

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 Balancing and Weighing
- STC Changes
- STC The Life Cycle of Butterflies
- FOSS Air and Weather

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"> • Force & Motion • States of Matter | Role of Each Part in a System | Conducting Investigations | Solving Problems With Tools |
| Life Science (S3) <ul style="list-style-type: none"> • Life Cycles • Habitats • Classifying Animals | | | |
| Earth & Space Science (S4) <ul style="list-style-type: none"> • Weather & Water • Air • Natural Resources | | | |

| Unit | Nature of Science: Systems Thinking, Inquiry, Technology & Problem Solving | | Integrate in All Units | | | | |
|------|--|---|------------------------|-------------------------------------|----------------------------|-------------|------------------|
| 1 | Instructional Objective | | Standard Reference | | | | |
| | Understand Systems Thinking; the Role of Each Part in a System | | Science 2.S.1.1 | LA | Math | | |
| 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 things are made up of parts. | Given a picture of a whole object, plant, or animal, name the parts. | Ch 1 Lesson 1 | The Lifecycle of Butterflies | X | | |
| 02 | The names of the parts are different from the names of the whole object. | Compare a part of an object with the whole object correctly using the words "whole" and "part." | Ch 1 Lesson 1 | All | X | | |
| 03 | Some objects can be taken apart and put back together. | Given several common objects, identify which objects may be taken apart and put back together without damage. | | Balancing & Weighing; Changes | X | | |
| 04 | Other objects cannot be taken apart without breaking them. | Given several common objects, identify which objects may be taken apart and put back together without damage. | | Balancing & Weighing; Changes | X | | |
| 2 | Instructional Objective: Inquiry | | Standard Reference | | | | |
| | Conducting Investigations | | Science 2.S.1.2.1 | LA 2.LA.6.2 2.LA.6.1 | Math 2.M.5.1 2.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. | Ch 1-4 | The Lifecycle of Butterflies | X | | |

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| 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 or picture graph. | Ch 6 Lessons 1-7 | Air & Weather | X | | |
| 03 | Observations are more reliable if they are repeated, especially by different people. | State verbally the need to repeat observations in order to be certain the results are reliable. | Ch 6 Lessons 1-7 | | | | |
| 04 | All observations must be reported honestly and accurately. | Record observations honestly and accurately. | | The Lifecycle of Butterflies; Air & Weather; Changes | X | | |
| 05 | Explanations can be made after many observations. | Participate in a discussion of how the recorded observations might answer the question. | | The Lifecycle of Butterflies; Air & Weather; Changes | | | |
| 06 | Models represent real things in some ways but not others. | Given a model of an object found in the real world, explain how it is like and unlike the object that it represents. | | | X | | |
| 3 | Instructional Objective Technology and Problem Solving - Solving Problems With Tools | | Standard Reference | | | | |
| | | | Science 2.S.1.3 2.S.1.6 | LA 2.LA.1.2 2.LA.6.2 | Math 2.M.2.1 | | |
| No. | Objectives | | Resources | | Assessment | | |
| | Know: | Be Able To: | Text | Labs or Activities | S N | E O C | I S A T |
| 01 | Scientists use standard and/or metric units of measurement when collecting data. | Measure in standard and/or metric units. | Throughout text | | X | | |
| 02 | Humans identify time in past, present, and future. | Discuss the concepts of past, present, and future. | | | | | |
| 03 | Scientists use the scientific method to conduct experiments and learn about our world. | Utilize the scientific method. | | | X | | |
| 04 | Asking questions is the basis of science. | Use scientific inquiry to develop critical thinking | | | X | | |

