COURSE: Science	GRADE(S): 6th Grade
Introduction: The Processes of Science	

NATIONAL STANDARDS:

SCIENCE THEMES: Systems and Interactions, Models, Patterns of Change, Energy, Change over time

PROCESS SKILLS: Observing, Classifying, Measuring, Analyzing and Interpreting Data, Predicting

BENCHMARKS:

STATE STANDARDS:

3.1.7.B Describe the use of models as an application of scientific or technological concepts.
- Identify and describe different types of models and their functions.
- Apply models to predict specific results and observations
- (e.g., population growth, effects of infectious organisms).

3.2.7.B Apply process knowledge to make and interpret observations.
- Measure materials using a variety of scales.
- Describe relationships by making inferences and predictions.
- Communicate, use space / time relationships, define operationally, raise questions, formulate hypotheses, test and experiment,
- Design controlled experiments, recognize variables, and manipulate variables.
- Interpret data, formulate models, design models, and produce solutions.

3.2.7.C Identify 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.
- Evaluate the appropriateness of questions.
- Design an investigation with limited variables to investigate a question.
- Conduct a two-part experiment.
- Judge the significance of experimental information in answering the question.
- Communicate appropriate conclusions from the experiment.

ASSESSMENT ANCHORS:

S8.A.1.1 Reasoning and Analysis: Explain, interpret and apply scientific, environmental, or technological knowledge presented in a variety of formats (e.g., visuals, scenarios, graphs).

ELIGIBLE CONTENT:

S8.A.1.1.1 Distinguish between a scientific theory and an opinion, explaining how a theory is supported with evidence, or how new data/ information may change existing theories and practice.

S8.A.1.1.3 Use evidence, such as observations or experimental results, to support inferences about a relationship.

KEY CONCEPTS:
- Inquiry, problem solving, critical thinking, measurement, communications, and links to real world applications should be integrated throughout science instructions to develop an understanding of the key concepts and content. The use of technology as a tool for investigating, communicating and doing science must also be integrated throughout this instruction.

UNIT OBJECTIVES: (*To be integrated in all areas of science)*

1. *Read and discuss Flinn Scientifics Middle School Science Safety Contract.*
   - Student and Parent signatures are required on safety contract. Signed contracts are to be kept

on file by science teacher.

2. *Design and conduct a simple scientific investigation incorporating the five steps of the scientific method:*
   - Ask a question, form a hypothesis, design and conduct an experiment, analyze the results of the experiment and draw a conclusion.
3. *Record and communicate scientific finding using words, illustrations, charts and/or presentations.*
   - Science notebooks or journals are kept by students.
4. *Describe some tools used in scientific investigations.*
   - Microscope, calculators, tape measure or ruler, thermometer, balance, spring scale.
5. *Describe some graphs used to communicate information.*
   - Bar graphs, circle graphs, line graphs.
6. *Explain the math skills necessary for communicating information.*
   - Finding an average, measuring volume, using an equation or formula, finding range, median and mode.

ACTIVITIES:

Students will:

- Brainstorm safety rules for science activities.
- Compare student generated rules to rules listed on the given science safety contract.
- Create Science Safety Posters.

The following activities will occur throughout the school year:

- Design an investigation using the scientific method.
- Use tools of science (rulers, scales, beakers, microscopes, magnifying glasses, etc.) to collect data.
- Record and illustrate results of experiments in science notebooks or journals.
- Prepare class presentations to share science findings.

Teacher directed differentiated instructional projects and activities are ongoing and based on student need.

RESOURCES:

- Houghton Mifflin Teacher Resources
- Harcourt Teacher Resources
- Flinn Scientifics Middle School Science Safety Contract
- Safe Science Lab Safety Awareness Student Resources
- How Scientists Work Series- What is the Scientific Method? Teacher Guide and Student Resources

WEBSITES:

http://www.unitedstreaming.com/search/searchResults.cfm?N=0&Nty=1&Ntk=All&blnSearchInit=true&Ntt=How+Scientists+Work%3A+What+is+the+Scientific+Method%3F.+&Nr=&btnFormHeaderSearchGo.x=12&btnFormHeaderSearchGo.y=12

ASSESSMENTS:

Included throughout the curriculum

How Scientists Work: What is the Scientific Method? Scientific method is a time-tested set of procedures used to create an accurate view or representation of the world. Using these procedures, anyone can repeat the experiments that lead a scientist to a result or group of results. In this program, junior scientists show how anybody can find new laws of science through perseverance and careful recording of data. http://www.unitedstreaming.com/search/assetDetail.cfm?guidAssetID=3D5DF2BC-1499-427C-B783-ADC8D56C2033 ***Safe Science: Lab Safety Awareness*** This two-part program includes visually forceful demonstrations, such as putting out a fire and modeling the effects of acid and electricity on people. We've responsibly presented them here to achieve a high impact on the student audience. Lessons include recognizing hazards, preventing commonly avoidable accidents, and coping with some emergencies.	

COURSE: Science	GRADE(S): 6th Grade
UNIT 1: Biology	

NATIONAL STANDARDS:

SCIENCE THEMES: Systems and Interactions, Models, Patterns of Change, Energy, Change over time

PROCESS SKILLS: Observing, Classifying, Measuring, Analyzing and Interpreting Data, Predicting

STATE STANDARDS:

3.3.7.B Describe the cell as the basic structural and functional unit of living things.

- Identify the levels of organization from cell to organism.
- Compare life processes at the organism level with life processes at the cell level.
- Explain that cells and organisms have particular structures that underlie their functions.
- Describe and distinguish among cell cycles, reproductive cycles and life cycles.
- Explain disease effects on structures or functions of an organism.

ASSESSMENT ANCHORS:

S8.B.1.1 Structure and Function of Organisms: Describe and compare structural and functional similarities and differences that characterize diverse living things.

ELIGIBLE CONTENT:

S8.B.1.1.2 Compare similarities or differences in both internal structures (e.g., invertebrate/vertebrate, vascular/nonvascular, single-celled/multi-celled, and external structures (e.g., appendages, body segments, type of covering, size, shape) of organisms.

S8.B.1.1.3 Apply knowledge of characteristic structures to identify or categorize organisms (i.e., plants, animals, fungi, bacteria, and protista).

S8.B.1.1.4 Identify the levels of organization from cell to organism and describe how specific structures (parts), which underlie larger systems, enable the system to function as a whole.

KEY CONCEPTS:

- The biochemical pathways are responsible for the living cell.
- The cell is the basic unit of structure and function of life.
- In order to function, cells covert food into energy.
- New cells are formed by the division of older cells.
- Microscopes allow us to see the cell.

UNIT OBJECTIVES:

1. *Identify the parts of a standard light microscope and their functions.*
   - The parts of a microscope are the eyepiece lens, the coarse adjustment, fine adjustment, arm, base, stage clip, mirror, stage, objectives, nosepiece, and tube.
2. *Demonstrate ability to operate a light microscope.*
   - Place the microscope on a flat surface.
   - Turn the low power objective into place.
   - Use the stage clips to hold the slide in place.
   - With your head to the side of the microscope, lower the objective slowly so that no contact is made with the stage and objective.
   - Look through the eyepiece and using the coarse knob raise the objective until the image of the specimen comes into view.
   - Use the fine adjustment knob to bring the image into sharper view.
3. *Identify and describe the structure and function of cells and cell parts.*
   - The cell is the smallest structure that carries out all the activities necessary for life.
   - All cells contain structures that serve different functions.

