

**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 according to common characteristics.	1. Group animals according to their traits.	1. Classify a variety of animals as vertebrates and invertebrates. Organize vertebrates into the five major groups (mammals, reptiles, amphibians, birds, and fish).	<i>The Magic School Bus Gets Cold Feet: A Book About Hot- and Cold-Blooded Animals</i> St. Louis Zoo - Vertebrates Class

B. Standard: Evidence, Models, and Explanations

<u>The student will know:</u>	<u>The student will be able to:</u>	<u>Suggested Activities</u>	<u>Suggested Resources</u>
1. That models can be used to represent things that are either too big or too small.	1. Create models or drawings that represent real world items.	1. Construct models of planets/solar systems.	

C. Standard: Change, Constancy, and Measurement

<u>The student will know:</u>	<u>The student will be able to:</u>	<u>Suggested Activities</u>	<u>Suggested Resources</u>
1. Clocks and stopwatches can be used to measure elapsed time.	1. Use a timing device to measure elapsed time during an activity.	1. Estimate the time it takes to run a certain distance. Use a stopwatch to check the estimation.	

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E. Standard: Form and Function

The student will know:

1. All organisms possess certain forms or shapes that help them to survive.

The student will be able to:

1. Identify a part of an organism that has a specific shape or form and explain how the form or shape of this part enables the organism to survive.

Suggested Activities

1. Observe photos or images of a variety of birds. Compare and contrast the shape and form of the birds' beaks. Discuss how a beak's shape enables the bird to obtain specific foods and survive.

Suggested Resources

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

<u>The student will know:</u>	<u>The student will be able to:</u>	<u>Suggested Activities</u>	<u>Suggested Resources</u>
<p>1. Additional, more careful observations resolve different explanations for the same event.</p> <p>2. The accuracy of measurements is very important as inaccuracy often produces questionable results.</p>	<p>1. Use simple equipment to observe more detail, measure more accurately, and obtain more information about the environment in order to develop more accurate explanations.</p> <p>2a. Judge whether measurements and computations of quantities are reasonable.</p> <p>2b. Compare measurements and computations to typical values with which students have had prior experience.</p>	<p>1. Participate in a simulated mystery in which incriminating "evidence" can be accurately determined only with the use of microscope or hard lens.</p> <p>2a. Given a set of data, such as length, area, volume, mass, or time, identify values that are questionable (e.g., values that are much larger or smaller than the others).</p> <p>2b. Identify the appropriate units of measurements for common objects (e.g., amount of water in a cup, a bucket, or a swimming pool).</p>	

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B. Standard: Understandings About Scientific Inquiry

The student will know:

1. Most experiments involve changing something and then repeatedly comparing it to something similar that has not been changed.

2. Graphs, charts, maps, equations, and oral and written reports can be used to share the results of a scientific investigation and facilitate its discussion.

The student will be able to:

1. Plan and conduct a simple experiment that is repeated and properly controlled; then discuss and respond thoughtfully to a variety of conclusions and determine whether the claims are logical arguments based on the results of the experiment.

2. Use a variety of methods, forms, and technologies to organize data into forms that are understandable.

Suggested Activities

1. Design two paper airplanes, identical except for one attribute. Measure and compare the distance thrown. Discuss whether this is a fair test of how far the planes fly or which plane is better.

2. Measure the growth and development of organisms, such as bean plants or meal worms and communicate observations using graphs, charts, and symbols.

Suggested Resources

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3. Strand: Physical Science

(NSES, IL 12, MO 1, 2)

A. Standard: Properties of Object and Materials

The student will know:

1. Matter is anything that has mass and volume and is composed of smaller parts.

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

The student will be able to:

1a. Select and classify a variety of common materials and objects as being composed of one substance or more than one substance.
1b. Refine and adapt the parts of objects to create a new object.
1c. Demonstrate the mass of an object equals the sum of the masses of its parts.

