

Curriculum Reference Guide

Biology

2015-2016



Course OVERVIEW

Students are required to master the Virginia Standards of Learning for each course in which they are enrolled. This guide is designed to give students and parents an overview of the course requirements as well as the materials needed for each class.

A list of the objectives associated with the course and the timeline in which these objectives will be taught have been compiled in this document. Additionally, students should insert the teacher's tutoring schedule in the space provided.

Students are encouraged to keep the *Curriculum Reference Guide* for each course and to refer to the information throughout the year. It is our hope that this document will be a valuable reference that will assist parents and students in having a successful school year.

Course Description

The Biology standards are designed to provide students with a detailed understanding of living systems. Emphasis continues to be placed on the skills necessary to examine alternative scientific explanations, actively conduct controlled experiments, analyze and communicate information, and gather and use information in scientific literature. The history of biological thought and the evidence that supports it are explored, providing the foundation for investigating biochemical life processes, cellular organization, mechanisms of inheritance, dynamic relationships among organisms, and the change in organisms through time. The importance of scientific research that validates or challenges ideas is emphasized at this level. All students are expected to achieve the content of the biology standards.

The Biology standards continue to focus on student growth in understanding the nature of science. This scientific view defines the idea that explanations of nature are developed and tested using observation, experimentation, models, evidence, and systematic processes. The nature of science includes the concepts that scientific explanations are based on logical thinking; are subject to rules of evidence; are consistent with observational, inferential, and experimental evidence; are open to rational critique; and are subject to refinement and change with the addition of new scientific evidence. The nature of science includes the concept that science can provide explanations about nature and can predict potential consequences of actions, but cannot be used to answer all questions.

Course Expectations

Course Requirements:

Completion of Earth Science with a passing grade of a D or higher.

Grading Rationale:

Nine Weeks Grade

Tests will be administered after the completion of each topic as shown in the course syllabus.

Percentage of Nine Weeks Grade

Homework	10%
Class work (daily)	20%
Quizzes/ Short Term Projects	30%
Tests/Major Projects	40%

The 9 weeks grade is composed of a minimum of the following:

Tests/Major Projects	3
Quizzes/ Short Term Projects	5
Class Work	8
Homework	7

Semester Grade

The semester grade average will be calculated by adding together each nine weeks' grade three times, adding in the semester exam once, and dividing the total by seven (7). This procedure is consistent with school board policy.

Final Grade

The final grade average will be calculated by adding together the two semester grades and dividing by two (2). This procedure is consistent with school board policy.

Materials:

Students are expected to provide the following materials:

- loose leaf paper / notebooks / lab notebooks
- appropriate writing utensils (blue / black ink pens, #2 pencils)
- graph paper (*as needed*)
- colored pencils (*as needed*)
- calculator (*as needed*)
- highlighters
- standard-sized display board for Science Fair project (*optional*)
- additional class materials may be required by individual teachers

Grading Scale

According to school board policy, a ten (10) letter grading key is used to report scholastic progress in the following ranges:

Letter Grade	Score Range	Point Value		
		General	Honors and Pre-IB + (0.5)	Advanced Placement and Dual Enrollment + (1.0)
A	100-93	4.0	4.5	5
A-	92-90	3.7	4.2	4.7
B+	89-87	3.3	3.8	4.3
B	86-83	3.0	3.5	4
B-	82-80	2.7	3.2	3.7
C+	79-77	2.3	2.8	3.3
C	76-73	2.0	2.5	3
C-	72-70	1.7	2.2	2.7
D+	69-67	1.3	1.8	2.3
D	66-63	1.0	1.5	2
D-	62-60	0.3	0.8	1.3
F	below 60	0.0	0.0	0.0



Biology Pace, Scope, and Sequence 2015-2016

CONCEPTS that must be addressed all year are **Scientific investigation and homeostasis**. See VDOE Curriculum framework for detailed essential knowledge and skills for each topic. At least one **Inquiry-based**, Scientific Investigation labs **MUST** be COMPLETED **EVERY** 9 WEEKS. Look up **Enhanced Scope and Sequence** for Biology on the VDOE website for a list of labs.

First Nine Weeks

SOL: BIO.1a

Big Idea: What role does science play in the study of life?

SOL Description	Higher Level Questioning	Resources
<p>The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which:</p> <p>a.) Observations of living organisms are recorded in the lab and in the field.</p> <ul style="list-style-type: none"> conduct investigations in the classroom and field, as appropriate, and critically examine investigations reported in scientific literature and databases. collect preliminary observations, both qualitative and quantitative. 	<p>Cognitive Level</p> <p>Remember Understand Analyze Create</p> <p>Question(s)</p> <p>How do scientists investigate natural phenomena? Create an experiment that can be done outside where you live. Create an experiment that can be done inside your home where you live.</p>	<p>Cricket Lab The VDOE ESS: http://www.doe.virginia.gov/testing/sol/standards_docs/science/2010/lesson_plans/index.shtml *Use this resource throughout the entire course.</p>
<p>Suggested Pacing</p>		
<p>BIO.1 (6 blocks – then ongoing through inquiry-based laboratory investigations)</p>		

First Nine Weeks

SOL: BIO1b-c.

Big Idea: What role does science play in the study of life?

SOL Description	Higher Level Questioning	Resources
<p>b.) Hypotheses are formulated based on direct observations and information from scientific literature.</p> <ul style="list-style-type: none"> • make clear distinctions among observations, inferences, and predictions. • formulate hypotheses based on cause-and-effect relationships. • justify hypotheses based on both preliminary observations and scientific literature. 	<p>Cognitive Level Analyze Evaluate</p> <p>Question(s) Compare and contrast observations, inferences, and hypothesis.</p>	<p>Virtual Laboratories: Dependent and Independent Variables- http://www.mhhe.com/biosci/genbio/virtual_labs_2K8/pages/Dependent_Independent.html</p> <p>PowerPoints: Scientific Method – http://www.e2ccb.org/webpages/rjows/ey/files/science%20and%20the%20scientific</p>
<p>c.) Variables are defined and investigations are designed to test hypotheses.</p> <ul style="list-style-type: none"> • identify the independent variable (IV) and the values of the IV that will be used in the experiment. • select dependent variables that allow collection of quantitative data. • identify variables that must be held constant. • establish controls as appropriate. • write clear, replicable procedures. 	<p>Cognitive Level Understand Analyze Evaluate</p> <p>Question(s) How is the independent variable related to the dependant variable? Why is a control necessary in a valid experiment?</p>	<p>Types of Variables in a Science Fair Project – http://scienceprojectideasforkids.com/2011/types-of-variables-2/</p> <p>Videos: Scientific Method Explained – https://www.youtube.com/watch?v=zcavPAFiG14&index=3&list=PL74524A1390E4B981</p> <p>Variable Manipulatives Hypothesis/Inferences/Observations/Prediction Manipulatives</p>

First Nine Weeks

SOL: BIO1d.

