

**Kindergarten
Science
Curriculum
2008**

Science Kindergarten Curriculum

Course Description:

The science curriculum is designed to introduce the kindergarten students to the basic concepts of the scientific process, science and society, mathematical applications in science, nature and process of technology, characteristics of life, chemistry, physics, earth science, astronomy and space science, environmental science. Kindergarten students will be exposed to these concepts through Nutrition, Space Science- Sun, Moon, and Stars and Day/Night, Life Science-Lifecycles of plants, butterflies, frogs, and chicks, Weather and Seasons, and Five Senses.

Core Curriculum Content Standard 5.1

STANDARD 5.1 (Scientific Processes) All students will develop problem-solving, decision-making and inquiry skills, reflected by formulating usable questions and hypotheses, planning experiments, conducting systematic observations, interpreting and analyzing data, drawing conclusions, and communicating results.

Cumulative Progress Indicators

By the end of **Grade 4**, students will:

A. Habits of Mind

1. Raise questions about the world around them and be willing to seek answers through making careful observations and experimentation.
2. Keep records that describe observations, carefully distinguish actual observations from ideas and speculations, and are understandable weeks and months later.

3. Recognize that when a science investigation is replicated, very similar results are expected.
4. Know that when solving a problem it is important to plan and get ideas and help from other people.

B. Inquiry and Problem Solving

1. Develop strategies and skills for information-gathering and problem-solving, using appropriate tools and technologies.
2. Identify the evidence used in an explanation.

C. Safety

1. Recognize that conducting science activities requires an awareness of potential hazards and the need for safe practices.
2. Understand and practice safety procedures for conducting science investigations.

Suggested activities that address these standards may include but are not limited to:

1. Students will track and record weather on a daily basis.
2. Students will plant seeds. They will watch and record growth and changes to the seed as it grows into a plant
3. Students will use proper safety gear when conducting science experiments.

Core Curriculum Content Standard 5.2

STANDARD 5.2 (Science and Society) All students will develop an understanding of how people of various cultures have contributed to the advancement of science and technology, and how major discoveries and events have advanced science and technology.

Cumulative Progress Indicators

By the end of **Grade 4**, students will:

A. Cultural Contributions

1. Describe how people in different cultures have made and continue to make contributions to science and technology.

B. Historical Perspectives

1. Hear, read, write, and talk about scientists and inventors in historical context.

Suggested activities that address these standards may include but are not limited to:

1. Listen to stories and participate in discussions regarding people in history such as George Washington Carver who discovered many uses of the peanut plant.

Core Curriculum Content Standard 5.3

STANDARD 5.3 (Mathematical Applications) All students will integrate mathematics as a tool for problem-solving in science, and as a means of expressing and/or modeling scientific theories.

Cumulative Progress Indicators

By the end of **Grade 4**, students will:

A. Numerical Operations

1. Determine the reasonableness of estimates, measurements, and computations of quantities when doing science.
2. Recognize and comprehend the orders of magnitude associated with large and small physical quantities.
3. Express quantities using appropriate number formats, such as:
 - ♣ integers.
 - ♣ fractions.

B. Geometry and Measurement

1. Select appropriate measuring instruments based on the degree of precision required.
2. Use a variety of measuring instruments and record measured quantities using the appropriate units.

C. Patterns and Algebra

1. Identify patterns when observing the natural and constructed world.

D. Data Analysis and Probability

1. Use tables and graphs to represent and interpret data

Suggested activities that address these standards may include but are not limited to:

1. Students will determine the best tool to measure growing plants such as rulers.
2. Students will use string and links to estimate and measure the circumference on a pumpkin.
3. Students will identify the patterns in real life objects such as brick walkway, zebra and giraffe skin using images found on Google images.
4. Students will create and read graphs to represent weather for each month.

Core Curriculum Content Standard 5.4

STANDARD 5.4 (Nature and Process of Technology) All students will understand the interrelationships between science and technology and develop a conceptual understanding of the nature and process of technology.

