Independent School District of Boise City

Science 5 District Course #5006

Course Description

Science at the elementary level will explore concepts in three main areas: earth science, physical science, and life science. One of the best ways to explore these concepts is through the use of our Hands on Science Laboratory Kits. These kits are the foundation of our elementary program and should have first priority in the curriculum continuum. Measurement, Systems Thinking, Inquiry, Technology and Problem Solving, the processes used to learn and understand science concepts, will be integrated into each unit of science. Units may be taught in any order, due to the constraints and/or availability of lab kits and materials.

Adopted Materials

Title: *Science*
Publisher: Scott Foresman

Title: *Using Science Notebooks in Elementary Classrooms*
Publisher: NSTA Press

Hands on Science Laboratory Kits
FOSS Mixtures and Solutions

- STC MicroWorlds
- STC Rocks and Minerals
  www.foridahoteachers.org

Course Scope

Domains of Science	**Nature of Science Systems (S1)**	**Nature of Science Inquiry (S1)**	**Technology & Problem Solving (S5)**
Physical Science (S2) ● Mixtures and Solutions	Complex Systems	Conducting Investigations	Different Technologies
Life Science (S3) ● Cells ● Heredity			
Earth & Space Science (S4) ● Rocks and Minerals ● Plate Tectonics ● Environmental Issues			

Unit	Nature of Science: Systems, Inquiry, Technology and Problem Solving		Integrate in All Units				
1	Instructional Objective Understand Systems, Order, and Organization		Standard Reference Science 5.S.1.1 5.S.1.2 5.S.1.3	LA 5.LA.1.2 5.LA.1.8 5.LA.2.1 5.LA.2.2 5.LA.4.2 5.LA.4.3 5.LA.6.3	Math 5.M.1.2 5.M.1.3 5.M.2.1 5.M.4.1 5.M.5.1 5.M.5.2		
No.	Objectives		Resources		Assessment		
	Know:	Be Able To:	Text	Labs or Activities	SN	EOC	ISAT
01	A system organizes information making it easier for scientist to communicate clearly. A system lists items in groups.	Compare one item to another; do not make multiple-item comparisons. Systems tested should be familiar to students. Systems that could be used to develop items include classroom systems (stations, seating plans, built-in operation schemes), games (tag, kick ball), school systems (student: teacher: principal), the rock cycle, the water cycle, and body systems (skeletal, digestive, respiratory).	Page 7-9 animal classification	Rocks and Minerals Lesson 2 ,3, &14	X		X
02	That change can occur within and among systems.	Explain how rocks changing from sedimentary to igneous to metamorphic in the rock cycle or water moving through the water cycle.	Pgs 354-357	Rocks and Minerals Lesson 3 Mixtures and Solutions Investigations 1 & 2			
03	Observations and data are evidence on which to base scientific explanations and predictions.	Make explanations and predictions based on directly described or illustrated information.	Life Science Pgs 1E and 26E	MicroWorlds Lesson 14			
04	The difference between observation and inference. An observation is using your senses to	Use data to write observations and interpret the data to make inferences.	xxii & xxiii Pgs 337E	Rocks and Minerals			

	find out about other objects, events or living things. An inference is a conclusion based on facts, experiences, observations or knowledge to make a reasonable guess based on what you have learned or what you know.			Lessons 2 &3 & 14			
05	Models explain or demonstrate a concept.	Make a model of a variety of different systems (ie: cells, chemical reactions, rock cycle, plate tectonics, muscles of an arm)	Pg. 33-35	Discovery Streaming "Rock Cycle", "Plate Tectonics"			
06	Both U.S. Customary and International System of Measurement (metric system) units with an emphasis on the metric system.	Measurement should be in millimeters, centimeters, grams.	Pg 340	MicroWorlds Lesson 7 Mixtures and Solutions Investigations throughout entire kit			
2	**Instructional Objective** Understand Scientific Inquiry and Develop Critical Thinking Skills		**Standard Reference**				
			Science **5.S.1.6**	**LA** **5.LA.1.2** **5.LA.1.8** **5.LA.2.1** **5.LA.2.2** **5.LA.4.2** **5.LA.4.3** **5.LA.6.3**	**Math** **5.M.1.1** **5.M.1.2** **5.M.1.3** **5.M.4.1** **5.M.5.3** **5.M.5.4** **5.M.5.5**		
No.	**Objectives**		**Resources**		**Assessment**		
	Know:	**Be Able To:**	**Text**	**Labs or Activities**	**SN**	**EOC**	**ISAT**
01	Questions can be answered by conducting scientific experiments.	Identify the questions being asked in an investigation. Gather scientific evidence that helps to answer a question. Research a given question; plan an appropriate investigation, which may include systematic observations, field studies, models, controlled	Page 7-9 animal classification	Rocks and Minerals Lesson 2 &3	**X**		**X**

