COURSE: Science	GRADE(S): 4th Grade
UNIT: Introduction: The Processes of Science	

NATIONAL STANDARDS:

SCIENCE THEMES: Systems and interactions, models, patterns of change, stability (constancy), energy, scale.

PROCESS SKILLS: Observing, classifying, measuring, analyzing and interpreting data, formulating hypotheses, predicting, experimenting/testing.

STATE STANDARDS:

3.1.4.A Know that natural and human-made objects are made up of parts.
- Identify and describe what parts make up a system.
- Identify system parts that are natural and human-made (e.g., ball point pen, simple electrical circuits, plant anatomy).
- Describe the purpose of analyzing systems.
- Know that technologies include physical technology systems (e.g., construction, manufacturing, and transportation), informational systems and biochemical-related systems.

3.1.4.B Know models as useful simplifications of objects or processes.
- Identify different types of models.
- Identify and apply models as tools for prediction and insight.
- Apply appropriate simple modeling tools and techniques.
- Identify theories that serve as models (e.g., molecules).

3.1.4.C Illustrate patterns that regularly occur and reoccur in nature.
- Identify observable patterns (e.g., growth patterns in plants, crystal shapes in minerals, climate, and structural patterns in bird feathers).
- Use knowledge of natural patterns to predict next occurrences (e.g., seasons, leaf patterns, and lunar phases).

3.1.4.D Know that scale is an important attribute of natural and human made objects, events and phenomena.
- Identify the use of scale as it relates to the measurement of distance, volume and mass.
- Describe scale as a ratio (e.g., map scales).
- Explain the importance of scale in producing models and apply it to a model.

3.1.4.E Recognize change in natural and physical systems.
- Recognize change as fundamental to science and technology concepts.
- Examine and explain change by using time and measurement.
- Describe relative motion.
- Describe the change to objects caused by heat, cold, light or chemicals.

3.2.4.A Identify and use the nature of scientific and technological knowledge.
- Distinguish between a scientific and a belief.
- Provide clear explanations that account for observations and results.
- Relate how new information can change existing perceptions.

3.2.4.B Describe objects in the world using the five senses.
- Recognize observational descriptors from each of the five senses (e.g., see-blue, feel-rough).
- Use observations to develop a descriptive vocabulary.

3.2.4.C Recognize and use the elements of scientific inquiry to solve problems.
- Generate questions about objects, organisms and/or events that can be answered through scientific investigations.
- Design an investigation.
- Conduct an experiment.

- State a conclusion that is consistent with the information.

3.2.4.D Recognize and use the technological design process to solve problems.

- Recognize and explain basic problems.
- Identify possible solutions and their course of action.
- Try a solution.
- Describe the solution, identify its impacts and modify if necessary.
- Show the steps taken and the results.

3.7.4.A Explore the use of basic tools, simple materials and techniques to safely solve problems.

- Describe the scientific principles on which various tools are based.
- Group tools and machines by their function.
- Select and safely apply appropriate tools and materials to solve simple problems.

3.7.4.B Select appropriate instruments to study materials.

- Develop simple skills to measure, record, cut, and fasten.
- Explain appropriate instrument selection for specific tasks.

4.8.4.A Identify the biological requirements of humans.

- Explain how a dynamically changing environment provides for sustainability of living systems.
- Identify several ways that people use natural resources.

4.8.4.C Explain how human activities may change the environment.

- Identify everyday human activities and how they affect the environment.
- Identify examples of how human activities within a community affect the natural environment.

ASSESSMENT ANCHORS:

S4.A.1 Reasoning and Analysis

S4.A.1.1 Identify and explain the pros and cons of applying scientific, environmental, or technological knowledge to possible solutions to problems.

S4.A.1.3 Recognize and describe change in natural or human-made systems and the possible effects of those changes.

S4.A.2.1 Apply skills necessary to conduct an experiment or design a solution to solve a problem.

S4.A.2.2 Identify appropriate instruments for a specific task and describe the information the instrument can provide.

KEY CONCEPTS:

1. Distinctions are made among observations, conclusions, inferences, and predictions.
2. Hypotheses are formulated based on cause and effect relationships.
3. Variables that must be held constant in an experimental situation are defined.
4. Appropriate instruments are selected to measure linear distance, volume, mass, and temperature.
5. Appropriate metric measures are used to collect, record, and report data.
6. Data is displayed using bar and basic line graphs.
7. Numerical data which is contradictory or unusual in experimental results is recognized.
8. Predictions are made based on data from picture graphs, bar graphs, and basic line graphs.

UNIT OBJECTIVES:

1. *Apply skills necessary to conduct an experiment or design a solution to solve a problem.*
   - Investigations involve asking and answering a question and comparing the answer with what scientists already know about the world.
   - There are different kinds of investigations depending on the questions they are trying to answer. Types of investigations include describing objects, events, and organisms; classifying them; and doing a fair test (experimenting).
   - To communicate an observation accurately, one must provide a clear description of exactly what is observed, and nothing more. Those conducting investigations need to

understand the difference between *what is seen* and what inferences, conclusions, or interpretations can be drawn from the observation.
- An inference is a conclusion based on evidence about events that *have already occurred* accurate observations and evidence are necessary to draw realistic and plausible conclusions.
- A scientific prediction is a forecast about what *may happen* in some future situation. It is based on the application of scientific principles and factual information.
- Systematic investigations require standard measures (metric), consistent and reliable tools, and organized reporting of data. The way the data are displayed can make it easier to uncover important information. This can assist in making reliable scientific forecasts of future events.

2. *Recognize that scientific inquiry is not a single method but a flexible process that involves the following:*
   - Using the senses and scientific equipment to make careful observations
   - Asking specific questions about observations that can be answered using the tools of science.
   - Forming hypotheses that explain what is observed.
   - Testing hypotheses through repeated experiments and other tests, and through collecting and recording data.
   - Analyzing and drawing conclusions from the data.
   - Asking new questions, making new observations, and forming new hypotheses based on these findings.

3. *Distinguish between a scientific fact and opinion.*
   - A scientific fact is an observation that has been confirmed repeatedly and is accepted as true (although its truth is never final).
   - An opinion is a person's ideas and thoughts towards something. It is an assessment, judgment or evaluation of something.

4. *Observe and record change by using time and measurement.*
   - Investigations require standard measures, consistent and reliable tools, and organized reporting of data. The way the data are displayed can make it easier to uncover important information. This can assist in making reliable scientific forecasts of future.

5. *Identify appropriate tools and instruments to be used for specific tasks. Listed below are examples of tools students should be familiar with using.*
   - Magnifying lenses which make objects appear larger and can be easily transported; Microscopes use several lenses to make objects appear much more detailed; Telescopes magnify objects that are far away.
   - Funnels are used when pouring a substance; Filter paper is use to separate solids from liquids.
   - Timers and stopwatches are used to measure the amount of time that has passed
   - Graph paper to make charts and graphs to display data.
   - Barometer to measure air pressure, wind sock and weather vane indicate wind direction; rain gauge measures the amount of rain that has fallen
   - Measuring: length-ruler, mass-balance scale, volume-beaker, and temperature/thermometer.

6. Provide clear explanations that account for observations and results and relate how new information can change existing perceptions.

SUGGESTED ACTIVITIES:	**ASSESSMENTS:**
Students will: 1. Differentiate among simple observations,	✧ Teacher Observations ✧ Lab Reports ✧ Lab Results

conclusions, inferences, and predictions, and correctly apply the terminology in oral and written work.
2. Analyze a set of twenty or fewer objects, measures, or pictures; classify into basic categories to organize the data (descriptive or numerical); and construct bar graphs and line graphs depicting the distribution of the data.
3. Use millimeters, centimeters, meters, kilometers, milliliters, liters, grams, and kilograms in measurement.
4. Choose the appropriate instruments including centimeter rulers, meter sticks, graduated cylinders, beakers, scales and balances, and Celsius thermometers for making basic metric measures.
5. Make predictions based on picture graphs, bar graphs and basic line graphs.
6. Generate questions about objects, organisms, or events that can be answered through scientific investigations.
7. Design and implement an investigation (a fair test) to test one variable.
8. Provide clear explanations that account for observations and results and relate how new information can change existing perceptions.
9. Observe a natural phenomenon (e.g., weather changes, length of daylight/night, and movement of shadows, animal migrations, and growth of plants), record observations, and then make a prediction based on those observations.
10. State a conclusion that is consistent with the information/data. Identify appropriate tools or instruments for specific tasks and describe the information they can provide (e.g., measuring: length-ruler, mass-balance scale, volume-beaker, temperature-thermometer; making observations: hand lens, binoculars, and telescope).

