



## LAB-AIDS CORRELATIONS TO VIRGINIA STANDARDS OF LEARNING

### High School Biology

*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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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.

*Note on Core Technology:* SGI Biology has over 100 dedicated web links, resources and simulations online at CT <http://www.sepuplhs.org/high/sgi/index.html>; many activities have technology support not listed in this overview document. See also “Evaluating Media Resources,” SE pp. 565-568. Additional CT available (on-line books, etc. at [www.lab-aids.com](http://www.lab-aids.com))

VA Standard of Learning (SOL)	Where found in SGI	Where assessed
BIO.1	The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which	
a) observations of living organisms are recorded in the lab and in the field;	Eco 2, SE pp. 57-61; Eco 10, SE pp. 103-107; Cell 3 SE pp. 171-179	Eco 2 AQ 1 AD Eco 10 AQ 4 AD, AQ 6 UC Cell 3 AQ 5 UC
b) hypotheses are formulated based on direct observations and information from scientific literature;	Throughout, e.g., all labs, Eco 2, SE pp. 57-61; Eco 10, SE pp. 103-107; Cell 11, SE pp. 216-218; see also Appendix I, SE pp. 569-570	Eco 2 AQ 1 AD Eco 10 AQ 4 AD, AQ 6 UC Cell 11 AQ 3 UC
c) variables are defined and investigations are designed to test hypotheses;	Throughout, e.g., all labs, Eco 2, SE pp. 57-61; Eco 10, SE pp. 103-107; Cell 11, SE pp. 216-218; see also Appendix I, SE pp. 569-570	Eco 2 AQ 1 AD Eco 10 AQ 4 AD, AQ 6 UC Cell 11 AQ 3 UC
d) graphing and arithmetic calculations are used as tools in data analysis;	See for example, Sus 1, SE pp. 3-7; Sus 3, SE pp. 14-21; Sus 5, SE pp. 26-30, Eco 2, SE pp. 57-61; Eco 10, SE pp. 103-107; Eco 14-15, SE pp. 119-128; Cell 11, SE pp. 216-218	Sus 1 AQ 1-5 Sus 3 AQ 1-3 Eco 2 AQ 1 AD Eco 10 AQ 4 AD, AQ 6 UC Eco 14 AQ 8-9 Eco 15 AQ 1-3 Cell 11 AQ 3 UC
e) conclusions are formed based on recorded quantitative and qualitative data;	See for example, Sus 1, SE pp. 3-7; Sus 3, SE pp. 14-21; Sus 5, SE pp. 26-30, Eco 2, SE pp. 57-61; Eco 10, SE pp. 103-107; Eco 14-15, SE pp. 119-128; Cell 11, SE pp. 216-218	Sus 1 AQ 1-5 Sus 3 AQ 1-3 Eco 2 AQ 1 AD Eco 10 AQ 4 AD, AQ 6 UC Eco 14 AQ 8-9 Eco 15 AQ 1-3 Cell 11 AQ 3 UC

VA Standard of Learning (SOL)	Where found in SGI	Where assessed
f) sources of error inherent in experimental design are identified and discussed;	Eco 2, SE pp. 57-61; Eco 10, SE pp. 103-107; Cell 11, SE pp. 216-218	Eco 2 AQ 1 AD Eco 10 AQ 4 AD, AQ 6 UC Cell 11 AQ 3 UC
g) validity of data is determined;	Sus 4, SE pp. 22-25; Eco 2, SE pp. 57-61; Eco 10, SE pp. 103-106; Cell 11, SE pp. 216-218	Sus 4 AQ 1-5 Eco 2 AQ 1 AD Eco 10 AQ 4 AD, AQ 6 UC Cell 11 AQ 3 UC
h) chemicals and equipment are used in a safe manner;	Throughout, see for example safety notes for each laboratory activity, and Appendix D, "Science Classroom Safety," SE pp. 541-542	
i) appropriate technology including computers, graphing calculators, and probeware, is used for gathering and analyzing data, communicating results, modeling concepts, and simulating experimental conditions;	CT: SGI Biology has over 100 dedicated web links, resources and simulations online at <a href="http://www.sepuplhs.org/high/sgi/index.html">http://www.sepuplhs.org/high/sgi/index.html</a> ; see also "Evaluating Media Resources," SE pp. 565-568	
j) research utilizes scientific literature;	Online, available through <a href="http://www.sepuplhs.org/high/sgi/index.html">http://www.sepuplhs.org/high/sgi/index.html</a> See links, for example for: Sus 1, 2 Cell 13, 14, 15 Gen 15	
k) differentiation is made between a scientific hypothesis, theory, and law;	Appendix I, SE pp. 569-570 (law not covered)	
l) alternative scientific explanations and models are recognized and analyzed; and	See for example, Eco 5, SE pp. 80-84; Cell 7, SE pp. 90-96; Gen 3, SE p. 278-281; Gen 10, pp. 328-333; Gen 16 pp. 366-375	Eco 5 AQ 6 ET Cell 7 AQ 5-6 Gen 3 AQ 4 UC Gen 10 AQ 1-4 Gen 16 Proc UC

