

**LESA
Science Curriculum
2008**

1. Strand: Unifying Concepts and Processes	(NSES, IL 12)
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A. Standard: Systems, Order, and Organization

<u>The student will know:</u>	<u>The student will be able to:</u>	<u>Suggested Activities</u>	<u>Suggested Resources</u>
1. Living things can be classified.	1. Group living things based on common characteristics.	1a. Study a collection of leaves and group them according to common characteristics. 1b. Study a collection of animal pictures and group them according to common characteristics.	www.mobot.com (Missouri Botanical Gardens, magazines) www.stlzoo.org (St. Louis Zoo), magazines
2. The levels of organization of living things.	2. Distinguish between cells, tissues, organs, and systems and organisms.	2a. Explore both animal and plant cells under a microscope. 2b. List examples of tissues, organs, systems, and organisms.	www.microscope-microscope.org/basic/preparing-microscope-slides.htm health or science textbook

B. Standard: Evidence, Model, and Explanation

<u>The student will know:</u>	<u>The student will be able to:</u>	<u>Suggested Activities</u>	<u>Suggested Resources</u>
1. Know that models can be used to represent things that are either too big or too small to handle.	1. Create models or drawings to represent real world items.	1a. Construct or draw models of plant and animal cells. 1b. Construct models of planets.	websites on building cell models www.nasa.gov books on planets

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C. Standard: Change, Constancy, and Measurement

The student will know:

1. That the metric system is used to measure the properties of matter.
2. That thermometers can be used to measure changes in temperature.

The student will be able to:

1. Use the metric system (liter, meters, grams) to measure the properties of matter.
2. Use a thermometer to measure degrees Celsius.

Suggested Activities

1. Use a balance, meter stick, and graduated cylinder to measure items set out by the teacher.
2. Record daily or hourly temperatures.

Suggested Resources

E. Standard: Form and Function

The student will know:

1. Organisms that survive in an environment have developed adaptations that allow the organisms to compete for available resources and cope with the physical conditions of their environment.

The student will be able to:

1. Identify positive adaptations of organisms to a given environment that increases chances of survival.

Suggested Activities

1. Observe a variety of plants and animals in an area. Identify the features of these organisms that make them suitable for that habitat.

Suggested Resources

St. Louis Zoo; Missouri Botanical Gardens; local watersheds or ponds

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2. Strand: Science As Inquiry	(NSES, IL 11, MO 7)
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A. Standard: Abilities Necessary to Do Scientific Inquiry

<u>The student will know:</u>	<u>The student will be able to:</u>	<u>Suggested Activities</u>	<u>Suggested Resources</u>
1. What is a hypothesis and its importance in the scientific method.	1. Form a hypothesis for a given question.	1. From a list of questions provided by the teacher, the student will form a hypothesis and explain their reasoning behind the hypothesis.	Sample Questions www.mpsvt.org/msms/sfair/sfquestions.html
2. How to measure length, mass, capacity, and temperature.	2a. Use a meter stick to measure the length of an object. 2b. Use a balance to measure the mass of an object. 2c. Use a graduated cylinder to measure the capacity of an object. 2d. Use a thermometer to measure temperature.	2a. Use a meter stick to measure the length of selected objects in the classroom. 2b. Use a balance to measure the mass of items selected by the teacher. 2c. Use a graduated cylinder to measure the capacity of objects selected by the teacher. 2d. Use a thermometer to measure the temperature of teacher selected locations.	

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3. That accurate gathering of data is important to the scientific method.

3. Explain how inaccurate data can lead to inaccurate conclusions.

3. Students measure partner's height in centimeters. Discuss the implications of mislabeling the data as inches.

4. The importance of displaying data in a usable format.

4. Display data in tables and graphs.

4a. Using the raw data on student height, make an organized table to display the information.

4b. Using the raw data on student height, make a bar graph to display the information.

5. Microscopes can increase our ability to observe small objects.

5a. Identify and properly use the parts of a microscope.

5a. After teacher demonstration, students will label a diagram of the parts of a microscope.

www.enchantedlearning.com/devises/microscope/label/index.shtml

5b. Use a low-power microscope to closely observe small objects.