- Plant cells and animal cells all have a cell membrane, a nucleus, and cytoplasm.
- Only plant cells have chloroplasts and a cell wall.
- Cell membranes control the movement of materials (water and food) into and out (waste) of cells.
- Organisms make new cells by cell division.

4. *Recognize that cells are the building blocks of all living organisms.*
   - All living things are made up of cells.
   - All life processes take place in cells.
   - All new cells are produced from existing cells.
5. *Understand how cells acquire and use energy.*
   - All living things need energy to survive.
   - Plants use a process called photosynthesis to make food by harnessing the energy of sunlight.
   - In the human body, every cell needs oxygen and nutrients. Every cell needs to get rid of carbon dioxide and other chemicals it can not use.
   - The digestive and circulatory systems are responsible for transporting nutrients to the cells of the body.
   - The circulatory and respiratory systems are involved in providing oxygen for cells and ridding the body of carbon dioxide.
6. *Explain the role of cell division in the growth of organisms.*
   - An organism starts life as one cell. The single cell has information that controls how the organism will develop.
   - Growth begins when the cell divides and becomes two cells.
   - In the next stage of growth, both cells divide. Now the developing organism has four cells.
   - Each of the four cells divides. At the eight cell stage, the organism looks like a ball. From here on, cells divide at different rates.
   - Most of an organism's cells continue to divide over its lifetime. However, the cells no longer divide at the same rate. Some cells do not divide at all.

ACTIVITIES:

Students will:

1. Given a diagram, label the parts of a microscope.
2. Practice microscope skills by examining cork (dead cells) and onion skin (live cells).
3. Identify and illustrate he following cell parts from an onion specimen: Cell wall, Cell membrane, Nucleus, Cytoplasm
4. Compare and contrast salt, sugar and sand. Place a few crystals of salt on a microscope slide. A cover slip is not needed. Examine under low magnification. Add a drop of water on a cover slip and place over salt. Observe changes. Repeat for sugar and sand.
5. After viewing visuals of plant cells, students will build a model of a plant cell using modeling clay.
6. Compare and contrast two different cells under a microscope.
7. Create flashcards identifying cell structures with their correct functions.
8. Science journal topics:
   - Why don't animal cells have chloroplasts?
   - Why is glucose important to both plant and animal cells?
9. Identify given microorganisms using an

ASSESSMENTS:

- ✧ 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
- ✧ Web Quest Activities
- ✧ Independent Activities

identification key.
10. Develop or complete a chart indicating the number of divisions to the number of cells
11. Develop a Concept Map.

Teacher directed differentiated instructional projects and activities are ongoing and based on student need.

RESOURCES:
- National Geographic Video
- Houghton Mifflin Teacher Resources
- Harcourt Teacher Resources
- How To Use A Microscope: Teacher's Guide with student activities.
- Life Science: Cells Teacher's Guide
- Cells: Teacher's Guide

WEBSITES:

http://www.unitedstreaming.com/search/assetDetail.cfm?guidAssetID=F48C423F-F866-4169-A9E1-12210C867DF4

Life Science: Cells
Everybody is made up of trillions of **cells**, each working like a tiny factory that does its part to "manufacture" what's needed to keep the body going. Inside the cell membrane is a nucleus, which holds the cell's DNA, and organelles that carry out the cell's specific task. Red blood **cells** are expert transporters of oxygen and carbon dioxide. White blood **cells** attack invading germs. All reproduce by mitosis, or cell division. A glitch in this process can lead to the growth of cancerous **cells** that crowd out healthy ones. **cells** ability to replicate is what keeps every living thing alive. But when the process goes awry, that ability threatens health and can be deadly.

http://www.unitedstreaming.com/search/assetDetail.cfm?guidAssetID=CD4D9AA2-39A6-4450-BB56-6D40F694E617

Cells
Description:
It's been more than 350 years since the microscope was invented, but scientists still use it to see the world at a different scale. Take a larger-than-life look at human and plant cells, and watch these tiny building blocks of life in action. Observe how the body repairs damaged cells after an encounter with boiling water. This program includes four short segments.

http://www.unitedstreaming.com/search/assetDetail.cfm?guidAssetId=4b7b0c5c-07cd-4b5a-

b196-c8ffd4dcb099 ***How To Use A Microscope*** **Description:** This unit of study has been created to provide students with a knowledge of the history of microscopes and the proper handling and use of these valuable tools. Upon completion of the unit, students should feel comfortable using a microscope and preparing slides. They should also have gained an appreciation for the development of different kinds of microscopes and knowledge of how they are used.	

COURSE: Science	GRADE(S): 6th Grade

UNIT 2: Earth Science
Section 1: Global Weather Systems

NATIONAL STANDARDS:

SCIENCE THEMES: Systems and Interactions, Models, Patterns of Change, Energy, Change over time

PROCESS SKILLS: Observing, Classifying, Measuring, Analyzing and Interpreting Data, Predicting

BENCHMARKS:

STATE STANDARDS:

3.4.7.D Describe essential ideas about the composition and structure of the universe and the earth's place in it.

- Compare various planets' characteristics.
- Describe basic star types and identify the sun as a star type.
- Describe and differentiate comets, asteroids and meteors.
- Identify gravity as the force that keeps planets in orbit around the sun and governs the rest of the movement of the solar system and the universe.
- Illustrate how the positions of stars and constellations change in relation to the Earth during an evening and from month to month.
- Identify equipment and instruments that explore the universe.
- Identify the accomplishments and contributions provided by selected past and present scientists in the field of astronomy.
- Identify and articulate space program efforts to investigate possibilities of living in space and on other planets.

3.5.7.C Describe basic elements of meteorology.

- Explain weather forecasts by interpreting weather data and symbols.
- Explain the oceans' impact on local weather and the climate of a region.
- Identify how cloud types, wind directions and barometric pressure changes are associated with weather patterns in different regions of the country.
- Explain and illustrate the processes of cloud formation and precipitation.
- Describe and illustrate the major layers of the earth's atmosphere.
- Identify different air masses and global wind patterns and how they relate to the weather patterns in different regions of the U.S.

3.5.7.D Explain the behavior and impact of the earth's water systems.

- Explain the water cycle using the processes of evaporation and condensation.
- Describe factors that affect evaporation and condensation.
- Distinguish salt from fresh water (e.g., density, electrical conduction).
- Compare the effect of water type (e.g., polluted, fresh, salt water) and the life contained in them.
- Identify ocean and shoreline features, (e.g., bays, inlets, spit, tidal marshes).

ASSESSMENT ANCHORS:

S8.A.1.3 Reasoning and Analysis: Identify evidence that certain variables may have caused measurable changes in natural or human-made systems.

S8.A.2.2 Processes, Procedures and Tools of Scientific Investigations: Apply appropriate instruments for a specific purpose and describe the information the instrument can provide.

ELIGIBLE CONTENT:

S8.A.1.3.3 Examine systems changing over time, identifying the possible variables causing this change, and drawing inferences about how these variables affect this change.

S8.A.2.2.1 Describe the appropriate use of instruments and scales to accurately measure time, mass,

distance, volume, or temperature safely under a variety of conditions.