VA Standard of Learning (SOL)	Where found in SGI	Where assessed
m) current applications of biological concepts are used.	See for example, "Case Studies," Eco 4 (Invasive Species), SE 72-29; Eco 18 (Fishery Case Studies), SE 141-144; Cell 8 (HIV/AIDS), SE 203-205; Gen 2 (Biofuel from bacteria) SE 274-277; Gen 16 (Gene therapy) SE 372-275; Gen 17 (Terminator Technology) SE 372-375	Eco 4 AQ 4 ET Eco 18 AQ 7-8 Cell 8 AQ 1-2 AD Gen 2 Proc GI Gen 16 Proc GI Gen 17 AQ 6-7
BIO.2 The student will investigate and understand the chemical and biochemical principles essential for life. Key concepts include:		
a) water chemistry and its impact on life processes;	Cell 7, 8, SE pp. 191-202  CT: <a href="http://www.lab-aids.com/ebooks/ebook.php?p=5;3;35;1">http://www.lab-aids.com/ebooks/ebook.php?p=5;3;35;1</a> (water chemistry) CT: See also links for Sus 5 activity at <a href="http://www.sepuplhs.org/high/sgi/students/index.html">http://www.sepuplhs.org/high/sgi/students/index.html</a> (water chemistry and testing for pollutants in water)	Cell 8 AQ 1-2 AD
b) the structure and function of macromolecules;	Cell 10, SE pp. 213-215; Gen 10, pp. 328-333	Cell 10 AQ 3 UC Gen 10 AQ 3-4 UC
c) the nature of enzymes; and	Cell 10 SE pp 203-205; Cell 11, SE pp. 216-218	Cell 10 AQ 3 UC Cell 11 AQ 4 AD
d) the capture, storage, transformation, and flow of energy through the processes of photosynthesis and respiration.	Eco 9-11, SE pp. 100-110; Cell 12, pp. 219-228	Eco 9 AQ 3, 6, UC Eco 10 AQ 4 AD, AQ6 UC Eco 11 AQ 5, 6, 8 UC Cell 12 AQ 8 UC
BIO.3 The student will investigate and understand relationships between cell structure and function. Key concepts include		

