Somers Point School District

Curriculum

Science

Grade 4

July 2010

Board Approved: September 2010

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Acknowledgments

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Somers Point Schools

Mission and Beliefs

Mission

Empower each student to make responsible choices, meet challenges, achieve personal success, and to contribute to a global society as they apply the New Jersey Core Curriculum Standards to become autonomous, lifelong learners who are literate, problem solvers across all disciplines.

Beliefs

Beliefs: We believe that our empowered learners:

- Participate in educational programs that are designed to meet the needs of learners while providing challenging activities in the context of real life situations.
- Are aware of community issues and take part in activities to better their community.
- Acquire basic skills in obtaining information, thinking critically, solving problems and communicating effectively.
- Develop intellectual curiosity and the ability to access information as needed
- Become reflective learners that have an understanding of their own strengths and weaknesses.
- Develop the aptitudes and skills to adjust to a changing world and an unpredictable future.
- Are lifetime learners who value and accept learning as a continuing and dynamic process affecting all aspects of life.

PROGRAM PHILSOSOPHY, GOALS, AND BELIEFS

Philosophy

An effective science curriculum…

- Reflects the belief that all students can and must learn enough science to assume their role as concerned citizens equipped with necessary information and decision-making skills;
- Reflects a nature of knowledge, pedagogy, and nature of human development linked to empirical research;
- Recognizes that an inquiry-based method is used to study sound science content;
- Encourages teachers to view that the study of science should be interesting and relevant to students' lives, emphasize student understanding through inquiry and be connected with other school subjects especially math.

Unifying Concepts and Processes

An effective science curriculum incorporates the following while addressing the content areas…

1. Systems, order and organizations
2. Evidence, models and explanation
3. Changes, constancy and measurement
4. Evolution and equilibrium
5. Form and function
6. Abilities to do and understanding of scientific inquiry
7. Technology
8. Social perspective

Educational Goals & Beliefs

- Inquiry is an effective method to actively involve students.
- All students share a natural curiosity about the world around them.
- Curriculum provides real world connections.
- Effective instruction integrates concepts within science and other content areas.
- Assessment is ongoing, diagnostic, and aligned with instruction.
- Students can improve their community and the world through problem-solving.
- The broad goal of a science program should be to foster understanding, interest, and appreciation of the world in which we live.

New Jersey State Department of Education
Core Curriculum Content Standards

Science Education in the 21st Century

"Today more than ever before, science holds the key to our survival as a planet and our security and prosperity as a nation" (Obama, 2008).

Scientific literacy assumes an increasingly important role in the context of globalization. The rapid pace of technological advances, access to an unprecedented wealth of information, and the pervasive impact of science and technology on day-to-day living require a depth of understanding that can be enhanced through quality science education. In the 21st century, science education focuses on the practices of science that lead to a greater understanding of the growing body of scientific knowledge that is required of citizens in an ever-changing world.

Mission: *Scientifically literate students possess the knowledge and understanding of scientific concepts and processes required for personal decision-making, participation in civic and cultural affairs, and economic productivity.*

Vision: A quality science education fosters a population that:

- Experiences the richness and excitement of knowing about the natural world and understanding how it functions.
- Uses appropriate scientific processes and principles in making personal decisions.
- Engages intelligently in public discourse and debate about matters of scientific and technological concern.
- Applies scientific knowledge and skills to increase economic productivity.

Then 2009 NJ science standards can be accessed at: http://www.njcccs.org/ContentAreaTabularView.aspx?code=5&Desc=Science

In addition, the New Jersey Standards Clarification Project provides materials that convey an understanding of the priorities in the NJ CCCS and how to capture those priorities in designing local curriculum and assessments, as well as in managing local instruction across content areas.

To access the NJ Standards Clarification Project: http://www.state.nj.us/education/aps/njscp/

Assessment Note:
All 4th & 8th grade students take the state end of year assessment the NJ ASK or the Alternative Proficiency Assessment when applicable.

4th Grade Science

Scope and Sequence

Unit I
Human Body
Unit II
Motion and Design

Unit III
Magnetism& Electricity
Unit IV
Water

Science Practices – Standard 5.1

The New Jersey Core Curriculum (2009) includes Science Practices (standard 5.1). This standard embodies the idea of "knowledge in use" and includes understanding scientific explanations, generating scientific evidence, reflecting on scientific knowledge, and participating productively in science. Science practices are integrated into the Cumulative Progress Indicators within each science domain in recognition that science content and processes are inextricably linked; science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge.

