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The Next Generation Sunshine State Standards for science are organized by grade level for grades K-8 and by Bodies of Knowledge for grades 9-12. Eighteen Big Ideas are encompassed in grades K-12 and build in rigor and depth as students advance. Each grade level includes benchmarks from the four Bodies of Knowledge (Nature of Science, Life Science, Earth and Space Science, and Physical Science).

**Fourth Grade Overview**

Fourth Grade focuses instructional delivery for science within the following twelve (12) Big Ideas/Standards:

**Nature of Science**
- Big Idea 1 – The Practice of Science
- Big Idea 2 – The Characteristics of Scientific Knowledge
- Big Idea 3 – The Role of Theories, Laws, Hypotheses, and Models

**Earth and Space Science**
- Big Idea 5 – Earth in Space and Time
- Big Idea 6 – Earth Structures

**Physical Science**
- Big Idea 8 – Properties of Matter
- Big Idea 9 – Changes in Matter
- Big Idea 10 – Forms of Energy
- Big Idea 11 – Energy Transfer and Transformations
- Big Idea 12 – Motion of Objects

**Life Science**
- Big Idea 16 – Heredity and Reproduction
- Big Idea 17 – Interdependence
# Fourth Grade

## Instructional Scope and Sequence

*All required and optional assessments are available on Canvas and Eduphoria*

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<td>Week 26</td>
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<td>Week 36</td>
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Depth of Knowledge, Formative Assessment Strategies, and Digital Program Access documents are now available on the Science Canvas site under the Curriculum Maps button.

### What is STEM Week?

STEM Week is a period of time dedicated to the implementation of an interdisciplinary, standards-rich experience that poses an age-appropriate, real-world problem to be solved through collaborative and creative measures.

- **Scientific Literacy**
  - The ability to use scientific knowledge and processes to understand the natural world as well as the ability to participate in decisions that affect it.

- **Technological Literacy**
  - The ability to know how to use new technologies, understand how new technologies are developed, and have the skills to analyze how new technologies affect us, our nation, and the world.

- **Engineering Literacy**
  - The ability to understand how technologies are developed via the engineering design process using problem-based lessons in a manner that integrates lessons across multiple subjects.

- **Mathematical Literacy**
  - The ability to analyze, reason, and communicate ideas effectively in order to pose, formulate, solve, and interpret solutions to mathematical problems in a variety of situations.
The engagement phase of the model is intended to capture students’ interest and focus their thinking on the concept, process, or skill that is to be learned.

During the engagement phase, the teacher is on center stage.

What does the teacher do?
- create interest/curiosity
- raise questions
- elicit responses that uncover student thinking/prior knowledge (preview/process)
- remind students of previously taught concepts that will play a role in new learning
- familiarize students with the unit

What does the student do?
- show interest in the topic
- reflect and respond to questions
- ask self-reflection questions:
  o What do I already know?
  o What do I want to know?
  o How will I know I have learned the concept, process, or skill?
- make connections to past learning experiences

Evaluation of Engagement
The role of evaluation during the engagement phase is to gain access to students’ thinking during the pre-assessment event/activity. Conceptions and misconceptions currently held by students are uncovered during this phase. These outcomes determine the concept, process, or skill to be explored in the next phase of the learning cycle.

The exploration phase of the model is intended to provide students with a common set of experiences from which to make sense of the concept, process, or skill that is to be learned.

During the engagement phase, the students come to center stage.

What does the teacher do?
- provide necessary materials/tools
- pose a hands-on/minds-on problem for students to explore
- provide time for students to “puzzle” through the problem
- encourage students to work together
- observe students while working
- ask probing questions to redirect student thinking as needed

What does the student do?
- manipulate materials/tools to explore a problem
- work with peers to make sense of the problem
- articulate understanding of the problem to peers
- discuss procedures for finding a solution to the problem
- listen to the viewpoint of others

Evaluation of Exploration
The role of evaluation during the exploration phase is to gather an understanding of how students are progressing towards making sense of a problem and finding a solution. Strategies and procedures used by students during this phase are highlighted during explicit instruction in the next phase.

The concept, process, or skill is formally explained in the next phase of the learning cycle.

The explanation phase of the model is intended to grow students’ understanding of the concept, process, or skill and its associated academic language.

During the explanation phase, the teacher and students share center stage.