Big Idea: What role does science play in the study of life?

SOL Description	Higher Level Questioning	Resources
<p>d.) Graphing and arithmetic calculations are used as tools in data analysis.</p> <ul style="list-style-type: none"> • record quantitative data in clearly labeled tables with units. • include labeled diagrams in the data record. • determine the range, mean, and values for data, using a graphing calculator and/or computer spreadsheet software. • plot data graphically, showing independent and dependent variables. 	<p>Cognitive Level Analyze Create</p> <p>Question(s) How are graphs used to analyze and report data? Given a set of data create a line graph.</p>	<p>DI Graphing Activity Multiple Line Graphs-Using Data Quantitative and Qualitative Manipulatives</p>

First Nine Weeks

SOL: BIO1e.

Big Idea: What role does science play in the study of life?

SOL Description	Higher Level Questioning	Resources
<p>e.) Conclusions are formed based on recorded quantitative and qualitative data.</p> <ul style="list-style-type: none"> describe trends from data where appropriate, using a graphing calculator and/or computer spreadsheet. use evidence, apply logic, and construct an argument for conclusions based on reported data. 	<p>Cognitive Level Understand Apply Analyze Create</p> <p>Question(s) How are experimental conclusions formed? Compare and contrast qualitative and quantitative data.</p>	<p>Cricket Lab (Inquiry)-(Qualitative Data) M&M Lab (Inquiry)-(Quantitative Data) Quantitative and Qualitative Manipulatives</p>

First Nine Weeks

SOL: BIO1f.

Big Idea: What role does science play in the study of life?

SOL Description	Higher Level Questioning	Resources
<p>f.) Sources of error inherent in experimental design are identified and discussed.</p> <ul style="list-style-type: none"> • recognize and discuss contradictory or unusual data. • determine the extent to which data support/do not support a hypothesis, and propose further hypotheses and directions for continued research. 	<p>Cognitive Level Apply Evaluate Create</p> <p>Question(s) How are experimental conclusions formed? Explain why multiple trials are necessary in experimentation.</p>	

First Nine Weeks

SOL: BIO1g-h.

Big Idea: What role does science play in the study of life?

SOL Description	Higher Level Questioning	Resources
<p>g.) Validity of data is determined.</p> <ul style="list-style-type: none"> discuss the validity of results as related to accuracy, confidence, and sources of experimental error based on number of trials and variance in the data. recognize that in order to ensure the validity of scientific investigations, they must be evaluated by other members of the scientific community. 	<p>Cognitive Level</p> <p>Apply Analyze Evaluate Create</p> <p>Question(s)</p> <p>Are experimental results always valid? How can you identify if data is invalid? Compare and contrast valid and invalid data examples. Why is collaboration important when doing experiments?</p>	<p>Activity-</p> <p>DI Data -Practice multiple trials in an inquiry-based laboratory investigation.</p>
<p>h.) Chemicals and equipment are used in a safe manner.</p>	<p>Cognitive Level</p> <p>Understand</p> <p>Question(s)</p> <p>How is safety maintained in the science laboratory?</p>	<p>Video-</p> <p>https://www.youtube.com/watch?v=WZ-1lfammjk</p> <p>Safety Writing Prompts</p> <p>Activity-</p> <p>Lab Equipment Scavenger Hunt Graduated Cylinder Lab Basic Microscope Lab</p>

First Nine Weeks

SOL: BIO1k.

Big Idea: What role does science play in the study of life?

SOL Description	Higher Level Questioning	Resources
<p>j.) Research utilizes scientific literature.</p> <ul style="list-style-type: none"> recognize that in order to ensure the validity of scientific investigation, they must be evaluated by other members of the scientific community. 	<p>Cognitive Level Apply</p> <p>Question(s) How is scientific knowledge validated and passed on to others? Which of the following would be an appropriate source of valid information?</p> <ol style="list-style-type: none"> Virginia Key to Indigenous Flora and Fauna The Effects of Hydro Carbons on the Chesapeake Bay- Scientific Journal Population Data from the Virginia Department of Fisheries and Wildlife, .gov site. 	<p>Scientific Literature Manipulatives</p>

First Nine Weeks

SOL: BIO1k.

Big Idea: What role does science play in the study of life?

SOL Description	Higher Level Questioning	Resources
<p>k.) Differentiation is made between a scientific hypothesis, theory, and law.</p> <ul style="list-style-type: none"> • compare and contrast hypotheses, theories, and laws. • identify and describe scientific theories that have been changed or modified over time. 	<p>Cognitive Level Remember Understand Apply Analyze</p> <p>Question(s) How do scientific hypotheses, theories, and laws differ? Give specific examples of scientific theories that have been modified over time.</p>	<p>Activity- Hypothesis/Theory/Law Manipulatives</p>

First Nine Weeks

SOL: BIO2 a.

Big Idea: What are the basic chemical principles that affect living things?

SOL Description	Higher Level Questioning	Resources
<p>The student will investigate and understand the chemical and biochemical principles essential for life. Key concepts include:</p> <p>a.) Water chemistry and its impact on life processes.</p> <ul style="list-style-type: none"> explain the importance of the chemical and physical properties of water that make it vital to life. 	<p>Cognitive Level Remember Understand</p> <p>Question(s) What is the elemental make up of a molecule of water? What inference can you make about the unique properties of water to the life processes of organisms? What way would you design a demonstration to show water dissolving different materials?</p>	<p>PowerPoints: Properties of Water – https://drive.google.com/a/spsk12.net/folderview?id=0B8FYbqcmdojfRzMtdXBsSmFtSmM&usp=sharing</p> <p>Worksheets: Properties of Water – https://drive.google.com/a/spsk12.net/folderview?id=0B8FYbqcmdojfU3RDSld1b01yN3M&usp=sharing</p> <p>Activity- Solutions</p> <p>Labs- How many drops can you pile on a penny? Acid/Base Solution Lab without probeware</p> <p>Virtual Lab- Alien Juice Bar: http://scienceview.berkeley.edu/showcase/flash/juicebar.html</p>
<p>Suggested Pacing</p>		
<p>BIO.2a., 1i., 2b-c. (7 Blocks)</p>		

First Nine Weeks

SOL: BIO1i.

