LAB-AIDS CORRELATIONS to Next Generation Sunshine State Standards[1]

2008 Science 9-12

Life Science

The purpose of this draft document is to provide an overview of support for the high school science standards and access points to *Science and Global Issues: Biology* materials produced by the Science Education for Public Understanding Program (SEPUP) and published and distributed by LAB-AIDS.

This document was prepared by Oralia Gil, LAB-AIDS Curriculum Specialist. This is not an exhaustive document.

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[1] http://www.cpalms.org/downloads.aspx

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

SGI BIOLOGY: Activity	NGSSS	SGI Biology Analysis Question
Sustainability		
1 INVESTIGATION: Our Global Community Students investigate the use of resources across regions of the world by manipulating indicator data.	SC.912.N.4.1 SC.912.N.4.2	2
2 INVESTIGATION: Life in Other Countries Students further investigate indicators of four countries and analyze the current sustainability challenges facing those communities.	SC.912.N.4.1 SC.912.N.4.2	5
3 READING: Sustainability Case Studies Students read about two communities that took steps to improve their resource use of energy, water, and land.	SC.912.N.4.1 SC.912.N.4.2	1
4 INVESTIGATION: Ecological Footprint Students complete an on-line survey that estimates their ecological footprint and then compares the results with averages for the United States, other countries, and the world.	SC.912.N.4.1 SC.912.N.4.2	6
5 LABORATORY : Jaffrey City's Problem Students act in the role of scientists testing for contaminants in the lake water of fictitious Jaffrey Lake.	SC.912.N.4.1 SC.912.N.4.2	2
6 TALK IT OVER: Jaffrey City's Master Plan Students propose a master plan for dealing with the contamination of Jaffrey Lake in a way that is satisfactory to the stakeholders in the community.	SC.912.N.4.1 SC.912.N.4.2	7
Ecology: Living on Earth		
1 TALK IT OVER: Ecosystems and Change Students investigate case studies of ecosystem changes and the impacts on organisms.	SC.912.L.17.20 SC.912.L.17.8	2, 4
2 LABORATORY : A Population of Duckweed Students monitor and analyze the growth of a population of duckweed plants for an eight-week period.	SC.912.L.17.5	4, 5, 7
3 INVESTIGATION: Biomes Students investigate characteristics of biomes and types of organisms in biomes.	SC.912.L.17.4 SC.912.L.17.7	1 - 3
4 INVESTIGATION: Invasive Species Students investigate characteristics that make it likely for a species to become an invasive and examine case studies of invasive species introductions	SC.912.L.17.8	1 - 4
5 MODELING: The Tragedy of the Commons	SC.912.L.17.20	1 - 7

SGI BIOLOGY: Activity	NGSSS	SGI Biology Analysis Question
Students investigate how fishing limits impact the sustainability of a fishery.		
6 INVESTIGATION: Producers and Consumers Students observe plankton and investigate the link between plankton productivity and sustainable fisheries.	SC.912.L.17.9	8
7 INVESTIGATION: Energy Flow Through an Ecosystem Students explore the relationships that exist among organisms in a kelp forest and use a food web they construct to predict the impact of different events on the kelp forest ecosystem.	SC.912.L.17.9 SC.912.L.17.13	1 – 7
8 INVESTIGATION: Carbon Cycle The class models the movement of carbon through the natural carbon cycle, and compares this to the impact of human activities on the movement of carbon in carbon cycle.	SC.912.E.7.1	3
9 INVESTIGATION: The Photosynthesis and Cellular Respiration Shuffle Students determine the cycle of photosynthesis and cellular respiration by organizing a series of statements into a sequence.	SC.912.L.18.7 SC.912.L.18.8 SC.912.L.18.9	1 - 3
10 LABORATORY : Respiring Beans Students investigate cellular respiration in beans. Students develop their own variable and test conditions.	SC.912.N.1.1 SC.912.L.18.8 SC.912.L.18.9	1 - 6
11 LABORATORY : Respiration and Photosynthesis in Plants Students observe underwater plants in various conditions to determine if plants respire and photosynthesize. Students develop their own variable and test conditions.	SC.912.L.18.7 SC.912.L.18.8 SC.912.L.18.9	5, 6
12 INVESTIGATION: Too Much Life Students use yeast to model population dynamic, cellular respiration & eutrophication.	SC.912.L.18.8	3
13 INVESTIGATION: Symbiotic Relationships Students use descriptions of inter-species interactions to determine different symbiotic relationships.	SC.912.L.18.6	1
14 INVESTIGATION: Investigating Population Growth Rates An online simulation is used to investigate the effect of birth rate and carrying capacity on the growth rate of a population.	SC.912.L.17.5 SC.912.L.13.13	1 - 8

