



LAB-AIDS Correlations to Georgia Science Standards of Excellence 2016

HIGH SCHOOL (9-12)

Science and Global Issues: Biology (SGI Biology) was developed 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. *SGI Biology* is published by, and available exclusively from, LAB-AIDS, Ronkonkoma NY, 800.381.8003.

This document was prepared by LAB-AIDS. This is not an exhaustive document. It is designed to provide a general overview of the alignment of *SGI Biology* to the state science program standards, grades 9-12, for review and adoption purposes. Support for the state standards may be found at other locations besides those explicitly stated in this document.

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Science in Global Issues Biology Unit Title	Issue Focus
Sustainability	Aspects of sustainability from a personal, community and global perspective
Ecology: Living on Earth	<p>Sustainability from an ecosystems perspective, with a focus on humans' impacts on ecosystems</p> <p>Making decisions regarding fisheries management</p>
Cell Biology: World Health	<p>Disparities between developing and developed countries in terms of diseases' impacts on life</p> <p>Making decisions about priorities for diseases that limit social, economic, and environmental progress</p>
Genetics: Feeding the World	<p>Comparison of selective breeding and genetic modification</p> <p>Use of genetically modified organisms, particularly in the production of agricultural crops</p>
Evolution: Maintaining Diversity	<p>Conserving genetic, species and ecosystem diversity</p> <p>Ecosystems services and intrinsic value models for conservation</p>

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.

Georgia Science Standards of Excellence 2016
High School (9-12) Biology Standards Correlation to
Science and Global Issues: Biology, 2nd Edition

Georgia Science Standard	Unit Title - Activity Number (s)	Assessment
SB1. Obtain, evaluate, and communicate information to analyze the nature of the relationships between structures and functions in living cells.		
a. Construct an explanation of how cell structures and organelles (including nucleus, cytoplasm, cell membrane, cell wall, chloroplasts, lysosome, Golgi, endoplasmic reticulum, vacuoles, ribosomes, and mitochondria) interact as a system to maintain homeostasis	CELLS 3, 4, 6, 7, 12	3 AQ 1-7 4 AQ 2 6 AQ 4 7 AQ 5 12 AQ3
b. Develop and use models to explain the role of cellular reproduction (including binary fission, mitosis, and meiosis) in maintaining genetic continuity.	CELLS 13, 14 GENETICS 10, 13, 14, 16, 17	13 AQ 1-7
c. Construct arguments supported by evidence to relate the structure of macromolecules (carbohydrates, proteins, lipids, and nucleic acids) to their interactions in carrying out cellular processes. (<i>Clarification statement:</i> The function of proteins as enzymes is limited to a conceptual understanding.)	CELLS 6, 9, 10, 11	9 Stopping to think 1, Q1-3 9 AQ 1 10 AQ 1-3 11 AQ1-7
d. Plan and carry out investigations to determine the role of cellular transport (e.g., active, passive, and osmosis) in maintaining homeostasis.	CELLS 6-9	7 AQ 2, 4, 5 8 AQ 1, 4, 5 9 AQ 5-6
e. Ask questions to investigate and provide explanations about the roles of photosynthesis and respiration in the cycling of matter and flow of energy within the cell (e.g., single-celled alga). (<i>Clarification statement:</i> Instruction should focus on understanding the inputs, outputs, and functions of photosynthesis and respiration and the functions of the major sub-processes of each including glycolysis, Krebs cycle, electron transport chain, light reactions, and Calvin cycle.)	ECOLOGY 7-11 CELLS 3,12	12 AQ 1-8
SB2. Obtain, evaluate, and communicate information to analyze how genetic information is expressed in cells.		
a. Construct an explanation of how cell structures and organelles (including nucleus, cytoplasm, cell membrane, cell wall, chloroplasts, lysosome, Golgi, endoplasmic reticulum, vacuoles, ribosomes, and mitochondria) interact as a system to maintain homeostasis.	CELLS 3, 4, 6, 7, 12	3 AQ 1-7 4 AQ 2 6 AQ 4 7 AQ 5 12 AQ3
b. Construct an argument based on evidence to support the claim that inheritable genetic variations may result from:	GENETICS 13, 14, 16, 19	13 AQ 1-4 14 AQ 1-8 16 PROCEDURE STEP

