



LAB-AIDS Correlations to Colorado Academic Standards

High School Biology¹

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 Mark Koker, Ph D, Director of Curriculum and Training at LAB-AIDS. This is not an exhaustive document. It is designed to provide a general overview of the alignment of *SGI Biology* to the Colorado 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.

For more information about this correlation or for questions about review copies, presentations, or any matters related to sales or service, please contact Ryan Luby, LAB-AIDS Regional Sale Manager, at 480.220.5516, or by email at ryan@lab-aids.com, or visit us on the web at www.lab-aids.com.

¹ <http://www.cde.state.co.us/scripts/allstandards/COSstandards.asp?glid=15&stid=7&glid2=0>



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.

Colorado Academic Standard	Location in SGI	Where assessed
1. Matter tends to be cycled within an ecosystem, while energy is transformed and eventually exits an ecosystem.		
EVIDENCE OUTCOMES		
<ul style="list-style-type: none"> Analyze how energy flows through trophic levels (DOK 1-2) 	Eco 7	7 AQ 2, 3, 4, UC
<ul style="list-style-type: none"> Evaluate the potential ecological impacts of a plant-based or meat-based diet (DOK 2) 	Eco 8*	8 AQ 3 UC
<ul style="list-style-type: none"> Analyze and interpret data from experiments on ecosystems where matter such as fertilizer has been added or withdrawn such as through drought (DOK 1-3) 	Eco 16, 17*	16 AQ 1 UC, AQ 5 D 17 AQ 1, 2 UC
<ul style="list-style-type: none"> Develop, communicate, and justify an evidence-based scientific explanation showing how ecosystems follow the laws of conservation of matter and energy (DOK 1-3) 	Eco 7, 8	7 AQ 2, 3, 4, UC 8 AQ 3 UC
<ul style="list-style-type: none"> Define and distinguish between matter and energy, and how they are cycled or lost through life processes (DOK 1-2) 	Eco 7, 8	7 AQ 2, 3, 4, UC 8 AQ 3 UC
<ul style="list-style-type: none"> Describe how carbon, nitrogen, phosphorus, and water cycles work (DOK 1) 	Eco 8, 9	8 AQ 3 UC 9 AQ 3, 6 UC
<ul style="list-style-type: none"> Use computer simulations to analyze how energy flows through trophic levels (DOK 1-2) 	www.sepuplhs.org*	
21ST CENTURY SKILL AND READINESS COMPETENCIES		
Inquiry Questions:		
<ul style="list-style-type: none"> How does a change in abiotic factors influence the stability or progression of an ecosystem? 	Eco 17	17 AQ 1, 2 UC
<ul style="list-style-type: none"> What happens when the cycling of matter in ecosystems is disrupted? 	Eco 16, 17	16 AQ 1 UC, AQ 5 D

Colorado Academic Standard	Location in SGI	Where assessed
		17 AQ 1, 2 UC
<ul style="list-style-type: none"> What energy transformations occur in ecosystems? 	Eco 7	7 AQ 2, 3, 4, UC
<ul style="list-style-type: none"> How does the process of burning carbon-rich fossil fuels compare to the oxidation of carbon biomolecules in cells? 	Eco 8, 9	8 AQ 3 UC 9 AQ 3, 6 UC
Relevance & Application:		
<ul style="list-style-type: none"> When the matter or energy flow in an ecosystem is disturbed, there are measurable effects such as the eutrophication of water. 	Eco 12, 16, 17	12 AQ 7 UC, Proc GI 16 AQ 1 UC, AQ 5 D 17 AQ 1, 2 UC
<ul style="list-style-type: none"> Matter and energy are cycled in natural systems such as wetlands in both similar and different ways than in human-managed systems such as wastewater treatment plants. 	Eco 6*	6 AQ 1-5
Nature Of:		
<ul style="list-style-type: none"> Address differences between experiments where variables can be controlled and those where extensive observations on a highly variable natural system are necessary to determine what is happening - such as dead zones in the Gulf of Mexico. (DOK 2) 	Eco 12	12 AQ 7 UC
<ul style="list-style-type: none"> Share experimental data, and respectfully discuss conflicting results emulating the practice of scientists. (DOK 2-3) 	All laboratory type activities (see TR 1, p. 23 for overview)	
<ul style="list-style-type: none"> Design ecological experiments in a closed system. (DOK 2-4) 	Eco 10	10 AQ 4 AD, AQ 6 UC
2. The size and persistence of populations depend on their interactions with each other and on the abiotic factors in an ecosystem		
EVIDENCE OUTCOMES		
<ul style="list-style-type: none"> Analyze and interpret data about the impact of removing keystone species from an ecosystem or introducing 	Eco 1, 4	1 Proc GI 4 AQ 4 ET