S8.A.2.2.2 Apply appropriate measurement systems (e.g., time, mass, distance, volume, temperature) to record and interpret observations under varying conditions.

S8.A.2.2.3 Describe ways technology extends and enhances human abilities for specific purposes (e.g., microscope, telescope, micrometer, hydraulics, barometer).

KEY CONCEPTS:

- Earth's system is composed of interacting subsystems of the geosphere, hydrosphere, atmosphere and biosphere.
- Each subsystem is ancient and is still changing.
- Understanding these subsystems allows us to access and utilize these resources wisely.
- Jet streams and ocean currents affect global weather patterns.
- The interaction of air masses and fronts are local weather factors.
- Meteorologists use weather data to track storms.
- Gases in the atmosphere slow the escape of heat from the Earth into space, creating a green house effect.

UNIT OBJECTIVES:

1. *Describe characteristics and structure of the atmosphere.*
   - Earth's atmosphere differs from that of other planets
   - Earth's atmosphere is composed of a mixture of gases (mostly nitrogen and oxygen)
   - The atmosphere is composed of five layers which fade from one into another.
2. *Describe how the Earth's atmosphere has changed over time.*
   - The atmosphere gradually developed over 4.5 billion years
   - Human activities such as burning fossil fuels, can affect the atmosphere
3. *Identify different air masses and global wind patterns and how they relate to the weather patterns in different regions of the U.S.*
   - The weather changes because the atmosphere is constantly changing.
   - Changes in air pressure, from uneven heating of Earth's surface and the air above it, cause wind to blow.
   - Prevailing or global winds are caused by the sun's uneven heating of large parts of the atmosphere.
   - Prevailing winds in the United States are from the west, so weather systems tend to move from west to east.
4. *Describe the Coriolis effect.*
   - The tendency for any moving body on or above the earth's surface, e.g., an ocean current or an artillery round, to drift sideways from its course because of the earth's rotation.
   - Winds curve to the right in the Northern Hemisphere and to the left in the Southern Hemisphere.
   - The Coriolis effect controls the rotation of many tornadoes.
5. *Explain how ocean currents affect global weather patterns.*
   - An ocean current is a continuous, moving stream of ocean water.
   - All water in a current has similar temperature and density.
   - Like winds, currents curve to the right or left depending on which hemisphere they are in.
   - Warm ocean currents carry warm water from the equator; they can cause cool climates to warm up.
   - Cold ocean currents from the poles bring cooler water with them and can cause warmer climates to cool down.
6. *Illustrate how the carbon cycle indirectly controls long-term climate change.*
   - Greenhouse gases which include water vapor, methane, nitrous oxide and especially carbon dioxide trap the Sun's energy inside the atmosphere.
   - The greater the amount of carbon dioxide in the atmosphere, the warmer the atmosphere becomes.
7. *Describe how jet streams steer weather.*
   - Jet streams are narrow belts of high-speed winds in the upper troposphere.
   - Jet streams often affect the speed and direction of movement of high- and low-pressure

systems. In this way, they can have a big influence on weather.

8. *Explain that the four factors which cause weather to occur are temperature, wind, air pressure, and moisture, and that all of these factors are caused, either directly or indirectly, by the sun.*
   - Energy from the Sun warms the atmosphere and Earth's surface. Different surfaces heat up at different rates.
   - Winds are caused by uneven heating of the Earth's surface. Winds blow from areas of high pressure towards areas of low pressure.
   - Air masses meet along fronts, often bringing changes in weather.
9. *Describe and interpret weather maps and reports and predict future weather patterns based on current data.*
   - Huge masses of air with similar characteristics of temperature and pressure move across the surface of the Earth.
   - The leading edge of these air masses is called fronts.
   - Weather patterns can be tracked as they move, giving an indication of upcoming weather.
   - Weather generally moves from west to east across most of North America.
10. *Explain how warm, cold, stationary and occluded fronts affect weather.*
    - A cold front often brings stormy weather. Usually, a cold front moves quickly. After it passes, the weather is cooler and drier.
    - A warm front often brings light steady precipitation. After a warm front passes, the weather is warmer.
    - An occluded front is formed as a cold front overtakes a warm front.
    - If the front is essentially not moving (i.e. the air masses are not moving) it is called a stationary front.
11. *Explain the parts of the water cycle and their relationship to each other, and to weather.*
    - The Sun's energy causes liquid to **evaporate**, as water vapor (gas) it moves through the air, and through the atmosphere.
    - Water vapor **condenses** into liquid. Millions of water droplets form clouds.
    - Rain, snow, hail, sleet or mist fall to Earth's surface as **precipitation**.
12. *Explain how advancements in weather instruments and forecasting meet human needs and improve our quality of life.*
    - Meteorologists analyze and predict weather, using a variety of instruments as well as data from satellites and radar.
    - Weather satellites measure and record data about temperature, water density and vapor, and particles in the atmosphere.
    - Doppler radar helps track and predict weather events.

ACTIVITIES:

Weather

Students will:

1. Create different types of graphs (pie, bar, line) to indicates the gases present in Earth's air.
2. Create posters comparing Earth's atmosphere to the atmosphere of other planets.
3. Illustrate and label the layers of the atmosphere. Students should identify what is special about each layer.
4. Debate the advantages and disadvantages of continuing the activities that are causing changes to the atmosphere (burning fossil fuels, air pollutants).
5. Given a weather map use current data to predict the weather in a given area within the next week.
6. Demonstrate the effect of spinning (Coriolis Effect) by spinning a globe, while it is spinning,

ASSESSMENTS:

- ✧ Observation Checklists
- ✧ Interviews and Dialogue
- ✧ Learning Logs or Notebooks
- ✧ Teacher-Made Tests and Quizzes
- ✧ Products and Projects
- ✧ Performance Tasks

REMEDIATION:

- ✧ Peer Tutoring
- ✧ Small Group Instruction
- ✧ Computer Assisted Learning
- ✧ Individualized Instruction
- ✧ Chunking of Information

ENRICHMENT:

- ✧ Research Opportunities
- ✧ Class Presentation
- ✧ Independent Investigation
- ✧ Case Study

use chalk to draw a straight line from the equator to the North Pole. Student should observe that the line deflects counterclockwise.

7. Create side by side illustrations of the greenhouse effect on both a greenhouse and the Earth. Student should identify that most solar radiation enters and is trapped by the glass/atmosphere.
8. Writing Prompt, "Suppose a plane was flying from Pennsylvania to California. How would the jet stream affect the flight of the plane?"
9. Using weather maps displays on overheads have students present a weather forecast as a local news station weather man.
10. Prepare a picture dictionary of warm, cold, occluded fronts, and stationary fronts- include weather symbols, definitions, and pictures of immediate weather to be expected followed by weather to be expected as front passes.
11. Label and explain the parts of the water cycle on given illustrations.
12. Use weather instruments: thermometer and barometer to measure air temperature, atmospheric pressure.
13. Visit online website such as Weather.Com to observe the weather images projected from satellites.

Teacher directed differentiated instructional projects and activities are ongoing and based on student need.

