LAB-AIDS Correlations to NEW YORK STATE LIVING ENVIRONMENT[1]

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 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.

For more information about this correlation or for questions about review copies, presentations, or any matters related to sales or service, please visit us on the web at www.lab-aids.com.

[1] http://www.p12.nysed.gov/ciai/mst/pub/livingen.pdf

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.

STANDARD 4

Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science.

Key Idea 1: Living things are both similar to and different from each other and from nonliving things.

PERFORMANCE INDICATOR 1.1

Explain how diversity of populations within ecosystems relates to the stability of ecosystems.

PERFORMANCE INDICATOR DESCRIPTOR	SGI LOCATION	WHERE ASSESSED
1.1a Populations can be categorized by the function they serve. Food webs identify the relationships among producers consumers and decomposers carrying out either autotropic or heterotropic nutrition.	Eco 6, 7	6 AQ 1-5 7 AQ 2, 4, 5, UC
1.1b An ecosystem is shaped by the nonliving environment as well as its interacting species. The world contains a wide diversity of physical conditions which creates a variety of environments.	Eco 7, 8, 9	7 AQ 2, 4, 5, UC 8 AQ 3 UC 9 AQ 3, 6 UC
1.1c In all environments organisms compete for vital resources. The linked and changing interactions of populations and the environment compose the total ecosystem.	Eco 1, 7, 14	1 Proc GI 7 AQ 2, 4, 5, UC 14 AQ 1-9
1.1d The interdependence of organisms in an established ecosystem often results in approximate stability over hundreds and thousands of years. For example as one population increases it is held in check by one or more environmental factors or another species.	Eco 16, 17	16 AQ 5 AD, AQ 1 UC 17 AQ 1, 2 UC
1.1e Ecosystems, like many other complex systems, tend to show cyclic changes around a state of approximate equilibrium.	Eco 16, 17	16 AQ 5 AD, AQ 1 UC 17 AQ 1, 2 UC
1.1f Every population is linked directly or indirectly with many others in an ecosystem. Disruptions in the numbers and types of species and environmental changes can upset ecosystem stability.	Eco 16, 17	16 AQ 5 AD, AQ 1 UC 17 AQ 1, 2 UC

PERFORMANCE INDICATOR 1.2

Describe and explain the structures and functions of the human body at different organizational levels (e.g., systems, tissues, cells, organelles).

PERFORMANCE INDICATOR DESCRIPTOR	SGI LOCATION	WHERE ASSESSED
1.2a Important levels of organization for structure and function include organelles, cells, tissues, organs, organ systems, and whole organisms.	Not covered (cells only, in Cell Biology unit)	
1.2b Humans are complex organisms. They require multiple systems for digestion, res- piration, reproduction, circulation, excretion, movement, coordination, and immunity. The systems interact to perform the life functions.		
1.2c The components of the human body, from organ systems to cell organelles, interact to maintain a balanced internal environment. To successfully accomplish this, organisms possess a diversity of control mechanisms that detect deviations and make corrective actions.		
1.2d If there is a disruption in any human system, there may be a corresponding imbalance in homeostasis.	Cell 8, 9	8 AQ 1, 2 AD 9 AQ 3, 5, 6, UC
1.2e The organs and systems of the body help to provide all the cells with their basic needs. The cells of the body are of different kinds and are grouped in ways that enhance how they function together.	Not covered (cells only, in Cell Biology unit)	
1.2f Cells have particular structures that perform specific jobs. These structures per- form the actual work of the cell. Just as systems are coordinated and work together, cell parts must also be coordinated and work together.	Cell 4, 5, 6	4 AQ 2 UC 5 AQ 1 UC 6 AQ 4 UC
1.2g Each cell is covered by a membrane that performs a number of important functions for the cell. These include: separation from its outside environment, controlling which molecules enter and leave the cell, and recognition of chemical signals. The processes of diffusion and active transport are important in the movement of materials in and out of cells.	Cell 8, 9	8 AQ 1, 2 AD 9 AQ 3, 5, 6, UC
1.2h Many organic and inorganic substances dissolved in cells allow necessary chemical reactions to take place in order to maintain life. Large organic food molecules such as proteins and starches must	Cell 7, 10	7 AQ 1-6 10 AQ 3 UC, Proc CS

