Science Curriculum Unit Planner

Grade: 1

Strand: Scientific Investigation, Reasoning, and Logic

SOL: 1.1
The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

a) the senses are used to observe differences in physical properties;
b) observations are made from multiple positions to achieve a variety of perspectives and are repeated to ensure accuracy;
c) objects or events are classified and arranged according to characteristics or properties;
d) simple tools are used to enhance observations;
e) length, mass, volume, and temperature are measured using nonstandard units;
f) inferences are made and conclusions are drawn about familiar objects and events;
g) a question is developed from one or more observations;
h) predictions are made based on patterns of observations;
i) observations and data are recorded, analyzed, and communicated orally and with simple graphs, pictures, written statements, and numbers; and
j) simple investigations and experiments are conducted to answer questions.

Time: Throughout units all year

1. Desired Results

Enduring Understandings (BIG Ideas)

Scientists use a variety of methods to study and understand the world around them.

Essential Questions

- What can be learned by doing scientific investigations?
- Why do scientists use a variety of methods of investigation?
- How do scientists make and use observations?
- What tools do scientists use?
- How do scientists classify information?

Understanding the Standard	Essential Knowledge, Skills and Processes
• The nature of science refers to the foundational concepts that govern the way scientists formulate explanations about the natural world. The nature of science includes the following concepts: a) the natural world is understandable; b) science is based on evidence, both observational and experimental; c) science is a blend of logic and innovation; d) scientific ideas are durable yet subject to change as new data are collected; e) science is a complex social endeavor; and f) scientists try to remain objective and engage in peer review to help avoid bias. In grade one, an emphasis should be placed on concepts a, b, and e.	Students will: • Use their senses and simple tools, such as a magnifying glass and a balance to enhance their observations of physical properties. • Make repeated observations of an object or event from multiple positions. • Classify and arrange objects or events according to at least two attributes or properties so that similarities and differences become apparent. • Measure length, mass, and volume, using nonstandard units. • Use familiar events and objects to make inferences and draw conclusions.

- Science assumes that the natural world is understandable. Scientific inquiry can provide explanations about nature. This expands students' thinking from just a knowledge of facts to understanding how facts are relevant to everyday life.
- Science demands evidence. Scientists develop their ideas based on evidence and they change their ideas when new evidence becomes available or the old evidence is viewed in a different way.
- Science is a complex social endeavor. It is a complex social process for producing knowledge about the natural world. Scientific knowledge represents the current consensus as to what is the best explanation for phenomena in the natural world. This consensus does not arise automatically, since scientists with different backgrounds from all over the world may interpret the same data differently. To build a consensus, scientists communicate their findings to other scientists and attempt to replicate one another's findings. In order to model the work of professional scientists, it is essential for first-grade students to engage in frequent discussions with peers about their understanding of their investigations.
- To communicate an observation accurately, one must provide a clear description of exactly what is observed and nothing more.
- Observations should be made from multiple positions (e.g., observations of the same object from the front of the object, from the back of the object, looking down on the object, etc.) whenever possible to achieve a variety of perspectives.
- Observations should be repeated multiple times to assure accuracy.
- Once the characteristics of several objects or several events have been observed and recorded, the objects or events can be arranged by those characteristics (e.g., several objects sorted by color, several events sorted on a timeline by age, etc.).
- Simple tools, such as a magnifying glass and a balance can extend the observations that people can make.
- Nonstandard units such as paper clips, a student's foot, index cards, etc., can be used to measure the length of objects. The mass of two objects can be compared by holding each object in a different hand. The volume of various liquids can be compared by pouring them in cups of the same size. Variations in temperature of different objects can be compared by the difference that is felt when each object is touched. Variations in air temperature can be compared by observing the differences one feels when in different environments (e.g., inside the classroom vs. outside on the playground

- Develop a question from one or more observations.
- Predict outcomes based on actual observations and evidence rather than random guesses.
- Communicate observations and data with simple graphs and pictures, oral and written statements, and with numbers.
- Answer questions by conducting simple experiments/investigations, using nonstandard measuring units and simple tools, such as a magnifying glass or a balance. A simple experiment is one that changes only one thing at a time (tests only one variable), gives quick results, and provides easily observable changes.
- Record observations of movement (length/distance) using nonstandard units.
- Compare the movement of objects, using graphs, pictures, and/or numbers.