2a. Predict the properties of a mixture given the concentration of ingredients.
2b. Identify the factors that determine the choice of materials for a particular purpose.

Suggested Activities

1a. Identify things that are combinations of substances (e.g., bricks, concrete, cakes, cookies).
1b. Identify the parts used to make lamp, coffee pot, sofa, etc.
1c. Construct an object out of Lego blocks, take it apart, and rearrange the parts to make a new project.
1d. Create an object made of Tinker Toys, Lego's, Lincoln Logs, etc. Take the object apart and total the mass of each component.

2. Prepare different concentrations of Kool-Aid, Jell-O, etc. Observe and compare differences in the properties of these mixtures to the concentrations used (color, taste, etc.)

Suggested Resources

www.chem4kids.com

www.chem4kids.com

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3. Physical properties of matter can change.

3a. Use magnifiers, measuring tools, and other technology to identify the properties of matter or objects.

3b. Select and apply strategies to change matter by heating or cooling. Predict what changes will occur.

3c. Observe and describe the effects of the environment on a variety of objects (dissolving, weathering, shrinking, melting, and rusting).

3a. Inspect and describe the physical characteristics of salt, flour, sugar, etc. Expand the description by using magnification.

3b. Investigate how much energy it takes to change water to ice or steam.

3c. 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.

What is the World Made of?
All About Solids, Liquids, and Gases by Kathleen Weidner Zoehfeld
www.chem4kids.com

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B. Standard: Position and Motion of Objects

The student will know:

1. Sound travels at different rates through different materials.

2. Forces can change an object's motion or position.

The student will be able to:

1. Select and apply technology and other resources to show that sound travels through some materials better than others.

2a. Identify that the way to change the position or motion of an object is by a push or a pull.
2b. Explain that the size of the change is related to the strength of the push or pull.

Suggested Activities

1a. Create a string phone using a Styrofoam cup, paper cup, and plastic cup to compare and contrast how sound travels through different materials.
1b. Use a tuning fork to show how sound travels through water. Relate this to animals who use sonar.

2. Demonstrate objects that can be pushed or pulled. Compare and contrast the objects' change in position and motion relative to the strength of the push or pull.

Suggested Resources

www.physics4kids.com
The St. Louis Science Center

www.physics4kids.com
The St. Louis Science Center

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

The student will know:

1. Warm objects lose heat to cooler ones until they reach the same temperature.

2. Some of the sun's light is transformed into heat when it hits objects.

3. Light spreads from a source and travels in straight lines. Light can be transmitted, reflected, refracted, or absorbed by different materials.

The student will be able to:

1. Identify which materials will become warmer and which materials will become cooler when mixed.

2. Predict the effect of sunlight on various objects, liquids, and solids.

3a. Predict which materials will reflect, which will absorb, and which will transmit light.

3b. Use lenses or water to observe examples of the bending of light; use mirrors or a water surface to show how light is reflected.

Suggested Activities

1. Explore how heat flows from warm objects to cooler ones, (ice cubes in water) to equalize the temperature.

2. Measure/record how the sun's light is transformed into heat (e.g., asphalt road, concrete, dark clothing). Demonstrate ways this is useful (e.g., melt ice faster, run a solar calculator, make sun tea, warm a room).

3a. Use glass, clear plastic, cloudy plastic, paper, etc., to determine which ones transmit light, partially transmit light, or cast shadows.

3b. Observe the changes in shadows at different distances from a light source and different angles between the light source and objects.

Suggested Resources

The Magic School Bus in the Arctic: A Book About Heat

The Magic School Bus Makes A Rainbow: A Book About Color

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4. Electricity can move through paths made out of matter.