RESOURCES:

- Houghton Mifflin Science Text
- Harcourt Science Text
    1. Weather on the Move- Teacher Guide and Student Activities
    2. Extreme Weather
    3. Hands-On Weather Experiments:
        - Tornado in a Bottle
        - Air has Weight
        - Make A Barometer
        - Inverted Glass with Water
        - Weight of Hot and Cold Liquids
        - Basic Dew
        - Cloud In A Bottle
        - Light Scatters
        - Can Crush
        - Heat Bottle With Balloon on Top
        - Balloon in Freezer
        - Measure Moisture
        - Air Pressure Barometer
        - Supplemental Activities

✧ Design an experiment

WEBSITES:

www.weather.com
This website provides current weather maps of all locations within the United States.

http://classroomclipart.com/cgi-bin/kids/imageFolio.cgi?direct=Weather
This website will provide weather images that can be used for presentations.

http://www.eslhq.com/worksheets/
http://www.unitedstreaming.com/search/assetDetail.cfm?guidAssetID=52EE4E5B-4EFB-4C40-9CFA-88D59ADB7888
In EXTREME WEATHER viewers will travel with the Tackle box team to visit the Weather Channel studios in Atlanta, the National Severe Storms Laboratory (NSSL) outside Oklahoma City and to interview students who have experienced a tornado. EXTREME WEATHER brings NOAA images into the classroom and provides an introduction to the technology used by today's forecasters. Dr. Harold Brooks of the NSSL helps explain why North America experiences some of the most severe weather found.

http://www.unitedstreaming.com/search/assetDetail.cfm?guidAssetID=21DE547B-3A40-41A0-A0CD-DDD44E371A85
This program introduces students to the concept of reading weather information: introduction to weather map lines and symbols; relationships between air masses, weather fronts, and weather; movement of weather, including the effects of prevailing winds and Earth's rotation, and the strategies of weather prediction.

COURSE: Science	GRADE(S): 6th Grade
UNIT: Earth Science - Unit 2: Earth's Water Systems	

NATIONAL STANDARDS:

SCIENCE THEMES: Systems and interactions, models, patterns of change, energy, change over time.

PROCESS SKILLS: Observing, classifying, measuring, analyzing and interpreting data, predicting.

STATE STANDARDS:

3.5.7.D Explain the behavior and impact of the earth's water systems.
- Explain the water cycle using the processes of evaporation and condensation.
- Describe factors that affect evaporation and condensation.
- Distinguish salt from fresh water (e.g., density, electrical conduction).
- Compare the effect of water type (e.g., polluted, fresh, salt water) and the life contained in them.
- Identify ocean and shoreline features, (e.g., bays, inlets, spit, tidal marshes).

4.1.7.A Explain the role of the water cycle within a watershed.
- Explain the water cycle.
- Explain the water cycle as it relates to a watershed.

4.1.7.C Explain the effects of water on the life of organisms in a watershed.
- Explain how water is necessary for all life.

ASSESSMENT ANCHORS:

S8.A.1 Reasoning and Analysis
S8.A.1.3 Identify evidence that certain variables may have caused measurable changes in natural or human-made systems.

S8.A.2 Processes, Procedures & Tools of Scientific Investigations
S8.A.2.2 Apply appropriate instruments for a specific purpose and describe the information the instrument can provide.

S8.D.1 Earth Features and Processes that Change Earth and Its Resources
S8.D.1.3 Describe characteristic features of Earth's water systems or their impact on resources.

ELIGIBLE CONTENT:

S8.A.1.3.3 Examine systems changing over time, identifying the possible variables causing this change, and drawing inferences about how these variables affect this change.

S8.A.2.2.1 Describe the appropriate use of instruments and scales to accurately measure time, mass, distance, volume, or temperature safely under a variety of conditions.

S8.A.2.2.2 Apply appropriate measurement systems (e.g., time, mass, distance, volume, temperature) to record and interpret observations under varying conditions.

S8.A.2.2.3 Describe ways technology extends and enhances human abilities for specific purposes (e.g., microscope, telescope, micrometer, hydraulics, barometer).

S8.D.1.3.1 Describe the water cycle and the physical processes on which it depends (i.e., evaporation, condensation, precipitation, transpiration, runoff, infiltration, energy inputs, and phase changes.

S8.D.1.3.2 Compare and contrast characteristics of freshwater and saltwater systems on the basis of their physical characteristics (composition, density, and electrical conductivity) and their use as natural resources.

S8.D.1.3.3 Distinguish among different water systems (e.g., wetland systems, ocean systems, river systems, and watersheds) and describe their relationships to each other, as well as, to landforms.

S8.D.1.3.4 Identify the physical characteristics of a stream and how these characteristics determine the

types of organisms found in an aquatic environment (e.g., biological diversity, water quality, flow rate, tributaries, surrounding watersheds).

KEY CONCEPTS:

1. Earth's system is composed of interacting subsystems of the geosphere, hydrosphere, atmosphere and biosphere.
2. Each subsystem is ancient and is still changing.
3. Understanding these subsystems allows us to access and utilize these resources wisely.
4. Most of the saltwater on Earth is found in oceans.
5. Most of the freshwater on Earth is in glaciers.

UNIT OBJECTIVES:

1. *Recognize how groundwater forms.*
   - Groundwater is water located within the gaps and pores in rocks below Earth's surface.
   - Groundwater can collect in large underground "lakes" called aquifers.

2. *Demonstrate an understanding of the water cycle.*
   - Water moves above, across, and through the Earth's crust and ecosystems in a process known as the water cycle.
   - The water cycle involves the evaporation, condensation, and precipitation of water.

3. *Compare the percentage of saltwater to the percentage of freshwater.*
   - Saltwater represents 97% of the water on Earth. Freshwater is the remaining 3%.

4. *Identify places where freshwater can be found (lakes/reservoirs, rivers, streams).*
   - Over ¾ of Earth's freshwater is in the form of frozen ice caps and glaciers near Earth's poles.
   - Most freshwater is groundwater.
   - The rest of freshwater includes the water in the air, soil, rivers, and freshwater lakes. This makes up only .5% of all freshwater on Earth.

5. *Identify places where saltwater can be found (oceans, saltwater marshes, estuary).*
   - Oceans contain 97% of the Earth's water.
   - Pacific Ocean covers approximately 64 million square miles.
   - Atlantic Ocean covers approximately 32 million square miles.
   - Indian Ocean covers approximately 28 million square miles.
   - Artic Ocean covers approximately 5 million square miles.
   - Antarctic Ocean - opinions vary over size.
   - An estuary is wherever freshwater from rivers mixes with saltwater from oceans.
   - Saltwater marshes occur on level, tidal-influenced areas.

6. *Compare and contrast characteristics of freshwater and saltwater systems on the basis of their physical characteristics (composition, density, electrical conductivity) and their use as natural resources.*
   - Each major body of water has its own physical properties, including animal and plant life, currents and underwater landscapes that include large mountains and valleys.
   - Natural water, whether in the atmosphere, on the ground surface, or under the ground, always contains dissolved minerals and gases as a result of its interaction with the atmosphere, minerals in rocks, ***organic*** matter, and living organisms.
   - The composition of stream and lake water varies from one place to another, and within a single watershed varies both seasonally and along the stream's path.
   - Groundwater often contains more dissolved minerals than surface water.
   - On average, seawater in the world's oceans has a ***salinity*** ~3.5%. This means that for every 1 *litre* (1000 mL) of seawater there are 35 grams of salts (mostly, but not entirely, *sodium chloride*) dissolved in it.