PERFORMANCE INDICATOR DESCRIPTOR	SGI LOCATION	WHERE ASSESSED
initially be broken down (digested to amino acids and simple sugars respectively), in order to enter cells. Once nutrients enter a cell, the cell will use them as building blocks in the synthesis of compounds necessary for life.		
1.2i Inside the cell a variety of specialized structures, formed from many different mol- ecules, carry out the transport of materials (cytoplasm), extraction of energy from nutrients (mitochondria), protein building (ribosomes), waste disposal (cell membrane), storage (vacuole), and information storage (nucleus).	Cell 4, 5, 6	4 AQ 2 UC 5 AQ 1 UC 6 AQ 4 UC
1.2j Receptor molecules play an important role in the interactions between cells. Two primary agents of cellular communication are hormones and chemicals produced by nerve cells. If nerve or hormone signals are blocked, cellular communication is disrupted and the organism's stability is affected.	Not covered	

PERORMANCE INDICATOR 1.3

Explain how a one-celled organism is able to function despite lacking the levels of organization present in more complex organisms.

PERFORMANCE INDICATOR DESCRIPTOR	SGI LOCATION	WHERE ASSESSED
1.3a The structures present in some single celled organisms act in a manner similar to the tissues and systems found in multicellular organisms, thus enabling them to perform all of the life processes needed to maintain homeostasis.	Cell 4, 5, 6	4 AQ 2 UC 5 AQ 1 UC 6 AQ 4 UC

Key Idea 2:

Organisms inherit genetic information in a variety of ways that result in continuity of structure and function between parents and offspring.

PERORMANCE INDICATOR 2.1

Explain how the structure and replication of genetic material result in offspring that resemble their parents.

PERFORMANCE INDICATOR DESCRIPTOR	SGI LOCATION	WHERE ASSESSED
2.1a Genes are inherited, but their expression can be modified by interactions with the environment.	Gen 17	AQ 1-7
2.1b Every organism requires a set of coded instructions for specifying its traits. For offspring to resemble their parents, there must be a reliable way to transfer information from one generation to the next. Heredity is the passage of these instructions from one generation to another.	Gen 5, 11	5 AQ 1-4 11 AQ 1-3
2.1c Hereditary information is contained in genes, located in the chromosomes of each cell. An inherited trait of an individual can be determined by one or by many genes, and a single gene can influence more than one trait. A human cell contains many thousands of different genes in its nucleus.	Gen 5, 11, 14	5 AQ 1-4 11 AQ 1-3 14 AQ 1 UC
2.1d In asexually reproducing organisms, all the genes come from a single parent. Asexually produced offspring are normally genetically identical to the parent.	Gen 3	Proc UC
2.1e In sexually reproducing organisms, the new individual receives half of the genetic information from its mother (via the egg) and half from its father	Gen 13	AQ 1-4

PERFORMANCE INDICATOR DESCRIPTOR	SGI LOCATION	WHERE ASSESSED
(via the sperm). Sexually produced offspring often resemble, but are not identical to, either of their parents.		
2.1f In all organisms, the coded instructions for specifying the characteristics of the organism are carried in DNA, a large molecule formed from subunits arranged in a sequence with bases of four kinds (represented by A, G, C, and T). The chemical and structural properties of DNA are the basis for how the genetic information that under- lies heredity is both encoded in genes (as a string of molecular "bases") and replicated by means of a template.	Gen 10, 12	10 AQ 1-4 12 AQ 1 UC
2.1g Cells store and use coded information. The genetic information stored in DNA is used to direct the synthesis of the thousands of proteins that each cell requires.	Gen 16, 17	16 Proc UC 17 AQ 1-7
2.1h Genes are segments of DNA molecules. Any alteration of the DNA sequence is a mutation. Usually, an altered gene will be passed on to every cell that develops from it.	Gen 12, 14	12 AQ 1 UC 14 AQ 1 UC
2.1i The work of the cell is carried out by the many different types of molecules it assembles, mostly proteins. Protein molecules are long, usually folded chains made from 20 different kinds of amino acids in a specific sequence. This sequence influences the shape of the protein. The shape of the protein, in turn, determines its function.	Gen 16, 17	16 Proc UC 17 AQ 1-7
2.1j Offspring resemble their parents because they inherit similar genes that code for the production of proteins that form similar structures and perform similar functions.	Gen 5	5 AQ 1-4
2.1k The many body cells in an individual can be very different from one another, even though they are all descended from a single cell and thus have essentially identical genetic instructions. This is because different parts of these instructions are used in different types of cells, and are influenced by the cell's environment and past history.	Gen 17	17 AQ 1-7

PERFORMANCE INDICATOR 2.2

Explain how the technology of genetic engineering allows humans to alter genetic makeup of organisms.

