SCIENCE

RHINEBECK PRIORITIZED CURRICULUM

The Living Environment

Biology

Standard 1:	**Students will use mathematical analysis, scientific inquiry, and engineering design, as appropriate, to pose questions, seek answers, and develop solutions**
Key Idea 1:	**The central purpose of scientific inquiry is to develop explanations of natural phenomena in a continuing and creative process.**

Background:

Science relies on logic and creativity. Science is both a body of knowledge and a way of knowing- an intellectual and social process that applies human intelligence to explaining how the world works. Scientific explanations are developed using both observations (evidence) and what people already know about the world (scientific knowledge). All scientific explanations are tentative and subject to change. Good science involves questioning, observing and inferring, experimenting, finding evidence, collecting and organizing data, drawing valid conclusions and undergoing peer review. Understanding the scientific view of the natural world is an essential part of personal, societal, and ethical decision making. Scientific literacy involves internalizing the scientific critical attitude so that it can be applied in everyday life, particularly in relation to health, commercial, and technological claims. Also, see Laboratory Checklist in Appendix A.

Guiding Questions:

What is Science?
What is "Good Science"?
Describe a scientifically literate person.
What is scientific inquiry?
What is the scientific method?
Why is the scientific method used to solve problems in science?

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Standard 1:Key Idea 1: Performance Indicator 1.1: Elaborate on basic scientific and personal explanations of natural phenomena, and develop extended visual models and mathematical formulations to represent one's thinking.				
Essential Knowledge/Skills (Major Understandings)	***Essential Questions***	***Classroom Ideas***	***Assessment Ideas***	***Vocabulary***
1.1a Scientific explanations are built by combining evidence that can be observed with what people already know about the world. 1.1b Learning about the historical development of scientific concepts or about individuals who have contributed to scientific knowledge provides a better understanding of scientific inquiry and the relationship between science and society. 1.1c Science provides knowledge but values are also essential to making effective and ethical decisions about the application of scientific knowledge.	▪ How are scientific explanations developed? ▪ Why is learning about the historical development of scientific concepts or contributing individuals important? ▪ Why do we need ethics in science?	▪ Scientific methods labs (ex: Investigating common descent) ▪ Lectures ▪ Mini-labs ▪ Formal labs ▪ Development of a time line, placing important events and scientists in time order ▪ Newsprint summary ▪ Films ▪ Socratic Seminars: Genetic Engineering ▪ Debates ▪ Current research article summaries ▪ Persuasive essays ▪ Write a problem ▪ Bioethics articles	▪ Mini labs ▪ Lab reports ▪ Journal writing ▪ Chapter tests ▪ Homework checks ▪ Quizzes ▪ Check problem	▪ Assumption ▪ Bias ▪ Conclusion ▪ Control ▪ Controlled experiment ▪ Data ▪ Dependent variable ▪ Evidence ▪ Experiment ▪ Hypothesis ▪ Indepent variables ▪ Inference model ▪ Observation ▪ Opinion ▪ Peer review ▪ Research plan ▪ Scientific literacy

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Standard 1:Key Idea 1: Performance Indicator 1.2: Have ideas through reasoning, library research, discussion with others, including experts.				
Essential Knowledge/Skills (Major Understandings)	***Essential Questions***	***Classroom Ideas***	***Assessment Ideas***	***Vocabulary***
1.2a Inquiry involves asking questions and locating, interpreting, and processing information from a variety of sources. 1.2b Inquiry involves making judgments about the reliability of the source and relevance of information.	▪ What is involved in science inquiry?	▪ Lab: Garlic root growth (All scientific method labs include background research, problem questions, lab design, analyzing and concluding about data collected) ▪ Library research ▪ Lectures ▪ Mini-labs ▪ A labs- Error analysis component ▪ Evaluate scientific vs. lay mans articles on a scientific topic ▪ Journal writing ▪ Library and online research	▪ Mini labs ▪ Lab reports ▪ Journal writing ▪ Chapter tests ▪ Quizzes ▪ Check problem	

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Standard 1:Key Idea 1: Performance Indicator 1.3: Work toward reconciling competing explanations; clarify points of agreement and disagreement.				
Essential Knowledge/Skills (Major Understandings)	***Essential Questions***	***Classroom Ideas***	***Assessment Ideas***	***Vocabulary***
1.3a Scientific explanations are accepted when they are consistent with experimental and observational evidence and when they lead to accurate predictions. 1.3b All scientific explanations are tentative and subject to change or improvement. Each new bit of evidence can create more questions than it answers. This leads to increasingly better understanding of how things work in the living world.	▪ When are scientific explanations accepted? ▪ Do scientific explanations ever change? When?	▪ Error analysis in scientific method labs ▪ Student research projects: - human genome project - nutritional research - ecology research - cancer research - genetics disease research ▪ Class discussions ▪ Socratic seminars ▪ Suggestions for improvement in lab conclusions ▪ Connections lab ▪ Brainstorm concept map ▪ Journal writing	▪ Mini labs ▪ Lab reports ▪ Journal writing ▪ Chapter tests ▪ Quizzes ▪ Project/poster rubric ▪ Short paper (2-4 pg.) rubric	
Standard 1:Key Idea 1: Performance Indicator 1.4: Coordinate explanations at different levels of scale, points of focus, and degrees of complexity and specificity, and recognize the need for such alternative representations of the natural world.				
Essential Knowledge/Skills (Major Understandings)	***Essential Questions***	***Classroom Ideas***	***Assessment Ideas***	***Vocabulary***
1.4a Well-accepted theories are ones that are supported by different kinds of scientific investigations often involving the contributions of individuals from different disciplines.	▪ What is a scientific theory?	▪ Study topics that are interdisciplinary: - x-ray diffraction - DNA analysis - Molecular biology - Technology ▪ Time line ▪ Library and online research ▪ film	▪ Homework check ▪ Quizzes ▪ Chapter test ▪ Short paper (2-4 pg.) rubric	

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Standard 1:	**Students will use mathematical analysis, scientific inquiry, and engineering design, as appropriate, to pose questions, seek answers, and develop solutions**
Key Idea 2:	**Beyond the use of reasoning and consensus, scientific inquiry involves the testing of proposed explanations involving the use of conventional techniques and procedures and usually requiring considerable ingenuity.**
Guiding Questions: What is the scientific method? What is a controlled experiment and how does it relate to the scientific method?	

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Standard 1:Key Idea 2: Performance Indicator 2.1: Devise ways of making observations to test proposed explanations.				
Essential Knowledge/Skills (Major Understandings)	***Essential Questions***	***Classroom Ideas***	***Assessment Ideas***	***Vocabulary***
2.1a Devise ways of making observations to test proposed explanations	▪ What is an observation? ▪ How is a qualitative observation different from a quantitative observation	▪ Hershey's kiss found by Neil Armstrong on moon scenario ▪ Scientific method labs	▪ Mini labs ▪ Lab reports ▪ Short paper (2-4 pages)	

Standard 1:Key Idea 2: Performance Indicator 2.2: Refine research ideas through library investigations, including electronic information retrieval and reviews of the literature, and through peer feedback obtained from review and discussion.				
Essential Knowledge/Skills (Major Understandings)	***Essential Questions***	***Classroom Ideas***	***Assessment Ideas***	***Vocabulary***
2.2a Development of a research plan involves researching background information and understanding the major concepts in the area being investigated. Recommendations for methodologies, use of technologies, proper equipment, and safety precautions should also be included.	▪ What are the essential parts of a research plan? ▪ What are safety procedures that always need to be followed in a lab setting?	▪ Ecology research papers ▪ DNA and protein synthesis variety show ▪ Peer review ▪ Inquiry Lab activities ▪ Research papers ▪ Scientific method lab ▪ Short paper(2-4 pages) ▪ Library and online research ▪ State required labs	▪ Mini labs ▪ Lab reports ▪ Short paper (2-4 pages)	