RESOURCES:

Harcourt Science Series

Worksheets in Curriculum Activity Binder

REMEDIATION:

- ✧ Peer support
- ✧ Cooperative Groups
- ✧ Individual assistance with labs

ENRICHMENT:

Student can create his own lab experiment on presented topics and present results to the class.

COURSE: Science	GRADE(S): 4th Grade
UNIT: Physical Science/Unit 1: Properties of Matter	

NATIONAL STANDARDS:

SCIENCE THEMES: Models, patterns of change, stability (constancy), energy, scale

PROCESS SKILLS: Observing, classifying, measuring, analyzing and interpreting data, formulating hypotheses, predicting, experimenting/testing.

STATE STANDARDS:

3.2.4.B Describe objects in the world using the five senses.
- Recognize observational descriptors from each of the five senses (e.g., see-blue, feel-rough.
- Use observations to develop a descriptive vocabulary.

3.4.4.A Recognize basic concepts about the structure and properties of matter.
- Describe properties of matter (e.g., hardness, reactions to simple chemical tests).
- Know that combining two or more substances can make new materials with different properties.
- Know different material characteristics (e.g., texture, state of matter, solubility).

ASSESSMENT ANCHORS:

S4.C.1 Structure, Properties, and Interaction of Matter and Energy.
S4.C.1.1 Describe observable physical properties of matter.

ELIGIBLE CONTENT:

S4.C.1.1.1 Use physical properties (e.g., mass, shape, size, volume, color, texture, magnetic property, state (solid, liquid, or gas), conductivity (electrical or heat) to describe matter.
S4.C.1.1.2 Categorize/group objects using physical characteristics.

KEY CONCEPTS

1. Matter is anything that has mass; takes up space; and occurs as a solid, liquid, or gas.
2. All matter – regardless of its size, shape, or color – is made of particles (atoms and molecules) that are too small to be seen with the unaided eye.
3. Matter is identified by specific physical and/or chemical properties.

UNIT OBJECTIVES:

1. Describe and classify states of matter (i.e., solid, liquid, gas)
   - A solid is matter that has a definite shape and usually takes up a definite amount of space. The particles are closely held together.
   - A liquid is matter that does not have a definite shape but takes up a definite amount of space. The particles are loosely held together.
   - A gas always filled the container it is in. The particles in a gas are very far apart from one another and move in all directions.

2. Use physical or chemical properties to describe matter
   - Mass, color, shape size, texture, odor, taste and state (solid, liquid, and gas) are examples of physical properties.
   - Recognize that chemical properties can only be observed when matter is changed into a new kind of matter. Example: rust on a nail

3. Use a variety of measurements to compare and contrast the physical properties of matter.
   - Scientists use the metric system to measure objects.
   - Objects can be measured to find their mass and volume.
   - Use appropriate tools to measure mass (balance), volume (beaker or graduated cylinder) and length (metric ruler).

4. Categorize or group items using physical properties.
   - Every type of matter has its own set of physical properties.

5. Analyze how the states of matter can change.
   - Adding or removing heat energy can cause matter to change state, or phase.
   - A substance changes from one phase to another at a particular temperature.
   - Freezing point, melting point, and boiling point are all physical properties specific to one kind of matter.

6. Conduct tests, compare data, and draw conclusions about mass, volume, and density.
   - Mass is the amount of matter an object has.
   - Weight is a measure of the force of gravity on mass.
   - Volume is the amount of space taken up by matter.
   - Density is the amount of mass in a given volume of matter.

SUGGUESTED ACTIVITIES:

Students will:

1. Design an investigation to determine how heat affects the states of matter (of water). Include in the design how information will be recorded, what measures will be made, what instruments will be used, and how the data will be graphed.
2. Create a collage using illustrations of various types of matter in three states—solid, liquid and gas.
3. Solid chocolate bars can be melted into a liquid state and poured into cone shaped cups to cool and change back to a solid state.
4. Construct and interpret a sequence of models (diagrams) showing the activity of molecules in all three states of matter.
5. Play a game of "What is that Matter?" Students will identify common classroom items based on descriptions of the items physical properties. Each student should describe the physical properties of one item for classmates to identify.
6. Compare and contrast the density, volume, weight and mass of a golf ball and a ping pong ball. Repeat the process for a sponge

ASSESSMENTS:

- ✧ Text Review questions
- ✧ Text Review worksheets
- ✧ Homework assignments
- ✧ Observation checklist
- ✧ Interviews and dialogue
- ✧ Learning logs or notebooks
- ✧ Teacher-made tests and quizzes
- ✧ Products and projects
- ✧ Performance tasks
- ✧ Portfolios

REMEDIATION:

- ✧ Peer support
- ✧ Cooperative Learning
- ✧ Individualized Instruction
- ✧ Small Group Instruction
- ✧ Computer generated visuals and simulations

ENRICHMENT:

- ✧ Research paper
- ✧ Class presentation of research
- ✧ Design a booklet describing the physical and chemical properties of 5 given elements.

and a similar size block of wood or wax. **RESOURCES:** Harcourt Science Series Activities in Curriculum Binder Websites http://www.unitedstreaming.com/search/assetDetail.cfm?guidAssetID=6BAA6AFA-8229-4AAF-AFD9-01EC31E9FD05 Properties of Matter, Part 1 Come join us in the "matter kitchen" as we learn that our entire world is made of matter, including things we don't see, such as the air we breathe. We learn to use our five senses to identify the properties of an object—size, weight, shape, color, and temperature. Students identify some of the tools used to measure the properties of matter. Finally, we learn that matter has mass and takes up space and that it can exist in different states—solids, liquids, or gases. © 2003 100% Educational Videos	

COURSE: Science	GRADE(S): 4th Grade

UNIT: Physical Science/Unit 2: Changes in Matter

NATIONAL STANDARDS:

SCIENCE THEMES: Models, patterns of change, stability (constancy), energy, scale.

PROCESS SKILLS: Observing, classifying, measuring, analyzing and interpreting data, formulating hypotheses, predicting, experimenting/testing.

STATE STANDARDS:

3.2.4.B Describe objects in the world using the five senses.

- Recognize observational descriptors from each of the five senses (e.g., see-blue, feel-rough.
- Use observations to develop a descriptive vocabulary.

3.4.4.A Recognize basic concepts about the structure and properties of matter.

- Describe properties of matter (e.g., hardness, reactions to simple chemical tests).
- Know that combining two or more substances can make new materials with different properties.
- Know different material characteristics (e.g., texture, state of matter, solubility).

ASSESSMENT ANCHORS:

S4.C.1 Structure, Properties, and Interaction of Matter and Energy.
S4.C.1.1 Describe observable physical properties of matter.

ELIGIBLE CONTENT:

S4.C.1.1.1 Use physical properties (e.g., mass, shape, size, volume, color, texture, magnetic property, state (solid, liquid, or gas), conductivity (electrical or heat) to describe matter.
S4.C.1.1.2 Categorize/group objects using physical characteristics.

KEY CONCEPTS:

1. Creating mixtures and solutions are two ways to combine substances.
2. The individual substances keep their own properties when they are combined physically.
3. When the substances are combined chemically, their properties change, and new substances are produced.

UNIT OBJECTIVES:

Students will:

1. Understand that there are over 100 known elements that make up all matter. The smallest part of an element is an atom.

2. Recognize that when two or more elements combine to form a new substance, it is called a compound. There are many different types of compounds, because atoms of elements combine in many different ways (and in different whole number ratios) to form different compounds. Examples include water (H2O) and table salt (NaCl).

3. Describe a mixture as a combination of two or more substances that do not lose their

identifying characteristics when combined. (tossed salad)

4. Describe a solution as a mixture in which one substance dissolves in another. (powdered drink)

5. Understand that as temperature increases, many kinds of matter change from a solid to a liquid to a gas. As its temperature decreases, that matter changes from a gas to a liquid to a solid.

6. Define physical change as any change in position, size, shape, or temperature that does not alter the composition of the substance. (Growth of a person)

7. Define chemical change as a change that produces a completely different kind of matter. (Ashes from burning wood)

8. Understand that some substances react with other substances to produce a chemical reaction. (rust)

SUGGESTED ACTIVITIES:

1. Provide a mixture of small items such as sand, paper clips, coins, salt, and plastic beads. Challenge students to devise a method to separate the items as quickly as possible.
2. Using a periodic chart, Illustrate a variety of common compounds. (NaCl, H2O, CO2)
3. Build three-dimensional models of compounds.
4. Classify common food/drink products as mixtures or solutions.
5. Provide students with spoonful of ice cream. Observe how substance changes as its temperature decreases.
6. Design an investigation to determine how heat affects the states of mater (e.g. water), including in the design the ways information will be recorded, the measurements that will be made, and the ways data will be graphed
7. Given a list of changes, students will classify changes as physical or chemical.
8. Compare and contrast physical and chemical changes. (Both involve a change in matter. Chemical changes produce a completely new substance.)
9. Lab: Create a new substance: Mixing glue with another substance can change its properties and create something new. Measure 30mL of glue into a measuring cup. Add 15mL of water to the cup, observe. Add 15 mL of borax solution, stir. Observe and record data about the new properties of the new substance.

