

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

- STC Organisms
- STC Solids and Liquids
- FOSS Pebbles, Sand, & Silt

Course Scope

Domains of Science	Nature of Science Systems (S1)	Nature of Science Inquiry (S1)	Technology & Problem Solving (S5)
Physical Science (S2) <ul style="list-style-type: none"> • Push, Pull & Position • Properties of Matter- Solids & Liquids 	Part-Whole Relationships	Making Observations	Tools & Materials
Life Science (S3) <ul style="list-style-type: none"> • Plant & Animal Parts • Habitats • Classifying Plants & Animals 			
Earth & Space Science (S4) <ul style="list-style-type: none"> • Observing the Sun & Moon • Earth Materials 			

Unit	Nature of Science: Systems, Inquiry, Technology & Problem Solving		District Reference 1006				
1	Instructional Objective Systems Thinking - Understand part-whole relationships.		Standard Reference				
			Science 1.S.1.2 1.S.1.6 1.S.1.7 1.S.1.8	LA 1.LA.1.2 1.LA.4.1 1.LA.4.2 1.LA.6.1	Math 1.M.2.1 1.M.3.4 1.M.5.1 1.M.5.2		
No.	Objectives		Resources		Assessment		
	Know:	Be Able To:	Text	Labs or Activities	S N	E O C	I S A T
01	Living and nonliving systems are made up of parts.	Given an object, organism or material, students will identify the parts and the whole.	<i>Scott Foresman Science</i>				
02	The names of the parts of a system are different from the names of the whole system.	Identify the whole.	<i>Scott Foresman Science</i>				
03	Some objects can be taken apart and put back together and some cannot.	Given several common objects, identify which objects may be taken apart and put back together without damage.	<i>Scott Foresman Science</i>				
04	When parts of a system are put together they can do things that they couldn't do by themselves.	Construct simple devices to do common tasks using common materials and explain how the parts depend on each other.	<i>Scott Foresman Science</i>				
05	Some systems may not work if some of its parts are missing.	Predict what would happen if a system (device, natural, or living thing) had a missing or broken part.	<i>Scott Foresman Science</i>				
2	Instructional Objective		Standard Reference				

			Science 1.S.1.2 1.S.1.6 1.S.1.7 1.S.1.8	LA 1.LA.1.2 1.LA.4.1 1.LA.4.2 1.LA.6.1	Math 1.M.2.1 1.M.3.4 1.M.5.1 1.M.5.2
No.	Objectives		Resources		Assessment
	Know:	Be Able To:	Text	Lab Kit	S N E O C I S A T
01	Investigations start with questions about the natural world.	Ask questions about objects, organisms, and events in their environment.	<i>Scott Foresman Science</i>		
02	Making and recording observations are the first steps to help us answer questions.	Observe patterns and relationships in the natural world and record observations in a table, picture graph, or science notebook.	<i>Scott Foresman Science</i>		
03	Understand that models represent real objects, events or processes.	Given a model of an object found in the real world, explain how it is like and unlike the object that it represents. Create a simple model (e.g. diagram or map, or physical model) of a common object, event or process.	<i>Scott Foresman Science</i>		
04	All observations must be reported honestly and accurately.	Record observations honestly and accurately even when they don't match initial expectations.	<i>Scott Foresman Science</i>		
3	Instructional Objective Technology & Problem Solving – Develop an understanding that we use tools to help us make observations about nature.		Standard Reference		
			Science 1.S.1.2 1.S.1.6 1.S.1.7 1.S.1.8	LA 1.LA.1.2 1.LA.4.1 1.LA.4.2 1.LA.6.1	Math 1.M.2.1 1.M.3.4 1.M.5.1 1.M.5.2
No.	Objectives		Resources		Assessment
	Know:	Be Able To:	Text	Labs or Activities	S N E O C I S A T

01	We use our senses to understand our world.	Use their senses to make observations.	Scott Foresman Science		X		
02	Simple instruments provide more information than observation through senses alone.	Measure using simple tools such as rulers, thermometers, magnifiers, and balances to collect data.	Scott Foresman Science				
03	Results of investigations are communicated in ways that others can learn from the results.	Record observations and measurements in science notebooks.	Scott Foresman Science		X		
04	Science is used everyday.	Give examples of how diverse people (children, parents, cooks, weather reporters, healthcare workers, gardeners) use science in daily life.	Scott Foresman Science				