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Standard 1:Key Idea 2: Performance Indicator 2.3:		**Develop and present proposals including formal hypotheses to test explanations; i.e., predict what should be observed under specific conditions if the explanation is true.**		
Essential Knowledge/Skills (Major Understandings)	***Essential Questions***	***Classroom Ideas***	***Assessment Ideas***	***Vocabulary***
2.3a Hypotheses are predictions based upon both research and observation. 2.3b Hypotheses are widely used in science for determining what data to collect and as a guide for interpreting the data. 2.3c Development of a research plan for testing a hypothesis requires planning to avoid bias (e.g., repeated trials, large sample size, and objective data-collecting techniques).	▪ What is a hypothesis? ▪ How are hypotheses used in science? ▪ What are the "elements" of a good experiment?	▪ Scientific method labs ▪ Mini labs ▪ Formal labs ▪ Write a problem ▪ State required labs	▪ Mini labs ▪ Lab reports ▪ Problem writing	
Standard 1:Key Idea 2: Performance Indicator 2.4:		**Carry out a research plan for testing explanations, including selecting and developing techniques, acquiring and building apparatus, and recording observations as necessary.**		
Essential Knowledge/Skills (Major Understandings)	***Essential Questions***	***Classroom Ideas***	***Assessment Ideas***	***Vocabulary***
2.4a Carry out a research plan for testing explanations including selecting and developing techniques, acquiring and building apparatus, and recording observations as necessary	▪ What procedure would you follow to test your hypothesis? ▪ What materials do you need to test your hypothesis? ▪ How will you design and build the appropriate apparatus to test your hypothesis?	▪ Scientific method labs ▪ Mini labs ▪ Formal labs ▪ Write a problem ▪ State required labs ▪ Design and build apparatus to test the hypothesis	▪ Mini labs ▪ Lab reports ▪ Problem writing ▪ Testing the designed apparatus	

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Standard 1:	**Students will use mathematical analysis, scientific inquiry, and engineering design, as appropriate, to pose questions, seek answers, and develop solutions**
Key Idea 3:	**The observations made while testing proposed explanations, when analyzed using conventional and invented methods, provide new insights into natural phenomena.**
Guiding Questions:	
How will you statistically analyze your experimental results?	

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Standard 1:Key Idea 3: Performance Indicator 3.1: Use various methods of representing and organizing observations (e.g., diagrams, tables, charts, graphs, equations, matrices) and insightfully interpret the organized data.				
Essential Knowledge/Skills (Major Understandings)	***Essential Questions***	***Classroom Ideas***	***Assessment Ideas***	***Vocabulary***
3.1a Interpretation of data leads to development of additional hypotheses, the formulation of generalizations or explanations of natural phenomena.	▪ After an experiment has been analyzed and a conclusion drawn, what happens next?	▪ Scientific method labs and all labs where data is collected ▪ Socratic seminars ▪ Mini labs ▪ Formal labs	▪ Mini labs ▪ Lab reports	
Standard 1:Key Idea 3: Performance Indicator 3.2: Apply statistical analysis techniques when appropriate to test if chance alone explains the results.				
Essential Knowledge/Skills (Major Understandings)	***Essential Questions***	***Classroom Ideas***	***Assessment Ideas***	***Vocabulary***
3.2 Apply statistical analysis techniques, when appropriate, to test if chance alone explains the results	▪ Why is statistical analysis of data important? ▪ How does a Chi square analysis work?	▪ Labs involving statistical analysis (ex., determining the population of an area)	▪ Mini labs ▪ Lab reports ▪ Problem writing	
Standard 1:Key Idea 3: Performance Indicator 3.3: Assess correspondence between the predicted result contained in the hypotheses and actual result, and reach a conclusion as to whether the explanation on which the prediction was based is supported.				
Essential Knowledge/Skills (Major Understandings)	***Essential Questions***	***Classroom Ideas***	***Assessment Ideas***	***Vocabulary***
3.3 Compare expected to actual results of an experiment and draw an appropriate conclusion	▪ Does your data support you hypothesis within a statistical range according to your Chi square or not?	▪ Labs involving statistical analysis (ex., determining the population of an area and natural selection analysis) ▪ Scientific method labs	▪ Mini labs ▪ Lab reports ▪ Problem writing	

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Standard 1:Key Idea 3: Performance Indicator 3.4: Based on the results of the test and through public discussion, revise the explanation and contemplate additional research.				
Essential Knowledge/Skills (Major Understandings)	***Essential Questions***	***Classroom Ideas***	***Assessment Ideas***	***Vocabulary***
3.4a Hypotheses are valuable, even if they turn out not to be true, because they many lead to further investigation. 3.4b Claims should be questioned if the data are based on samples that are very small, biased, or inadequately controlled or if the conclusions are based on the faulty, incomplete, or misleading use of numbers. 3.4c Claims should be questioned if fact and opinion are intermingled, if adequate evidence is not cited, or if the conclusions do not follow logically from the evidence given.	▪ If a hypothesis is not supported by experimental data, what does a scientist do? ▪ What are some experimental errors that would lead others to question the validity of the claim?	▪ Scientific method labs ▪ Conclusion-error analysis ▪ Suggestions for improvement ▪ Lecture/class discussion ▪ Debates ▪ Journal writing ▪ Library/online research	▪ Mini labs ▪ Lab reports ▪ Journal writing	

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Standard 1:Key Idea 3: Performance Indicator 3.5: Develop a written report for public scrutiny that describes the proposed explanation, including a literature review, the research carried out, its result, and suggestions for further research.				
Essential Knowledge/Skills (Major Understandings)	***Essential Questions***	***Classroom Ideas***	***Assessment Ideas***	***Vocabulary***
3.5a One assumption of science is that other individuals could arrive at the same explanation if they had access to similar evidence. Scientists make the results of their investigations public; they should describe the investigations in ways that enable others to repeat the investigations. 3.5b scientists use peer review to evaluate the results of scientific investigations and the explanations proposed by other scientists. They analyze the experimental procedures, examine the evidence, identify faulty reasoning, point out statements that go beyond the evidence, and suggest alternative explanations for the same observations.	▪ Why is peer review and experimental verification of any investigation important?	▪ Lecture/ class discussions ▪ Scientific method ▪ Lab analysis ▪ Journal writing ▪ Library/ online research ▪ Write a problem	▪ Mini labs ▪ Lab reports ▪ Journal writing ▪ Unit checks	

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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.**

Background:

Living things are similar in that they rely on many of the same processes to stay alive, yet diverse in the ways that these processes and interactions are carried out.

Nonliving things lack certain features of living organisms, such as the ability to maintain a cellular organization, carry out metabolic processes while maintaining internal stability (homeostasis), and pass on hereditary information through reproduction.

In most biological respects, humans are like other living organisms. For instance, they are made up of cells like those of other animals, have much the same chemical composition, have organ systems and physical characteristics like many others, reproduce in a similar way, carry the same kind of genetic information system, and are part of a food web.

The components of living systems, from a single cell to an ecosystem, must work together to maintain balance. To successfully accomplish this, organisms possess a diversity of regulatory mechanisms that function to maintain the level of organization necessary for life. Diversity is important at many levels of organization-from a single cell to a multi-cellular organism to an ecosystem.

Vocabulary:

Abiotic	Autotroph	Biodiversity	Biosphere	Biotic	Carnivore	Carrying capacity
Community	Community	Competition	Consumer	Decomposer	Ecology	Ecological niche
Ecological succession	Ecosystem	Energy pyramid	Environment	Food chain	Food web	Habitat
Herbivore	Heterotroph	Host	Limiting factors	Parasite	Population	Predator
Prey	Producer	Scavenger				

Guiding Questions:

What is life?
How would your life be different if you were composed of only a single cell?
If you were an alien and came to Earth, how would you distinguish between living and non-living material?