Colorado Academic Standard	Location in SGI	Where assessed
non-native species into an ecosystem (DOK 1-3)		
<ul style="list-style-type: none"> Describe or evaluate communities in terms of primary and secondary succession as they progress over time (DOK 1-2) 	Eco 16, 17	16 AQ 1 UC, AQ 5 D 17 AQ 1, 2 UC
<ul style="list-style-type: none"> Evaluate data and assumptions regarding different scenarios for future human population growth and their projected consequences (DOK 1-3) 	Eco 15	15 Proc OD
<ul style="list-style-type: none"> Examine, evaluate, question, and ethically use information from a variety of sources and media to investigate ecosystem interactions (DOK 1-2) 	Eco 1, 4, 18, 19	1 Proc GI 4 AQ 4 ET 18 AQ 1, 2 19 AQ 3 UC
21ST CENTURY SKILL AND READINESS COMPETENCIES		
Inquiry Questions:		
<ul style="list-style-type: none"> How do keystone species maintain balance in ecosystems? 	Eco 1, 4, 16	1 Proc GI 4 AQ 4 ET 16 AQ 5 AD, AQ 1 UC
<ul style="list-style-type: none"> How does the introduction of a non-native species influence the balance of an ecosystem? 	Eco 1, 4	1 Proc GI 4 AQ 4 ET
<ul style="list-style-type: none"> How is the succession of local organisms altered in an area that is disturbed or destroyed? 	Eco 16, 17	16 AQ 5 AD, AQ 1 UC 17 AQ 1, 2 UC
Relevance & Application:		
<ul style="list-style-type: none"> Earth's carrying capacity is limited, and as the human population grows, we must find ways to increase the production of resources all people need to live. 	Eco 14	14 AQ 1-8 UC
<ul style="list-style-type: none"> The extraction of resources by humans impacts nature ecosystems. 	Eco 18, 19	18 AQ 1, 2 19 AQ 3 UC
Nature Of:		

Colorado Academic Standard	Location in SGI	Where assessed
<ul style="list-style-type: none"> Critically evaluate scientific explanations in popular media to determine if the research methodology and evidence presented are appropriate and sufficient to support the claims. (DOK 2-3) 	Local standard	
3. Cellular metabolic activities are carried out by biomolecules produced by organism		
EVIDENCE OUTCOMES		
<ul style="list-style-type: none"> Identify biomolecules and their precursors/building blocks (DOK 1) 	Cell 10	10 AQ 3 UC, Proc CS
<ul style="list-style-type: none"> Develop, communicate, and justify an evidence-based explanation that biomolecules follow the same rules of chemistry as any other molecule (DOK 1-3) 	Cell 10	10 AQ 3 UC, Proc CS
<ul style="list-style-type: none"> Develop, communicate, and justify an evidence-based explanation regarding the optimal conditions required for enzyme activity (DOK 1-3) 	Cell 11	11 AQ 4 AD
<ul style="list-style-type: none"> Infer the consequences to organisms of suboptimal enzyme function - such as altered blood pH or high fever - using direct and indirect evidence (DOK 1-3) 	Cell 11	11 AQ 4 AD
<ul style="list-style-type: none"> Analyze and interpret data on the body's utilization of carbohydrates, lipids, and proteins (DOK 1-2) 	Cell 9, 10	9 AQ 3, 5, 6 UC 10 AQ 3 UC, Proc CS
21ST CENTURY SKILL AND READINESS COMPETENCIES		
Inquiry Questions:		
<ul style="list-style-type: none"> How are rates of enzyme activity in cells affected by various factors such as pH or temperature? 	Cell 11	11 AQ 4 AD
<ul style="list-style-type: none"> How does one know that enzymes speed up chemical reactions? 	Cell 11	11 AQ 4 AD
Relevance & Application:		