What does the teacher do?
- ask for justification/clarification of newly acquired understanding
- use a variety of instructional strategies
- use common student experiences to:
  o develop academic language
  o explain the concept
- use a variety of instructional strategies to grow understanding
- use a variety of assessment strategies to gauge understanding

What does the student do?
- record procedures taken towards the solution to the problem
- explain the solution to a problem
- communicate understanding of a concept orally and in writing
- critique the solution of others
- comprehend academic language and explanations of the concept provided by the teacher
- assess own understanding through the practice of self-reflection

Evaluation of Explanation
The role of evaluation during the explanation phase is to determine the degree of learning that occurs following a differentiated approach to meeting the needs of all learners. Application of new knowledge in unique problem solving situations during this phase constructs a deeper and broader understanding. The concept, process, or skill has been and will be evaluated as part of all phases of the learning cycle.

The elaboration phase of the model is intended to be used during all phases of the learning cycle driving the decision-making process and informing next steps.

During the evaluation phase, the teacher and students share center stage.

What does the teacher do?
- observe students during all phases of the learning cycle
- assess students’ knowledge and skills
- look for evidence that students are challenging their own thinking
- present opportunities for students to assess their learning
- ask open-ended questions:
  o What do you think?
  o What evidence do you have?
  o How would you explain it?

What does the student do?
- participate actively in all phases of the learning cycle
- demonstrate an understanding of the concept
- solve problems
- evaluate own progress
- answer open-ended questions with precision
- ask questions
Volusia County Schools
Elementary Science Department

NGSS BODY OF KNOWLEDGE:  NATURE OF SCIENCE
Unit of Study:  Introduction to Practice of Science

PACING:  Week 1
August 14 – August 18

Week 1
Introduction to Science

Note: Learning Targets beginning with “review” indicate instruction from previous grades.

Explode that science does not always follow a rigidly defined method (“the scientific method”) but that science does involve the use of observations and empirical evidence.

Explain that science focuses solely on the natural world.

Students will:
• set up a science notebook that will be used all year by students.
• explore various fields of science realizing that not all scientists follow the scientific method (e.g., biologist vs. paleontologist or astronomer vs. botanist).
• explain the role of a scientist (ask questions and find answers).
• explain that science does involve the use of observations and evidence.
• define science (study of the natural world through observation and evidence).

Week 1
Introduction to Science Process

This topic is continued on the next page.

Keep records that describe observations made, carefully distinguishing actual observations from ideas and inferences about the observations.

NOTE: Begin recording observations of the moon’s visible shape for the next unit.

Students will:
• record observations of an object and/or an event in a science notebook using a variety of data collection tools (e.g., diagrams, charts, graphs).
• make inferences based on observations.
• distinguish observations from inferences.
• communicate observations and inferences (findings) with others in the classroom.
• critique each other’s findings through engaging discussions.

The first 3 weeks of instruction are meant to be an introduction to scientific thinking. These standards continue to be instructed throughout the year to be mastered by week 39.

04 SMT 1
Pre-Assessment
August 14 – 18
**Week 1**

**Introduction to Science Process**

Teacher Hints for this topic are on the next page.

**Students will:**

- **identify** appropriate tools to use when making measurements.
- **demonstrate** proper use of scientific tools to ensure accuracy of measurements.
- **engage** in a common team investigation using metric measurement tools (e.g., beakers, graduated cylinders, ruler, meter stick, tape measure, thermometer, scale, gram weights).
- **compare** the methods and results of other team investigations.
- **formulate** opinions, new ideas, and conclusions based on team comparisons.
- **seek** reasons to explain any differences that may have occurred.
- **critique** others’ work in a written manner to make recommendations of how to improve future investigations.

### SC.4.N.1.2
communication

### SC.4.N.1.3
evidence

### SC.4.N.1.4
flaw

### SC.4.N.1.5
interpretation

### SC.4.N.1.6
investigation

### SC.4.N.1.7
metric

### SC.4.N.1.8
prediction

### SC.4.N.1.9
records

### SC.4.N.1.10
scientific tools
  - beaker
  - graduated cylinder
  - hand lens
  - meter stick
  - ruler
  - scale
  - stopwatch
  - tape measure
  - thermometer
  - weights

### SC.4.N.1.11
scientific method
  - question
  - research
  - hypothesis
  - experiment
    - materials
    - procedure
  - data
  - results
  - conclusion

### SC.4.N.1.12
variable

---

Compare the observations made by different groups using multiple tools and seek reasons to explain the differences across groups.

Compare the methods and results of investigations done by other classmates.

**Students will:**

- **Identify** appropriate tools to use when making measurements.
- **Demonstrate** proper use of scientific tools to ensure accuracy of measurements.
- **Engage** in a common team investigation using metric measurement tools (e.g., beakers, graduated cylinders, ruler, meter stick, tape measure, thermometer, scale, gram weights).
- **Compare** the methods and results of other team investigations.
- **Formulate** opinions, new ideas, and conclusions based on team comparisons.
- **Seek** reasons to explain any differences that may have occurred.
- **Critique** others’ work in a written manner to make recommendations of how to improve future investigations.

