



Lab-Aids Correlations for
SOUTH CAROLINA COLLEGE- AND CAREER-READY SCIENCE STANDARDS 2021
BIOLOGY

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This document is intended to show how the SEPUP *Science and Global Issues: Biology, 3rd Edition* program materials align with the [South Carolina College- and Career-Ready Science Standards 2021](#).

ABOUT SEPUP

Materials from the Science Education for Public Understanding Program (SEPUP) are developed at the Lawrence Hall of Science, University of California, Berkeley, and distributed nationally by Lab-Aids, Inc. Development of SEPUP materials is supported by grants from the National Science Foundation. SEPUP programs are available as full year courses, or separately, as units, each taking 3-9 weeks to complete. For more information about SEPUP, visit www.sepuplhs.org.

ABOUT SCIENCE AND GLOBAL ISSUES: BIOLOGY, 3rd EDITION

Science and Global Issues: Biology was developed by SEPUP with grant support from the National Science Foundation. It was field tested nationally in classrooms across the country. The program consists of a student book, equipment kit, print and online teacher resources, and online content for students, including additional print, video, digital simulations and more. The five units in this course look at topics such as human impact on ecosystems, global health, genetically modified organisms, and biodiversity. In each unit, students are challenged to reason scientifically while applying their understanding of the main concepts of that unit: sustainability, ecology, cell biology, genetics, and evolution. Each teacher edition chapter provides detailed information on support for key NGSS core content, practices, crosscutting concepts, use of phenomena, and more. For more information on the *Science and Global Issues: Biology* program, please visit <https://www.lab-aids.com/sgi>.

Science and Global Issues: Biology, 3rd Edition Scope and Sequence

SGI: Biology Unit Name	Activities	Issue Focus
Unit A Sustainability: Changing Human Impact	1-4	Aspects of sustainability from a personal, community and global perspective
Unit B Ecology: Living on Earth	1-17	Sustainability from an ecosystem perspective, with a focus on humans' impacts on ecosystems; Making decisions regarding fisheries management
Unit C Cells: Improving Global Health	1-17	Disparities between developing and developed countries in terms of diseases' impacts on life; Making decisions about priorities for diseases that limit social, economic, and environmental progress
Unit D Genetics: Feeding the World	1-17	Comparison of selective breeding and genetic modification; Use of genetically modified organisms, particularly in the production of agricultural crops
Unit E Evolution: Managing Change	1-15	Conserving genetic, species and ecosystem diversity; Ecosystems services

South Carolina 2021 College- and Career-Ready Science Standards	Science and Global Issues: Biology Unit Activity Number and Name * Indicates PE Assessment Opportunity
From Molecules to Organisms: Structures and Processes (LS1)	
B-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. <i>State Assessment Boundary:</i> Assessment does not include identification of specific cell or tissue types, whole body systems, specific protein structures and functions, or the biochemistry of protein synthesis.	Genetics: Feeding the World 2. Creating Genetically Modified Bacteria 7. Protein Synthesis: Transcription and Translation 8. Cell Differentiation and Gene Expression 9. Explaining Herbicide Resistance in Weeds *10. Molecular Mechanism of Herbicide Resistance Cells: Improving Global Health 6. Specialized Cells and Disease
B-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. <i>Clarification Statement:</i> 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. <i>State Assessment Boundary:</i> Assessment does not include interactions and functions at the molecular or chemical reaction level.	Cells: Improving Global Health 2. Everyday Hydration 3. Homeostasis Disrupted 4. Body Systems in Balance 5. Evidence of Disease *6. Specialized Cells and Disease *7. Homeostasis and Medical Treatment 8. Feedback Loops in Humans
B-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. <i>Clarification Statement:</i> Examples of investigations could include heart rate response to exercise, stomata response to moisture and temperature, and root development in response to water levels. <i>State Assessment Boundary:</i> Assessment does not include the cellular and chemical processes involved in the feedback mechanism.	Cells: Improving Global Health 1. Survival Needs 2. Everyday Hydration 3. Homeostasis Disrupted 4. Body Systems in Balance 5. Evidence of Disease 7. Homeostasis and Medical Treatment *8. Feedback Loops in Humans 9. Global Nutrition
B-LS1-4. Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms. <i>Clarification Statement:</i> Emphasis is on normal cell division as well as instances in which cell division is uncontrolled (e.g., cancer). <i>State Assessment Boundary:</i> Assessment does not include specific gene control mechanisms or rote memorization of the steps of mitosis.	Genetics: Feeding the World 3. Mitosis and Asexual Reproduction *8. Cell Differentiation and Gene Expression
B-LS1-5 Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy. <i>Clarification Statement:</i> Emphasis is on explaining 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. <i>State Assessment Boundary:</i> Assessment does not include specific biochemical steps.	Cells: Improving Global Health *11. How Plants Make Food 12. Photosynthesis and the Environment 13. Feeding the World's Population 15. Energy For Life
B-LS1-6. Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with	Cells: Improving Global Health 9. Global Nutrition 10. Burning Calories

