



LAB-AIDS Correlation to
Pennsylvania Assessment Anchors for Biological Science, Grade 11
High School Biology¹

Science and Global Issues: Biology (SGI Biology) is written by the SEPUP group, at the Lawrence Hall of Science, University of California Berkeley, under the direction of Dr. Barbara Nagle, SEPUP Director. Development of *SGI Biology* is supported by grants from the National Science Foundation.

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¹ <http://www.pdesas.org/standard/AnchorsDownloads>



Science in Global Issues Biology Unit Title	Student Book Pages	Issue Focus
Sustainability	1-46	Aspects of sustainability from a personal, community and global perspective
Ecology: Living on Earth	43-154	Sustainability from an ecosystems perspective, with a focus on humans' impacts on ecosystems Making decisions regarding fisheries management
Cell Biology: World Health	155-258	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
Genetics: Feeding the World	259-412	Comparison of selective breeding and genetic modification Use of genetically modified organisms, particularly in the production of agricultural crops
Evolution: Maintaining Diversity	413-512	Conserving genetic, species and ecosystem diversity Ecosystems services and intrinsic value models for conservation

Key to SEPUP Assessment System:

SEPUP materials include research-based assessment system developed by SEPUP and the Berkeley Evaluation and Assessment Research Group (BEAR) in the University of California Graduate School of Education. Forming the core of the SEPUP Assessment System are the **assessment variables** (content and process skills to be assessed), **assessment questions or tasks** used to gather evidence and **scoring guides** for interpreting students' responses (correspond to assessment variables).

The seven assessment variables are:

Designing Investigations (DI)

Organizing Data (OD)

Analyzing Data (AD)

Understanding Concepts (UC)

Evidence and Trade-offs (ET)

Communication Skills (CS)

Group Interaction (GI)

Types of assessment:

Quick Checks (✓) present opportunities for informal formative assessment and may be used prior to instruction to find out what students know or think. They may also be used to help teachers track students' knowledge of key information or progress in understanding a concept.

Some embedded questions and tasks and all item bank questions are all suitable for summative assessment. Analysis questions are included at the end of each activity.

Citations included in the correlation document are as follows:

5 AQ 1-4 means that the standard or benchmark may be assessed using Analysis Questions 1-4 for Activity 5.

5: AQ 1-4, 5 UC means that in addition to AQ1-4, AQ 5 uses the Understanding Concepts scoring guide for Activity 5.

16 Proc UC means that the procedure (Proc) of Activity 16 contains an embedded task and uses the Understanding Concepts scoring guide.

For more information on program assessment and using SEPUP rubrics, consult the Teacher's Guide, TR part IV.

PA Assessment Anchor and Text	Location in SGI Biology	Where Assessed
S11.A.1 Reasoning and Analysis		
S11.A.1.1 Analyze and explain the nature of science in the search for understanding the natural world and its connection to technological systems. <i>Reference: 3.1.10.A, 3.2.10.A, 3.1.10.E</i>		
S11.A.1.1.1 Compare and contrast scientific theories, scientific laws, and beliefs (e.g., the universal law of gravitation, how light travels, formation of moons, stages of ecological succession).	Appendix I Eco 17 (succession) Evo 4, 14 (biological evolution)	17 AQ 1, 2 UC 4 AQ 1-3 14 AQ 1 UC, CS
S11.A.1.1.2 Analyze and explain the accuracy of scientific facts, principles, theories, and laws.	Appendix I Eco 17 (succession) Evo 4, 14 (biological evolution)	17 AQ 1, 2 UC 4 AQ 1-3 14 AQ 1 UC, CS
S11.A.1.1.3 Evaluate the appropriateness of research questions (e.g., testable vs. not-testable).	Cell 11, 15 Gen 8	11 AQ 4 AD 15 AQ 1-3 8 AQ 1-4
S11.A.1.1.4 Explain how specific scientific knowledge or technological design concepts solve practical problems (e.g., momentum, Newton’s universal law of gravitation, tectonics, conservation of mass and energy, cell theory, theory of evolution, atomic theory, theory of relativity, Pasteur’s germ theory, relativity, heliocentric theory, ideal gas laws).	Cell 13 (cell theory) Evo 4, 14 (biological evolution)	13 Proc GI 4 AQ 1-3 14 AQ 1 UC, CS
S11.A.1.1.5 Analyze or compare the use of both direct and indirect observation as means to study the world and the universe (e.g., behavior of atoms, functions of cells, birth of stars).	Sus 2, 3 Eco 2, 9, 10 Cell 4, 5, 6	2 Proc GI 3 AQ 1-3 2 AQ1 AD 9 AQ 3, 6 UC 10 AQ 4 AD, AQ 6 UC 4 AQ 2 UC 5 AQ 1 UC 6 AQ 4 UC