Unit	Physical Science		District Reference 1006				
4	Instructional Objective Understand how properties are used to identify, describe and categorize states of matter		Standard Reference				
			Science 1.S.2.1	LA 1.LA.1.2 1.LA.4.1 1.LA.4.2 1.LA.6.1	Math 1.M.2.1 1.M.3.4 1.M.5.1 1.M.5.2		
No.	Objectives		Resources		Assessment		
	Know:	Be Able To:	Text	Labs or Activities	S N	E O C	I S A T
01	Solids and liquids can be described by their properties.	Observe, describe, and classify the properties of solids and liquids. (Liquid: definite volume and flows, does not have definite shape. Solid: defined shape takes up space and does not flow.)	Ch. 8	Solids and Liquids Pebbles, Sand and Silt activity 1, 2, 4	X		
02	Materials can exist in different states.	Conduct tests to classify a material as a solid or liquid.	Ch. 8	Solids and Liquids			
03	Materials can change states of matter.	Observe and describe/illustrate the changes in water as it goes through the states of solid, liquid	Ch. 8	Solids and Liquids	X		

		and gas.					
5	Instructional Objective Understand how the position and motion of objects are affected by different forces.		Standard Reference				
			Science 1.S.2.1 1.S.2.2	LA 1.LA.1.2 1.LA.4.1 1.LA.4.2 1.LA.6.1	Math 1.M.2.1 1.M.3.4 1.M.5.1 1.M.5.2		
No	Objectives		Resources		Assessment		
	Know:	Be Able To:	Text	Labs or Activities	S N	E O C	I S A T
01	Objects may move in many different ways (i.e. revolve, rotate, at rest, float, fall).	Conduct tests to examine the factors that affect movement.	Ch. 9	Solids and Liquids			
02	The position and motion of objects can be changed by pushing or pulling.	Predict, test, and describe pushing and pulling of objects.	Ch. 9	Solids and Liquids	X		
03	The size of the change is related to the strength of the push or the pull.	Predict, test, and describe pushing and pulling of objects using different amounts of force.	Ch. 9	Solids and Liquids	X		
04	Things near the earth fall to the ground unless something holds them up.	Demonstrate and explain that gravity is a force that pulls things down.	Ch. 9	Solids and Liquids			
05	Some forces can act without touching an object. (magnets, gravity)	Observe and show that a magnet can push or pull some objects without touching an object.	Ch. 9	Solids and Liquids			

Unit	Life Science	District Reference 1006				
6	Instructional Objective Understand the structure and function of plant and animal parts		Standard Reference			
			Science 1.S.2.1.1 1.S.3.1.1 1.S.3.1.2 1.S.3.2.1	LA 1.LA.1.2 1.LA.4.1 1.LA.4.2 1.LA.6.1	Math 1.M.2.1 1.M.3.4 1.M.5.1 1.M.5.2	
No	Objectives		Resources		Assessment	
	Know:	Be Able To:	Text	Labs or	S N	E O S

				Activities		C	A T
01	Objects are living or non-living.	Sort and classify objects as living or nonliving.	Ch. 1, 2, 3, 4, 5	Organisms			
02	Most living things need water, air, space, food, and shelter.	Observe and record that most living things need food, water, and air. Observe and record or demonstrate that plants need light.	Ch 1, 2, 3, 4, 5	Organisms	X		
03	Animals move in different ways	Graph parts needed to move and ways animals can move.	Ch 1, 2, 3, 4, 5	Organisms	X		
04	Plants and animals have different structures that serve different functions in growth and survival.	Identify and describe root, stem, leaf, flower, seed. Identify and describe different animal structures. (e.g., wings, fur, claws, scales, etc.) Identify and describe structures that change over the life cycle (e.g., seed-flower, eggs-chickens, eggs-frogs,)	Ch 1,2, 3, 4 5	Organisms	X		
05	Humans are similar to other organisms. Humans have basic needs and also grow, change and die.	Identify and describe the external parts of the body (e.g. head, hands, fingers, eyes and ears). Apply what students know about plants and animals to what students know about themselves.	Ch 1, 2, 3, 4 5	Organisms	X		
7	<p align="center">Instructional Objective</p> <p align="center">Understand that plants and animals live and survive in different environments.</p>	Standard Reference					
		Science 1.S.2.1.1 1.S.3.1.1 1.S.3.1.2 1.S.3.2.1 1.S.5.1.1	LA 1.LA.1.2 1.LA.4.1 1.LA.4.2 1.LA.6.1	Math 1.M.2.1 1.M. 3.4 1.M. 5.1 1.M. 5.2			
No	Objectives		Resources		Assessment		
	Know:	Be Able To:	Text	Labs or Activities	S N	E O C	I S A T

01	Many different kinds of living things live in a variety of environments.	Compare and contrast different habitats or environments (aquatic, arctic, rainforest, freshwater, woodland, desert)	Ch. 1, 2, 3, 4, 5	Organisms	X		
02	Unique characteristics of plants and animals allow them to survive in a specific ecosystem.	Compare and contrast the structures of plants and animals in different environments (aquatic, arctic, rainforest, freshwater, woodland, desert)	Ch. 1, 2, 3, 4, 5	Organisms Guided Inquiry p. 40, 74,	X		
03	Activities of humans affect plants and animals in many ways.	Describe ways humans affect plants and animals both positively and negatively.	Ch 6	Organisms	X		
04	Plants and animals are dependent on each other for survival	Describe how animals depend on plants or other animals (food, oxygen, seeds, pollination, shelter)	Ch.1, 2, 3, 4, 5, 6 P 160	Organisms	X		
05	People need water, food, air, waste removal, in a particular range of temperatures in their environment just as other animals do.	Apply what they know about plants and animals to what they know about themselves.	Ch. 1, 2, 3, 4, 5	Organisms	X		
8	Instructional Objective Understand that plants and animals change over time in order to survive.		Standard Reference				
			Science 1.S.3.1.1 1.S.3.1.2 1.S.3.2.1 1.S.2.1.1	LA 1.LA.1.2 1.LA.4.1 1.LA.4.2 1.LA.6.1	Math 1.M.2.1 1.M.3.4 1.M.5.1 1.M.5.2		
No.	Objectives		Resources		Assessment		
	Know:	Be Able To:	Text	Labs or Activities	S N	E O C	I S A T
01	Some kinds of organisms that once lived on earth have completely disappeared although they were similar to others that are alive today.	State that fossils represent the remains of prehistoric plants and animals similar to present day living organisms.	p. 174-176	United Streaming Trade Books Internet sites			
02	Offspring are very much but not exactly like their parent and like one another.	Write 2 sentences that compare and contrast an offspring with its parent (butterfly, tadpole, guppy, snail, kitten, mealworm, puppy, chick, brine shrimp)	Ch.. 4	p. 84 Organisms	X		
03	Animals and plants grow and change	Observe and describe the life cycle of a plant and animal. Plants (seed, growth, reproduction,	Ch. 4	Organisms	X		