4. Identify the basic components of a circuit, including a cell and switch.

4. Create and observe a closed circuit (e.g., D-cell battery, small light bulb, and 20-cm wire).

The Magic School Bus and the Electric Field Trip
The Magic House
The St. Louis Science Center

5. An object that attracts metals has the property of magnetism.

5. Identify objects that can be attracted by a magnet and objects that cannot be attracted by a magnet.

5. Gather a variety of magnetic objects, nonmagnetic objects, and a magnet. Predict which objects the magnet will attract. Test predictions.

The Magic House
The St. Louis Science Center

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4. Strand: Life Science

(NSES, IL 12, MO 3, 4)

A. Standard: Characteristics of Organisms

The student will know:

1. Most organisms require a variety of materials including food, water, air, and a suitable environment for survival. Animals obtain energy and nutrients from plants or other animals.

The student will be able to:

1a. Conduct investigations to gather data, information, and ideas relating to the energy and nutrients organisms need from their environment in order to survive.
1b. Summarize the effect of various conditions on plant and animal survival tactics.

Suggested Activities

1a. Compare a human's energy and material needs for growth to the same needs for other organisms.
1b. Explore a simple, natural system (e.g., classroom aquarium or outdoor habitat) and generate questions about the transfer of energy and use of nutrients.

Suggested Resources

The Magic School Bus Hops Home: A Book About Animal Habitats
Litzinger Road Ecology Center - "Who Eats What?"
www.stlzoo.org
www.mobot.org

B. Standard: Life Cycles of Organisms

The student will know:

1. All types of living organisms have offspring, and the similarities between parents and their offspring become more apparent as the offspring mature.

The student will be able to:

1. Design and conduct investigations to observe and compare similarities and differences between offspring and their parents.

Suggested Activities

1. Observe and compare similarities and differences between mature birds/nestling, butterflies/caterpillars, etc.

Suggested Resources

St. Louis Zoo - "Born to be Wild"
www.stlzoo.org

Grade level: Third Grade

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2. The phases in the life cycle of all living organisms are predictable, but differ from species to species.

2. Design and conduct investigations to observe and record the life cycles of organisms.

2. Observe and record the life cycles of an insect, a frog, and a dandelion. Compare the differences.

The Magic School Bus Plants Seeds: A Book About How Living Things Grow
Litzinger Road Ecology Center - "Who Eats What?"
The Butterfly House - "Wings of Wonder"
www.stlzoo.org
www.mobot.org

3. Organisms resemble their parents because they inherit physical characteristics from them. Organisms with two parents inherit characteristics of both.

3. Organize physical characteristics of offspring and parents into useful forms for communicating visual clarity and interpret patterns and sources of inheritance.

3. Chart and interpret data about inherited characteristics from an actual or hypothetical human biological family. Identify similarities and differences.

St. Louis Zoo- "Born to be Wild"
www.stlzoo.org

4. Some characteristics of organisms are inherited and some are acquired as a result of interaction with the environment.

4. Identify and consider a variety of viewpoints when interpreting whether characteristics are inherited or acquired.

4. Investigate and describe the habitats of local organisms. Identify physical structures and behaviors that enable them to survive in their environment.

Shaw Nature Reserve - "Bugs, Beaks, and Beasties: Animal Adaptations"
www.stlzoo.org

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C. Standard: Organisms and Environments

The student will know:

1. Interactions between organisms and their environment contribute to continuous cycling of matter and energy.

The student will be able to:

1a. Describe how organisms within a contained system maintain their relationships over time and what adjustments occur naturally within this system.
1b. Develop a food web to show the energy flow from any organism to another.

Suggested Activities

1a. Conduct an extended investigation (terrarium, aquarium, local habitat) to explain how the inhabitants meet their energy needs. Generate reasonable questions about these interactions and design simple tests to investigate these questions.
1b. Use pictures of plants, insects, birds, animals, and micro-organisms to illustrate the flow of energy from producers to decomposers.