Big Idea: What role does science play in the study of life?

SOL Description	Higher Level Questioning	Resources
<p>The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which:</p> <p>i.) Appropriate technology including computers, graphing calculators, and probeware is used for gathering and analyzing data, communicating results, modeling concepts, and simulating experimental conditions.</p> <ul style="list-style-type: none"> identify and use appropriate technology for data collection and analysis, including probeware (i.e., sensors for temperature, pH and dissolved oxygen). 	<p>Cognitive Level Apply</p> <p>Question(s) Identify and describe technology used for data collection and analysis.</p>	<p>Acid/Base Solution Lab with Probeware Heat Capacity Lab with Probeware</p>

First Nine Weeks

SOL: BIO2b.

Big Idea: What are the basic chemical principles that affect living things?

SOL Description	Higher Level Questioning	Resources
<p>b.) The structure and function of macromolecules.</p> <ul style="list-style-type: none"> recognize that the main components of a living cell are carbon, hydrogen, nitrogen, oxygen, phosphorus, and sulfur. Carbon atoms can easily bond to several other carbon atoms in chains and rings to form large complex molecules. explain the role and function the four major categories of macromolecules (lipids, carbohydrates, proteins, and nucleic acids). identify the functions of different types of proteins and recognize the significance that their conformation play in their functions. 	<p>Cognitive Level Remember Understand Apply Evaluate</p> <p>Question (s) What are the four major categories of macromolecules? What are the functions of lipids? What are the functions of carbohydrates? What are the functions of nucleic acids? What are the functions of proteins? What determines the function of a protein?</p>	<p>Worksheets: Macromolecules – https://drive.google.com/a/spsk12.net/folderview?id=0B8FYbqcmdojfRWZ4S1NuYjMyVFU&usp=sharing</p> <p>Miscellaneous Web Sites: 4 types of macromolecules – Flash cards and quizlet – http://quizlet.com/4118661/4-types-of-macromolecules-flash-cards/ Macromolecules – http://www.austincc.edu/biology/assessment/pdf/Module2_Macromolecules.pdf</p> <p>Activities: Protein Models</p> <p>Labs: McMush Lab</p>

First Nine Weeks

SOL: BIO2c.

Big Idea: What are the basic chemical principles that affect living things?

SOL Description	Higher Level Questioning	Resources
<p>c.) The nature of enzymes.</p> <ul style="list-style-type: none"> describe the structure of enzymes and explain their role in acting as catalysts to control the rate of metabolic reactions. 	<p>Cognitive Level Understand Evaluate</p> <p>Question (s) What is an enzyme? What is the function of an enzyme?</p>	<p>PowerPoints: Enzymes - http://highered.mheducation.com/sites/007337797x/student_view0/chapter6/image_powerpoint.html https://drive.google.com/a/spsk12.net/file/d/0B8FYbqcmdojfcDJxbGV1RG1OajA/view?usp=sharing https://drive.google.com/a/spsk12.net/file/d/0B8FYbqcmdojfSUdvv3lIT3FpNmcl/view?usp=sharing</p> <p>Worksheets: Enzymes – https://drive.google.com/a/spsk12.net/file/d/0B8FYbqcmdojfTE1VUURJWFlwVU0/view?usp=sharing</p> <p>Virtual Laboratories: Virtual Enzyme Lab http://www.phschool.com/science/biology_place/labbench/lab2/intro.html</p> <p>Labs: Amylase Lab Bromelin /Pineapple Lab</p>

First Nine Weeks

SOL: BIO3a-b.

Big Idea: How are cell structures adapted to their functions?

SOL Description	Higher Level Questioning	Resources
<p>The student will investigate and understand relationships between cell structure and function. Key concepts include:</p> <p>a.) Evidence supporting the cell theory.</p> <ul style="list-style-type: none"> describe the key events leading to the development of the cell theory. 	<p>Cognitive Level Understand</p> <p>Question(s) What events led to the development of the cell theory? What are the components of the cell theory?</p>	<p>Activity- Cell Theory Foldable</p>
<p>b) Characteristics of prokaryotic and eukaryotic cells.</p> <ul style="list-style-type: none"> Compare and contrast characteristics of prokaryotic and eukaryotic cells. 	<p>Cognitive Level Understand Analyze Evaluate</p> <p>Question(s) In what ways are prokaryotic cells and eukaryotic cells the same and in what ways are they different?</p>	<p>Types of Prokaryotes Advanced Graphic Organizer Cells Alive (http://www.cellsalive.com/) Learn.Genetics "Amazing Cells" (http://learn.genetics.utah.edu/content/cells/)</p>
Suggested Pacing		
BIO.3a-b., 1l., 3c., 4c. 1i. (7 blocks)		

First Nine Weeks

SOL: BIO1.

Big Idea: What role does science play in the study of life?

SOL Description	Higher Level Questioning	Resources
<p>The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which:</p> <p>I.) Alternative scientific explanations and models are recognized and analyzed.</p> <ul style="list-style-type: none"> • recognize that in order to ensure the validity of scientific investigations, they must be evaluated by other members of the scientific community. • identify and describe scientific theories that have been changed or modified over time. 	<p>Cognitive Level</p> <p>Remember Understand Apply</p> <p>Question (s)</p> <p>Who and how did different scientists collaborate on the cell theory?</p>	<p>Cell Theory Foldable</p>

First Nine Weeks

SOL: BIO3c.

Big Idea: How are cell structures adapted to their functions?

SOL Description	Higher Level Questioning	Resources
<p>c.) Similarities between the activities of the organelles in a single cell and a whole organism.</p> <ul style="list-style-type: none"> • compare and contrast the activities of an organelle in a single cell and a whole organism. • identify the following essential cell structures and their functions. <ul style="list-style-type: none"> -the nucleus (contains DNA; site where RNA is made) -ribosome (site of protein synthesis) -mitochondrion (site of cell respiration) -chloroplast (site of photosynthesis) -endoplasmic reticulum (transports materials through the cell) -Golgi (site where cell products are packaged for export) -lysosome (contains digestive enzymes) -cell membrane (controls what enters and leaves the cell) -cell wall (provides support) -vacuole (storage of material) -cytoplasm (contains organelles and site of many chemical reactions) -centriole (organizes spindle fibers in animal cells) -cytoskeleton <p>8/12/2015</p>	<p>Cognitive Level</p> <p>Understand Apply Analyze Evaluate</p> <p>Question(s)</p> <p>Describe the functions of cellular organelles and how the functioning affects the whole organism.</p>	<p>The Cell: An Image Library (http://www.cellimagelibrary.org/home) Cell Model Activity Cell City Analogy Activity</p>

First Nine Weeks

SOL: BIO4c.