PERFORMANCE INDICATOR DESCRIPTOR	SGI LOCATION	WHERE ASSESSED
2.2a For thousands of years new varieties of cultivated plants and domestic animals have resulted from selective breeding for particular traits.	Gen 4, 6, 7	4 AQ 4 UC 6 Proc GI 7 AQ 1-6
2.2b In recent years new varieties of farm plants and animals have been engineered by manipulating their genetic instructions to produce new characteristics.	Gen 6, 7, 17	6 Proc GI 7 AQ 1-6 17 AQ 1-7
2.2c Different enzymes can be used to cut, copy, and move segments of DNA. Characteristics produced by the segments of DNA may be expressed when these segments are inserted into new organisms, such as bacteria.	Gen 16, 17, 19	16 Proc UC 17 AQ 1-7 19 AQ 1-3
2.2d Inserting, deleting, or substituting DNA segments can alter genes. An altered gene may be passed on to every cell that develops from it.	Gen 12, 13	12 AQ 1 UC 13 AQ 1-4
2.2e Knowledge of genetics is making possible new fields of health care; for example, finding genes which may have mutations that can cause disease will aid in the development of preventive measures to fight disease. Substances, such as hormones and enzymes, from genetically engineered organisms may reduce the cost and side effects of replacing missing body chemicals.	See, for example, Case Studies in Gen 16, 17, 18	16 Proc UC 17 AQ 1-7 18 AQ 2 CS

Key Idea 3: Individual organisms and species change over time.

PERFORMANCE INDICATOR 3.1

Explain the mechanisms and patterns of evolution.

PERFORMANCE INDICATOR DESCRIPTOR	SGI LOCATION	WHERE ASSESSED
3.1a The basic theory of biological evolution states that the Earth's present-day species developed from earlier, distinctly different species.	Evol 4, 11, 13, 14	4 AQ 1-3 11 AQ 1-4 13 AQ 1-5 14 AQ 1 UC, CS
3.1b New inheritable characteristics can result	Evol 6, 11, 12	6 AQ 1-3

PERFORMANCE INDICATOR DESCRIPTOR	SGI LOCATION	WHERE ASSESSED
from new combinations of existing genes or from mutations of genes in reproductive cells.		11 AQ 1-4 12 AQ 1-4
3.1c Mutation and the sorting and recombining of genes during meiosis and fertilization result in a great variety of possible gene combinations.	Gen 13 Evol 12	13 AQ 1-4 12 AQ 1-4
3.1d Mutations occur as random chance events. Gene mutations can also be caused by such agents as radiation and chemicals. When they occur in sex cells, the mutations can be passed on to offspring; if they occur in other cells, they can be passed on to other body cells only.	Gen 13 Evol 12	13 AQ 1-4 12 AQ 1-4
3.1e Natural selection and its evolutionary consequences provide a scientific explanation for the fossil record of ancient life forms, as well as for the molecular and structural similarities observed among the diverse species of living organisms.	Evol 5, 6	5 AQ 1-5 6 AQ 1-3
3.1f Species evolve over time. Evolution is the consequence of the interactions of (1) the potential for a species to increase its numbers, (2) the genetic variability of offspring due to mutation and recombination of genes, (3) a finite supply of the resources required for life, and (4) the ensuing selection by the environment of those offspring better able to survive and leave offspring.	Evol 4, 11, 14	4 AQ 1-4 11 AQ 1-4 14 AQ 1, ET & CS
3.1g Some characteristics give individuals an advantage over others in surviving and reproducing, and the advantaged offspring, in turn, are more likely than others to survive and reproduce. The proportion of individuals that have advantageous characteristics will increase.	Evol 4, 11, 14	4 AQ 1-4 11 AQ 1-4 14 AQ 1, ET & CS
3.1h The variation of organisms within a species increases the likelihood that at least some members of the species will survive under changed environmental conditions.	Evol 12, 13	12 AQ 1-4 13 AQ 1-5
3.1i Behaviors have evolved through natural selection. The broad patterns of behavior exhibited by organisms are those that have resulted in greater reproductive success.	Evol 10, 11, 12	10 AQ 2, 3 UC 11 AQ 1-4 2 AQ 1-4
3.1j Billions of years ago, life on Earth is thought by many scientists to have begun as	Evol 3	AQ 1 UC, CS