Cumulative Progress Indicators

By the end of **Grade 2**, students will:

A. Science and Technology

1. Indicators for this strand are introduced at a higher grade level.

B. Nature of Technology

1. Select and use simple tools and materials to complete a task.

C. Technological Design

1. Make a plan in order to design a solution to a problem.

2. Describe a toy or other familiar object as a system with parts that work together.

Suggested activities that address these standards may include but are not limited to:

1. Students will use magnifying glasses to study details of objects such as shells, rocks, plants, butterfly wings.
2. Students will use descriptive words and picture representations of animals, their surroundings and natural habitats
3. Students will make a plan to recycle plastics and paper in the classroom to help solve the garbage problem.

Core Curriculum Content Standard 5.5

STANDARD 5.5 (Characteristics of Life) All students will gain an understanding of the structure, characteristics, and basic needs of organisms and will investigate the diversity of life.

Cumulative Progress Standards:

By the end of **Grade 2**, students will:

A. Matter, Energy, and Organization in Living Systems

1. Investigate the basic needs of humans and other organisms.
2. Compare and contrast essential characteristics that distinguish living things from nonliving things.

B. Diversity and Biological Evolution

1. Recognize that different types of plants and animals live in different parts of the world.

2. Recognize that some kinds of organisms that once lived on earth have completely disappeared.

C. Reproduction and Heredity

1. Recognize that humans and other organisms resemble their parents.

Suggested activities that address these standards may include but are not limited to:

1. Students will study the lifecycle of the butterfly, frogs and chicks.
2. Students will study the lifecycle of the plant, from seed to plant.
3. Students will match baby animals to their parents using pictures, and student generated projects.

Core Curriculum Content Standard 5.6

STANDARD 5.6 (Chemistry) All students will gain an understanding of the structure and behavior of matter.

Strands and Cumulative Progress Indicators

By the end of **Grade 2**, students will:

A. Structure and Properties of Matter

1. Sort objects according to the materials from which they are made or their physical properties, and give a rationale for sorting.
2. Use magnifiers to observe materials, then draw and describe what more can be seen using the tools.

3. Observe that water can be a liquid or a solid and can change from one form to the other.

B. Chemical Reactions

1. Indicators for this strand are introduced at a higher grade level.

Suggested activities that address these standards may include but are not limited to:

1. Students will sort buttons by colors, size and shape.
2. Students will sort leaves by color, size, and shape.
3. Students will use magnifiers to observe leaves; they will then make a leaf rubbing of their leaf.
4. Students will observe how water can freeze into ice and how ice melts into water.

Core Curriculum Content Standard 5.7

STANDARD 5.7 (Physics) All students will gain an understanding of natural laws as they apply to motion, forces, and energy transformations.

Strands and Cumulative Progress Indicators

By the end of **Grade 2**, students will:

A. Motion and Forces

1. Distinguish among the different ways objects can move such as:
 - fast and slow.
 - in a straight line.

- in a circular path.
 - back and forth.
2. Show that the position and motion of an object can be changed by pushing or pulling the object.

B. Energy Transformations

1. Demonstrate that sound can be produced by vibrating objects.

Suggested activities that address these standards may include but are not limited to:

1. Students will use cars to show force of motion. Students will run cars over the table and then over the carpet. Students will then compare how the car traveled more slowly on the carpet an faster on the table or bare floor.
2. Students will use force to try to push and pull objects, such as push a toy and it moves, push a wall and it does not.
3. Students will view Magic School Bus Haunted House to learn how sounds are made by vibrations.

Core Curriculum Content Standard 5.8

STANDARD 5.8 (Earth Science) All students will gain an understanding of the structure, dynamics, and geophysical systems of the earth.

Strands and Cumulative Progress Indicators

By the end of **Grade 2**, students will:

A. Earth's Properties and Materials

1. Observe and describe rocks and soil.

B. Atmosphere and Weather

1. Identify the sources and uses of water.
2. Recognize that water can disappear (evaporate) and collect on cold surfaces (condense).
3. Describe current weather conditions and recognize how those conditions affect our daily lives.
4. Describe daily and seasonal changes and patterns in the weather.