VA Standard of Learning (SOL)	Where found in SGI	Where assessed
a) evidence supporting the cell theory;	Cell 6, SE pp. 190	Cell 6 AQ 4 UC
b) characteristics of prokaryotic and eukaryotic cells;	Cell 3-4, SE pp. 171-183; Cell 6, pp. 186-190	Cell 3 AQ 5 UC Cell 4 AQ 2 UC Cell 6 AQ 4 UC
c) similarities between the activities of the organelles in a single cell and a whole organism;	Cell 4-6, SE pp. 180-190	Cell 3 AQ 5 UC Cell 4 AQ 2 UC Cell 6 AQ 4 UC
d) the cell membrane model; and	Cell 7, 8, 9, SE pp. 196-212	Cell 7 AQ 5-6 Cell 8 AQ 1-2 AD Cell 9 AQ 3, 5, 6 UC
e) the impact of surface area to volume ratio on cell division, material transport, and other life processes.	Cell 8, 9, SE pp. 198-212  CT <a href="http://www.lab-aids.com/ebooks/ebook.php?p=4;1;49;1">http://www.lab-aids.com/ebooks/ebook.php?p=4;1;49;1</a>	
BIO.4 The student will investigate and understand life functions of Archaea, Bacteria and Eukarya. Key concepts include		
a) comparison of their metabolic activities;	Cell 6, pp. 186-190 Appendix G, SE pp. 548-551 CT <a href="http://lab-aid.com/ebooks/ebook.php?p=4;1;10;1">http://lab-aid.com/ebooks/ebook.php?p=4;1;10;1</a> (Experimental procedure to determine variation in metabolic activity of yeast as a function of temperature) CT <a href="http://www.sepuplhs.org/high/sands/students/index.html">http://www.sepuplhs.org/high/sands/students/index.html</a> , in particular link for Cell 6 (see above citation)	
b) maintenance of homeostasis;	Cell 6, pp. 186-190 Appendix G, SE pp. 548-551 CT <a href="http://lab-aid.com/ebooks/ebook.php?p=4;1;11;1">http://lab-aid.com/ebooks/ebook.php?p=4;1;11;1</a> (discussion of homeostasis)	

VA Standard of Learning (SOL)	Where found in SGI	Where assessed
	CT <a href="http://www.sepuplhs.org/high/sands/students/index.html">http://www.sepuplhs.org/high/sands/students/index.html</a> , in particular link for Cell 6 (see above citation)	
c) how the structures and functions vary among and within the Eukarya kingdoms of protists, fungi, plants, and animals, including humans;	Appendix G, SE pp. 548-551	
d) human health issues, human anatomy, and body systems;	Human health issues, see for example, SE p. 167 (malaria), p. 196 (diabetes), p. 203 (HIV/AIDS), p. 233 (cancer), p. 247 (rotavirus); anatomy and body systems not covered	
e) how viruses compare with organisms; and	Cell 6, SE pp. 186-191, SE p. 203 (HIV/AIDS), p. 247 (rotavirus); Cell 16 pp. 244	Cell 6 AQ 4 UC Cell 16 AQ 7-8
f) evidence supporting the germ theory of infectious disease.	See for example, SE p. 167 (malaria), p. 196 (diabetes), p. 203 (HIV/AIDS), p. 233 (cancer), p. 247 (rotavirus); anatomy and body systems not covered  See also CT <a href="http://lab-aid.com/ebooks/ebook.php?p=1;3;37;1">http://lab-aid.com/ebooks/ebook.php?p=1;3;37;1</a> (history of the germ theory of disease)	
BIO.5 The student will investigate and understand common mechanisms of inheritance and protein synthesis. Key concepts include		
a) cell growth and division;	Cell 13, SE pp. 229-235; Gen 2-3 SE pp. 269-278	Cell 13 Proc GI Gen 2 Proc GI Gen 3 Proc UC
b) gamete formation;	Gen 13, SE pp. 346-352	Gen 13 AQ 3-4



VA Standard of Learning (SOL)	Where found in SGI	Where assessed
c) cell specialization;	Cell 14-15, SE pp. 236-243	Cell 14 AQ 1-5 Cell 15 AQ 1-4
d) prediction of inheritance of traits based on the Mendelian laws of heredity;	Gen 5, SE pp. 290-299	Gen 5 AQ 1-4
e) historical development of the structural model of DNA;	Gen 10-11, SE pp. 328-342; Gen 12, SE pp. 343-345	Gen 10 AQ 1-4 Gen 11 AQ 1-3 Gen 12 AQ 1 UC
f) genetic variation;	Gen 14, SE pp. 353-360; Gen 17 SE pp. 376-384; Evo 12 SE pp. 484-487	Gen 14 AQ 1 UC Gen 17 AQ 1-7 Evo 12 AQ 1-4
g) the structure, function, and replication of nucleic acids;	Gen 12, SE pp. 343-345; Gen 16, SE pp. 366-375	Gen 12 AQ 1 ET Gen 16 Proc ET
h) events involved in the construction of proteins;	Gen 16, SE pp. 366-375	Gen 16 Proc ET
i) use, limitations, and misuse of genetic information; and	See for example, SE pp. 372 (gene therapy), p. 382 (terminator technology), Gen 19, 20, SE pp. 393-407; Cell 15 pp. 240-243	Gen 19 AQ 1-3 Gen 20 Proc OD, ET Cell 15 AQ 1-3
j) exploration of the impact of DNA technologies.	Gen 1-2 SE pp. 261-277; Gen 15 SE pp.361-365; SE pp. 372 (gene therapy), p. 382 (terminator technology), Gen 18-20, SE pp. 385-407	Gen 1 AQ 4 ET Gen 2 Proc GI Gen 15 Proc CS, GI Gen 18 AQ 2 CS Gen 19 AQ 1-3 Gen 20 Proc ET, AD
BIO.6 The student will investigate and understand bases for modern classification systems. Key concepts include		
a) structural similarities among organisms;	Evo 5 SE pp. 443-445; Evo 7 SE pp. 454-458; Evo 10, SE pp 472-481 No structural information in Evo 10, also see appendix G, "Classifying	Evo 5 AQ 1-5 Evo 7 AQ 1-5 Evo 10 AQ 2, 3 UC