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S11.A.1.2 Identify and analyze the scientific or technological challenges of societal issues; propose possible solutions and discuss implications. <i>Reference: 3.2.10.A, 4.3.10.B</i>		
S11.A.1.2.1 Explain and apply scientific concepts to societal issues using case studies (e.g., spread of HIV, deforestation, environmental health, energy).	Eco 1, 18 Cell 2, 3, 8	1 Proc GI 18 AQ 1-2 2 AQ 4 UC 3 AQ 5 UC 8 AQ 1&2 UC
S11.A.1.2.2 Use case studies (e.g., Wright brothers' flying machine, Tacoma Narrows Bridge, Henry Petroski's Design Paradigms) to propose possible solutions and analyze economic and environmental implications of solutions for real- world problems.	Gen 2, 16, 17 Evo 9	2 Proc GI 16 Proc UC 17 AQ 1-5 9 Proc GI
S11.A.1.3 Describe and interpret patterns of change in natural and human-made systems. <i>Reference: 3.1.10.C, 3.1.10.E, 4.8.10.A</i>		
S11.A.1.3.1 Use appropriate quantitative data to describe or interpret change in systems (e.g., biological indices, electrical circuit data, automobile diagnostic systems data).	Sus 1, 2 Eco 18 Evo 15	1 AQ 1-5 2 Proc GI 18 AQ 1-2 15 AQ 1 ET & CS
S11.A.1.3.2 Describe or interpret dynamic changes to stable systems (e.g., chemical reactions, human body, food webs, tectonics, homeostasis).	Eco 7 Cell 5, 6, 9	7 AQ 2, 3, 4 UC 5 AQ 1 UC 6 AQ 1 4 UC 9 AQ 3, 5 & 6
S11.A.1.3.3 Describe how changes in physical and biological indicators (e.g., soil, plants, animals) of water systems reflect changes in these systems (e.g. changes in bloodworm populations reflect changes in pollution levels in streams).	Eco 2, 8, 14, 15, 19 Evo 15	2 Proc OD, AQ 1 AD 8 AQ 3 UC 14 AQ 1-5 15 Proc OD 19 AQ 1-4 AQ 1 ET & CS
S11.A.1.3.4 Compare the rate of use of natural resources	Eco 18, 19 Cell 18	18 AQ 1-2 19 AQ 3 UC, Proc