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Standard 4: Key Idea 1: Performance Indicator 1.1: Explain how diversity of populations within ecosystems relates to the stability of ecosystems.				
Essential Knowledge/Skills (Major Understandings)	***Essential Questions***	***Classroom Ideas***	***Assessment Ideas***	***Vocabulary***
1.1a Populations can be categorized by the function they serve. Food webs identify the relationships among producers, consumers, and decomposers carrying out either autotrophic or heterotrophic nutrition. 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. 1.1c In all environments, organisms compete for vital resources. The linked and changing interactions of populations and the environment compose the total ecosystem. 1.1d The interdependence of organisms in an established ecosystem often results in approximate ability 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. 1.1e Ecosystems, like many other complex systems, tend to show cyclic changes around a state of approximate equilibrium. 1.1f Every population is linked, directly or indirectly, with any others in an ecosystem. Disruptions in the numbers and types of species and environmental changes can upset ecosystem stability	▪ How can populations be categorized by functions they serve? ▪ How can ecosystems be shaped by the non-living environment and interacting species? ▪ How do organisms compete for vital resources? ▪ How does the interdependence of organisms in an ecosystem result in stability over time? ▪ What material cycles show changes that keeps the environment on an equilibrium? How do they work? ▪ What does disruption in ecosystem stability mean for populations?	▪ Construct food webs, trophic levels, food chains, food pyramids ▪ Wipe board example ▪ Draw a picture ▪ Homework explanation ▪ Homework pairs/ newsprint ▪ Do now ▪ Illustrate material cycles (O_2, C_2, H_2O, N_2, Phosphorus) ▪ Brainstorm- concept map ▪ Examine world biomes with slides ▪ Examine local geography to see how it affects life in our area ▪ Biome research project options- biome brochure, small group sharing, or role playing ▪ Categorize using symbiotic relationships (+, -, 0) by giving examples of mutualism, parasitism, communalism ▪ Using food webs, draw a picture, create wipe board example, an do now ▪ Estimation of population size lab ▪ Beaks of finches lab- State required ▪ Explore the role of zebra mussels in Great Lakes and Hudson River ecology . ▪ Newsprint summary ▪ Poster project ▪ Short paper (2-4 pages) ▪ Lecture ▪ Graphically illustrate role of introduces species and their impact on environment (ex., purple loose strife, lampreys, etc.) ▪ Paper option on endangered species or introduced species or poster project ▪ Ecology jigsaw assignment ▪ Write a problem ▪ Film	▪ Homework checks ▪ Check newsprint summary ▪ Check picture ▪ Wipe board work ▪ Project/poster rubric ▪ Short paper (2-4 pg.) ▪ Quiz ▪ Chapter test ▪ Test revisions ▪ Check problem ▪ Start question/do now ▪ Check concept map ▪ Homework pairs ▪ Mini lab ▪ Lab report	

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Standard 4:Key Idea 1: 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).				
Essential Knowledge/Skills (Major Understandings)	***Essential Questions***	***Classroom Ideas***	***Assessment Ideas***	***Vocabulary***
1.2a Important levels of organization for structure and function include organelles, cells, tissues, organs, organ systems, and whole organisms. 1.2b Humans are a complex organisms. They require multiple systems for digestion, respiration, reproduction, circulation, excretion, movement, coordination, and immunity. The systems interact to perform the life functions. 1.2c The components for 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 will be a corresponding imbalance in homeostasis. 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. 1.2f Cells have particular structures that perform specific jobs. These structures perform the actual work of the cell. Just as systems are coordinated and work together, cell parts must also be coordinated and work together.	▪ What is the importance of levels of organization for structure and function to organisms? ▪ What systems are needed for complex organism survival? ▪ What roles do control mechanisms play in human body homeostasis? ▪ What occurs when human system homeostasis is disrupted? ▪ How do cells get their basic needs met? How are they grouped together? ▪ How do specific structures help cells coordinate cell function within and without the cell?	▪ Graphically illustrate the terms cells, tissues, organs, organ systems, and whole organisms and their relationship ▪ Brainstorm –concept map ▪ Wipeboard example ▪ Do now ▪ Time line ▪ Lectures ▪ Draw a picture ▪ Newsprint summary ▪ Film ▪ Poster project ▪ Discuss/debate/determine life processes (think-pair-share, small groups, finding life on other planets) ▪ Demo with human torso model ▪ Have students in small groups represent different systems and describe functions ▪ Groups to show relationship among all body systems? ▪ Provide "what if" malfunctions- students explain/graphically represent affect on system ▪ Using microscopes, students observe cell types ▪ Mini and formal labs ▪ Project: Create a living 3-D cell and justify role each part plays ▪ Examine cells and discuss functions based on organelles present ▪ Cell project – edible ▪ Build a model ▪ Crossword puzzle	▪ Check picture ▪ Check concept map ▪ Wipe board work ▪ Start question/do now ▪ Check time line ▪ Quiz ▪ Chapter test ▪ Test revisions ▪ Check newsprint summary ▪ Project/poster summary ▪ Short paper (2-4 pg.) ▪ Lab report	

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Standard 4:Key Idea 1: 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).**			
Essential Knowledge/Skills (Major Understandings)	***Essential Questions***	***Classroom Ideas***	***Assessment Ideas***	***Vocabulary***
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. 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 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 molecules, 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) 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.	▪ What is the role of the cell membrane? ▪ What are the processes of diffusion and active transport? How are they important to movement of materials into and out of the cell? ▪ What substances allow chemical reactions to take place in order to maintain life? ▪ How do cells use these substances? ▪ How do specialized structures inside the cell carry out cellular functions? ▪ How do receptor molecules play an important role in interactions between cells? ▪ What happens if cellular communication is blocked?	▪ Have students create an authentic model diffusion - Wipe board example - Draw a picture - Brainstorm- concept map - Film - Demo ▪ Lab- The Effects of Osmosis on a Cell" ▪ Mini lab- Use stop watches to measure length of time scent takes to reach different areas of room ▪ Have students chew saltine crackers to get sweet taste (starches to simple sugars) ▪ Lab- Show electron micrographs - Compare organelle/function with "real life relationships" (ex., mitochondrion power supply ▪ Ted and Fred- Diffusion highlights ▪ Classic diffusion lab dialysis with glucose, starch, iodine, and water ▪ Discuss disorders of endocrine/nervous system (ex., tetanus, Lou Gehrig's Disease, epilepsy) ▪ Independent or small group project researching disorders - poster project - library/ online research - short paper (2-4 pg.) ▪ Diffusion through a membrane –State required	▪ Model rubric ▪ Wipe board work ▪ Check picture ▪ Check concept map ▪ Lab reports ▪ Mini lab ▪ Quiz ▪ Chapter test ▪ Test revisions	

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Standard 4: Key Idea 1: Performance Indicator 1.3: Explain how a one-celled organism is able to function despite lacking the levels of organization present in more complex organisms.				
Essential Knowledge/Skills (Major Understandings)	***Essential Questions***	***Classroom Ideas***	***Assessment Ideas***	***Vocabulary***
1.3a The structures present in some single-celled organisms act in a similar to the tissues and systems found in multi-cellular organisms, thus enabling them to perform all of the life processes needed to maintain homeostasis.	▪ What structures do single-celled organisms have that act in similar ways as those found in multi-cellular organisms? ▪ How do they carry out processes needed to maintain homeostasis?	▪ Compare and contrast organelle functions to organs/systems of multi-cellular organisms (i.e. humans) ▪ Dissection labs ▪ Protozoa labs ▪ Cell Labs ▪ Students will use cell models to illustrate life functions ▪ Students build cell models - brainstorm-concept map - film - do now - crossword puzzle - wipe board example - draw a picture	▪ Mini labs ▪ Lab report ▪ Model rubric ▪ Check concept map ▪ Start question/ do now ▪ Crossword puzzle ▪ Wipe board work ▪ Check picture ▪ Quiz ▪ Chapter test ▪ Test revisions	

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

Background:

Organisms from all kingdoms possess a set of instructions (genes) that determine their characteristics. These instructions are passed from parents to offspring during reproduction. Students are familiar with simple mechanisms related to the inheritance of some physical traits in offspring. They are now able to begin to understand the molecular basis of heredity and how this set instructions can be changed through recombination, mutation, and genetic engineering.

The inherited instructions that are passed from parent to offspring exist in the form of a code. This code is contained in DNA molecules. The DNA molecules must be accurately replicated before being passed on. Once the coded information is passed on, it is used by a cell to make proteins. The proteins that are made become cell parts and carry out most functions of the cell.