Colorado Academic Standard	Location in SGI	Where assessed
<ul style="list-style-type: none"> Apply knowledge of biomolecular structure and activity to make consumer decisions, especially about diet with respect to saturated and unsaturated fatty acids, essential and nonessential amino acids, and simple and complex carbohydrates. 	Cell 7*	7 AQ 1-6
<ul style="list-style-type: none"> Explain how high temperatures such as a fever may alter cellular enzyme activity. 	Cell 11	11 AQ 4 AD
<ul style="list-style-type: none"> Recognize that many biomolecules can be made in the lab and have the exact same structure and function as ones made by living organisms. 	Cell 11*	11 AQ 4 AD
Nature Of:		
<ul style="list-style-type: none"> Critically evaluate scientific explanations in popular media to determine if the research methodology and evidence presented are appropriate and sufficient to support the claims. (DOK 2-3) 	Cell 2, 3, 7, 8, 13	2 AQ 4 UC 3 AQ 5 UC 7 AQ 1-6 8 AQ 1, 2 UC 13 Proc GI
4. The energy for life primarily derives from the interrelated processes of photosynthesis and cellular respiration. Photosynthesis transforms the sun's light energy into the chemical energy of molecular bonds. Cellular respiration allows cells to utilize chemical energy when these bonds are broken.		
EVIDENCE OUTCOMES		
<ul style="list-style-type: none"> Develop, communicate, and justify an evidence-based scientific explanation the optimal environment for photosynthetic activity (DOK 1-3) 	Cell 12	12 AQ 8 UC
<ul style="list-style-type: none"> Discuss the interdependence of autotrophic and heterotrophic life forms such as depicting the flow of a carbon atom from the atmosphere, to a leaf, through the food chain, and back to the atmosphere (DOK 1-2) 	Eco 9 Cell 12	9 AQ 3, 6 UC 12 AQ 8 UC
<ul style="list-style-type: none"> Explain how carbon compounds are gradually oxidized to provide energy 	Cell 13	13 Proc GI

Colorado Academic Standard	Location in SGI	Where assessed
in the form of adenosine triphosphate (ATP), which drives many chemical reactions in the cell (DOK 1-2)		
21st Century Skill and Readiness Competencies		
Inquiry Questions:		
<ul style="list-style-type: none"> What variables can be manipulated to change the rate of photosynthesis? 	Cell 12	12 AQ 8
<ul style="list-style-type: none"> What variables affect the rate of cell respiration? 	Cell 12	12 AQ 8
Relevance & Application:		
<ul style="list-style-type: none"> Agriculture is of great importance to humans. For example, most food comes from agriculture. 	Gen 4, 7	4 AQ 2 UC 7 AQ 1-6
<ul style="list-style-type: none"> Various foods such as cheeses, yogurts, alcohol, and breads are produced by fermentation - anaerobic respiration - that is carried out by various organisms. 	Cell 12	12 AQ 8 UC
<ul style="list-style-type: none"> The experience of muscle fatigue after intense exercise is related to anaerobic respiration in muscle cells. 	Cell 12*	12 AQ 8 UC
<ul style="list-style-type: none"> Primary producers such as marine phytoplankton and rainforest flora play an integral role in sustaining all life on Earth. 	Eco 9 Cell 12	9 AQ 3, 6 UC 12 AQ 8 UC
Nature Of:		
<ul style="list-style-type: none"> Recognize that the current understanding of photosynthesis and cellular respiration has developed over time and become more sophisticated as new technologies have lead to new evidence. (DOK 1) 	Cell 12	12 AQ 8 UC
<ul style="list-style-type: none"> Critically evaluate models for photosynthesis and cellular respiration, and identify their 	Eco 9 Cell 12	9 AQ 3, 6 UC 12 AQ 8 UC