ASSESSMENTS:

- ✧ Text Review questions
- ✧ Text Review worksheets
- ✧ Homework assignments
- ✧ Observation checklist
- ✧ Interviews and dialogue
- ✧ Learning logs or notebooks
- ✧ Teacher-made Tests and Quizzes
- ✧ Products and Projects
- ✧ Performance Tasks
- ✧ Portfolios

REMEDIATION:

- ✧ Peer support
- ✧ Cooperative learning
- ✧ Individualized instruction
- ✧ Small Group instruction
- ✧ Computer generated visuals and simulations

ENRICHMENT:

- ✧ Research paper
- ✧ Class Presentation of research
- ✧ WebQuest activities
- ✧ Independent activities

RESOURCES:

Harcourt Science Series
Activities in Curriculum Binder
Changes in Matter United Streaming Teacher's Guide
What Makes Matter United Streaming Teacher's Guide

Websites
http://www.unitedstreaming.com/search/assetDetail.cfm?guidAssetID=E4892186-BAC3-49C0-9534-C814404BF4A5

Matter and Its Properties: What Makes Up Matter?
Description:
In order to determine what makes up matter, students will be introduced to the abstract notion of the atom through 3-D animation. The structure of the atom, including protons, neutrons, and electrons, is highlighted. The examples of gold, silver, and oxygen are used to show how atoms make up elements, and the examples of steel and water are used to show how different kinds of atoms form compounds. The language of chemistry is also introduced through simple chemical symbols and formulas.

http://www.unitedstreaming.com/search/assetDetail.cfm?guidAssetID=85B1D471-15A4-4294-88E2-43497FD983F4
Matter and Its Properties: Changes In Matter
Description:
Through everyday examples, students will see how they benefit from changes in matter and will understand that matter is changing everywhere around them. The different characteristics and samples of physical changes and chemical changes are shown, including changes in state. Common chemical changes, such as the burning of paper, the baking of a cake, and the rusting of a car are shown through colorful imagery. © 1999 United Learning

COURSE: Science	GRADE(S): 4th Grade
UNIT: Physical Science/Unit 3: Energy	

NATIONAL STANDARDS:

SCIENCE THEMES: Systems and interactions, models, patterns of change, stability (constancy), energy, scale.

PROCESS SKILLS: Observing, classifying, measuring, analyzing and interpreting data, formulating hypotheses, predicting, experimenting/testing.

STATE STANDARDS:

3.1.4.B Know models as useful simplifications of objects or processes.
- Identify different types of models.
- Identify and apply models as tools for prediction and insight.
- Apply appropriate simple modeling tools and techniques.
- Identify theories that serve as models (e.g., molecules).

3.1.4.D Know that scale is an important attribute of natural and human made objects, events and phenomena.
- Identify the use of scale as it relates to the measurement of distance, volume and mass.
- Describe scale as a ratio (e.g., map scales).
- Explain the importance of scale in producing models and apply it to a model.

3.1.4.E Recognize change in natural and physical systems.
- Recognize change as fundamental to science and technology concepts.
- Examine and explain change by using time and measurement.
- Describe relative motion.

3.4.4.B Know basic energy types, sources and conversations.
- Identify energy forms and examples (e.g., sunlight, heat, stored, motion).
- Know the concept of the flow of energy by measuring flow through an object or system.
- Describe static electricity in terms of attraction, repulsion and sparks.
- Apply knowledge of the basic electrical circuits to design and construction of simple direct current circuits.
- Classify materials as conductors and nonconductors.
- Know and demonstrate the basic properties of heat by producing it in a variety of ways.
- Know the characteristics of light (e.g., reflection, refraction, absorption) and use them to produce heat, color or a virtual image.

ASSESSMENT ANCHORS:

S4.A.2 Processes, Procedures and Tools of Scientific Investigations.
S4.A.2.1 Apply skills necessary to conduct an experiment or design a solution to solve a problem.

S4.A.3 Systems, Models and Patterns.
S4.A.3.3 Identify and make observations about patterns that regularly occur and reoccur in nature.

ELIGIBLE CONTENT:

S4.A.2.1.1 Generate questions about objects, organisms, or events that can be answered through scientific investigations.

S4.A.2.1.2 Design and describe an investigation (a fair test) to test one variable.

S4.A.2.1.3 Observe a natural phenomenon (e.g., weather changes, length of daylight/night, movement of shadows, animal migrations, growth of plants), record observations and then make a prediction based on those observations.

S4.A.2.1.4 State a conclusion that is consistent with the information/data.

KEY CONCEPTS:

1. Energy can be in the form of potential or kinetic energy.
2. Potential energy is the energy that is stored in an object
3. Kinetic energy is the energy of motion.
4. Energy can change back and forth from potential to kinetic energy.
5. Forms of energy include electrical, light, sound, heat, mechanical and chemical energy.
6. Each form of energy can change into the others
7. Light waves travel in straight lines in all directions away from a source.
8. When light waves hit an object, they can be reflected, transmitted (pass through material), refracted, or absorbed.
9. Sound is a form of energy that you can hear.
10. Sound waves are produced by vibrations of matter.

UNIT OBJECTIVES:

1. *Define potential energy and kinetic energy.*
   - Kinetic energy is the energy of motion
   - Potential energy is the energy that is stored in an object.

2. *Distinguish between kinetic and potential energy.*

3. *Describe changes between potential and kinetic energy.*
   - Energy often changes back and forth between potential and kinetic energy. This is known as energy transformation.

4. *Identify various forms of energy.*
   - Solar energy-any energy from the sun
   - Electrical energy-comes from the movement of electrons in an electric current
   - Light energy- Light is a form of energy that can be seen when it interacts with matter. Light travels in waves in straight lines in all directions from a source.
   - Sound energy- a form of energy produced by vibrations.
   - Mechanical energy is a form energy an object has due to its motion.
   - Chemical energy is stored in matter.

5. *Describe how one form of energy can be converted into another form of energy. Examples:*
   - Electrical energy can change into light and heat energy.
   - Mechanical energy (windmills) can change into electrical energy.
   - Chemical energy can change into mechanical energy.

6. *Explain what light is and how it travels.*
   - Light is a form of energy that travels in waves in straight lines in all directions for a source.

7. *Observe how a mirror reflects light.*
   - Light waves reflect when they bounce off of a surface.

8. *Observe the refraction of light through water.*
   - Light waves refract when they bend as they pass between materials.

9. *Name three events that can happen when light hits an object.*
   - It can pass through, be reflected, or be absorbed

10. *Explain how sound is produced.*
    - Sound transmission requires three elements: vibrations, a medium, and a receiver. Sound needs a medium (solid, liquid or gas) to go through and there must be an initial vibration to

propagate a wave.

11. *Describe the basic properties of sound.*
    - The pitch of a sound is how high or how low it is.
    - The frequency of a sound is the number of vibrations per second.
    - The loudness of a sound is called volume.

SUGGESTED ACTIVITIES:

Students will:

1. Students will create a skit that follows energy as it changes form. The main character should play an object that is affected by the different forms of energy it encounters. Students can include as many energy transformations as time allows.
2. Have students create a Types of Energy booklet. Energy types should be defined and illustrated.
3. Students will drop a rubber ball from varying heights and measure the distances that the ball goes up in the air
4. Use ramps and rubber balls to measure the distances that the ball will travel when placed at the top, middle and bottom of the ramp.
5. Create a collage using pictures of varying types of energy.
6. Complete a forms of energy mobile with forms of energy listed on one side and corresponding examples on the opposite side.
7. Research, prepare and present informational presentations on given sources of energy.
8. Design an experiment to test the potential and kinetic energy of an object.
9. Experiment with shadows- pair students and provide them with flashlights and common classroom objects. Have them shine light at object from various positions and observe shadow position and size.
10. Shadow Portraits- follow lab directions for grouping students to have them trace the shadow made by their classmate's head and neck.
11. Flashlight tag- experiment with reflection by providing mirrors and flashlights.
12. Experiment with vibrations- following lab directions, place a tongue depressor or ruler on the edge of a desk and gently lift one side and release. Observe the sound.
13. Vibration Labs- following lab directions- observe the difference in frequency and pitch.
14. Create a musical instrument capable of

ASSESSMENTS:

- ✧ Text Review questions
- ✧ Text Review worksheets
- ✧ Homework assignments
- ✧ Observation checklist
- ✧ Interviews and dialogue
- ✧ Learning logs or notebooks
- ✧ Teacher-made tests and quizzes
- ✧ Products and projects
- ✧ Performance tasks
- ✧ Portfolios

REMEDIATION:

- ✧ Peer support
- ✧ Cooperative learning
- ✧ Individualized instruction
- ✧ Small Group instruction
- ✧ Computer generated visuals and simulations

ENRICHMENT:

- ✧ Research paper
- ✧ Class Presentation of research
- ✧ WebQuest activities
- ✧ Independent activities

producing different sounds

RESOURCES:

Harcourt Science Series
Activities in curriculum binder
Energy Story: Introduction
Chapter 1- What is Energy?