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15 MODELING: Changes Due to Population Growth Students examine the effect of a salmon farm on wild salmon population growth.	SC.912.L.17.5 SC.912.L.17.13	1 - 5
16 INVESTIGATION: Ecosystems Out of Balance Students examine graphs of different populations effected by fisheries and try to determine what the whole ecosystem effect has been.	SC.912.L.17.9 SC.912.L.17.13	5
17 READING: Ecosystem Change and Resiliency Students read about primary and secondary succession and how that is affected by ecosystem resiliency.	SC.912.L.17.4 SC.912.L.17.8	1 - 4
18 TALK IT OVER : Fishery Case Studies Students analyze case studies and predict how fishery management strategies might impact the sustainability of Bayside and the Purple-spotted Flatfish fishery.	SC.912.L.17.13	2
19 INVESTIGATION: Making Sustainable Fishery Decisions Students analyze indicator data to determine the impact of a fishery management strategy on the sustainability of Bayside and the Purple-spotted Flatfish fishery.	SC.912.L.17.13	1 - 4
Cell Biology: World Health		
1 TALK IT OVER : World Health and Sustainability Students look at world health data and examine factors of sustainability tied to disease	HE.912.C.1.3 HE.912.C.1.8	1 - 3
2 LABORATORY : Cells and Disease Students observe normal red blood cells, sickled red blood cells, and blood infected with Plasmodium in order to determine the cause of two patients' symptoms. Students begin to think about cell structure and function.	HE.912.C.1.8	1 – 3, 5, 6
3 LABORATORY: What is a Cell? Students prepare a drawing of a cell as a formative assessment and write their ideas about cells. Then they examine using a light microscope the similarities and differences in various types of living cells and fixed cells.	SC.912.L.14.2	1 - 5
4 INVESTIGATION: What Do Cells Do? Students learn about common cells structures and functions.	SC.912.L.14.2 SC.912.L.14.3	2
5 INVESTIGATION: What Do Specialized Cells	SC.912.L.16.14	

SGI BIOLOGY: Activity	NGSSS	SGI Biology Analysis Question
Do? Students investigate the different numbers and types of organelles required for specialized plant and animal cells.		
6 READING: Cell Structure and Function Students read about the history of the development of the cell principle, and cell structures and functions.	SC.912.L.14.1 SC.912.L.14.3	1 - 4
7 MODELING: A Model Membrane Students investigate several models of the cell membrane in order to observe properties of the cell membrane.	SC.912.L.14.2 SC.912.L.14.6	4 - 6
8 LABORATORY: The Cell Membrane and Diffusion Students investigate the properties of the cell membrane and osmosis and diffusion by using dialysis tubing models using water, glucose, starch and iodine.	SC.912.L.14.2	2 - 4
9 READING: Cell Membrane Structure and Function Students read about the cell membrane's functions and the fluid mosaic model.	SC.912.L.14.2	1 - 6
10 RESEARCH PROJECT AND PRESENTATION: Functions of Proteins in Cells Students research one type of protein and present the information to the class in order to learn the diverse functions of proteins in cells.	SC.912.L.18.1	1 - 3
11 LABORATORY : Investigating Enzyme Function Students design an experiment to test the effects of pH and temperature on the function of an enzyme.	SC.912.L.18.11	1 – 2
12 READING: Photosynthesis and Cellular Respiration Students complete a computer simulation of the processes of photosynthesis and cellular respiration and then complete a reading about the two processes	SC.912.L.18.7 SC.912.L.18.8 SC.912.L.18.9 SC.912.L.18.11	1 - 8
13 INVESTIGATION: The Cell Cycle Students investigate the cell cycle including mitosis and cytokinesis	SC.912.L.16.14 HE.912.C.1.4 HE.912.C.1.8	3, 5, 7
14 INVESTIGATION: Stem Cell Differentiation Students use a set of colored chips to investigate the steps in which embryonic stem cells become specialized cells.	SC.912.L.16.8	