Georgia Science Standard	Unit Title - Activity Number (s)	Assessment
<ul style="list-style-type: none"> new genetic combinations through meiosis (crossing over, nondisjunction); non-lethal errors occurring during replication (insertions, deletions, substitutions); and/or heritable mutations caused by environmental factors (radiation, chemicals, and viruses). 		2, 13, 14, AQ 3-5 19 AQ 1-3
c. Ask questions to gather and communicate information about the use and ethical considerations of biotechnology in forensics, medicine, and agriculture. (Clarification statement: The element is intended to include advancements in technology relating to economics and society such as advancements may include Genetically Modified Organisms.)	GENETICS 1, 2, 8, 19, 20	1 AQ 1-5 2 AQ 4 8 AQ 2, 4 19 AQ 3 20 AQ 1-4
SB3. Obtain, evaluate, and communicate information to analyze how biological traits are passed on to successive generations.		
a. Use Mendel's laws (segregation and independent assortment) to ask questions and define problems that explain the role of meiosis in reproductive variability.	GENETICS 13-14 UNIT REVIEW: GENETICS	13 AQ 1-4 14 AQ 2-8
b. Use mathematical models to predict and explain patterns of inheritance. (Clarification statement: Students should be able to use Punnett squares (monohybrid and dihybrid crosses) and/or rules of probability, to analyze the following inheritance patterns: dominance, codominance, incomplete dominance.)	GENETICS 4, 6, 7	4 AQ 1-4 6 AQ 1-3 7 AQ 3-6
c. Construct an argument to support a claim about the relative advantages and disadvantages of sexual and asexual reproduction.	GENETICS 3, 4 UNIT REVIEW: GENETICS	3 AQ 2-4 4 AQ 2-4
SB4. Obtain, evaluate, and communicate information to illustrate the organization of interacting systems within single-celled and multi-celled organisms.		
<p>a. Construct an argument supported by scientific information to explain patterns in structures and function among clades of organisms, including the origin of eukaryotes by endosymbiosis. Clades should include:</p> <ul style="list-style-type: none"> archaea bacteria eukaryotes <ul style="list-style-type: none"> fungi plants animals <p>(Clarification statement: This is reflective of 21st century classification schemes and nested hierarchy of clades and is intended to develop a foundation for comparing major groups of organisms. The term 'protist' is useful in describing those eukaryotes that are not within</p>	<p>CELLS 6</p> <p>EVOLUTION 7</p> <p>APPENDIX G: CLASSIFICATION SCHEME</p>	<p>6 AQ 1-2</p> <p>7 AQ 2-4</p>

Georgia Science Standard	Unit Title - Activity Number (s)	Assessment
the animal, fungal or plant clades but the term does not describe a well-defined clade or a natural taxonomic group.)		
b. Analyze and interpret data to develop models (i.e., cladograms and phylogenetic trees) based on patterns of common ancestry and the theory of evolution to determine relationships among major groups of organisms.	EVOLUTION 8-10	8 AQ 1-3 9 PROCEDURE STEP 3, AQ 1
c. Construct an argument supported by empirical evidence to compare and contrast the characteristics of viruses and organisms.	CELLS 9, 16	9 STOPPING TO THINK 3, Q 1-2 16 AQ 1, 3, 5-7
SB5. Obtain, evaluate, and communicate information to assess the interdependence of all organisms on one another and their environment.		
a. Plan and carry out investigations and analyze data to support explanations about factors affecting biodiversity and populations in ecosystems. (<i>Clarification statement:</i> Factors include population size, carrying capacity, response to limiting factors, and keystone species.)	ECOLOGY 2, 12-16	12 AQ 4-7 13 AQ 3,4 14 AQ 3-7
b. Develop and use models to analyze the cycling of matter and flow of energy within ecosystems through the processes of photosynthesis and respiration. <ul style="list-style-type: none"> • Arranging components of a food web according to energy flow. • Comparing the quantity of energy in the steps of an energy pyramid. • Explaining the need for cycling of major biochemical elements (C, O, N, P, and H). 	ECOLOGY 7, 8, 11 CELLS 12 UNIT REVIEW: CELL BIOLOGY	7 AQ 1-6, 8 8 AQ 1-6 11 AQ 5, 6, 8 12 AQ 2, 3, 5
c. Construct an argument to predict the impact of environmental change on the stability of an ecosystem.	ECOLOGY 7, 8 EVOLUTION 13, 14	7 AQ 5,8 8 AQ 4-6 13 AQ 3-5 14 AQ 4, 6, 7
d. Design a solution to reduce the impact of a human activity on the environment. (<i>Clarification statement:</i> Human activities may include chemical use, natural resources consumption, introduction of non-native species, greenhouse gas production.)	ECOLOGY 7, 19 CELLS 20 EVOLUTION 2, 15	7 AQ 5, 8 19 AQ 1-4 20 PROCEDURE STEP 6 2 AQ 4 15 AQ 1-4
e. Construct explanations that predict an organism's ability to survive within changing environmental limits (e.g., temperature, pH, drought, fire).	ECOLOGY 12	12 AQ 1-7
SB6. Obtain, evaluate, and communicate information to assess the theory of evolution.		
a. Construct an explanation of how new understandings of Earth's history, the emergence of new species from pre-existing species, and our	EVOLUTION 10-13	10 AQ 10 11 AQ 1-2 12 AQ 3-4

Georgia Science Standard	Unit Title - Activity Number (s)	Assessment
understanding of genetics have influenced our understanding of biology.		13 AQ 1-2
b. Analyze and interpret data to explain patterns in biodiversity that result from speciation.	EVOLUTION 11, 13, 15 UNIT REVIEW: EVOLUTION	11 AQ 1, 2, 4 13 AQ 1, 3, 4 15 AQ 1-4
c. Construct an argument using valid and reliable sources to support the claim that evidence from comparative morphology (analogous vs. homologous structures), embryology, biochemistry (protein sequence) and genetics support the theory that all living organisms are related by way of common descent.	EVOLUTION 7, 14	7 AQ 1-4 14 AQ 1
d. Develop and use mathematical models to support explanations of how undirected genetic changes in natural selection and genetic drift have led to changes in populations of organisms. (<i>Clarification statement:</i> Element is intended to focus on basic statistical and graphic analysis. Hardy Weinberg would be an optional application to address this element.)	EVOLUTION 13	13 AQ 1, 2
e. Develop a model to explain the role natural selection plays in causing biological resistance (e.g., pesticides, antibiotic resistance, and influenza vaccines).	CELLS 2 (MALARIA CASE STUDY), 3 (TUBERCULOSIS CASE STUDY)	2 AQ 2, 6

November 2016- Denis Baker