Norton City Schools Standards-Based Science Course of Study 2003

KINDERGARTEN

NATURE OF SCIENCE-These scientific process skills should be integrated into the following grade level content units.

Science and Technology Standard (ST)
Scientific Inquiry Standard (SI)
Scientific Ways of Knowing Standard (SK)

K-2 Benchmarks	Grade Level Indicators and Sub-Objectives	Teaching Strategies/Resources
By the end of the K-2 program, the student will: **<u>Science and Technology</u>** **✶ Explain why people, when building or making something, need to determine what it will be made of and how it will affect other people and the environment. (ST-A)** **✶ Explain that to construct something requires planning, communication, problem solving and tools. (ST-B)** **<u>Scientific Inquiry</u>** **✶ Ask a testable question. (SI-A)** **✶ Design and conduct a simple investigation to explore a question. (SI-B)** **✶ Gather and communicate**	**By the end of Kindergarten, the student will:** **<u>Understanding Technology</u>** **✶ Explore that objects can be sorted as "natural" or "man-made." (ST-K-1)** **✶ Explore that some materials can be used over and over again (e.g., plastic or glass containers, cardboard boxes and tubes). (ST-K-2)** **<u>Abilities To Do Technological Design</u>** **✶ Explore that each kind of tool has an intended use, which can be helpful or harmful (e.g., scissors can be used to cut paper but they can also hurt you). (ST-K-3)** **<u>Doing Scientific Inquiry</u>** **✶ Ask "what if" questions. (SI-K-1)** **✶ Explore and pursue student-generated "what if" questions. (SI-K-2)** **✶ Use appropriate safety procedures when completing scientific investigations. (SI-K-3)** **✶ Use the five senses to make observations about the natural world. (SI-K-4)** **✶ Draw pictures that correctly portray features of the item being described. (SI-K-5)** **✶ Recognize that numbers can be used to count a collection of things.**	

information from careful observations and simple investigation through a variety of methods. (SI-C) **<u>Scientific Ways of Knowing</u>** **✶ Recognize that there are different ways to carry out scientific investigations. Realize that investigations can be repeated under the same conditions with similar results and may have different explanations. (SK-A)** **✶ Recognize the importance of respect for all living things. (SK-B)** **✶ Recognize that diverse groups of people contribute to our understanding of the natural world. (SK-C)**	**(SI-K-6)** **✶ Use appropriate tools and simple equipment/instruments to safely gather scientific data (e.g., magnifiers and other appropriate tools). (SI-K-7)** **✶ Measure the lengths of objects using non-standard methods of measurement (e.g., teddy bear counters and pennies). (SI-K-8)** **✶ Make pictographs and use them to describe observations and draw conclusions. (SI-K-9)** **✶ Make new observations when people give different descriptions for the same thing. (SI-K-10)** **<u>Nature of Science</u>** **✶ Recognize that scientific investigations involve asking open-ended questions. (How? What if?) (SK-K-1)** **✶ Recognize that people are more likely to accept your ideas if you can give good reasons for them. (SK-K-2)** **<u>Ethical Practices</u>** **✶ Interact with living things and the environment in ways that promote respect. (SK-K-3)** **<u>Science and Society</u>** **✶ Demonstrate ways science is practiced by people everyday (children and adults). (SK-K-4)**	

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KINDERGARTEN
DAILY OBSERVATIONS
Earth and Space Sciences Standard (ES)

K-2 Benchmarks	Grade Level Indicators and Sub-Objectives	Teaching Strategies/Resources
By the end of the K-2 program, the student will: **<u>Earth and Space Sciences</u>** **✶ Observe constant and changing patterns of objects in the day and night sky. (ES-A)** **✶ Observe, describe and measure changes in the weather, both long term and short term. (ES-C)**	**By the end of Kindergarten, the student will:** **<u>The Universe</u>** **✶ Observe that the Sun can be seen only in the daytime, but the Moon can be seen sometimes at night and sometimes during the day. (ES-K-1)** **<u>Processes That Shape Earth</u>** **✶ Explore that sometimes change is too fast to see and sometimes change is too slow to see. (ES-K-3)** **✶ Observe and describe day-to-day weather changes (e.g., today is hot, yesterday we had rain). (ES-K-4)** **✶ Observe and describe seasonal changes in weather. (ES-K-5)** **<u>Sub-Objectives to Meet Indicators:</u>** • Make a graph of weather observations over a period of time (e.g., sunny days, cloudy days, hot days, rainy days, windy days, etc.). • Clarify observations and evaluate predictions of weather by investigating current data (e.g., T.V. weather reports, telephone time and temperature, newspapers, etc.). • Observe weather and dress according to weather conditions. • Observe seasonal changes over time due to temperature, light, sunshine, rainfall, etc. • Describe changes in the environment as seasons change (e.g., winter-cold, snow, ice, clouds, etc.).	