Colorado Academic Standard	Location in SGI	Where assessed
strengths and weaknesses. (DOK 2-3)		
5. Cells use passive and active transport of substances across membranes to maintain relatively stable intracellular environments		
EVIDENCE OUTCOMES		
<ul style="list-style-type: none"> Analyze and interpret data to determine the energy requirements and/or rates of substance transport across cell membranes (DOK 1-2) 	Cell 7, 8, 9	7 AQ 1-6 8 AQ 3 UC 9 AQ 3, 6 UC
<ul style="list-style-type: none"> Compare organisms that live in freshwater and marine environments, and identify the challenges of osmotic regulation for these organisms (DOK 2) 	Cell 7*	7 AQ 1-6
<ul style="list-style-type: none"> Diagram the cell membrane schematically, and highlight receptor proteins as targets of hormones, neurotransmitters, or drugs that serve as active links between intra and extracellular environments (DOK 1) 	Cell 9	9 AQ 3, 6 UC
<ul style="list-style-type: none"> Use tools to gather, view, analyze, and interpret data produced during scientific investigations that involve passive and active transport (DOK 1-2) 	Cell 9	9 AQ 3, 6 UC
<ul style="list-style-type: none"> Use computer simulations and models to analyze cell transport mechanisms (DOK 1-2) 	Cell 9* www.sepuplhs.org	9 AQ 3, 6 UC
21ST CENTURY SKILL AND READINESS COMPETENCIES		
Inquiry Questions:		
<ul style="list-style-type: none"> What variables affect the rate of transport across a membrane? 	Cell 8, 9	8 AQ 3 UC 9 AQ 3, 6 UC
<ul style="list-style-type: none"> Why is it important that cell membranes are selectively permeable? 	Cell 7, 8, 9	7 AQ 1-6 8 AQ 3 UC 9 AQ 3, 6 UC
Relevance & Application:		
<ul style="list-style-type: none"> Osmotically balanced solutions such 	Cell 7, 8, 9	7 AQ 1-6

Colorado Academic Standard	Location in SGI	Where assessed
as intravenous and ophthalmic solutions are critical in medical settings.		8 AQ 3 UC 9 AQ 3, 6 UC
<ul style="list-style-type: none"> Drugs target receptor proteins such as hormones and neurotransmitters in membranes and mimic the action of natural signals there. 	Cell 7, 8, 9	7 AQ 1-6 8 AQ 3 UC 9 AQ 3, 6 UC
<ul style="list-style-type: none"> Technology is used to support humans on dialysis. 	Cell 7, 8*	7 AQ 1-6 8 AQ 3 UC
Nature Of:		
<ul style="list-style-type: none"> Ask testable questions and make a falsifiable hypothesis about how cells transport materials into and out of the cell and use an inquiry approach to find the answer. (DOK 1-4) 	Cell 7	7 AQ 1-6
<ul style="list-style-type: none"> Share experimental data, and respectfully discuss conflicting results emulating the practice of scientists. (DOK 2-3) 	Cell 2, 3, 8, 11	2 AQ 4 UC 3 AQ 5 UC 8 AQ 1&2 UC 11 AQ 3 UC
<ul style="list-style-type: none"> Recognize and describe the ethical traditions of science: value peer review; truthful reporting of methods and outcomes; making work public; and sharing a lens of professional skepticism when reviewing the work of others. (DOK 1) 	Throughout, see for example app laboratory type activities Appendix I: What is science?	
6. Cells, tissues, organs, and organ systems maintain relatively stable internal environments, even in the face of changing external environments		
EVIDENCE OUTCOMES		
<ul style="list-style-type: none"> Discuss how two or more body systems interact to promote health for the whole organism (DOK 1-2) 	Not covered	
<ul style="list-style-type: none"> Analyze and interpret data on homeostatic mechanisms using direct and indirect evidence to develop and support claims about the effectiveness of feedback loops 	Not covered	