		death) Animals (birth, development, reproduction, death)					
04	Some animals and plants are alike in the way they look and the things they do and others are very different from one another.	Compare and contrast animals and plants in fresh water and woodland habitats.	Ch. 2, 3, 4, 5	Organisms	X		

Unit	Earth and Space Science		District Reference 1006				
9	Instructional Objective Understand there are patterns to the relative motions of the earth, sun and moon.		Standard Reference				
			Science 1.S.1.4.1 1.S.2.2.1	LA 1.LA.1.2 1.LA.4.1 1.LA.4.2 1.LA.6.1	Math 1.M.2.1 1.M. 3.4 1.M. 5.1 1.M. 5.2		
No.	Objectives		Resources		Assessment		
	Know:	Be Able To:	Text	Labs or Activities	S N	E O C	I S A T
01	Earth's rotation causes day and night	State that the earth's rotation causes day and night.	Ch 11	websites			
02	The moon does not change. It looks different every night because of the sun's shadow but looks the same again every four weeks.	Using websites observe phases of the moon and illustrate 4 phases during a month.	Ch 11	United streaming, websites			
10	Instructional Objectives Understand local weather changes from day to day but trends in temperature, or of rain or snow, tend to be predictable during a season.		Standard Reference				
			Science 1.S.2.1.1 1.S.2.2.1 1.S.3.1.1 1.S.3.1.2 1.S.3.2.1 1.S.4.1.1 1.S.5.1.1	LA 1.LA.1.2 1.LA.4.1 1.LA.4.2 1.LA.6.1	Math 1.M.2.1 1.M. 3.4 1.M. 5.1 1.M. 5.2		
No	Objectives		Resources		Assessment		
	Know:	Be Able To:	Text	Labs or	S N	E O	I S

				Activities		C	A T
01	Weather conditions change from day to day and from season to season.	Name common local weather conditions for each season (e.g. rain, snow, wind.) Observe, measure and record local weather conditions, noting changes and patterns from day to day and over the seasons.(e.g. temperature, wind, rain, snow, clouds)	Ch 7	United Streaming		X	
02	Seasonal patterns such as weather and length of day are associated with changes in humans, plant and animal life.	Identify changes in human, plant and animal life associated with seasons. (e.g., clothing choices, trees losing leaves, animal migration, fur, and birth)	Ch. 7,	United Streaming		X	
03	The sun provides the light and heat (energy) necessary to warm the land, air and water.	State that the sun is the source of light and heat.	Ch 10	United Streaming			
11	Instructional Objective Earth materials have different physical properties which make them useful in different ways.	Standard Reference					
		Science 1.S.2.1.1 1.S.2.2.1	LA 1.LA.1.2 1.LA.4.1 1.LA.4.2 1.LA.6.1	Math 1.M.2.1 1.M. 3.4 1.M. 5.1 1.M. 5.2			
No.	Objectives		Resources		Assessment		
	Know:	Be Able To:	Text	Labs or Activities	S N	E O C	I S A T
01	Some materials are natural and some are manufactured (man made).	Identify and describe the differences between common natural and manufactured materials and objects using properties.	Ch 6	Pebbles, Sand and Silt Kit		X	
02	That earth materials can have many properties, including size, weight, shape, color, texture.	Observe, describe and sort earth materials based on properties.	Ch 6	Pebbles, Sand and Silt Kit		X	
03	Earth materials are natural resources suitable for specific uses.	Observe and list common uses (construction, decoration) of basic earth materials (rocks, water, soil)	Ch 6	Pebbles, Sand and Silt Kit		X	
04	Land is affected by wind, ice, rain, water.	List forces of nature that change the land.	Ch. 6			X	

			p. 158, 159			
05	Some changes are so slow or so fast that they are hard to see	Describe changes that happen over time. (erosion, weathering)	P 146		X	

Elementary Lab Kit Scope and Sequence

Grade \ Strand	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 to 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 questions 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...	I claim this because...
<i>or</i>	<i>or</i>
I know that...	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.