---

Raise questions about the natural world, use appropriate reference materials that support understanding to obtain information (identifying the source), conduct both individual and team investigations through free exploration and systematic investigations and generate appropriate explanations based on those explorations.

Recognize that science involves creativity in designing experiments.

**Students will:**

- **Generate** testable questions about the world that can be answered through observation and investigation.
- **Research** topics related to the questions they generate (e.g., internet, leveled-readers, non-fiction resources, newspaper).
- **Form** a hypothesis based on research.
- **Investigate** student-generated questions, individually and in teams, through free exploration, experimentation (scientific method), or other types of investigations using appropriate science tools (metric measurement).
- **Form** conclusions based on data obtained during investigations.
- **Identify** any flaw(s) in the experimental design that may have affected the outcome.

Recognize and explain that scientists base their explanations on evidence.

Attempt reasonable answers to scientific questions and cite evidence in support.

**Students will:**

- **Define** data and evidence (a collection of observable and measurable information gathered during an investigation).
- **Discuss** previously acquired data/evidence to form a conclusion (a statement that explains whether the data does or does not support the hypothesis including an explanation of why).
- **Compare** conclusions.
- **Recognize** that sharing ideas and conclusions is a source of new information and knowledge for a scientist.
- **Explain** that scientists base their explanations on data and evidence.
Teacher Hints for “Introduction to Science Process”:

- Digital textbook resources can be accessed through V-Portal. Click the Curriculum Maps button on the Grade 4 Canvas home page for the Digital Programs Access information.
- Students could prepare for the Earth’s Movements (Weeks 4-6) learning targets by beginning each morning with work routines which include collecting data on seasons, star patterns, and moon phases. Students could take turns collecting different types of data during different times of the year.
- Lessons should be structured to build background knowledge for topics to be covered in 4th grade. Topics should be varied and may include, but should not be limited to the following: plants, rocks, minerals, magnets, Alka-Seltzer investigations, mystery bags, mystery photos.
- Considerations may be given to utilizing activities and investigations that target traditionally low performing benchmarks with the focus of science process at this time of year. For example, students could prepare for a deeper understanding of Plant Life Cycles (Week 28) by growing seeds at this time to collect data and record observations on growth and possible seasonal changes that may occur. This information would be further utilized later during plant instruction.
- During this time, teachers have the opportunity to select and use a variety of science tools to explore the scientific process.
- Students should practice making and recording observations daily. Students naturally make observations with their eyes but may need to be reminded that observations should utilize all of their senses (e.g., “I see bubbles forming when vinegar is mixed with baking soda. I hear bubbles fizzing when vinegar is mixed with baking soda.”).
- An inference is a logical guess based on observations. It is arrived at based on the face value of the observations alone and is not the result of a systematic analysis or testing of the evidence (e.g., “I infer that a chemical change is occurring when the vinegar and baking soda are combined.”)
- Students need to make inferences based on evidence gathered during observations. Considerations should be made to practice this skill with each benchmark throughout the year to support student understanding. Connections to other core subjects may be referenced.
- Teachers should lead students in the understanding that scientists do not only learn from doing hands-on investigations but also from reading non-fiction reference materials, such as, journals, newspapers, reference books etc.
- Teachers should discuss the importance of researching a topic before forming a hypothesis or conducting an investigation.
- Teachers need to engage students in a discussion about the importance of multiple trials and large experimental groups when conducting experiments.
- Teachers should continue to model controlling variables and testing a control group for comparison purposes.
- Teachers should organize common investigations so that students will be able to compare their results with the results of other groups. When differences arise, students should compare the tools and different methods that were used by each group to possibly explain the differences.
- Teachers need to avoid referring to a hypothesis as being right or wrong when forming a conclusion. Instead, guide students to articulate that a hypothesis is either supported or not supported by the evidence (data) gathered.
  - My hypothesis was supported by the evidence I collected. I thought _____ would occur as a result of my experimentation. I now know_____.
  - My hypothesis was not supported by the evidence I collected. I thought _____ would occur, but it did not. Instead my evidence supports_____.
- Science block offers students an opportunity to collect authentic data that should be accessed for instructional purposes during the Language Arts and Mathematics blocks as appropriate throughout the school year.
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**Weeks 4-5**

### Earth’s Movements

#### Moon

**Relate that the rotation of Earth (day and night) and apparent movements of the sun, moon, and stars are connected.**

**Describe the changes in the observable shape of the moon over the course of about a month.**

**Students will:**
- **recognize** that the moon does not produce its own light; it reflects light from the sun.
- **recognize** that the moon revolves around (orbits) Earth in about 28 days as Earth revolves around (orbits) the sun.
- **describe** the changes (patterns) that occur to the observable shape of the moon over the course of about a month that have been recorded in a science notebook.
- **predict** the changes in the observable shape of the moon starting at any point in the cycle.
- **sequence** moon patterns.
- **compare** observable shapes of the moon.
- **explain** that the moon’s physical shape does not actually change.
- **explain** that Earth’s rotation on its axis causes the moon to appear as though it is moves across the sky in the day or night sky.