Throughout recorded history, humans have used selective breeding and other biotechnological to produce products or organisms with desirable traits. Our current understanding of DNA extends this to the manipulations of genes leading to the development of new ombinati9ons of traits and new varieties of organisms.

Vocabulary:

Genetic	Genes	Inheritance	Recombination	Mutation	Genetic engineering	DNA
Replicated	Selective breeding	Biotechnological	Offspring	Traits	Heredity	Chromosomes
Asexually	Sexually	Egg	Sperm	A bases	G base	C base
T base	Template	Alteration	Cultivated	Domestic	Inserting	Deleting
Substituting	Enzymes					

Guiding Questions:

Why don't children look exactly like their parents?
Why are there so many breeds of dogs?
What do you know about DNA?

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Standard 4: Key Idea 2: Performance Indicator 2.1: Explain how the structure and replication of genetic material result in offspring that resemble their parents.				
Essential Knowledge/Skills (Major Understandings)	***Essential Questions***	***Classroom Ideas***	***Assessment Ideas***	***Vocabulary***
2.1a Genes are inherited, but their expression can be modified by interactions with the environment. 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. 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 2.1d In asexually reproducing organisms, all the genes come from a single parent. Asexually produced offspring are normally genetically identical to the parent. 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 (via the sperm). Sexually produced offspring often resemble, but are not identical to, either of their parents.	▪ How can genes, which are inherited, be modified by the environment? ▪ How can traits be passed on from one generation to the next? ▪ What is hereditary information contained in? ▪ How do genes and chromosomes influence human traits? ▪ How does asexual reproduction compare to sexual reproduction? ▪ In sexually reproduced individuals, where does the genetic information come from? ▪ Does the new individual resemble both parents and why?	▪ Perform experiments with plants grown in light vs. dark (draw picture, wipe board example) ▪ Use examples of the Himalayan rabbit and the Peppered Moth (draw picture, wipe board example) ▪ Small group presentations of work done by scientists such as Chase, Griffith, Watson & Crick that lead to knowledge of DNA as hereditary material (time line or library/on line research) ▪ Have student use the Internet to research the Human Genome Project and write an essay (oral report) on their findings ▪ Complete a Human Inheritance Lab ▪ Lab- DNA Spooling ▪ Mitosis (slide observations) whitefish blastula/onion rout tip - mini and formal labs - film - draw a picture - journal writing ▪ Discuss and observe the types of asexual reproduction: binary fission, budding, regeneration and vegetative propagation ▪ Have students complete an ABO Blood Group Lab using fake blood or do Paternity simulation lab - film - draw a picture - wipe board example - brainstorm- concept lab - journal writing	▪ Mini labs ▪ Lab report ▪ Check pictures ▪ Wipe board work ▪ Quiz ▪ Chapter test ▪ Test revisions ▪ Project/poster rubric ▪ Check timeline ▪ Short paper (2-4 pg.) ▪ Journal writing	▪ Asexual reproduction ▪ Biotechnology ▪ Bond ▪ Chromosome ▪ Clone ▪ DNA ▪ Egg ▪ Expressed ▪ Genes ▪ Genetic engineering ▪ Genetic recombination ▪ Heredity ▪ Mutation ▪ Replicate ▪ Selective breeding ▪ Sexual reproduction ▪ Sperm ▪ Subunit ▪ Template ▪ Traits

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Standard 4: Key Idea 2: Performance Indicator 2.1: Explain how the structure and replication of genetic material result in offspring that resemble their parents.				
Essential Knowledge/Skills (Major Understandings)	***Essential Questions***	***Classroom Ideas***	***Assessment Ideas***	***Vocabulary***
2.1f In all organisms, the coded instructions for speci9fyng 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 underlies heredity is both encoded in genes (as a string of molecular "bases") and replicated by means of a template. 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. 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. 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.	▪ What is DNA? ▪ What is the structure? ▪ What are the components? ▪ How do cells store and use coded information? ▪ What is a mutation? ▪ What carries out the work of the molecules? ▪ How are proteins formed? ▪ What are they made of? What determines their function?	▪ Discuss genetic disorders such as PKU, Tay-Sachs, Cystic Fibrosis, and Down's Syndrome ▪ Irradiate seeds in microwave for varying amounts of time. Place in petri dishes or plant and observe for growth pattern. Discuss results. ▪ Use a molecular model to illustrate DNA structure or have students build their own structure. ▪ Have students role play to represent nucleotides, construct DNA strands and model replication ▪ Research increased use of DNA in court trials; pros and cons ▪ Use analogies to represent DNA, mRNA, tRNA and protein synthesis. Example: compare to construction site or a football team. ▪ Give students a model of DNA and have them build the corresponding mRNA and tRNA ▪ Use Legos to build models to show "lock and key" nature of interactions ▪ Lab- Protein synthesis ▪ Relationships and biodiversity – State required ▪ DNA technology – State required	▪ Project/poster rubric ▪ Short paper (2-4 pg) ▪ Journal writing ▪ Mini lab ▪ Lab report ▪ Quiz ▪ Chapter test ▪ Test revisions ▪ Wipe board work ▪ Check picture ▪ Start question/do now ▪ Check problem ▪ Homework checks ▪ Model rubric ▪ Check concept map	

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Standard 4: Key Idea 2: Performance Indicator 2.1: Explain how the structure and replication of genetic material result in offspring that resemble their parents.				
Essential Knowledge/Skills (Major Understandings)	***Essential Questions***	***Classroom Ideas***	***Assessment Ideas***	***Vocabulary***
2.1j Offspring resemble their parents because they inherit similar genes that code for the production for proteins that form similar structures and perform similar functions. 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.	▪ Why do offspring resemble their parents? ▪ Why are there many body cells, each with their own function?	▪ Explore Human Genome Project by: - Constructing a chronological journal documenting advances in human gene technology - Express opinions regarding implications of these advancements - Socratic Seminar ▪ Homework explanation ▪ Brainstorm-concept map ▪ Film ▪ Crossword puzzle	▪ Quiz ▪ Chapter test ▪ Test revisions ▪ Mini labs ▪ Lab report ▪ Check time line ▪ Journal writing ▪ Homework checks ▪ Check concept map ▪ Crossword puzzle	

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Standard 4: Key Idea 2 Performance Indicator 2.2: Explain how the technology of genetic engineering allows humans to alter genetic makeup of organisms.				
Essential Knowledge/Skills (Major Understandings)	***Essential Questions***	***Classroom Ideas***	***Assessment Ideas***	***Vocabulary***
2.2a For thousands of years new varieties of cultivated plants and domestic animals have resulted from selective breeding for particular traits. 2.2b In recent years new varieties of farm plants and animals have been engineered by manipulating their genetic instructions to produce new characteristics. 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. 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. 2.2e Knowledge of genetics is making possible new field 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.	▪ Where have the many varieties of plants and animals? ▪ How have farm plants and animals been developed in recent years? ▪ What process is used to create new plants and animals? ▪ In what ways can DNA segments be altered? ▪ How can knowledge of genetics make it possible for new fields of health care?	▪ Use dogs as an example of selective breeding ▪ Compare the domestication of dogs and cats ▪ Research: - dairy cows bred for higher milk production - thoroughbred horses - polyploidy leading to large fruit - Cornell University development of tomato plant immune to the Monarch butterfly by using examples of growth hormone, insulin or interferon. ▪ Students construct a diagram representing recombinant DNA technology ▪ Invite a university professor in to discuss recombinant DNA technology ▪ Research various career opportunities relating to genetics and technology for oral presentations ▪ Discuss possibilities of genetic engineering. ▪ Socratic seminar	▪ Journal writing ▪ Check newsprint ▪ Quiz ▪ Chapter test ▪ Test revisions ▪ Homework checks ▪ Start question/ do now ▪ Check picture ▪ Wipe board work ▪ Project/poster rubric ▪ Short paper (2-4 pg.) ▪ Check problem ▪ Check concept map	

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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 3: **Individual organisms and species change over time.**

Background:

Evolution is the change of species over time. This theory is the central unifying theme of biology. This change over time is well documented by extensive evidence for a wide variety of sources. Students need to know that in sexually reproducing organisms, only changes in the genes of sex cells an become the basis for evolutionary change and that these evolutionary changes may occur in structure, function, and behavior over time. Students need to be able to distinguish between evolutionary change and the changes that occur during the lifetime of an individual organism.

