Grades 6-8

The following are the strands and standards set forth by the National Science Education Standards. This curriculum is written so that any of the material can be covered at any point in grades 6-8. It is the preference of the individual school which dictates the order in which this information is covered. All material in these strands and standards should be covered at some point in grades 6-8.

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1. Strand: Unifying Concepts and Processes (NSES, IL 12)

A. Standard: Systems, Order, and Organization

The student will know:	The student will be able to:	Suggested Activities	Suggested Resources
1. The natural and designed world is complex; it is too large and complicated to investigate and comprehend all at once.	1. Think and analyze in terms of systems to help keep track of mass, energy, objects, organisms, and events.	1a. Place animals at the zoo into the correct kingdom. 1b. Identify major human body systems.	www.stlzoo.org; http://www.stcms.si.edu/hbs/hbs_student.htm
2. An assumption of order establishes the basis for cause-effect relationships and predictability.	2. Recognize the causes of various different effects and vice versa. Make predictions based on observations and prior knowledge.	2. Punnett Squares	http://www.athro.com/evo/gen/punexam.html; http://users.adelphia.net/~lubehawk/BioHELP!/psquare.htm
3. Order can be described statistically.	3. Apply mathematical formulas to scientific concepts.	3. Solve problems of various types.	http://homepage.mac.com/dtrapp/ScienceMath.html
4. Organization provides useful ways of thinking about the world.	4. Recognize that the periodic table, taxonomy of organisms, and other physical and biological systems are organized.	4. Organize hardware (screws, nuts, bolts, washers, etc.) into categories.	http://www.pbs.org/wgbh/nova/teachers/activities/2905_link.html

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B. Standard: Evidence, Models and Explanation

The student will know:	The student will be able to:	Suggested Activities	Suggested Resources
1. Evidence consists of observations and data that explain and predict changes in natural and designed systems.	1. Select and apply information which supports or refutes positions, processes or changes.	1a. Prepare a position paper on a scientifically oriented topic. 1b. Prepare graphs to predict a trend.	Internet Library
2. Models are schemes or structures that represent real objects or events and have explanatory power.	2. Recognize, interpret, and create a variety of models (physical objects, plans, mental constructs, mathematical equations, computer simulations, etc.).	2a. Build a model of DNA, the Space Shuttle, a volcano, etc. Interpret maps, charts, graphs. 2b. Use a formula to solve for a variable (e.g. time, distance, speed).	Text; reproducible workbooks
3. Explanations of scientific knowledge are based on existing information and new evidence and must be consistent and logical.	3. Develop increasingly accurate, detailed, and logical explanations of scientific knowledge.	3a. Prepare an expository paper on a scientific topic. 3b. Perform and explain an experiment before a group.	Janice Van Cleave's books on science experiments.

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C. Standard: Constancy, Change, and Measurement

The student will know:	The student will be able to:	Suggested Activities	Suggested Resources
1. Most things are in the process of becoming different--changing--but some properties of objects and processes are characterized by constancy.	1. Recognize that the speed of light, the charge of an electron, and the total mass plus energy in the universe are constant. Changes might occur, for example, in properties of materials, position of objects, motion, and form and function of systems.	1. Record the mass of vinegar and baking soda prior to their reaction. Place the materials in a plastic bag and combine them. Record the mass again after the reaction.	http://www.coe.uh.edu/texasipc/units/changes/conservation.pdf
2. Changes in systems can be quantified.	2. Apply mathematical concepts to find derived quantities such as temperature, speed, and work.	2. Calculate the specific heat of a metal.	http://www.geocities.com/CapeCanaveral/Hall/1410/lab-C-17.html.
3. Different systems of measurement are used for different purposes.	3. Choose the correct system and unit of measurement in a variety of situations.	3. Create a list of objects in the room. Students will measure the length, temperature, height, mass, and volume of the objects.	http://www.aaamath.com/mea.html

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D. Standard: Evolution and Equilibrium

The student will know:	The student will be able to:	Suggested Activities	Suggested Resources
1. Evolution is a series of changes, some gradual and some sporadic, that accounts for the present form and function of objects, organisms, and natural and designed systems.	1. Explain that the general idea of evolution is that the present arises from materials and forms of the past and that God is the master designer of all.	1a. Obtain photographs of camouflaged animals and ask students how natural selection has prepared them for survival in their environment. 1b. Make camouflage animals to hide around classroom environment.	
2. Equilibrium is a physical state in which forces and changes occur in opposite and off-setting directions.	2. Say that interacting units of matter tend toward equilibrium states in which the energy is distributed as randomly and uniformly as possible.	2. Design an experiment using steady state, balance, and homeostasis.	

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E. Standard: Form and Function

The student will know:	The student will be able to:	Suggested Activities	Suggested Resources
1. Form and function are complementary aspects of objects, organisms, and systems in the natural and designed world.	1. Identify how the form or shape of an object or system is frequently related to use, operation, or function. Function frequently relies on form.	1. Introduce the general idea of structure-function in the context of human organ systems working together.	
2. Understanding of form and function applies to different levels of organization.	2. Explain function by referring to form and explain form by referring to function.	2. Compare and contrast how birds have differing anatomies based on the functions that need to be accomplished for a specific task.	