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and their impact on sustainability.	Evo 15	ET 18 AQ 2 ET 15 Proc OD
S11.A.2 Processes, Procedures, and Tools of Scientific Investigations		
S11.A.2.1 Apply knowledge of scientific investigation or technological design to develop or critique aspects of the experimental or design process. <i>Reference: 3.2.10.B, 3.2.10.D</i>		
S11.A.2.1.1 Critique the elements of an experimental design (e.g., raising questions, formulating hypotheses, developing procedures, identifying variables, manipulating variables, interpreting data, and drawing conclusions) applicable to a specific experimental design.	Eco 10, 11 Cell 11 Gen 2, 9	10 AQ 4 AD, 6 UC 11 AQ 5, 6, 8 UC 11 AQ 4 AD 2 Proc GI 9 Proc GI
S11.A.2.1.2 Critique the elements of the design process (e.g. identify the problem, understand criteria, create solutions, select solution, test/evaluate, communicate results) applicable to a specific technological design.	Eco 3 Gen 4, 6, 7, 19, 20	3 AQ 5, 6 UC 4 AQ 4 UC 6 Proc GI 7 AQ 1-6 19 AQ 1-3 20 Proc AD ET
S11.A.2.1.3 Use data to make inferences and predictions, or to draw conclusions, demonstrating understanding of experimental limits.	Eco 10, 11 Cell 11 Gen 2, 9	10 AQ 4 AD, 6 UC 11 AQ 5, 6, 8 UC 11 AQ 4 AD 2 Proc GI 9 Proc GI
S11.A.2.1.4 Critique the results and conclusions of scientific inquiry for consistency and logic.	Eco 10, 11 Cell 11 Gen 2, 9	10 AQ 4 AD, 6 UC 11 AQ 5, 6, 8 UC 11 AQ 4 AD 2 Proc GI 9 Proc GI
S11.A.2.1.5 Communicate results of investigations using multiple representations.	Sus 2, 3, 6 Cell 10 Gen 15, 18 Evo 14, 15	2 Proc GI 3 AQ 2, 3 6 AQ 1-2 10 AQ 3 UC 15 Proc CS, GI 18 AQ 2 CS 14 AQ 1 UC, CS

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		15 AQ 1 ET, CS
S11.A.2.2 Evaluate appropriate technologies for a specific purpose, or describe the information the instrument can provide. <i>Reference: 3.7.10.B, 3.8.10.B</i>		
S11.A.2.2.1 Evaluate appropriate methods, instruments, and scale for precise quantitative and qualitative observations (e.g., to compare properties of materials, water quality).	Eco 10 Cell 11 Gen 9	10 AQ 4 AD, 6 UC 11 AQ 4 AD 9 Proc GI
S11.A.2.2.2 Explain how technology (e.g., GPS, spectroscope, scanning electron microscope, pH meter, probe, interface, imaging technology, telescope) is used to extend human abilities and precision.	Cell 8, 13, 16 Gen 9, 11, 19	8 AQ 1 & 2 AD 13 Proc GI 16 AQ 1-7 9 Proc GI 11 AQ 1-5 19 AQ 1-3
S11.A.3 Systems, Models, and Patterns		
S11.A.3.1 Analyze the parts of a simple system, their roles, and their relationships to the system as a whole. <i>Reference: 3.1.10.A, 3.1.10.E, 4.3.10.C</i>		
S11.A.3.1.1 Apply systems analysis, showing relationships (e.g., flowcharts, concept maps), input and output, and measurements to explain a system and its parts.	Eco 7, 8 Evo 1, 15	7 AQ 2, 3, 4 UC 8 AQ 3 UC 1 AQ 1-2 15 AQ 1 ET & CS
S11.A.3.1.2 Analyze and predict the effect of making a change in one part of a system on the system as a whole.	Eco 7, 8 Evo 1, 15	7 AQ 2, 3, 4 UC 8 AQ 3 UC 1 AQ 1-2 15 AQ 1 ET & CS
S11.A.3.1.3 Use appropriate quantitative data to describe or interpret a system (e.g., biological indices, electrical circuit data, automobile diagnostic systems data).		