5b. Make observations using a microscope and discuss their observations.

[www.microscopeworld.com/MWorld/low microscope ideas.aspx](http://www.microscopeworld.com/MWorld/low_microscope_ideas.aspx)

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B. Standard: Understandings about Scientific Inquiry

The student will know:

1. The steps involved in the scientific method.

The student will be able to:

1. Apply the steps of the scientific method while conducting an experiment.

Suggested Activities

1. As a class answer the question: "Which gender has better short-term memory?" Discuss and form a hypothesis. Have individual students repeat a spoken random number string, adding one digit each time. Record the longest string accurately repeated by every student. Organize the data by gender, build a bar graph of average digits remembered, and form a conclusion.

Suggested Resources

www.enchantedlearning.com/graphicorganizers/scientificmethod/index.shtml

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3. Strand: Physical Science

(NSES , IL 12, MO 1, 2)

A. Standard: Properties of Objects and Materials

The student will know:

1. Different types of matter conduct heat at different rates.

2. Different materials have different electrical resistance. Resistance converts electrical energy into heat energy.

3. Substances can occur either in pure form or as a mixture.

The student will be able to:

1. Identify characteristics of conductive materials and insulative materials.

2. Explain the characteristics of a substance that makes it a good conductor or insulator.

3a. Predict the properties of a mixture given the concentration of ingredients.

Suggested Activities

1. Investigate different materials used to make cups to determine which are good conductors of heat and which are good insulators.

2. Use various materials in a simple circuit to show the difference between conductors and insulators and compare the efficiency of electrical conductors.

3a. Prepare different concentrations of Kool-Aid, Jell-O, etc. Observe and compare differences in the properties of these mixtures to the concentrations used.

Suggested Resources

[www.Sciencecompanion.com/files/curriculum/samples/MiniModule%203-5%20Electrical%](http://www.Sciencecompanion.com/files/curriculum/samples/MiniModule%203-5%20Electrical%20)

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	3b. Identify the factors that determine the choice of materials for a particular purpose.	3b. Investigate the properties of materials that make them useful for a given purpose in the real world. Use this knowledge to design a common object to solve a problem (types of clothing, furniture, etc.).	textbook
4. Physical properties of matter can change.	4a. Use magnifiers, measuring tools, and other technology to identify the properties of matter or objects.	4a. Inspect and describe the physical characteristics of salt, flour, sugar, etc. Expand the description by using magnification.	
	4b. Select and apply strategies to change matter by heating or cooling. Predict what changes will occur	4b. Investigate how much energy it takes to change water to ice or water vapor.	www.macmillanmh.com/science/2008/student/na/grade4/g4_ch10.html (Science in Motion)
	4c. Observe and describe the effects of the environment on a variety of objects (dissolving, weathering, shrinking, melting, rusting, etc.).	4c. Observe the long-term effects of the environment on a block of salt, a patch of snow, an exposed piece of iron, etc. and describe the changes.	www.chem4kids.com/files/matter_intro.html

B. Standard: Position and Motion of Objects

The student will know:

1. An object's motion can be described in terms of another object (e.g., faster, slower) and how its position changes over time.

The student will be able to:

1. Compare one object's position and motion relative to another object.

Suggested Activities

1. Use wind-up cars to describe an object's motion and position relative to a fixed point and relative to another moving object.

Suggested Resources

www.school-for-champions.com/science/motion.htm

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C. Standard: Light, Heat, Electricity, and Magnetism

The student will know:

1. Electricity can be converted into light, heat, sound, magnetism, or mechanical motion.

2. Forces can be mechanical, gravitational, magnetic, or electrostatic.

The student will be able to:

1. Apply knowledge of simple circuits to create a new circuit that involves more components.

2a. Demonstrate the force of gravity by using a scale.

2b. Design and conduct inquiries to study the effects of an electrostatic force on the motion of an object.

2c. Demonstrate and investigate magnetic force fields.