Big Idea: What are the basic chemical principles that affect living things?

SOL Description	Higher Level Questioning	Resources
<p>The student will investigate and understand life functions of Archaea, Bacteria and Eukarya. Key concepts include:</p> <p>c.) How the structures and functions vary among and within the Eukarya kingdoms of protists, fungi, plants, and animals, including humans.</p> <ul style="list-style-type: none"> categorize and compare the Eukarya kingdoms based on cell structure, locomotion, reproduction, response to the environment and metabolism. 	<p>Cognitive Level Understand Analyze Evaluate</p> <p>Question(s) Compare and contrast the cellular structures of different protists.</p>	<p>Protist Foldable-Advanced Graphic Organizer</p>

First Nine Weeks

SOL: BIO1i.

Big Idea: What role does science play in the study of life?

SOL Description	Higher Level Questioning	Resources
<p>The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which:</p> <p>i.) Appropriate technology including computers, graphing calculators, and probeware, is used for gathering and analyzing data, communicating results, modeling concepts, and simulating experimental conditions.</p> <ul style="list-style-type: none"> identify and use appropriate technology for data collection and analysis, including probeware (i.e., sensors for temperature, pH and dissolved oxygen). 	<p>Cognitive Level Apply</p> <p>Question(s) Create a Venn Diagram of the two different types of eukaryotic cells.</p>	<p>Cheek Cell Microscope Lab Onion Cell Microscope Lab Pond Water Microscope Lab</p>

Second Nine Weeks

SOL: BIO4f.

Big Idea: Are all microbes that make us sick made of living cells?

SOL Description	Higher Level Questioning	Resources
<p>The student will investigate and understand life functions of Archaea, Bacteria, and Eukarya. Key concepts include:</p> <p>f.) Evidence supporting germ theory of infections disease.</p> <ul style="list-style-type: none"> describe how Pasteur's and Koch's experimentation and hypothesis led to an understanding of the presence of microorganisms and their relationship to diseases. 	<p>Cognitive Level Understand Evaluate</p> <p>Question(s) How does an infectious disease affect a human's ability to maintain homeostasis?</p>	
Suggested Pacing		
BIO 4f., 1l., j. (2 blocks)		

Second Nine Weeks

SOL: BIO11.,j.

Big Idea:

SOL Description	Higher Level Questioning	Resources
<p>The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which:</p> <p>i.) Alternative scientific explanations and models are recognized and analyzed.</p> <ul style="list-style-type: none"> recognize that in order to ensure the validity of scientific investigations, they must be evaluated by other members of the scientific community. identify and describe scientific theories that have been changed or modified over time. 	<p>Cognitive Level Remember Understand Apply</p> <p>Question(s) How do infectious diseases affect human health and cells?</p>	<p>APA Formatted Research Paper on Infectious Diseases (non-viral)</p>
<p>j.) Research utilizes scientific literature.</p> <ul style="list-style-type: none"> recognize that in order to ensure the validity of scientific investigations, they must be evaluated by other members of the scientific community. 	<p>Cognitive Level Apply</p> <p>Question(s) Where can appropriate, valid information on infectious diseases be obtained and used for research purposes.</p>	<p>Scientific Literature on Infectious Diseases (scientific journals, appropriate websites, scientific keys) CDC website NIH website, available literature</p>

Second Nine Weeks

SOL: BIO3d.

Big Idea: How are cell structures adapted to their functions?

SOL Description	Higher Level Questioning	Resources
<p>The student will investigate and understand relationships between cell structure and function. Key concepts include:</p> <p>d.) The cell membrane model.</p> <ul style="list-style-type: none"> • describe how the selective permeability of the cell membrane affects the life of a cell. • describe processes associated with movement across the membrane for diffusion, facilitated diffusion, osmosis, and active transport. • describe the relationship between a cell's external solute concentration and its effect on the cell's internal solute concentration. 	<p>Cognitive Level Understand</p> <p>Question(s) How does the structure of the cell membrane contribute to its ability to control the movement of materials in and out of the cell? How is the cell's internal solute concentration affected by its external solute concentration? How is the cell's internal solute concentration affected by the processes of diffusion, facilitated diffusion, osmosis, and active transport?</p>	<p>Gummy Bear Lab Iodine Baggie Lab Tonicity with Dialysis Tubing Lab</p>
<p>Suggested Pacing</p>		
<p>BIO 3d-e, 4b. (3 blocks)</p>		

Second Nine Weeks

SOL: BIO3e, 4b.

Big Idea: How are cell structures adapted to their functions?

SOL Description	Higher Level Questioning	Resources
<p>e.) The impact of surface area to volume ratio on cell division, material transport, and other life processes.</p> <ul style="list-style-type: none"> compare the efficiency of the ability of a cell to transport material based on surface area to volume ratios. 	<p>Cognitive Level Understand Analyze Evaluate</p> <p>Question(s) Is a mouse's cell the same size as an elephant's cell? Explain why. Create a diagram of a cell explaining why cells remain relatively small.</p>	<p>Balloon (Surface Area/Volume Ratio) Demonstration Surface Area/Volume Ratio Activity/Manipulatives Gelatin Lab</p>
<p>The student will investigate and understand life functions of Archaea, Bacteria and Eukarya. Key concepts include:</p> <p>b.) Maintenance of homeostasis.</p> <ul style="list-style-type: none"> identify the proper response an organism would exhibit in response to changes in the environment to maintain homeostasis. 	<p>Cognitive Level Apply</p> <p>Question(s) How would a cell maintain homeostasis in a high salt concentration solution? Low salt concentration?</p>	<p>Homeostasis Writing Prompts -Tonicity Foldable Activity</p>

Second Nine Weeks

SOL: BIO2d.