According to many scientists, biological evolution occurs through natural_selection. Natural selection is the result of overproduction of offspring, variations among offspring, the struggle for survival, the adaptive value of certain variations, and the subsequent survival and increased reproduction of those best adapted to a particular environment. Selection for individuals with a certain trait can result in changing the proportions of the trait in a population.

The diversity of life on Earth today is the result of natural selection occurring over a vast amount of geologic time for most organisms, but over a short amount of time for organisms with short reproductive cycles such as pathogens in an antibiotic environment and insects in a pesticide environment.

Biology Vocabulary:

Evolution	Biology	Natural selection	Pathogens	Fertilization
Radiation	Extinction	Geologic time	Meiosis	

Guiding Questions:

What does the word diversity mean to you?
How do populations change?
What evidence is there that groups of organisms have changed over time?
Assuming there is a struggle for life among similar organisms, what are ways to evaluate or measure success in the struggle for life?
If we have the best medicines, why do we also have the deadliest bacteria and viruses?

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Standard 4: Key Idea 3: Performance Indicator 3.1: Explain the mechanisms and patterns of evolution.				
Essential Knowledge/Skills (Major Understandings)	***Essential Questions***	***Classroom Ideas***	***Assessment Ideas***	***Vocabulary***
3.1a The basic theory of biological evolution states that the Earth's present-day species developed from earlier, distinctly different species. 3.1b New inheritable characteristics can result from new combinations of existing genes or from mutations of genes in reproductive cells. 3.1c Mutation and the sorting and recombining of genes during meiosis and fertilization result in a great variety of possible gene combinations. 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. 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.	▪ What is evolution? ▪ How do new traits in a population arise? ▪ How are mutation and sexual reproduction important sources of variation? ▪ How do mutations occur? ▪ What is natural selection and how does it provide an explanation for unity and diversity among organisms?	▪ Comparing and contrasting fossils ▪ Bats in the Belfry (CIBT Lab) ▪ Review of 7th grade Mendalian genetics Punnett squares pedigrees ▪ Lab: Meiosis- Sexually reproducing organisms ▪ Create a meiosis flipbook ▪ Mini lab- 10-2 (Glencoe) Formulating models: Modeling crossing over ▪ Biological warfare: - Agent orange (article summary) - Gulf War Syndrome (article summary) ▪ Oral or written report on Socratic Seminar on mutagenic agents pros and cons ▪ Graphic organizer ▪ CIBT- Investigating common descent lab ▪ Discuss homologons structures and biochemical similarities ▪ Wooly bear lab (natural selection) ▪ Adaptations for reproductive success in flowering plants – State required	▪ Mini lab ▪ Lab reports ▪ Check time line ▪ Check newsprint summary ▪ Homework checks ▪ Start question/ do now ▪ Quiz ▪ Chapter test ▪ Test revisions ▪ Wipe board work ▪ Check picture ▪ Check concept map ▪ Crossword puzzle ▪ Check problem ▪ Short paper (2-4 pg.) ▪ Model rubric	▪ Adaptive value ▪ Evolution ▪ Extinction ▪ Fossil record ▪ Genetic variation ▪ Geologic time ▪ Mutation ▪ Natural selection ▪ Overproduction ▪ Theory

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Standard 4: Key Idea 3: Performance Indicator 3.1: Explain the mechanisms and patterns of evolution.				
Essential Knowledge/Skills (Major Understandings)	***Essential Questions***	***Classroom Ideas***	***Assessment Ideas***	***Vocabulary***
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. 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. 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. 3.1i Behaviors have evolved through natural selection. The broad patterns of behavior exhibited by organisms have enveloped to ensure reproductive success.	▪ What factors interact in the process of natural selection? ▪ How do gene frequencies increase? ▪ Why is variation important to any population? ▪ Do behaviors evolve?	▪ Darwin' Finches ▪ Bats in the Belfry (CIBT) ▪ Discussion of giraffes and rabbits ▪ Examine data from predator/prey relationships graph and discuss ▪ Prey relationships graphs and discuss implications ▪ Peppered moth discussion ▪ Evolution of seed dispersal ▪ Natural selection labs ▪ Beaks of Finches Lab – State required ▪ Natural selection lab ▪ Adaptations for reproductive success in flowering plants – State required	▪ Mini lab ▪ Lab report ▪ Model rubric ▪ Crossword puzzle ▪ Quiz ▪ Chapter test ▪ Test revisions ▪ Start question/do now ▪ Check concept map ▪ Homework checks	

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Standard 4: Key Idea 3: Performance Indicator 3.1: Explain the mechanisms and patterns of evolution.				
Essential Knowledge/Skills (Major Understandings)	***Essential Questions***	***Classroom Ideas***	***Assessment Ideas***	***Vocabulary***
3.1j Billions of years ago, life on Earth is thought by many scientists to have begun as 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 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.	▪ How did life evolve on Earth? ▪ How is evolution of a population like a bush? ▪ What is extinction? ▪ Is extinction always a bad thing?	▪ Stress that the environment is the selecting agent ▪ Write an essay on one species illustrating developed resistance ▪ Movie- "Evolution: Human Predators" ▪ Oral or written report on "Superbug" or a deadly disease that resists antibiotics ▪ Bats in the Belfry ▪ Endangered or extinct species report/project	▪ Short paper (2-4 pg.) ▪ Check timeline ▪ Journal writing ▪ Check picture ▪ Wipe board work ▪ Quiz ▪ Chapter test ▪ Test revisions ▪ Check concept map ▪ Mini lab ▪ Lab report ▪ Project/poster rubric ▪ Homework checks	

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

Background:

Species transcend individual life spans through reproduction. Asexual reproduction produces genetically identical offspring. Sexual reproduction produces offspring that have a combination of genes inherited from each parent's specialized sex cells (gametes).

The processes of gamete production, fertilization, and development follow an orderly sequence of events. Zygotes contain all the Information necessary for growth, development, and eventual reproduction of the organism.

Development is a highly regulated process involving mitosis and differentiation. Reproduction and development are subject to environmental impact. Human development, birth, and aging should be viewed as a predictable pattern of events.

Reproductive technology has medical, agricultural, and ecological applications.

Biology Vocabulary:

Sexual	Asexual	Gametes	Fertilization	Zygotes	Mitosis	Differentiation
Cloning	Meiosis	Testosterone	Estrogen	Progesterone	Ovaries	Embryo
Fetus	Uterus	Placenta	Testes	pregnancy		

Guiding Questions:

Where do seedless oranges come from:
How does mitotic cell division insure genetic continuity?

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Standard 4: Key Idea 4: Performance Indicator 4.1: Explain how organisms, including humans, reproduce their own kind.				
Essential Knowledge/Skills (Major Understandings)	***Essential Questions***	***Classroom Ideas***	***Assessment Ideas***	***Vocabulary***
4.1a Reproduction and development are necessary for the continuation of any species. 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. 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. 4.1d The zygote may divide by mitosis and differentiate to form the specialized cells, tissues, and organs of multicellular organisms.	▪ Why is reproduction necessary for the species, but not for the individual? ▪ How do organisms asexually reproduce? ▪ What are the products of meiosis? ▪ How do meiosis and fertilization provide for continuity of the species through sexual reproduction? ▪ What happens to the fertilized egg after zygote formation?	▪ Compare life function of reproduction to other life functions ▪ Research current articles on cloning (Dolly, mice) and write a position paper ▪ Movie- "DNA Revolution" and study guide ▪ Meiosis and sexual reproduction lab ▪ Discuss cleavage, gastrulation and differentiation ▪ Compare and contrast three germ layers	▪ Check concept map ▪ Quiz ▪ Chapter test ▪ Test revisions ▪ Start question/do now ▪ Check newsprint summary ▪ Check pictures ▪ Wipe board work ▪ Short paper (2-4 pg.) ▪ Mini lab ▪ Lab report ▪ Homework checks ▪ Journal writing	▪ Asexual reproduction ▪ Cloning ▪ Differentiation ▪ Egg ▪ Embryo ▪ Estrogen ▪ Expressed ▪ Fertilization ▪ Fetus ▪ Gamete ▪ Gene expression ▪ Meiosis ▪ Mitosis ▪ Ovaries ▪ Placenta ▪ Progesterone ▪ Recombination ▪ Sex cell ▪ Sexual reproduction ▪ Species ▪ Sperm ▪ Testes ▪ Testosterone ▪ Uterus ▪ zygote