7. *Distinguish among different water systems (wetland systems, ocean systems, river systems,*

watersheds) and describe their relationship to each other, as well as, to landforms.

- Wetlands are places that are covered with water sometimes, while other times they dry out. Wetlands help to store floodwater before it runs off and causes damage. Wetlands protect land and communities by blocking the force of wind and waves from storms coming in from the ocean.
- Oceans are large, deep storage areas filled with saltwater. Water for land drains and flows into the oceans where it can be stored for thousands of years.
- Rivers are streams of water that travel downhill. They carry water to lakes or to oceans. The tiniest rivers are creeks or streams.
- A watershed is the land area from which surface runoff drains into a stream, channel, lake, reservoir, or other body of water; also called a drainage basin.

8. *Describe the characteristics of healthy streams how these characteristics determine the types of organisms found in an aquatic environment (biological diversity, water quality, flow rate, tributaries, surrounding watershed).*
   - In aquatic habitats, *pH* has a strong effect on which fish, amphibians, invertebrates and plants can live in a community.
   - Fish can not maintain their internal body temperature as do humans. Fish have very specific temperature requirements. Water temperature can influence oxygen concentration, metabolism (body functions), reproduction and growth.
   - Dissolved oxygen (DO) is another important water quality factor for fish and many aquatic invertebrates. DO is the amount of oxygen dissolved in the water.
   - Temperature, water velocity, wind, water depth and plant growth influence DO in water.
   - Generally, dissolved oxygen levels in aquatic habitats must be greater than 6.5 mg/l for fish and aquatic organisms to survive.
   - In Pennsylvania, two major kinds of pollution impair our waters: Agricultural runoff and abandoned mine drainage (AMD). These pollution sources put excess nutrients, siltation and metals into our waters.

9. *Identify common hazards to groundwater.*
   - Microbial contaminants, such as, viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.
   - Inorganic contaminants, such as, salts and metals, which can occur naturally or result from urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming. EXAMPLE: Salt spread on roads during winter months.
   - Pesticides and herbicides which may come from a variety of sources, such as, agriculture, storm water runoff, and residential uses. EXAMPLE: Products used for greener lawns.
   - Organic chemical contaminants, including synthetic and volatiles organic chemicals (oil) which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban storm water runoff, and septic systems. EXAMPLE: Changing car oil and pouring in the ground.

10. *Identify ways to protect water resources.*
    - Properly dispose of hazardous or toxic substances. Motor oil, pesticides, leftover paints, mothballs, flea collars, household cleaning chemicals, can be harmful to ground water.

SUGGESTED ACTIVITIES:

Students will:

1. Play a water review game using true/false water facts to informally access students' background knowledge.
2. Conduct *Well Underground Experiment* by cutting the top off of a two-liter soda bottle. Fill the bottom with gravel. Add a layer of sand, and then a layer of soil. Push the pump (from a

ASSESSMENTS:

- ✧ Observation checklists
- ✧ Interviews and dialogue
- ✧ Learning logs or notebooks
- ✧ Teacher-made tests and quizzes
- ✧ Products and projects
- ✧ Performance tasks
- ✧ Criterion-referenced tests

REMEDIATION:

soap dispenser) down in the middle of the bottle. Slowly pour water inside to make an aquifer. Mark how high the water rises into the sand on the outside of the bottle. Use the pump to put water into an empty cup. After you get all the water out, pour it right back in. Add a few drops of red food coloring. Now pump out the water again. Explain what happened and why.

3. Conduct *Porosity and Filtering Experiment* by placing a small amount of soil in a bottle of water. Shake the bottle up so that the water and soil mixes and becomes muddy. Place a few cotton balls inside a funnel and then put the funnel on the top of an empty container. Slowly pour the muddy water through the funnel. See Experiment #2.
4. Illustrate posters of the water cycle and complete concept maps for *FRESHWATER*, *THE WATER CYCLE AND EVAPORATION.*
5. Brainstorm water sources and categorize them as fresh or saltwater.
6. Predict percentages of salt and freshwater, chart the predictions using a pie graph and compare student predictions to actual percentages.
7. Design a tiered *FRESHWATER BOOKLET* listing definitions, examples and pictures of ponds, lakes, rivers, streams, creeks, reservoirs, springs, and groundwater.
8. Design a bar graph indicating the land covered by each of the five oceans.
9. Work in groups to complete a Venn diagram comparing and contrasting characteristics of saltwater and freshwater.
10. Complete *FLOATING EGG EXPERIMENT*: Fill two containers halfway with water. Gently add a hardboiled egg to one of them. To the other container add two spoonfuls of salt and stir it until it all dissolves. Gently add the other egg to the container of saltwater. See Experiment #9.
11. Write cause and effect statements to describe the relationships of various water systems to each other and landforms. EXAMPLE: Snow melts on mountaintops/streams overflow banks.
12. Research water quality of local streams by measuring *ph* and temperature of given samples. Predict fish species living in stream and confirm with Brodhead Watershed Association.
13. Design car bumper stickers with PROTECT YOUR GROUND WATER messages.
14. Write newspaper articles describing an event which polluted local drinking water.

Teacher directed differentiated instructional

- ✧ Peer tutoring
- ✧ Small group instruction
- ✧ Computer assisted learning
- ✧ Individualized instruction
- ✧ Chunking of information

ENRICHMENT:

- ✧ Research opportunities
- ✧ Class presentation
- ✧ Independent investigation
- ✧ Case study
- ✧ Design a map indicating local water streams, lakes and reservoirs.

projects and activities are ongoing and based on student need.

RESOURCES:

Houghton Mifflin Text
Harcourt Text
Water on Earth; Teacher's Guide & Student Activities
Leader's Guide: Learning About Water
Freshwater Wetlands Teaching Guide
The Water Cycle Teachers Guide & Resources
Brodhead Watershed Drinking Water Threats
EPA's *"It's YOUR Drinking Water: Get to Know It and Protect It"!*
Citizen's Guide to Ground-Water Protection (Student downloadable booklets)

WEBSITES:

http:www.water.ncsu.edu/watershedss/info/wtype.html
This website gives background information and illustrations of freshwater wetland areas.

http://www.brodheadwatershed.org/dwt.htm
This website provides local information about our local watershed.

http://www.pawatersheds.org/
This website provides supplemental information regarding watersheds in our area.

http://www.unitedstreaming.com/search/assetDetail.cfm?guidAssetID-2B007459-F1C0-403B-80B3-9B9247F76AO3
Oceans: Charting the Vastness
As versatile media support for Earth Science, Geology, Biology and Aquatic Science units, this program chronicles the influence that oceans exert on Earth's weather patterns, demonstrates the connection between sea-floor topography and plate tectonics, and illustrates geographic distribution of marine organisms. Students' understanding of the oceans' mineral resources and diversity of marine life will be enhanced as they learn about the water's composition, the dynamics of currents and tides, and the various mammals, fish and other inhabitants of these marine ecosystems.

http://www.unitedstreaming.com/search/assetDetail.cfm?guidAssetID=6B20E3E7-5C72-4758-B251-D88F429CC899