Suggested Activities

1. Use the battery, wires, and a light (or motor or buzzer) to demonstrate the requirements for a complete circuit. Observe the effect of interrupting the circuit.

2a. Prepare a demonstration using a scale to measure the effects of gravity on common objects.

2b. Use a comb and pieces of paper or a balloon to demonstrate electrostatic force.

2c. Use a bar magnet and iron filings in a plastic bag to demonstrate a force field. Sketch the field lines.

Suggested Resources

www.eduplace.com/science/hmxs/ps/mode1/sections/sect2.html

textbook

www.school-for-champions.com/science/static.htm

Wooly Willy toy

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4. Strand: Life Science

(NSES, IL 12, MO 3, 4)

A. Standard: Characteristics of Organisms

The student will know:

1. Organisms are composed of parts that work together and exhibit behaviors that ensure the survival of the whole organism.

2. Plants and animals are alive and have characteristics that make them different from non-living matter.

3. Fossils provide evidence of plants and animals that lived long ago and the environment in which they lived.

The student will be able to:

1. Discover and evaluate patterns and relationships between the parts of organisms that work together and the behaviors that ensure the survival of the whole organism.

2. Identify characteristics that determine whether an object or material is living or non-living and apply that knowledge to unknown samples.

3. Plan and make a written, oral, and visual presentation about the natural history of our state based on evidence of fossils found in Missouri or Illinois.

Suggested Activities

1. Observe and record the behaviors of plants under a variety of conditions (e.g., changes in light, water, composition of soil, and use of fertilizers) and relate the observation to the plant's requirements for survival.

2. Describe how a turtle and a tree differ from a rock. List these characteristics and identify the similarities and differences that exist.

3a. Compare and contrast the Missouri or Illinois environment of today to that of long ago through fossil evidence.

3b. Compare the similarities and differences between fossils and living organisms. Ask reasonable questions about those comparisons.

Suggested Resources

www.mbgnet.net/bioplants/ada pt.html

www.school.discoveryeducation.com/lessonplans/programs/livingthing/

www.statefossils.com:
www.lakeneosho.org/MissouriFossilsMenu.html

www.rom.on.ca/schools/fossils/game.php

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4. Fossils give evidence that organisms that lived in the past were both similar to and different from present-day organisms.

4. Design and conduct investigations to observe similarities and differences in fossils as compared to present day organisms and develop reasonable questions that would account for the differences.

4a. Observe and compare the similarities and differences between fossils and common present-day organisms.

4b. Make plaster casts of present-day objects (shells, plants) and observe the similarities and differences between the fossil and the actual object.

www.nps.gov/archive/badl/teacher/fossils.htm

B. Standard: Life Cycles of Organisms

The student will know:

1. The stages of complete and incomplete metamorphosis.

2. An organism's life cycle follows the pattern of birth, growth, reproduction, and death.

The student will be able to:

1. List the stages of complete and incomplete metamorphosis.

2. Identify the stages of the life cycle in various animals.

Suggested Activities

1. Supply students with photos and labels of insects at each stage of metamorphosis. They will arrange the photos in the correct order with the correct labels.

2. Make a poster showing the life cycle of a frog (birth, growth, reproduction, death).

Suggested Resources

www.eduplace.com/science/sla/tg/3/insect_tg.html;
www.pmsd.k12.pa.us/showcase/butterfly/video/butterfly.mov

video.nationalgeographic.com/video/player/animals/amphibians-animals/frogs-and-toads/frog_tadpole_development.html

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C. Standard: Organisms and Environments

The student will know:

1. Behavior patterns and survival of organisms result from their interactions with a specific environment.

2. Organisms that survive in an environment have developed adaptations that allow the organisms to compete for available resources and cope with the physical conditions of their environment.

The student will be able to:

1a. Predict how specific changes in the environment will affect people and other organisms found in this environment.

1b. Identify behavior and physical adaptations that help organisms adapt to changing conditions.

1c. Identify the physical attributes and behavior of living organisms that enable them to survive.

2. Identify positive adaptations of organisms to a given environment that increase chances for survival.

Suggested Activities

1a. Plan and conduct simple investigations to explore how modifications in soil, water, and sunlight affect the growth and survival of a plant.