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| | | skills. | | | | |
| 05 | The use of technology advances scientific discovery. | Identify the relationship between science and technology. | | | | |
| 06 | Scientific tools are used to discover solutions. | Use available technology to assist in solving problems. | | | | |
| 07 | It is important to understand that interpersonal relationships are important in scientific endeavors. | Work in teams to solve scientific problems. | | | X | |
| 08 | Scientists have been discovering details about our world for centuries. | Identify the contributions of notable scientists. | | | | |

| Unit | Physical Science - Matter, Forces, and Motion | | District Reference 2006 | | | | |
|------|---|---|-------------------------|---|-----------------|-------------|------------------|
| 4 | Instructional Objective | | Standard Reference | | | | |
| | Understand the properties of matter | | Science 2.S.2.1 | LA 2.LA.4.2 | Math 2.M.4.1 | | |
| No. | Objectives | | Resources | | Assessment | | |
| | Know: | Be Able To: | Text | Labs or Activities | S N | E O C | I S A T |
| 01 | Matter takes up space and has mass. | Explore matter. (e.g., Gas In A Bag! Experiment.) | Ch 8 | Changes; Air & Weather http://www.schools.pinellas.k12.fl.us/educators/tec/Davis2/matter.ppt/sld001.htm | | | |
| 02 | Matter can be described, classified, and compared by its physical properties. | Identify physical properties of a variety of objects. | Ch 8 | Changes; Air & Weather; Balancing & Weighing | X | | |
| 03 | The three states of matter are solid, liquid, and | List examples of a solid, a liquid, and a gas. | Ch 8 | Changes; Air | X | | |

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| | gas. | | | & Weather | | | |
| 04 | Solid is matter that has its own size and shape. Solids retain their shape regardless of the container they occupy. | Define properties of solid objects. | Ch 8 | Changes; Balancing & Weighing | X | | |
| 05 | A liquid is matter that does not have its own shape and takes the shape of its container. Liquids take the shape of the part of the container they occupy. | Define properties of liquids in different containers. | Ch 8 | Changes | X | | |
| 06 | A gas is matter that does not have its own shape and size and takes the shape of its container. | Define properties of gas. | Ch 8 | Changes; Air & Weather | X | | |
| 5 | Instructional Objective | | Standard Reference | | | | |
| | Develop an understanding of how matter can change. | | Science 2.S.2.1 | LA 2.LA.6.3 | Math | | |
| No. | Objectives | | Resources | | Assessment | | |
| | Know: | Be Able To: | Text | Labs or Activities | S N | E O C | I S A T |
| 01 | The physical properties of matter can change. | Identify changes that occur in matter. | Ch 8 | Changes; The Lifecycle of Butterflies | X | | |
| 02 | The chemical properties of matter can change. | Observe the formation of rust. | | Changes | X | | |
| 03 | Matter can change states. | Show how water can change states. | Ch 8 | Changes; Air & Weather | X | | |
| 04 | Some solids can dissolve in liquid. | Dissolve a solid in a liquid. Example: Gas In A Bag!, A Dissolving Race, Bubbles and Fizz, Changing Salt Water To Crystals | Ch 8 | Changes | X | | |
| 05 | Liquids evaporate when exposed to air. | Observe how a liquid in a covered and an uncovered dish differ in the evaporation process. | Ch 8 | Changes | X | | |
| 6 | Instructional Objective | | Standard Reference | | | | |

| | | | Science 2.S.2.2 | LA 2.LA.4.2 | Math 2.M.4.1 | | |
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| No. | Objectives | | Resources | | Assessment | | |
| | Know: | Be Able To: | Text | Labs or Activities | S N | E O C | I S A T |
| 01 | Motion is the act of moving. | Record changes in the position of an object and describe the resulting motion. | Ch 10 Lesson 1 | Balancing & Weighing | X | | |
| 02 | A force is a push or pull that makes an object move. | Experiment with pushing and pulling. | Ch 10 Lesson 1 | Balancing & Weighing Discovery Education Streaming Video How Things Move (16 min.) | X | | |
| 03 | Gravity is a force. | Throw a basketball towards a hoop and explain what causes it to return to the ground. | Ch 10 Lesson 1 | Balancing & Weighing | X | | |
| 04 | Work happens whenever a force makes an object move. | Illustrate examples of work: shoveling, digging, pulling a wagon, riding a bike, etc. | Ch 10 Lesson 2 | Balancing & Weighing | X | | |
| 05 | Friction is a force that makes moving objects slow down or stop. | Compare the movement of an object across a smooth surface and a rough surface: sand paper vs. waxed paper, smooth floor vs. carpet. | Ch 10 Lesson 3 | Balancing & Weighing | X | | |
| 06 | There is a relationship between balance and the position of two masses. | Use a beam and equal arm balance to examine the relationship between balance and mass. | | Balancing & Weighing | X | | |
| 07 | The location of the fulcrum affects balance. | Use the beam balance to explore the position of the fulcrum and its relationship to balance. | | Balancing & Weighing | X | | |