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2. Strand: Science as Inquiry (NSES, IL 11, MO 7)

A. Standard: Abilities Necessary to Do Scientific Inquiry

The student will know:	The student will be able to:	Suggested Activities	Suggested Resources
1. Communication and the open sharing of information and knowledge are essential parts of scientific inquiry.	1. Locate, read, listen to, and view various forms of information to interpret and evaluate; organize information into text, tables, and graphs; use a variety of methods, forms, and technologies to describe the meaning and implications of the information.	1. Organize a science lesson using verbal communication, visual display, and hands-on experiences.	
2. Various statistical procedures are used to determine characteristics of sets of data as well as to determine the validity of experimental results.	2. Apply mathematical procedures to investigations and data sets in order to determine patterns, relationships, and predictions.	2. Find the mean and median of sets of data, calculate percent and ratios, and determine the units in which the values should be expressed.	
3. A valid experiment or fair test, involves the manipulation of only one variable, while all others are held constant. Experiments should be repeated many times before accepting the results as true.	3. Design and conduct investigations that include an adequate number of repeated trials, unbiased sampling, accurate measurement and record keeping, and a comparison to a control.	3. Design and complete an independent science investigation that includes repeated trials and is properly controlled.	

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4. The use of tools allows more sophisticated means of observation and data collection, analysis, storage, and retrieval.	4. Read analog and digital meters that measure length, volume, mass, time, and temperature. Use microscopes, cameras, and computers to locate, select, identify, collect, store, manipulate, and receive information.	4. Use an electronic temperature probe connected to a computer to accurately measure and graph temperature changes associated with a variety of insulating materials.	

B. Standard: Understandings About Scientific Inquiry

The student will know:	**The student will be able to:**	**Suggested Activities**	**Suggested Resources**
1. Different kinds of questions suggest different kinds of scientific investigations.	1. Perform investigations involving observing and describing objects, organisms, or events and collecting specimens.	1. Conduct an experiment posing different outcomes and methods of obtaining results.	
2. Current scientific knowledge and understanding guide scientific investigations.	2. Research scientific domains that employ different methods, core theories, and standards to advance scientific knowledge and understanding.	2. Organize a list of current science topics and communicate possible applications to daily life.	
3. Science advances through legitimate skepticism. Asking questions and querying other scientists' explanations is part of scientific inquiry.	3. Evaluate explanations proposed by other scientists by examining and comparing evidence, identifying faulty reasoning, pointing out statements that go beyond the evidence, and suggesting alternative explanations for the same observations.	3. Students can debate and communicate about an experiment performed in class or use another finished and published report.	

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4. Scientific investigations sometimes result in new ideas and phenomena for study.	4. Generate new methods or procedures for an investigation, or develop new technologies to improve the collection of data.	4. Create a setting for student work that is flexible and supportive of science inquiry.

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3. Strand: Physical Science (NSES, IL 12, MO 1, 2)

A. Standard: Properties and Changes of Properties in Matter

The student will know:	The student will be able to:	Suggested Activities	Suggested Resources
1. Almost all matter is derived from naturally occurring elements. Each element is made of atoms that bond together to form molecules.	1. Investigate changes of state of water and use the particulate model to describe these changes.	1. Construct models of water, sodium chloride, or hydrogen and discuss the relationship of the structures to the physical properties of the substance.	http://www.chem1.com/acad/webtext/chembond/
2. The arrangement, motion, and interaction of molecules determines the physical state for the matter.	2. Investigate property changes as a result of changes in the physical state of a substance. Investigate how the rate of change of state is affected by the addition or removal of heat.	2a. Demonstrate the volume changes due to changes in the physical state of iodine, water, or dry ice. 2b. Measure and compare the rate of melting of ice on different colored fabrics exposed to sunlight.	http://www.chem.purdue.edu/gchelp/atoms/states.html
3. Some physical properties depend on the amount of matter present while other properties do not.	3. Identify those properties that are characteristic of a substance and those that depend on the amount of substance present.	3. Design and perform experiments that identify the melting point, density, mass, volume, etc. of water.	http://www.iun.edu/~cpanhd/C101webnotes/matter-and-energy/properties.html

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4. Compounds can be analyzed and separated by making use of their unique chemical and physical properties.	4. Separate natural or synthetic substances into their component compounds.	4a. Determine the most appropriate methods to separate milk, blood, sea water, processed foods, paints, cosmetics, etc. into their component parts. 4b. List the fat content in a variety of meats, canned vegetables, breads, snacks, etc., and identify the potential health problems/benefits associated with eating those foods.	http://www.docbrown.info/page01/ElCpdMix/EleCmdMix2.htm
5. Chemical changes occur at the atomic level to form new substances with different properties.	5. Identify chemical changes in common objects as a result of interactions with heat, light, and air.	5. Identify and describe the chemical changes in various materials by observing everyday events (nail left in water, cooking vegetables).	http://www.ric.edu/faculty/ptiskus/chemical/
6. The interaction between matter and energy can result in changes in electronic, atomic, and molecular motion.	6. Explain how an energy source interacts with and causes changes in different materials.	6. Use measurements to show how microwave heating affects various materials such as plastic, glass, or water. Explain the result in terms of changes in electronic, atomic, or molecular motions.	