		experiments, or open-ended explorations.					
02	A hypothesis is based on observations. A hypothesis is a possible answer to a question based on prior knowledge.	Provide sequential graphics, students will be able to select the most logical hypothesis from a list of possible options.	Pgs 354-357	Rocks and Minerals Lesson 3 Mixtures and Solutions Investigations 1 & 2			
03	Scientific investigations use a control and a variable. A variable is the part of the experiment that can change, while the control remains the same.	Identify a variable and control in an experiment.	Life Science Pgs 1E and 26E	MicroWorlds Lesson 14	**X**		
04	How to read and follow technical instructions.	Will be able to conduct an experiment individually.	xxii & xxiii Pgs 337E	Rocks and Minerals Lessons 2 &3 & 14			
05	Appropriate tools and techniques to gather and display data.	Use metric rulers, bar graphs, and basic tables.	Pg. 33-35	Discovery Streaming "Rock Cycle", "Plate Tectonics"	**X**		**X**
06	That evidence is used to support descriptions, explanations, predictions, and models.	Given a set of evidence or series of observations and be asked to gather information or make predictions based on this evidence.	Pg 340	MicroWorlds Lesson 7 Mixtures and Solutions Investigations throughout entire kit	**X**		**X**
07	How to make alternative explanations and predictions.	Provide sequential graphics and a set of possible explanations, students will be able to select the most logical explanation from a list of possible options.	Page 7-9 animal classification	Rocks and Minerals Lesson 2 &3	**X**		**X**
08	How to communicate scientific procedures and explanations.	Identify a question, state a hypothesis, identify and control variables, test hypothesis and interpret data.	Pgs 354-357	Rocks and Minerals Lesson 3 Mixtures and Solutions Investigations	**X**		

				1 & 2			
3	**Instructional Objective** Understand How Technology and Problem Solving Work Together in Science.		**Standard Reference** **Science 5.S.1.3 5.S.5.2**	**LA 5.LA.1.2 5.LA.2.2 5.LA.4.2 5.LA.6.3**	**Math 5.M.2.1**		
No.	**Objectives**		**Resources**		**Assessment**		
	Know:	**Be Able To:**	**Text**	**Labs or Activities**	**SN**	**EOC**	**ISAT**
01	Science and technology are interdependent. Science drives technology by demanding better instruments and suggesting ideas for new designs. Technology drives science by providing instruments and research methods.	Research examples of how scientists promote technological advances (e.g., how Sir Isaac Newton discovered a spectrum of color in white light; advanced warning systems for natural disasters like hurricanes, tornadoes, etc.)	Career Pages at end of chapters	FOSS Variable Kit including science stories	**X**		
02	How science and technology are part of a student's life.	Understand that people, alone or in groups, invent new tools to solve problems and do work that affects aspects of life outside of science.	Pgs 574-599	MicroWorlds Lessons 5-6			
03	Examples of science and technology.	Recognize which science tools are used to answer specific science needs. Including, but not limited to balances, spring scales, microscopes, hand lenses and computers.		MicroWorlds Lessons 1-5			
04	The process of problem solving begins by defining a problem, identifying criteria for a successful solution, followed by research to better understand the problem, and brainstorming potential solutions.	Formulate a problem that can be solved by the design process, and identify criteria for success. Apply the scientific method to obtain results.			**X**		**X**
05	Measurement is an essential piece in the scientific inquiry process.	Measure in both metric and the U.S. Customary (with an emphasis in metric) and select tools to make the appropriate measurements.			**X**		**X**

Unit	**Physical Science**	**District Course 5006**

4	**Instructional Objective** Understand the Structure and Function of Matter and Molecules and Their Interactions.		**Standard Reference**				
			Science 5.S.2.1	**LA** **5.LA.1.2** **5.LA.1.8** **5.LA.2.1** **5.LA.2.2** **5.LA.4.2** **5.LA.4.3** **5.LA.6.3**	**Math** **5.M.1.1** **5.M.1.2** **5.M.1.3** **5.M.3.2** **5.M.3.3** **5.M.5.1** **5.M.5.2** **5.M.5.3**		
No.	**Objectives**		**Resources**		**Assessment**		
	Know:	**Be Able To:**	**Text**	**Labs or Activities**	**SN**	**EOC**	**ISAT**
01	An element is the basic building block of matter, a compound is a combination of two or more elements that can not be separated by physical means and a mixture is two or more substances that are be mixed together but can be separated because they are not chemically combined.	Identify the characteristics of an element, compound, and mixture.	Pgs 343-347, 350-351, 358-361	Mixtures and Solutions Investigations 1and 4	**X**		**X**
02	The physical differences among solids, liquids and gases.	Recognize the differences in molecular distance between a solid, a liquid, and a gas, as well as differences in basic molecular motion.	Pg 340		**X**		**X**
03	How physical change relates to physical properties.	Recognize the change(s) in physical properties that take place when physical changes occur including ice melting into water and water being heated into steam.	Pg 375		**X**		**X**
5	**Instructional Objective** Develop an Understanding of Atomic Structure		**Standard Reference**				
			Science	**LA** **5.LA.1.2** **5.LA.1.8** **5.LA.2.1** **5.LA.2.2** **5.LA.4.2** **5.LA.4.3** **5.LA.6.3**	**Math** **5.M.1.1** **5.M.5.1**		