**Investigate and report the effects of space research and exploration on the economy and culture of Florida.**

**Students will:**
- **read and discuss** how the effects of space research and exploration has created advances in science that have impacted the economy and culture of Florida (e.g., medical technology, transportation, agriculture, and industrial productivity).
- **research** products that were generated specifically for space but have now found purpose for public use (e.g., freeze-dried food, memory foam, mylar blanket).

**Teacher Hints for “Earth’s Movements”:**
- Waxing, waning, gibbous, and crescent moon terminology will not be assessed on the 5th grade SSA.
- Star patterns appear to translate (slide) across the sky nightly (and from season to season) without changing their shape or distance from one another.
- Mental models can be taught by reading a descriptive paragraph about something vague or unfamiliar. Students listen first while forming a picture in their minds of what is being described. Next, they create a 2- or 3-dimensional representation of what they pictured. Share and compare with a partner.
- Students will not be required to recognize or name constellations.
- National Space Day is the first Friday in May. Try to plan activities for your class/school to recognize this day and use it as a form of review.
- Use varied materials (video, books, visuals) to help students understand that star patterns appear to shift in the sky when in reality it is Earth that is moving. Have students choose one star to look at each night (e.g., North Star) to observe it as it appears to shift in the sky.
- A free planetarium for your computer can be found at [http://www.stellarium.org/](http://www.stellarium.org/).
- Emphasize that the moon does not actually change shape but only appears to. We see different amounts of the part that reflects the sun.
- Students will be required to recognize the motion of rotation (the spinning of Earth or the moon on its axis) and revolution (one complete trip of Earth around the sun).
- The following website will be helpful in tracking the shapes of the moon in a science notebook: [www.stardate.org/nightsky/moon](http://www.stardate.org/nightsky/moon) and [http://www.moongiant.com/](http://www.moongiant.com/).
- In addition to determining a missing observable shape of the moon within a given pattern, consider asking students to predict the observable shape that will occur in 1 week, 2 weeks, 3 weeks, and 4 weeks.
- Connections may be made in science to patterning activities done in mathematics. For example, pattern changes of objects/numbers can be compared to pattern changes in observable shapes of the moon and patterns of stars/constellations.
- The effects of space research and exploration on the economy and culture of Florida is an opportunity for integrating Social Studies and ELA.
### Teacher Notes

All optional curriculum resources can be found on the 5th Grade Science Canvas Site
## NGSSS BODY OF KNOWLEDGE: NATURE OF SCIENCE/EARTH AND SPACE SCIENCE

### Unit of Study: Earth

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### Topics

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<td><strong>Teacher Hints for &quot;Weathering/Erosion&quot;:</strong></td>
<td></td>
<td><strong>weathering</strong></td>
</tr>
<tr>
<td>- Students will not be responsible for understanding chemical weathering.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Since students continue to confuse erosion and weathering, these concepts should be taught as two separate concepts.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Teachers may consider using the erosion foldable activity (Agents of Erosion) found on page 267 in the teacher's edition.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Provide various examples of scenarios in which allow students to identify examples of surface changes in nature and identify the process that caused them utilizing conditions from natural weather phenomenon either on school grounds or from the media.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Week 8

**Rocks/Minerals**

| Identify the three categories of rocks: igneous, (formed from molten rock); sedimentary (pieces of other rocks and fossilized organisms); and metamorphic (formed from heat and pressure). |
|---|---|
| **Students will:** | **SC.4.E.6.1** |
| • use technology and tools to study and investigate samples of rocks. | Embedded Nature of Science |
| • observe and identify examples for each of the three categories of rocks (igneous, sedimentary, and metamorphic). | SC.4.N.1.1 |
| • construct models for each of the three categories of rocks to include major details. | SC.4.N.3.1 |
| • explain, pictorially and in words, the steps of the rock cycle. | Embedded Earth Science |
| • describe how each category of rock is formed within the rock cycle. | SC.4.E.6.5 |
| o igneous – formed from molten rock | |
| o sedimentary – formed with other pieces of rock and fossilized organisms | |
| o metamorphic – formed from heat and pressure | |
| • differentiate between the three different categories of rocks based on how each is formed and/or their physical properties. | |