Websites:
http://www.unitedstreaming.com/search/assetDetail.cfm?guidAssetID=FD5D90B6-3C2F-4651-A32E-495045ECC2BA

Getting to Know Energy
Description:
Energy is all around you. Learn about the many different types of energy and how energy can change form. Discover that energy never goes away, that it can only be transferred from one form into another. © 2000 100% Educational Videos

http://www.unitedstreaming.com/search/assetDetail.cfm?guidAssetID=1F005AD4-36B2-48E8-9FED-17476A5871FE

Out of Darkness: An Introduction to Light
Description:
All the major topics concerning light are covered, including: reflection, refraction, the spectrum and the speed of light. Key points are clarified by animated illustrations. Simple experiments are shown encouraging students to investigate the properties of light on their own.

COURSE: Science	GRADE(S): 4th Grade
UNIT: Physical Science/Unit 4: Electricity	

NATIONAL STANDARDS:

SCIENCE THEMES: Systems and interactions, models, patterns of change, stability (constancy), energy, scale.

PROCESS SKILLS: Observing, classifying, measuring, analyzing and interpreting data, formulating hypotheses, predicting, experimenting/testing.

STATE STANDARDS:

3.1.4.B Know models as useful simplifications of objects or processes.
- Identify different types of models.
- Identify and apply models as tools for prediction and insight.
- Apply appropriate simple modeling tools and techniques.
- Identify theories that serve as models (e.g., molecules).

3.1.4.D Know that scale is an important attribute of natural and human made objects, events and phenomena.
- Identify the use of scale as it relates to the measurement of distance, volume and mass.
- Describe scale as a ratio (e.g., map scales).
- Explain the importance of scale in producing models and apply it to a model.

3.1.4.E Recognize change in natural and physical systems.
- Recognize change as fundamental to science and technology concepts.
- Examine and explain change by using time and measurement.
- Describe relative motion.

3.4.4.B Know basic energy types, sources and conversations.
- Identify energy forms and examples (e.g., sunlight, heat, stored, motion).
- Know the concept of the flow of energy by measuring flow through an object or system.
- Describe static electricity in terms of attraction, repulsion and sparks.
- Apply knowledge of the basic electrical circuits to design and construction of simple direct current circuits.
- Classify materials as conductors and nonconductors.
- Know and demonstrate the basic properties of heat by producing it in a variety of ways.
- Know the characteristics of light (e.g., reflection, refraction, absorption) and use them to produce heat, color or a virtual image.

ASSESSMENT ANCHORS:

S4.A.2 Processes, Procedures and Tools of Scientific Investigations.

S4.A.2.1 Apply skills necessary to conduct an experiment or design a solution to solve a problem.

S4.A.3 Systems, Models and Patterns.

S4.A.3.3 Identify and make observations about patterns that regularly occur and reoccur in nature.

ELIGIBLE CONTENT:

S4.A.2.1.1 Generate questions about objects, organisms, or events that can be answered through scientific investigations.

S4.A.2.1.2 Design and describe an investigation (a fair test) to test one variable.

S4.A.2.1.3 Observe a natural phenomenon (e.g., weather changes, length of daylight/night, movement of shadows, animal migrations, growth of plants), record observations and then

make a prediction based on those observations.

S4.A.2.1.4 State a conclusion that is consistent with the information/data.

KEY CONCEPTS:

1. Particles carry electric charges that attract or repel
2. Charged particles can jump from one object to another, or flow through a complete circuit made of certain materials.

UNIT OBJECTIVES:

Students will:

1. *Create and observe electric charges in matter.*
   - There are two kinds of electric charges, positive and negative.

2. *Identify positive and negative charges.*
   - Matter is negatively charged if it has more negative charges (electrons) than positive charges (protons). It is positively charged if it has more positive charges (protons) than negative charges (electrons).

3. *Demonstrate an understanding that like charges repel and unlike charges attract.*
   - Opposite charges attract each other. Positive attracts Negative/ Negative attracts Positive.
   - Same charges repel each other. Positive repels Positive/ Negative repels Negative.

4. *Observe that charges can jump from one material to another.*
   - The buildup of negative electric charges on a material is called static electricity.
   - A built-up negative charge on an object will stay until it is discharged.
   - In an electric discharge, negative electric charges move from a charged object to another object.

5. *Describe electric current.*
   - The continuous flow of negative electric charges is called electric current.
   - Negatively charged particles move easily through conductors, but not through insulators.

6. *Construct a complete circuit.*
   - An electric circuit is the pathway that an electric current follows.

7. *Describe the behavior of electric current.*
   - An electric current will flow only through a closed or complete circuit.

8. Compare different kinds of circuits.
   - There are two types of electric circuits: a series circuit in which electric current passes through a single pathway, and a parallel circuit in which current passes along more than one pathway.

SUGGESTED ACTIVITIES:

Students will:

1. Charged balloons: Create static electricity with friction.
2. Demonstrate attract and repel with balloons.
3. Distinguish between charged and uncharged items using various objects and charged balloons.

ASSESSMENTS:

- ✧ Text Review questions
- ✧ Text Review worksheets
- ✧ Homework assignments
- ✧ Observation checklist
- ✧ Interviews and dialogue
- ✧ Learning logs or notebooks
- ✧ Teacher-made tests and quizzes
- ✧ Products and projects

4. Demonstrate attraction as it applies to static electricity. Tape a piece of yarn to the center of students' desks. Lift yarn without touching it by placing a charge balloon over it. Pick up salt from a desk using charged balloons.
5. Given illustrations of balloons with negative and positive symbols shown, the students should identity balloon as negatively or positively charged.
6. Light the bulb: Using lab directions students will construct simple circuits and identify contact points on a battery and a bulb
7. Circuit board games: Using lab directions students will construct a circuit board. Design a matching game using a circuit board.
8. Fan-tastic circuits: Using lab directions students will construct an electric circuit that includes a motor. Design and construct an electric fan
9. Construct series and parallel circuits
10. Compare and contrast series and parallel circuits.

RESOURCES:

Harcourt Science Series
Lab Activity Directions included with Curriculum
Teacher Guide and student activities for Junior Electrician: Static Electricity
Teacher Guide and student activities for Junior Electrician: Current Electricity

Websites:

http://www.unitedstreaming.com/search/assetDetail.cfm?guidAssetID=181AB19E-B67D-4C71-A837-3C665FBAFD54

Junior Electrician: Static Electricity
Description
This program helps to explain situations related to the effects of static electricity. The program describes the atomic structure of matter and illustrates how electrons moving from one atom to another are the key to a static charge. It introduces electrons and protons as primary particles of the atom. It shows how objects can pick up a charge of static electricity and how that charge can attract or repel other objects. Demonstrations using pith balls and a Van de Graaf generator help to illustrate ideas presented.

http://www.unitedstreaming.com/search/assetDetail.cfm?guidAssetID=19AA73A3-77C0-4978-88E5-74247B1F8D37

- Performance tasks
- Portfolios

REMEDIATION:

- Peer support
- Cooperative learning
- Individualized Instruction
- Small group instruction
- Computer generated visuals and simulations.

ENRICHMENT:

- Research paper
- Class presentation of research
- WebQuest activities
- Independent activities

Junior Electrician: Current Electricity Description: This program is about current electricity. Atomic structure is discussed and the two kinds of electricity, static and current, are presented. The generation of electricity is also shown. Principles of current electricity, circuits, switches, and circuit breakers are illustrated. Conductors and insulators are also discussed.	

COURSE: Science	GRADE(S): 4th Grade
UNIT: Environment & Ecology - Unit 2: Wetlands and Watersheds	

NATIONAL STANDARDS:

SCIENCE THEMES: Systems and interactions, models, patterns of change, stability (constancy), energy, scale.

PROCESS SKILLS: Observing, classifying, measuring, analyzing and interpreting data, formulating hypotheses, predicting, experimenting/testing.

STATE STANDARDS:

3.5.4.D Recognize the earth's different water resources.
- Know that approximately three-fourths of the earth is covered by water.
- Identify and describe types of fresh and salt-water bodies.
- Identify examples of water in the form of solid, liquid and gas on or near the surface of the earth.
- Explain and illustrate evaporation and condensation.
- Recognize other resources available from water (e.g., energy, transportation, minerals, food).