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| Unit | Earth Science - Weather, Water, and Natural Resources | District Reference 2006 |
| 7 | Instructional Objective | Standard Reference |

| | | | Science 2.S.4.1 | LA 2.LA.1.2 | Math 2.M.5.1 | | |
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| No. | Objectives | | Resources | | Assessment | | |
| | Know: | Be Able To: | Text | Labs or Activities | S N | E O C | I S A T |
| 01 | Weather varies from season to season. | Draw an outdoor scene that depicts typical weather for each season. | Ch 6 Lesson 1-7 | Air & Weather | X | | |
| 02 | Different weather conditions exhibit different characteristics. | List or draw the characteristics of different weather conditions. | Ch 6 Lesson 1-7 | Air & Weather | X | | |
| 03 | The way water moves from the clouds to the Earth and back to the clouds again is called the water cycle. | Conduct an investigation to demonstrate the water cycle. | Ch 6 Lesson 2 | Air & Weather; Changes; Discovery Education Streaming Video <u>Clouds, Weather, and Life</u> (12:05 min.) | X | | |
| 04 | There are three basic types of cloud formations: cirrus, stratus, and cumulus. | Draw and label each of the three types of clouds. | | Air & Weather; Discovery Education Streaming Video <u>Clouds, Weather, and Life</u> (12:05 min.) | X | | |
| 05 | Weather has observable patterns. | Observe and describe patterns of weather and temperature. | | Air & Weather | X | | |
| 06 | Weather can be predicted by observing recorded patterns. | Chart the early morning weather conditions, make a prediction for the day's weather based on charted conditions, and compare his or her predictions to actual conditions at the end of the | | Air & Weather | X | | |

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| | | day. | | | | | |
| 07 | Meteorologists use a variety of instruments to chart, graph, and predict changes in weather. | Become familiar with instruments that monitor weather conditions. | Ch 13 Lesson 4 | Air & Weather | | | |
| 8 | Instructional Objective | | Standard Reference | | | | |
| | Air and Its Effects on Weather | | Science 2.S.4.1 | LA 2.LA.4.2 | Math 2.M.4.1 | | |
| No. | Objectives | | Resources | | Assessment | | |
| | Know: | Be Able To: | Text | Labs or Activities | S N | E O C | I S A T |
| 01 | Air is a gas. | Demonstrate that air is invisible and takes up space. | Ch 8 Lesson 2 | Air & Weather | | | |
| 02 | Air interacts with objects. | Investigate the movement of air. | | Air & Weather | | | |
| 03 | Wind is moving air. | Design and construct a project that uses air to make it move (i.e. mobile). | | Air & Weather | | | |
| 9 | Instructional Objective | | Standard Reference | | | | |
| | Understand the importance of natural resources and the need to manage and conserve them. | | Science 2.S.5.1 | LA 2.LA.4.2 | Math | | |
| No. | Objectives | | Resources | | Assessment | | |
| | Know: | Be Able To: | Text | Labs or Activities | S N | E O C | I S A T |
| 01 | A natural resource is a useful thing that comes from nature. | Identify natural resources. | Ch 5 Lesson 1 | BFI, Foothills Learning Center, Botanical Garden | X | | |
| 02 | Air is a natural resource. | Analyze the importance of resources (i.e. rocks, water, plants, and soil). | Ch 5 Lesson 1 | BFI, Foothills Learning Center, | X | | |