**Big Idea: How do plants and other organisms capture energy from the sun?
How do organisms obtain energy?**

SOL Description	Higher Level Questioning	Resources
<p>The student will investigate and understand the chemical and biochemical principles essential for life. Key concepts include:</p> <p>d.) The capture, storage, transformation, and flow of energy through the processes of photosynthesis and respiration.</p> <ul style="list-style-type: none"> • explain how light is the initial source of energy for most communities. • recognize the equations for photosynthesis and respiration and identify the reactants and products. • describe the role of ATP in the storage and release of chemical energy in the cell. • explain the interrelatedness of photosynthesis and cell respiration. 	<p>Cognitive Level Apply Analyze Evaluate</p> <p>Question(s) How is light the initial source of energy for most communities? How is the energy captured by photosynthesizing organisms accessed by non-photosynthesizing organisms? How is ATP used to store and release energy within the cell? In what ways are photosynthesis and cellular respiration complementary processes?</p>	<p>Virtual Laboratories- Water Weed Lab (possible DI opportunities) http://www.biologycorner.com/worksheets/waterweed_sim.html Plant Pigment Chromatography Lab Leaf Stomata Lab Protozoan Behavior Lab Fermentation Lab without probeware Elodea Lab without probeware</p>
<p>Suggested Pacing</p>		
<p>BIO. 2d., 1h., 4a., 1l-m. (5 blocks)</p>		

Second Nine Weeks

SOL: BIO1i.

Big Idea: What role does science play in the study of life?

SOL Description	Higher Level Questioning	Resources
<p>The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which:</p> <p>i.) Appropriate technology including computers, graphing calculators, and probeware, is used for gathering and analyzing data, communicating results, modeling concepts, and simulating experimental conditions.</p> <ul style="list-style-type: none"> identify and use appropriate technology for data collection and analysis, including probeware (i.e., sensors for temperature, pH and dissolved oxygen). 	<p>Cognitive Level Apply</p> <p>Question(s) How can probeware be used to measure gases produced during photosynthesis?</p>	<p>Elodea Lab with probeware Fermentation Lab with probeware Plant Chromatography with UV Spec Lab</p>

Second Nine Weeks

SOL: BIO4a.

**Big Idea: How do plants and other organisms capture energy from the sun?
How do organisms obtain energy?**

SOL Description	Higher Level Questioning	Resources
<p>The student will investigate and understand life functions of Archaea, Bacteria and Eukarya. Key concepts include:</p> <p>a.) Comparison of metabolic activities.</p> <ul style="list-style-type: none"> compare and contrast the metabolic activities of all domains of life. 	<p>Cognitive Level</p> <p>Understand Analyze Evaluate</p> <p>Question(s)</p> <p>Create a table explaining how all bacteria, and all eukaryotes, metabolize (the process), the organelles involved in the process, the products produced, and the reactants needed in the process.</p>	<p>Metabolism Project Metabolism Foldable</p>

Second Nine Weeks

SOL: BIO11-m.

Big Idea: What role does science play in the study of life?

SOL Description	Higher Level Questioning	Resources
<p>l.) Alternative scientific explanations and models are recognized and analyzed.</p> <ul style="list-style-type: none"> recognize that in order to ensure the validity of scientific investigations, they must be evaluated by other members of the scientific community. identify and describe scientific theories that have been changed or modified over time. 	<p>Cognitive Level Remember Understand Apply</p> <p>Question (s) How did different scientists (Priestly and Bonnett) collaborate on the discovery of gases during photosynthesis?</p>	<p>Metabolism Project</p>
<p>m.) Current applications of biological concepts are used.</p> <ul style="list-style-type: none"> identify and describe scientific theories that have been changed or modified over time. 	<p>Cognitive Level Understand Apply</p> <p>Question(s) How do current biological concepts (metabolism) lead to change or modification of what we know about life on Mars?</p>	<p>Video- TED Talk: http://www.ted.com/talks/joel_le_vine?language=en with possible writing prompt.</p>

Second Nine Weeks

SOL: BIO5e.

Big Idea: What is the structure of DNA, and how does it function in genetic inheritance?

SOL Description	Higher Level Questioning	Resources
<p>The student will investigate and understand common mechanisms of inheritance and protein synthesis. Key concepts include:</p> <p>e) Historical development of the structural model of DNA</p> <ul style="list-style-type: none"> describe the key events leading to the development of the structural model of DNA. 	<p>Cognitive Level Remember Understand Evaluate</p> <p>Question(s) Discuss the events and explain the experiments that were significant in the development the DNA model.</p>	<p>Video with notes- https://www.youtube.com/watch?v=6xhmUd9gcHM</p>
<p>Suggested Pacing</p>		
<p>BIO. 5e., 1l., 5g-h. (6 blocks)</p>		

Second Nine Weeks

SOL: BIO1.

Big Idea: What role does science play in the study of life?

SOL Description	Higher Level Questioning	Resources
<p>I.) Alternative scientific explanations and models are recognized and analyzed</p> <ul style="list-style-type: none"> recognize that in order to ensure the validity of scientific investigations, they must be evaluated by other members of the scientific community. identify and describe scientific theories that have been changed or modified over time. 	<p>Cognitive Level</p> <p>Remember Understand Apply</p> <p>Question(s)</p> <p>How did different scientists (collaborate on the discovery of DNA?</p>	<p>History of DNA, Foldable</p>

Second Nine Weeks

SOL: 5g-h.

**Big Idea: What is the structure of DNA, and how does it function in genetic inheritance?
How does information flow from the cell nucleus to direct the synthesis of proteins in the cytoplasm?**

SOL Description	Higher Level Questioning	Resources
<p>g) The structure, function, and replication of nucleic acids.</p> <ul style="list-style-type: none"> describe the basic structure of DNA and its function in inheritance. explain the process of DNA replication. 	<p>Cognitive Level Understand Evaluate</p> <p>Questions(s) Summarize the steps that occur during the process of DNA replication.</p>	<p>DNA Model Activity DNA Extraction Lab (can try with different types of cells for DI) DNA Replication Activity</p>
<p>h.) Events involved in the construction of proteins.</p> <ul style="list-style-type: none"> given a DNA sequence, write a complementary mRNA strand (A-U, T-A, C-G and G-C). explain the process of protein synthesis, including DNA transcription and translation. 	<p>Cognitive Level Understand Evaluate Create</p> <p>Questions(s) Explain how the arrangement of nucleotides in DNA determines the arrangement of amino acids in the primary structure of a protein. How might a change in the arrangement of nucleotides in DNA, influence the primary structure of a protein?</p>	<p>Protein Synthesis Manipulatives Protein Synthesis Activity Alien Genetics</p>

Second Nine Weeks

SOL: BI05a, c.

Big Idea: How does a cell produce a new cell?