4.1.4.A Identify various types of water environments.
- Identify the lotic system (e.g., creeks, rivers, streams).
- Identify the lentic system (e.g., ponds, lakes, swamps).

4.1.4.B Explain the differences between moving and still water.
- Explain why water moves or does not move.
- Identify types of precipitation.

4.1.4.C Identify living things found in water environments.
- Identify fish, insects and amphibians that are found in fresh water.
- Identify plants found in fresh water.

4.1.4.D Identify a wetland and the plants and animals found there.
- Identify different kinds of wetlands.
- Identify plants and animals found in wetlands.
- Explain wetlands as habitats for plants and animals.

4.1.4.E Recognize the impact of watersheds and wetlands on animals and plants.
- Explain the role of watersheds in everyday life.
- Identify the role of watersheds and wetlands for plants and animals.

4.6.4.A Understand that living things are dependent on nonliving things in the environment for survival.
- Identify and categorize living and nonliving things.
- Describe the basic needs of an organism.
- Identify basic needs of a plant and an animal and explain how their needs are met
- Identify plants and animals with their habitat and food sources.
- Identify environmental variables that affect plant growth.
- Describe how animals interact with plants to meet their needs for shelter.
- Describe how certain insects interact with soil for their needs.
- Understand the components of a food chain.
- Identify a local ecosystem and its living and nonliving components.
- Identify a simple ecosystem and its living and nonliving components.
- Identify common soil textures.
- Identify animals that live underground.

4.6.4.C Identify how ecosystems change over time.
- Identify how ecosystems change over time.

4.8.4.A Identify the biological requirements of humans.

- Explain how a dynamically changing environment provides for sustainability of living systems.
- Identify several ways that people use natural resources.

4.8.4.B Know that environmental conditions influence where and how people live.

- Identify how regional natural resources influence what people use.
- Explain the influence of climate on how and where people live.

4.8.4.C Explain how human activities may change the environment.

- Identify everyday human activities and how they affect the environment.
- Identify examples of how human activities within a community affect the natural environment.

4.8.4.D Know the importance of natural resources in daily life.

- Identify items used in daily life that come from natural resources.
- Identify ways to conserve our natural resources.
- Identify major land uses in the community.

4.9.4.A Know that there are laws and regulations for the environment.

- Identify local and state laws and regulations regarding the environment.
- Explain how the recycling law impacts the school and home.
- Identify and describe the role of a local or state agency that deals with environmental laws and regulations.

ASSESSMENT ANCHORS:

S4.A.3 Systems, Models and Patterns.

S4.A.3.1 Identify systems and describe relationships among parts of a familiar system (e.g., digestive system, simple machines, water cycle.

S4.B.2 Continuity of Life

S4.B.2.1 Identify and explain how adaptations help organisms to survive.

S4.B.3 Ecological Behavior and Systems

S4.B.3.1 Identify and describe living and nonliving things in the environment and their and interaction.

S4.B.3.2 Describe, explain, and predict change in natural or human-made systems and the possible affects of those changes on the environment.

S4.B.3.3 Identify or describe human reliance on the environment at the individual or the community level.

S4.D.1 Earth Features and Processes that Change Earth and Its Resources

S4.D.1.2 Identify the types and uses of Earth's resources.

ELIGIBLE CONTENT:

S4.A.3.1.3 Categorize the parts of an ecosystem as either living or non-living and describe their roles in the system.

S4.B.2.1.1 Identify characteristics for plant and animal survival in different environments (e.g., wetland, tundra, desert, prairie, deep ocean, forest).

S4.B.3.1.1 Describe the living and nonliving components of a local ecosystem (e.g., lentic and lotic systems, forest, cornfield, grasslands, city park or playground).

S4.B.3.1.2 Describe interactions between living and nonliving components (e.g., plants-water, soil, sunlight, carbon dioxide, temperature; animals - food, water, shelter, oxygen, temperature) of a local ecosystem.

S4.B.3.2.1 Describe what happens to a living thing when its habitat is changed.

S4.B.3.2.2 Describe and predict how changes in the environment (e.g., fire, pollution, flood, building dams) can affect systems.

S4.B.3.2.3 Explain and predict how changes in seasons affect plants, animals, or daily human life (e.g., food availability, shelter, mobility).

S4.B.3.3.5 Describe the effects of pollution (e.g., litter) in the community.

S4.D.1.2.3 Recognize ways that humans benefit from the use of water resources (e.g., agriculture, energy, recreation).
S4.D.1.3.1 Describe types of freshwater and saltwater bodies (e.g., lakes, rivers, wetlands, oceans).
S4.D.1.3.3 Describe or compare lotic systems (ponds, lakes, bays) and lentic systems (streams, creeks, rivers).
S4.D.1.3.4 Explain the role and relationship of a watershed or a wetland on water sources (e.g., water storage, groundwater recharge, water filtration, water source, water cycle)

KEY CONCEPTS

1. The Earth consists of a variety of ecosystems.
2. Humans are dependent on and affect the environment.
3. There are cycles and processes that continually reshape the earth.

UNIT OBJECTIVES:

1. *Identify various types of water environments.*
   - Lentic Ecosystem or Lotic Ecosystems- Ecologists divide continental waters into two categories Lentic and Lotic.
   - A Lotic Ecosystem has flowing waters. Examples include: creeks, streams, runs, rivers, springs, brooks and channels.
   - A Lentic Ecosystem has still waters. Examples include: ponds, basin marshes, ditches, reservoirs, seeps, lakes, and vernal / ephemeral pools.

1. *Explain the differences between moving and still water.*
   - The difference between lentic and lotic habitats is not always clear-cut. The decisive criterion is the length of time a given mass of water resides within a certain part of an aquatic ecosystem, a concept clearly related to flow rates. Lakes have water retained for days/months/years, energy is fixed primarily in lake, more organisms suspended in water column.Streams have water in transit almost immediately, energy fixed primarily in watershed, and most organisms near/on or in substrate.
2. *List the characteristics of wetlands.*
   - Wetlands are areas of land that are wet at least part of the year.
   - They are often transition zones between land and water.
   - All wetlands have water-soaked soil at some time, which affects the kinds of plants and animals that live there.

3. *Describe the functions of a wetland.*
   - Wetlands improve water quality
   - They reduce erosion and flooding
   - They provide habitats for a wide variety of plants and animals
   - They help replenish groundwater during dry times.

4. *Compare and contrast different types of wetlands.*
   - Freshwater marshes are found on the edges of lakes, ponds, and rivers. They are saturated with water from rainfall and runoff. Marsh plants include thick clumps of grasses, sedges, rushes, cattails, and water lilies. 90% of wetlands are freshwater marshes. Millions of ducks, geese, shorebirds and other wildlife depend on marshes for their survival.
   - Salt marshes are wetlands frequently covered with saltwater from the ocean. They are transition zones between land and sea.
   - Swamps can be described as flooded forests or scrublands. Swamps are mostly found in the eastern United States and Alaska. Swamps support a great variety of plants and animals.
   - Bogs are found in many parts of the United States. They form in wet areas where there is little water flow and limited oxygen. Bogs are usually covered with mats of sphagnum moss that support other types of plants. Many animals may visit the bog but few live there permanently.

5. *Identify the importance of maintaining wetlands.*
   - It is estimated that more than half of America's wetlands have been destroyed, mostly by draining and /or filling and using them for purposes such as development or agriculture. This trend is just beginning to change. The public is becoming aware of the vital functions that wetlands serve.

6. *Identify ways people can help protect wetlands.*
   - Learn more about wetlands from school and libraries.
   - Tell other about the importance of saving wetlands.
   - Identify wetlands that are in your neighborhood.
   - Be a wetland watcher and report and destruction of wetlands
   - Support federal and state legislation protection wetlands
   - Join an organization active in wetland conservation or form your own group.

7. *Discuss laws related to wetland conservation.*
   - Federal- Clean Water Act, Section 404, monitored by the U.S. Environmental Protection Agency (EPA). It says that wetlands cannot be dug up or filled in without a proper permit.
   - State- Clean Streams Law, Chapter 105, Code Title 25, PA Code, monitored be PA dept. of Environmental Protection (DEP)
   - Local – township regulations vary by township, they are monitored by township supervisors and borough councils.