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other elements to form amino acids and other large carbon-based molecules necessary for essential life processes. <i>Clarification Statement: Emphasis is on using evidence from models and simulations to support explanations of how the products of photosynthesis can be used to form the molecules of life.</i> <i>State Assessment Boundary: Assessment does not include the details of the specific chemical reactions or molecular identification of macromolecules.</i>	11. How Plants Make Food 13. Feeding the World's Population 14. Investigating Cellular Respiration 15. Energy For Life *16. Matter For Cells
B-LS1-7. Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules are broken and the bonds in new compounds are formed, resulting in a net transfer of energy. <i>Clarification Statement: Emphasis is on the conceptual understanding of the inputs and outputs of the processes of aerobic and anaerobic cellular respiration.</i> <i>State Assessment Boundary: Assessment should not include identification of the steps or specific processes involved in cellular respiration nor specific types of fermentation. Assessment should be limited to comparing efficiency of aerobic and anaerobic cellular respiration</i>	Cells: Improving Global Health 10. Burning Calories 14. Investigating Cellular Respiration *15. Energy For Life 16. Matter For Cells
Ecosystems: Interactions, Energy, and Dynamics (LS2)	
B-LS2-1. Use mathematical and/or computational representations to support explanations of biotic and abiotic factors that affect carrying capacity of ecosystems at different scales. <i>Clarification Statement: Emphasis is on quantitative analysis and comparison of the relationships among interdependent factors including boundaries, resources, climate, and challenges. Examples of mathematical comparisons could include graphs, charts, histograms, or population changes gathered from simulations and historical data sets. Examples of scales could be a pond versus an ocean.</i> <i>State Assessment Boundary: Assessment does not include deriving mathematical equations to make comparisons.</i>	Ecology: Living On Earth 1. Establishing a Baseline 2. Population Growth Models *3. Factors Affecting Population Size 4. Scaling Up: Ecosystems
B-LS2-2. Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales. <i>Clarification Statement: Examples of mathematical representations include finding the average, determining trends, and using graphical comparisons of multiple sets of data.</i> <i>State Assessment Boundary: Assessment is limited to provided data.</i>	Ecology: Living On Earth 3. Factors Affecting Population Size 4. Scaling Up: Ecosystems *5. Patterns of Biological Diversity
B-LS2-3. Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions. <i>Clarification Statement: Emphasis is on conceptual understanding of the role of aerobic and anaerobic respiration in the conservation of matter and flow of energy into, out of, and within various ecosystems.</i> <i>State Assessment Boundary: Assessment focuses on the conceptual understanding and does not include the specific chemical processes of either aerobic or anaerobic respiration.</i>	Cells: Improving Global Health 10. Burning Calories *15. Energy For Life Ecology: Living On Earth 6. Producers and Consumers 7. The Photosynthesis and Cellular Respiration Shuffle *8. Life in the Dark
B-LS2-4. Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem. <i>Clarification Statement: Emphasis is on using a mathematical model of stored energy in biomass to describe the transfer of energy from one</i>	Ecology: Living On Earth 6. Producers and Consumers 7. The Photosynthesis and Cellular Respiration Shuffle

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trophic level to another and that matter and energy are conserved as matter cycles and energy flows through ecosystems. Emphasis is on conservation of carbon, oxygen, hydrogen, and nitrogen as they move through an ecosystem. State Assessment Boundary: Assessment is limited to proportional reasoning to describe the cycling of matter and flow of energy.	9. Modeling Energy Flow in Ecosystems *10. Crossing Ecosystem Boundaries
B-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. Assessment Boundary: Assessment does not include the specific chemical steps of photosynthesis and respiration.	Cells: Improving Global Health 10. Burning Calories Ecology: Living On Earth 11. Ecosystems and the Carbon Cycle *12. Rebalancing the Equation?
B-LS2-6. Evaluate 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: Living On Earth 13. Ecosystems at the Tipping Point *14. The Great Lakes Ecosystem 15. Is Aquaculture a Solution? 16. Sustainable Fisheries Case Studies
B-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on biodiversity and ecosystem health. <i>Lab-Aids Note: The Evolution: Managing Change Unit supports two ETS Performance Expectations:</i> ETS1-3: Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts. ETS1-4: Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.	Genetics: Feeding the World 16. Evaluating Genetically Modified Organisms 17. Alternatives to Farming Genetically Modified Organisms Cells: Improving Global Health 1. Survival Needs 2. Everyday Hydration 3. Homeostasis Disrupted 7. Homeostasis and Medical Treatment 9. Global Nutrition 13. Feeding the World's Population 17. Designing Solutions: World Health Ecology: Living On Earth 13. Ecosystems at the Tipping Point 14. The Great Lakes Ecosystem 15. Is Aquaculture a Solution? 16. Sustainable Fisheries Case Studies *17. Making Sustainable Fisheries Decisions Evolution: Managing Change 10. Applying Evolutionary Thinking 13. Shrinking Salmon *14. Mitigating Change
B-LS2-8. Evaluate 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	Evolution: Managing Change 1. Changing Environments *3. Social Behavior