SOL Description	Higher Level Questioning	Resources
<p>The student will investigate and understand common mechanisms of inheritance and protein synthesis. Key concepts include:</p> <p>a) Cell growth and division.</p> <ul style="list-style-type: none"> create a diagram to model the stages of mitosis and explain the processes occurring at each stage. 	<p>Cognitive Level Apply Create</p> <p>Question(s) Construct diagrams showing the processes of mitosis and describe the events occurring in each.</p>	<p>Activities: PMAT Manipulative Cell Cycle Foldable</p>
<p>c) Cell specialization.</p> <ul style="list-style-type: none"> describe the importance of cell specialization in the development of multicellular organisms. 	<p>Cognitive Level Understand Evaluate</p> <p>Question(s) Why is cell specialization necessary in the development of multicellular organisms?</p>	
<p>Suggested Pacing</p>		
<p>BIO. 5a., c. (4 blocks)</p>		

Third Nine Weeks

SOL: BIO5d.

Big Idea: How does cellular information pass from one generation to another?

SOL Description	Higher Level Questioning	Resources
<p>The student will investigate and understand common mechanisms of inheritance and protein synthesis. Key concepts include:</p> <p>b.) Gamete formation.</p> <ul style="list-style-type: none"> • create a diagram to model the stages of meiosis and explain the processes occurring at each stage. • compare and contrast the process of mitosis and meiosis and determine under which conditions each process will occur. 	<p>Cognitive Level</p> <p>Understand Apply Analyze Evaluate Create</p> <p>Question(s)</p> <p>Construct diagrams showing the processes of meiosis and describe the events occurring in each. In what ways are mitosis and meiosis the same and in what ways are they different? Which cells undergo mitosis and which undergo meiosis?</p>	
Suggested Pacing		
BIO 5b., d., f., j., 1l., j. (10 blocks)		

Third Nine Weeks

SOL: BIO5d.

**Big Idea: How does cellular information pass from one generation to another?
How can we use genetics to study human inheritance?**

SOL Description	Higher Level Questioning	Resources
<p>d) Prediction of inheritance of traits based on the Mendelian laws of heredity.</p> <ul style="list-style-type: none"> explain how the Mendelian laws of heredity apply to the patterns of inheritance. identify the traits expressed from a given genotype. Use a Punnett square to show all possible combinations of gametes and the likelihood that particular combinations will occur in monohybrid and dihybrid crosses. 	<p>Cognitive Level</p> <p>Remember Understand Evaluate Apply</p> <p>Question(s)</p> <p>How are phenotypes influenced by homozygous dominant, heterozygous, and homozygous recessive genotypes?</p> <p>Assess the likelihood that particular genotypes/phenotypes will occur in the cross between particular gametes in monohybrid and dihybrid crosses.</p> <p>How are karyotypes used to determine the sex of a person and their genetic health?</p>	<p>Websites-</p> <p>Bozeman Science (http://www.bozemanscience.com/biology-main-page/) Crash Course (http://goo.gl/HdWJMd) Khan Academy: Cellular & Molecular Biology (https://www.khanacademy.org/science/biology/cellular-molecular-biology) Cells Alive (http://www.cellsalive.com/) Learn.Genetics (http://learn.genetics.utah.edu/) HHMI Biointeractive (http://www.hhmi.org/biointeractive)</p> <p>Labs-</p> <p>Oompah Loompah Genetics Virtual Labs- Blood Typing Simulation Lab:</p>

Third Nine Weeks

SOL: BIO5f., j.

**Big Idea: How does cellular information pass from one generation to another?
How can we use genetics to study human inheritance?
How and why do scientists manipulate DNA in living cells?**

SOL Description	Higher Level Questioning	Resources
<p>f.) Genetic variation</p> <ul style="list-style-type: none"> • evaluate karyotype charts and make a determination of the gender and genetic health of the individual. • provide examples of reasons for genetic diversity and why it can be an advantage for populations. • provide examples of mutations that are lethal, harmful, and beneficial. 	<p>Cognitive Level</p> <p>Understand Apply Analyze</p> <p>Question(s)</p> <p>Explain how genetic diversity occurs and why it may be beneficial for a population. How can karyotypes be analyzed to see genetic variation in different people?</p>	<p>Karyotype Lab Mutation Lab</p>
<p>j.) Exploration of the impact of DNA technologies</p> <ul style="list-style-type: none"> • evaluate examples of genetic engineering and the potential for controversy. 	<p>Cognitive Level</p> <p>Evaluate</p> <p>Question(s)</p> <p>Assess ways in which genetic engineering is used and defend your position on whether its use may be considered unethical within society.</p>	<p>Socratic Seminar on Ethics in Biotechnology Biotechnology Simulations- http://learn.genetics.utah.edu/</p>

Third Nine Weeks

SOL: BIO11.,j.

Big Idea:

SOL Description	Higher Level Questioning	Resources
<p>The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which:</p> <p>i.) Alternative scientific explanations and models are recognized and analyzed.</p> <ul style="list-style-type: none"> recognize that in order to ensure the validity of scientific investigations, they must be evaluated by other members of the scientific community. identify and describe scientific theories that have been changed or modified over time. 	<p>Cognitive Level Remember Understand Apply</p> <p>Question(s) How do genetic disorders affect human health? What are some common genetic disorders and their characteristics?</p>	<p>APA Formatted Research Paper on Genetic Diseases</p>
<p>j.) Research utilizes scientific literature.</p> <ul style="list-style-type: none"> recognize that in order to ensure the validity of scientific investigations, they must be evaluated by other members of the scientific community. 	<p>Cognitive Level Apply</p> <p>Question(s) Where can appropriate, valid information on genetic disorders be obtained and used for research purposes.</p>	<p>Scientific Literature on Infectious Diseases (scientific journals, appropriate websites, scientific keys) NIH website, available literature</p>

Third Nine Weeks

SOL: BIO4c.

Big Idea: What is the goal of biologists who classify living things?
How do protists and fungi affect the homeostasis of other organisms and ecosystems?
What are the five main groups of plants, and how have four of these groups adapted to life on land?
What characteristic and traits define animals?
How do the structures of animals allow them to obtain essential materials and eliminate wastes?
How do the body systems of animals allow them to collect information about their environments and respond appropriately?
How do changes in the environment affect the reproduction, development, and growth of plants?