Science Vocabulary

investigation, physical properties, observation, attributes, classifying, data, communication, length, measure, mass, prediction, volume, conclusion, inferences, experiment, patterns, comparing, random, simple tools (instruments), balance, magnifying glass, question, evidence, compare, graph, movement

in winter, inside the freezer compartment of a refrigerator vs. inside a kitchen). • An inference is a tentative explanation based on background knowledge and available data. • A conclusion is a summary statement based on data from the results of an investigation. • Questions about what is observed can be developed. • A prediction is a forecast about what may happen in some future situation. It is based on information and evidence. A prediction is different from a guess. • Graphs are powerful ways to display data, making it easier to recognize important information. Describing things as accurately as possible is important in science because it enables people to compare their observations with those of others. • Data should be displayed in bar graphs and picture graphs at the grade one level. • An experiment is a fair test designed to answer a question.	

2. Assessment Evidence

Prior Knowledge	**Throughout the Unit**
• Observations are made for a variety of reasons • Objects are described both pictorially and verbally • Sequencing according to size • Classifying by a single attribute • Nonstandard units can be used for measuring • Use of picture graphs for 10 or fewer objects • Identify the five senses with their corresponding sensing organ and sensory descriptors (sweet, sour, bitter, salty, etc., see K.2)	**Formative Assessment:** • Teacher observation of students engaged in cooperative learning investigations. • KWL • Science notebook (questions, predictions, observations, summaries, charts, drawings) • Conduct simple experiments using simple tools • Record data on scientific investigations performed **Summative Assessment:** • Test/assessment • Graph making and reading • Students will draw themselves as a scientist. Illustrations must include what the student is studying and the use of two simple tools within the investigation.

3. Learning Plan

References to Adopted Materials:

- Science Fusion - Unit 1 "How Scientists Work"

Lesson 1 "What Are Senses and Other Tools?"
Lesson 2 "How Can We Use Our Senses?"
Lesson 3 "What Are Inquiry Skills?"
Lesson 4 "How Do We Use Inquiry Skills?"
Lesson 5 "How Do Scientists Work?"
People in Science: Mary Anderson

- Science Fusion - Unit 2 "Technology All Around Us"

Lesson 1 "How Do Engineers Work?
Lesson 2 "How Can We Solve a Problem?"

Lesson 3 “What Materials Make Up Objects?”
Lesson 4 “How Can Materials Be Sorted?”
People in Science: Dr. Eugene Tsui

- Science Fusion, Unit 6 – Earth’s Resources

Lesson 3 “What Can We Observe About Rocks?”

- Science Fusion - Unit 9 “All About Matter”

Lesson 1 ”What Can we Observe About Objects?”
Lesson 3 “How Can We Measure Temperature?”

Suggested Activities:

- Develop a KWL chart about scientists. *Read What Do Scientists Do*? By: Marcie Bovetz to encourage a discussion with the students.
- Make a web using Kidspiration software to show what scientists do and the tools they use.
- Students explore and engage in being scientists, while keeping a science journal on things they observe around the classroom and also outside the school. 1-3 days should be spent on each of the following skills: use 5 senses, use instruments, classify into two groups, communicate data with oral, written words, pictures and graphs, make inferences and ask questions, make predictions, conduct science experiments.
- The following activities were developed by Tricia Obsester, *From Singing to Subtraction: Integrating Science Across the Curriculum*, workshop.

Encouraging Observation

1. Open a regular “Observation Station” Place different items-perhaps related to each unit of study or just unusual-on a special table or tray. Encourage students to look at the object(s) from all sides, to lift it, smell it, listen to it (if appropriate). Teach students about “scientific drawing” where they use as much detail as possible, accurate colors, and always label and date the picture.
2. Arrange the same objects to use for drawing “still life” introducing the styles of different famous artists
3. Use a “Sharing Suitcase”. Use an old lunch box covered with adhesive tape. Take turns sending the suitcase home. Students bring it back to school filled with one non-toy item and share the item with the class. Let the class ask 2 or 3 questions, and make 2 or 3 observations (model first; eg. “I see that it is black and white” I notice that is shaped like a rectangle”).
4. Maintain “Science Notebooks” or “Nature Notebooks” have students draw and label pictures of things they study (e.g. seeds sprouting, leaves changing color). You can have words ready to cut and glue to use as labels. Students can use the notebooks for vocabulary. They can also use glue or sketch sorting activities inside (e.g. things that float/things that sink).