Water Smart: Water on Earth

DESCRIPTION: The majority of Earth's surface is covered with water but it's mainly saltwater. Through vivid video examples, kids gain awareness of varied types of bodies of water on our plant and how they are connected. We learn that water is not just liquid and it's not always surface water. Different phases and properties of water are presented as students compare and contrast glaciers, groundwater, wetlands, aquifiers, lakes, estuaries, oceans and streams. The program ends with a true/false video quiz. Written materials reinforce vocabulary and motivate students to learn. Eight experiments and demonstrations are included that kids can duplicate using simple materials. Students practice math skills while improving skills in observation and measurement. A dozen internet references will help teachers develop additional material while providing kids with links they can visit for fun and education. ©2004 United http://www.epa.gov/safewater/protect/citguide.html This website provides a student resource titled "It's YOUR drinking Water: Get to know it and Protect it"	

COURSE: Science	GRADE(S): 6th Grade
UNIT 3: Environment and Ecology	

NATIONAL STANDARDS:

SCIENCE THEMES: Systems and Interactions, Models, Patterns of Change, Energy, Change over time

PROCESS SKILLS: Observing, Classifying, Measuring, Analyzing and Interpreting Data, Predicting

BENCHMARKS:

STATE STANDARDS:

4.6.7.A Explain the flows of energy and matter from organism to organism within an ecosystem.

- Identify and explain the characteristics of biotic and abiotic.
- Describe and explain the adaptations of plants and animals to their environment**.**
- Demonstrate the dependency of living components in the ecosystem on the nonliving components.
- Explain energy flow through a food web.
- Explain the importance of the predator/prey relationship and how it maintains the balances within ecosystems.
- Understand limiting factors and predict their effects on an organism.
- Identify niches for producers, consumers and decomposers within an ecosystem.
- Compare and contrast the major ecosystems of Pennsylvania.
- Identify the major characteristics of a biome.
- Compare and contrast different biomes and their characteristics.
- Identify the relationship of abiotic and biotic components and explain their interaction in an ecosystem.
- Explain how different soil types determine the characteristics of ecosystems.

4.6.7.B Explain the concepts of cycles.

- Identify and explain cycles within an ecosystem.
- Analyze the role of different cycles within an ecosystem**.**

4.6.7.C Explain how ecosystems change over time.

- Explain how ecosystems change.
- Identify the succession stages of a given ecosystem.
- Explain how specific organisms may change an ecosystem.
- Explain a change in an ecosystem that relates to humans.

4.7.7.A Describe diversity of plants and animals in ecosystems.

- Select an ecosystem and describe different plants and animals that live there.
- Identify adaptations in plants and animals.
- Recognize that adaptations are developed over long periods of time and are passed on from one generation to the next.
- Understand levels of ecosystem organization (e.g., individuals, populations, species).

4.7.7.B Explain how species of living organisms adapt to their environment.

- Explain the role of individual variations in natural selection.
- Explain how an adaptation is an inherited structure or behavior that helps an organism survive and reproduce.
- Describe how a particular trait may be selected over time and account for a species' adaptation.
- Compare and contrast animals and plants that have very specific survival requirements with those that have more general requirements for survival.
- Explain how living things respond to changes in their environment.
- Explain how one species may survive an environmental change while another might not.

4.7.7.C Explain natural or human actions in relation to the loss of species.

- Identify natural or human impacts that cause habitat loss.
- Explain how habitat loss can affect the interaction among species and the population of

a species.
- Analyze and explain the changes in an animal population over time.
- Explain how a habitat management practice affects a population.
- Explain the differences among threatened, endangered and extinct species.
- Identify Pennsylvania plants and animals that are on the threatened or endangered list.
- Describe state laws passed regarding threatened and endangered species in Pennsylvania.
- Explain why one species may be more susceptible to becoming endangered than another species.

ASSESSMENT ANCHORS:

S8.A.1.3 **Reasoning and Analysis:** Identify evidence that certain variables may have caused measurable changes in natural or human-made systems.

ELIGIBLE CONTENT:

S8.A.1.3.2 Use evidence, observations, or explanations to make inferences about change in systems over time (e.g., carrying capacity, succession, population dynamics, loss of mass in chemical reactions, Indicator fossils in geologic time scale) and the variables affecting these changes.

S8.A.1.3.3 Examine systems changing over time, identifying the possible variables causing this change, and drawing inferences about how these variables affect this change.

S8.A.1.3.4 Given a scenario, explain how a dynamically changing environment provides for the sustainability of living systems.

KEY CONCEPTS:

- An ecosystem is a collection of cycles.
- An ever-changing environment causes changes in the diversity and population of organisms.

UNIT OBJECTIVES:

1. *Define an ecosystem*
   - An ecosystem comprises organisms and their physical environment.
   - Ecosystem support life
   - Living (biotic) and nonliving (abiotic) factors interact in an ecosystem
2. *Explain how all ecosystems need certain materials.*
   - Living things need certain materials, or matter, to meet their needs. This matter remains in the ecosystem, moving through it in continuous cycles, in which the matter changes form, but is never created or destroyed.
   - Temperature, light, soil, and water are important nonliving factors in ecosystems.
3. *Explain how species of living organisms adapt to their environment*
   - Biodiversity is the number and variety of life forms within an ecosystem. Healthy ecosystems support a variety of species.
   - Adaptations are a characteristic of a species that allows members of the species to survive in a particular environment.
   - Over time, species either develop adaptations to changing environments or they become extinct.
4. *Explain ecosystem components*
   - Cycles- A cycle is a series of events that happens over and over again. Three of the most important cycles in ecosystems involve water, carbon and nitrogen.
   - Energy flow- Most energy in ecosystems enters as sunlight, get transferred into food by photosynthesis, and passes from organism to organism in food webs. Each of the organisms in an ecosystem fills the energy role of producer, consumer, or decomposer.
   - Change over time- Systems change until stable, and then remain stable until surrounding change.
5. *Explain basic concepts of natural selection*
   - Individuals whose unique characteristics are best suited for their environment tend to survive and produce offspring.
6. *Describe the waste disposal methods and the recycling process*

- Three methods of handling solid waste are burning, burying and recycling.

7. *Describe how human actions affect the health of the environment*
   - Human activities can threaten biodiversity. These activities include habitat destruction, poaching, pollution, and the introduction of exotic species.
8. *Explain biodiversity*
   - The number of different species in an area
9. *Describe diversity of plants and animals in ecosystems*
10. *Explain how species of living organisms adapt to their environment*
    - The behaviors and physical characteristics that allow organisms to live successfully in their environments. Over time, poorly suited characteristics may disappear from the species.
11. *Explain interactions/relationships amongst organisms*
    - There are three major types of interactions among organisms: competition, predation, and symbiosis.
12. *Explain natural or human actions in relation to the loss of species*
    - Natural events such as earthquakes or volcanic eruptions can wipe out populations.
    - Habitat destruction, poaching, pollution, and the introduction of exotic species can lead to loss of species.
13. *Describe how the development of civilization relates to the environment*
    - Environmental issues fall into three categories: resource use, population growth, and pollution.
    - Decisions regarding environmental issues are made on personal, local, national, and global level. Every decision has an impact on the environment.
    - Human populations are increasing and this causes problems in the environment
    - Humans use many resources: renewable and nonrenewable