1b. Explain how humans and animals are effected by temperature, rainfall, violent storms, earthquakes, floods, etc., and how they adapt. Make a chart with three columns: Changing Conditions, Effect, Means of Adapting.

1c. Investigate and describe the habitat of a bird of prey. Identify physical attributes and behaviors of the bird that enable it to survive in its environment.

2. Observe a variety of local plants and animals in an area. Identify the features of these organisms that make them suitable for that habitat.

Suggested Resources

[www.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/agic7061/\\$FILE/conditional_soil.pdf](http://www.agric.gov.ab.ca/$department/deptdocs.nsf/all/agic7061/$FILE/conditional_soil.pdf)

Video: [Ultimate Guide to Birds of Prey](#) (Discovery)

rla.sd81.bc.ca/~science03/prim-science/4/adaptations.html
www.macmillanmh.com/science/2008/student/na/grade4/g4+c h4.html(go to Adaptation of a Desert Plant)

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5. Strand: Earth and Space Science (NSES, IL 12, MO 5, 6)

A. Standard: Properties of Earth Materials

<u>The student will know:</u>	<u>The student will be able to:</u>	<u>Suggested Activities</u>	<u>Suggested Resources</u>
1. Soil composition varies from location to location and affects the type of plants that grow in that location.	1. Use technological tools and other resources to identify types of soil and the plants that grow well in them.	1. Create and conduct a simple investigation to determine what plants will grow best in different kinds of soil.	web.ukonline.co.uk/fred.moor/soil/formed.f0107.htm ; http://ezinearticles.com/?Finding-Plants-That-Will-Survive-In-Your-Soil-Type&id=657988
2. Rocks, minerals, and soil have physical characteristics by which they can be classified.	2. Classify rocks, minerals, and soils according to their physical characteristics.	2. Classify a given group of rocks according to color, size, weight, texture, density, and size of crystals.	http://astlc.ua.edu/lessonplans/Lrocks.htm ;
3. That water exists on the earth as usable (fresh water) and non-usable (frozen, salt).	3. Distinguish between the locations of each type of water.	3. Create a color-coded map to show the location of usable and non-usable water on Earth.	www.watercan.com/h2oh/2-6.shtml

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B. Standard: Objects in the Sky

The student will know:

1. The motion and positions of objects in the solar system are observable phenomena that can be explained.

2. Our solar system is a group of planets and asteroids that revolve around the sun.

3. The Earth and planets revolve around the sun causing the seasons.

4. The rotation of the earth causes day and night.

The student will be able to:

1. Evaluate information about the motion and position of Earth, moon, and sun to determine the patterns that give us our day, month, year, moon phases, and eclipses.

2. Identify characteristics of the inner and outer planets of our solar system.

3. Identify the relationship between the Earth's revolution and the seasons.

4. Explain how the Earth's rotation causes day and night.

Suggested Activities

1. Demonstrate the positions and motions of the sun, moon, and Earth to explain moon phases, solar eclipse, and moon eclipse.

2. Use information from the science text, reference books, and websites to design a travel brochure advertising tours to visit the planets.

3. Demonstrate the revolution of the earth around the sun and explain how that causes the seasons.

4. Use a globe and a light source to demonstrate how Earth's rotation causes day and night.

Suggested Resources

www.enchantedlearning.com

nasa.gov;
www.nineplanets.org

[www.classzone.com/books/earth_science/terc/content/visualizations/es0408page01.cfm?chapter_no=04;](http://www.classzone.com/books/earth_science/terc/content/visualizations/es0408page01.cfm?chapter_no=04)
www.windows.ucar.edu/tour/link=/the_universe/uts/earth3.html&edu=elem

www.windows.usar.edu/tour/link=/the_universe/uts/earth?.html

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C. Standard: Changes in Earth and Sky

The student will know:

1. That weathering, erosion, and deposition change the surface of the earth.

2. Earth's surface features are continually changing.

The student will be able to:

1. Identify examples and causes of weathering, erosion, and deposition.

2. Select and apply problem-solving strategies using prior knowledge and experiences to show how and where Earth's surface is continually changing.