C. Processes that Shape the Earth

1. Indicators for this strand are introduced at a higher grade level.

D. How We Study the Earth

1. Record observations that describe the features of the natural world in their local environment.

Suggested activities that address these standards may include but are not limited to:

1. Students will identify uses of water in our daily lives, drinking, bathing, and cooking.
2. Students will track daily weather and discuss how it affects their decisions for the day such as clothing- jackets, sweater, scarves and mittens, short sleeve shirts, shorts and sandals, raincoats and umbrellas. Will the children play outside today or inside it due to temperature or precipitation?
3. Students will track the daily weather in the month of March as Lion or Lamb days. If the temperature is over 42 degrees it will be a lamb day, under 42 degrees a lion day. The students will discuss the difference of a “winter” day and “spring”

day. The students will also discuss how the weather and day changes in the morning to the afternoon.

Core Curriculum Content Standard 5.9

STANDARD 5.9 (Astronomy & Space Science) All students will gain an understanding of the origin, evolution, and structure of the universe.

Strands and Cumulative Progress Indicators

By the end of **Grade 2**, students will:

A. Earth, Moon, Sun System

1. Recognize that the sun supplies light and heat to the Earth.
2. Observe the patterns of day and night and the movements of the shadows of an object on the Earth during the course of a day.

B. Solar System

1. Recognize that the sun can only be seen during the day, but the moon can be seen sometimes at night and sometimes during the day.

C. Stars

1. Observe that stars are many, scattered, and different in brightness.
2. Observe that the position of the stars, with respect to each other (constellations) is unchanging.

D. Galaxies and Universe

1. Indicators for this strand are introduced at a higher grade level.

Suggested activities that address these standards may include but are not limited to:

1. Students will use flashlights to duplicate the light of the sun.
2. Students will listen to books on the sun and list why the sun is important to people and the Earth.
3. Students will view the beginning portion of Peter Pan and discuss how Peter could never really lose his shadow. Students will create shadows using hands and classroom objects.
4. Students will determine that only solid objects create shadows. Clear objects let light pass through therefore will not create shadows.

Core Curriculum Content Standard 5.10

STANDARD 5.10 (Environmental Studies) All students will develop an understanding of the environment as a system of interdependent components affected by human activity and natural phenomena.

Strands and Cumulative Progress Indicators

By the end of **Grade 2**, students will:

A. Natural Systems and Interactions

1. Associate organisms' basic needs with how they meet those needs within their surroundings.

B. Human Interactions and Impact

1. Identify various needs of humans that are supplied by the natural or constructed environment.

Suggested activities that address these standards may include but are not limited to:

1. Students will match animal pictures with their habitats.
2. Students will create frogs in ponds pictures.
3. Students will create watch caterpillars grow and eat, turn into chrysalis and emerge as butterflies.

Core Curriculum Content Standard 8.1

Technological Literacy

STANDARD 8.1 (Computer and information literacy) All students will use computer applications to gather and organize information and to solve problems.

Strands and Cumulative Progress Indicators

By the end of **Grade 4**, students will:

A. Basic Computer Skills and Tools

1. Use basic technology vocabulary.
2. Use basic features of an operating system (e.g., accessing programs, identifying and selecting a printer, finding help).
3. Input and access text and data, using appropriate keyboarding techniques or other input devices.

4. Produce a simple finished document using word processing software.
5. Produce and interpret a simple graph or chart by entering and editing data on a prepared spreadsheet template.
6. Create and present a multimedia presentation using appropriate software.
7. Create and maintain files and folders.
8. Use a graphic organizer.
9. Use basic computer icons.