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7. In a closed system, matter is conserved during any physical or chemical change.	7. Use laboratory investigations to demonstrate the formation of new materials and the conservation of matter.	7a. In laboratory investigations, demonstrate precipitation, gas evolution, electrolysis of water. 7b. Compare the mass of substances before and after a chemical change.	Baking soda and vinegar in a bag. Mass of reactants before = mass of products after.
8. Matter is made of tiny particles called atoms. Atoms are made of smaller particles called protons, neutrons, and electrons.	8. Identify the location, charges, and mass of the particles and relate that information to the periodic table.	8. Use manipulative objects to create models of atoms.	www.chem4kids.com
9. Solution properties depend on concentration and nature of the substances involved.	9. Identify the components of a solution, demonstrating the use of ratios and percents in preparing different concentrations of the solution, and compare the properties of different concentrations of the solution.	9. Mix four different concentrations of Jell-O solutions, reporting the ratios of the components, and compare the taste, viscosity, color, etc., of the four solutions.	
10. Chemical reactions can be represented by chemical equations which list the reactants and products.	10. Balance simple equations and name both the products and reactants.	10. Use various web sites to practice the process of balancing chemical equations.	http://richardbowles.tripod.com/chemistry/balance.htm; http://www.wakeforest.edu/~ylwong/balanceeq/balanceq.html
11. The organization of the periodic table is based on the properties of the elements and reflects the structure of atoms.	11. Locate elements on the periodic table and give information based on the location of the element.	11. Create a periodic table by applying the properties of elements to manipulative objects.	*Grab a Seat at the Periodic Table*, Laura Layton Strom, Scholastic, 2008

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B. Standard: Motion and Forces

The student will know:	The student will be able to:	Suggested Activities	Suggested Resources
1. The motion of an object can be described as a change in position, direction, and speed.	1. Use appropriate technologies to measure and compute the direction and magnitude of the forces causing the motions of common activities.	1. Describe the position, direction, and speed of a person in an elevator with respect to someone else in the elevator and with respect to someone on one floor of the building.	*Hands-On Minds-On Science Force and Motion,* Teacher Created Materials, Inc 1994
2. The motion of an object can be represented graphically in terms of direction, speed, or position over time.	2. Create and interpret a graph relating direction, speed, or position over time.	2. Determine the speeds of objects using measurements of distance and time. Compare the results numerically and graphically.	http://camillasenior.homestead.com/motion_graphs.pdf
3. Acceleration occurs when an object speeds up, slows down, or changes direction.	3. Explain how an object's acceleration is affected by outside forces and its mass.	3. Describe the acceleration of a race car as it runs the race course. Explain, in terms of outside forces, how an object may change its direction or acceleration.	http://www.stockcarscience.com

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4. The overall effect of many forces acting on an object at the same time is called net force, which determines the motion of the object.	4. Use technologies to determine the direction of acceleration and the net force of an object moving in a circle.	4a. Define and discuss the forces and acceleration involved when an object changes direction. 4b. Identify the forces involved and determine the net force of a person sitting in a chair. Predict what would happen if the forces were changed.	http://www.glenbrook.k12.il.us/GBSSCI/PHYS/CLASS/newtlaws/u2l2d.html
5. Whenever an object exerts a force on another, an equal but opposite force is exerted back on it.	5. Recognize and define the forces necessary for an object to move or be in equilibrium.	5. Using a model airplane, explain all forces that allow it to fly.	http://www.nasa.gov/audience/foreducators/topnav/materials/listbytype/757.Glider.Kit.html
6. Every object exerts a force on every other object. The magnitude depends on the masses of the objects and the distance between them.	6. Compare and describe the gravitational force between two objects.	6a. Explain, in terms of the forces involved, why a satellite orbits Earth. 6b. Compare the gravitational force of one object to another that has a mass 100 times greater.	http://www.christa.org/gravity.htm

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C. Standard: Transfer of Energy

The student will know:	The student will be able to:	Suggested Activities	Suggested Resources
1. Chemical, physical, and nuclear changes involve energy transfers.	1. Realize when any change in matter occurs a change in energy also occurs.	1. Investigate endothermic and exothermic reactions.	http://www.sciencenter.org/chemistry/
2. The electromagnetic spectrum consists of energy bands of visible and invisible wavelengths.	2. List and compare the different types of electromagnetic waves and relate them to daily activities.	2a. Show examples of X-rays. 2b. Discuss the benefits of sun screen. 2c. Explain how a microwave cooks food.	http://imagine.gsfc.nasa.gov/docs/science/know_l1/emspectrum.html
3. White light from the sun consists of a mixture of wavelengths and energies in the visible part of the electromagnetic spectrum.	3. List, in order, the wavelengths of visible light.	3. Shine light through a prism to break white light into the different colors.	http://science.hq.nasa.gov/kids/imagers/ems/visible.html
4. Applications and forms of potential and kinetic energy.	4. Use simple machines to demonstrate the conversion of kinetic to potential energy and vice versa.	4. Build and design roller coasters using marbles, pipe insulation and duct tape.	www.6flags.com
5. Energy travels through matter as waves.	5. Identify and label the different parts of the wave.	5. Use a spring toy to demonstrate how waves travel through an object.	http://www.kettering.edu/~drussell/Demos/waves/wavemotion.html