VA Standard of Learning (SOL)	Where found in SGI	Where assessed
	Living Organisms,” SE pp. 547-564	
b) fossil record interpretation;	Evo 5-6, SE pp. 443-454	Evo 5 AQ 1-5 Evo 6 AQ 1-3
c) comparison of developmental stages in different organisms;	Evo 7, SE pp. 454-458 (introduced, not taught to mastery)	Evo 7 AQ 1-5
d) examination of biochemical similarities and differences among organisms; and	Evo 8 (pp. 459-464)	Evo 8 AQ 1 UC
e) systems of classification that are adaptable to new scientific discoveries.	Evo 9, SE pp. 465-471, Evo 10, pp. 472-481	Evo 9 AQ 1 ET Evo 10 AQ 2, 3 UC
BIO.7 The student will investigate and understand how populations change through time. Key concepts include		
a) evidence found in fossil records;	Evo 5-6, SE pp. 443-454	Evo 5 AQ 1-5 Evo 6 AQ 1-3
b) how genetic variation, reproductive strategies, and environmental pressures impact the survival of populations;	Evo 10-12, SE pp 472-489	Evo 10 AQ 2, 3 UC Evo 11 AQ 1-4 Evo 12 AQ 1-4
c) how natural selection leads to adaptations;	Evo 11, SE pp 482-484; Evo 12, SE pp. 484-489	Evo 11 AQ 1-4 Evo 12 AQ 1-4
d) emergence of new species; and	Evo 10, SE pp. 472-481	Evo 10 AQ 2, 3 UC
e) scientific evidence and explanations for biological evolution.	Evo -7 SE pp. 443-454; Evo 10-14, SE pp. 472-499	Evo 7 AQ 1-4 Evo 10 AQ 2, 3 UC Evo 11 AQ 1-4

VA Standard of Learning (SOL)	Where found in SGI	Where assessed
		Evo 12 AQ 1-4 Evo 13 AQ 1-5 Evo 14 AQ 1 AD, ET
BIO.8 The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. Key concepts include		
a) interactions within and among populations including carrying capacities, limiting factors, and growth curves;	Eco 14-17, SE pp. 119-139	Eco 14 Eco 15 Proc OD Eco 16 AQ 5 AD, aQ 1 UC Eco 17 AQ 1-2 UC
b) nutrient cycling with energy flow through ecosystems;	Eco 7-8, SE pp. 90-99, Eco 9, SE pp. 100-102	Eco 7 AQ 2-4 UC Eco 8 AQ 3 UC Eco 9 AQ 3, 6 UC
c) succession patterns in ecosystems;	Eco 16, SE pp. 129-138	Eco 16 AQ 5 AD, AQ 1 UC
d) the effects of natural events and human activities on ecosystems; and	Eco 1, SE pp. 45-56; Eco 4, pp. 70-79, Eco 16, pp. 129-134; Eco 18, SE pp. 139-144	Eco 1 Proc GI Eco 4 AQ 4 ET Eco 16 AQ 5 AD, AQ 1 UC Eco 18 AQ 1-2
e) analysis of the flora, fauna, and microorganisms of Virginia ecosystems.	Not covered, state-specific or local content	