	• Observe and describe familiar patterns and cycles (e.g., day and night, passage of time, etc.). • Construct and/or observe simple models of the sun, moon, and earth (e.g., sky tent, StarLab, pictures, drawings, mobiles, etc.). • Discuss day/night using a globe/sphere and light source (e.g., ball and flashlight or lamp, etc.).	

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KINDERGARTEN
CARE AND OBSERVATION OF ANIMALS
Earth and Space Sciences Standard (ES)
Life Sciences Standard (LS)

K-2 Benchmarks	Grade Level Indicators and Sub-Objectives	Teaching Strategies/Resources
By the end of the K-2 program, the student will: **<u>Earth and Space Sciences</u>** **✶ Explain that living things cause changes on Earth. (ES-B)** **<u>Life Sciences</u>** **✶ Discover that there are living things, non-living things and pretend things, and describe the basic needs of living things (organisms). (LS-A)** **✶ Explain how organisms function and interact with their physical environment. (LS-B)** **✶ Describe similarities and differences that exist among individuals of the same kind of plants and animals. (LS-C)**	**By the end of Kindergarten, the student will:** **<u>Processes That Shape Earth</u>** **✶ Explore that animals and plants cause changes to their surroundings. (ES-K-2)** **<u>Characteristics and Structure of Life</u>** **✶ Explore differences between living and non-living things (e.g., plant-rock). (LS-K-1)** **✶ Discover that stories (e.g., cartoons, movies, comics) sometimes give plants and animals characteristics they really do not have (e.g., talking flowers). (LS-K-2)** **<u>Heredity</u>** **✶ Describe how plants and animals usually resemble their parents. (LS-K-3)** **✶ Investigate variations that exist among individuals of the same kind of plant or animal. (LS-K-4)** **<u>Diversity and Interdependence of Life</u>** **✶ Investigate observable features of plants and animals that help them live in different kinds of places. (LS-K-5)** **✶ Investigate the habitats of many different kinds of local plants and animals and some of the ways in which animals depend on plants and**	

	each other in our community. (LS-K-6)
	
	<u>Sub-Objectives to Meet Indicators:</u>
	• Recognize characteristics that can identify a thing as living:
	  ° Ability to grow and change
	  ° Ability to react to its environment
	  ° Need for food or another source of energy
	  ° Take in gases for respiration (e.g., breathing, etc.)
	  ° Ability to reproduce
	  ° Made up of cells (taught at grades 3-4)
	• Identify a living organism's need for:
	  ° Source of food or energy
	  ° Water
	  ° Gases to take in (e.g., breathing, etc.)
	  ° Environment that will allow for survival (e.g., protection, light, temperature, etc.)
	• Differentiate between animals by their physical properties (e.g., weight, size, color, texture, etc.).
	• Sort and classify animals into categories according to ways in which animals move, foods they eat, coverings, environment, etc.
	• Compare and contrast indoor animals (e.g., mice, spiders, fleas, cats, lice, canaries, goldfish, etc.) and outdoor animals (e.g., foxes, worms, owls, deer, moles, etc.).
	• Identify and describe domestic and wild animals (e.g., cow, horse, cat, dog, mouse, platypus, tiger, sloth, anteater, chimpanzee, etc.).
	• Observe animal growth from a baby to an adult, noting the ways that animals grow and develop (e.g., through pictures, movies, field trips, classroom animals, etc.).
	• Explore how animals adapt to changing conditions both indoors and outdoors (e.g., light, weather, temperature, seasons, etc.).	

Norton City Schools Standards-Based Science Course of Study 2003

KINDERGARTEN
CARE AND OBSERVATION OF PLANTS
Earth and Space Sciences Standard (ES)
Life Sciences Standard (LS)

K-2 Benchmarks	Grade Level Indicators and Sub-Objectives	Teaching Strategies/Resources
By the end of the K-2 program, the student will: **<u>Earth and Space Sciences</u>** **✶ Explain that living things cause changes on Earth. (ES-B)** **<u>Life Sciences</u>** **✶ Discover that there are living things, non-living things and pretend things, and describe the basic needs of living things (organisms). (LS-A)** **✶ Explain how organisms function and interact with their physical environment. (LS-B)** **✶ Describe similarities and differences that exist among individuals of the same kind of plants and animals. (LS-C)**	**By the end of Kindergarten, the student will:** **<u>Processes That Shape Earth</u>** **✶ Explore that animals and plants cause changes to their surroundings. (ES-K-2)** **<u>Characteristics and Structure of Life</u>** **✶ Explore differences between living and non-living things (e.g., plant-rock). (LS-K-1)** **✶ Discover that stories (e.g., cartoons, movies, comics) sometimes give plants and animals characteristics they really do not have (e.g., talking flowers). (LS-K-2)** **<u>Heredity</u>** **✶ Describe how plants and animals usually resemble their parents. (LS-K-3)** **✶ Investigate variations that exist among individuals of the same kind of plant or animal. (LS-K-4)** **<u>Diversity and Interdependence of Life</u>** **✶ Investigate observable features of plants and animals that help them live in different kinds of places. (LS-K-5)** **✶ Investigate the habitats of many different kinds of local plants and animals and some of the ways in which animals depend on plants and**	

	each other in our community. (LS-K-6)
	