**Teacher Hints for “Rocks/Minerals”:**

The following information pertains to the **mineral portion of this topic:**

- Students should have multiple experiences with the physical properties (hardness, color, luster, cleavage, and streak color) used to identify minerals.
- Students will not be responsible for identifying the Mohs scale or cleavage criteria.
- Students will not be responsible for identifying minerals but will be responsible for identifying a physical property from its description.
- Students will not be responsible for identifying minerals.
- Students should use a hand lens to observe the minerals that comprise rocks (e.g., granite contains quartz, feldspar, and mica). Page 247 in the Student Edition comments on this.
- The following minerals may be used on the SSA and the Volusia Science Tests: quartz, feldspar, mica, calcite, talc, pyrite, and graphite.
- Students should be provided with scenarios that include natural rocks representing the various mineral properties.
- The Happy Scientist provides video support of this content ([www.thehappyscientist.com](http://www.thehappyscientist.com)).

The following information pertains to the **rock portion of this topic:**

- Rocks constantly change from one type to another.
- Students will need to understand the formation of rocks through the rock cycle. ([http://www.windows2universe.org/earth/geology/rocks_intro.html](http://www.windows2universe.org/earth/geology/rocks_intro.html)).
- Igneous rocks are formed when hot melted rock, called magma, cools (e.g., granite, lava rock).
- Sedimentary rocks are formed when pieces of other rocks and fossilized organisms are squeezed together (i.e., limestone, chalk).
- Metamorphic rocks are formed from extreme heat and extreme pressure (e.g., slate, marble).
- Students will not be responsible for memorizing names of rocks (e.g., granite, slate, quartzite). They will be responsible for identifying categories of rocks (igneous, sedimentary, and metamorphic) according to how they are formed.
- Students should be able to identify the various stages of the rock cycle in a flow chart.
- Use of videos and animations by students to observe and then explain how igneous, sedimentary, and metamorphic rocks are formed is encouraged.
- Locations of available rock/mineral resources found in Florida can be discovered at [http://www.dep.state.fl.us/geology/geologictopics/minerals.htm#Mine](http://www.dep.state.fl.us/geology/geologictopics/minerals.htm#Mine). Information on this website can be referenced during the following Unit of Study (Renewable/Nonrenewable Resources) as well.
Week 9
Renewable/Nonrenewable Resources

<table>
<thead>
<tr>
<th><strong>Recognize that humans need resources found on Earth and that these are either renewable or nonrenewable.</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Students will:</strong></td>
</tr>
<tr>
<td>• define resources as anything from the environment that meets our needs and wants.</td>
</tr>
<tr>
<td>• provide examples of renewable resources (e.g., water, wind, solar, trees).</td>
</tr>
<tr>
<td>• provide examples of nonrenewable resources (rocks, minerals, soil, and fossil fuels such as coal, oil, natural gas).</td>
</tr>
<tr>
<td>• identify renewable and nonrenewable resources found on Earth that humans need and how they are used.</td>
</tr>
<tr>
<td>• distinguish between renewable and nonrenewable resources found on Earth.</td>
</tr>
<tr>
<td>• explain that nonrenewable resources exist in a fixed quantity in Earth and may be used up.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Identify resources available in Florida (water, phosphate, oil, limestone, silicon, wind, and solar energy).</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Students will:</strong></td>
</tr>
<tr>
<td>• identify natural resources available in Florida (water, phosphate, oil, limestone, silicon, wind, and solar energy).</td>
</tr>
<tr>
<td>• distinguish Florida’s natural resources as renewable (water, wind, solar, trees) and nonrenewable (phosphate, oil, limestone, silicon).</td>
</tr>
</tbody>
</table>

**Teacher Hints for “Renewable/Nonrenewable Resources”:**

- Consider the social studies implications of local landforms and bodies of salt and fresh water and impact of these and other resources on local and state economy.
- Examples of renewable resources may include: fresh water, fresh air, forests, agriculture (plants and animals), oils from seeds, sun (solar energy), wind (wind energy-turbines), water (hydro-powered), geothermal (heat from earth’s interior), etc.
- Examples of nonrenewable resources may include: fossil fuels, uranium, minerals.
- Note that some examples of nonrenewable resources such as minerals (e.g., iron, copper, aluminum) or fossil fuels (i.e., petroleum, coal, natural gas), while continuously formed in nature, will eventually be depleted and cannot be utilized by current consumers.

| 04 VST 1 | Earth and Space Science | October 9 – 13 |
## Teacher Notes

All optional curriculum resources can be found on the 5th Grade Science Canvas Site
# NGSSS BODY OF KNOWLEDGE: NATURE OF SCIENCE/PHYSICAL SCIENCE