ACTIVITIES:

1. Build an Ecosystem- Use an aquarium or other container to build an ecosystem
2. Design a park near your school. Include plants that are native to the local environment.
3. Conservation Campaign- develop a plan for reducing the amount of paper, water or energy used in your school and prepare a class presentation of plan
4. Experiment with how plants react to sunlight. Move a potted plant so that the sun shines on it from a different direction and observe.
5. Explore the soil found in different areas of the school grounds.
6. Explore how temperature can vary in one place by placing thermometers in different locations of the classroom.
7. Investigate decomposers by observing what happens to fruit slice placed in a sealed container of soil.
8. Identify an organism on your school grounds and write about how it fits into the ecosystem.
9. Investigate limiting factors by designing an experiment to test the hypothesis: "If plants grow too close together the health of the population will be affected."
10. Explore how polluted water moves through plants by placing a few drops of food coloring in a half cup of water. Place a stalk of celery in water and observe. Write about what observations suggest about plants

ASSESSMENTS:

- ✧ Observation Checklists
- ✧ Interviews and Dialogue
- ✧ Learning Logs or Notebooks
- ✧ Teacher-Made Tests and Quizzes
- ✧ Products and Projects
- ✧ Performance Tasks

REMEDIATION:

- ✧ Peer Tutoring
- ✧ Small Group Instruction
- ✧ Computer Assisted Learning
- ✧ Individualized Instruction
- ✧ Chunking of Information

ENRICHMENT:

- ✧ Research Opportunities
- ✧ Class Presentation
- ✧ Independent Investigation
- ✧ Case Study
- ✧ Design an experiment

growing in polluted water.

11. Design your own experiment to simulate an oil spill and test the effectiveness of various materials to remove oil
12. Explore and investigate the changes that take place over time in a pond community. Collect pond water and observe drops under microscope. Cover remaining pond water with hay that has been soaked water. Repeat every three days for two weeks. Communicate observations and write paragraph explaining why ecosystem changed over time.
13. Investigate particles in the air- spread a thin layer of petroleum jelly on index cards and hang in various locations around the school environment. Collect cards in one week and examine with hand lens. Identify the types of particles collected at each location. Which location had the most pollution?

Teacher directed differentiated instructional projects and activities are ongoing and based on student need.

RESOURCES:

- Houghton Mifflin Teacher Resources
- Harcourt Teacher Resources
    1. Ecology: Organisms in Their Environments- Teacher Guide and student activities to accompany video presentation
    2. Ecosystems: The Role of Abiotic Factors- Teachers Guide and students activities to accompany video presentation
    3. Ecology Resource Guide
    4. The Roles of Plants and Animals: Producers, Consumers, Predators, Prey
    5. Biomes: Background Information and students activities
    6. Air Quality and Pollution

WEBSITES OR VIDEO RESOURCES

http://www.unitedstreaming.com/search/assetDetail.cfm?guidAssetID=0B666D65-13A0-46AD-9914-4C7BA106DA46

Biology: The Science of Life: Ecology: Organisms in Their Environment
This video contains 11 segments.

Description:

This fifteen-minute program examines the interactions between organisms in their environments. The program addresses two important questions posed by core-curriculum standards:

1. What are ecosystems and how do

organisms interact in them? 2. How do matter and energy flow in the environment? The concepts of ecosystem, population, niche, food chain, food web, food pyramid, and the carbon cycle are all explained in this very useful program. © 2003 United Learning http://www.unitedstreaming.com/search/assetDetail.cfm?guidAssetID=2C732E32-E564-4F96-A45C-3BF6D0BAFB1E Biology: The Science of Life: Ecosystems: The Role of Abiotic Factors (15 min.) This video contains 11 segments. ***Description:*** This fifteen-minute program examines the role of non-living, abiotic factors and the role they play in shaping ecosystems. Five abiotic factors are examined: water, air, soil, heat, and light. In addition, three air-mediated cycles are presented: the water cycle, the carbon-dioxide/oxygen cycle, and the nitrogen cycle. © 2003 United Learning	

COURSE: Science	GRADE(S): 6th Grade
UNIT 4: Physical Science, Chemistry and Physics	

NATIONAL STANDARDS:

SCIENCE THEMES: Systems and Interactions, Models, Patterns of Change, Energy, Change over time

PROCESS SKILLS: Observing, Classifying, Measuring, Analyzing and Interpreting Data, Predicting

BENCHMARKS:

STATE STANDARDS:

3.4.7.A Describe concepts about the structure and properties of matter.

- Identify elements as basic building blocks of matter that cannot be broken down chemically.
- Distinguish compounds from mixtures.
- Describe and conduct experiments that identify chemical and physical properties.
- Describe reactants and products of simple chemical reactions.

ASSESSMENT ANCHORS:

S8.A.1.2 Reasoning and Analysis: Identify and explain the impacts of applying scientific, environmental, or technological knowledge to address solution to practical problems.

S8.A.1.3 Reasoning and Analysis: Identify evidence that certain variables may have caused measurable changes in natural or human-made systems.

S8.A.3.2 Systems, Models and Patterns: Apply knowledge of models to make predictions, draw inferences, or explain technological concepts.

S8.C.1.1 Structure, Properties, and Interaction of Matter and Energy: Explain concepts about the structure and properties (physical and chemical) of matter.

S8.C.2.1 Forms, Sources, Conversion, and Transfer of Energy Describe energy sources, transfer of energy, or conversion of energy.

ELIGIBLE CONTENT:

S8.A.1.2.1 Describe the positive and negative, intended and unintended, effects of specific scientific results or technological developments. (e.g., air/space travel, genetic engineering, nuclear fission/fusion, artificial intelligence, lasers, organ transplants).

S8.A.3.2.1 Describe how scientists use models to explore relationships in natural systems (such as an ecosystem, river system, or the solar system).

S8.A.3.2.3 Given a model showing simple cause and effect relationships in a natural system, predict results that can be used to test the assumptions in the model. (e.g., photosynthesis, water cycle, diffusion, infiltration)

S8.C.1.1.1 Explain the differences among elements, compounds, and mixtures.

S8.C.1.1.2 Use characteristic physical or chemical properties to distinguish one substance from another (e.g., density, thermal expansion/contraction, freezing/melting points, streak test).

S8.C.2.1.1 Distinguish among forms of energy (e.g., electrical, mechanical, chemical, heat, light, sound, nuclear) and sources of energy (i.e., renewable and nonrenewable energy)

S8.C.2.1.2 Explain how heat is transferred from one place to another through convection, conduction, or radiation.

S8.C.2.1.3 Describe how one form of energy (e.g., electrical, mechanical, chemical, heat, light, sound, nuclear) can be converted into a different form of energy.

KEY CONCEPTS:

- Atoms are the basic building blocks of matter.
- Atoms are the smallest form of elements.
- Elements make up the periodic table
- Matter is made up of particles called atoms that are too small to see with the eyes.
- Matter can be an element, a compound or a mixture.

- Matter can undergo physical and chemical changes.