PERFORMANCE INDICATOR DESCRIPTOR	SGI LOCATION	WHERE ASSESSED
simple, single-celled organisms. About a billion years ago, increasingly complex multi- cellular organisms began to evolve.		
3.1k Evolution does not necessitate long-term progress in some set direction. Evolutionary changes appear to be like the growth of a bush: Some branches survive from the beginning with little or no change, many die out altogether, and others branch repeatedly, sometimes giving rise to more complex organisms.	Evol 14	AQ 1, ET & CS
3.1l Extinction of a species occurs when the environment changes and the adaptive characteristics of a species are insufficient to allow its survival. Fossils indicate that many organisms that lived long ago are extinct. Extinction of species is common; most of the species that have lived on Earth no longer exist.	Evol 13	AQ 1-5

Key Idea 4: The continuity of life is sustained through reproduction and development.

PERFORMANCE INDICATOR 4.1

Explain how organisms, including humans, reproduce their own kind.

PERFORMANCE INDICATOR DESCRIPTOR	SGI LOCATION	WHERE ASSESSED
4.1a Reproduction and development are necessary for the continuation of any species.	Cell 13 Gen 3	13 Proc GI 3 AQ 1, UC & CS
4.1b Some organisms reproduce asexually with all the genetic information coming from one parent. Other organisms reproduce sexually with half the genetic information typically contributed by each parent. Cloning is the production of identical genetic copies.	Gen 3	3 AQ 5 UC
4.1c The processes of meiosis and fertilization are key to sexual reproduction in a wide variety of organisms. The process of meiosis results in the production of eggs and sperm which each contain half of the genetic information. During fertilization, gametes unite to form a zygote, which contains the complete genetic information for the offspring.	Gen 13	AQ 1-4
4.1d The zygote may divide by mitosis and differentiate to form the specialized cells, tissues,	Gen 13	AQ 1-4

PERFORMANCE INDICATOR DESCRIPTOR	SGI LOCATION	WHERE ASSESSED
and organs of multicellular organisms.		
4.1e Human reproduction and development are influenced by factors such as gene expression, hormones, and the environment. The reproductive cycle in both males and females is regulated by hormones such as testosterone, estrogen, and progesterone.	Human growth, development, and reproduction are not covered in the SGI Biology course	
4.1f The structures and functions of the human female reproductive system, as in almost all other mammals, are designed to produce gametes in ovaries, allow for internal fertilization, support the internal development of the embryo and fetus in the uterus, and provide essential materials through the placenta, and nutrition through milk for the newborn.		
4.1g The structures and functions of the human male reproductive system, as in other mammals, are designed to produce gametes in testes and make possible the delivery of these gametes for fertilization.		
4.1h In humans, the embryonic development of essential organs occurs in early stages of pregnancy. The embryo may encounter risks from faults in its genes and from its mother's exposure to environmental factors such as inadequate diet, use of alcohol/drugs/tobacco, other toxins, or infections throughout her pregnancy.		

Key Idea 5: Organisms maintain a dynamic equilibrium that sustains life.

PERFORMANCE INDICATOR 5.1

Explain the basic biochemical processes in living organisms and their importance in maintaining dynamic equilibrium.

