Wayne Central School District
Ontario Center, NY 14519

Science Curriculum

SIXTH GRADE
Draft

Revised: June 12, 2001

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I. District Philosophy

The Wayne Central School District believes that the goal of education is the all-around development of each student. The role of the school is to enable individuals to develop to their fullest potential.

The school, in cooperation with the home and community, will assist the student with intellectual, social, cultural, emotional, physical and moral growth. The school should help create within each student an awareness of civic responsibilities and respect for authority to assist the student in becoming a well-integrated, responsible person capable of assuming a vital role in an evolving civilization.

The Wayne Central School District subscribes to the general theory of individual differences; namely, that each student is an individual and has innate abilities, ambitions, and emotions. In the process of educating this individual, the program should provide a challenge while reflecting a concern for needs based on individual capabilities.

The Wayne Central School District further subscribes to the following fundamental principles:

1. **Children, regardless of potential, are capable of learning and acquiring the skill and knowledge needed to function to the best of their ability in our society,**

2. **Our responsibility is to see that children learn. The energies of all participants should be focused on achieving the desired outcomes. Accountability does not end with following established rules and procedures; its essence is found in results,**

3. **Minimum competence, while necessary, is not enough. Successful participation in our society demands much more. All children are entitled to approved curriculum, to instructional methods, and to expectations that challenge them to perform at their best, and help them to become truly proficient in knowledge and skills,**

4. **Every child in New York State is entitled to the resources necessary to provide the sound, basic education that the state constitution requires,**

5. **Each participant in the educational system should have the opportunity to effectively discharge his or her responsibility, and each participant should be held accountable for achieving desired results. This principle applies to all participants in the educational process – students, parents, teachers, counselors, librarians, administrators, the Board of Education, and others,**

6. **Achievement of desired results by individuals and groups should be rewarded. Creativity in our students needs to be nurtured and encouraged. Occasional failure in a large and diverse system us probably unavoidable. However, failure should not be permitted to persist. When it occurs, with either individuals or groups, help should be provided and the situation changed.**

II. District Mission Statement:

Based upon the belief that all students can learn, the staff of Wayne Central School district accepts the responsibility to teach all students regardless of differences, the fundamental skills. We further accept the responsibility to challenge all students to attain higher levels of achievement. Wayne Central will provide the opportunity, environment, and encouragement to meet this goal while developing the whole child physically, emotionally, and culturally.

III. NYS Learning Standards:

Health, Physical Education, and Home Economics

1. Personal Health and Fitness – Students will have the necessary knowledge and skills to establish and maintain physical fitness, participate in physical activity, and maintain personal health.
2. A Safe and Healthy Environment – Students will acquire the knowledge and ability necessary to create and maintain a safe and healthy environment
3. Resource Management – Students will understand and be able to manage their personal and community resources.

Mathematics, Science, and Technology

1. Analysis, Inquiry, and Design – Students will use mathematical analysis, scientific inquiry, and engineering design, as appropriate, to pose questions, seek answers, and develop solutions.
2. Information Systems – Students will access, generate, process, and transfer information using appropriate technologies
3. Mathematics – Students will understand mathematics and become mathematically confident by communicating and reasoning mathematically, by applying mathematics in real-world settings, and by solving problems through the integrated study of number systems, geometry, algebra, data analysis, probability, and trigonometry.
4. Science – 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.
5. Technology – Students will apply technological knowledge and skills to design, construct, use, and evaluate products and systems to satisfy human and environmental needs.
6. Interconnectedness: Common Themes – Students will understand the relationships and common themes that connect mathematics, science, and technology and apply the themes to these and other areas of learning.
7. Interdisciplinary Problem Solving – Students will apply the knowledge and thinking skills of mathematics, science, and technology to address real-life problems and make informed decisions.

English Language Arts

1. Students will listen, speak, read and write for information and understanding. As listeners and readers, students will collect data, facts and ideas; discover relationships, concepts, and generalizations; and use knowledge generated from oral, written, and electronically produced texts. As speakers and writers, they will use oral and written language that follows the accepted conventions of the English language to acquire, interpret, apply, and transmit information.
2. Language for Literary Response and Expression – Students will read and listen to oral, written, and electronically produced texts and performances from American and world literature; relate texts and performances to their own lives; and develop an understanding of the diverse social, historical, and cultural dimensions the texts and performances represent. As speakers and writers. Students will use oral and written language that follows the accepted conventions of the English language for self-expression and artistic creation.
3. Language for Critical Analysis and Evaluation – Students will listen, speak, read and write for critical analysis and evaluation. As listeners and readers, students will analyze experiences, ideas, information, and issues presented by others using a variety of established criteria. As speaker and writers, they will use oral and written language that follows the accepted conventions of the English language to present, from a variety of perspectives, their opinions and judgements on experiences, ideas, information and issues.
4. Language for Social Interaction – Students will listen, speak, read, and write for social interaction. Students will use oral and written language that follows the accepted conventions of the English language for effective social communication with a wide variety of people. As reader and listeners, they will use the social communications of others to enrich their understanding of people and their views.

Languages Other Than English

1. Communication Skills – Students will be able to use a language other than English for communication.
2. Cultural Understanding – Students will develop cross-cultural skills and understandings.

The Arts

1. Creating, Performing, and Participating in the Arts – Students will actively engage in the processes that constitute creation and performance in the arts (dance, mucus, theatre, and visual arts) and participate in various roles in the arts.
2. Knowing and Using arts materials and Resources – Students will be knowledgeable about and make use of the materials and resources available for participation in the arts in various roles.
3. Responding to and Analyzing Works of Art – Students will respond critically to a variety of works in the arts, connecting the individual work to other works and to other aspects of human endeavor and thought.
4. Understanding the Cultural Contributions of the Arts – Students will develop an understanding of the personal and cultural forces that shape artistic communication and how the arts in turn shape the diverse cultures of past and present society.

Career Development and Occupational Studies

1. Career Development – Students will be knowledgeable about the world of work, explore career options, and relate personal skills, aptitudes, and abilities to future career decisions.
2. Integrated Learning – Students will demonstrate how academic knowledge and skills are applied in the workplace and other settings.
3. Universal Foundation Skills – Students will demonstrate mastery of the foundation skills and competencies essential for success in the workplace.
4. Career Majors – Students who choose a career major will acquire the career-specific technical knowledge/skills necessary to progress toward gainful employment, career advancement, and success in postsecondary programs.

Social Studies

1. History of the United State and New York – Students will use a variety of intellectual skills to demonstrate their understanding of major ideas, eras themes, developments, and turning points in the history of the United States and New York.
2. World History – Students will use a variety of intellectual skills to demonstrate their understanding of major ideas, eras, themes, developments and turning points in world history and examine the broad sweep of history from a variety of perspectives.
3. Geography – Students will use a variety of intellectual skills to demonstrate their understanding of the geography of the interdependent world in which we live – local, national and global – including the distribution of people, places, and environments over the Earth's surface.
4. Economics – Students will use a variety of intellectual skills to demonstrate their understanding of how the United States and other societies develop economic systems and associated institutions to allocate scarce resources, how major decision-making units function in the United States and other national economies, and how an economy solves the scarcity problem through market and nonmarket mechanisms.
5. Civics, Citizenship, and Government – Students will use a variety of intellectual skills to demonstrate their understanding of the necessity for establishing governments; the governmental system of the United States Constitution; the basic civil values of American constitutional democracy; and the roles, rights, and responsibilities of citizenship including avenues of participation.

IV. Commencement Outcomes

James A. Beneway High School
"Adult Roles, Skills & Knowledge"

CITIZEN

A citizen is a responsible, law-abiding member of society who:

- Has a strong sense of values;
- Knows right from wrong;
- Is aware of community news, issues and norms;
- Accepts diversity in ethnicity and belief;
- Has knowledge of government at all levels and issues relative to each;
- Associates with others in positive and productive ways.

LIFE - LONG LEARNER

A life-long learner is one who perseveres, is self-motivated, is innately curious, focused and:

- Is able to set goals;
- Adheres to deadlines/due-dates, has time management skills and abilities;
- Is a problem solver, can define problems, analyze information and task analyze/prioritize potential solutions, has the ability to select the best "tool/strategy" for the situation, and can enlist others in the process of evaluation and refocusing.

LEADER

A leader is a problem solver with effective communication skills. He/she has an ability to motivate others and:

- Is a strong willed person with vision, beliefs and convictions to carry out each.
- Is able to recognize and effectively use all resources, such as material, time and human
- Is responsible and accountable for self and others.

WORKER/WAGE EARNER/BUSINESS OWNER

A worker/wage earner is an individual who is trust worthy, moral and ethical, and who:

- Possess basic job skills with a willingness to change, grow and develop new skills;
- Is a good communicator;
- Demonstrates leadership skills and initiative and the ability to work as a team player;
- Is responsible, reliable and respectful to others;
- Has the ability to make sound decisions.

CONSUMER

A consumer is an individual who has knowledge of the global economy and:

- Utilizes and applies budgeting skills and credit awareness;
- Maintains long-terms personal financial planning (savings, banking, retirement);
- Understand one's rights, responsibilities and risks.

COUNSELOR/TEACHER/MENTOR

A counselor/teacher/mentor is an individual who is patient, self-confident, assertive leader who:

- Is a problem solver and can guide others to solve problems;
- Is an active listener;
- Is aware of issues, societal, family, religious differences and different customs;
- Has interpersonal skills and values others opinions.

PARENT/FAMILY MEMBER

A parent/family member is an individual who:

- Is nurturing and loving;
- Displays flexibility;
- Has high character and morals;
- Is accountable and consistent with respect to expectations and follow through;
- Becomes actively involved in their children and family's education and other pursuits.

FRIEND

A friend is an individual who shows great interest and respect for others, and who:

- Is non-judgmental and available when a time of need arises;
- Is unselfish, honest, supportive, caring and genuine;
- Is an open-minded listener who seeks to understand before being understood;
- Give him/herself to other without expectations of compensation or return of favor.