UNIT OBJECTIVES:

1. *Describe the structure of atoms and how each element's atoms are different.*
   - All matter is made of the atoms of approximately 100 elements.
   - Atoms are made of protons, neutrons, and electrons.
2. *Examine and explain how the periodic table of elements is organized.*
   - Elements can be organized by similarities.
   - The periodic table organizes the atoms of the elements by properties and atomic number.
   - Most elements are metals.
3. *Define and describe the structure of matter.*
   - Matter is anything that takes up space and has mass.
   - Matter exists in four states: solid, liquid, gas and plasma.
4. *Compare properties of solids, liquids, and gases in the following areas: Mass vs. weight, volume, density, solubility, physical state, and boiling, melting, freezing point.*
5. *Differentiate elements, compounds, mixtures, and solutions.*
   - An element is a substance that contains only one kind of atom.
   - A compound is a substance that has two or more elements that are chemically combined (water).
   - A mixture is a combination of two or more substances that keep their original properties(tossed salad).
   - A solution is a mixture in which all the substances are evenly distributed (salt water)
6. *Illustrate how atoms combine to form compounds.*
   - Elements combine to form compounds.
   - Compounds have different properties from the elements that made them.
7. *Compare and contrast physical change vs. chemical change.*
8. *Identify changes in matter as physical and/or chemical.*
   - Chemical changes occur through chemical reactions.
   - Evidence of a chemical reaction includes a color change, the formation of a precipitate, the formation of a gas, and a change in temperature.
   - Physical change is a change in size, shape or state but is still the same substance.

ACTIVITIES:

Students will:

1. Research common elements and design a class booklet of element facts.
2. Classify elements (ex: copper, aluminum, sulfur, carbon, gold and other readily available elements) by their physical properties.
3. Identify the missing element –students will use atomic weight to place element in correct position on periodic table.
4. Build a Gumdrop Molecule Lab- Assign colors to represent elements. Students are given a bag of elements (gumdrops) and toothpicks (bonds) and a compound formula- NaCl. If Na is represented by yellow and Cl is represented with orange, students should connect yellow and orange to represent NaCl.
5. Experiment with changes in state of matter (ex: Solid to liquid, liquid to gas, liquid to solid) This can be done by heating chocolate bars. Solid chocolate changes to liquid and gas. Pour liquid chocolate into small cups and let cool, liquid to solid.
6. Demonstrate the concept of compounds, mixtures and solutions with the following activity: Using raison brand cereal and corn flakes, use corn flakes to demonstrate a compound by explaining that there are many ingredients in corn flakes but you can not

ASSESSMENTS:

- ✧ Observation Checklists
- ✧ Interviews and Dialogue
- ✧ Learning Logs or Notebooks
- ✧ Teacher-Made Tests and Quizzes
- ✧ Products and Projects
- ✧ Performance Tasks

REMEDIATION:

- ✧ Peer Tutoring
- ✧ Small Group Instruction
- ✧ Computer Assisted Learning
- ✧ Individualized Instruction
- ✧ Chunking of Information

ENRICHMENT:

- ✧ Research Opportunities
- ✧ Class Presentation
- ✧ Independent Investigation
- ✧ Case Study
- ✧ Design an experiment

separate them. Raison bran is a mixture because raisons can be separated from the cereal. Use salt water to demonstrate a solution, salt dissolves and is evenly distributed in the liquid. You can compare this solution to a mixture of rice and water.

7. Play a review game of Name that Element by giving each student the symbol of a common element. Student can hold up their card when teacher says element name.
8. Diagram given chemical compounds on posters. Elements should be labeled and color coded.
9. Complete a lab to demonstrate that gas takes up space. Students will use a funnel to direct vinegar into a balloon. Another student will have a small test tube or beaker filled halfway with baking soda. Place the balloon on the test tube and slowly allow vinegar to flow into the tube. The chemical reaction produces carbon dioxide gas which will fill the balloon.
10. Complete labs demonstrating chemical changes (Chemistry for Every Kid).
11. Complete labs demonstrating physical changes (Chemistry for Every Kid).
12. Lab reports for all experiments indicating what was learned or proven by lab
13. Create Concept Mobile for Matter

Teacher directed differentiated instructional projects and activities are ongoing and based on student need.

RESOURCES:

- Houghton Mifflin Text
- Harcourt Text
- Chemistry for Every Kid-Janice Van Cleave
- *Bill Nye-States of Matter Video
- *Bill Nye-Chemicals Video
- Physical Science: Elements Teacher's Guide
- Physical Science: Chemistry Teacher's Guide
- Greatest Discovers with Bill Nye: Chemistry Teacher's Guide.

WEBSITES:

http://www.unitedstreaming.com/search/assetDetail.cfm?guidAssetID=5D0AFE41-D9E8-4B98-A6C5-5E293642D5F7

Greatest Discoveries with Bill Nye-ChemistryDescription: Oxygen and Atoms — Explore atomic and molecular structure and see how oxygen was first isolated. Chemical Structure and the Periodic Table of Elements — Examine the experiments that brought us the periodic table of the elements. Chemicals and Electricity — See how electrochemistry revealed the subatomic particles we know as electrons. Chemical Compounds and Radioactivity — Explore the benefits of chemical compounds and radioactivity. Plastics and Fullerenes:

The Future of Chemistry — See how plastics and nanotechnology are changing our world. http://www.unitedstreaming.com/search/assetDetail.cfm?guidAssetID=21314E6B-9ED8-4735-8DFE-96A5B023BBB0 **Physical Science: Elements** **Description:** There are 91 naturally occurring elements, and another 25 that are created artificially. The atoms of an element are specific to that element, having a particular number of protons, neutrons, and electrons. Most elements combine with others to form compounds, such as water (hydrogen and oxygen). It's the many combinations of elements that make for the variety of substances in the world. Keeping track of all the elements would be difficult were it not for the handy periodic table, which organizes the elements by atomic structure. Hydrogen, the simplest of elements, always exists as a compound. Hydrogen fuels both stars and the rockets that reach for them. The light bulb is a study in practical elements. Because tungsten has the highest melting point of any metal, it makes the perfect material for the filaments that—once electrified—glow with white-hot light. Inside the bulb's glass is not oxygen but argon, used because it won't react with the tungsten filament. Carbon is the stuff of diamonds and the stuff of life. The process by which diamonds are created and extracted is slow and arduous. It's no wonder the flashy gems are so valued. In a fireworks display, the elements are showcased. From the propellants to the colors to the patterns, a fireworks show is a chemical extravaganza. © 2002 Discovery Channel School. http://www.unitedstreaming.com/search/assetDetail.cfm?guidAssetID=5D0AFE41-D9E8-4B98-A6C5-5E293642D5F7 **Physical Science: Chemistry** **Description:** Chemistry studies the properties of matter and how substances combine and react. Some—such as oil and water—don't combine, while others—those that produce fire, for example—do so spectacularly. Energy from chemical reactions can result in heat, light, or motion. The chemical reaction between gasoline and heat runs the internal combustion engine. The chemical reaction between hydrogen and oxygen in a fuel cell may also power a vehicle, but with no harmful emissions. Any student who's watched forensic TV shows knows that chemistry is used to solve crimes. In one actual case, a toy chemistry set helped solve a murder. Knowledge of chemistry explains not only how a fire burns, but how to put it out as well. Our sense of smell	

responds to chemical molecules in the air. Were it not for this ability our food wouldn't taste nearly as good. But the human sense of smell pales in comparison to that of a dog's. Able to smell 100 times better than people, dogs can even smell skin.	