Fair Lawn

Public Schools

Fair Lawn, NJ

Grade 4 Science

August

2015

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The elementary school science program focuses on inquiry-based, hands-on science instruction. The current program is aligned to the 2009 NJCCCS and a transition plan is in place to move toward the NGSS which includes pilot programs and teacher training.

Science Department

Fair Lawn School District

Committee Credits

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2004

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Grade 4 Science

I. Course Synopsis

Science should be taught with a focus on hands-on student-inquires as well as content driven instruction for three units of study. Students are expected to take part in at least two investigations for each chapter in the textbook with an optional unit summary investigation. Teachers are encouraged to include additional investigations, research, and cross curricular opportunities, especially including literacy and mathematics.

II. Philosophy & Rationale

Through the study of science, students will learn to apply scientific knowledge and problem solving skills to "real-word" situations. Utilizing the scientific method, students will recognize the importance of variables and constants to answer questions and test hypothesis. They will learn to predict the results of investigations, record and construct methods to display data (including bar and line graphs), interpret and then draw conclusions from that data. Through the study of science, students will also learn strategies to determine the meaning of key vocabulary words. The study of science provides an excellent opportunity for students to enhance reading and mathematical skills as they complete student-centered investigations.

Our elementary school science program is undergoing a transition toward the NGSS.

All NGSS aligned courses in the Fair Lawn Schools demonstrate a commitment preparing students to become college and career ready as well as the other guiding assumptions of the Frameworks for Science Education (NRC, 2011) and the NGSS including

- Students are born investigators;
- Science instruction should focus on core ideas and practices;
- An understanding of science develops over time;
- Science and engineering require both knowledge and practice;
- Science education must connect to students' interests and experiences; and
- Promoting equity for all students must be a focus of science education.

Additionally, all NGSS aligned courses in the Fair Law Schools integrate the three dimensions discussed in the Frameworks for Science Education and the NGSS, including

- Science & Engineering Practices which describe behaviors that scientists engage in as they investigate and build models and theories about the natural world and the key set of engineering practices that engineers use as they design and build models and systems; (NGSS PDF)
- Cross Cutting Concepts which link all domains of science and provide an organizational schema for interrelating knowledge from various science fields into a coherent and scientifically-based view of the world; (NGSS PDF) and
- Disciplinary Core Ideas which focus and unite K-12 science, have a broad importance across multiple sciences or engineering disciplines or are a key organizing concept within a single discipline; provide a key tool for understanding or investigating more complex ideas and solving problems; relate to the interests and life experiences of students; are connected to societal or personal concerns that require scientific or technological knowledge; and are teachable and learnable over multiple grades at increasing depth and sophistication. (NGSS PDF)

Once the elementary school program is fully aligned to the NGSS, the above noted concepts will be further and more fully defined within the curriculum.

Since coherence is a main dimension of the NGSS, consider reviewing the "story line" for the middle school physical science, life science, earth and space science, and engineering, technology and applications of science, as well as the high school physical science, life science, earth and space science, and engineering, technology and application of science for a full picture of the NGSS philosophy. For a full picture of how these programs are implemented in the Fair Lawn Schools, visit the district curriculum website.

Differentiated instruction for students at different levels of achievement and specific learning needs (e.g. special education, English Language Learners (ELL), at-risk, and Gifted & Talented) is embedded in targeted scaffolding based on knowledge of each student's interests, needs, and assessment data, including, but not limited to, in class formative and summative assessments.

When deemed appropriate, department teachers will engage students in purposeful paired discussions to share information more effectively, such as the "turn and talk" (Harvey & Daniels, 2009). "Text annotation" could be used, for example to optimize reading comprehension (Daniels & Steineke, 2010).

III. Scope & Sequence

During the 2013-2014 school year, the district implemented a three-four week cycle of science and social studies.

Rather than being asked to teach, and students to learn, science ***and*** social studies every week for a short period of time (1-2) periods, the 2013-2014 will provide teachers and students will a more concentrated amount of time to focus on social studies ***or*** *science* for about 4 weeks. Teachers will be able to connect literacy, technology, and other content areas with this thematic focus on our current social studies and science units.

Unit 1: Electricity, Magnetism, Light, Color, Sound (4 Weeks)

Unit 2: Simple Machines (4 Weeks)

Unit 3: Human Body (4 Weeks)

Elementary School Marking Period Schedule

	MP 1	MP 2	MP 3
K	Matter: Liquids Solids Plants & Animals	Five Senses How & Why Things Move	Caring for Earth Weather
1	Earth & Space*	Weather	Living Things
2	Matter, Weather, Water Cycle	Life Long Ago	Solar System Light & Shadows*
3	Composition & Changing Earth	Living World	Plant & Animal Habitat
4	Electricity, Magnetism, Light, Color Sound	Simple Machines	Human Body
5	Weather & Our Environment	Our Solar System & Beyond*	How & Why Things Work

IV. Unit Descriptions

Throughout each of the following units, students and teachers should focus on the development of science practices (5.1).