V. Scope and Sequence

Wayne Central School District

SCIENCE 5-8 SCOPE & SEQUENCE

MST PLANNING DOCUMENT FOR INTERMEDIATE LEVEL

PROCESS SKILLS
BASED ON STANDARD 4

General Skills:	5	6	7	8
1. Follow safety procedures in the classroom and laboratory	R	R	R	R
2. Safely and accurately use the following measurement tools: • Metric ruler[1], balance[2], stop watch[3], graduated cylinder[4], thermometer[5], spring scale[6], voltmeter[7]	1, 5	1, 4, 5	1, 5	1, 2, 3, 4, 5, 6,
3. Use appropriate units for measured or calculated values	R	R	R	R
4. Recognize and analyze patterns and trends	R	R	R	R
5. Classify objects according to an established scheme and a student generated scheme	R	R	R	R
6. Develop and use a dichotomous key	I	I	M	R
7. Sequence events	R	R	R	R
8. Identify cause and effect relationships	R	R	R	R
9. Use indicators and interpret results	R	R	R	R

Key:

I Skill is introduced but not benchmarked
T Skill receives considerable instruction (taught but not benchmarked)
M Concept is mastered and benchmarked. Note that a skill may be introduced and benchmarked in one year. In those cases, only an M appears
R Concept is reviewed
E Expand

Living Environment Skills	5	6	7	8
1. Manipulate a compound microscope to view microscopic objects	T	T	M	R
2. Determine the size of a microscopic object using a compound microscope	I	I	M	R
3. Prepare a wet mount slide	M	R	R	R
4. Use appropriate staining techniques	I	I	M	R
5. Design and use a Punnett square or a pedigree chart to predict the probability of certain traits			M	R
6. Classify living things according to a student generated scheme and an established scheme.	R	R	R	R
7. Interpret and/or illustrate the energy flow in a food chain, energy pyramid or food web	R	R	R	R
8. Identify pulse points and pulse rates	I	I	M	R
9. Identify structure and function relationships in organisms	I	I	M	R

Physical Setting Skills	5	6	7	8
1. Given the latitude and longitude of location, indicate its position on a map and determine the latitude and longitude of a given location on a map	I	M	R	
2. Using identification tests and a flow chart, identify mineral samples	M	R		
3. Use a diagram of the rock cycle to determine geological processes that led to the formation of a specific rock type	M	R		
4. Plot the location of recent earthquake and volcanic activity on a map and identify patterns of distribution	M	R		
5. Use a magnetic compass to find cardinal directions		M		
6. Measure the angular elevation of an object using appropriate instruments		M		
7. Generate and interpret field maps including topographic and weather maps		M		

	5	6	7	8
8. Predict the characteristics of an air mass based on the origin of the air mass		**M**		
9. Measure weather variables such as wind speed and direction, relative humidity, barometric pressure, etc.		**M**		
10. Determine the density of liquids, and regular and irregular shaped solids				**M**
11. Determine the volume of a regular and irregular shaped solids using water displacement				**M**
12. Using the Periodic Table, identify an element as a metal, nonmetal, or noble gas	**I**	**I**	**I**	**M**
13. Determine the identity of an unknown element using physical and chemical properties				**M**
14. Using appropriate resources, separate the parts of a mixture				**M**
15. Determine the electrical conductivity of a material, using a simple circuit				**M**
16. Determine the speed and acceleration of moving object				**M**

MST PLANNING DOCUMENT FOR STANDARD 4
INTERMEDIATE LEVEL – LIVING ENVIRONMENT

Living Environment Performance Indicator 1.1 *Compare and contrast the parts of plants, animals, and one-celled organisms.*

Major Understandings	**5**	**6**	**7**	**8**
1.1a Living things are composed of cells. Cells provide the structure and carry on the major functions to sustain life. Cells are usually microscopic in size.	●		●	
1.1b The way in which cells function is similar in all living things. Cells grow and divide, producing more cells. Cells take in nutrients, which they use to provide energy for the work that cells do and to make the materials that a cell or an organism needs.	●		●	
1.1c Most cells have cell membranes, genetic material, and cytoplasm. Some cells have a cell wall and/or chloroplasts. Many cells have a nucleus.	●		●	
1.1d Some organisms are single cells; others, including humans, are multicellular.	●		●	
1.1e Cells are organized for more effective functioning in multicellular organisms. Levels of organization for structure and function of a multicellular organism include cells, tissues, organs, and organ systems.	●		●	
1.1f Many plants have roots, stems, leaves, and reproductive structures. These organized groups of tissues are responsible for a plant's life activities.		●		
1.1g Multicellular animals often have similar organs and systems specialized for carrying out the major life activities.			●	
1.1h Living things are classified by shared characteristics on the cellular and organism level. In classifying organisms, biologists consider details of internal and external structures. Biological classification systems are arranged from general (kingdom) to specific (species).			●	

Living Environment Indicator 1.2 *Explain the functioning of the major human organ systems and their interactions.*

Major Understandings	**5**	**6**	**7**	**8**
1.2a Each systems is composed of organs and tissues which perform specific functions and interact with each other, e.g., digestion, gas exchange, excretion, circulation, locomotion, control and coordination, reproduction, and protection from disease.	●		●	
1.2b Tissues, organs, and organ systems help to provide all cells with basic needs such as nutrients, oxygen, and waste removal.			●	
1.2c The digestive system consists of organs that are responsible for the mechanical and chemical breakdown of food. The breakdown process results in molecules that can be absorbed and transported to cells.			●	
1.2d During respiration, cells use oxygen to release the energy stored in food. The respiratory system supplies oxygen and removes carbon dioxide (gas exchange).			●	
1.2e The excretory system functions in the disposal of dissolved waste molecules, the elimination of liquid and gaseous wastes, and the removal of excess heat energy.			●	
1.2f The circulatory system moves substances to and from cells where they are needed or produced, responding to changing demands.			●	
1.2g Locomotion, necessary to escape danger, obtain food and shelter, and reproduce, is accomplished by the interaction of skeletal and muscular systems and coordinated by the nervous system.			●	
1.2h The nervous and endocrine systems interact to control and coordinate the body's responses to changes in the environment, and to regulate growth, development, and reproduction. Hormones are chemicals produced by the endocrine system; hormones regulate many body functions.	●			
1.2i The male and female reproductive systems are responsible for producing sex cells necessary for the production of offspring.	●		●	
1.2j Disease breaks down the structures or functions of an organism. Some diseases are the result of failures of the system. Others are the result of damage by infection from other organisms (germ theory). Specialized cells protect the body from infectious disease. The chemicals they produce identify and destroy microbes that enter the body.			●	

Living Environment Performance Indicator 2.1 *Describe the asexual mechanisms for passing genetic materials from generation to generation.*

Major Understandings	5	6	7	8
2.1a Hereditary information is contained in genes. Genes are composed of DNA that makes up the chromosomes of cells.			●	
2.1b Each gene carries a single unit of information. A single inherited trait of an individual can be determined by one pair or by many pairs of genes. A human cell contains thousands of different genes.			●	
2.1c Each human cell contains a copy of all the genes needed to produce a human being.			●	
2.1d In asexual reproduction, all the genes come from a single parent. Asexually produced offspring are genetically identical to the parent.			●	
2.1e In sexual reproduction typically half of the genes come from each parent. Sexually produced offspring are not identical to either parent.			●	

Living Environment Performance Indicator 2.2 *Describe simple mechanisms related to the inheritance of some physical traits in offspring.*

Major Understandings	5	6	7	8
2.2a In all organisms, genetic traits are passed on from generation to generation.			●	
2.2b Some genes are dominant and some are recessive. Some traits are inherited by mechanisms other that dominance and recessiveness.			●	
2.2c The probability of traits being expressed can be determined using models of genetic inheritance. Some models of prediction are pedigree charts and Punnett squares.			●	

Living Environment Performance Indicator 3.1 *Describe sources of variation in organisms and their structures and relate the variations to survival.*

Major Understandings	5	6	7	8
3.1a The processes of sexual reproduction and mutation have given rise to a variety of traits within a species.			●	
3.1b Changes in environmental conditions can affect the survival of individual organisms with a particular trait. Small differences between parents and offspring can accumulate in successive generations so that descendants are very different from their ancestors. Individual organisms with certain traits are more likely to survive and have offspring than individuals without those traits.			●	
3.1c Human activities such as selective breeding and advances in genetic engineering may affect the variations of species.			●	

Living Environment Performance Indicator 3.2 *Describe factors responsible for competition within species and the significance of that competition.*

Major Understandings	5	6	7	8
3.2a In all environments, organisms with similar needs may compete with one another for resources.	●	●		
3.2b Extinction of a species occurs when the environment changes and the adaptive characteristics of a species are insufficient to permit its survival. Extinction of species is common. Fossils are evidence that a great variety of species existed in the past.	●	●		
3.2c Many thousands of layers of sedimentary rock provide evidence for the long history of Earth and for the long history of changing lifeforms whose remains are found in the rocks. More recently deposited rock layers are more likely to contain fossils resembling existing species.	●	●		
3.2d Although the time needed for changes in a species is usually great, some species of insects and bacteria have undergone significant change in just a few years.	●	●		

Living Environment Performance Indicator 4.1 *Observe and describe the variations in reproductive patterns of organisms, including asexual and sexual reproduction.*

Major Understandings	5	6	7	8
4.1a Some organisms reproduce asexually. Other organisms can reproduce both sexually and asexually.	●		●	
4.1b There are many methods of asexual reproduction, including division of a cell into two cells, or when part of an animal or plant is separated from the parent and becomes another individual.			●	
4.1c Methods of sexual reproduction depend on the species. All methods involve the merging of sex cells to begin the development of a new individual. In many species, including plants and humans, eggs and sperm are produced.			●	
4.1d Fertilization and/or development in organisms may be internal or external.	●		●	

Living Environment Performance Indicator 4.2 *Explain the role of sperm and egg cells in sexual reproduction.*

Major Understandings	5	6	7	8
4.2a The male sex cell is the sperm. The female sex cell is the egg. The fertilization of an egg by a sperm results in a fertilized egg.			●	
4.2b In sexual reproduction, sperm and egg each carry one-half of the genetic information for the new individual. Therefore, the fertilized egg contains genetic information from each parent.			●	

Living Environment Performance Indicator 4.3 *Observe and describe developmental patterns in selected plants and animals (e.g., insects, frogs, humans, seed-bearing plants).*

Major Understandings	5	6	7	8
4.3a Multicellular organisms exhibit complex changes in development, which begin after fertilization. The fertilized egg undergoes numerous cellular divisions that will result in a multicellular organism, with each cell having identical genetic information.			●	
4.3b In humans, the fertilized egg grows into tissue which develops into organs and organ systems before birth.			●	
4.3c Various body structures and functions change as an organism goes through its life cycle.	●		●	
4.3d Patterns of development vary among animals. In some species they young resemble the adult, while in others they do not. Some insects and amphibians undergo metamorphosis as they mature.	●	●	●	
4.3e Patterns of development vary among plants. In seed-bearing plants, seeds contain stored food for early development. Their later development into adulthood is characterized by varying patterns of growth from species to species.		●		
4.3f As an individual organism ages, various body structures and functions change.	●		●	

Living Environment Performance Indicator 4.4 *Observe and describe cell division at the microscopic level and its macroscopic effects.*