## Unit of Study: Matter

### Prerequisite Learning
- **Kindergarten** – SC.K.P.8.1, SC.K.P.9.1, SC.K.P.13.1, SC.K.E.5.1
- **First Grade** – SC.1.P.8.1, SC.1.P.13.1, SC.1.E.5.2, SC.1.E.5.3

<table>
<thead>
<tr>
<th>Properties of Matter</th>
<th>Learning Targets/Skills</th>
<th>Benchmarks</th>
<th>Academic Language</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Weeks 10-11</strong></td>
<td>Measure and compare objects and materials based on their physical properties including: mass, shape, volume, color, hardness, texture, odor, taste, attraction to magnets.</td>
<td>SC.4.P.8.1</td>
<td>mass matter physical properties</td>
</tr>
<tr>
<td></td>
<td>Students will:</td>
<td></td>
<td>observable</td>
</tr>
<tr>
<td></td>
<td>• compare objects based on observable and measurable physical properties (shape, color, hardness, texture, odor, taste, attraction to magnets, mass, volume, temperature).</td>
<td></td>
<td>measurable states of matter</td>
</tr>
<tr>
<td></td>
<td>• investigate and explain that all matter has the following measurable properties: volume (takes up space) and mass (weight).</td>
<td></td>
<td>solid liquid gas</td>
</tr>
<tr>
<td></td>
<td>• record and compare the mass and volume of solid and liquid matter using metric units.</td>
<td></td>
<td>temperature volume</td>
</tr>
<tr>
<td></td>
<td>• record and compare the volume of regular- and irregular-shaped solids using the water displacement method.</td>
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<tr>
<td></td>
<td>• display data appropriately in charts, tables, and graphs.</td>
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<tr>
<td></td>
<td>• compare measurement data with other lab groups checking for accuracy.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• explain any differences that may have occurred across groups.</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Explore the Law of Conservation of Mass by demonstrating that the mass of a whole object is always the same as the sum of the masses of its parts.</td>
<td>SC.4.P.8.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Students will:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• explore the Law of Conservation of Mass (whole = sum of its parts) to obtain the mass of various objects using tools and technology.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• demonstrate that the mass of a whole object is always equal to the sum of its parts.</td>
<td>SC.4.P.8.2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Identify properties and common uses of water in each of its states.</td>
<td>SC.4.P.8.2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Students will:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• investigate and describe properties of water in all three states.</td>
<td>SC.4.P.8.2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• identify common uses of water in all three states.</td>
<td>SC.4.P.8.2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• explain the importance of water to life on Earth.</td>
<td>SC.4.P.8.2</td>
<td></td>
</tr>
</tbody>
</table>

**Embedded Nature of Science**
- SC.4.N.1.1
- SC.4.N.1.2
- SC.4.N.1.5
- SC.4.N.1.6
Teacher Hints for “Properties of Matter”:
- Physical properties of matter are observable and measurable.
- Density is no longer instructed at the elementary level.
- Students should have a good working knowledge of mass/weight and volume and be presented with various situations in which mass and volume have to be calculated.
- Mass is the amount of matter in an object. Mass and weight are the same on Earth. At this grade level, mass and weight will be used interchangeably.
- Water displacement is a technique used to measure the volume of an object by calculating how much water it displaces (pushes aside) when placed into a sample of water.
- Students should comfortably make the following associations:

<table>
<thead>
<tr>
<th>Property</th>
<th>Tool</th>
<th>Unit of Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass (weight)</td>
<td>balance, digital scale</td>
<td>g, kg</td>
</tr>
<tr>
<td>Volume</td>
<td>beaker, graduated cylinder</td>
<td>mL, L</td>
</tr>
<tr>
<td>Temperature</td>
<td>thermometer</td>
<td>°C, °F</td>
</tr>
</tbody>
</table>

Week 12
Magnets

Investigate and describe that magnets can attract magnetic materials and attract and repel other magnets.

Students will:
- **investigate and classify** objects that are attracted to magnets (paper clips, iron filings, scissors) and those that are not (bottle, penny, copper wire, eraser, foil, nickel, steel).
- **investigate** that all magnets, regardless of shape, have a north pole (N) and a south pole (S) although they may not be marked.
- **investigate** the presence of a magnetic field with different-shaped magnets.
- **describe** the effects of the magnetic field of different-shaped magnets using iron filings.
- **investigate** how magnets attract and repel other magnets based on the presence of a magnetic field.

Teacher Hints for “Magnets”:
- Explore contact and non-contact forces with the use of various magnets.
- Since some magnets do not label the north and south poles, this is an opportunity to explore the properties of magnets.
- Magnetism is a property of matter. Magnets are tools that help to determine an object’s magnetic property.
- Given a few objects, explore whether the objects are magnetic or are magnets themselves.
- Earth’s magnetism will not be assessed.