SUGGESTED ACTIVITIES:

Students will:

1. Design and create models of lentic and lotic water systems.
2. Design a wetland scene illustrating appropriate plants and animals
3. Identify local wetland areas
4. Observe a demonstration using a teacher made wetland model following the lab directions titled Wonderful, Waterful Wetlands
5. Research types of wetlands and present information to class in a powerpoint presentation.
6. Develop a wetlands vocabulary booklet containing terms, definitions and illustrations
7. Given a wetland picture, identify as marsh, bog, swamp, river or stream, lake or pond, or coastal wetland.
8. Create a mural of a wetland habit
9. Write a letter to a government official or agency explaining the importance of protecting America's wetlands
10. Design and create a "Wetlands Conservation Poster"
11. Examine wetland animals through in class visit from representative of Monroe Conservation District
12. Visit the Cranberry Bog to experience characteristics of a bog
13. Write a descriptive paragraph describing the

ASSESSMENTS:

- ✧ Teacher-made tests and quizzes
- ✧ Products and projects
- ✧ Performance tasks

REMEDIATION:

- ✧ Peer support
- ✧ Cooperative learning
- ✧ Individualized instruction
- ✧ Small group instruction
- ✧ Computer generated visuals and simulations.

ENRICHMENT:

- ✧ Research paper
- ✧ Class presentation of research

visit to the bog **RESOURCES:** Monroe Conservation District Wetland Curriculum What are Wetlands? Informational packet Wetlands- Informational article Wetlands lab activity directions Our Wonderful Wetlands Teachers' Guide and student activities **WEBSITES:** http://www.unitedstreaming.com/search/assetDetail.cfm?guidAssetID=33B68604-91E1-456D-B84C-1B0E89B841D4 Our Wonderful Wetlands **Description:** Swamps, bogs, and marshes are all seen in this on-location visit to some of our most valuable and least understood ecosystems. The protection of wetlands is also emphasized in the program.	

COURSE: Science	GRADE(S): 4th Grade
UNIT: Environment & Ecology - Unit 3: Protecting and Preserving Ecosystems	

NATIONAL STANDARDS:

SCIENCE THEMES: Systems and interactions, models, patterns of change, stability (constancy), energy, scale.

PROCESS SKILLS: Observing, classifying, measuring, analyzing and interpreting data, formulating hypotheses, predicting, experimenting/testing.

STATE STANDARDS:

4.6.4.C Identify how ecosystems change over time.

4.8.4.A Identify the biological requirements of humans.

- Explain how a dynamically changing environment provides for sustainability of living systems.
- Identify several ways that people use natural resources.

4.8.4.B Know that environmental conditions influence where and how people live.

- Identify how regional natural resources influence what people use.
- Explain the influence of climate on how and where people live.

4.8.4C Explain how human activities may change the environment.

- Identify everyday human activities and how they affect the environment.
- Identify examples of how human activities within a community affect the natural environment.

4.8.4.D Know the importance of natural resources in daily life.

- Identify items used in daily life that come from natural resources.
- Identify ways to conserve our natural resources.
- Identify major land uses in the community.

4.9.4.A Know that there are laws and regulations for the environment.

- Identify local and state laws and regulations regarding the environment.
- Explain how the recycling law impacts the school and home.
- Identify and describe the role of a local or state agency that deals with environmental laws and regulations.

ASSESSMENT ANCHORS:

S4.A.3 Systems, Models and Patterns

S4.A.3.1 Identify systems and describe relationships among parts of a familiar system (e.g., digestive system, simple machines, water cycle).

S4.B.2 Continuity of Life

S4.B.2.1 Identify and explain how adaptations help organisms to survive

S4.B.3 Ecological Behavior and Systems

S4.B.3.1 Identify and describe living and nonliving things in the environment and their interaction.

S4.B.3.2 Describe, explain, and predict change in natural or human-made systems and the possible affects of those changes on the environment.

S4.B.3.3 Identify or describe human reliance on the environment at the individual or the community level.

S4.D.1 Earth Features and Processes that Change Earth and Its Resources

S4.D.1.2 Identify the types and uses of Earth's resources.

S4.D.1.3 Describe Earth's different sources of water or describe changes in the form of water.

ELIGIBLE CONTENT:

S4.A.3.1.3 Categorize the parts of an ecosystem as either living or non-living and describe their roles in the system.
S4.B.2.1.1 Identify characteristics for plant and animal survival in different environments (e.g., wetland, tundra, desert, prairie, deep ocean, forest).
S4.B.3.1.1 Describe the living and nonliving components of a local ecosystem (e.g., lentic and lotic systems, forest, cornfield, grasslands, city park or playground).
S4.B.3.1.2 Describe interactions between living and nonliving components (e.g. plants-water, soil, sunlight, carbon dioxide, temperature; animals - food, water, shelter, oxygen, temperature) of a local ecosystem.
S4.B.3.2.1 Describe what happens to a living thing when its habitat is changed.
S4.B.3.2.2 Describe and predict how changes in the environment (e.g., fire, pollution, flood, building dams) can affect systems.
S4.B.3.2.3 Explain and predict how changes in seasons affect plants, animals, or daily human life (e.g., food availability, shelter, mobility).
S4.B.3.3.5 Describe the effects of pollution (e.g., litter) in the community.
S4.D.1.2.3 Recognize ways that humans benefit from the use of water resources (e.g., agriculture, energy, recreation.
S4.D.1.3.1 Describe types of freshwater and saltwater bodies (e.g., lakes, rivers, wetlands, oceans).
S4.D.1.3.3 Describe or compare lotic systems (ponds, lakes, bays) and lentic systems (streams, creeks, rivers).
S4.D.1.3.4 Explain the role and relationship of a watershed or a wetland on water sources (e.g., water storage, groundwater recharge, water filtration, water source, water cycle).

KEY CONCEPTS.

1. Organisms have structural adaptations or physical attributes that help them meet a life need.
2. Organisms also have behavioral adaptations, or certain types of activities they perform, which help them meet a life need.
3. The organization of communities is based on the utilization of the energy from the sun within a given ecosystem. The greatest amount of energy in a community is in the producers.
4. Within a community, organisms are dependent on the survival of other organisms. Energy is passed from one organism to another.
5. An organism's habitat provides food, water, shelter, and space. The size of the habitat depends on the organism's needs.
6. A **niche** is the function that an organism performs in the food web of that community. A niche also includes everything else the organism does and needs in its environment. No two types of organisms occupy the exact same niche in a community.
7. During its life cycle, an organism's role in the community, its niche, may change. For example, what an animal eats, what eats it, and other relationships will change.
8. Humans can have a major impact on ecosystems.
9. Habitat is the place or kind of place in which an animal or plant naturally lives.

UNIT OBJECTIVES:

Students will:

1. *Describe the basic characteristics of an ecosystem.*
    - An ecosystem can be any size. It can be a large forest, a hollow log, or a small puddle of water.
    - A system is made of many parts that interact.

2. *Identify and describe living and nonliving things in the environment and their interaction.*
    - An ecosystem is made of living and nonliving parts in an environment that interact with each other. Living things are all the organisms such as plants, animals, protists, fungi, and bacteria. Nonliving things are air, climate, soil and water.

- Every ecosystem has its own set of nonliving conditions. Living things that live there are suited to those conditions.

3. *Explain how plants and animals interact with one another in an ecosystem.*
   - Different climates produce different ecosystems.
   - Different ecosystems support different organisms with different adaptations.
   - Tundra, grassland, forest, desert and rainforest are types of ecosystems.
   - Living things in an ecosystem help each other to meet their needs.
   - Organisms depend on each other for food, shelter, and protection.

4. *Identify and explain how adaptations help organisms to survive.*
   - Camouflage and mimicry are physical adaptations that can protect or hide an organism from predators or prey.
   - Camouflage is coloring or markings that help an organism blend in with its surroundings.
   - Mimicry allows an animal to look like another kind of animal or like a plant.
   - Behavioral adaptations help some animals hunt for food or defend themselves.
   - Hibernation is a behavioral adaptation that helps some animals survive during the winter.

5. *Describe patterns of interdependency in ecological systems.*
   - There are different habitats in every ecosystem. An organism's habitat is the area where it lives with other organisms within the ecosystem- its "address".
   - Each species in an ecosystem occupies a particular niche. Its niche is its "job" including the type of food the organism eats, how it gets its food, and which other species use the organism as food.
   - Shelter is a basic need of living things that is often met with the help of other organisms.

6. *Illustrate the flow of energy through an ecosystem.*
   - Most living things use energy from the Sun to live and grow.
   - Energy in an ecosystem is passed from one organism to another.

7. *Explain the role of producers, consumers, and decomposers.*
   - Producers make their own food, consumers use other organisms as food, and decomposers digest the waste and remains of dead plants and animals.
   - Decomposers help recycle food energy for reuse by producers and consumers.
   - Plants play the role of producers.
   - All animals depend on producers or other animals that eat producers for food.
   - Natural and human-made events can affect a food chain.

8. *Demonstrate an understanding of food chains and food webs.*
   - A food chain shows the path of food energy through an ecosystem.
   - Food chains include producers and consumers.
   - Consumers are described by what they eat (herbivore, carnivore, omnivore).
   - A food web shows how the food chains in an ecosystem overlap.
   - One type of organism can be part of more than one food chain.