B. Application of Productivity Tools

Social Aspects

1. Discuss the common uses of computer applications and identify their advantages and disadvantages.
2. Recognize and practice responsible social and ethical behaviors when using technology, and understand the consequences of inappropriate use including:
 - ♣ Internet access
 - ♣ Copyrighted materials
 - ♣ On-line library resources
 - ♣ Personal security and safety issues
3. Practice appropriate Internet etiquette.
4. Recognize the ethical and legal implications of plagiarism of copyrighted materials.

Information Access and Research

5. Recognize the need for accessing and using information.
6. Identify and use web browsers, search engines, and directories to obtain information to solve real world problems.
7. Locate specific information by searching a database.
8. Recognize accuracy and/or bias of information.

Problem Solving and Decision Making

9. Solve problems individually and/or collaboratively using computer applications.

10. Identify basic hardware problems and solve simple problems.

Suggested activities that address these standards may include but are not limited to:

1. Students will use proper vocabulary when using and talking about the computer, such as mouse, click, minimize.
2. Students will identify yahoo and Google as search engines to research on internet.
3. Students will use computer programs, such as primarygames.com, independently solving simple technical problems.

Instructional Strategies:

- Shared reading of quality literature
- Class discussions
- Class experiments
- Student created art projects
- Viewing videos and internet clips, such as on United Streaming
- Computer web sites games
- Center activities

Evaluation/Assessment of Students

- Student responses in group discussions
- Student products in completing assessments
- Student outcomes of experimental process

Evaluation/Assessment of Curriculum:

This course of study will be evaluated/assessed by instructional staff during the first year of implementation for the purpose of necessary revision at the end of the first year. In addition, this course of study will be reviewed according to the Five-Year Curriculum Review Schedule.

Resources/Bibliography

- Science Closet (End of the Hallway Upstairs)
 - Skeleton
 - Story Apron with story kits
 - Five Senses Box
 - Big Books
- United Streaming- Full videos and clips
 - Magic School Series found on United Streaming
- Hudson Maxim Library
 - Full list of videos available from the librarian
 - Books available from the library
- Book list obtained from Scholastic.com
 - From Caterpillar to Butterfly**, By Deborah Heiligman
 - The Butterfly Alphabet Book**, By Brian Cassie
 - The Very Hungry Caterpillar**, By Eric Carle
 - The Caterpillar and the Polliwog**, By Jack Kent
 - Rain Forest**, By Helen Cowcher
 - Me and My Place in Space**, By Joan Sweeney
 - A Day in Space**, By Suzanne Lord; Jolie Epstein
 - The Magic School Bus® Lost in the Solar System**, By Joanna Cole
 - The Moon Book**, By Gail Gibbons
 - From Seed to Plant**, by Gail Gibbons
 - The Seasons of Arnold's Apple Tree**, by Gail Gibbons
 - Weather Words and What They Mean**, by Gail Gibbons
 - Busy Bunnies' Five Senses**, By Teddy Slater
 - David Smells! A Diaper David Book**, By David Shannon
 - The Magic School Bus® Explores the Senses**, By Joanna Cole
 - What Will The Weather Be Like Today?**, By Paul Rogers
 - Wild Weather: Blizzards!** By Lorraine Jean Hopping
 - Wild Weather: Lightning!**, By Lorraine Jean Hopping
 - Wild Weather: Tornadoes!**, By Lorraine Jean Hopping
 - Snow? Let's Go!**, By Karen Nagel
 - When Winter Comes**, By Nancy Van Laan
 - Cloudy with a Chance of Meatballs**, By Judi Barrett
 - I Am Snow**, By Jean Marzollo
 - Spring!**, By Samantha Berger
 - Red Leaf, Yellow Leaf**, By Lois Ehlert
 - I Am a Leaf**, By Jean Marzollo
 - Why Do Leaves Change Color?**, By Betsy Maestro
 - Autumn Leaves**, By Ken Robbins
 - I'm a Caterpillar**, By Jean Marzollo

I Am a Leaf, By Jean Marzollo
I Am an Apple, By Jean Marzollo