PERFORMANCE INDICATOR DESCRIPTOR	SGI LOCATION	WHERE ASSESSED
5.1a The energy for life comes primarily from the Sun. Photosynthesis provides a vital connection between the Sun and the energy needs of living systems.	Cell 9, 11	9 AQ 3, 5, 6 UC 11 Proc DI, AQ 4 AD
5.1b Plant cells and some one-celled organisms contain chloroplasts, the site of photo- synthesis. The process of photosynthesis uses solar energy to	Eco 9 Cell 12	9 AQ 3, 6 UC 12 AQ 8 UC

PERFORMANCE INDICATOR DESCRIPTOR	SGI LOCATION	WHERE ASSESSED
combine the inorganic molecules carbon dioxide and water into energy-rich organic compounds (e.g., glucose) and release oxygen to the environment.		
5.1c In all organisms, organic compounds can be used to assemble other molecules such as proteins, DNA, starch, and fats. The chemical energy stored in bonds can be used as a source of energy for life processes.	Cell 10, 12	10 AQ 3 UC 12 AQ 8 UC
5.1d In all organisms, the energy stored in organic molecules may be released during cellular respiration. This energy is temporarily stored in ATP molecules. In many organ- isms, the process of cellular respiration is concluded in mitochondria, in which ATP is produced more efficiently, oxygen is used, and carbon dioxide and water are released as wastes.	Cell 12	AQ 8 UC
5.1e The energy from ATP is used by the organism to obtain, transform, and transport materials, and to eliminate wastes.	Cell 12	AQ 8 UC
5.1f Biochemical processes, both breakdown and synthesis, are made possible by a large set of biological catalysts called enzymes. Enzymes can affect the rates of chemical change. The rate at which enzymes work can be influenced by internal environmental factors such as pH and temperature.	Cell 11	AQ 4 AD Proc DI, GI
5.1g Enzymes and other molecules, such as hormones, receptor molecules, and antibodies, have specific shapes that influence both how they function and how they interact with other molecules.	Cell 11	AQ 4 AD Proc DI, GI

PERFORMANCE INDICATOR 5.2

Explain disease as a failure of homeostasis.

PERFORMANCE INDICATOR DESCRIPTOR	SGI LOCATION	WHERE ASSESSED
5.2a Homeostasis in an organism is constantly threatened. Failure to respond effectively can result in disease or death.	See case studies, Cell 2, 3, 7, 8, 14, 16	2 AQ 4 UC 3 AQ 5 UC 7 AQ 1-6 8 AQ 1&2 AD 14 AQ 1-4 16 AQ 7-8

PERFORMANCE INDICATOR DESCRIPTOR	SGI LOCATION	WHERE ASSESSED
5.2b Viruses, bacteria, fungi, and other parasites may infect plants and animals and interfere with normal life functions.	See case studies, Cell 2, 3, 7, 8, 14, 16	2 AQ 4 UC 3 AQ 5 UC 7 AQ 1-6 8 AQ 1&2 AD 14 AQ 1-4 16 AQ 7-8
5.2c The immune system protects against antigens associated with pathogenic organisms or foreign substances and some cancer cells.	Cell 10, 13	10 AQ 3 UC 13 Proc GI
5.2d Some white blood cells engulf invaders. Others produce antibodies that attack them or mark them for killing. Some specialized white blood cells will remain, able to fight off subsequent invaders of the same kind.	Cell 2, 10	2 AQ 4 UC 10 AQ 3 UC
5.2e Vaccinations use weakened microbes (or parts of them) to stimulate the immune system to react. This reaction prepares the body to fight subsequent invasions by the same microbes.	Cell 3, 8, 16, 17	3 AQ 5 UC 8 AQ 1, 2 AD 16 AQ 1-8 17 Proc GI
5.2f Some viral diseases, such as AIDS, damage the immune system, leaving the body unable to deal with multiple infectious agents and cancerous cells.	Cell 8, 10, 16	8 AQ 1, 2 AD 10 AQ 3 UC 16 AQ 1-8
5.2g Some allergic reactions are caused by the body's immune responses to usually harmless environmental substances. Sometimes the immune system may attack some of the body's own cells or transplanted organs.	Cell 5	5 AQ 1 UC
5.2h Disease may also be caused by inheritance, toxic substances, poor nutrition, organ malfunction, and some personal behavior. Some effects show up right away; others may not show up for many years.	Cell 2, 3, 7, 8, 13, 16	2 AQ 4 UC 3 AQ 5 UC 7 AQ 1-6 8 AQ 1&2 AD 14 AQ 1-4 16 AQ 7-8
5.2i Gene mutations in a cell can result in uncontrolled cell division, called cancer. Exposure of cells to certain chemicals and radiation increases mutations and thus increases the chance of cancer.	Cell 13	Proc GI
5.2j Biological research generates knowledge used to design ways of diagnosing, preventing, treating, controlling, or curing diseases of plants and animals.	Cell 2, 3, 7, 8, 13, 16	2 AQ 4 UC 3 AQ 5 UC 7 AQ 1-6