	<u>Sub-Objectives to Meet Indicators:</u>
	• Recognize characteristics that can identify a thing as living:
	  ° Ability to grow and change
	  ° Ability to react to its environment
	  ° Need for food or another source of energy
	  ° Take in gases for respiration (e.g., breathing, etc.)
	  ° Ability to reproduce
	  ° Made up of cells (taught at grades 3-4)
	• Identify a living organism's need for:
	  ° Source of food or energy
	  ° Water
	  ° Gases to take in (e.g., breathing, etc.)
	  ° Environment that will allow for survival (e.g., protection, light, temperature, etc.)
	• Construct a planter to observe plant growth (e.g., terrarium, Ziploc bags, film canisters, etc.).
	• Observe the growth of a root system using a clear container (e.g., cup, film container, etc.).
	• Follow directions to care for plants from seed to mature organisms, including planting, feeding, and watering.
	• Estimate the size and growth of a plant.
	• Compare and contrast several plants varying in size, using nonstandard units (e.g., bigger, smaller, taller, etc.).
	• Describe various kinds of plants (e.g., carrot, lettuce, cabbage, tomato, pea, bean, etc.).
	• Examine sprouting, growth, flowering, dying, and decay of plants.
	• Order a series of pictures of plant growth in stages from seed to flowering.
	• Explore the impact of different variables on plants (e.g., heat, light, water, salt, fertilizer, etc.).
	• Observe plants and describe changes in them over time (e.g., through pictures, drawings, audio-taped reflections, etc.).	

KINDERGARTEN
FIVE SENSES: PHYSICAL PROPERTIES
Physical Sciences Standard (PS)

K-2 Benchmarks	Grade Level Indicators and Sub-Objectives	Teaching Strategies/Resources
By the end of the K-2 program, the student will: **<u>Physical Sciences</u>** **✶ Discover that many objects are made of parts that have different characteristics. Describe these characteristics and recognize ways an object may change. (PS-A)**	**By the end of Kindergarten, the student will:** **<u>Nature of Matter</u>** **✶ Demonstrate that objects are made of parts (e.g., toys, chairs). (PS-K-1)** **✶ Examine and describe objects according to the materials that make up the object (e.g., wood, metal, plastic and cloth). (PS-K-2)** **✶ Describe and sort objects by one or more properties (e.g., size, color and shape). (PS-K-3)** **<u>Sub-Objectives to Meet Indicators:</u>** • Explore the five senses through inquiry (e.g., smell kits, feely bags, blindfolded taste tests, recorded sounds, etc.). • Use instruments to enhance observations (e.g., hand lenses, magnifying glasses, binoculars, microscopes, etc.). • Identify the five senses and explore their uses. • Explore physical properties of living and nonliving things: ° Color ° Temperature ° Magnetic/Nonmagnetic ° Size ° Weight/Mass ° Luster/Shininess ° Shape ° Float/Sink	

	° Malleability/Flexibility ° Texture • Measure in nonstandard units (e.g., light/heavy, small/big, tall/short, paper clips, unifix cubes, etc.). • Experience and describe objects in sensory terms (e.g., texture, smell, taste, loudness, etc.).	

KINDERGARTEN
THE WAY THINGS MOVE
Physical Sciences Standard (PS)

K-2 Benchmarks	Grade Level Indicators and Sub-Objectives	Teaching Strategies/Resources
By the end of the K-2 program, the student will: **<u>Physical Sciences</u>** **✶ Discover that many objects are made of parts that have different characteristics. Describe these characteristics and recognize ways an object may change. (PS-A)** **✶ Recognize that light, sound and objects move in different ways. (PS-B)**	**By the end of Kindergarten, the student will:** **<u>Forces and Motion</u>** **✶ Explore that things can be made to move in many different ways such as straight, zigzag, up and down, round and round, back and forth, or fast and slow. (PS-K-4)** **✶ Investigate ways to change how something is moving (e.g., push, pull). (PS-K-5)** **✶ Investigate a variety of ways to make things move and what causes them to change speed, direction and/or stop. (PS-1-6)** **<u>Sub-Objectives to Meet Indicators:</u>** • Describe ways to change how something is moving (direction and/or speed) by giving objects pushes or pulls (forces). • Experiment with friction and identify it as a force that acts against motion when two surfaces are touching (e.g., objects moving on carpet, grass, tile, sidewalks, sandpaper, etc.). • Describe and compare and contrast how objects move in different ways. • Recognize relationships between mass and force, including: ° Things only move when something moves them. ° Things keep moving until something stops them. ° The harder something is pushed, the faster it goes. ° The more massive something is, the harder it is to move. • Explain or predict the motion of an object (e.g., where it will end up).	