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Standard 4: Key Idea 4: Performance Indicator 4.1: Explain how organisms, including humans, reproduce their own kind.				
Essential Knowledge/Skills (Major Understandings)	***Essential Questions***	***Classroom Ideas***	***Assessment Ideas***	***Vocabulary***
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. 4.1f The structures and functions of the human female reproductive system, as in 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.	▪ What factors influence human reproduction and development? ▪ What are the structures and functions of the organs in the female reproductive system? ▪ What are the structures and functions of the organs in the male reproductive system? ▪ Why are the first 3 months of pregnancy most important in the healthy development of an embryo? ▪ What are the risks a pregnant female must avoid during this time?	▪ Movie: "Miracle of Life" ▪ Lab: The Menstrual Cycle ▪ Lab: Structure of the Flower ▪ Lab: Bovine Fetal Development ▪ Use models or diagrams of reproductive systems ▪ Lab: Male reproductive systems ▪ Research and discuss birth defects and factors that cause them for a round table discussion ▪ Invite a public health nurse or school nurse to give a presentation on risks to developing embryos ▪ Design brochures/posters warning pregnant women about potential risks to developing embryos	▪ Mini lab ▪ Lab report ▪ Check picture ▪ Wipe board work ▪ Check concept map ▪ Start question/do now ▪ Crossword puzzle ▪ Quiz ▪ Chapter test ▪ Test revisions	

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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 5: **Organisms maintain a dynamic equilibrium that sustains life.**

Background:

Life is dependent upon availability of an energy source and raw materials that are used in the basic enzyme-controlled biochemical processes of living organisms. The biochemical processes occur within a narrow range of conditions. Because organisms are continually monitor and responded to these changes. Responses to change can range in complexity from simple activation of a cell chemical process to elaborate learned behavior. The result of these responses is called homeostasis, a "dynamic equilibrium" or "steady state: which keeps the internal environment within certain limits.

Organisms have a diversity of homeostasis feedback mechanisms that detect deviation from the normal state and take corrective actions to return their systems to the normal range. These mechanisms maintain they physical and chemical aspects of the internal environment within narrow limits that are favorable for cell activities. Failure of the se control mechanisms can result in disease or even death.

Biology Vocabulary:

Homeostasis	Guard cells	Steady state	Deviation	Photosynthesis	Chlorplasts	Glucose
Respiration	ATP	Oxygen	Carbon dioxide	Water	Catalyst	pH
Antibodies	Homeostasis	Viruses	Bacteria	Fungi	Parasites	Immune system
Antigens	Pancreas	Cancer	Vaccinations	Microbes	AIDS	Infectious
Cancerous	Allergic	Transplanted	Disease	Gene mutations	Stimuli	Organismal
Feedback mechanisms	Pathogenic organisms	Dynamic equilibrium				

Guiding Questions:

Why do you sweat?
Why do we get a fever when we have an infection?
How can non-living things cause illness in people?
How is a thermostat or cruise control like homeostasis?

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Standard 4: Key Idea 5: Performance Indicator 5.1: Explain the basic biochemical processes in living organisms and their importance in maintaining dynamic equilibrium.					
Essential Knowledge/Skills (Major Understandings)	***Essential Questions***	***Classroom Ideas***	***Assessment Ideas***	***Vocabulary***	
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. 5.1b Plant cells and some one-celled organisms contain choloroplasts, the site of photosynthesis. The process of photosynthesis uses solar energy to 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.	▪ Why is photosynthesis an important process for all life, not just plants? ▪ What are the steps involved in photosynthesis? ▪ How are organic compounds used by all organisms?	▪ Discuss chemosynthesis-based ecosystems and implications on other planets. ▪ Lab: Some Aspects of Photosynthesis in Elodea ▪ Lab: Chloroplast Analysis in Fall Leaves ▪ Lab biochemistry ▪ Use molecular models to construct simple organic molecules and build more complex molecules ▪ Dehydration synthesis activity ▪ Organic molecules jigsaw project	▪ Mini labs ▪ Lab report ▪ Homework checks ▪ Check concept map ▪ Quiz ▪ Chapter test ▪ Test revisions	▪ AIDS ▪ Allergy ▪ Antibodies ▪ Antigen ▪ ATP ▪ Bacteria ▪ Biochemical processes ▪ Catalyst ▪ Cellular respiration ▪ Chloroplast ▪ Disease ▪ Dynamic equilibrium ▪ Enzyme ▪ Feedback mechanism ▪ Fungi	▪ Gas exchange ▪ Glucose ▪ Guard cells ▪ Homeostasis ▪ Immune system ▪ Insulin ▪ Microbe ▪ Mitochondria ▪ Pancreas ▪ Parasite ▪ Pathogen ▪ Ph ▪ Photosynthesis ▪ Respiration ▪ Stimuli ▪ Synthesis ▪ Vaccine ▪ virus

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Standard 4: Key Idea 5: Performance Indicator 5.1: Explain the basic biochemical processes in living organisms and their importance in maintaining dynamic equilibrium.				
Essential Knowledge/Skills (Major Understandings)	***Essential Questions***	***Classroom Ideas***	***Assessment Ideas***	***Vocabulary***
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 organisms, 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. 5.1e The energy from ATP is then used by the organism to obtain, transform, and transport materials, and to eliminate wastes. 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. 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.	▪ What are the steps involved in cellular respiration? ▪ Why is the manufacturing of ATP important? ▪ Why are enzymes so important? ▪ How do enzymes function? ▪ How does shape determine function?	▪ Lab: Respiration in Yeast ▪ Game development- Respiration and Photosynthesis ▪ Graphic organizers comparing respiration to photosynthesis ▪ Concept maps- Passive vs. Active transport ▪ Lab: Catalytic Activity of Enzymes (CIBT) ▪ Lab: Got Milk? No, It's Cheese (CIBT) ▪ Demonstrate or build lock and key models of enzyme/substrate complex ▪ Induced fit models	▪ Wipe board work ▪ Check picture ▪ Check concept map ▪ Homework checks ▪ Mini lab ▪ Lab report ▪ Quiz ▪ Chapter test ▪ Test revisions ▪ Start question/ do now ▪ Crossword puzzle ▪ Model rubric	

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Standard 4: Key Idea 5: Performance Indicator 5.2: Explain disease as a failure of homeostasis.				
Essential Knowledge/Skills (Major Understandings)	***Essential Questions***	***Classroom Ideas***	***Assessment Ideas***	***Vocabulary***
5.2a Homeostasis in an organism is constantly threatened. Failure to respond effectively can result in disease or death. 5.2b Viruses, bacteria, fungi, and other parasites may infect plants and animals and interfere with normal life functions. 5.2c The immune system is designed to protect against antigens associated with pathogenic organisms or foreign substances and some cancer cells. 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. 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.	▪ What is homeostasis and how is it important to an organism? ▪ How do pathogens cause disease? ▪ How does the immune system reestablish homeostasis when faced with a pathogen invasion? ▪ What are vaccines and how are they used to prevent disease?	▪ Lab: Homeostasis through Antagonism (CIBT) ▪ Brainstorm negative and positive feedback systems in the body or ecosystem that help maintain homeostasis ▪ Demonstrate viral transmission (hole punched paper in a balloon- pop) ▪ Graphically illustrate viral life cycle ▪ Pathogen research project (library research, table dev., jigsaw sharing) ▪ Demo- antibody action ▪ Guest speaker: Health care professional to discuss immunity, disease and vaccinations ▪ Draw a picture ▪ Use wipe board examples ▪ Films ▪ Making connections lab – State required	▪ Mini lab ▪ Lab report ▪ Quiz ▪ Chapter test ▪ Test revisions ▪ Student responses ▪ Journal entries ▪ Class work ▪ Lab rubric ▪ Check picture ▪ Short paper (2-4 pg.) ▪ Check concept map ▪ Start question/ do now	