Major Understandings	5	6	7	8
4.4a In multicellular organisms, cell division is responsible for growth, maintenance, and repair. In some one-celled organisms cell division is a method of asexual reproduction.			●	
4.4b In one type of cell division, chromosomes are duplicated and then separated into two identical and complete sets to be passed to each of the two resulting cells. In this type of cell division, the hereditary information is identical in all the cells that result.			●	
4.4c Another type of cell division is responsible for the production of egg and sperm cells is sexually reproducing organisms. The eggs and sperm resulting from this type of cell division contain one-half of the hereditary information.			●	
4.4d Cancers are a result of abnormal cell division.			●	

Living Environment Performance Indicator 5.1 *Compare the way a variety of living specimens carry out basic life functions and maintain dynamic equilibrium.*

Major Understandings	5	6	7	8
5.1a Animals and plants have a great variety of body plans and internal structures that contribute to their ability to maintain a balanced condition.			●	
5.1b An organism's overall body plan and its environment determine the way that the organisms carries out the life processes.			●	
5.1c All organisms require energy to survive. The amount of energy needed and the method for obtaining this energy varies among cells. Some cells use oxygen to release the energy stored in food.	●	●	●	
5.1d The methods for obtaining nutrients vary among organisms. Producers, such as green plants, use light energy to make their food. Consumers, such as animals, take in energy-rich food.		●		
5.1e Herbivores obtain energy from plants. Carnivores obtain energy from animals. Omnivores obtain energy from both plants and animals. Decomposers, such as bacteria and fungi, obtain energy by consuming wastes and/or dead organisms.		●		
5.1f Regulation of an organism's internal environment involves sensing the internal environment and changing physiological activities to keep conditions within the range required for survival. Regulation includes a variety of nervous and hormonal feedback systems.			●	
5.1g The survival of an organism depends on its ability to sense and respond to its external environment.			●	

Living Environment Performance Indicator 5.2 *Describe the importance of major nutrients, vitamins, and minerals in maintaining health and promoting growth, and explain the need for a constant input of energy for living organisms.*

Major Understandings	5	6	7	8
5.2a Food provides molecules that serve as fuel and building material for all organisms. All living things, including plants, must release energy from their food, using it to carry on their life processes.	●		R	
5.2b Foods contain a variety of substances which include carbohydrates, fats, vitamins, proteins, minerals, and water. Each substance is vital to the survival of the organism.	●		R	
5.2c Metabolism is the sum of all chemical reactions in an organism. Metabolism can be influenced by hormones, exercise, diet, and aging.	●		●	
5.2d Energy in foods is measured in Calories. The total caloric value of each type of food varies. The number of Calories a person requires varies from person to person.	●		●	
5.2e In order to maintain a balanced state, all organisms have a minimum daily intake of each type of nutrient based on species, size, age, sex, activity, etc. An imbalance in any of the nutrients might result in weight gain, weight loss, or a diseased state.	●		●	
5.2f Contraction of infectious disease, and personal behaviors such as use of toxic substances and some dietary habits, may interfere with one's dynamic equilibrium. During pregnancy these conditions may also affect the development of the child. Some effects of these conditions are immediate; others may not appear for many years.	●		●	

Living Environment Performance Indicator 6.1 *Describe the flow of energy and matter through food chains and food webs.*

Major Understandings	5	6	7	8
6.1a Energy flows through ecosystems in one direction, usually from the Sun, through producers to consumers and then to decomposers. This process may be visualized with food chains or energy pyramids.	●	●		
6.1b Food webs identify feeding relationships among producers, consumers, and decomposers in an ecosystem.	●	●	●	
6.1c Matter is transferred from one organism to another and between organisms and their physical environment. Water, nitrogen carbon dioxide, and oxygen are examples of substances cycled between the living and nonliving environment.		●		

Living Environment Performance Indicator 6.2 *Provide evidence that green plants make food and explain the significance of this process to other organisms.*

Major Understandings	5	6	7	8
6.2a Photosynthesis is carried on by green plants and some other organisms containing chlorophyll. In this process, the Sun's energy is converted into and stored as chemical energy in the form of a sugar. The quantity of sugar molecules increases in green plants during photosynthesis in the presence of sunlight.		●		
6.2b The major source of atmospheric oxygen is photosynthesis. Carbon dioxide is removed from the atmosphere and oxygen is released during photosynthesis.		●		
6.2c Green plants are the producers of food which is used directly or indirectly by consumers.		●		

Living Environment Performance Indicator 7.1 *Describe how living things, including humans, depend upon the living and nonliving environment for their survival.*

Major Understandings	5	6	7	8
7.1a A population consists of all individuals of a species that are found together at a given place and time. Populations living in one place form a community. The community and the physical factors with which it interacts compose an ecosystem.	●	●		
7.1b Given adequate resources and no disease or predators, populations (including humans) increase. Lack of resources, habitat destruction and other factors, such as predation and climate, limit the growth of certain populations in the ecosystem.	●	●		
7.1c In all environments, organisms interact with one another in many ways. Relationships among organisms may be competitive, harmful, or beneficial. Some species have adapted to be dependent upon each other with the result that neither could survive without the other.	●	●		
7.1d Some microorganisms are essential to the survival of other living things.	●		●	
7.1e The environment may contain dangerous levels of substances (pollutants) that are harmful to organisms. Therefore, the good health of environments and individuals requires monitoring of soil, air, and water and taking steps to keep them safe.	●		●	

Living Environment Performance Indicator 7.2 *Describe the effects of environmental changes on humans and other populations.*

Major Understandings	5	6	7	8
7.2a In ecosystems, balance is the result of interactions between the community members and their environment.	●	●		
7.2b The environment may be altered through the activities of organisms. Alterations are sometimes abrupt. Some species may replace others over time, resulting in long-term gradual changes (ecological succession).	●	●		
7.2c Overpopulation by any species impacts the environment due to the increased use of resources. Human activities can bring about environmental degradation through resource acquisition, urban growth, land-use decisions, and waste disposal, etc.	●	●		
7.2d Since the Industrial Revolution, human activities have resulted in major pollution of air, water, and soil. Pollution has cumulative ecological effects such as acid rain, global warming, or ozone depletion. The survival of living things on our planet depends on the conservation and protection of Earth's resources.	●	●		

MST PLANNING DOCUMENT FOR STANDARD 4
INTERMEDIATE LEVEL – THE PHYSICAL SETTING

Physical Setting Performance Indicator 1.1 *Explain, daily, monthly, and seasonal changes on Earth*

Major Understandings	**5**	**6**	**7**	**8**
1.1a Earth's Sun is an average sized star. The Sun is more than a million times greater in volume than Earth.		●		
1.1b Other stars are like the Sun, but so far away that they look like points of light. Distances between stars are vast compared to distances within our solar system.		●		
1.1c The Sun and the planets that revolve around it are the major bodies in the solar system. Other members include comets, moons, and asteroids. Earth's orbit is nearly circular.		●		
1.1d Gravity is the force that keeps planets in orbit around the Sun and the Moon in orbit around the Earth.		●		●
1.1e Most objects in the solar system have a regular and predictable motion. These motions explain such phenomena as a day, a year, phases of the Moon, eclipses, tides, meteor showers, and comets.		●		
1.1f The latitude/longitude coordinate system and our system of time are based on celestial observations.		●		
1.1g Moons are seen by reflected light. Our Moon orbits Earth, while Earth orbits the Sun. The Moon's phases as observed from Earth are the result of seeing different portions of the lighted area of the Moon's surface. The phases repeat in a cyclic pattern in about one month.		●		
1.1h The apparent motions of the Sun, Moon, Planets, and stars across the sky can be examined by Earth's rotation and revolution. Earth's rotation causes the length of one day to be approximately 24 hours. This rotation also causes the Sun and Moon to appear to rise along the eastern horizon and to set along the western horizon/Earth's revolution around the Sun defines the length of the year as 365 ¼ days.		●		
1.1i The tilt of Earth's axis of rotation and the revolution of Earth around the Sun cause seasons on Earth. The length of daylight varies depending on latitude and season.		●		
1.1j The shape of Earth, the other planets, and stars is nearly spherical.		●		

Physical Setting Performance Indicator 2.1 *Explain how the atmosphere (air), hydrosphere (water), and lithosphere (land) interact, evolve, and change.*

Major Understandings	**5**	**6**	**7**	**8**
2.1a Nearly all the atmosphere is confined to a thin shell surrounding Earth. The atmosphere is a mixture of gases, including nitrogen and oxygen with small amounts of water vapor, carbon dioxide, and other trace gases. The atmosphere is stratified into layers, each having distinct properties. Nearly all weather occurs in the lowest layer of the atmosphere.		●		
2.1b As altitude increases, air pressure decreases.		●		●
2.1c The rock at Earth's surface forms a nearly continuous shell around Earth called the lithosphere.	●	●		
2.1d The majority of the lithosphere is covered by a relatively thin layer of water called the hydrosphere.		●		
2.1e Rocks are composed of minerals. Only a few rock-forming minerals make up most of the rocks of Earth. Minerals are identified on the basis of physical properties such as streak, hardness, and reaction to acid.	●			
2.1f Fossils are usually found in sedimentary rocks. Fossils can be used to study past climates and environments.		●		
2.1g The dynamic processes that wear away Earth's surface include weathering and erosion.	●			
2.1h The process of weathering breaks down rocks to form sediment. Soul consists of sediment, organic material, water, and air.	●			
2.1i Erosion is the transport of sediment. Gravity is the driving force behind erosion. Gravity can act directly or through agents such as moving water, wind, and glaciers.	●			
2.1j Water circulates through the atmosphere, lithosphere, and hydrosphere in what is known as the water cycle.		●		

Physical Setting Performance Indicator 2.2 *Describe volcano and earthquake patterns, the rock cycle, and weather and climate changes.*