SOL Description	Higher Level Questioning	Resources
<p>The student will investigate and understand life functions of Archaea, Bacteria and Eukarya. Key concepts include:</p> <p>c.) How the structures and functions vary among and within the Eukarya kingdoms of protists, fungi, plants, and animals, including humans.</p> <ul style="list-style-type: none"> • categorize and compare the Eukarya kingdoms based on cell structure, locomotion, reproduction, response to the environment and metabolism. 	<p>Cognitive Level</p> <p>Understand Analyze Evaluate</p> <p>Question(s)</p> <p>Compare and contrast the Eukarya kingdoms by creating a chart describing their cell structure, locomotion, reproduction, response to the environment and metabolism.</p>	<p>Kingdom Characteristics Manipulatives</p>
<p>Suggested Pacing</p>		
<p>BIO 4a., e., 6a-e. (5 blocks)</p>		

Third Nine Weeks

SOL: BIO4e.

Big Idea: Are all microbes that make us sick made of living cells?

SOL Description	Higher Level Questioning	Resources
<p>e.) How viruses compare with organisms.</p> <ul style="list-style-type: none"> compare and contrast a virus and a cell in relation to genetic material and reproduction. 	<p>Cognitive Level</p> <p>Understand Analyze Evaluate</p> <p>Question(s)</p> <p>Create a Venn diagram that compares and contrasts viruses and cells in relation to structures, genetic material, and reproduction.</p>	<p>Viruses Advanced Graphic Organizer</p>

Third Nine Weeks

SOL: BIO6a-b.

**Big Idea: How do fossils help biologists understand the history of life on Earth?
What is the goal of biologists who classify living things?**

SOL Description	Higher Level Questioning	Resources
<p>The student will investigate and understand bases for modern classification systems. Key concepts include:</p> <p>a.) Structural similarities among organisms.</p> <ul style="list-style-type: none"> • construct and utilize dichotomous keys to classify groups of objects and organisms • describe relationships based on homologous structures. • investigate flora and fauna in field investigations and apply classification systems. 	<p>Cognitive Level</p> <p>Understand Apply Evaluate Create</p> <p>Question(s)</p> <p>How are dichotomous keys used to compare and contrast organisms?</p>	<p>Dichotomous Key of Virginia's Native Plants Homologous Structures Fossil Flipbooks – The world's history book Phone App for Leaf Identification Adaptation of the Thumb Lab</p>
<p>b.) Fossil record interpretation.</p> <ul style="list-style-type: none"> • compare structural characteristics of an extinct organism, as evidenced by its fossil record, with present, familiar organisms. 	<p>Cognitive Level</p> <p>Understand Analyze Evaluate</p> <p>Question(s)</p> <p>What are some similarities between extinct animals and those currently threatened with extinction?</p>	

Does a similarity in DNA explain species relationships?
Third Nine Weeks

SOL: BIO6c-d.

Big Idea: What is the goal of biologists who classify living things?

SOL Description	Higher Level Questioning	Resources
<p>c.) Comparison of developmental stages in different organisms.</p> <ul style="list-style-type: none"> recognize similarities in embryonic stages in diverse organisms in the animal kingdom, from zygote through embryo and infer relationships. 	<p>Cognitive Level Remember Understand Apply</p> <p>Question(s) What is the relationship between species form and function?</p>	<p>Classification manipulatives</p>
<p>d.) Examination of biochemical similarities and differences among organisms.</p> <ul style="list-style-type: none"> compare biochemical evidence (DNA sequences, amino acid sequences) and describe relationships. 	<p>Cognitive Level Understand Analyze Evaluate</p> <p>Question(s) Does a similarity in DNA explain species relationships?</p>	<p>DNA Fingerprinting Activity</p>

Third Nine Weeks

SOL: BIO6e.

Big Idea: What is the goal of biologists who classify living things?

SOL Description	Higher Level Questioning	Resources
<p>e.) Systems of classification that are adaptable to new scientific discoveries.</p> <ul style="list-style-type: none"> • interpret a cladogram or phylogenetic tree showing evolutionary relationships among organisms. • investigate flora and fauna in field investigations and apply classification systems. 	<p>Cognitive Level</p> <p>Understand Apply Analyze Evaluate</p> <p>Question(s)</p> <p>What is the name of the system used to classify living organisms?</p> <p>What are the six kingdoms of biotic organisms, and how are these organisms classified?</p>	<p>Cladogram Practice Problems Cladogram Construction Building the perfect animal</p>

Third Nine Weeks

SOL: BIO7a.

**Big Idea: What is natural selection?
How can populations evolve to form new species?
How do fossils help biologists understand the history of life on Earth?**

SOL Description	Higher Level Questioning	Resources
<p>The student will investigate and understand how populations change through time. Key concepts include:</p> <p>a.) Evidence found in fossil records.</p> <ul style="list-style-type: none"> • determine the relative age of a fossil given information about its position in the rock and absolute dating by radioactive decay. • differentiate between relative and absolute dating based on fossils in biological evolution. 	<p>Cognitive Level Understand Analyze Evaluate</p> <p>Question(s) What is the difference in relative dating and absolute dating of fossil ages? How does the location of a fossil affect the evaluation of the fossil's age?</p>	<p>Video- www.HHMI.org/biointeractive Fossil evidence changing over time.</p>
Suggested Pacing		
BIO 7a-e. (5 blocks)		

Third Nine Weeks

SOL: BIO7b-c.

**Big Idea: What is natural selection?
How can populations evolve to form new species?
What factors contribute to changes in populations?**

SOL Description	Higher Level Questioning	Resources
<p>b.) How genetic variation, reproductive strategies, and environmental pressures impact the survival of populations.</p> <ul style="list-style-type: none"> • recognize that adaptations may occur in populations of organisms over a period of time. • describe the impact of reproductive strategies and rates on a population's survival. • describe how genetic variation can lead to gradual changes in populations and the emergence of new species over time. • predict the impact of environmental pressures on populations. 	<p>Cognitive Level Understand Evaluate Create</p> <p>Question(s) How can the true meaning of the phrase "survival of the fittest" be described?</p>	<p>Biology Corner-Peppered Moth Simulation Video: www.HHMI.org/biointeractive</p>
<p>c.) How natural selection leads to adaptations</p> <ul style="list-style-type: none"> • explain how natural selection leads to changes in gene frequency in a population over time. 	<p>Cognitive Level Understand Evaluate</p> <p>Question(s) What factors determine the speed at which a species can evolve?</p>	<p>Rift Research – Reports on rift valley in Africa to show isolation Evolution Island/Bird Beak Simulation Lab Darwin's Finches Bio Evolution Strategies Venn Diagrams Laboratory: Process of Natural Selection</p>

Third Nine Weeks

SOL: BIO7d-e.