Weeks 13-15
Changes in Matter

Identify some familiar changes in materials that result in other materials with different characteristics, such as decaying animal or plant matter, burning, rusting, and cooking.

Students will:
- **identify** familiar physical changes in matter in which the objects’ properties are retained (e.g., cutting, tearing, crumpling, folding, melting, freezing, dissolving).
- **identify** familiar chemical changes in matter that result in a new substance with new properties (e.g., burning, frying, rusting, grilling, toasting, decaying plant and animal matter).
- **record** observations of physical and chemical changes in a science notebook.
- **make inferences** about observations made of physical and chemical changes.
- **describe** observable signs that a chemical change may exhibit (smell, color, heat, fizzing sound, and substance given off).

Teacher Hints for “Changes in Matter”:
- Although students have had exposure to physical changes in previous grade levels, this is their first exposure to chemical changes (e.g., when baking soda (solid) is mixed with vinegar (liquid), carbon dioxide (gas) is produced in the form of bubbles. Carbon dioxide has different properties than either baking soda or vinegar).
- Another example of a chemical change is: iron nails exposed to oxygen forms rust. Rust is a completely different substance than iron or oxygen.
- Students should make comparative observations between original matter and that which has undergone a change (e.g., a new iron nail and a rusted iron nail, a new candle and one that is burning, fresh and decaying leaves, bread that is not toasted and toasted) and engage in discussions to share their observations and listen to the thinking of their classmates.
Teacher Notes

All optional curriculum resources can be found on the 5th Grade Science Canvas Site
## NGSSS BODY OF KNOWLEDGE: NATURE OF SCIENCE/PHYSICAL SCIENCE

### Unit of Study: Energy & Motion

### PACING: Weeks 16 – 25
November 27 – February 16

### Prerequisite Learning
- First Grade – SC.1.P.12.1, SC.1.P.13.1

### Topics

#### Forms of Energy

**Learning Targets/Skills**

- Observe and describe some basic forms of energy, including light, heat, sound, electrical, and the energy of motion.

**Students will:**
- **observe and describe** some basic forms of energy, including light, heat, sound, electrical, and the energy of motion (mechanical).
- **identify** examples of these energy forms in their life and in the natural world.
- **compare and contrast** these types of energy.
- **review** how light travels in a straight path until interrupted by an object.
- **review** how light passes through other objects (transparent, translucent, opaque).
- **review** how light reflects, bends, and absorbs.

**Weeks 16-17**

**Investigate and explain that sound is produced by vibrating objects and that pitch depends on how fast or slow the object vibrates.**

**Students will:**
- **describe** the requirements/components necessary for sound to be produced.
- **Investigate** the production of sound (e.g., tuning forks, hollow tubes, vocal cords, or water bottles filled with different amounts of water).
- **explain** that sound is produced by vibrating objects.
- **investigate** variations in pitch (e.g., water bottle liquids, rulers, straws, stretched rubber bands).
- **explain** that pitch depends on the speed (fast and slow) an object vibrates and the measurements (size and length) of the object.

**Benchmarks**

- SC.4.P.10.1
- SC.4.P.10.3

**Embedded Nature of Science**

- SC.4.N.1.1
- SC.4.N.1.3
- SC.4.N.1.4
- SC.4.N.1.6
- SC.4.N.1.7

**Teacher Hints for “Forms of Energy”:**

- In 3rd grade, students are expected to **identify** basic forms of energy. In 4th grade, students are expected to be able to **observe and describe** basic forms of energy.
- Students will no longer need to know potential and kinetic energy.
- The study of sound energy is new to 4th grade.
- Please note that resources such as ScienceSaurus will showcase several different forms of energy that students may recognize as examples in their life. Students only need to identify electrical sources but not explain how they work (5th grade benchmark).
- Sound activities should focus on vibration and pitch. Students can make their own musical instruments.
**Weeks 18-19**  
**Energy in Motion**

- *Investigate and describe* that energy has the ability to cause motion or create change.
- *Describe how moving water and air are sources of energy and can be used to move things.*

**Students will:**
- **investigate and describe** how energy can cause motion (e.g., moving water can turn a water wheel to make hydropower, wind can move sand across the beach or sail a model boat, solar energy can power a model car).
- **investigate and describe** how energy can create change in matter (e.g., heat energy can melt ice, moving water can make rocks smooth, light can keep food warm).
- **explain** the relationship between energy and motion.

- **SC.4.P.10.2** change energy  
- **SC.4.P.10.4** hydropower  
- **Embedded**  
- **Nature of Science**  
  - SC.4.N.1.1  
  - SC.4.N.1.4  
  - SC.4.N.1.6  
  - SC.4.N.1.7  
  - SC.4.N.1.8

**Teacher Hints for “Energy in Motion”:**
- Some additional examples of how energy causes motion and change are as follows: sun’s energy causes plants to grow, heat energy causes a volcano to erupt, and electrical energy causes a city to light up at night.