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Standard 4: Key Idea 5: Performance Indicator 5.2: Explain disease as a failure of homeostasis.				
Essential Knowledge/Skills (Major Understandings)	***Essential Questions***	***Classroom Ideas***	***Assessment Ideas***	***Vocabulary***
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. 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. 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. 5.2i Gene mutation in a cell can result in uncontrolled cell division called cancer. Exposure of cells to certain chemical and radiation increases mutations and thus increases the chance of cancer. 5.2j Biological research generates knowledge used to design ways of diagnosing, preventing, treating, controlling, or curing diseases of plants and animals.	▪ How does AIDS affect the body? ▪ What are allergies? ▪ What are life risk factors that promote disease? ▪ What is a gene mutation and how do gene mutations cause cancer? ▪ How does the integration of science and technology promotes a longer life span?	▪ Guest Healthcare speaker ▪ ELISA lab (CIBT) ▪ Poll students who have allergies; discuss systems and treatments ▪ Concept map (disease at center) Include: - cause - symptoms - cures - prevention's - examples ▪ Students create a timeline showing the historical development of vaccines ▪ Activity- Population growth of cancer cells and /or bacterial, viral growth using a chess board and rice. In 1st box place one grain of rice, double for each box, etc. ▪ Student project- Design a study on a new drug to treat a fictitious disease; report via brochure on new "Wonder Drug" ▪ Newsprint summary ▪ Draw pictures	▪ Mini lab ▪ Lab report ▪ Check newsprint summary ▪ Check concept map ▪ Quiz ▪ Chapter test ▪ Chapter revisions ▪ Start question/ do now ▪ Wipe board work ▪ Check picture ▪ Check timeline ▪ Journal writing ▪ Project/poster rubric	

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Standard 4: Key Idea 5: Performance Indicator 5.3: Relate processes at the system level to the cellular level in order to explain dynamic equilibrium in multicelled organisms.				
Essential Knowledge/Skills (Major Understandings)	***Essential Questions***	***Classroom Ideas***	***Assessment Ideas***	***Vocabulary***
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. 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.	▪ What is dynamic equilibrium and how does it relate to homeostasis? ▪ How are feedback mechanisms involved in maintaining homeostasis?	▪ Lab: It's Reflexive (CIBT) ▪ Wipe board example ▪ Draw a picture ▪ Demo ▪ Brainstorm- concept map ▪ Lab: Pulse Rate/ Exercise Lab ▪ Simulated urinalysis lab to show how kidneys help maintain homeostasis ▪ Making connections – State required lab	▪ Mini lab ▪ Lab reports ▪ Wipe board work ▪ Check picture ▪ Check concept map ▪ Quiz ▪ Chapter test ▪ Test revisions	

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

Background:

The fundamental concept of ecology is that living organisms interact with and are dependent on their environment and each other. These interactions result in a flow of energy and a cycling of materials that are essential of life.

Competition can occur between members of different species for an ecological niche. Competition can also occur within species. Competition may be for abiotic resources, such as space, water, air, and shelter, and for biotic resources such as food and mates. Students should be familiar with the concept of food chains and webs.

Biology Vocabulary:

Ecology	Competition	Niche	Abiotic	Biotic	Algae	Atoms
Molecules	Biosphere	Energy pyramid	Carbon	Hydrogen	Nitrogen	Oxygen
Host relationship	Scavenge	Biodiversity	Ecological succession	Predator	Prey	Parasite
Habitat	Carrying capacity	Producer	Consumer			

Guiding Questions:

What are some of the things that you obtain directly from the environment?
What positive and negative effects does man have on the environment?
How are populations controlled in nature and not able to grow unchecked? How is the human population unique?
How does nature recycle?

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Standard 4: Key Idea 6: Performance Indicator 6.1: Explain factors that limit growth of individuals and populations.					
Essential Knowledge/Skills (Major Understandings)	***Essential Questions***	***Classroom Ideas***	***Assessment Ideas***	***Vocabulary***	
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. 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 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. 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.	▪ How does energy flow through a system? ▪ How do materials flow through a system? ▪ Why is a food web a better way of showing energy flow through a system than a food chain does? ▪ What is carrying capacity?	▪ Visually compare photosynthesis and respiration ▪ Use food chains and webs to discuss energy flow ▪ Use models and charts to discuss water, carbon, oxygen and nitrogen cycles ▪ Discuss problems caused when cycles are interrupted ▪ Develop energy pyramids with simulated data ▪ Present students with a survival problem such as stranded on an island with chickens and grain. What would be the best survival technique? ▪ Deer population on island and reintroduction of wolf study	▪ Check concept map ▪ Check picture ▪ Wipe board work ▪ Homework checks ▪ Quiz ▪ Chapter test ▪ Test revisions ▪ Check newsprint summary ▪ Start question/do now ▪ Crossword puzzle ▪ Journal writing	▪ Abiotic ▪ Autotroph ▪ Biodiversity ▪ Biosphere ▪ Biotic ▪ Carnivore ▪ Carrying capacity ▪ Community ▪ Competition ▪ Consumer ▪ Decomposer ▪ Ecology ▪ Ecological niche ▪ Ecological succession ▪ Ecosystem ▪ Energy pyramid ▪ Environment ▪ Food chain	▪ Food web ▪ Habitat ▪ Herbivore ▪ Heterotroph ▪ Host ▪ Limiting factors ▪ Parasite ▪ Population ▪ Predator ▪ Prey ▪ Producer ▪ Scavenger

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Essential Knowledge/Skills (Major Understandings)	***Essential Questions***	***Classroom Ideas***	***Assessment Ideas***	***Vocabulary***
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). 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. 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 any cause disease in, scavenge, or decompose another.	▪ What are the abiotic factors that affect the growth and survival of organisms? ▪ How do abiotic factors limit population sizes? ▪ How do the biotic factors in an ecosystem relate?	▪ Lab: Ecology of Duckweed (CIBT) ▪ Mini lab ▪ Wipe board example ▪ Draw a picture ▪ Write a problem ▪ Brainstorm- concept map ▪ Do now ▪ Predator/ prey relationship ▪ Explore affects of overcrowding on seed growth ▪ Research affects of overcrowding on rats ▪ Student research symbiosis and generate a list of organisms exhibiting mutualism, commensalism, and parasitism ▪ Concept map or poster with relationships researched ▪ Ecology jigsaw project ▪ Field trip to Raptor Center ▪ Environmental conditions and seed germination – State required	▪ Lab report ▪ Mini lap ▪ Check concept map ▪ Check picture ▪ Check problem ▪ Wipe board work ▪ Homework checks ▪ Quiz ▪ Chapter test ▪ Test revisions ▪ Check newsprint summary ▪ Start question/do now ▪ Journal writing	

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Standard 4: Key Idea 6: Performance Indicator 6.2: Explain the importance of preserving diversity of species and habitats.				
Essential Knowledge/Skills (Major Understandings)	***Essential Questions***	***Classroom Ideas***	***Assessment Ideas***	***Vocabulary***
6.2a As a result of evolutionary processes, there is a diversity of organisms and of 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. 6.2b Bio-diversity also ensures the availability of a rich variety of genetic materials 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.	▪ How is biodiversity important in ecosystem stability? ▪ How is biodiversity important to human kind?	▪ Human impacts research paper/jigsaw ▪ Guest speaker- Bill Robinson with animals, explaining animal adaptation ▪ Given a list of medicines, students develop a chart or graph showing the origins of the medicines ▪ Newsprint summary ▪ Wipe board example ▪ Do now ▪ Journal writing ▪ Homework explanation ▪ Draw a picture ▪ Relationships and Biodiversity – State required	▪ Check newsprint summary ▪ Wipe board work ▪ Check picture ▪ Start question/do now ▪ Journal writing ▪ Homework checks ▪ Short paper (2-4 pg.) ▪ Quiz ▪ Chapter test ▪ Test revisions ▪ Check concept map ▪ Check problem	