Major Understandings	5	6	7	8
2.2a The interior of Earth is hot. Heat flow and movement of material within Earth cause sections of Earth's crust to move. This may result in earthquakes, volcanic eruption, and the creation of mountains and ocean basins.	●			
2.2b Analysis of earthquake wave data (vibrational disturbances) leads to the conclusion that there are layers within Earth. These layers – the crust, mantle, outer core, and inner core – have distinct properties.	●	●		
2.2c Folded, tilted, faulted, and displaced rock layers suggest past crustal movement.	●			
2.2d Continents fitting together like puzzle parts and fossil correlations provided initial evidence that continents were once together.	●			
2.2e The Theory of Plate Tectonics explains how the "solid" lithosphere consists of a series of plates that "float" on the partially molten section of the mantle. Convection cells within the mantle may be the driving force for the movement of the plates.	●			
2.2f Plates may collide, move apart, or slide past one another. Most volcanic activity and mountain building occur at the boundaries of these plates, often resulting in earthquakes.	●			
2.2g Rocks are classified according to their method of formation. The three classes of rocks are sedimentary, metamorphic and igneous. Most rocks show characteristics that give clues to their formation conditions.	●	●		
2.2h The rock cycle model shows how types of rock or rock material may be transformed from one type of rock to another.	●	●		
2.2i Weather describes the conditions of the atmosphere at a given location for a short period of time.		●		
2.2j Climate is the characteristic weather that prevails from season to season and year to year.		●		
2.2k The uneven heating of Earth's surface is the cause of weather.		●		
2.2l Air masses form when air remains nearly stationary over a large section of Earth's surface and takes on the conditions of temperature and humidity from that location. Weather conditions at a location are determined primarily by temperature, humidity, and pressure of air masses over that location.		●		

2.2m Most local weather condition changes are caused by movement of air masses.		●		
2.2n The movement of air masses is determined by prevailing winds and upper air currents.		●		
2.2o Fronts are boundaries between air masses. Precipitation is likely to occur at these boundaries.		●		
2.2p High-pressure systems generally bring fair weather. Low-pressure systems usually bring cloudy unstable conditions. The general movement of highs and lows is from west to east across the United States.		●		
2.2q Hazardous weather conditions include thunderstorms, tornadoes, hurricanes, ice storms, and blizzards. Humans can prepare for and respond to these conditions if given sufficient warning.		●		
2.2r Substances enter the atmosphere naturally and from human activity. Some of these substances include dust from volcanic eruptions and green house gases such as carbon dioxide, methane, and water vapor. These substances can affect weather, climate, and living things.		●		

Physical Setting Performance Indicator 3.1 *Observe and describe properties of materials, such as density, conductivity, and solubility.*

Major Understandings	**5**	**6**	**7**	**8**
3.1a Substances have characteristic properties. Some of these properties include color, odor, phase at room temperature, density, solubility, heat and electrical conductivity, hardness, and boiling and freezing points.				●
3.1b Solubility can be affected by temperature, surface area, stirring, and pressure.				●
3.1c The motion of particles helps to explain the phases (states) of matter as well as changes from one phase to another. The phase in which matter exists depends on the attractive forces among its particles.				●
3.1d Gases have neither a determined shape nor a definite volume. Gases assume the shape and volume of a closed container.				●
3.1e A liquid has definite volume, but takes the shape of a container.				●
3.1f A solid has definite shape and volume. Particles resist a change in position.				●
3.1g Characteristic properties can be used to identify different materials, and separate a mixture of substances into its components. For example, iron can be removed from a mixture by means of a magnet. An insoluble substance can be separated from a soluble substance by such processes as filtration, settling, and evaporation.				●

3.1h Density can be described as the amount of matter that is in a given amount of space. If two objects have equal volume, but one has more mass, the one with more mass is denser.				●
3.1i Buoyancy is determined by comparative densities.				●

Physical Setting Performance Indicator 3.2 *Distinguish between chemical and physical changes.*

Major Understandings	**5**	**6**	**7**	**8**
3.2a During a physical change a substance keeps its chemical composition and properties. Examples of physical changes include freezing, melting, condensation, boiling, evaporation, tearing, and crushing.				●
3.2b Mixtures are physical combinations of materials and can be separated by physical means.				●
3.2c During a chemical change, substances react in characteristic ways to form new substances with different physical and chemical properties. Examples of chemical changes include burning of wood, cooking of an egg, rusting of iron, and souring of milk.				●
3.2d Substances are often placed in categories if they react in similar ways. Examples include metals, nonmetals, and noble gases.				●
3.2e The Law of Conservation of Mass states that during an ordinary chemical reaction matter cannot be created or destroyed. In chemical reactions, the total mass of the reactants equals the total mass of the products.				●

Physical Setting Performance Indicator 3.3 *Develop mental models to explain common chemical reactions and changes in states of matter.*

Major Understandings	**5**	**6**	**7**	**8**
3.3a All matter is made up of atoms. Atoms are far too small to see with a light microscope.				●
3.3b Atoms and molecules are perpetually in motion. The greater the temperature, the greater the motion.				●
3.3c Atoms may join together in well-defined molecules or may be arranged in regular geometric patterns.				●
3.3d Interactions among atoms and/or molecules result in chemical reactions.				●
3.3e The atoms of any one element are different from the atoms of other elements.				●

3.3f There are more than 100 elements. Elements combine in a multitude of ways to produce compounds that account for all living and nonliving substances. Few elements are found in their pure form.				●
3.3g The Periodic Table is one useful model for classifying elements. The Periodic Table can be used to predict properties of elements (metals, nonmetals, noble gases).				●

Physical Setting Performance Indicator 4.1 *Describe the sources and identify the transformations of energy observed in everyday life.*

Major Understandings	**5**	**6**	**7**	**8**
4.1a The Sun is a major source of Energy for Earth. Other sources of energy include nuclear and geothermal energy.		●		●
4.1b Fossil fuels contain stored solar energy and are considered nonrenewable resources. They are a major source of energy in the United States. Solar energy, wind, moving water, and biomass are some examples of renewable energy resources.		●		●
4.1c Most activities in everyday life involve one form of energy being transformed into another. For example, the chemical energy in gasoline is transformed into mechanical energy in an automobile engine. Energy, in the form of heat, is almost always one of the products of energy transformations.		●		●
4.1d Different forms of energy include heat, light, electrical, mechanical, sound, nuclear, and chemical. Energy is transformed in many ways.		●		●
4.1e Energy can be considered to be either kinetic energy, which is the energy of motion, or potential energy, which depends on relative position.				●

Physical Setting Performance Indicator 4.2 *Observe and describe heating and cooling events.*

Major Understandings	5	6	7	8
4.2a Heat moves in predictable ways, flowing from warmer objects to cooler ones, until both reach the same temperature.				●
4.2b Heat can be transferred through matter by the collisions of atoms and/or molecules (conduction) or through space (radiation). In a liquid or gas, currents will facilitate the transfer of heat (convection).				●
4.2c During a phase change, heat energy is absorbed or released. Energy is absorbed when a solid changes to a liquid and when a liquid changes to a gas. Energy is released when a gas changes to a liquid and when a liquid changes to a solid.				●
4.2d Most substances expand when heated and contract when cooled. Water is an exception, expanding when changing to ice.				●
4.2e Temperature affects the solubility of some substances in water.				●

Physical Setting Performance Indicator 4.3 *Observe and describe energy changes as related to chemical reactions.*

Major Understandings	5	6	7	8
4.3a In chemical reactions, energy is transferred into or out of the system. In addition to heat, light, electricity, or mechanical, motion may be involved in such transfers.				●

Physical Setting Performance Indicator 4.4 *Observe and describe the properties of sound. Light, magnetism, and electricity.*

Major Understandings	5	6	7	8
4.4a Different forms of electromagnetic energy have different wavelengths. Some examples of electromagnetic energy are microwaves, infrared light, visible light, ultraviolet light, x-rays, and gamma rays.				●
4.4b Light passes through some materials, sometimes refracting in the process. Materials absorb and reflect light, and may transmit light. To see an object, light from that object, emitted by or reflected from it, must enter the eye.				●
4.4c Vibrations in materials set up wavelike disturbances that spread away from the source. Sound waves are an example. Vibrational waves move at different speeds in different materials. Sound cannot travel in a vacuum.				●
4.4d Electrical energy can be produced from a variety of energy sources can be transformed into almost any other form of energy.				●
4.4e Electrical circuits provide a means of transferring electrical energy.		●		
4.4f Without touching them, material that has been electrically charged attracts uncharged material, and may attract or repel other charged material.		●		
4.4g Without direct contact, a magnet attracts certain materials and either attracts or repels other magnets. The attractive force of a magnet is greatest at its poles.				●

Physical Setting Performance Indicator 4.5 *Describe situations that supports the principle of conservation of energy.*

Major Understandings	5	6	7	8
4.5a Energy cannot be created or destroyed, but only changes from one form into another.				●
4.5b Energy can change from on form to another, although in the process some energy is always converted to heat. Some systems transform energy with less loss of heat than others.				●

Physical Setting Performance Indicator 5.1 *Describe different patterns of motion of objects.*

Major Understandings	5	6	7	8
5.1a The motion of an object is always judged with respect to some other object or point. The idea of absolute motion of rest is misleading.				●
5.1b The motion of an object can be described by its position, direction of motion, and speed.				●
5.1c An object's motion is the result of the combined effect of all forces acting on the object. A moving object that is not subjected to a force will continue to move at a constant speed in a straight line. An object at rest will remain at rest.				●
5.1d Force is directly related to an object's mass and acceleration. The greater the force, the greater the change in motion.				●
5.1e For every action there is an equal and opposite reaction.				●

Physical Setting Performance Indicator 5.2 *Observe, describe, and compare effects of forces (gravity, electric current, and magnetism) on the motion of objects.*

Major Understandings	5	6	7	8
5.2a Every object exerts gravitational force on every other object. Gravitational force depends on how much mass the objects have an on how far apart they are. Gravity is one of the forces acting on orbiting objects and projectiles.				●
5.2b Electric currents and magnets can exert a force on each other.				●
5.2c Machines transfer mechanical energy from one object to another.				●
5.2d Friction is a force that opposes motion.				●
5.2e A machine can be made more efficient by reducing friction. Some common ways of reducing friction include lubricating or waxing surfaces.				●
5.2f Machines can change the direction or amount of force, or the distance or speed of force required to do work.				●
5.2g Simple machines include a lever, a pulley, a wheel and axle, and an inclined plane. A complex machine uses a combination of interacting simple machines, e.g., a bicycle.				●

VI. Course Overview

Using a multi-disciplinary approach, students explore topics in physical setting and living environment. The course uses textbooks, videos, projects and laboratory investigations as the primary means of helping students acquire knowledge in these areas.

I. Ecosystems – 8 weeks
II. Scientific Method – 2 weeks
III. Electrical Energy – 6 weeks
IV. Astronomy – 6 weeks
V. Weather – 5 weeks
VI. Plant Ecology – 5 weeks
VII. Fossils – 4 weeks

VII. Instructional Outline

I. Ecosystems

A. Students explore how living and nonliving things affect and are affected by the environment.
B. Students also examine how energy is transferred in living things and how cycles occur in nature.
C. Students recognize symbiotic relationships and identify how organisms may become extinct or endangered.

II. Scientific Method

A. Students are introduced to the Scientific Method that will be incorporated into a Math/Science/Technology (MST) independent project.