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6. Energy can be transferred as waves. The frequency and wavelengths of the waves are affected by the relative motion of the source and receiver.	6. Demonstrate energy transfers though the use of convection, conduction, and radiation. Understand Doppler Effect.	6. Boil water.	http://www.bbc.co.uk/schools/gcsebitesize/physics/energy/energytransferrev4.shtml; http://www.youtube.com/watch?v=3sAF1PqZn68
7. Energy is required to produce changes in matter and to do work.	7. When work is done energy is also transferred.	7. Build and design an energy transfer device.	www.rubegoldgerg.com
8. Compare and contrast series and parallel circuits.	8. Describe and construct a parallel and series circuit diagrams.	8. Construct parallel and series circuits.	http://www.youtube.com/watch?v=apHkG4T6QHM

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4. Strand: Life Science (NSES, IL 12, MO 3, 4)

A. Standard: Structure and Function in Living Systems

The student will know:	The student will be able to:	Suggested Activities	Suggested Resources
1. Organisms can be classified into kingdoms based on similarities and differences.	1. Develop and use a classification key that can be used to place common organisms into proper kingdoms.	1a. Sort a collection of objects, such as shoes, and create a dichotomous classification key for these objects. 1b. Dissect owl pellets.	*Simple Organisms in Action Bacteria: Viruses: Protists: Fungi*, Schlessinger Media; 4-volume set, Frey Scientific
2. Cells contain a set of structures called organelles that control the various functions of the cell.	2. Use appropriate technology to get a visual understanding of organelles; conduct investigations and research on the structure and function of various cell organelles.	2. View prepared slides of cells.	
3. In living systems, from cells to biosphere, components interact within a hierarchy of organizations.	3. Use a variety of technologies and resources to conduct inquiries into a living system.	3. Draw a pyramid of the organization of living systems.	
4. Energy is needed for living cells to carry out all the processes of life.	4. Design and conduct investigations and organize data, information, and ideas about how energy is needed for living cells to carry out all the processes of life.	4. Use a variety of seeds and plant in various classroom locations.	

5. Photosynthesis and cellular respiration are complementary processes.	5. Design and conduct investigations to determine what factors affect the processes of photosynthesis, anaerobic respiration, and aerobic respiration.	5. Perform an experiment using plant cuttings to investigate the processes of photosynthesis and respiration.	Glencoe Life Science Text 2005

B. Standard: Reproduction and Heredity

The student will know:	**The student will be able to:**	**Suggested Activities**	**Suggested Resources**
1. Each cell of a developing organism receives an exact copy of the genetic information contained in the fertilized egg.	1. Organize data, information, and ideas to explain the stages through which a fertilized egg or seed changes into its adult form.	1. Build a model of DNA using Kinex or other available material.	Kinex, toothpicks & colored marshmallows
2. In sexual reproduction, each gamete contributes a set of chromosomes to the offspring, giving it the traits of both parents.	2. Organize data, information, and ideas into a visual representation of the patterns and relationships involved in the chromosome contributions of gametes in sexual reproduction.	2. Draw models of the processes of mitosis & meiosis and label the various phases of each process.	
3. Chromosomes are components of cells that occur in pairs and carry hereditary information from one cell to its daughter cells and from a parent to its offspring.	3. Use models to demonstrate how genetic material is transmitted and how gene traits are expressed in offspring.	3. Use Punnett squares and pedigree charts to demonstrate how single gene traits are expressed in offspring.	http://www.phschool.com/atschool/sci_exp_lep/life_science/Student_Area/LS_SC4_ACT_index.html

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4. The sorting and combination of genes in sexual reproduction results in greater variety of possible gene combinations than in asexual reproduction that results in offspring genetically identical to the parent.	4. Present a visual representation of variation in offspring due to sexual reproduction and how asexual reproduction results in genetic clones of the parent.	4. Research traits of various animals and/or plants and make a frequency table of findings and communicate them to other students.	

C. Standard: Regulation and Behavior

The student will know:	**The student will be able to:**	**Suggested Activities**	**Suggested Resources**
1. How hormones function and how a feedback system works in the body.	1. Identify endocrine glands and the effects of the hormones they produce.	1. Label and list the main parts of the Endocrine system.	
2. The basic structure of a neuron and the differences of the central and peripheral nervous systems.	2. Describe the sensory receptors and how the sense organs respond to stimulus.	2. Perform an experiment improving reaction times.	
3. The differences between innate and learned behavior.	3. Explain how reflexes and instincts help organisms survive.	3. Observe earthworm behavior.	
4. The importance of social behavior and cyclic behavior.	4. Design and research different behavioral adaptations in living organisms that exhibit social and cyclic behaviors.	4. Investigate animal migration patterns and document the progression.	

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D. Standard: Populations and Ecosystems

The student will know:	The student will be able to:	Suggested Activities	Suggested Resources
1. A successful population can adapt to environmental changes through genetic variations.	1. Present ideas, opinions, and arguments in an organized and convincing way stating the differences and similarities between successful populations and their environments.	1. Conduct a natural selection simulation to demonstrate that a specific trait has selective advantage for an organism.	
2. Changes in populations are often, but not always, driven by gradual or catastrophic changes in environmental conditions.	2. Evaluate information, ideas, arguments, and products to determine patterns, relationships, perspectives, and credibility relating to changes in populations due to environmental conditions.	2. Observe and describe changes that occur during the development of animals. Explain how environmental factors could affect development.	
3. All organisms, including humans, are part of and depend on one global food web that begins with organisms at the bottom of the energy pyramid.	3. Apply the knowledge learned to describe examples of interacting organisms and classify them as beneficial, competitive, or detrimental to each other for survival.	3. Construct simple diagrams of food chains to trace the flow of matter and to categorize the organisms of the food chain according to the function they serve.	
4. Abstract concepts of global environment can be applied to complex interactions of the biotic and abiotic factors that affect populations and ecosystems.	4. Speculate on the environmental changes that would have global impact and discuss the mechanisms by which the changes become global.	4. Investigate the greenhouse effect and relate it to possible changes in the biosphere.	