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Standard 4: Key Idea 6: Performance Indicator 6.3: Explain how the living and nonliving environments change over time and respond to disturbances.				
Essential Knowledge/Skills (Major Understandings)	***Essential Questions***	***Classroom Ideas***	***Assessment Ideas***	***Vocabulary***
6.3a The interrelationships and interdependencies of organisms affect the development of stable ecosystems. 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. 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.	▪ How are stable ecosystems affected? ▪ How does ecological succession lead to ecosystem stability? ▪ How can ecosystems be made less stable?	▪ Human impacts research report and jigsaw ▪ Research Mount. St. Helen's or Yellowstone fires since the incidents and write a newspaper article or article for younger audience magazines, such as "Ranger Rick" ▪ Create concept maps for succession ▪ Brainstorm- concept map ▪ Newsprint summary ▪ Film ▪ Draw a picture ▪ Wipe board example ▪ Journal writing ▪ Do now	▪ Short paper (2-4 pg.) ▪ Check concept map ▪ Check newsprint summary ▪ Check picture ▪ Wipe board work ▪ Journal writing ▪ Start question/ do now ▪ Quiz ▪ Chapter test ▪ Test revisions	

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

Background:

Population growth has placed new strains on the environment-massive pollution of air and water, deforestation and extinction of species, global warning, and alteration of the ozone shield. Some individuals believe that there will be a technological fiz for such problems. Others, concerned with the accelerating pace of change and the ecological concept of finite resources, are far less optimistic. What is certain, however, is that resolving these issues will require increasing global awareness, cooperation, and action.

Since the students of today will be the elected officials and informed public of tomorrow, the teacher should encourage a diversity of activities that will allow students to explore, explain, and apply conceptual understandings and skills necessary to be environmentally literate.

Biology Vocabulary:

Global warming	Ozone shield	Deforestation	Finite resources	Global awareness	Atmosphere	Water cycle
Recycling	Industrialization					

Guiding Questions:

Where is acid rain most severe and why?
What positive and negative effects does man have on the environment?
In what ways has environment changed in the last year?
How many people are alive today and how is that number changing?
What activities have you engaged in that might have contributed to changes in your environment?
Why do communities have planning boards and zoning laws?

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Standard 4: Key Idea 7: Performance Indicator 7.1: Describe the range of interrelationships of humans with the living and nonliving environment.

Essential Knowledge/Skills (Major Understandings)	*Essential Questions*	*Classroom Ideas*	*Assessment Ideas*	*Vocabulary*
7.1a The Earth has finite resources; increasing human consumption places stress on the natural processes that renew some resources and deplete those resources that cannot be renewed. 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 recycling of nutrients. Humans are changing many of these basic processes and the changes may be detrimental. 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.	▪ What affects have humans had on the planet in terms of natural resources? ▪ Why is it important to consider maintaining ecological stability when considering resource use? ▪ How do humans modify ecosystems and what effects could these modifications have to all life in the area?	▪ Brainstorm ideas of ways that humans have impacted the environment and classify. ▪ Research recycling laws and practices in various counties in NYS (or various countries) to compare ecological practices to economic issues. ▪ Have students complete a graphic organizer comparing recyclable products ▪ Open-ended lab where each student collects data regarding wastes produced in a 24 hour period and draw conclusions from data collected. ▪ Students create floor plan of their home and locate toxic substances from a supplied list. ▪ Field trip to recycling center, landfill, sewage treatment or power plant or have someone from those sites come and talk to students ▪ Journal writing ▪ Write a problem ▪ Film ▪ Draw a picture ▪ Wipe board example ▪ Homework explanation ▪ Video: "The Blue Planet" ▪ Lab- Does acid rain affect the germination of seeds? ▪ Library and online research ▪ Timeline ▪ Crossword puzzle ▪ Do now ▪ Mini labs	▪ Check concept map ▪ Mini lab ▪ Lab report ▪ Start question/do now ▪ Crossword puzzle ▪ Journal writing ▪ Check picture ▪ Wipe board work ▪ Homework checks ▪ Quiz ▪ Chapter test ▪ Test revisions ▪ Check problem ▪ Check timeline ▪ Short paper (2-4 pg.) ▪ Check newsprint summary	▪ Carrying capacity ▪ Deforestation ▪ Direct harvesting ▪ Energy flow ▪ Fossil fuel ▪ Global warming ▪ Industrialization ▪ Nonrenewable resource ▪ Nuclear fuel ▪ Ozone shield ▪ Pollution ▪ Renewable resource ▪ Technology ▪ Trade off ▪ Water cycle

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Standard 4: Key Idea 7: Performance Indicator 7.2: Explain the impact of technological development and growth in the human population on the living and nonliving environment.				
Essential Knowledge/Skills (Major Understandings)	***Essential Questions***	***Classroom Ideas***	***Assessment Ideas***	***Vocabulary***
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. 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. 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.	▪ How does human activity disrupt ecosystems? ▪ What is the result of degradation of ecosystems? ▪ What is the result of reduction of biodiversity? ▪ What happens when organisms are added to or removed from an ecosystem? ▪ What is the result of usage of fossil and nuclear energy?	▪ Examine local use of land issues ▪ Debate pros and cons of reintroducing bobcat and wolf to Adirondacks ▪ Discuss use of biological controls and integrated pest management ▪ Take a current community issue (or make one up) and have student's develop a plan for or against it to present at a "Town Meeting" ▪ Mini lab ▪ Formal lab ▪ Brainstorm- concept map ▪ Write a problem ▪ Do now ▪ Crossword puzzle ▪ Newsprint summary ▪ Draw a picture ▪ Wipe board example ▪ Library and online research ▪ Film ▪ Short paper (2-4 pg.)	▪ Mini labs ▪ Lab report ▪ Check concept map ▪ Check problem ▪ Start question ▪ Crossword puzzle ▪ Check newsprint summary ▪ Check picture ▪ Wipe board work ▪ Quiz ▪ Chapter test ▪ Test revisions ▪ Journal writing	

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Standard 4: Key Idea 7: Performance Indicator 7.3: Explain how individual choices and societal actions can contribute to improving the environment.				
Essential Knowledge/Skills (Major Understandings)	***Essential Questions***	***Classroom Ideas***	***Assessment Ideas***	***Vocabulary***
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. 7.3b The decisions of one generation both provide and limit the range of possibilities open to the next generation.	▪ Why is it important to assess the impact of a new technology before it is introduced?	▪ Use demonstration as whole apple = Earth so students can see how little of Earth can support life ▪ Socratic seminar involving introduction of new technologies ▪ Brainstorm- concept map ▪ Write a problem ▪ Journal writing ▪ Library and online research ▪ Do now ▪ Use resources to research how wind, sun, heat from the earth and ocean tides are being used as alternative energy sources (individually or groups). ▪ Written essay comparing and contrasting alternative energy sources or group presentation/debate in class.	▪ Check concept map ▪ Check problem ▪ Journal writing ▪ Start question/do now ▪ Quiz ▪ Chapter test ▪ Test revisions ▪ Short paper (2-4 pg.)	

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Resource Materials			
Title	**Source**	**Title**	**Source**
Biology- The Study of Life (Laboratory Manual)	Prentice Hall 4th Edition 0-13-083353-3	Brief Review for New York The Living Environment	Prentice Hall 2004 Edition 0-13-125577-0
Biology- The Study Of Life (Teacher Edition)	Prentice Hall 4th Edition 0-13-806622-1	Living in the Environment	G. Tyler Miller, Jr. 11th Edition 0-534-56269-8
Biology- The Study of Life (Student Edition)	Prentice Hall 4th Edition 1991 ISBN 0-13-083296-0	Biology- The Dynamics of Life (Student Edition)	Glencoe/ McGraw-Hill, 1998 ISBN 0-02-825431-7
Biology- The Study of Life (Teacher Edition)	Glencoe/ McGraw-Hill 1998 ISBN 0-02-825432-5	Biology	Campbell, Reese, Mitchell 5th Edition 0-8053-6566-4
Biology- Living Systems (Teacher Edition)	Glencoe/McGraw Hill ISBN: 0-02-826294-8		