Fourth Grade – Science-2004			
Light and Color (10 weeks)			
Unit/Concept/Objective	Standards	Terminology	Possible Resources
a) How is light reflected? b) How does light bend? c) How are shadows formed? d) What happens to light as it passes through a prism? e) How is a rainbow formed?	5.2.4.A.1-4 5.2.4.B.1 5.2.4.C.1-4 5.2.4.D.1	Ray Reflection refraction shadow prism spectrum rainbow absorb opague transparent translucent concave convex prism focal point	Harcourt Science Chap. 4 Lesson 1& 2

Fourth Grade - Science- 2004			
Sound (4 weeks)			
Unit/Concept/Objective	Standards	Terminology	Possible Resources
a) How does sound travel? b) How sound travels in waves? c) How does sound travels through liquids, solids and gas? d) How sound travels through your ear?	5.2.4.A.1-4 5.2.4.B.1 5.2.4.C.1-4 5.2.4.D.1	Wave pitch Echo vibration, Decibel Frequency tuning fork Compression Sonic boom	Harcourt Chapter 3 Lesson 1-3 Awesome Experiments In Light & Sound

Fourth Grade – Science- 2004			
Electricity and Magnetism (10 weeks)			
Unit/Concept/Objective	Standards	Terminology	Possible Resources
a) Understanding static electricity b) How does electricity travel through a current? c) What materials can electricity travel through? d) Differentiate between a series circuit and a parallel circuit e) The properties of magnetism	5.2.4.A.1-4 5.2.4.B.1 5.2.4.C.1-4 5.2.4.D.1	Charge circuit current conductor insulator positive charge negative charge static electricity magnet poles electromagnet	Harcourt Science Series Chapter 1 Lesson 1-4 Scholastic Science Series

Fourth Grade – Science- 2004			
Human Body Systems (Time Frame 6 weeks)			
Unit/Concept/Objective	Standards	Terminology	Possible Resources
a) How do the skeletal & muscular systems of the body work?	5.3.4.A.1-3	Tissue Organ Cardiac muscle Smooth muscle Striated muscle	Harcourt Brace Chapter 4 Unit A
b) How do the respiratory & circulatory systems of the body work?		Lungs Capillary Heart Artery Vein	
c) How do the nervous & digestive systems of the body work?		Brain Neuron Nerve Spinal cord Esophagus Stomach Small intestine Large intestine	

Fourth Grade – Science- 2004			
Simple Machines (10 weeks)			
Unit/Concept/Objective	Standards	Terminology	Possible Resources
a) What is work? How is force measured?	5.2.4.E.1-4	Simple Machine Force work	Harcourt Science Chapter 3 Lessons 1-5
b) Understanding inclined planes		Inclined planes Screw wedge	
c) Understand & identify inclined planes			
d) Understand & identify fixed & moveable pulley's		Lever Fulcrum pulley fixed pulley moveable pulley wheel axle gear Friction Compound machine spring scale lubrication	
e) Explain how a wheel & axle make work easier			
f) How do gears work?			
g) Identify simple machines within a compound machine			
h) How does friction affect force?			
i) How do wheels reduce friction?			

j) How does lubrication reduce friction?			

Suggested Activities & Suggested Modifications for Special Education Students, ELL Students, Students at Risk, and Gifted Students:

1. Students with special needs and ELL learners may be provided with key vocabulary terms prior to the unit beginning. In particular, the amount of key vocabulary terms should be reduced for ELL students.
2. Opportunities should be given to students to form connections between math and literacy skills and concepts.
3. ELL students may be provided with additional visual aids. For additional modifications, refer to Classroom Instruction that Works for ELL Learners *or the* SIOP protocol.
4. Gifted students may be challenged by asking them to form additional connections between life, earth and physical science concepts and to engage in additional critical thinking or research studies.

V. Course Materials
Harcourt McGraw Hill Science

VI. Assessment
Student content knowledge and understanding will be assessed through tests, quizzes, lab reports, performance assessments, and classroom activities. (Rubrics are available in the activity book and on-line.) Students will participate in an analysis of a piece of modern technology during the "How & Why Things Work" unit which will involve an oral and written presentation.