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E. Standard: Diversity and Adaptations of Organisms

The student will know:	The student will be able to:	Suggested Activities	Suggested Resources
1. The study of fossil records and living organisms provides evidence of the appearance, diversification, and extinction of many life forms.	1. Organize information and data to demonstrate the appearance, diversification, and extinction of many life forms.	1. Create a timeline of the appearance and disappearance of different species in the fossil record.	
2. Each structure in an organism is uniquely adapted to a particular function for enhancing the ability of the organism to survive.	2. Design and conduct investigations and research on how an organism is uniquely adapted to a particular function for enhancing its ability to survive.	2. Research an organism and specify its adaptations over time.	
3. A species is an important biological grouping of organisms whose members have similar structures, normally interbred, and produce fertile offspring.	3. Review and revise the definition of a species in order to improve understanding and clarity and apply the definition to sample situations.	3. Compare and contrast different species within a genus.	
4. Natural selection is the process that ensures individuals with certain traits are more likely to survive and have offspring of the same species.	4. Research the evolutionary adaptations of a number of present-day organisms and explain how these adaptations contributed to the survival of the organisms.	4. View DVD and discuss; Debate project on cloning.	Unlocking the Mystery of Life; DVD, Illustra Media

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5. Strand: Earth and Space Science (NSES, IL 12, MO 3, 4)

A. Standard: Structure of the Earth System

The student will know:	The student will be able to:	Suggested Activities	Suggested Resources
1. The surface of the Earth has changes as a result of dynamic forces originating within the mantle. The physical evidence (faulting, volcanoes, folding of rock, etc.) of these constructive and destructive forces is associated with plate movement.	1. Conduct an investigation to develop and evaluate information and ideas concerning the theory of plate tectonics. Use landform models and maps to analyze the distribution of global features and geological phenomena such as volcanoes and earthquakes. Identify the physical evidence of how the surface of the earth changes through deformation, volcanic eruptions, deposition, weathering, and erosion.	1. Demonstrate how forces on materials cause wrinkles, folds, and faults. Plot the location of earthquakes, volcanoes, trenches, and oceanic ridges, to identify patterns of evidence of the existence of movement of crustal plates. Make rocks out of plaster to observe how they change after exposing them over time to different elements (running water, freezing, wind, etc.).	
2. Earth has four distinct physical spheres: geosphere, hydrosphere, atmosphere, and biosphere. Each has different compositions yet interfaces with each other.	2. Apply information about the measurements and concepts about the four spheres to develop a perspective on how they inter-relate.	2. Describe how soils influence the agricultural productivity and economy of the area. Construct a closed system terrarium with standing water and multiple life forms and make ongoing observations of the cycling of water and/or other substances.	

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3. There is economic value in Missouri resources, both above and below ground.	3. Reason inductively about Missouri's mineral deposits and their relationship to the economy and deductively about environmental concerns - past, present, and future.	3. Identify major resources in Missouri and their annual value from products (lead, iron, limestone, etc.). Compare and contrast present day maps, land images, and aerial photographs of Missouri to those of the past. Identify any changes that have occurred in the topography of Missouri and investigate reasons for the change.	
4. Rocks and minerals can be classified by their chemical and physical properties.	4. Conduct research using physical observation and chemical testing to classify a variety of rocks and minerals. Describe how rocks and minerals are formed.	4. Classify "mystery" rocks as either igneous, sedimentary, or metamorphic based on their color, texture, etc. Identify minerals using tests and observations to determine their hardness, color, luster, density, crystal shape, and cleavage and fracture.	Rock Cycle Activities; Rock and mineral almanacs
5. Surface and subsurface water replenish each other. Human activity and natural events can affect the quality of the supply.	5. Organize data, information, and ideas about human activity and natural events can affect the quality of the supply.	5. Observe bodies of water through field trips to infer how natural and human activity has impacted the area. Research how much water people use in one day by keeping water logs of personal water usage.	Missouri Stream Team

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6. Properties of soil and the hydrology of surface and groundwater have physical and cultural impact standpoint.	6. Conduct research to develop and evaluate information and ideas of the human impact on water resources. Design and conduct field or laboratory investigations to study types of soil; recognize how different types of soil lead to differences in drainage, percolation for septic systems, and groundwater quality.	6. Identify a source of contamination using a model designed to simulate groundwater testing methods and discuss challenges to locating and cleaning underground contamination. Identify a local watershed and determine the factors that influence the replenishment of the groundwater supply.
7. The water cycle is driven by energy transfer processes, such as convection and radiation, and is constantly changing the location and phase of water.	7. Exchange information, questions, and ideas with others to discuss the effects of energy transfer on the water cycle. Describe the process of cloud formation through the water cycle.	7. Construct a model to demonstrate the process of the water cycle. Design simple experiments to demonstrate the influence of wind and temperature on the hydrologic cycle.
8. Solar energy travels through space, is distributed on Earth by radiation, conduction, or convection, and powers atmospheric and oceanic circulation.	8. Explain how the transfer of energy by air and ocean currents regulate the physical environment of the earth.	8. Use weather maps to explore the relationship between atmospheric circulation and oceanic circulation on the temperatures of different parts of the world.