PERFORMANCE INDICATOR DESCRIPTOR	SGI LOCATION	WHERE ASSESSED
		8 AQ 1&2 AD 14 AQ 1-4 16 AQ 7-8

PERFORMANCE INDICATOR 5.3

Relate processes at the system level to the cellular level in order to explain dynamic equilibrium in multicelled organisms.

PERFORMANCE INDICATOR DESCRIPTOR	SGI LOCATION	WHERE ASSESSED
5.3a Dynamic equilibrium results from detection of and response to stimuli. Organisms detect and respond to change in a variety of ways both at the cellular level and at the organismal level.	Cell 8, 9	8 AQ 1&2 AD 9 AQ 3, 5, 6 UC
5.3b Feedback mechanisms have evolved that maintain homeostasis. Examples include the changes in heart rate or respiratory rate in response to increased activity in muscle cells, the maintenance of blood sugar levels by insulin from the pancreas, and the changes in openings in the leaves of plants by guard cells to regulate water loss and gas exchange.	Eco 10	AQ 4 AD AQ 6 UC

Key Idea 6: Plants and animals depend on each other and their physical environment.

PERFORMANCE INDICATOR 6.1

Explain factors that limit growth of individuals and populations.

PERFORMANCE INDICATOR DESCRIPTOR	SGI LOCATION	WHERE ASSESSED
6.1a Energy flows through ecosystems in one direction typically from the Sun through photosynthetic organisms including green plants and algae to herbivores to carnivores and decomposers.	Eco 6, 7	6 AQ 1-5 7 AQ 2, 3, 4 UC

PERFORMANCE INDICATOR DESCRIPTOR	SGI LOCATION	WHERE ASSESSED
6.1b The atoms and molecules on the Earth cycle among the living and nonliving components of the biosphere. For example carbon dioxide and water molecules used in photosynthesis to form energy-rich organic compounds are returned to the environment when the energy in these compounds is eventually released by cells. Continual input of energy from sunlight keeps the process going. This concept may be illustrated with an energy pyramid.	Eco 7	7 AQ 2, 3, 4 UC
6.1c The chemical elements such as carbon hydrogen nitrogen and oxygen that make up the molecules of living things pass through food webs and are combined and recombined in different ways. At each link in a food web some energy is stored in newly made structures but much is dissipated into the environment as heat.	Eco 8, 9	8 AQ 3 UC 9 AQ 3, 6 UC
6.1d The number of organisms any habitat can support (carrying capacity) is limited by the available energy water oxygen and minerals and by the ability of ecosystems to recycle the residue of dead organisms through the activities of bacteria and fungi.	Eco 14	AQ 1-9
6.1e In any particular environment, the growth and survival of organisms depend on the physical conditions including light intensity temperature range mineral availability soil/rock type and relative acidity (pH).	Eco 12	AQ 7 UC
6.1f Living organisms have the capacity to produce populations of unlimited size but environments and resources are finite. This has profound effects on the interactions among organisms.	Eco 14, 15	14 AQ 1-9 15 Proc OD
6.1g Relationships between organisms may be negative, neutral or positive. Some organisms may interact with one another in several ways. They may be in a producer/consumer predator/prey or parasite/host relationship; or one organism may cause disease in, scavenge or decompose another.	Eco13	AQ 3 UC

PERFORMANCE INDICATOR 6.2

Explain the importance of preserving diversity of species and habitats.