5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.

A. Understand Scientific Explanations : Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.

B. Generate Scientific Evidence Through Active Investigations : Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.

C. Reflect on Scientific Knowledge : Scientific knowledge builds on itself over time.

D. Participate Productively in Science : The growth of scientific knowledge involves critique and communication, which are social practices that are governed by a core set of values and norms.

The Somers Point School District curriculum weaves these standards into each science unit of study. Through our hands-on, inquiry based approach to science content, students cover each area of standard 5.1 listed above.

Suggested blocks of Instruction	**Grade Level/Subject:** **Grade 4/ Science**	**Big Idea:** The natural world is defined by organisms and life processes which conform to principles regarding conservation and transformation of matter and ecan be applied to improving human health and well being **Topic:** Human Body **Goal 1:** The student will be able to understand the structure, characteristics, and basic needs of organisms and will investigate the diversity of life.	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions / Enduring Understandings**	**Learning Activities including technology integration, interdisciplinary activities, and differentiation methods / Materials / Assessment**
40 mins. Per day for 8 weeks	5.3.4.A.2 Compare and contrast structures that have similar functions in various organisms, and explain how those functions may be carried out by structures that have different physical appearances. 5.3.4.A.3 Describe the interactions of systems involved in carrying out everyday life activities.	**Essential Questions:** • How is matter transformed, and energy transferred/transformed in living systems? **Enduring Understandings:** • All organisms transfer matter and convert energy from one form to another. • Both matter and energy are necessary to build and maintain structures within the organism.	**Learning Activities** Investigation1, Part 1&2 Investigation 2, Part 3&4 Investigation 3, Part 1&2 Investigation 4, Part 1 Science Stories The Marvelous Machine, The Shape of Your Body; Your Amazing Opposable Thumb; Comparing joints; Space Race; The Circulatory System **Materials:** See material list Investigation1p.8; investigation 2 p. 13; investigation 3 p.19; investigation 4 p8 **Assessment:** Teacher Observation, Assessment charts, End of Module Assessment, Portfolio assessment, benchmarks

Suggested blocks of Instruction	**Grade Level/Subject:** **4th Grade/Science**	**Big Idea:** The flow of energy drives processes of change in all biological, chemical, physical and geological systems. The conservation of energy is a law that can be used to analyze and build understandings of diverse physical and biological systems. **Topic:** Motion and Design **Goal 2:** The student will be able to gain an understanding of natural laws as they apply to motion.	
	Objectives/Cluster Concepts/Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions / Enduring Understandings**	**Learning Activities including technology integration, interdisciplinary activities, and differentiation methods / Materials / Assessment**
40 mins. Per day for 8 weeks	5.2.4.C.3 Draw and label diagrams showing several ways that energy can be transferred from one place to another. 5.2.4.E.1 Demonstrate through modeling that motion is a change in position over a period of time. 5.2.4.E.2 Identify the force that starts something moving or changes its speed or direction of motion.	**Essential Questions:** • How would the universe be different if one or more of the laws of motion were suspended? • How do we know that things have energy? **Enduring Understandings:** • The same basic rules govern the motion of all bodies, from planets and stars to birds and billiard balls. • Energy takes many forms. • These forms can be grouped into types of energy that are associated with the motion of mass (kinetic energy), and types of energy associated with the position of mass and with energy fields (potential energy).	**Learning Activities** Motion and Design Lesson 1(p3-14) Motion and Design Lesson 2(p.15-24) Motion and Design Lesson 3(pp25-34;Extsp29-30) Motion and Design Lesson 4(p35-46;Extsp40-41) Motion and Design Lesson 5(p47-56) Motion and Design Lesson 7(p65-72;Extsp68-69) Motion and Design Lesson 8(p.73-80) Motion and Design Lesson 9(p 80-81) Motion and Design Lesson 10(p91-100) Motion and Design Lesson 11(p101-108) Motion and Design Lesson 12(p109-116) Motion and Design Lesson 13(p117-124;Exts120-121) Motion and Design Lesson14 (p125-138;Extsp130) Motion and Design Lesson 15 (p.139-144) Motion and Design Lesson 16 (p.145-152;Exts148) Motion and Design Lesson 17(p.153-156) STC Book:(63, 29-31, 49-51,54-57) **Materials: See Materials TG 5-6**