III. Electrical Energy

A. This unit explores the fact that energy exists within a material or in the position or motion of an object.
B. Students study static and current electricity.
C. They recognize relationships between magnetism and electricity and learn electrical safety.

IV. Astronomy

A. Students learn that the earth and celestial phenomena can be described by principles of relative motion and perspective.
B. Students explore the stars, planets, and motion of the solar system that explains our daily, monthly, and seasonal changes on Earth.

V. Weather

A. Students recognize factors influencing both weather and climate and appreciate the value of technology in observing and predicting these factors.
B. The affect of moving air on weather systems is explored.
C. Causes of hazardous weather as well as safety precautions are discussed.

VI. Plant Ecology

A. The conduction system, photosynthesis and respiration are explored through growing, observing and experimenting with plants.

VII. Fossils

A. The rock cycle is reviewed in order to determine how and where fossils are formed.
B. Fossils are examined as a method of finding out about ancient organisms.
C. Students collect fossils on a field trip, then identify, label, classify and display their fossil collections.

VIII. Course Benchmarks

A. The Living Environment
   1. Living things are both similar to and different from each other and from nonliving things.
   2. Individual organisms and species change over time.
   3. Organisms maintain a dynamic equilibrium that sustains life.
   4. Plants and animals depend on each other and their physical environment.

B. The Physical Setting
   1. The earth and celestial phenomena can be described by principles of relative motion and perspective.
   2. Most of the phenomena that we observe on Earth involve interactions among components of air, water, and land.
   3. Energy exists in many forms, and when these forms change energy is conserved.
   4. Energy and matter interact through forces that result in changes in motion.

IX. Units of Study

Unit One

Ecosystems

A. Unit Benchmarks

Living Environment

At the end of this unit students will be able to;

3.2 In all environments, organisms with similar needs may compete with one and other for resources.

5.1d The methods for obtaining nutrients vary among organisms. Producers, such as green plants, use light energy to make their food.

5.1e Herbivores obtain energy from plants. Carnivores obtain energy from animals. Omnivores obtain energy from both plants and animals. Decomposers, such as bacteria and fungi, obtain energy by consuming wastes and/or dead organisms.

6.1a Energy flows through ecosystems in one direction, usually from the Sun, through producers to consumers and then to decomposers. This process may be visualized with food chains or energy pyramids.

6.1b Food webs identify feeding relationships among producers, consumers, and decomposers in an ecosystem.

6.1c Matter is transferred from one organism to another and between organisms and their physical environment. Water, nitrogen, carbon dioxide, and oxygen are examples of substances cycled between the living and the nonliving environment.

6.2b The major source of atmospheric oxygen is photosynthesis. Carbon dioxide is removed from the atmosphere and oxygen is released during photosynthesis.

6.2c Green plants are producers of food which is used directly or indirectly by consumers.

7.1a A population consists of all individuals of a species that are found together at a given place and time. Populations living in one place form a community. The community and the physical factors with which it interacts form an ecosystem.

7.1b Given adequate resources and no disease or predators, populations (including humans) increase. Lack of resources, habitat destruction and other factors such as predation and climate; limit the growth of certain populations in an ecosystem.

7.1c In all environments, organisms interact with one another in many ways. Relationships among organisms may be competitive, harmful, or beneficial. Some species have adapted to be dependent upon each other with the result that neither could survive without the other.

B. Unit Assessment

Unit Test

C. Rubric

D. Activities

1. Teacher Constructed Activities:

Activity	Benchmark	Standard	Application Level
a. Shoebox Observation Lab *Materials:*	**S2.1**	**MST: 1**	**4**
b. Nature Observation Walk *Materials:*	**S2.1**	**MST: 1**	**4**
c. Whirlwind Tour **Introduction of equipment and materials** *Materials:*	**S2.1**	**MST: 1**	**4**
d. OH! DEER! Game and Graph *Materials:*	**7.1a** **7.1b** **7.1c**	**MST: 4**	**5** **3**
e. Owl Pellet Lab *Materials:*	**6.1b**	**MST: 4**	**4**
f. Food Chains *Materials:*	**4.1c** **6.1a**	**MST: 4**	**2**
g. Producer, consumer, and decomposer collage *Materials:*	**5.1a**	**MST: 4**	**1**
h. Water Cycler Lab *Materials:*	**2.1j**	**MST: 4**	**4**

Activity	Benchmark	Standard	Application Level
i. Water Cycle – The Incredible Journey *Materials:*	**2.1j**	**MST: 4**	**4**
j. Nitrogen Stamp Kit *Materials:*	**2.1a**	**MST: 4**	**1**
k. Animal Card Activity *Materials:*	**5.1e**	**MST: 4**	**1**
l. Energy Pyramid *Materials:*	**6.1a**	**MST: 4**	**1**
m. Food Web Worksheets *Materials:*	**6.1b**	**MST: 4**	**1**
n. Symbiotic relationships- draw and label *Materials:*	**7.1c**	**MST: 4**	**2**
o. Symbiosis packet *Materials*	**7.1c**	**MST: 4**	**2**
p. Draw and illustrate carbon dioxide and nitrogen cycles. **Demonstration: Elodea and bromthymol blue** *Materials:*	**6.1c**	**MST: 4**	**2**
q. Comparing Climates Graphing **<u>Harcourt Science</u> pages C12-13** *Materials:*	**2.2j** **7.1b**	**MST: 4**	**4**

r. Exploring Groundwater *Materials:*	**6.1c**	**MST: 4**	**4**

Application Level

1. **Knowledge**
2. **Apply in Discipline**
3. **Apply Across Disciplines**
4. **Apply to Real World Predictable Situations**
5. **Apply to Real World Unpredictable Situations**

2. Textbook with Teaching Strategies

Activity	Benchmark	Standard	Application Level
a. Characteristics of An Ecosystem **Harcourt Science pages C6-11** **Science Horizons pages 94-98** *Materials:*	**3.2a** **6.2c** **1.1**	**MST: 4** **MST: 6**	**1** **1**
b. How Organisms Get Energy **Harcourt Science pages C38-43** **Science Horizons pages 100-105** *Materials:*	**5.1a** **5.1e**	**MST: 4**	**1**
c. Populations **Harcourt Science page C39** **Science Horizons pages 114-118** *Materials:*	**7.1a**	**MST: 4**	**1**
d. Natural Cycles **Harcourt Science pages C12-19** **Science Horizons pages 106-111** *Materials:*	**2.1a** **6.2b**	**MST: 4**	**1**
e. Symbiosis **Harcourt Science pages C44-51** *Materials:*	**7.1c**	**MST: 4**	**1**
f. People In Science **Carol Yoon – Science Writer** **HarcourtScience page C30** *Materials:*		**MST: 5**	**1**

Application Level

1. **Knowledge**
2. **Apply in Discipline**
3. **Apply Across Disciplines**
4. **Apply to Real World Predictable Situations**
5. **Apply to Real World Unpredictable Situations**

3. Computer Assisted, Cross Disciplinary and Miscellaneous Instruction

Activity	Benchmark	Standard	Application Level
a. Owl Pellet CD ROM *Materials:*	**6.1b**	**MST: 4**	**1**
b. OH! DEER! Graph (Math) *Materials:*	**7.2c**	**MST: 4**	**3**
c. Owl Pellet Video *Materials:*	**6.1b**	**MST: 4**	**1**
d. Bill Nye Video "Biodiversity" *Materials:*	**6.1b** **7.1a**	**MST: 4**	**1**
e. Magic School Bus: "Decomposers Video" *Materials:*	**5.1a**	**MST: 4**	**1**
f. Pond-Life Food Web 574.5263 Nat *Materials:*	**6.1b**	**MST: 4**	**1**

Application Level:

1: Knowledge
2: Apply in Discipline
3: Apply Across Disciplines
4: Apply to Real World Predictable Situations
5: Apply to Real World Unpredictable Situations

E. Vocabulary

ecosystem
organism
decomposer
consumer
producer
herbivore
carnivore
omnivore
food chain
predator
prey
scavenger
population
community
biome
tropical
temperate
evaporation
condensation
precipitation
biotic
abiotic
environment
habitat
niche
transpiration
groundwater
renewable resources
reusable resources
symbiosis
parasitism
mutualism
commensalism

F. References and Resources

Harcourt Science. Harcourt Brace.
Science Horizons. Silver, Burdett and Ginn.
"Owl Pellet Video". Genesis.
Project Wild. Western Regional Environmental Education Council, Inc.
Exploring Life Science. Prentice Hall. Pages 678-681.
Integrated Science Activity Book II. Pages 193-206.
Video – "Bill Nye- Biodiversity"

Unit Two

The Scientific Method

A. Unit Benchmarks

At the end of this unit students will be able to;

S1.1 Formulate questions independently with the aid of references appropriate for guiding the search for explanations of everyday observations.

S1.2 Construct explanations independently for natural phenomena, especially by proposing preliminary visual models of phenomena.

S1.3 Represent, present and defend their proposed explanations of everyday observations so that they can be understood and assessed by others.

S2.1 Use conventional techniques and those of their own design to make further observations and refine their explanations, guided by a need for more information.

S2.2 Develop, present and defend formal research proposals for testing their own explanations of common phenomena, including ways of obtaining needed observations and ways of conducting simple controlled experiments.

S2.3 Carry out their research proposals, recording observations and measurements to help assess the explanation.

S3.1 Design charts, tables, graphs and other representations of observations in conventional and creative ways to help them address their research questions or hypothesis.

S3.2 Interpret the organized data to answer the research question or hypothesis and to gain insight into the problem.

S3.3 Modify their personal understanding of phenomena based on evaluation of their hypothesis

B. Unit Assessment

MST Project

C. Rubric

MST Project Grading Rubrics

Background Information

	Outstanding 4	Satisfactory 3	Needs Improvement 2	Unsatisfactory 1
Bibliography Complete				
Background Information complete				
Accurate information				
Language skills: • Spelling • Punctuation • Capitalization • Grammar				

Visuals: Display, Diagrams, Graph, Charts, etc.