Suggested Resources

The Magic School Bus Gets Eaten: A Book About Food Chains
Missouri Botanical Garden - "Today's Special: Food Chains"
Litzinger Road Ecology Center-"Who Eats What?"
www.mobot.org

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5. Strand: Earth and Space Science

(NSES, IL 12, MO 5, 6)

A. Standard: Properties of Earth Materials

The student will know:

1. Water condenses, evaporates, and exists as a gas, liquid, or solid on Earth and in the air.

2. All rocks (igneous, sedimentary, and metamorphic) are made of minerals.

3. Soil is made up of living and nonliving things.

The student will be able to:

1. Develop strategies for predicting and addressing the effect of temperature or wind on evaporation and condensation.

2a. Identify the properties of rocks and minerals.
2b. Explain the three ways that rocks form.

3a. Explain how soil forms.
3b. Identify the different types of soil.

Suggested Activities

1. Conduct investigations to determine the effect of temperature or wind on evaporation and condensation.

2a. Observe the differences in rocks with a hand lens and classify them into different groups.
2b. Perform a scratch test on different minerals and compare results.

3a. Observe different soils. Describe how each looks, smells, and feels.
3b. Measure and compare the amount of water held by different soils.

Suggested Resources

The Magic School Bus Inside the Earth

Missouri Botanical Garden-
"Dr. Carver: Soil Scientist"
www.mobot.org

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4. Fossils provide evidence about organisms that lived long ago and the nature of the environment at that time.

4a. Explore and compare how different fossils form.
4b. Identify different fossil fuels.

4a. Observe and compare different fossils.
4b. Emulate the fossilization of an insect in amber by placing a carrot slice in liquid glue. Compare and contrast the "fossilized" carrot slice with a controlled carrot slice.
4c. Create a model of an imprint using clay and small objects.

B. Standard: Objects in the Sky

The student will know:

1. Earth is not alone in the universe. Most of the objects in the universe are separated by enormous distances.

2. Earth is in our solar system and has unique properties.

The student will be able to:

1a. Present ideas and opinions about the relationship of the sun and moon to Earth and Earth's position in the universe.
1b. Describe the major components of our solar system.

2. Compare and contrast Earth's properties to other planets in our solar system.

Suggested Activities

1a. Draw a picture of the relative positions of the Earth, moon, and sun.
1b. Use scaled objects at different distances to model the solar system and to show the distances between planets and their sizes.

2. Identify some characteristics of Earth that allow it to support life.

Suggested Resources

The Magic School Bus Lost in Space
There's No Place Like Space: All About Our Solar System (Cat in the Hat)
The Planets in Our Solar System by Franklyn M. Branley
www.nasa.gov
www.nineplanets.org

www.nasa.gov

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3. Constellations are patterns of stars.

3. Identify the major constellations and determine the seasonal changes in patterns.

3. Observe the night sky over an extended period of time, keeping a record or chart of the observations to identify the major constellations.

www.nasa.gov
St. Louis Science Center
(Planetarium)

C. Standard: Changes in Earth and Sky

The student will know:

1. Earth rotates on a tilted axis and revolves around the sun. This combination causes changes in the amount of sunlight reaching the Earth's surface and makes our seasons.

2. Recurring predictable movements of the Earth and moon can be used to measure time.

3. The appearance of the moon that can be seen from Earth changes in an observable pattern.

The student will be able to:

1. Explain how Earth's movements and tilt cause Earth's seasons.

2. Explain how time can be based on the movements of Earth in relation to the sun, moon, and stars.

3. Explain why the moon appears to change shape and describe the moons phases.

Suggested Activities

1. Model a demonstration of the tilt of Earth's axis in relation to the place of the orbit around the sun and use it to explain seasons at different places on the Earth.

2a. Make a working sundial and explain how it measures time.
2b. Construct and use a Big Dipper star clock.