Suggested blocks of Instruction	**Grade Level/Subject:** **4th Grade/Science**	**Big Idea:** The flow of energy drives processes of change in all biological, chemical, physical and geological systems. The conservation of energy is a law that can be used to analyze and build understandings of diverse physical and biological systems. **Topic:** Motion and Design **Goal 2:** The student will be able to gain an understanding of natural laws as they apply to motion.	
	Objectives/Cluster Concepts/Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions / Enduring Understandings**	**Learning Activities including technology integration, interdisciplinary activities, and differentiation methods / Materials / Assessment**
			Assessment: Teacher Observation, pre and post book assessments, student self assessment, lab sheets, record sheets, rubrics, lab sheets

Suggested blocks of Instruction	**Grade Level/Subject:** **Fourth/Science**	**Big Idea:** The flow of energy drives processes of change in all biological, chemical, physical and geological systems. The conservation of energy is a law that can be used to analyze and build understandings of diverse physical and biological systems. **Topic:** Magnetism & Electricity **Goal 3:** The student will be able to gain an understanding of the structure and behavior of matter, and natural laws as they apply to motion, forces, and energy transformations.	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions / Enduring Understandings**	**Learning Activities including technology integration, interdisciplinary activities, and differentiation methods / Materials / Assessment**
40 mins. Per day for 8 weeks	5.2.4.A.4 Categorize objects based on the ability to obsorb or reflect light and conduct heat or electricity. 5.2.4.C.1 Compare various forms of energy as observed in everyday life and describe their applications. 5.2.4.C.2 Compare the flow of heat through metals and non-metals by taking and analyzing measurements. 5.2.4.C.3 Draw and label diagrams showing several ways that energy can be transferred from one place to another. 5.2.4.D.1 Repair an electric circuit by completing a closed loop that includes wires, a battery (or batteries), and at least one other electrical component to produce observable change.	**Essential Questions:** • How would the universe be different if one or more of the laws of motion were suspended? • How do we know that things have energy? **Enduring Understandings:** • The same basic rules govern the motion of all bodies, from planets and stars to birds and billiard balls. • Energy takes many forms. • These forms can be grouped into types of energy that are associated with the motion of mass (kinetic energy), and types of energy associated with the position of mass and with energy fields (potential energy).	**Learning Activities** Investigation 1 part 1-4; Foss Science Stories Magnificent Magnet Models; How magnets Interact; Making Static Investigation 2, Parts 1-4 Investigation 3, Parts 1-4 Investigation 4 Parts 1-3 Investigation 5 Parts 1 & 2 Foss Science Stories Magnets and Electricity in your Life, Mores Gets Clicking: A Story of Samuel Morse; Foss Web Activity :Electromagnets **Materials:** See materials list: Investigation 1- p.8,18, 23,30 Investigation 2 p.8, 14, 20, 26 Investigation 3 p. 10, 16, 22, Investigation 4 p.8, 14, 19 Investigation 5 p.8, 15, **Assessment:** Teacher Observation, Assessment charts, End of Module Assessment, Portfolio assessment, benchmarks

Suggested blocks of Instruction	**Grade Level/Subject:** **Fourth/Science**	**Big Idea:** Materials exist throughout our physical world. The structures of materials influence their physical properties, chemical reactivity and use. **Topic:** Water **Goal 4:** The student will be able to gain an understanding of the structure, characteristics, and basic needs of organisms and will investigate the diversity of life. They will gain an understanding of the structure and behavior of matter.	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions / Enduring Understandings**	**Learning Activities including technology integration, interdisciplinary activities, and differentiation methods / Materials / Assessment**
40 mins per day for 8 weeks	5.2.4.A.3 Determine the weight and volume of common objects using appropriate tools. 5.2.4.B.1 Predict and explain what happens when a common substance, such as shortening or candle wax, is heated to melting and then cooled to a solid. 5.2.4.E.1 Demonstrate through modeling that motion is a change of position over a period of time. 5.2.4.E.2 Identify the force that starts something moving or changes it's speed or direction of motion. 5.3.4.C.1 Predict the biotic and abiotic characteristics of an unfamiliar organisms' habitat. 5.3.4.C.2 Explain the consquences of rapid ecosystem change (e.g., flooding, wind storms, snow fall, volcanic eruptions), and compare them to consequences of gradual ecosystem change (e.g., gradual increase or decrease in daily temperatures, change in yearly rainfall).	**Essential Questions:** • How do properties of materials determine their use? **Enduring Understandings:** • The structures of materials determine their properties.	**Learning Activities** Investigation 4, Part 1, Science Stories The Pond; FOSS Web Activity: Investigation 3, Parts 1-4; Science Stories Evaporation and Condensation; The water Cycle; FOSS Web Activity: Evaporation **Materials:** See materials sheet p. 8, 12, 17, 21; Investigation 3. Investigation 4 p. 8 **Assessment:** Teacher Observation, Assessment charts, End of Module Assessment, Portfolio assessment, benchmarks