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15 TALK IT OVER : Stem Cell Research Students discuss a set of questions surrounding the stem cell research debate, and examine why it is not useful for addressing infectious diseases.	SC.912.N.1.3 SC.912.N.1.4	1 - 3
16 INVESTIGATION: HIV/AIDS Infection and Cell Organelles Students investigate how HIV uses the endomembrane system during infection of a human cell.	HE.912.C.1.3 HE.912.C.1.8	8
17 TALK IT OVER : Disease Interventions Students summarize the disease mechanism for six diseases, examine various interventions for the six diseases and their trade-offs	HE.912.C.1.3 HE.912.C.1.8	2
18 TALK IT OVER : World Health Proposal Students write a world health proposal to address the problems of disease and vote on which to fund when funding is limited.	HE.912.C.1.3 HE.912.C.1.8	3
Genetics: Feeding the World		
1 INVESTIGATION: A Genetically Modified Solution? Students consider the use of Genetically Modified Organisms by looking at it from the perspective of a country trying to decide if they should grow Bt corn.	SC.912.L.16.10	2
2 LABORATORY : Creating Genetically Modified Bacteria Students investigate the conditions necessary for genetically modified bacteria to express an inserted gene.	SC.912.L.16.10 SC.912.N.1.1	1, 4
3 MODELING: Mitosis and Asexual Reproduction Students view online computer animations and construct a narrated sketch of the phases of meiosis. Students show how a gene inserted into a genetically modified organism can be passed on to a daughter cell through the process of asexual reproduction.	SC.912.L.16.14	1, 2
4 INVESTIGATION: Breeding Corn Students observe the phenotypes of several ears of corn and use their observations and Punnett squares to determine the genotypes of the parents used to produce the resulting corn ears.	SC.912.L.16.2	2, 3
5 READING: Genes and Traits	SC.912.L.16.1	1 - 4

SGI BIOLOGY: Activity	NGSSS	SGI Biology Analysis Question
Students read about basic genetics concepts as they relate to the heredity of traits.	SC.912.L.16.2	
6 MODELING : Breeding Corn for Two Traits Students use Punnett squares to predict the outcome of a cross between corn plants for two traits. Students create a plan to determine the genotype of a parent based on observing the results of crosses for two traits.	SC.912.L.16.2	1, 2
7 MODELING: Breeding Better Rice Students use Allele Cards to apply their knowledge of genetics to the breeding of a desirable strain of rice.	SC.912.L.16.1 SC.912.L.16.2	1, 2
8 INVESTIGATION: Interpreting Pedigrees Students trace traits in pedigrees to determine their mechanism of inheritance.	SC.912.L.16.2 HE.912.C.1.4	1, 4
9 LABORATORY : DNA Isolation Students compare DN A isolated from spinach to DN A from various other samples to investigate the universal structure of DNA.	SC.912.L.16.9	4
10 MODELING: Modeling DNA Structure Students work with several different representations and a model of DN A to learn about its molecular structure.	SC.912.L.16.3 SC.912.L.16.9	4
11 READING: Genomics Students read about the history of genomics and how the science is developing.	SC.912.L.16.9 SC.912.L.16.10	1 – 4
12 INVESTIGATION: DNA Replication Students use online simulation & DNA model to gather evidence to support one of three hypothesis of DN A replication–conservative, semi-conservative, or dispersive-- in a historical exploration of the DNA replication experiments conducted by Meselson and Stahl.	SC.912.L.16.3 SC.912.N.1.3 SC.912.N.1.6	1, 2
13 MODELING: Meiosis and Sexual Reproduction Students view computer simulations to investigate how chromosomes divide during meiosis. Students use their understanding of meiosis to explore the question, “What is the chance an inserted gene will be passed onto a daughter cell through the process of sexual reproduction?”	SC.912.L.16.16	1 – 4
14 READING: Genes and Chromosomes Students read about the passing of chromosomes from the parents to offspring	SC.912.L.16.16 HE.912.C.1.4	3, 4

