Unit 1 - Science Skills & Practices

Content Area: **Science**
Course(s): **Science 7**
Time Period: **September**
Length: **~15 Days**
Status: **Published**

Unit Summary

(NGSS & NJ Model curriculum for science do not list a specific unit focused solely on science practices. This unit is based on standards from the 2009 New Jersey Core Curriculum Content Standards - Science with the intention of introducing students to safety practices, as well as more complex thinking and functioning as student scientists at the middle school level.

5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.

Standards

Strand A. Understand Scientific Explanations : Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.

- 5.1.8.A.1 - Core scientific concepts and principles represent the conceptual basis for modelbuilding and facilitate the generation of new and productive questions.
- 5.1.8.A.2 - Results of observation and measurement can be used to build conceptual-based models and to search for core explanations.
- 5.1.8.A.3 - Predictions and explanations are revised based on systematic observations, accurate measurements, and structured data/evidence

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Strand B. Generate Scientific Evidence Through Active Investigations : Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.

- 5.1.8.B.1 - Evidence is generated and evaluated as part of building and refining models and explanations.
- 5.1.8.B.2 - Mathematics and technology are used to gather, analyze, and communicate results.
- 5.1.8.B.3 - Carefully collected evidence is used to construct and defend arguments.
- 5.1.8.B.4 - Scientific reasoning is used to support scientific conclusions.

Strand C. Reflect on Scientific Knowledge : Scientific knowledge builds on itself over time.

- 5.1.8.C.1 - Scientific models and understandings of fundamental concepts and principles are refined as new evidence is considered.
- 5.1.8.C.2 - Predictions and explanations are revised to account more completely for available evidence.
- 5.1.8.C.3 - Science is a practice in which an established body of knowledge is continually revised, refined, and extended.

Strand D. Participate Productively in Science : The growth of scientific knowledge involves critique and communication, which are social practices that are governed by a core set of values and norms.

- 5.1.8.D.1 - Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work.
- 5.1.8.D.2 - In order to determine which arguments and explanations are most persuasive, communities of learners work collaboratively to pose, refine, and evaluate questions, investigations, models, and theories (e.g., argumentation, representation, visualization, etc.).
- 5.1.8.D.3 - Instruments of measurement can be used to safely gather accurate information for making scientific comparisons of objects and events.
- 5.1.8.D.4 - Organisms are treated humanely, responsibly, and ethically.

Student Learning Objectives

1. Demonstrate understanding and use interrelationships among central scientific concepts to revise explanations and to consider alternative explanations.
2. Use mathematical, physical, and computational tools to build conceptual-based models and to pose theories.
3. Use scientific principles and models to frame and synthesize scientific arguments and pose theories.
4. Design investigations and use scientific instrumentation to collect, analyze, and evaluate evidence as part of building and revising models and explanations.
5. Gather, evaluate, and represent evidence using scientific tools, technologies, and computational strategies.
6. Use qualitative and quantitative evidence to develop evidence-based arguments.
7. Use quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.
8. Monitor one’s own thinking as understandings of scientific concepts are refined.
9. Revise predictions or explanations on the basis of discovering new evidence, learning new information, or using models.
10. Generate new and productive questions to evaluate and refine core explanations.
11. Engage in multiple forms of discussion in order to process, make sense of, and learn from others’ ideas, observations, and experiences.
12. Engage in productive scientific discussion practices during conversations with peers, both face-to-face and virtually, in the context of scientific investigations and modelbuilding.

13. Demonstrate how to safely use tools, instruments, and supplies.
14. Handle and treat organisms humanely, responsibly, and ethically.

Essential Questions

How can we use science to learn more about the natural and designed world?

What evidence do scientists collect?

How can you determine if evidence is valid and reasonable?

How can you use evidence to solve problems and make decisions?