Suggested Activities

1a. Do an online image search to locate pictures of weathered rock. Then explain the cause of the weathering.

1b. Put a mound of sand in a cake pan. Simulate rain on the sand. Observe the erosion of the sand from the running water and its deposition on the bottom of the sand pile.

2a. Use globes and maps to identify major geological features. Compare Missouri or Illinois features to those in other states.

2b. Choose a local area that has undergone changes due to erosion, wind, or plant/animal/human activity. Identify these changes as slow or rapid.

Suggested Resources

search engines

oregonstate.edu/precollege/GK12/Activities/ACT_EnvironStudies/ENVIRON_68_SoilAndErosion/SoilAndErosion.html

www.isgs.uiuc.edu;
www.nrcs.usda.gov

www.nrcs.usda.gov

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3. That winds are formed when warm air rises and cooler air moves into its place.

3. Explain that warm air is less dense than cold air which causes it to rise.

3. Construct and fly a model of a hot air balloon.

www.concord.org/~btinker/workbench_web/unit/1-01HotAirBalloons.html;
www.thenakedscientists.com/HTML/content/kitchenscience/exp/build-a-hot-air-balloon/;
www.inventorscolony.com/balloon/

4. That clouds form when warm air evaporates, rises, and cools, which allows the water vapor to condense.

4. Explain cloud formation in terms of evaporation and condensation.

4. Create a cloud in a jar using the principles of cloud formation.

www.windows.ucar.edu/tour/link=/teacher_resources/3clouds_edu.html;
www.rever.com/video/357000/cloud-formation/

5. That different types of clouds signify different weather conditions.

5. Identify the weather conditions that typically accompany cumulus, cumulonimbus, cirrus, and stratus clouds.

5. Over a period of five days, students will record daily cloud type and weather conditions.

www.uen.org/Lessonplan/preview.cgi?Lpid=10089;
[Video:Weather Fundamentals:Clouds \(Schlessinger Science Library\)www.libraryvideo.com](http://www.libraryvideo.com/Video:WeatherFundamentals:Clouds(SchlessingerScienceLibrary)www.libraryvideo.com)

6. That barometric pressure, temperature, precipitation, and wind speed are important in measuring and predicting the weather.

6. Use a barometer, thermometer, rain gauge, and anemometer to measure and predict weather patterns.

6. Make and use a weather station that includes a thermometer, rain gauge, anemometer, and barometer.

www.flinnsci.com/Documents/demoPDFs/EarthSci/ES10389.pdf;
www.wikihow.com/Make-a-Simple-Weather-Barometer;
www.fi.edu/weather/todo/r-gauge.html

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6. Strand: Science and Technology

(NSES, IL 13, MO 8)

B. Standard: Understands about Science and Technology

The student will know:

1. Problems can often be solved by physically altering specific components of mechanical or biological systems and observing the consequences.

2. Technological solutions to problems often have drawbacks as well as benefits.

The student will be able to:

1. Select and apply appropriate technology and common materials for construction and repair of simple things and make safe electrical connections with various electrical devices for the purpose of solving a problem or performing a task.

2. Predict possible negative consequences to people, other organisms, or the environment, if technological solutions to specific problems.

Suggested Activities

1. Construct a "doorbell" for people with hearing impairment using wires, batteries, bulbs, etc.

2. Considering a specific technological solution to a problem, such as controlling insects in farm crops, list possible alternative solutions and drawbacks of each.