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| | | | | Botanical Garden | | | |
| 03 | Changes in the environment affect living things (i.e forest fires, floods, litter, water and air pollution, etc.). | Draw a before and after picture of a given environment identifying a change. | Ch 5 Lesson 4-5 | BFI, Foothills Learning Center, Botanical Garden | X | | |
| 04 | People can conserve natural resources through recycling efforts. | Explore ways people can prevent pollution by participating in school wide recycling programs. | Ch 5 | BFI, Foothills Learning Center, Botanical Garden | X | | |

| Unit | Life Science - Life Cycles | | District Reference 2006 | | | | |
|------|---|--|-------------------------|--------------------|------------------|-------------|------------------|
| 10 | Instructional Objective Develop an understanding that animals can be grouped according to their characteristics. | | Standard Reference | | | | |
| | | | Science 2.S.3.1 | LA | Math 4.1 | | |
| No. | Objectives | | Resources | | Assessment | | |
| | Know: | Be Able To: | Text | Labs or Activities | S N S N | E O C | I S A T |
| 01 | A living thing has a life cycle, including reproduction and death, and a nonliving thing does not. | Compare living and nonliving things. | | | X | | |
| 02 | Animals can be classified as vertebrates or invertebrates. | Create a T-Chart of common animals according to their classification. | Ch 2 | | X | | |
| 03 | Vertebrates and Invertebrates can be classified into smaller groups. | Sort animals according to classification: mammals, birds, fish, reptiles, amphibians, and insects. | Ch 2 | | X | | |
| 11 | Instructional Objective Develop an understanding that living things grow and change. | | Standard Reference | | | | |
| | | | Science 2.S.3.1 | LA 2.LA.4.4 | Math 4.1 | | |

| No. | Objectives | | Resources | | Assessment | | |
|-----|--|---|---------------------------|---|------------|-------------|------------------|
| | Know: | Be Able To: | Text | Labs or Activities | S N | E O C | I S A T |
| 01 | The way a living thing grows and changes is called a life cycle. | Illustrate a human life cycle including infancy, childhood, adolescence, and adulthood. | | The Life Cycle of Butterflies | X | | |
| 02 | An insect life cycle has four stages. | Draw the four stages of an insect's life cycle. | | The Life Cycle of Butterflies http://teams.lcoe.edu/documentation/classrooms/judi/life/activities/cycles/life_cycles.html Discovery Education Streaming Video Segment <u>The Lives of Butterflies</u> found in TLC Elementary School: Our Natural World (8:45 min.) | X | | |
| 03 | Life cycles follow similar patterns. | Compare and contrast the life cycles of at least two living things. | | The Life Cycle of Butterflies | X | | |
| 04 | Body parts have a specific purpose. | Label the parts of a butterfly, chrysalis, or caterpillar and determine its use or benefit. | | The Life Cycle of Butterflies | X | | |
| 12 | Instructional Objective | | Standard Reference | | | | |

| | | | Science 2.S.3.1 2.S.3.2 | LA 3.5 4.2 | Math 5.2 | | |
|-----|---|--|-------------------------------|--|-------------|-------------|------------------|
| No. | Objectives | | Resources | | Assessment | | |
| | Know: | Be Able To: | Text | Labs or Activities | S N | E O C | I S A T |
| 01 | All living things need air, water, food, and shelter. | List the four things necessary for survival. | Ch 3 | The Life Cycle of Butterflies | X | | |
| 02 | An animal's habitat provides for its basic needs. | Chose an animal and write a description explaining how its basic needs are met in its habitat. | Ch 3 | The Life Cycle of Butterflies | X | | |
| 03 | Animals are adapted to their environments: shape, color, camouflage. | Write how color, shape and camouflage benefit an animal in its habitat. | | Foothills Learning Center Trunk: Hawks and Lizards https://college.livetext.com/folder/1821075/uUFMGnDX_science_lesson.ppt#258 http://www.worldofteaching.com/powerpoints/biology/Animal%20Adaptations%201.ppt | X | | |
| 04 | There are similarities and differences between natural and man made environments. | Make a Venn Diagram comparing and contrasting a natural and a man made environment (i.e. playground vs. forest, aquarium vs. ocean, backyard vs. grassland, etc.). | | | 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 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... | 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.