PERFORMANCE INDICATOR DESCRIPTOR	SGI LOCATION	WHERE ASSESSED
6.2a As a result of evolutionary processes there is a diversity of organisms and roles in ecosystems. This diversity of species increases the chance that at least some will survive in the face of large environmental changes. Biodiversity increases the stability of the ecosystem.	Evo 1, 15	1 AQ 1-6 15 AQ 1, CS ET
6.2b Biodiversity also ensures the availability of a rich variety of genetic material that may lead to future agricultural or medical discoveries with significant value to humankind. As diversity is lost potential sources of these materials may be lost with it.	Evo 1, 2, 15	1 AQ 1-6 2 Proc GI 15 AQ 1, CS ET

PERFORMANCE INDICATOR 6.3

Explain how the living and nonliving environments change over time and respond to disturbances.

PERFORMANCE INDICATOR DESCRIPTOR	SGI LOCATION	WHERE ASSESSED
6.3a The interrelationships and interdependencies of organisms affect the development of stable ecosystems.	Eco 1, 4, 16, 17	1 Proc GI 4 AQ 4 ET 16 AQ 5 AD, 1 UC 17 AQ 1, 2 UC
6.3b Through ecological succession, all ecosystems progress through a sequence of changes during which one ecological community modifies the environment, making it more suitable for another community. These long-term gradual changes result in the community reaching a point of stability that can last for hundreds or thousands of years.	Eco 17	AQ 1, 2 UC
6.3c A stable ecosystem can be altered, either rapidly or slowly, through the activities of organisms (including humans), or through climatic changes or natural disasters. The altered ecosystem can usually recover through gradual changes back to a point of long- term stability.	Eco 1, 4, 16, 17	1 Proc GI 4 AQ 4 ET 16 AQ 5 AD, 1 UC 17 AQ 1, 2 UC

Key Idea 7: Human decisions and activities have had a profound impact on the physical and living environment.

Describe the range of interrelationships of humans with the living and nonliving environment.

PERFORMANCE INDICATOR DESCRIPTOR	SGI LOCATION	WHERE ASSESSED
7.1a The Earth has finite resources; increasing human consumption of resources places stress on the natural processes that renew some resources and deplete those resources that cannot be renewed.	Eco 8, 17, 19 Evol 15	8 AQ 3 UC 17 AQ 1, 2 UC 19 AQ 3 UC 15 AQ 1 ET CS
7.1b Natural ecosystems provide an array of basic processes that affect humans. Those processes include but are not limited to: maintenance of the quality of the atmosphere, generation of soils, control of the water cycle, removal of wastes, energy flow, and recy- cling of nutrients. Humans are changing many of these basic processes and the changes may be detrimental.	Eco 1, 4, 16, 17 Evol 1, 15	1 Proc GI 4 AQ 4 ET 16 AQ 5 AD, 1 UC 17 AQ 1, 2 UC 1 AQ 1-6 15 AQ 1 ET, CS
7.1c Human beings are part of the Earth's ecosystems. Human activities can, deliberately or inadvertently, alter the equilibrium in ecosystems. Humans modify ecosystems as a result of population growth, consumption, and technology. Human destruction of habitats through direct harvesting, pollution, atmospheric changes, and other factors is threatening current global stability, and if not addressed, ecosystems may be irreversibly affected.	Eco 1, 4, 16, 17 Evol 1, 15	1 Proc GI 4 AQ 4 ET 16 AQ 5 AD, 1 UC 17 AQ 1, 2 UC 1 AQ 1-6 15 AQ 1 ET, CS

PERFORMANCE INDICATOR 7.2

Explain the impact of technological development and growth in the human population on the living and nonliving environment.

PERFORMANCE INDICATOR DESCRIPTOR	SGI LOCATION	WHERE ASSESSED
7.2a Human activities that degrade ecosystems result in a loss of diversity of the living and nonliving environment. For example, the influence of humans on other organisms occurs through land use and pollution. Land use decreases the space and resources available to other species, and pollution changes the chemical composition of air, soil, and water.	Eco 1, 4, 16, 17	1 Proc GI 4 AQ 4 ET 16 AQ 5 AD, 1 UC 17 AQ 1, 2 UC
7.2b When humans alter ecosystems either by adding or removing specific organisms, serious consequences may result. For example, planting large expanses of one crop reduces the biodiversity of the area.	Eco 1, 4, 16, 17 Evol 1, 15	1 Proc GI 4 AQ 4 ET 16 AQ 5 AD, 1 UC 17 AQ 1, 2 UC

PERFORMANCE INDICATOR DESCRIPTOR	SGI LOCATION	WHERE ASSESSED
		1 AQ 1-6 15 AQ 1 ET, CS
7.2c Industrialization brings an increased demand for and use of energy and other resources including fossil and nuclear fuels. This usage can have positive and negative effects on humans and ecosystems.	Eco 8, 9	8 AQ 3 UC 9 AQ 3, 6 UC

PERFORMANCE INDICATOR 7.3

Explain how individual choices and societal actions can contribute to improving the environment.