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group behavior, and (3) developing logical and reasonable arguments based on evidence. Examples of group behaviors could include flocking, schooling, or herding, and cooperative behaviors such as hunting, migrating, or swarming.	
Heredity: Inheritance and Variation of Traits (LS3)	
B-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. State Assessment Boundary: Assessment does not include the phases of meiosis or the biochemical mechanism of specific steps in the process (including gene regulation).	Genetics: Feeding the World 4. Breeding Corn 5. Breeding Corn for Two Traits 7. Protein Synthesis: Transcription and Translation 10. Molecular Mechanism of Herbicide Resistance *11. Meiosis and Sexual Reproduction 12. Genes and Chromosomes
B-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 genetic variation occurs. State Assessment Boundary: Assessment does not include the phases of meiosis or the biochemical mechanism of specific steps in the process.	Genetics: Feeding the World 1. Superweeds! Where Did They Come From? 6. How Did This Happen? Class Consensus 11. Meiosis and Sexual Reproduction 12. Genes and Chromosomes *13. Which Plant Is Genetically Modified?
B-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. State Assessment Boundary: Assessment does not include Hardy-Weinberg or Chi-square analysis.	Genetics: Feeding the World 4. Breeding Corn 5. Breeding Corn for Two Traits *6. How Did This Happen? Class Consensus 14. Genetically Modified Organisms and Biodiversity
B-LS4-1. Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence. Clarification Statement: Emphasis is on students' conceptual understanding of the role each line of evidence has relating to common ancestry and biological evolution. Examples of evidence could include similarities in DNA sequences, anatomical structures, and order of appearance of structures in embryological development. State Assessment Boundary: Assessment is limited to conceptual explanations of the evidence for biological evolution and is not extended to the lines of evidence for specific species. Assessment does not include classification of organisms.	Evolution: Managing Change 6. Increasing Timescales 7. Extinction 8. The Anthropocene 9. Evidence and the Theory of Evolution *10. Applying Evolutionary Thinking
B-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,	Evolution: Managing Change 1. Changing Environments 2. Increasing Temperatures 3. Social Behavior 4. Genetic Variation and Change *5. Is It Evolution? 6. Increasing Timescales 12. Emerging Diseases

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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. State Assessment Boundary: Assessment does not include other mechanisms of evolution, such as genetic drift, gene flow through migration, and co-evolution.	
B-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. State Assessment Boundary: Assessment is limited to basic statistical and graphical analysis. Assessment does not include allele frequency calculations.	Evolution: Managing Change 1. Changing Environments 2. Increasing Temperatures 3. Social Behavior *4. Genetic Variation and Change 5. Is It Evolution? 6. Increasing Timescales
B-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. State Assessment Boundary: Assessment does not include allele frequency calculations.	Evolution: Managing Change 1. Changing Environments 2. Increasing Temperatures 3. Social Behavior 4. Genetic Variation and Change 5. Is It Evolution? *6. Increasing Timescales 11. The Evolution of Resistance 12. Emerging Diseases
B-LS4-5. 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 rate of change of the environment affect distribution or disappearance of traits in species.	Evolution: Managing Change 6. Increasing Timescales 7. Extinction *8. The Anthropocene 9. Evidence and the Theory of Evolution 10. Applying Evolutionary Thinking
B-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 testing solutions for a proposed problem related to threatened or endangered species, or to genetic variation of organisms for multiple species. <i>Lab-Aids Note: The Evolution: Managing Change Unit supports two ETS Performance Expectations:</i> ETS1-3: Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts. ETS1-4: Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.	Evolution: Managing Change 12. Emerging Diseases 13. Shrinking Salmon *14. Mitigating Change