Suggested Resources

www.eduplace.com/science/hmxs/ps/mode1/sections/sect2.html

schoolipm.ifas.ufl.edu/techp10.htm;
www2.mcdaniel.edu/Biology/e/h01/pesticides/pro,cons_of_pesticides.html

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

<u>The student will know:</u>	<u>The student will be able to:</u>	<u>Suggested Activities</u>	<u>Suggested Resources</u>
1. Proper principles and practices of good health.	1a. Make healthy choices in personal nutrition.	1a. Fill in a blank food pyramid with pictures of food in each group, their nutritional value, and the correct number of servings per day.	www.nationaldairycouncil.org; http://teamnutrition.usda.gov/resources/mpk_coloring.pdf ;
	1b. Make healthy choices in personal hygiene.	1b. Make a class presentation about a food found in one of the food groups. Persuade the class to eat that food by giving facts about its origin and nutritional value.	http://www.educationworld.com/a_lesson/lesson/lesson054.shtml
	1c. Make healthy choices in personal fitness and exercise practices.	1c. After touching objects in the room and their own face and hair, students will rub their hands on a piece of bread. Seal the bread for several days and observe the mold that will appear.	http://www.health.state.mn.us/handhygiene/curricula/curriculumumsos.pdf
		1d. Students will walk/run each day and keep track of the miles traveled each week. They will then trace their route on a map of the United States to show their progress across the country.	http://www.teacher.com/lesson/health/fitness/walkamerica/html

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2. The names and functions of the respiratory, circulatory, and digestive systems of the human body.

2a. Name the parts and function of the respiratory system

2a. Build a model of the respiratory system and explain the function of each organ.

http://www.lung.ca/children/grades4_6/respiratory/index.html;

<http://www.adprima.com/sci-respsystem.htm>

2b. Name the parts and function of the digestive system.

2b. Act out what happens to food in the digestive system and explain each step.

<http://www.sites4teachers.com/links/redirect.php?url=http://www.pecentral.org/lessonideas/health/health/p.asp>

2c. Name the parts and function of the circulatory system.

2c. Create a travel brochure for a trip through the circulatory system.

http://www.education-world.com/a_lesson/01-1/lp222_01.shtml

B. Standard: Types of Resources

The student will know:

1. That natural resources can be renewable and nonrenewable.

2. That people need natural resources to survive.

The student will be able to:

1. Distinguish between renewable and nonrenewable resources.

2. Name natural resources used by humans.

Suggested Activities

1. Make a list renewable and nonrenewable resources and explain why they were placed in each category.

2. Make a chart listing products and the natural resources used in making them.

Suggested Resources

<http://sftrc.cas.psu.edu/LessonPlans/Forestry/ForestsAre.html>

<http://www.nashvillefossils.com/resources/pages/uses.html>

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C. Standard: Changes in the Environment

The student will know:

1. Changes in an environment caused naturally or by humans, can be beneficial or harmful to the organisms living in that environment.

2. Conservation of natural resources is important to the future of our planet.

The student will be able to:

1. Identify changes in an environment as beneficial or harmful.

2a. Identify ways to conserve natural resources.

2b. Conserve paper by recycling used paper.

Suggested Activities

1a. Research and report on an endangered animal telling about the animal, its habitat, and how changes in its habitat have had an effect on the population.
1b. Conduct a pond study over a longer period of time. Observe the habitat, write their observations, and include photos of any changes.

2a. Make a list of ways to conserve energy at home, at school, and in the community.

2b. Make new paper out of scraps collected in the classroom.

Suggested Resources

library.thinkquest.org/2878/

<http://www.psd267/wednet.edu/~kfranz/science/WaterHabitat/waterhabitat.htm>

http://www.alliantenergykids.com/stellent2/groups/public/documents/pub/pnk_tp_ec_001523.hcsp
www.make-stuff.com/recycling/paper.html

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8. Strand: History and Nature of Science	(NSES, IL 13)
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A. Standard: Science as a Human Endeavor

<u>The student will know:</u>	<u>The student will be able to:</u>	<u>Suggested Activities</u>	<u>Suggested Resources</u>
1. That scientific inventions have had an impact on our world.	1. Identify inventions and how they have impacted the world.	1. Create an invention museum in the classroom. Include the invention, inventor, and how the invention changed the world.	www.infoplease.com/ipa/A0004637.html
2. There are many possible careers in the field of science.	2. Explain what different scientists do in their jobs.	2. Research and report on one scientist and his/her career.	http://www.pbs.org/safarchive/s/5_cool/53_career.html