9. Weather is caused by changes in the atmosphere.	9. Conduct research into how the changes in the atmosphere affect the weather. Graph the percentages of gases and other particles that make up the atmosphere.	9. Keep a weather log recording different observable aspects of the weather (temperature, air pressure, cloud cover, wind speed and direction, etc.).	National Weather Service

B. Standard: Earth's History

The student will know:	The student will be able to:	Suggested Activities	Suggested Resources
1. Surface and subsurface rock and mineral deposits lead to the determination of age, origin, and events in Earth's history.	1. Use appropriate technology and other resources to locate, select, and organize information to determine relative age of mineral, rock, and soil samples or associated events that may have occurred.	1. Research how rock composition, layering, and physical structure reflect the geologic history of an area.	
2. Formation of layers of sedimentary rock and their associated fossils confirm the long history of Earth and its changing life forms.	2. Construct models and geological profiles to demonstrate the age relationship of sedimentary rock layers.	2. Analyze information from field research of a nearby road, cut, stream bank, or ditch to interpret the sequence of rock layering and relative age. Use sand, salt, and Epsom salts to make your own sandstone. Students can observe how sandstone is formed.	Making Sandstone Activity

3. The earth has changed overtime due to similar catastrophes and constructive and destructive forces throughout history.	3. Describe how the earth has changed through out history through natural forces.	3. Present a power point presentation exploring how the earth has changes over a specific period of time. Use US maps to observe landforms and river systems in certain areas.	

C. Standard: Earth in the Solar System

The student will know:	**The student will be able to:**	**Suggested Activities**	**Suggested Resources**
1. Earth rotates on tilted axis as it revolves around the sun causing sunlight to hit at different angles. The revolution and tilt produce seasonal variations in weather and climates.	1. Evaluate how revolution, rotation, and tilt of the earth influences the amount of sunlight that reaches the surface.	1. Build models to demonstrate and predict the seasons in different hemispheres of Earth at a given time. Chart this information and compare the results to weather patterns in Missouri throughout the year.	
2. Our solar system is part of the Milky Way Galaxy, one of many galaxies in the universe.	2. Use a variety of visual aids to locate the position of the solar system in the Milky Way. Locate the Earth within the Milky Way Galaxy.	2. Use photographs to approximate the location of the solar system in the Milky Way Galaxy. Build a model of the solar system.	

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3. The force of gravity determines the orbital patterns of celestial objects around the sun.	3. Conduct an investigation that demonstrates planetary orbits and apply the processes and knowledge learned to patterns within the solar system. Describe how tides are a result of the gravitational pull from the moon.	3. Make a model planet to simulate planetary orbit patterns. The planet can be made from string with different weighted washers. Use tide tables to note times of high tides and low tides each day for one week. Then predict the tide times for the next three days based on the results of their research.	US National Oceanic and Atmospheric Administration (NOAA) - tide predictor
4. Celestial objects possess both similarities and differences.	4. Use a variety of resources to compare and contrast the physical properties of planets.	4. Use NASA photographs and satellite images to compare the size and surface features of the planets and their moons. Create an itinerary of a space vacation that describes what will be seen at different stops along the way.	www.NASA.gov
5. Research associated with space exploration has resulted in technological advances that have affected the quality of life.	5. Identify common products that have developed as a result of research associated with space exploration.	5. Collaboratively make a list of everyday items that are spin-offs from the space program.	

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6. The universe is so large that its distances are expressed in special units (i.e., light years, astronomical units).	6. Use visual and mathematical aids to determine the approximate locations of stars in the constellations. Create a model in which the same scale is used to depict the distances between objects and calculate the time required to travel a direct path to them from the Earth. Interpret and evaluate information related to distances from our solar system to other points in our galaxy and the universe.	6. Design and construct a planetarium that models the constellations in the northern hemisphere. Use scale drawings to determine the distance between Earth and the moon. Explain how these methods can be used to estimate astronomical distances and how linear measurements convert to light years. Describe the relative sizes of the planets (as viewed from Earth) and their distances from the sun. Use triangulation to determine the distance between specific points on Earth. Explain how this method can be used to estimate astronomical distances.	Build a Solar System
7. A variety of technological tools are used to provide information concerning the physical properties and conditions of the solar system.	7. Discuss how information received from space probes has either confirmed or modified scientific theories concerning conditions on other planets	7. Select a space probe mission and research what type of information these robotic explorers have provided about solar system. Discuss how this information has either confirmed or modified scientific theories about other planets.	www.clcstlouis.org

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8. Most information about the universe comes from the electromagnetic spectrum.	8. Use an illustration of the electromagnetic spectrum to describe the relationship between wavelength, energy, and frequency.	8. Use full electromagnetic photograph to view objects in the sky to see a wide range of features and information.