3. Observe and chart the appearance of the moon over time and describe the changes in its appearance.

Suggested Resources

www.nasa.gov

What Makes Day and Night
by Franklyn M. Branley
www.nasa.gov

The Moon Seems to Change
by Franklyn M. Branley
www.nasa.gov

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4. The ability of water to change forms as it moves through a system is called the water cycle. The water cycle has a major role in determining the weather.

4. Describe in sequence the main processes of the water cycle.

4. Place a cup of water in a warm place. Place a cup of water in a cool place. Compare and contrast the different levels of evaporation.

The Magic School Bus Wet All Over: A Book About the Water Cycle

5. The surface of the Earth changes due to both slow and rapid processes.

5a. Explain how storms, earthquakes, and other natural events can change land quickly.
5b. Describe the differences between weathering and erosion.

5a. Observe the changes that occur when a piece of chalk is placed in a cup of vinegar. Draw and describe the changes.
5b. Compare and contrast the effects of gentle and heavy rain on landscapes of soil and sand.

The Magic School Bus Blows Its Top: A Book About Volcanoes

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6. Strand: Science and Technology	(NSES, IL 13, MO 8)
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A. Standard: Abilities of Technological Design

The student will know:

1. The application of concepts, principles, and processes of technological design are useful for problem solving.

The student will be able to:

- 1a. Study existing products of technological design to determine function.
- 1b. Determine how well a product does what it is supposed to do.
- 1c. Design a possible improvement on this product or an alternative product.

Suggested Activities

1. Observe an old technological design (e.g., apple peeler). Investigate to determine the function of the technological design and possible problems it might solve or cause. Design possible improvements on this product or an alternative product.

Suggested Resources

B. Standard: Understands about Technology and Design

The student will know:

1. Telescopes and satellite imaging allow scientists to observe features and structures of some objects in the sky.

The student will be able to:

1. Identify prominent features of Earth and planets from images gathered by telescopes and satellites.

Suggested Activities

1. List obvious features of the moon and Earth from NASA photographs and satellite images. Name some things that can be learned or predicted from studying these images.

Suggested Resources

www.nasa.gov

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C. Standard: Abilities to Distinguish Between Natural Objects and Objects Made by Man

The student will know:

1. All things are God-made or man-made.

The student will be able to:

1. Identify things created by God and things made by man.

Suggested Activities

1. Walk around school property and observe various objects and materials. Distinguish between those created by God and those made by man.

Suggested Resources

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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. Nutrition is essential to health.	1a. Describe and identify the nutrients found in the basic food groups. 1b. Identify what constitutes a balanced diet.	1a. Gather a variety of foods. Test each food item by rubbing on white or brown paper. Observe the rubbings to find which foods made the paper translucent (foods containing large amounts of fat). 1b. Observe the nutritional information of a variety of foods. Using a food pyramid, plan a balanced diet for a day.	
2. That care of their bodies will maintain and improve health.	2. Identify and explain that dental hygiene, cleanliness, and exercise helps to prevent or overcome illness.	2. Invite the school nurse or health care professional to demonstrate and explain basic personal care.	<i>The Magic School Bus Inside Ralphie: A Book About Germs</i>

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C. Standard: Types of Resources

The student will know:

1. Water is a valuable, natural resource essential to all life.

The student will be able to:

1. Exchange information and ideas with others about water conservation and the essential need for water by all living things while recognizing different points of view.

Suggested Activities

1. Survey family and friends to see how many ways they use water. Compare findings with classmates and classify essential uses.

Suggested Resources

D. Standard: Changes in the Environment

The student will know:

1. Human activities can change the environment in ways that affect the health and survival of all living organisms.

The student will be able to:

1. Explain how human activities can affect the environment in positive and negative ways.

Suggested Activities

1. Identify a classroom or school environmental issue (recycling, conserving electricity, cafeteria waste). Design and implement a plan to address the issue.

Suggested Resources

The St. Louis Zoo -
"Conservation Connections"
www.stlzoo.org
Missouri Department of
Conservation -
<http://mdc.mo.gov/>