SGI BIOLOGY: Activity	NGSSS	SGI Biology Analysis Question
during the process of sexual and asexual reproduction.		
15 PROJECT : Evaluating Genetically Modified Organisms Student produce informational posters that highlight the development of and issues related to a genetically modified organism. Information gained through a poster session is used to develop criteria to evaluate GM organisms that will be used in the final activity.	SC.912.N.4.1 SC.912.N.4.2	1, 2
16 MODELING: Protein Synthesis: Transcription and Translation Students work through the stages of protein synthesis. Then they work through a model to show the steps involved at each stage.	SC.912.L.16.4 SC.912.L.16.5	2, 4
17 INVESTIGATION AND MODELING: Cell Differentiation and Gene Expression Students explore gene expression combinations and explore the impact of gene expression and repression on cell phenotype.	SC.912.L.16.5	2 - 5
18 LABORATORY: Which Corn is Genetically Modified? Students run and interpret a DNA electrophoresis gel to determine which corn samples contain genetically modified corn.	SC.912.L.16.10	2, 3
19 READING: Biopharming Edible Vaccines Students read about the engineering of plants that are genetically modified to produce proteins that induce a vaccine response in humans.	SC.912.L.16.4 SC.912.L.16.10 HE.912.C.1.4	3
20 TALK IT OVER: Are GMOs the Solution? Students use information gathered from different research studies to determine if they want to use a genetically modified crop to help solve a sustainability challenge.	SC.912.L.16.10	3
Evolution: Maintaining Diversity		
1 TALK IT OVER : Biodiversity and Sustainability Students play a game in which they manage one ecosystem on an island to learn about how biodiversity and sustainability are connected.	SC.912.N.4.1	6
2 TALK IT OVER : Human Activities and Biodiversity Students read scenarios that describe various human activities that affect the diversity of ecosystems, species, and populations.	SC.912.L.15.5	

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3 MODELING: Geologic Time Students convert geologic time to the scale of a football field and place key events along the timeline.	SC.912.L.15.1	1, 4
4 READING: Darwin and the Development of a Theory Students read about Charles Darwin and how his ideas were emerging from others' and led to the theory of evolution by natural selection.	SC.912.L.15.13 SC.912.N.1.3 SC.912.N.1.6 SC.912.N.3.1	1
5 INVESTIGATION: Using Fossil Evidence to Investigate Whale Evolution Students examine illustrations of whale fossils and stratigraphic representations to trace the evolution of whales.	SC.912.L.15.1	1
6 READING: Evidence from the Fossil Record Students read about how scientists interpret evidence from the fossil record, including the use of stratigraphy and radiometric dating to determine the age of fossils.	SC.912.L.15.1 SC.912.N.1.3 SC.912.N.3.1	1, 2
7 INVESTIGATION: The Phylogeny of Vertebrates Students use a matrix of shared derived characters to create an evolutionary tree for a group of vertebrates, and use additional evidence to support a tree hypothesis.	SC.912.L.15.1 SC.912.L.15.5	2
8 INVESTIGATION: Studying Hominids Students examine fossil and molecular data to hypothesize the evolutionary relationships between apes, and extinct and modern humans.	SC.912.L.15.1 SC.912.L.15.4	1
9 INVESTIGATION: Studying Lineages for Conservation Students read about Madagascar and investigate an evolutionary tree of lemurs in order to rank four areas on the island for conservation priority	SC.912.L.14.4	
10 INVESTIGATION: What is a Species? Students use the biological species concept as one piece of information about where new species are in the process of separation from existing species. Students also investigate the factors that lead to reproductive isolation of species.	SC.912.L.15.13 SC.912.L.15.9	1 - 10
11 MODELING: Natural Selection Students work with a computer simulation to	SC.912.L.15.13	1, 2

SGI BIOLOGY: Activity	NGSSS	SGI Biology Analysis Question
investigate the processes of adaptive radiation and extinction.		
12 MODELING: The Genetic Basis of Adaptation Students use a model to investigate changes in gene frequency in a population of mice after an environmental change occurs.	SC.912.L.15.1	
13 READING: The Processes and Outcomes of Evolution Students read about the concepts of microevolution, adaptation, speciation, macroevolution, and extinction.	SC.912.L.15.14	1
14 TALK IT OVER : Ideas About Evolution Students reexamine the thinking they have done in the unit about the statements describing scientific concepts related to evolution.	SC.912.L.15.1	
15 TALK IT OVER : Conservation on an Island Biodiversity Hotspot Students read about four forest areas being considered for conservation on a fictitious island, and use phylogenetic data and other evidence to make their recommendation.	SC.912.N.4.1 SC.912.4.4.2	1 - 4