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6. Strand: Science and Technology (NSES, IL 13, MO 8)

A. Standard: Abilities of Technology Design

The student will know:	The student will be able to:	Suggested Activities	Suggested Resources
1. Technological tools and other resources are used to locate, select, and organize information.	1. Use internet search engines and other research resources.	1. Compare and contrast availability and accessibility of a variety of resources for a specific topic. Prepare a research paper on a designated topic utilizing various research tools.	Yahoo.Com: Google; Selected Websites; Texts; Periodicals; Encyclopedias; Topic books
2. Measurements are made using appropriate instruments, including rulers, balances, scales, thermometers, graduated cylinders, and stop watches.	2. Use instruments correctly to take measurements.	2. Design a variety of investigations aimed at taking precise measurements with each tool. Chart and graph results.	Utilize objects in the environment to measure using the appropriate instrument.
3. Magnifying instruments are used to view small and far away objects in more detail and clarity.	3. Describe, select and tell how to use magnifying instruments like hand lenses, microscopes, and ground and space telescopes.	3. View small objects using hand lenses and microscopes; record observations. Take a field trip to Science Center or observatory.	St. Louis Science Center

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B. Standard: Understandings about Science and Technology

The student will know:	The student will be able to:	Suggested Activities	Suggested Resources
1. Data can be represented and interpreted through the use of technology.	1. Analyze and share data using tools such as calculators and computers.	1a. Prepare charts, graphs and graphic organizers of data from experiments and investigations. 1b. Calculate mean, mode, and median of raw data.	Computer software programs and/or websites for creating charts, graphs, graphic organizers
2. Needs, attitudes, and values influence and direct technological development in various cultures.	2. Evaluate and describe present and projected uses of and needs for technologies in different cultures and subcultures.	2. Analyze the features of standard of living for specific cultures (i.e. GNP, population density, compulsory education mandates, etc.); determine present and projected needs for technology.	World Almanac Internet
3. Decisions made to develop and use technologies often lead to competition between environmental and economic concerns.	3. Present information on the problems and goals of business interest and of environmental concerns.	3. Debate the environmental and economic pros and cons of the development and uses of alternative sources of energy.	Internet Library

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7. Strand: Science in Personal and Social Perspectives (NSES, IL 12, MO 8)

A. Standard: Personal Health

The student will know:	The student will be able to:	Suggested Activities	Suggested Resources
1. The importance of maintaining and improving physical and mental health through physical fitness.	1. Describe the importance of personal exercise as a foundation of physical fitness and list the benefits of being physically fit.	1. Design a workout regime for a week of activity.	
2. The existence of hazards and potential for accidents imposes a need for injury prevention.	2. Identify hazards and potential accidents in their environment in order to develop plans that involve the use of safety precautions and proper decision making.	2. Develop a plan for fire safety and prevention in their own home.	State Farm Fire Safety in the Home
3. The psychological and physical effects that tobacco, drugs, and alcohol have on the human body.	3. Research the effects that smoking and chewing tobacco, substance abuse, and alcoholism has on a person and the people around them physically and socially.	3. Presentation by a guest speaker on the effects that tobacco, alcohol, and drugs have on the body.	DARE

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4. Proper nutrition is essential for development and growth of the human body.	4. Describe what requirements need to be met to nourish our bodies through the food we eat. Compare and contrast a healthy diet with an unhealthy diet.	4a. Design a menu for a days worth of meals based on the food pyramid and caloric intake. 4b. Demonstrate how much sugar a person can intake in a day through the what they drink and eat by converting the grams of sugar from soda, juices, candies, etc., into teaspoons (4 grams = about 1 tsp.)	www.mypyramid.com
5. The sex drive is a God-given function that requires understanding.	5. Acknowledge that abstinence is the only sure way to prevent pregnancy and the spread of disease.	5. Make a pamphlet on the adverse effects of an STD.	
6. Natural environments may contain harmful substances.	6. Organize data regarding environmental health issues and regulations involving soil, water, and air.	6a. Perform soil and water tests in a local area and test them for different substances. Use Project Wet's Poison Pump Activity to show how contaminants can travel through water. 6b. Make a water filter to see how water treatment plants work and regulate their water.	Project Wet

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B. Standard: Populations, Resources and Environment

The student will know:	The student will be able to:	Suggested Activities	Suggested Resources
1. Population increases and decreases can affect the environment and natural resources.	1. Compare and contrast how environmental degradation and resource depletion vary from region to region and country to country.	1. Use maps of several different regions from the US to organize data from those regions into a chart or graph to show how population has an effect on the environment and natural resources over a certain period of time.	

C. Standard: Natural Hazards

The student will know:	The student will be able to:	Suggested Activities	Suggested Resources
1. Natural hazards are caused by internal and external processes of the earth system.	1. Use models to determine how natural hazards (earthquakes, landslides, wildfires, volcanic eruptions, floods, storms, and impact of asteroids) affect property, habitats, people, and animals.	1. Make a power point presentation on a specific natural disaster explaining how the area and living organisms were affected. Participate in a natural disaster simulation earthquake (or other natural disaster).	
2. Research how human interaction with the environment can induce some hazards and increase the risk of others.	2. Design ways for humans to reduce the risks of natural hazards through looking at land-use, waste disposal, urban growth, and use of natural resources.	2. Field trip to the Lock and Dam in Alton to explore their Great Rivers Museum to explore how water is affected by us.	National Great Rivers Museum, Alton, IL

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D. Standard: Risks and Benefits