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S11.A.3.1.4 Apply the universal systems model of inputs, processes, outputs, and feedback to a working system (e.g., heating, motor, food production) and identify the resources necessary for operation of the system.	Gen 4, 6, 7, 17, 19	4 AQ 4 UC 6 Proc GI 7 AQ 3-6 17 AQ 6-7 19 AQ 1-3
S11.A.3.2 Compare observations of the real world to observations of a constructed model. <i>Reference: 3.1.10.B, 3.2.10.B, 4.1.10.B, 4.6.10.A</i>		
S11.A.3.2.1 Compare the accuracy of predictions represented in a model to actual observations and behavior.	Eco 5 Cell 7 Gen 3, 10 Gen 11, 12	5 AQ 1 ET 7 AQ 1-6 3 Proc UC 10 AQ 1-4 11 AQ 1-5 12 AQ 1 UC
S11.A.3.2.2 Describe advantages and disadvantages of using models to simulate processes and outcomes.	Eco 5 Cell 7 Gen 3, 10 Gen 11, 12	5 AQ 1 ET 7 AQ 1-6 3 Proc UC 10 AQ 1-4 11 AQ 1-5 12 AQ 1 UC
S11.A.3.2.3 Describe how relationships represented in models are used to explain scientific or technological concepts (e.g., dimensions of objects within the solar system, life spans, size of atomic particles, topographic maps).	Eco 5 Cell 7 Gen 3, 10 Gen 11, 12	5 AQ 1 ET 7 AQ 1-6 3 Proc UC 10 AQ 1-4 11 AQ 1-5 12 AQ 1 UC
S11.A.3 Systems, Models, and Patterns		
S11.A.3.3 Compare and analyze repeated processes or recurring elements in patterns. <i>Reference: 3.1.10.C, 3.2.10.B</i>		
S11.A.3.3.1 Describe or interpret recurring patterns that form the basis of biological classification, chemical periodicity, geological order, or astronomical order.	Appendix G (biological classification)	
S11.A.3.3.2 Compare stationary physical patterns (e.g., crystals, layers of rocks, skeletal systems, tree	Cell 6 (cell structure and function, the cytoskeleton)	6 AQ 4 UC

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rings, atomic structure) to the object's properties.		
S11.A.3.3.3 Analyze physical patterns of motion to make predictions or draw conclusions (e.g., solar system, tectonic plates, weather systems, atomic motion, waves).	Not applicable	
S11.B.1 Structure and Function of Organisms		
S11.B.1.1 Explain structure and function at multiple levels of organization. <i>Reference: 3.3.10.A, 3.3.10.B, 4.6.10.A, 4.7.10.B</i>		
S11.B.1.1.1 Explain how structure determines function at multiple levels of organization (e.g., chemical, cellular, anatomical).	Cell 6, 9 Gen 10, 12	6 AQ 4 UC 9 AQ 3, 5, 6 UC 10 AQ 1-3 12 AQ 1 UC
S11.B.1.1.2 Compare and contrast the structural and functional similarities and differences among living things (e.g., classify organisms into classification groups, compare systems).	Appendix G Cell 5, 6	5 AQ 1 UC 6 AQ 4 UC
S11.B.1.1.3 Compare and contrast cellular processes (e.g., photosynthesis and respiration, meiosis and mitosis, protein synthesis and DNA replication).	Eco 9 (photosynthesis, respiration) Cell 13 (meiosis) Gen 12, 13, 16 (DNA replication, protein synthesis)	9 AQ 3, 6 UC 13 Proc GI 12 AQ 1 UC 13 AQ 1-3 16 Proc UC
S11.B.2 Continuity of Life		
S11.B.2.1 Explain the mechanisms of the theory of evolution. <i>Reference: 3.3.10.C, 3.3.10.D, 3.4.10.D, 4.7.10.C</i>		
S11.B.2.1.1 Explain the theory of evolution by interpreting data from fossil records, similarities in anatomy and, physiology, or DNA studies that are relevant to the theory of evolution.	Evo 4, 5, 6, 13, 14	4 AQ 1-3 5 AQ 1-5 6 AQ 1-3 13 AQ 1-5 14 AQ 1 UC & CS
S11.B.2.1.2 Explain the role of mutations, differential reproduction, and gene recombination in changing the genetic makeup of a population.	Evo 11, 12	11 AQ 1-4 12 AQ 1-4