Colorado Academic Standard	Location in SGI	Where assessed
to maintain homeostasis (DOK 1-2)		
<ul style="list-style-type: none"> Distinguish between causation and correlation in epidemiological data, such as examining scientifically valid evidence regarding disrupted homeostasis in particular diseases (DOK 2) 	Cell 2, 3, 7, 8, 12, 16	2 AQ 4 UC 3 AQ 5 UC 8 AQ 1&2 UC 12 AQ 8 UC 16 AQ 1-2
<ul style="list-style-type: none"> Use computer simulations and models of homeostatic mechanisms (DOK 1-2) 	Not covered	
21ST CENTURY SKILL AND READINESS COMPETENCIES		
Inquiry Questions:		
<ul style="list-style-type: none"> How can an experiment be designed and conducted to test for adaptive homeostasis during exercise and other body activities? 	Not covered	
<ul style="list-style-type: none"> Where and when are negative versus positive feedback loops more effective in the human body? 	Not covered	
Relevance & Application:		
<ul style="list-style-type: none"> The disruption of homeostatic mechanisms may lead to disease, and if severe enough, death. 	Not covered	
<ul style="list-style-type: none"> Body systems differ when in a state of health and disease. For example, buildup and rupture of atherosclerotic plaque inside a blood vessel can cause a heart attack. 	Cell 2, 3, 7, 8, 12, 16	2 AQ 4 UC 3 AQ 5 UC 7 AQ 1-6 8 AQ 1&2 UC 12 AQ 8 UC 16 AQ 1-2
<ul style="list-style-type: none"> The regulatory responses of autoimmune diseases such as Type I diabetes, multiple sclerosis and rheumatoid arthritis are different than those of healthy immune systems. 	Cell 2, 3, 7, 8, 12, 16	2 AQ 4 UC 3 AQ 5 UC 7 AQ 1-6 8 AQ 1&2 UC 12 AQ 8 UC 16 AQ 1-2
Nature Of:		
<ul style="list-style-type: none"> Research and present findings about 	Cell 7*	7 AQ 1-6

Colorado Academic Standard	Location in SGI	Where assessed
the results of dietary deficiencies or excesses. (DOK 1-2)		
<ul style="list-style-type: none"> Research and present findings about how medical problems that impact life span have changed throughout history due to altered lifestyles and advances in medicine. (DOK 1-2) 	Cell 2, 3, 7, 8, 12, 16	2 AQ 4 UC 3 AQ 5 UC 7 AQ 1-6 8 AQ 1&2 UC 12 AQ 8 UC 16 AQ 1-2
<ul style="list-style-type: none"> Differentiate between scientific evidence evaluated by the Food and Drug Administration (FDA) for drug approval and anecdotal evidence shared among individuals or in magazines/newspapers that a food or supplement is effective for a given problem. (DOK 2) 	Cell 7, 13*	7 AQ 1-6 13 Proc GI
7. Physical and behavioral characteristics of an organism are influenced to varying degrees by heritable genes, many of which encode instructions for the production of proteins		
EVIDENCE OUTCOMES		
<ul style="list-style-type: none"> Analyze and interpret data that genes are expressed portions of DNA. (DOK 1-2) 	Gen 5	5 AQ 1-4
<ul style="list-style-type: none"> Analyze and interpret data on the processes of DNA replication, transcription, translation, and gene regulation, and show how these processes are the same in all organisms (DOK 1-2) 	Gen 12, 16, 17	12 AQ 1 UC 16 Proc GI 17 AQ 1-7
<ul style="list-style-type: none"> Recognize that proteins carry out most cell activities and mediate the effect of genes on physical and behavioral traits in an organism (DOK 1) 	Gen 16, 17	16 Proc GI 17 AQ 1-7
<ul style="list-style-type: none"> Evaluate data showing that offspring are not clones of their parents or siblings due to the meiotic processes of independent assortment of chromosomes, crossing over, and mutations (DOK 1-2) 	Gen 13, 14	13 AQ 1-2 14 AQ 1 UC