The student will know:	The student will be able to:	Suggested Activities	Suggested Resources
1. Risk analysis keeps in mind the type of hazard and estimates the numbers of people to be effected.	1. Determine options for reducing or eliminating risks within their homes and schools.	1. Plan a fire escape route for their families in their own homes.	
2. There are risks associated with natural, chemical, biological, social, and personal hazards.	2. Categorize certain risks into the categories they fall under.	2. Make a brochure on one of many types of hazards (natural, chemical, biological, social, or personal). Include how to avoid those hazards and what to do if you come into contact with that risk.	
3. That they can use a systematic approach to thinking critically about risks and benefits.	3. Design and compare different proposals of a situation evaluating the risks and benefits.	3. Students can work collaboratively on a policy issue (i.e. local, state, federal).	Project Citizen
4. Important personal and social decisions are made based on perceptions of benefits and risks.	4. Develop an understanding of risks and benefits.	4. Give students a situation in which they need to decide what risks and benefits are involved.	

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E. Standard: Science and Technology in Society

The student will know:	The student will be able to:	Suggested Activities	Suggested Resources
1. Science influences society through its knowledge and world view.	1. List ways that science influences individuals in society through the way they think about themselves, others, and the environment.	1. Interview people about what they think about different scientific issues.	
2. Scientific research is the result of changes within society.	2. Research how the priorities of society and funding influence scientific research.	2. Research a scientific cause that needs funding and raise funds for that cause.	
3. Technology influences society through its products and processes.	3. Explain how technology changes with social, political, and economic changes.	3a. Compare and contrast how people communicated with one another 20 years ago with how they communicate with one another today. 3b. Make a list of the pros and cons of each. 3c. Develop a timeline for one technological invention describing how its changes are a result of social needs.	
4. Advancements in science and technology are the result of contributions from various people from different time periods and cultures.	4. Understand that science and technology have evolved through the contributions of people throughout history.	4. Have students research different benefactors of science through websites having them put together a power point presentation about them.	

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5. Scientists and engineers work in many different settings.	5. Describe different jobs or positions that a scientist or engineer could have in society.	5. Have a scientist as a guest speaker to explain and describe what they do in their job.
6. Ethical codes are in place to keep humans informed and property safe.	6. Relate what ethical codes are and how they are used in the medical and scientific world.	6. Hold student debates on specific issues of ethics within the medical community.
7. Science cannot answer all questions and technology cannot solve all human problems or meet all human needs.	7. Communicate the limitations that science and technology have in their lives.	7. Write a journal entry on what their life would be like if they were to not have science and technology in their lives.

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8. Strand: History and Nature of Science (NSES, IL 13)

A. Standard: Science as a Human Endeavor

The student will know:	The student will be able to:	Suggested Activities	Suggested Resources
1. Women and men of various social and ethnic backgrounds, and with diverse interests, abilities, talents, qualities, and motivations, engage in the activities of science. Some scientists work in teams, and some work alone, but all communicate extensively with others.	1. Identify different professions and relate those professions to a specific area of science.	1. Have students research several different careers and identify the type or types of science involved with that career.	www.careerbuilder.com
2. Science is very much a human endeavor, and the work of science relies on basic human qualities, such as reasoning, insight, energy, skill, and creativity--as well as on scientific habits of mind, such as intellectual honesty, tolerance of ambiguity, skepticism, and openness to new ideas.	2. Use basic human qualities and scientific habits to analyze and solve scientific problems.	2. Perform activities and investigations where students create their own lab based on a question or observation.	

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B. Standard: Nature of Science

The student will know:	The student will be able to:	Suggested Activities	Suggested Resources
1. The steps of the scientific method and how they are applied.	1. Use the scientific method in order to solve problems.	1. Use the scientific method to test an observation. (Why is the sky blue?)	www.sciencebuddies.org
2. Scientists often have conflicting theories and results. Scientists analyze these differences to eliminate mistakes in process or conclusion.	2. Compare results with others to determine the validity and accuracy of their results.	2. Test the speed of different toy cars on the same track. Have students compare results to determine why a particular car was faster or slower than the others.	http://homepage.mac.com/richtherrn/physics/carlab.pdf

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C. Standard: History of Science

The student will know:	The student will be able to:	Suggested Activities	Suggested Resources
1. Many individuals have contributed to the traditions of science.	1. Study some of these individuals to provide further understanding of scientific inquiry, science as a human endeavor, the nature of science, and the relationships between science and society.	1. Research/presentation on a specific scientist and their contribution to society.	
2. In historical perspective, science has been practiced by different individuals in different cultures. In looking at the history of many peoples, one finds that scientists and engineers of high achievement are considered to be among the most valued contributors to their culture.	2. Recognize the impact that historical scientists have had on society in the past, present, and will have in the future.	2. Research a Nobel Prize winning scientist, and detail how that scientist is perceived today in the scientific community.	www.nobelprize.org www.almaz.com
3. Tracing the history of science can show how difficult it was for scientific innovators to break through the accepted ideas of their time to reach the conclusions that we currently take for granted.	3. Explain how a present commonly accepted scientific concept, originated from a completely different concept. Recognize how the scientist's new concept was received (i.e. geocentric/ heliocentric models of the solar system, flat/round Earth).	3. Create a timeline detailing the development of atomic theory from Democritus to Dalton to today.	http://hi.fi.tripod.com/timeline/timeline.htm