No.	Objectives		Resources		Assessment		
	Know:	Be Able To:	Text	Labs or Activities	SN	EOC	ISAT
01	An atom is the smallest whole piece of matter and is made of protons, neutrons, and electrons	Explain that all matter is made of atoms and give examples of common elements due to properties-substances composed of just one type of atom.	Pg 348		X		
02	The periodic table is a chart in which all the elements are arranged according to the repeating patterns of their properties	Be familiar with the arrangement of the periodic table.	Pgs 348-349	Mixture and Solutions FOSS Science Stories	X		
03	Density is the amount of mass in a certain volume of matter	Compare densities of equal volumes of a solid, a liquid or a gas	Pgs 346, 360-361	Mixtures and Solutions Investigations 2 and 3	X		

Unit	Life Science		District Course 5006				
6	Instructional Objective Understand the Cell is the Basis of Form and Function for All Living Things		Standard Reference Science 5.S.3.2 5.S.3.3	LA 5.LA.1.2 5.LA.1.8 5.LA.2.1 5.LA.2.2 5.LA.4.2 5.LA.4.3 5.LA.6.3	Math 5.M.5.1 5.M.5.3		
No.	Objectives		Resources		Assessment		
	Know:	Be Able To:	Text	Labs or Activities	SN	EOC	ISAT
01	The structural differences between plant and animal cells.	Label the readily observable organelles: nucleus, cytoplasm, cell wall, cell membrane, and chloroplast.	Pgs 34-35, 40-43, 52 94-95	Microworlds	X		X

02	How plants use photosynthesis to convert light energy from the sun into chemical energy.	a. Diagram the process in which chlorophyll, carbon dioxide, and water are necessary for photosynthesis to occur. b. know that the energy necessary to "power" the photosynthetic reaction is provided by the Sun.	Pgs 90, 96-97, 116 and 152-153	Microworlds	**X**		**X**
03	The concept that traits are passed from parents to offspring.	Identify the observable family traits such as: eye color, hair color and texture, and widow's peak.	Pg 170-171	Microworlds	**X**		**X**

Unit	**Earth Science**		**District Course 5006**				
7	**Instructional Objective** Understand Scientific Theories of Origin and Subsequent Changes in the Universe and Earth Systems		**Standard Reference**				
			Science 5.S.4.1	**LA 5.LA.1.2 5.LA.1.8 5.LA.2.1 5.LA.2.2 5.LA.4.2 5.LA.4.3 5.LA.6.3**	**Math 5.M.5.1 5.M.5.2**		
No.	**Objectives**		**Resources**		**Assessment**		
	Know:	**Be Able To:**	**Text**	**Labs or Activities**	**SN**	**EOC**	**ISAT**
01	How plate tectonics and continental drift change the surface of the Earth.	Recognize how interaction of plate boundaries relate to the formation of earthquakes and volcanoes	Pgs 266-271	Pg 260	**X**		**X**
02	The rock cycle and identify the three classifications of rocks.	Explain and diagram how sedimentary, igneous, and metamorphic rocks are formed.	Pg 286-289	Rocks and Minerals Lesson 1-3			

Unit	**Personal and Social Perspectives; Technology**	**District Course 5006**
8	**Goal**	**Standard Reference**

	Understand Common Environmental Quality Issues, Both Natural and Human Induced		**Science** **5.S.5.1**	**LA** **5.LA.1.2** **5.LA.1.8** **5.LA.2.1** **5.LA.2.2** **5.LA.4.2** **5.LA.4.3** **5.LA.6.3**	**Math** **5.M.1.2** **5.M.5.1**		
No.	**Objectives**		**Resources**		**Assessment**		
	Know:	**Be Able To:**	**Text**	**Labs or Activities**	**SN**	**EOC**	**ISAT**
01	The differences between renewable and nonrenewable resources.	Classify resources as renewable or nonrenewable.	Pgs 299-329				
02	Issues for environmental studies. Consider different regional issues such as industrial, technical and agricultural with emphasis on local issues like the Boise River, Birds of Prey habitat, salmon recovery, mining and waste management.	Identify events in the local school or community environment including food waste from the hot lunch program, storm runoff entering a local stream, and the impact on grass color due to uneven watering of the school yard.	Pgs 156, 167- 169, 172-177	Pgs 164 & 178-179, 180-181	**X**		**X**