Colorado Academic Standard	Location in SGI	Where assessed
<ul style="list-style-type: none"> Explain using examples how genetic mutations can benefit, harm, or have neutral effects on an organism (DOK 1-2) 	Gen 12, 16	12 AQ 1 UC 16 Proc UC
21ST CENTURY SKILL AND READINESS COMPETENCIES		
Inquiry Questions:		
<ul style="list-style-type: none"> Why is it possible for a cell from one species to express genes from another species as in genetic modification of organisms? 	Gen 1, 2	1 AQ 4 UC 2 Proc GI
<ul style="list-style-type: none"> Why are human offspring not genetic clones of their parents or siblings? 	Gen 13, 14	13 AQ 1-2 14 AQ 1 UC
<ul style="list-style-type: none"> How is it possible to distinguish learned from instinctual behaviors such as imprinting etiquette, and suckling by mammals? 	Not covered	
Relevance & Application:		
<ul style="list-style-type: none"> Recombinant DNA technology has many uses in society such as the development of new medical therapies and increased production of drugs. 	Gen 1, 2	1 AQ 4 ET 2 Proc GI
<ul style="list-style-type: none"> Selective breeding differs from genetic modification, yet shares a common goal. 	Gen 4, 6, 7	4 AQ 4 UC, Proc AD 6 Proc GI 7 AQ 1-2
<ul style="list-style-type: none"> There are benefits and risks to having genetically modified organisms in the food supply. 	Gen 15, 17, 18, 20	15 Proc CS, GI 17 AQ 1-7 18 AQ 2 CS 20 AQ 1-2
<ul style="list-style-type: none"> There are implications to inheriting DNA replication errors. 	Gen 14	14 AQ 1 UC
Nature Of:		
<ul style="list-style-type: none"> Recognizing that research on genetically modified organisms is done in university laboratories and 	Gen 15, 17, 18, 20	15 Proc CS, GI 17 AQ 1-7

Colorado Academic Standard	Location in SGI	Where assessed
seed companies, discuss the implications of different types of funding and the ethical traditions of science: value peer review; truthful reporting of methods and outcomes; making work public; and sharing a lens of professional skepticism when reviewing the work of others. (DOK 1-2)		18 AQ 2 CS 20 AQ 1-2
8. Multicellularity makes possible a division of labor at the cellular level through the expression of select genes, but not the entire genome.		
EVIDENCE OUTCOMES		
<ul style="list-style-type: none"> Develop, communicate, and justify an evidence-based scientific explanation of how cells form specialized tissues due to the expression of some genes and not others (DOK 1-3) 	Gen 17	17 AQ 1-7
<ul style="list-style-type: none"> Analyze and interpret data that show most eukaryotic deoxyribonucleic acid (DNA) does not actively code for proteins within cells (DOK 1-2) 	Gen 16, 17	16 Proc UC 17 AQ 1-7
<ul style="list-style-type: none"> Develop, communicate, and justify an evidence-based scientific explanation for how a whole organism can be cloned from a differentiated - or adult - cell (DOK 1-3) 	Evo 2	2 Proc GI
<ul style="list-style-type: none"> Analyze and interpret data on medical problems using direct and indirect evidence in developing and supporting claims that genetic mutations and cancer are brought about by exposure to environmental toxins, radiation, or smoking (DOK 1-3) 	Cell 13	13 Proc GI
21ST CENTURY SKILL AND READINESS COMPETENCIES		
Inquiry Questions:		
<ul style="list-style-type: none"> Why is it possible to clone a whole 	Cell 14, 15	15 AQ 1-2

Colorado Academic Standard	Location in SGI	Where assessed
organism from an undifferentiated cell?		16 Proc OD
<ul style="list-style-type: none"> Why are stem cells sought by researchers as potential cures to medical problems? 	Cell 14, 15	15 AQ 1-2 16 Proc OD
Relevance & Application:		
<ul style="list-style-type: none"> Stem cells may be used to improve medical disorders such as diabetes, Parkinson's disease, torn cartilage, and damaged hearts. 	Cell 14, 15	15 AQ 1-2 16 Proc OD
<ul style="list-style-type: none"> Recent research and insights into DNA and genes have changed many aspects of society such as the criminal justice system, food supply, and medical treatments. 	Cell 9, 18	9 AQ 3, 5, 6, UC 18 AQ 2 ET
Nature Of:		
<ul style="list-style-type: none"> Debate the advantages and disadvantages of bioengineering - cloning or genetically modifying - organisms in the food supply. (DOK 2-3) 	Cell 9, 18	9 AQ 3, 5, 6, UC 18 AQ 2 ET
<ul style="list-style-type: none"> Science is influenced by the cultural norms of a society. Discuss the ethical and political issues associated with stem cell research and how these have impacted both the research done and its applications. (DOK 1-3) 	Cell 9, 18	9 AQ 3, 5, 6, UC 18 AQ 2 ET
<ul style="list-style-type: none"> Debate the ethical and political issues associated with stem cell research and how these affect research. (DOK 2-3) 	Cell 9, 18	9 AQ 3, 5, 6, UC 18 AQ 2 ET
9. Evolution occurs as the heritable characteristics of populations change across generations and can lead populations to become better adapted to their environment		
EVIDENCE OUTCOMES		
<ul style="list-style-type: none"> Develop, communicate, and justify an evidence-based scientific explanation for how Earth's diverse life forms today evolved from 	Evo 4, 5, 6	4 AQ 1-2 5 AQ 1-2 6 AQ 1-2