Super Sorting

1. Build students’ observation and classifying skills with a collection of “collections”’ fill small plastic bags with common objects and let students work together to sort in different ways. Ideas: buttons (different shapes, colors, sizes, number of holes); bottle caps (sizes, colors, with or without text); keys (colors, shapes); plastic insects or reptiles (eye color, number of legs, wings or no wings, skin design); shells (colors, shapes, sizes, stripes)
2. Regularly fill a basket, tub or tray with items to be sorted (related to unit of study). For example, photos of each students, stuffed animals; apples; leaves; gourds/squash; plastic fruit; seeds; evergreen branches; items made from trees. Provide topic cards to help identify the sort and build word recognition (e.g. “big” “little”; “soft” “hard”’ “striped” “plain”; “orange” “green” “brown”. Follow up with a sort using pictures (or just words for advanced students).
3. Use photos and postcards of paintings, etc. for sorting activities; e.g. sort pictures into living and non-living

things. Old calendars, magazines, and the Internet are good sources for pictures.

Exploring the Senses

1. Read Aliki's *My Five Senses* as an introductory book.
2. Fill pairs of film canisters with different items- pennies, rice, beans, cotton balls, paper clips, etc. Have students shake and try to match sounds.
3. Make a flipbook where students fill in their favorite things to smell, taste, etc. Prior to the activity, lead the class in brainstorming ideas and have students brainstorm in small groups.
4. Read *Lucy's Picture*, by Nicola Moon, about a little girl making a picture for her blind grandparent. Have students make a picture or collage using different textures of paper, fabric, and found objects.
5. Bring in objects with Braille text. Give students a paper with the Braille alphabet (in black dots) and let them spell their names/words in the Braille pattern.
6. Make texture cards- cover with different types of fabric, sandpaper, rice, etc. Make sets and see if students can find matching pairs.
7. Fill in a sense chart (whole class or individually) for a character in a book or a song- what did he or she- Smell? Taste? Touch? See? Feel? A few good books to do this with *Cookie's Week*, by Cindy Ward and *If You Give a Mouse a Cookie* and other titles by Laura Numeroff
8. When talking about Famous People, (e.g. Christopher Columbus) make a sense book of the new things each person saw, tasted, etc.

Data Collection

1. Give students many opportunities for interactive graphs-using cubes, links, magnets, their bodies, their shoes, etc.
2. Write each student's name on an index card. Use a pocket chart for "Question of the Day". Each morning have students move their cards to answer a question (e.g. "What is your favorite fruit?" "What color are your eyes?") Talk about the results later in the day. This is a good way to introduce a topic of study and introduce students to different types of graphs.

Review Activities:

- Bingo with related vocabulary
- Matching –vocabulary words with their definitions and/or pictures
- Continually use simple tools to explore things around the students. Vary the instruments used so that the students will have experience with different kinds.
- Use ongoing Science Centers with each unit of study (see *Investigate* for each chapter lesson in Harcourt)

Outdoor Connections:

- Go on a "Nature Walk" through school grounds or a nearby park. Discuss how observers must be quiet and look around. Two good books to share before going out: *Nature Walk* by Douglas Florian and *Nature Spy* by Shelly Rotner and Ken Kreisler

4. Resources

Trade books:

- Aliki, My Five Senses
- Bovetz, Marcie. What Do Scientists Do?
- Canizares, Susan and Chessen, Betsey. Science Outside (Scholastic)
- Canizares, Susan and Chessen, Betsey. Science Tools (Scholastic)
- Canizares, Susan and Chanko, Pamela. Look, Listen and Learn (Scholastic)
- Chanko, Pamela and Berger, Samantha. Scientists (Scholastic)
- Florian, Douglas. Nature Walk

- Gelman, Rita Golden. What are Scientists? What Do They Do? Let's Find Out (also available in Spanish)
- Kramer, Stephen. How to Think Like a Scientist
- Lehn, Barbara. What is a Scientist?
- Rotner, Shelly and Kreisler, Ken. Nature Spy
- Scieszka, Jon. Science Verse
- Trumbauer, Lisa. Everyone is a Scientist

Web Sites:

- *Science Standards of Learning, Enhanced Scope and Sequence, Grade 1*
  http://www.doe.virginia.gov/testing/sol/scope_sequence/science_scope_sequence/scopeseq_science1.pdf
- www.brainpopjr.com

Videos:

- Gutnik, Martin J. How to Do a Science Project and Report
- Scientific method, Teacher's Video Co., c2000
- Science as inquiry for children, Schlessinger Media, c2006
- Science as inquiry in action, Schlessinger Media, c2006

Discovery Education:

- The Magic School Bus: Shows and Tells. (Gr. K-2). Run time: 24:05

Field Trips:

- None specified

Other:

- Project WET: K-12 Curriculum and Activity Guide
- Project WILD: K-12 Curriculum and Activity Guide
- Project WILD – Aquatic: K-12 Curriculum and Activity Guides
- Environmental Education Activity Guide: PreK-8, Project Learning Tree
- Growing Up Wild: Exploring Nature with Young Children (Ages 3-7), Project WILD