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S11.B.2.1.3 Explain the role of selective breeding and biotechnology in changing the genetic makeup of a population.	Gen 4, 6, 7, 17, 18 Evo 2	4 AQ 4 UC 6 Proc GI 7 AQ 1-5 17 AQ 6-7 18 AQ 2 CS 2 Proc GI
S11.B.2.1.4 Explain why natural selection can act only on inherited traits.	Evo 11, 12	11 AQ 1-4 12 AQ 1-4
S11.B.2.2 Describe how genetic information is inherited and expressed. <i>Reference: 3.3.10.C</i>		
S11.B.2.2.1 Describe how genetic information is expressed (i.e., DNA, genes, chromosomes, transcription, translation, and replication).	Gen 10, 14, 16, 17	10 AQ 1-4 14 AQ 1 UC 16 Proc UC 17 AQ 6-7
S11.B.2.2.2 Compare and contrast mitosis and meiosis in passing on genetic information.	Cell 13 Gen 3, 13	13 Proc GI 3 Proc UC 13 AQ 1-4
S11.B.2.2.3 Explain how different patterns of inheritance affect population variability (i.e., multiple alleles, co-dominance, dominance, recessiveness, sex-influenced traits, and sex-linked traits).	Gen 5, 14 Evo 12	5 AQ 2-4 14 AQ 1 UC 12 AQ 1-2
S11.B.3 Ecological Behavior and Systems		
S11.B.3.1 Use evidence or examples to explain the characteristics of and interactions within an ecosystem. <i>Reference: 4.3.10.C, 4.6.10.A</i>	Eco 4, 7	4 AQ 4 ET 7 AQ 2, 3, 4 UC
S11.B.3.1.1 Explain the significance of diversity in ecosystems.	Eco 4, 16, 17	4 AQ 4 ET 16 AQ 1 UC, AQ 5 AD 17 AQ 1, 2 UC

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S11.B.3.1.2 Explain the biotic (i.e., plant, animal, and microbial communities) and abiotic (i.e., soil, air, temperature, and water) components of an ecosystem and their interaction.	Eco 7, 8, 9	7 AQ 2, 3, 4 UC 8 AQ 3 UC 9 AQ 3, 6 UC
S11.B.3.1.3 Describe how living organisms affect the survival of one another.	Eco 13	13 AQ 3 UC
S11.B.3.1.4 Compare the similarities and differences in the major biomes (e.g., desert, tropical rain forest, temperate forest, coniferous forest, tundra) and the communities that inhabit them.	Eco 3	3 AQ 5, 6 UC
S11.B.3.1.5 Predict how limiting factors (e.g., physical, biological, chemical) can affect organisms.	Eco 8, 11	8 AQ 3 UC 11 AQ 5, 6, 8 UC
S11.B.3.2 Analyze patterns of change in natural or human-made systems over time. <i>Reference: 3.1.10.C, 4.2.10.D, 4.3.10.B, 3.1.10.E, 4.3.10.C</i>		
S11.B.3.2.1 Use evidence to explain how cyclical patterns in population dynamics affect natural systems.	Eco 2, 14, 15	2 AQ 1 AD 14 AQ 1-8 15 Proc OD
S11.B.3.2.2 Explain biological diversity as an indicator of a healthy environment.	Evo 1, 15	1 Proc GI 15 Proc OD
S11.B.3.2.3 Explain how natural processes (e.g., seasonal change, catastrophic events, habitat alterations) impact the environment over time.	Eco 1, 16, 19 Evo 1, 2, 15	1 Proc GI 16 AQ 1 UC 19 AQ 3 UC, Proc UC 1 Proc GI 2 Proc GI 15 AQ 1 ET & CS
S11.B.3 Ecological Behavior and Systems		
S11.B.3.3 Explain how human-made systems impact the management and distribution of natural		

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resources. <i>Reference: 4.2.10.C, 4.4.10.C, 3.8.10.C</i>		
S11.B.3.3.1 Describe different human-made systems and how they use renewable and nonrenewable natural resources (i.e., energy, transportation, distribution, management, and processing).	Eco 18, 19 Gen 20 Evo 2	18 AQ 1-2 19 AQ 3 UC 20 Proc AD ET 2 Proc GI
S11.B.3.3.2 Compare the impact of management practices (e.g., production, processing, research, development, marketing, distribution, consumption, by- products) in meeting the need for commodities locally and globally.	Eco 18, 19 Evo 2, 15	18 AQ 1-2 19 AQ 3 UC 2 Proc GI 15 AQ 1 ET, CS
S11.B.3.3.3 Explain the environmental benefits and risks associated with human-made systems (e.g., integrated pest management, genetically engineered organisms, organic food production).	Eco 18, 19 Gen 1, 2, 17	18 AQ 1-2 19 AQ 3 UC 1 AQ 4 ET 2 Proc GI 17 AQ 6, 7