SUGGESTED ACTIVITIES:

Students will:

1. After listing natural areas on the board (park, river, forest, field) have students name organisms that might live in each habitat.
2. Using reference sources students will collect detailed data on a organism and its habitat.
3. Illustrate the food webs in a local area and compare and contrast the niches of several different organisms within the community.
4. Design an investigation to determine which beak adaptation is best suited for various

ASSESSMENTS:

- ✧ Teacher-made tests and quizzes.
- ✧ Products and projects.
- ✧ Performance tasks.

REMEDIATION:

- ✧ Peer support.
- ✧ Cooperative learning.
- ✧ Individualized instruction.
- ✧ Small group instruction.
- ✧ Computer generated visuals and simulations.

foods.

5. Examine and record the differences between structural and behavioral adaptations in living things.
6. Determine how recorded adaptations allow organisms to succeed in their environment.
7. Given a picture of an ecological problem (air pollution, erosion, litter) have students prepare an action plan to address the problem.

RESOURCES:

Harcourt Text
Activity/Lab directions in curriculum folder

WEBSITES:

http://www.unitedstreaming.com/search/assetDetail.cfm?guidAssetID=7E165B8E-F1A0-4524-91CE-8EFAFA01315B

Creature Features: Changes to Environment
This video contains 2 segments.

Description:
"Creature Features" is a series of seven five-minute programs which focuses on the delicate balance of ecosystems. The scientific concepts presented in this series include interdependence of life forms, animal habitats and communities, adaptation and human intervention. This series will bring to school children a special awareness and appreciation for nature and its processes. In some instances, creatures' basic survival is being endangered by human activity. The forest habitat of the Delmarva fox squirrel, for example, is being cleared to make room for human communities. The Potomac River, another example, which was once a dumping site for raw sewage and chemicals, became a deadly environment for its inhabitants as well. Fortunately, some ecology groups are moving the fox squirrel to a safer environment, and "Save Our Streams" and school groups have helped to restore the Potomac Rive

ENRICHMENT:

- ✧ Research paper
- ✧ Class presentation of research

COURSE: Science	GRADE(S): 4th Grade
UNIT: Earth Science - Unit 1: Weather	

NATIONAL STANDARDS:

SCIENCE THEMES: Systems and interactions, models, patterns of change, stability (constancy), energy, scale.

PROCESS SKILLS: Observing, classifying, measuring, analyzing and interpreting data, formulating hypotheses, predicting, experimenting/testing.

STATE STANDARDS:

3.1.4.B Know models as useful simplifications of objects or processes.
- Identify different types of models.
- Identify and apply models as tools for prediction and insight.
- Apply appropriate simple modeling tools and techniques.
- Identify theories that serve as models (e.g., molecules).

3.1.4.C Illustrate patterns that regularly occur and reoccur in nature.
- Identify observable patterns (e.g., growth patterns in plants, crystal shapes in minerals, climate, and structural patterns in bird feathers).
- Use knowledge of natural patterns to predict next occurrences (e.g., seasons, leaf patterns, lunar phases.

3.1.4.E Recognize change in natural and physical systems.
- Recognize change as fundamental to science and technology concepts.
- Examine and explain change by using time and measurement.
- Describe relative motion.
- Describe the change to objects caused by heat, cold, light or chemicals.

3.2.4.B Describe objects in the world using the five senses.
- Recognize observational descriptors from each of the five senses (e.g., see-blue, feel-rough).
- Use observations to develop a descriptive vocabulary.

3.5.4.C Know basic weather elements.
- Identify cloud types.
- Identify weather patterns from data charts (including temperature, wind direction and speed, precipitation) and graphs of the data.
- Explain how the different seasons affect plants, animals, food availability and daily human life.

ASSESSMENT ANCHORS:

S4.A.1 Reasoning and Analysis
S4.A.13 Recognize and describe change in natural or human-made systems and the possible affects of those changes.

S4.D.2 Weather, Climate and Atmospheric Processes
S4.D.2.1 Identify basic weather conditions and how they are measured.

ELIGIBLE CONTENT:

S4.A.1.3.1 Observe and record change by using time and measurement.
S4.A.1.3.3 Observe and describe the change to objects caused by heat, cold or light.
S4.D.2.1.1 Identify basic cloud types (cirrus, cumulus, stratus, cumulonimbus) and make connections to basic elements of weather (e.g., changes in temperature and precipitation).
S4.D.2.1.2 Identify weather patterns from data charts or graphs of the data (e.g., temperature, wind direction, wind speed, cloud types, precipitation).
S4.D.2.1.3 Identify appropriate instruments (thermometer, rain gauge, weather vain, anemometer,

and barometer) to study weather and what they measure.

KEY CONCEPTS.

1. Scientists gather data about temperature, humidity, and wind and air pressure. They use the information to make predictions about weather.

UNIT OBJECTIVES:

Student will:

1. *Explain how clouds form and how they are named.*
   - Clouds form when water vapor in the air condenses.
   - Clouds are named according to their shape and altitude.

2. *Recognize and identify main cloud types.*
   - Cirrus, stratus, cumulus, and cumulo-nimbus clouds are associated with certain weather conditions.
   - Cumulus clouds are fluffy and white with flat bottoms. They usually indicate fair weather. However, when they get larger and darker on the bottom, they produce thunderstorms.
   - Cirrus clouds are feathery and fibrous clouds. They are associated with fair weather. Cirrus clouds often indicate that rain or snow will fall within several hours.
   - Stratus clouds are smooth, gray clouds that cover the whole sky (block out direct sunlight). Light rain and drizzle are usually associated with stratus clouds.

3. *Collect and analyze weather data.*
   - Meteorologists study weather by measuring temperature, air pressure, humidity, and wind speed. They use instruments such as the thermometer, barometer, anemometer, and wind vane.

4. *Recognize weather patterns.*
   - The place where two moving air masses meet is called a front, which can result in rapidly changing weather.
   - The same types of air masses usually form over North America each year, creating weather patterns that repeat with the seasons.

5. *Describe how meteorologists track and predict the weather.*
   - A meteorologist is a scientist who studies weather.
   - Scientists gather weather data from observations, weather balloons, airplanes, and satellites in space. Information gathered may be used to produce a weather map.
   - Meteorologists record weather information on computers with weather maps and other data. They use this data and the computers to forecast weather.
   - A weather forecast is a prediction of what the weather will be like for the next days.

6. *Demonstrate the ability to interpret a weather map.*
   - A weather map uses symbols to show fronts and weather conditions in different places.
   - A key on the map explains the symbols.

7. *Use knowledge of climates and seasons to explain affects on plants, animals, and daily life.*
   - Climate is the average weather conditions of an area over a long period of time. Climate affects the kinds of living things that can live in an area. It is the long-term weather of that area (at least 30 years). This includes the region's general pattern of weather conditions, seasons and weather extremes like hurricanes, droughts, or rainy periods. Two of the most important factors determining an area's climate are air temperature and precipitation.
   - Earth has three climate zones: tropical, polar and temperate.
   - Pennsylvania has a temperate climate.
   - A temperate climate usually has warm, dry summers and cold, wet winters.

SUGGESTED ACTIVITIES:

Students will:

1. Differentiate between cloud types (cirrus, stratus, cumulus, and cumulo-nimbus clouds) and associated weather.
2. Design mobile which models cloud types and describes the associated weather.
3. Use weather instruments to record temperature, air pressure, wind speed and direction.
4. Using computerized weather programs; predict local weather patterns and develop a weekly weather forecast.
5. Use a current weather map from a daily newspaper (USA Today) to analyze and report the varying weather conditions throughout the United States.
6. Research and present an informational brochure on Life in the Pocono Mountain during spring, fall, winter, and summer.

RESOURCES:

Harcourt Science Series
Curriculum Activity and Lab Directions
United Streaming Teachers Guide
and student resources

Websites:

http://www.unitedstreaming.com/search/assetDetail.cfm?guidAssetID=29340679-9632-44C6-B054-7A2E4DA551F2

Weather Smart: Forecasting and Weather Instruments

Description:

Knowing tomorrow's weather helps all of us plan and have more productive, enjoyable, and safe lives. This vivid program shows the basics of how weather forecasts are made. Students learn to understand the symbols that they see on weather maps in the media. By measuring, charting, and tracking weather, it becomes easy to see how things change as weather moves from one part of the Earth to another. It is also made clear that math skills are vital to measuring and forecasting. We examine the tools and instruments used by meteorologists to detect and measure clouds, precipitation, temperature, humidity, wind, and pressure. Students become familiar with the names and functions of weather instruments. © 2001 United Learning

ASSESSMENTS:

- ✧ Text review questions
- ✧ Text review worksheets
- ✧ Homework assignments
- ✧ Observation checklist
- ✧ Interviews and dialogue
- ✧ Learning logs or notebooks
- ✧ Teacher-made tests and quizzes
- ✧ Products and projects
- ✧ Performance tasks
- ✧ Portfolios

REMEDIATION:

- ✧ Peer support
- ✧ Cooperative learning
- ✧ Individualized instruction
- ✧ Small group instruction
- ✧ Computer generated visuals and simulations.