PERFORMANCE INDICATOR DESCRIPTOR	SGI LOCATION	WHERE ASSESSED
7.3a Societies must decide on proposals which involve the introduction of new technologies. Individuals need to make decisions which will assess risks, costs, benefits, and trade-offs.	See for example, Eco 18, 19 Cell 15 Gen 19, 20 Evol 15	18 AQ 1-2 19 AQ 3 UC 15 AQ 1-3 19 AQ 1-3 20 Proc AD ET 15 AQ 1 ET CS
7.3b The decisions of one generation both provide and limit the range of possibilities open to the next generation.	See for example, Eco 18, 19 Cell 15 Gen 19, 20 Evol 15	18 AQ 1-2 19 AQ 3 UC 15 AQ 1-3 19 AQ 1-3 20 Proc AD ET 15 AQ 1 ET CS

APPENDIX A LIVING ENVIRONMENT—LABORATORY CHECKLIST

In addition to demonstrating the performance indicators relating to scientific inquiry described in Standard 1, biology students need to develop proficiency in certain laboratory or technical skills in order to successfully conduct investigations in biological science. During the school year, teachers should ensure that students develop the capacity to successfully perform each of the laboratory skills listed below. Proficiency in performing these laboratory skills may also be evaluated by items found on certain parts of the State's Living Environment assessment.

Note: Includes locations in SGI Biology and LAB-AIDS kits where the skills are assessed.

NYS LE Lab Skill Performance Indicator	SGI Biology Location
Follows safety rules in the laboratory	Each laboratory contains detailed safety notes; see also Appendix D, *Science Classroom Safety*
Selects and uses correct instruments	
• Uses graduated cylinders to measure volume	Eco 2, 10, 11 Cell 8, 11 Gen 2, 9
• Uses metric ruler to measure length	LA 52
• Uses thermometer to measure temperature	
• Uses triple-beam or electronic balance to measure mass	
• Uses a compound microscope/ stereoscope effectively to see specimens clearly, using different magnifications	Cell 2, 3 LA 9, 61, 64
Identifies and compares parts of a variety of cells	Cell 2, 3, 4
Compares relative sizes of cells and organelles	Cell 2, 3, 4
Prepares wet-mount slides and uses appropriate staining techniques	Cell 2, 3 LA 9, 61, 64
Designs and uses dichotomous keys to identify specimens	LA 51
Makes observations of biological processes	Eco 2, 10, 11, 12 Cell 2, 3
Dissects plant and/or animal specimens to expose and identify internal structures	LA 60, 9, 61, 64
Follows directions to correctly use and	Cell 11

NYS LE Lab Skill Performance Indicator	SGI Biology Location
interpret chemical indicators	Gen 9 LA 803S, 80, 81R, 82
Uses chromatography and/or electrophoresis to separate molecules	LA 15, 17
Designs and carries out a controlled, scientific experiment based on biological processes	Eco 10, 11 Cell 11
States an appropriate hypothesis	Eco 10, 11 Cell 11
Differentiates between independent and dependent variables	Eco 10, 11 Cell 11
Identifies the control group and/or controlled variables	Eco 10, 11 Cell 11
Collects, organizes, and analyzes data, using a computer and/or other laboratory equipment	Sus 1,2 Eco 8, 9, 14 Cell 12, 16 Gen 16 Evo 11
Organizes data through the use of data tables and graphs	Sus 1, 5,6 Eco Cell 10 Gen 15, 18 Evo 3, 14,15
Analyzes results from observations/expressed data	Sus 4 Eco 2, 10, 16 Evo 3
Formulates an appropriate conclusion or generalization from the results of an experiment	Eco 10, 11 Cell 11 Gen 6, 7
Recognizes assumptions and limitations of the experiment	Eco 10, 11 Cell 11 Gen 6, 7, 12