	4	3	2	1
Complete				
Clear and neat lettering				
Visual Appeal: • Color • Design • Well balanced				

Work Habits

	4	3	2	1
Checkpoints met on time				
Effort				
Neat, Legible				

Experiment Summary

	4	3	2	1
Scientific Method is followed:				
• Question				
• Hypothesis				
• Variables (x2)				
• Materials				
• Procedure				
• Data				
• Conclusion (x2)				

Presentation

	4	3	2	1
Clear, audible, eye contact, refers to visuals, posture, ability to answer questions				

D. Activities

1. Teacher Constructed Activities:

Activity	Benchmark	Standard	Application Level
a. Teacher constructed experiments such as: **Water Drop on a Penny** **Ball Bounce** **Paper Chromatography** **Ball and Ramp** **Jawbreaker Dissolving** *Materials:*	**S1.1-S1.3** **S2.1-S2.3** **S3.1-S3.3**	**MST: 1**	**1-5**

Application Level:

1: Knowledge
2: Apply in Discipline
3: Apply Across Disciplines
4: Apply to Real World Predictable Situations
5: Apply to Real World Unpredictable Situations

E. Vocabulary

Hypothesis
Procedure
Data
Conclusion
Prediction
Held constant variable
Manipulated variable
Responding variable

F. References and Resources

Video 501/Sci The Scientific Method (National Geographic)

Unit Three

Electricity

A. Unit Benchmarks

Physical Setting

At the end of this unit students will be able to;

3.3a All matter is made up of atoms. Atoms are far too small to see with the light microscope.

4.4f Without touching them, material that has been electrically charged attracts uncharged material and may either attract of repel other charged material.

4.4e Electrical circuits provide a means of transferring electrical energy.

4.1c Most activities in everyday life involve on form of energy being transformed into another. For example, the chemical energy in gasoline is transformed into mechanical energy in an automobile engine. Energy in the form of heat is almost always one of the products of energy transformations.

4.1d Different forms of energy include heat, light, electrical, mechanical, sound, nuclear, and chemical. Energy is transformed in many ways.

4.1a The sun is a major source of energy for the earth. Other sources of energy include nuclear and geothermal.

4.1b Fossil fuels contain stored solar energy and are considered nonrenewable resources. They are a major source of energy in the United States. Solar energy, wind, moving water, and biomass are some examples of renewable energy resources.

4.4g Without direct contact, a magnet attracts certain materials and either attracts or repels other magnets. The attractive force of a magnet is greatest at its poles.

B. Unit Assessment

Unit Test

Question box

C. Rubric

Evaluation Rubric: Unit 3 Electrical Energy
Question Box Project

Evaluation Criteria Categories	Outstanding	Acceptable	Unacceptable	Weight	Total
Accuracy of information	Completely accurate (1 each)	Mostly accurate (1 each)	Little or none accurate (1 each)	x2	10
Electrical Specifications: -Questions and answers wired correctly	All wired correctly (1 each)	Most wired correctly (1 each)	Few or none wired correctly (1 each)	x2	10
- battery and bulb wired correctly	Wired correctly and working (5)	Wired incorrectly but working (3)	Not wired correctly, does not work (0)	x2	10
Spelling	Zero to one word spelled incorrectly (5)	Two to three words spelled incorrectly (3)	More than three words spelled incorrectly (0)	x2	10
Neatness: -lettering -cutting -pasting	Neat (5)	Somewhat neat (3)	Sloppy (0)	x2	10

50 Total

Scoring Key: Outstanding 43 – 50 86% - 100%

Acceptable 33 – 42 66% - 85%

Unacceptable 0 – 32 below 65%

D. Activities

1. **Teacher Constructed Activities:**

Activity	Benchmark	Standard	Application Level
a. Bohr Model *Materials:* glue, colored marshmallows, construction paper	**3.3a.1**	**MST: 4**	**2**
b. Electron Cloud Model *Materials:* construction paper or computer	**3.3a.1**	**MST: 4**	**2**
c. Static Lab *Materials:* ruler, paper chads, plastic wrap or balloon and gelatin	**4.4f**	**MST: 4**	**4**
d. Teacher demonstrations *Materials:* selected materials such as banana, comb/water, tube, tin can	**4.4f**	**MST: 4**	**4**
e. Circuit Lab *Materials:* batteries, bulbs, wires, holders, clips, switch	**4.1c.1** **4.4e.1**	**MST: 4**	**4**
f. Electromagnet Lab *Materials:* nail, wire, battery, paper clips	**4.4d**	**MST: 4**	**4**
g. Conductor and Insulator lab *Materials:* battery, wire, light bulb	**4.4e.2**	**MST: 4**	**4**
h. Electrical Question Box (Assessment) *Materials:* shoebox, wire, brass brads, battery, bulb, holder, construction paper, glue	**4.4e.1**	**MST: 4**	**4**

i. Generator Flipbook *Materials:* Prepared flipbook pages	**4.1d** **4.1a**	**MST: 4**	**1**
j. Teacher Demonstrations – Generator *Materials:* magnet, wire coil, overhead projector	**4.1d**	**MST: 4**	**1**
k. Motor Lab/Demo *Materials:* batteries, wood block, thumb tacks, magnets, insulated wire, copper wire, armature of insulated wire	**4.4g**	**MST: 4**	**4**

Application Level:

1: Knowledge
2: Apply in Discipline
3: Apply Across Disciplines
4: Apply to Real World Predictable Situations
5: Apply to Real World Unpredictable Situations

2. Textbook with Teaching Strategies

Activity	Benchmark	Standard	Application Level
a. Read pages 202-205, 208-209 (atoms) Science Horizons Read E2-E11, Harcourt Science	**3.3a.2**	**MST: 4**	**1**
b. Read pages 326-331, (charged particles attract) Science Horizons Read E82-E88, Harcourt Science	**4.4f**	**MST: 4**	**1**
c. Read pages 336-343, (producing electricity) Science Horizons Read E88-E89, Harcourt Science	**4.4d**	**MST: 4**	**1**
d. Read pages 332-334, Transformation of energy) Science Horizons Read E74-E75, E76-E81, E92-97, Harcourt Science	**4.1a** **4.1d**	**MST: 4**	**1**

Application Level:

1: Knowledge
2: Apply in Discipline
3: Apply Across Disciplines
4: Apply to Real World Predictable Situations
5: Apply to Real World Unpredictable Situations

3. Computer Assisted, Cross Disciplinary and Miscellaneous Instruction

Activity	Benchmark	Standard	Application Level
a. Bohr Model *Materials:* Science Horizons textbook	**3.3a.1**	**MST: 4**	**2**
b. Electron Cloud Model ***Materials:* Science Horizons Textbook**	**3.3a.1**	**MST: 4**	**2**

Application Level:

1: Knowledge
2: Apply in Discipline
3: Apply Across Disciplines
4: Apply to Real World Predictable Situations
5: Apply to Real World Unpredictable Situations

E. Vocabulary

atom
proton
neutron
electron
nucleus
orbit
static electricity
battery
current electricity
circuit
series circuit
parallel circuit
conductors
insulators
switch
magnetism/magnet
electromagnet
generator
motor
fuse
circuit breaker
law of conservation of energy
energy
chemical energy
fission

F. References and Resources

Science Horizons, Silver Burdett and Ginn
Video – "Bill Nye – Electricity", Physical Science Series, Electrical Energy, SVE & Churchill

Unit Four

Astronomy

A. Unit Benchmarks

Physical Setting

At the end of this unit students will be able to;

1.1a Earth's Sun is an average-sized star. The Sun is more than a million times greater in volume than Earth.

1.1b Other stars are like the Sun, but so far away that they look like points of light.

1.1c The Sun and the planets that revolve around it are the major bodies in the solar system. Other members include comets, moons, and asteroids. Earth's orbit is nearly circular (elliptical).

1.1d gravity is the force that keeps planets in orbit around the Sun and the Moon in orbit around the Earth.

1.1e Most objects in the solar system have a regular and predictable motion. These motions explain such phenomena as a day, a year, phases of the Moon, eclipses, tides, meteor showers and comets.

1.1f The latitude/longitude coordinate system and our system of time are based on celestial observations.

1.1g The Moon is seen by reflected light. Our Moon orbits Earth, while Earth orbits the Sun. The Moon's phases as observed from Earth are the result of seeing different portions of the lighted area of the Moon's surface. The phases repeat in a cyclic pattern in about one month.

1.1h The apparent motion of the Sun, Moon, planets, and stars across the sky can be explained by Earth's rotation and revolution. Earth's rotation causes the length of day to be approximately 24 hours. This rotation also causes the sun and Moon to appear to rise along the eastern horizon and to set along the western horizon/earth's revolution around the Sun defines the length of the year as 365¼ days.

1.1i The tilt of Earth's axis of rotation and the revolution of Earth around the Sun cause seasons on earth. The length of daylight varies depending on latitude and season.

1.1j The shape of the Earth, the other planets, and stars is nearly spherical.

B. Unit Assessment

Unit Test

Planet Power Point Project

C. Rubric

Planet PowerPoint Project
Mrs. Driscoll's Science Class

Name _____ Period ____

Student's Checklist

REQUIRED SLIDES:

_____ Title slide
- planet name
- your name
- picture

_____ Brief description of planet/symbol
_____ Movement
- orbital period
- rotational period

_____ Location
- number from sun
- distance in miles from sun
- diameter at equator

_____ Physical features
- gravity
- elements
- temperature in °F (highest or lowest)

_____ Moons/rings?
_____ Five unique facts
_____ Clincher
_____ Sources of information

ALL SLIDES HAVE:

_____ no word errors
_____ correct spelling
_____ 30 font or greater

Total Points _____

Teacher Checklist

REQUIRED SLIDES:

_____ Title slide (5pts)
- planet name
- your name
- picture

_____ Brief description of planet/symbol (5pts)
_____ Movement (5pts)
- orbital period
- rotational period

_____ Location (5pts)
- number from sun
- distance in miles from sun
- diameter at equator

_____ Physical features (5pts)
- gravity
- elements
- temperature in °F (highest or lowest)

_____ Moons/rings? (5pts)
_____ Five unique facts (10pts)
_____ Clincher (2pts)
_____ Sources of information (3pts)

ALL SLIDES HAVE:

_____ no word errors (5pts)
_____ correct spelling (5pts)
_____ 30 font or greater (5pts)

Student Signature _____

D. Activities

1. Teacher Constructed Activities:

Activity	Benchmark	Standard	Application Level
a. "What are characteristics of the Sun?" Activity 15: The Sun **Earth, Moon, and Sun. Chameleon Publishing** *Materials:*	**1.1a**	**MST: 4**	**1**
b. Draw an Ellipse **Harcourt Science pages D84-85** *Materials:*	**1.1c**	**MST: 4**	**1**
c. Complete chart on weight and gravitational pull **Intermediate Solar System Student Lab Manual** *Materials:*	**1.1d**	**MST: 4**	**1**
d. Read and fill in chart about Planets *Materials:*	**1.1c**	**MST: 4**	**1**
e. Eclipse Demonstration *Materials:* globe, flashlight	**1.1e**	**MST: 4**	**2**
f. Tides **Activity 13** **Earth, Moon, and Sun** **Chameleon Publishing** *Materials:*	**1.1e**	**MST: 4**	**1**
g. Same Side of the Moon Demonstrations **Materials: flashlight, moon model, penny, quarter**	**1.1g**	**MST: 4**	**2**
h. Locating Planets and Asteroids **The Solar System and Beyond** **Chameleon Publishing**	**1.1c**	**MST: 4**	**2**

i. Space Rocks - Activity 13 **A Comet – Activity 14** **Intermediate Solar System Lab Book** *Materials:*	**1.1e**	**MST: 4**	**1**
j. Rotation Demonstration *Materials*: flashlight, globe	**1.1e**	**MST: 4**	**2**
k. The Planets- Rotation and Revolution **Intermediate Solar System Lab Book** *Materials:*	**1.1h**	**MST: 4**	**1**
l. Day, Night and Solar Noon at Different Latitudes **Teacher Demonstration** *Materials:*	**1.1f**	**MST: 4**	**1**
m. Sunrise and Sunset Demonstration *Materials*: globe, flashlight	**1.1h**	**MST: 4**	**2**
n. Angle of Insolation Lab **Harcourt Science pages D92-93** *Materials:* thermometers, wooden blocks, light source	**1.1i**	**MST: 4**	**2**
o. Lunar Calendar *Materials*: calendar, pictures of moon phases	**1.1g** **1.1e**	**MST: 4**	**4**
p. Chart – Gravitational Pull on Different Planets and Moons **"How Much Do You Weigh?"** *Materials:*	**1.1d**	**MST: 4**	**4**
q. Facts About The Planets **Sheet #10a and b** *Materials:*	**1.1c**	**MST: 4**	**1**
r. Tracking Sunrise and Sunset *Materials*: graph paper	**1.1i**	**MST: 4**	**4**

s. The Sizes of The Planets **Harcourt Science pages D76-77** *Materials:*	**1.1c**	**MST: 4**	**2**
t. Views of The Moon (Moon's Phases) **Harcourt Science pages D100-101** *Materials:*	**1.1e** **1.1g**	**MST: 4**	**4**

Application Level:

1: Knowledge
2: Apply in Discipline
3: Apply Across Disciplines
4: Apply to Real World Predictable Situations
5: Apply to Real World Unpredictable Situations

2. Textbook with Teaching Strategies

Activity	Benchmark	Standard	Application Level
a. "Why Do Moons Have Phases?" **Intermediate Solar System Student Activity Book pages 24-26** **Harcourt Science pages D100-105** *Materials:*	**1.1g** **1.1e**	**MST: 4**	**1**
b. Waxing and Waning Phases **Harcourt Science pages D102-103** **Astronomy pages 24j-34j. Prentice-Hall.** *Materials:*	**1.1g** **1.1e**	**MST: 4**	**1**
c. Eclipses **Intermediate Solar System Student Activity Book pages 27-32** *Materials:*	**1.1e**	**MST: 4**	**1**
d. Meteors, Comets and Asteroids **Harcourt Science pages 80-81** **Intermediate Solar System Student Activity Book pages 33-35** *Materials:*	**1.1c**	**MST: 4**	**1**
e. How Revolution Causes Seasonal Changes on Earth **Harcourt Science pages D86-91** **Intermediate Solar System Student Activity Book pages 16-23** *Materials:*	**1.1e**	**MST: 4**	**4**
f. Rotation Causes Day and Night **Harcourt Science pages D86-90** *Materials:*	**1.1 e**	**MST: 4**	**4**
g. Latitude/Longitude in the Sky **Harcourt Science page D90** **Pathways in Science: Man and Energy in Space pages 77-78** *Materials:*	**1.1f**	**MST: 4**	**1**
h. Seasons **Harcourt Science pages D92-99** **Intermediate Solar System Student Activity Book pages 20-23** *Materials:*	**1.1i**	**MST: 4**	**1**

i. Length of Day and Night Relates To Latitude **Harcourt Science pages D94-95** **Astronomy pages 14j-23j. Prentice-Hall** *Materials:*	**1.1i**	**MST: 4**	**1**
j. Brightness of Stars **Harcourt Science page D114** *Materials:*	**1.1b**	**MST: 4**	**1**
k. Cycles of Planets **Harcourt Science pages D86-91** *Materials:*	**1.1h**	**MST: 4**	**1**

Application Level:

1: Knowledge
2: Apply in Discipline
3: Apply Across Disciplines
4: Apply to Real World Predictable Situations
5: Apply to Real World Unpredictable Situations

3. Computer Assisted, Cross Disciplinary and Miscellaneous Instruction

Activity	Benchmark	Standard	Application Level
a. The Planet Power Point Project (Computer Assisted) *Materials:*	**1.1c**	**MST: 4**	**1**
b. Star Lab Visit (Cross Disciplinary) Star Lab Kit, Wayne County BOCES *Materials:*	**1.1h**	**4**	**1**

Application Level:

1: Knowledge
2: Apply in Discipline
3: Apply Across Disciplines
4: Apply to Real World Predictable Situations
5: Apply to Real World Unpredictable Situations

E. Vocabulary

astronomy
rotation
axis
revolution
ellipse
orbit
solstice
equinox
phases of the moon
planet
gravity
moon
tide
eclipse
galaxy
star
asteroid
meteoroid
comet
astronomical unit
season
axial tilt
nebula
supernova
galactic cluster

F. References and Resources

Harcourt Science. Harcourt and Brace Publishers
Science Horizons. Silver, Burdett and Ginn
Astronomy. Prentice-Hall
Pathways in Science: Man and Energy in Space
Intermediate Solar System Student Activity Book
Chameleon Publishing
Selected Library Books on Planets
Videos- "The Seasons", "Day and Night" and Bill Nye- "The Moon"

Unit Five

Weather

A. Unit Benchmarks

Physical Setting

At the end of this unit students will be able to;

2.1a Nearly all the atmosphere is confined to a thin shell surrounding Earth. The atmosphere is a mixture of gases, including nitrogen and oxygen with small amounts of water vapor, carbon dioxide, and other trace gases. The atmosphere is stratified into layers, each having distinct properties. Nearly all weather occurs in the lowest layer of the atmosphere.

2.1b As altitude increases, air pressure decreases.

2.2i Weather describes the conditions of the atmosphere at a given location for a short period of time.

2.2j Climate is the characteristic weather that prevails from season to season and year to year.

2.2k The uneven heating of the earth's surface is the cause of weather.

2.2l Air masses form when air remains nearly stationary over a large section of Earth's surface and takes on the conditions of temperature and humidity from that location. Weather conditions at a location are determined primarily by temperature, humidity, and pressure of air masses over that location.

2.2m Movement of air masses causes most local weather condition changes.

2.2n Prevailing winds and upper air currents determine the movement of air masses.

2.2o Fronts are boundaries between air masses. Precipitation is likely to occur at these boundaries.

2.2p High pressure systems generally bring fair weather. Low pressure systems usually bring cloudy unstable conditions. The general movement of highs and lows is from west to east across the United States.

2.2q Hazardous weather conditions include thunderstorms, tornadoes, hurricanes, ice storms, and blizzards. Humans can prepare for and respond to these conditions if given sufficient warning.

2.2r Substances enter the atmosphere naturally and from human activity. Some of these substances include dust from volcanic eruptions and greenhouse gases such as carbon dioxide, methane, and water vapor. These substances can affect weather, climate, and living things.

B. Unit Assessment

Unit Test

Optional Assessment – Climate Power point Project

C. Rubric

D. Activities

1. Teacher Constructed Activities:

Activity	Benchmark	Standard	Application Level
a. Earth's Delicate Veil —illustrate layers of the atmosphere and identify weather as occurring in the layer closest to Earth (troposphere) *Materials:* prepared instructions, paper, pencils, ruler	**2.1a.2**	**MST: 4**	**1**
b. Describe the movement of high and low pressure systems and distinguish the types of weather associated with each. *Materials*: High and Low Pressure Maps, High and Low Pressure Systems Activity	**2.2p**	**MST: 4**	**1**
a. Distinguish between air currents and winds Activity: What Causes Winds? *Materials:* Over Land and Sea Graph	**2.2n1**	**MST: 4**	**2**
d. Layers of the Atmosphere Activity – make a diagram and infer what the layers are and where their boundaries are. *Materials:* graph paper, ruler, pencil, prepared directions, Harcourt Science, pages C84-C85	**2.1a.2**	**MST: 4**	**2**

Application Level:

1: Knowledge
2: Apply in Discipline
3: Apply Across Disciplines
4: Apply to Real World Predictable Situations
5: Apply to Real World Unpredictable Situations

2. Textbook with Teaching Strategies

Activity	Benchmark	Standard	Application Level
a. Explain the affect of air masses on local weather. **Read pages C92-C93, Harcourt Science** **Read pages 402-407, Science Horizons** *Materials:*	**2.2m**	**MST: 4**	**2**
b. Define and describe fronts and weather associated with them. **Read pages C94-C97, Harcourt Science** **Read pages 402-407, Science Horizons** *Materials:*	**2.2o**	**MST: 4**	**1**
c. Identify and describe local, global, prevailing winds and jet streams. **Read page C93, Harcourt Science** **Read pages 408-411, Science Horizons** *Materials:*	**2.2n.2**	**MST: 4**	**1**
d. Layers of the Atmosphere **Read pages C84-C87, Harcourt Science** *Materials:*	**2.1a.2**	**MST: 4**	**1**
e. Define weather as the condition of the atmosphere at a given location for a short period of time. **Read p 402, Science Horizons** *Materials:*	**2.2I**	**MST: 4**	**1**
f. Identify gases in our atmosphere and explain how they interact with land and water as the cycle through nature. **Read pages C84-C89, Harcourt Science** **Read pages 402-407, Science Horizons** *Materials:*	**2.1a.1**	**MST: 4**	**1**
g. Identify factors that determine weather **Read pages C98, C92-C93, Harcourt Science** **Read pages 402-407, Science Horizons** *Materials:*	**2.2l.1**	**MST: 4**	**1**
h. Hazardous Weather **Read pages C106-C113, Harcourt Science** *Materials:*	**2.2q.1**	**MST: 4**	**1**

i. Preparing for Hazardous Weather **Read pages C106-C113, Harcourt Science** *Materials:*	**2.2q.2**	**MST: 4**	**1**
j. Greenhouse Effect **Read pages, Science Horizons** *Materials:*	**2.2r.1** **2.2r.2**	**MST: 4**	**1**

Application Level:

1: Knowledge
2: Apply in Discipline
3: Apply Across Disciplines
4: Apply to Real World Predictable Situations
5: Apply to Real World Unpredictable Situations