VII. Cross Curricular Aspects

The study of science provides an excellent opportunity for students to enhance reading and mathematical skills as they complete student-centered investigations. Teachers are urged to integrate literacy through the use of the leveled readers and through instruction of how to read non-fiction text, note taking, etc. The analysis of data through the construction and interpretation of graphs leads to mathematical literacy.

Cross Curricular Aspects

CCCS Literacy: Students will be expected to apply anchor standards for reading and writing in non-fiction situations.

CCCS Math: Students will be expected to perform number operations, measurement, analyze data, and apply geometry. They may be asked to apply the concepts of fractions to scientific principles.

Interdisciplinary Connections and Alignment to Technology standards

Science classes in the Fair Lawn Public schools promote career-readiness skills related to Personal Financial Literacy (9.1) and Career Awareness, Exploration, and Presentation (9.2). Some course concepts from the Career and Technical Education Standards (9.3), but these are not directly correlated since our district is not a CTE program.

The Fair Lawn Public Schools District fosters an environment that promotes career-readiness skills in all content areas. Whereas Career Ready Practices are explored consistently, specific alignment to Personal Finance Literacy (9.1) and Career Awareness, Exploration, and Presentation Standards (9.2) are included in the district level document (below). When appropriate, the Career and Technical Education Standards (9.3) have been reviewed and aligned as well.

Examples:
9.2A: Career awareness as it relates to the study of each unit.
9.2B: Career exploration in each unit of study.

In addition, every effort is made to integrate technology and engineering into our science classes. Educational Technology (8.1) and Technology Education, Engineering, Design, and Computational Thinking – Programming (8.2) standards are cross connected throughout our science programs.

Examples:
8.1A: Use spreadsheets to analyze & interpret data from laboratories, 6-12.
Use the internet to increase productivity and efficiency, 9-12.
8.1B,C: Use data to solve real-world problems, 6-12.
Use online platforms to collaborate & address global issues, 9-12.
8.1F: Collect and analyze data using internet and data simulations, 6-12.
8.2A: Become aware of the invention process, 3-5.
8.2B: Become aware of the global impacts on technology, 6-12.
8.2C: Apply the design process to pushes & pulls, K-2.
8.2D: Use tools to reduce work, K-2.

For additional detail on how these standards are integrated throughout the Fair Lawn Schools curriculum, review the Fair Lawn Public Schools District Alignment to Technology & Career Readiness & 21st Century Skills Standards Curriculum Appendix.

Name _____ Date _____

Science Inquiry Guide

What is the question you are answering? Page # _____
How do you think the materials can be used to answer this question?
What is your prediction/hypotheses as to what will happen?
What are some of the possible variables?
In what way was your prediction proven or disproven?

Summer Science Committee 2009

Oral Presentation Rubric

Title:_____ Score: _____

Name: _____ Date: _____

CATEGORY	4 **Advanced**	3 **Proficient**	2 **Developing**	1 **Needs Improvement**
Content	Shows a full understanding of the topic.	Shows a good understanding of the topic.	Shows a good understanding of parts of the topic.	Does not seem to understand the topic very well.
Focus	Stays on topic all of the time.	Stays on topic most of the time.	Stays on topic some of the time.	It was hard to tell what the topic was.
Fluency	Always speaks in complete sentences. Transitions between ideas.	Usually speaks in complete sentences. Some transitions between ideas.	Sometimes speaks in complete sentences. Few transitions between ideas.	Rarely speaks in complete sentences. No transitions between ideas.
Word Choice	Uses vocabulary appropriate for the audience. Extends audience vocabulary by defining words that might be new to most of the audience.	Uses vocabulary appropriate for the audience. Includes 1-2 words that might be new to most of the audience, but does not define them.	Uses vocabulary appropriate for the audience. Does not include any vocabulary that might be new to the audience.	Uses several (5 or more) words or phrases that are not understood by the audience.
Vocalization	Speaks clearly and distinctly all the time, and mispronounces no words. Uses vocal variety. Well paced.	Speaks clearly and distinctly all the time. Mispronounces few words. Uses some vocal variety. Appropriate pace.	Speaks clearly and distinctly most of the time. Mispronounces some words. Little vocal variety. Inconsistent pace.	Often mumbles or cannot be understood OR mispronounces many words. Monotone. Too fast/ too slow.
Body Language and Eye Contact	Stands up straight, looks relaxed and confident. Gestures enhance performance. Establishes eye contact with everyone in the room.	Stands up straight and uses some gestures. Establishes eye contact with everyone in the room most of the time.	Sometimes stands up straight. Uses few gestures. Little eye contact evidenced.	Slouches and/or does not look at audience during the presentation. No gestures.