**Big Idea: What is natural selection?
How can populations evolve to form new species?
What factors contribute to changes in populations?**

SOL Description	Higher Level Questioning	Resources
<p>d.) Emergence of new species.</p> <ul style="list-style-type: none"> describe how genetic variation can lead to gradual changes in populations and the emergence of new species over time. 	<p>Cognitive Level Understand Evaluate</p> <p>Question(s) How can the presence or absence of an adaptation impact a species survival?</p>	
<p>e.) Scientific evidence and explanations for biological evolution.</p> <ul style="list-style-type: none"> compare and contrast punctuated equilibrium with gradual change over time. 	<p>Cognitive Level Understand Analyze Evaluate</p> <p>Question(s)How are punctuated equilibrium and gradualism similar and how do they differ? How does natural selection impact the development of new species?</p>	<p>Video: www.HHMI.org/biointeractive Got lactase? Coevolution of gene and culture.</p>

Fourth Nine Weeks

SOL: BIO8a.

Big Idea: What factors contribute to changes in population?

SOL Description	Higher Level Questioning	Resources
<p>The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. Key concepts include:</p> <p>a.) Interactions within and among populations including carrying capacities, limiting factors, and growth curves.</p> <ul style="list-style-type: none"> • graph and interpret a population growth curve and identify the carrying capacity of the populations. • make predictions about changes that could occur in population numbers as the result of population interactions. 	<p>Cognitive Level</p> <p>Remember Understand Apply Evaluate Create</p> <p>Question(s)</p> <p>What factors can limit the growth of a species population? What internal and external factors can affect a species' population size?</p>	<p>Parasite Investigation-RAFT Develop and illustrate each of the three ecosystem pyramids. Ooey Gooey Guts Lab</p>
<p>Suggested Pacing</p>		
<p>BIO 8a., 1d., 8b-e. (7 blocks)</p>		

First Nine Weeks

SOL: BIO1d.

Big Idea: What role does science play in the study of life?

SOL Description	Higher Level Questioning	Resources
<p>The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which:</p> <p>d.) Graphing and arithmetic calculations are used as tools in data analysis.</p> <ul style="list-style-type: none"> • record quantitative data in clearly labeled tables with units. • include labeled diagrams in the data record. • determine the range, mean, and values for data, using a graphing calculator and/or computer spreadsheet software. • plot data graphically, showing independent and dependent variables. 	<p>Cognitive Level Analyze Create</p> <p>Question(s) How can trends in population numbers be determined by looking at a population graph? Create a graph showing the carrying capacity of a population? How do you know a population is growing exponentially? Logistically? or has reached its carrying capacity?</p>	<p>Kaibab Deer Graphing Activity</p>

Fourth Nine Weeks

SOL: BIO8b-c.

**Big Idea: How do living and nonliving parts of the Earth interact and affect the survival of organisms?
How do abiotic and biotic factors shape ecosystems?**

SOL Description	Higher Level Questioning	Resources
<p>b.) Nutrient cycling with energy flow through ecosystems.</p> <ul style="list-style-type: none"> illustrate and/or model the key processes in the water, carbon, and nitrogen cycle and explain the role of living things in each of the cycles. given an illustration of a food chain and a food web, identify each organism as a producer (autotroph), consumer (primary/second order), or decomposer and describe their role in the ecosystem. interpret how the flow of energy occurs between trophic levels in all ecosystems in each of the following: <ul style="list-style-type: none"> -food chain -food web -Pyramid of energy -Pyramid of biomass -Pyramid of numbers 	<p>Cognitive Level Understand Apply Evaluate Create</p> <p>Question(s) Construct and manipulate models of the nutrient cycles. In which direction does energy flow in a food chain? What amount of energy is available at each trophic level of a food chain? How are the energy, biomass, and number pyramids similar, how are they different?</p>	<p>Biogeochemical Cycles Activity Ecosystem Levels Analogies Flip Book Develop and illustrate each of the three ecosystem pyramids. Biogeochemical Cycles Activity The Great Pyramid Activity Energy/Trophic Pyramid Manipulative</p>
<p>c.) Succession patterns in ecosystems.</p> <ul style="list-style-type: none"> describe the patterns of succession found in aquatic and terrestrial ecosystems of Virginia. identify the similarities and differences between primary and secondary succession. describe the characteristics of a climax community. <p>8/12/2015</p>	<p>Cognitive Level Understand Apply Evaluate</p> <p>Question(s) What are the sequence of events that occur during ecosystem succession? Why does succession occur at a faster rate on an old farm than a natural ecosystem?</p>	<p>Succession Brochure/Comic Strip Ecological Succession Activity</p>

Fourth Nine Weeks

SOL: BIO8d.

Big Idea: How have human activities shaped local and global ecology?

SOL Description	Higher Level Questioning	Resources
<p>d.) The effects of natural events and human activities on ecosystems.</p> <ul style="list-style-type: none"> • identify and describe an ecosystem in terms of the following: <ul style="list-style-type: none"> -effects of biotic and abiotic components -examples of interdependence -evidence of human influences -energy flow and nutrient cycling -diversity analysis • evaluate examples of human activities that have negative and positive impacts on Virginia's ecosystems. 	<p>Cognitive Level</p> <p>Understand Apply Evaluate</p> <p>Question(s)</p> <p>What is the criteria for an organism to be considered biotic vs. abiotic? How do humans impact the survival of other species?</p>	<p>Laboratory: The Effects of Acidity on Seed Germination</p>

Fourth Nine Weeks

SOL: BIO8e.

Big Idea: How do living and nonliving parts of the Earth interact and affect the survival of organisms?

SOL Description	Higher Level Questioning	Resources
<p>e.) Analysis of the flora, fauna, and microorganisms of Virginia ecosystems</p> <ul style="list-style-type: none"> use local ecosystems to apply ecological principles in the classroom and in the field where appropriate, using field guides and dichotomous keys for identifying and describing flora and fauna that characterize the local ecosystem. evaluate examples of human activities that have negative and positive impacts on Virginia's ecosystems. recognize that the Chesapeake Bay watershed includes the majority of Virginia and human activities play an important role in its health. 	<p>Cognitive Level</p> <p>Understand Apply Analyze Evaluate</p> <p>Question(s)</p> <p>Create a food web of Virginia's Chesapeake Bay Watershed, or other Tidewater Area Watershed Systems ecosystem. Identify positive and negative impacts humans have had on these ecosystems.</p>	<p>Chesapeake Bay Watershed Activity Design a Food Web of organisms found in VA natural ecosystems</p>