3. Computer Assisted, Cross Disciplinary and Miscellaneous Instruction

Activity	Benchmark	Standard	Application Level
a. Climate Power Point Project (Computer assisted and cross disciplinary) *Materials:*	**(4) 2.2j (2) key idea 1, 2, 3**	**MST: 4, 2**	**4**
b. Recognize that as altitude increases, air pressure decreases – teacher discussion *Materials:*	**2.1b**	**MST: 4**	**1**
c. Identify and explain the causes of hazardous weather conditions – Weather Video *Materials:*	**2.2q.1**	**MST: 4**	**1**

Application Level:

1: Knowledge
2: Apply in Discipline
3: Apply Across Disciplines
4: Apply to Real World Predictable Situations
5: Apply to Real World Unpredictable Situations

E. Vocabulary

weather
air mass
humidity (relative)
climate
front
global winds
prevailing winds
jet stream
isotherm
altitude
tropical
temperate
polar
ozone
troposphere
thermosphere
mesosphere
stratosphere
air pressure
forecast
stations model
surface map
weather balloon
weather map
thunderstorm
hurricane
tropical storm
tornado
warm front
cold front
stationary front
occluded front

F. References and Resources

Science Horizons, Silver Burdett
Earth Science Laboratory Manual, Prentice Hall
Pathways in Science: Man and Energy in Space
AIMS
Integrated Science Activity Book II
Video 551.5 HUR “Hurricanes, Tornadoes, and Thunderstorms”, Rainbow Educational Media
Video “The Atmosphere in Motion”

Unit Six

Plant Ecology

A. Unit Benchmarks

The Living Environment

At the end of this unit students will be able to;

1.1f Many plants have roots, stems, leaves, and reproductive structures. These organized groups of tissues are responsible for a plant's life activities.

1.2b Tissues, organs, and organ systems help to provide all cells with nutrients, oxygen and waste removal.

4.3e Patterns of development vary among plants. In seed-bearing plants, seeds contain stored food for early development. Their later development into adulthood is characterized by varying patterns of growth from species to species.

5.1g The survival of an organism depends on its ability to sense and respond to its external environment.

6.2a Photosynthesis is carried on by green plants and other organisms containing chlorophyll. In this process, the sun's energy is converted into and stored as chemical energy in the form of a sugar.

6.2b The major source of atmospheric oxygen is photosynthesis. Carbon dioxide is removed from the atmosphere and oxygen is released during photosynthesis.

6.2c Green plants are the producers of food which is used directly or indirectly by consumers.

B. Unit Assessment

Unit Test

C. Rubric

D. Activities

1. **Teacher Constructed Activities:**

Activity	Benchmark	Standard	Application Level
a. Conduction System Lab *Materials*: celery, food-coloring, beaker, knife	**1.2b** **1.1f**	**MST: 4**	**2**
b. Draw a diagram of a flowering plant and label the parts and functions *Materials:*	**1.1f**	**MST: 4**	**2**
c. Demonstration: Carnations in Food -Coloring *Materials*: carnations, food-coloring, beaker	**1.1f**	**MST: 4**	**4**
d. Stomate Lab *Materials*: video microscope, geranium leaves, slides, cover slips	**1.1f**	**MST: 4**	**4**
e. Starch Lab *Materials*: Iodine, corn starch, leaves	**6.2a**	**MST: 4**	**4**
f. The Plant Game *Materials:*	**6.2a**	**MST: 4**	**5**
g. Plant seeds and Maintain Growth Chart *Materials:*	**4.3e**	**MST: 4**	**5**
h. Notes and Drawings on Tropisms *Materials:*	**5.1g**	**MST: 4**	**2**

Application Level:
1: Knowledge
2: Apply in Discipline
3: Apply Across Disciplines
4: Apply to Real World Predictable Situations
5: Apply to Real World Unpredictable Situations

2. Textbook with Teaching Strategies and Miscellaneous

Activity	Benchmark	Standard	Application Level
a. Parts of a Plant **Harcourt Science pages B4-11** **Science Horizons pages 64-69** *Materials:*	**1.1f**	**MST: 4**	**1**
b. Photosynthesis and Respiration **Harcourt Science 5 pages A96-101** *Materials:*	**1.1f**	**MST: 4**	**1**
c. Overhead Transparency Charts on Photosynthesis and Respiration **Science Horizons** *Materials:*	**6.2b**	**MST: 4**	**2**
d. How Plants Respond to Their Environment **Harcourt Science pages B12-17** *Materials:*	**5.1g**	**MST: 4**	**1**
e. Video: "Plants: Green, Growing, Giving Life" *Materials:*	**6.2c**	**MST: 4**	**2**

Application Level:

1: Knowledge
2: Apply in Discipline
3: Apply Across Disciplines
4: Apply to Real World Predictable Situations
5: Apply to Real World Unpredictable Situations

E. Vocabulary

conduction system
roots
stems
leaves
organs
tissues
xylem
phloem
root hairs
stomates
guard cells
photosynthesis
respiration

F. References and Resources

Harcourt Science. Harcourt and Brace
Science Horizons. Silver, Burdett and Ginn
Video- "Plants: Green, Growing, Giving Life" 581.3 PLA

Unit Six

Fossils

A. Unit Benchmarks

At the end of this unit students will be able to;

Physical Setting

2.1c The rock at earth's surface forms a nearly continuous shell around Earth called the lithosphere.

2.1d The majority of the lithosphere is covered by a relatively thin layer of water called the hydrosphere.

2.2g Rocks are classified according to their method of formation. The three classes of rocks are sedimentary, metamorphic and igneous. Most rocks show characteristics that give clues to their formation conditions.

2.2h The rock cycle model shows how types of rock or rock material may be transformed from one type of rock to another.

2.2f Plates may collide, move apart, or slide past one another. Most volcanic activity and mountain building occur at the boundaries of these plates, often resulting in earthquakes.

Living Environment

3.2b Extinction of a species occurs when the environment changes and the adaptive characteristics of a species are insufficient to permit its survival. Extinction of a species is common. Fossils are evidence that a great variety of species existed in the past.

3.2c Many thousands of layers of sedimentary rock provide evidence for the long history of Earth and for the long history of changing life forms whose remains are found in the rocks. Recently deposited rock layers are more likely to contain fossils resembling existing species.

7.2b The environment may be altered through activities of organisms. Alterations are sometimes abrupt. Some species may replace others over time, resulting in long-term gradual changes (ecological succession).

B. Unit Assessment

Unit Test

Fossil Display

C. Rubric

Evaluation Rubric: Timeline

Evaluation Criteria Categories	Outstanding	Acceptable	Unacceptable	Weight	Total
Accuracy of Measurement	Within 5 mm of the Standard (3)	Within 1 cm of the Standard (2)	More than 1 cm from the Standard (0)	x1	3
Spelling	All Correct (2)	Mostly Correct (1)	Few or None Correct (0)	x1	2
Sequencing of periods and eras	All Correct (15)	Mostly Correct (10)	Few or None Correct (0)	x1	15
					20

Scoring Key:			
	Outstanding	18 – 20	85% - 100%
	Acceptable	13 – 17	65% - 84%
	Unacceptable	0 – 12	less than 65%

Evaluation Rubric: Display of Fossils

Evaluation Criteria Categories	3 Outstanding	2 Acceptable	0 Unacceptable	Weight	Total
Appearance	Neat	Legible	Illegible or Sloppy	x1	3
Labeling - Name of fossil	All Correct	Mostly Correct	Mostly or All Incorrect	x1	3
- Collected by	All Correct	Mostly Correct	Mostly or All Incorrect	x1	3
- Date	All Correct	Mostly Correct	Mostly or All Incorrect	x1	3
- Location	All Correct	Mostly Correct	Mostly or All Incorrect	x1	3
- Brief Description	All Correct	Mostly Correct	Mostly or All Incorrect	x1	3
					18 per card – 5 cards total
					90

Scoring Key:			
	Outstanding	78 – 90	87% - 100%
	Acceptable	59 – 77	65% - 86%
	Unacceptable	0 – 58	less than 65%

D. Activities

1. Teacher Constructed Activities:

Activity	Benchmark	Standard	Application Level
a. Draw and Label Spheres of the Earth *Materials:*	**2.1d**	**MST: 4**	**2**
b. Examine Rock Samples: Igneous, Sedimentary and Metamorphic Rocks *Materials:*	**2.2g**	**MST: 4**	**1**
c. AIMS #7, 8, and 9 *Materials:*	**2.2g**	**MST: 4**	**1**
d. Label Diagram of the Rock Cycle *Materials:*	**2.2h**	**MST: 4**	**1**
e. Mold and Cast Lab *Materials*: plastic fossils, clay, plaster of Paris	**2.1f**	**MST: 4**	**4**
f. AIMS #24, 25, and 26 *Materials:*	**2.1f**	**MST: 4**	**1**
g. Earth History Timeline Activity *Materials*: adding machine tape, meter stick	**3.2c**	**MST: 4**	**1**
h. "The Fossil Hunters Guide" *Materials:*	**3.2c**	**MST: 4**	**1**

Application Level:

1: Knowledge
2: Apply in Discipline
3: Apply Across Disciplines
4: Apply to Real World Predictable Situations
5: Apply to Real World Unpredictable Situations

2. Textbook with Teaching Strategies

Activity	Benchmark	Standard	Application Level
a. "Spheres of The Earth" **Harcourt Science pages D4-11** *Materials:*	**2.1c**	**MST: 4**	**1**
b. "What is A Fossil?" **Science Horizons pages 154-164** *Materials:*	**2.1f**	**MST: 4**	**1**
c. "Changes in Living Things" **Science Horizons pages 166-168** *Materials:*	**3.2b**	**MST: 4**	**1**
d. "Extinct Species" **Science Horizons pages 180-182** *Materials:*	**3.2b**	**MST: 4**	**1**
e. "The Process of Change" **Science Horizons pages 176-179** *Materials:*	**3.2b** **7.2b**	**MST: 4**	**1**
f. "Rocks and the Rock Cycle" **Harcourt Science pages D36-67** *Materials:*	**2.2g**	**MST: 4**	**1**

Application Level:

1: Knowledge
2: Apply in Discipline
3: Apply Across Disciplines
4: Apply to Real World Predictable Situations
5: Apply to Real World Unpredictable Situations

E. Vocabulary

fossil
paleontologist
petrified
trilobite
brachiopod
crinoid stem
amber
mummified
carbonization
burrow
molds and casts
era
period
precambrian
paleozoic
mesozoic
cenozoic

F. References and Resources

Harcourt Science. Harcourt and Brace
Science Horizons. Silver, Burdett and Ginn
AIMS
Video – "Fossils! Fossils!" 560 FOS

X. Course Assessment

XI. Curriculum Review Process