.B: Developing Possible Solutions	CC.2: Cause and Effect

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