ENRICHMENT:

- ✧ Research paper.
- ✧ Class presentation of research.
- ✧ WebQuest activities.
- ✧ Independent activities.

COURSE: Science	GRADE(S): 4th Grade
UNIT: Earth Science: Solar System	

NATIONAL STANDARDS:

SCIENCE THEMES: Systems and interactions, models, patterns of change, stability (constancy), energy, scale.

PROCESS SKILLS: Observing, classifying, measuring, analyzing and interpreting data, formulating hypotheses, predicting, experimenting/testing.

STATE STANDARDS:

3.1.4.A Know that natural and human-made objects are made up of parts.
- Identify and describe what parts make up a system.
- Identify system parts that are natural and human-made (e.g., ball point pen, simple electrical circuits, plant anatomy).
- Describe the purpose of analyzing systems.
- Know that technologies include physical technology systems (e.g., construction, manufacturing, and transportation), informational systems and biochemical-related systems.

3.1.4.B Know models as useful simplifications of objects or processes.
- Identify different types of models.
- Identify and apply models as tools for prediction and insight.
- Apply appropriate simple modeling tools and techniques.
- Identify theories that serve as models (e.g., molecules).

3.1.4.C Illustrate patterns that regularly occur and reoccur in nature.
- Identify observable patterns (e.g., growth patterns in plants, crystal shapes in minerals, climate, and structural patterns in bird feathers).
- Use knowledge of natural patterns to predict next occurrences (e.g., seasons, leaf patterns, lunar phases).

3.1.4.D Know that scale is an important attribute of natural and human made objects, events and phenomena.
- Identify the use of scale as it relates to the measurement of distance, volume and mass.
- Describe scale as a ratio (e.g., map scales).
- Explain the importance of scale in producing models and apply it to a model.

3.2.4.B Describe objects in the world using the five senses.
- Recognize observational descriptors from each of the five senses (e.g., see-blue, feel-rough).
- Use observations to develop a descriptive vocabulary.

3.4.4.D Describe the composition and structure of the universe and the earth's place in it.
- Recognize earth's place in the solar system.
- Explain and illustrate the causes of seasonal changes.
- Identify planets in our solar system and their general characteristics.
- Describe the solar system motions and use them to explain time (e.g., days, seasons), major lunar phases and eclipses.

ASSESSMENT ANCHORS:

S4A.2 Processes, Procedures and Tools of Scientific Investigations.

S4.A.2.2 Identify appropriate instruments for a specific task and describe the information the instrument can provide.

S4.A.3 Systems, Models and Patterns

S4.A.3.1 Identify systems and described relationships among parts of a familiar system.

S4.A.3.2 Use models to illustrate simple concepts and compare the models to what it represents.

S4.A.3.3 Identify and make observations about patterns that regularly occur and reoccur

in nature.

ELIGIBLE CONTENT:

S4.A.2.2.1 Identify appropriate tools or instruments for specific tasks and describe the information they can provide (e.g., measuring: length-ruler, mass-balance scale, volume-beaker, temperature-thermometer; making observations: hand lens, binoculars, and telescopes).
S4.A.3.1.1 Categorize systems as either natural or human-made.
S4.A.3.2.1 Identify what different models represent (e.g., maps show physical features, directions, distances; gloves represent Earth; drawings of watersheds depict terrain; dioramas show ecosystems; concept maps show relationships of ideas).
S4.A.3.2.2 Use models to make observations to explain how systems work (e.g., water cycle, sun-Earth-moon system).
S4.A.3.2.3 Use appropriate, simple modeling tools and techniques to describe or illustrate a system (e.g., two cans and string to model a communications system, terrarium to model an ecosystem).

KEY CONCEPTS:

1. Each planet has unique and identifiable features. Planets have some common features. Images can be used to study the planets and their features.

UNIT OBJECTIVES:

Students will:

1. *Recognize Earth's place in the solar system.*
   - The Earth is one of eight planets that revolve around the Sun and comprise the solar system. The Earth, third planet from the sun, is one of the four rocky inner planets. It is about 150 million kilometers from the sun.
   - The Earth is a geologically active planet with a surface that is constantly changing. Unlike the other four inner planets, it has large amounts of life-supporting water and an oxygen-rich atmosphere. The Earth's protective atmosphere blocks out most of the sun's damaging rays.

2. *Identify planets in our solar system and their general characteristics.*
   - Mercury, Venus, Earth and Mars are the inner planets of our solar system.
   - All inner planets are small and rocky.
   - Mercury is the planet closest to the Sun. It is a small planet, a little bigger than Earth's moon.
   - Venus is the second planet from the Sun. It is about the same size as Earth and has an atmosphere made of thick, swirling clouds that are burning hot and poisonous.
   - Earth is the third planet from the Sun and the largest rocky planet in the solar system. Earth is the only planet with liquid water on its surface. Earths atmosphere makes life possible on Earth.
   - Mars is the fourth planet from the Sun. Rocks and soil that cover much of Mars contains the mineral iron oxide which is reddish-brown. This has given Mars the nickname, the "Red Planet".
   - Jupiter, Saturn, Uranus and Neptune are outer planets. Their orbits are beyond the asteroid belt. All three planets are gas giants with many moons.
   - Saturn is the sixth planet from the Sun. It is a gas giant with bright rings and at least 33 moons.
   - Uranus is the seventh planet from the Sun. It is a gas giant with a ring system and rotates on its side.
   - Neptune is the eighth planet from the Sun. It is the smallest of the gas giants. Neptune has a blue color, a ring system, and many moons.

3. *Describe the solar system motions and use them to explain time (days, seasons), major lunar phases and eclipses.*
   - Earth is always moving.

- Earth rotates on an imaginary axis.
- Earth takes about 23 hours and 56 minutes to complete one rotation.
- Earth's rotation causes day and night.
- Earth is always moving.
- Earth follows an elliptical orbit as it revolves around the Sun.
- Gravity keeps Earth revolving around the Sun
- The Earth's axis tilt and it orbits the Sun cause the changing season.
- The changing phases of the Moon depend upon the positions of the Sun, Moon, and Earth.
- The Moon rotates once on its axis at about the same rate it revolves once around the Earth.
- An eclipse occurs, when one object in space comes between the Sun and another object. This occurs when the Moon passes through Earth's shadow and when the Moon's shadow falls on part of Earth.
- Lunar and solar eclipses can be seen from Earth. Solar eclipses are seen only during daylight hours during the new Moon phase. Lunar eclipses occur at night during the full Moon phase.

SUGGESTED ACTIVITIES:

Students will:

1. Differentiate between rotation and revolution by having students model the appropriate movements
2. Describe and illustrate how the Earth's axial tilt causes the seasons by creating an informational booklet
3. Model the formation of the eight moon phases, sequence the phases in order, and describe how the phases occur.
4. Research and summarize and create a presentation on a given planet.
5. Paint a mural of the solar system.
6. Students can tape record what they would say if giving a tour for the planet of their choice.
7. Students can design an interactive game that teaches facts about the solar system.
8. Students can identify science facts from fiction during the reading of a science fiction story.
9. Have students write poems that relate to something in space. Encourage them to focus on images and rhythm rather than rhyme.

RESOURCES:

Harcourt Science Series
Activities and lab directions included in curriculum binder
United Streaming Teacher and Student resources

Websites:
http://www.unitedstreaming.com/search/assetDetail.cfm?guidAssetID=BE531185-9C5B-442B-BB55-BFAB42203BC8

ASSESSMENTS:

- ✧ Teacher-Made tests and quizzes.
- ✧ Products and projects.
- ✧ Performance tasks.

REMEDIATION:

- ✧ Peer support.
- ✧ Cooperative learning.
- ✧ Individualized instruction.
- ✧ Small group instruction.
- ✧ Computer generated visuals and simulations.

ENRICHMENT:

- ✧ Research paper.
- ✧ Class presentation of research.
- ✧ Present information on recent lunar or solar eclipses.

Spin Around the Solar System, A: How the Solar System Works This is a primer on the solar system. The program describes the parts of the solar system (the sun, planets, moons, asteroids, etc.) and explains how they piece together with universal forces and various types of energy to form a complete system. The show also presents current scientific thought on how the sun and planets developed and shows where the solar system sits in relation to the Milky Way Galaxy and the universe.	