Colorado Academic Standard	Location in SGI	Where assessed
common ancestors (DOK 1-3)		
<ul style="list-style-type: none"> Analyze and interpret multiple lines of evidence supporting the idea that all species are related by common ancestry such as molecular studies, comparative anatomy, biogeography, fossil record and embryology (DOK 2-3) 	Evo 4, 5, 6	4 AQ 1-2 5 AQ 1-2 6 AQ 1-2
<ul style="list-style-type: none"> Analyze and interpret data suggesting that over geologic time, discrete bursts of rapid genetic changes and gradual changes have resulted in speciation (DOK 1-3) 	Evo 4	4 AQ 1-2 5 AQ 1-2 6 AQ 1-2
<ul style="list-style-type: none"> Analyze and interpret data on how evolution can be driven by three key components of natural selection - heritability, genetic variation, and differential survival and reproduction (DOK 1-3) 	Evo 4, 5, 6, 11, 13	4 AQ 1-2 5 AQ 1-2 6 AQ 1-2 11 AQ 1-2 13 AQ 1-2
<ul style="list-style-type: none"> Generate a model - an evolutionary tree - showing how a group of organisms is most likely diverged from common ancestry (DOK 2- 	Evo 5, 6, 7	5 AQ 1-2 6 AQ 1-2 7 AQ 1-2
21ST CENTURY SKILL AND READINESS COMPETENCIES		
Inquiry Questions:		
<ul style="list-style-type: none"> How do subtle differences among closely-related fossil species provide evidence of environmental change and speciation? 	Evo 5, 6	5 AQ 1-2 6 AQ 1-2
<ul style="list-style-type: none"> How does studying extinct species contribute to our current understanding of evolution? 	Evo 5, 6	5 AQ 1-2 6 AQ 1-2
<ul style="list-style-type: none"> How can patterns of characteristics shared among organisms be used to categorize life's diversity according to relatedness? 	Evo 8, 9, 10 Appendix G	8 AQ 1 UC 9 AQ 1 ET 10 AQ 2, 3 UC, Proc GI
<ul style="list-style-type: none"> How does modern agriculture affect biodiversity? 	Evo 1, 2, 15	1 AQ 1-2 2 Proc GI

Colorado Academic Standard	Location in SGI	Where assessed
		AQ 1 ET, CS
Relevance & Application:		
<ul style="list-style-type: none"> Resistance can occur when antibiotics and pesticides are overused or abused. 	Gen 2*	2 Proc GI
<ul style="list-style-type: none"> Human activities can generate selective pressures on organisms, such as breeding new kinds of dogs and improving livestock. 	Evo 2	2 Proc GI
Nature Of:		
<ul style="list-style-type: none"> Understand that all scientific knowledge is subject to new findings and that reproducible, corroborated, and converging lines of data yield a scientific theory. (DOK 1) 	Evo 4, 14 Appendix I, What is science?	4 AQ 1-2 14 AQ 1 UC, CS
<ul style="list-style-type: none"> Differentiate among the use of the terms "hypothesis," "theory," and "law" as they are defined and used in science compared to the usage of these terms in other disciplines or everyday use. (DOK 1-2) 	Evo 4, 14 Appendix I, What is science?	4 AQ 1-2 14 AQ 1 UC, CS