Suggested blocks of Instruction	**Grade Level/Subject:** **Fourth/Science**	**Big Idea:** Materials exist throughout our physical world. The structures of materials influence their physical properties, chemical reactivity and use. **Topic:** Water **Goal 4:** The student will be able to gain an understanding of the structure, characteristics, and basic needs of organisms and will investigate the diversity of life. They will gain an understanding of the structure and behavior of matter.	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions / Enduring Understandings**	**Learning Activities including technology integration, interdisciplinary activities, and differentiation methods / Materials / Assessment**
	5.4.4.C.2 Catergorize unknown samples as either rocks or minerals. 5.4.4.E.1 Develop a general set of rules to predict temperature changes of earth materials, such as water, soil, and sand, when placed in the sun and in the shade. 5.4.4.G.1 Explain how clouds form. 5.4.4.G.2 Observe daily cloud patterns, types of precipitation, and temperature, and categorize the clouds by the conditions that form precipitation. 5.4.4.G.3 Trace a path a drop of water might follow through the water cycle. 5.4.4.G.4 Model how the properties of water can change as water moves through the water cycle.		

Suggested blocks of Instruction	**Grade Level/Subject:** **Fourth/Science**	Big Idea: Organisms are linked to one another in an ecosystem by the flow of energy and the cycling of materials. Humans are an integral part of the natural system and human activities can alter the stability of ecosystems.	
		Topic: Water	
		Goal 5: The student will be able to gain an understanding of the structure, dynamics, and geophysical systems of the earth and the environment as a system of interdependent components affected by human activity and natural phenomena.	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions / Enduring Understandings**	**Learning Activities including technology integration, interdisciplinary activities, and differentiation methods / Materials / Assessment**
		Essential Questions: • How can change in one part of an ecosystem affect change in other parts of the ecosystem? • How do humans impact the diversity and stability of ecosystems? **Enduring Understandings:** • Organisms and their environments are interconnected. • Changes in one part of the system will affect other parts of the system. • Humans can alter the living and non-living factors within an ecosystem, thereby creating changes to the overall system.	**Learning Activities** Investigation 4 Part 2 Investigations 3, Parts 1-4; Investigation 1, Part 1, 3; Investigation 4, Part 1; Investigation 2, Parts 3 **Materials:** See materials list Investigation 1 p.8, 19; Investigation 2 p. 19; Investigation 3 p.8, 12, 17, 21 FOSS Science Stories; Wet and Dry Places; Evaporation and Condensation; The Water Cycle; FOSS Web Activity: Evaporation; FOSS Web, Picture Water Cycle Investigation 4 p.14 FOSS Science Stories The Power of Water FOSS Web Activity Match the Resource FOSS Science **stories pp.17-20, 23** **Assessment:** Teacher Observation, Assessment charts, End of Module Assessment, Portfolio assessment, benchmarks

4th Grade Science

COURSE BENCHMARKS

The student will be able to…

Unit I
Understand and discuss the structure, characteristics and needs of organisms Investigate and explain the diversity of life
Unit II
Design and build a vehicle to meet certain requirements Set up a system to pull their vehicle and meet time requirements Draw conclusions about the effect of differently weighted strings on their vehicle Create graphs to display their results
Unit III
Write detailed procedures and results Demonstrate that two magnets are stronger than one Draw an accurate schematic diagram using conventional symbols Understand that electricity flows through wires, has a magnetic field, and interacts with the magnetic needle of a compass
Unit IV
Observe and explain condensation and how it occurs Use a graduated cylinder to measure and compare Use a balance to compare amounts of water Give examples of renewable and nonrenewable resources Use maps to identify physical features Explain how erosion, weathering, landslides, earthquakes, and volcanic eruptions effect the earth