Elementary Lab Kit Scope and Sequence

Strand / Grade	Life	Earth	Physical	Technology/Math
Kindergarten			Fabric	Comparing & Measuring
Grade 1	Organisms	Pebbles, Sand, & Silt	Solids & Liquids	
Grade 2	Life Cycles of Butterflies	Weather / Air & Weather	Changes	Balancing & Weighing
Grade 3	Plant Growth & Development		Chemical Tests	Measurement
Grade 4		Land & Water	Electric Circuits	
Grade 5	Microworlds	Rocks and Minerals	Mixtures & Solutions	
Grade 6	Environments		Motion & Design	Variables

Using Science Notebooks

Model of Metacognition

- Students learn science by accessing prior science content knowledge;
- using science-process skills;
- and applying reading, writing, listening, and speaking skills to learn content

Language Arts

- The applications of LA skills are essential for students not only to develop a deep understanding of science content but also to attain scientific literacy.
- Science is the perfect area to integrate LA, especially expository writing in the form of student science notebooks.
- Notebooks are the best record of what science content is actually taught by teachers and learned by students.
- Notebooks provide an excellent assessment and feedback tool for teachers.
- The integration of LA and science can help teachers address the time issue that is so valuable in our system.

Science Notebooks 7 Essential Components

- Question, Problem, Purpose
- Prediction
- Developing a Plan
- Observation, Data, Charts, Graphs, Drawings, and Illustrations
- Claims of Evidence (analysis)
- Drawing Conclusions
- Reflection – Next Steps and New Questions

*Date and time should be recorded with each entry along with important headings or titles. The notebook is a record of what was observed or measured and this information is available for future use.

Getting Started

- Use writing prompts or sentence stems to get the writing started.
- When students are learning the write, drawings and/or illustrations convey understanding or misunderstanding of concepts.

Questions, Problems, Purpose

- Classroom discussions help students write investigable questions by asking ”What do I want to find out?” or “What is the problem that needs resolution?”.
- Start questions with HOW, WHAT, or WHICH.
- Avoid question that can be answered with a “yes” or “no”, or questions that start with WHY.

Prediction

- A prediction is what students think will happen:
    - I think ___ will happen because... or
    - If ___ then ___ because...
- “ because” activates students recall of prior knowledge.

- Predictions must relate to the focus question that starts the investigation.
- Drawings or illustrations can be used by young or ESL students to make predictions.
- Predictions may reveal misconceptions which gives insight into current student thinking.

Planning
- Writing prompts and scaffolds are used to get students started.
- Stage 1 – developing the general plan (variables and observations) with the help of written prompts.
- Stage 2 – developing the operational plan (steps) from the general plan.
- Build a data organizer to record observations or measurements.

Observations, Data, Charts, Graphs, Drawings, and Illustrations
- Involve the use of any of the five senses.
- Students existing knowledge influences what they hear, see, or smell, which means they will not observe phenomena in the same way.
- Young and ESL students need to draw their observations first and label second
- Observations lead students to see patterns in the collected data.
- Teacher prompts can improve the quality of observations:
    - How are ___ the same as ___?
    - How are ___ different from ___?
    - What did you notice when you ___?
- Use guiding questions to develop charts or graphs of observations or data:
    - Which type of graph is the most appropriate to show your data: Bar, Line, or Pie?
    - What are you going to name or title your graph?
    - What is the best way to show your data: scale, intervals, or symbols?
    - (Older students) Where is your dependent and independent variable?
    - (Older students) What are you going to name each axis?
- Provide chart templates or graphic organizers to students when depicting cycles or relationships.

Three Challenges That Science Programs Face When Fostering Inquiry
- The formulation of scientific explanations from evidence
- Analysis of various types of scientific data
- The formulation of conclusions based on relevant evidence.

Claims and Evidence
- Teachers should provide an explanation framework (T chart) as a means of helping students develop the ability to analyze data:

Claims	Evidence
I claim that... *or* I know that...	I claim this because... *or* I know this because

Drawing Conclusions
- Students look for patterns, interpret, and explain their results.

- Students must use their claims and data to support their conclusions.
- Writing prompts help students for conclusions:
    - Today I learned...
    - I know this because...
- A conclusion is the final “answer” to the focus question or the solution to the problem identified at the beginning of the investigation.

Reflection: Next Steps, New Questions

- Frame questions just as before with scaffolds such as What...?, Which...?, or How...?
- Avoid question that can be answered with a “yes” or “no”, or questions that start with WHY.
- “I wonder what would happen if...?” is a sentence prompt that helps students begin the reflection process.