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**Week 20-21**  
**Heat**

- *Identify common materials that conduct heat well or poorly.*

**Students will:**
- **review** how things that give off light often give off heat.
- **review** how heat is produced when two objects rub against each other.
- **investigate** heat energy by measuring temperature changes in a liquid.
- **collect and record** temperature readings during investigations in charts, tables, and graphs.
- **investigate** which materials are the best conductors of heat (e.g., clay, metal, and glass).
- **investigate** which materials are non-conductors/insulators of heat (e.g., plastic, wood, styrofoam).
- **make inferences** about observations made during conductivity investigations.
- **form** conclusions about which materials conduct heat well or poorly based on investigations.

- **SC.4.P.11.1** conductor heat  
- **SC.4.P.11.2** heat flow/transfer  
- **Embedded**  
- **Nature of Science**  
  - SC.4.N.1.1  
  - SC.4.N.1.4  
  - SC.4.N.1.6  
  - SC.4.N.1.7  
  - SC.4.N.1.8

**Teacher Hints for “Heat”:**
- Temperature is a measure of heat energy. Ice water has heat energy. Try the following investigation: Take the temperature of ice water. Add more ice. Take the temperature again. Discuss the findings.
- The NGSSS do not contain insulators/insulation in the wording of the benchmark language. However, it does show up in the SSA Item Writer glossary making it fair game vocabulary. During heat conduction investigations, refer to objects as good or poor conductors of heat energy as well as conductors and insulators.
- The following is a simple conduction experiment: Place a plastic, metal, and wooden spoon in hot water. Record observations.
### Motion of Objects

**Weeks 22-25**

**Recognize that an object in motion always changes its position and may change its direction.**

**Students will:**
- **describe** an object’s position and motion in space.
- **explain** that motion is a change of an object’s position.
- **demonstrate** that moving objects **always** change position.
- **demonstrate** that moving objects may change direction.

**Investigate and describe that the speed of an object is determined by the distance it travels in a unit of time and that objects can move at different speeds.**

**Students will:**
- **explain** that the speed of an object is determined by the distance it travels within a unit of time.
- **investigate and compare** the speeds of different objects by measuring the distance each object travels during a set amount of time using tools and technology.
- **investigate and compare** the speeds of different objects by measuring the amount of time it takes each object to travel a set amount of distance using tools and technology.
- **display** obtained speeds in chart, table and graph format.

**Teacher Hints for “Motion of Objects”:**
- A change of position is called motion.
- A change in motion means starting or stopping, speeding up or slowing down, or moving in a different direction.
- Speed is a change in position over a period of time.
- The guided inquiry in the student edition, page 436, directs students to roll a marble down a ramp and time how long it takes to move 180 cm. A discussion about speed (not calculations) can ensue. This activity can be extended to meet the benchmark expectations by rolling a marble down a ramp and seeing how far it travels in 3 seconds.

<table>
<thead>
<tr>
<th>04 VST 2</th>
<th>Physical Science</th>
<th>February 12 – 16</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEM Week – Week 26 (See the Grade 4 Canvas site for STEM lesson)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Teacher Notes

All optional curriculum resources can be found on the 5th Grade Science Canvas Site
## NGSSS BODY OF KNOWLEDGE: NATURE OF SCIENCE/LIFE SCIENCE

### Unit of Study: Life

#### Prerequisite Learning
- Kindergarten – SC.K.L.14.3
- Second Grade – SC.2.L.17.1, SC.2.L.17.2

#### Topics

<table>
<thead>
<tr>
<th>Week 27</th>
<th>Plant Life Cycles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning Targets/Skills</td>
<td>Compare and contrast the major stages in the life cycles of Florida plants and animals, such as those that undergo incomplete and complete metamorphosis, and flowering and nonflowering seed-bearing plants.</td>
</tr>
<tr>
<td><strong>Students will:</strong></td>
<td>• review that all living things have a life cycle.</td>
</tr>
<tr>
<td></td>
<td>• explore life cycles of various plants found in Florida (e.g., orange tree, pine tree, hibiscus).</td>
</tr>
<tr>
<td></td>
<td>• diagram the major stages in the life cycles of plants. (seed → seedling → mature plant → flower or cone).</td>
</tr>
<tr>
<td></td>
<td>• compare the major stages in the life cycles of Florida plants, both flowering and nonflowering seed-bearing plants (e.g., daisies and pine trees).</td>
</tr>
</tbody>
</table>

#### Teacher Hints for “Plant Life Cycles”:
- All living things have a life cycle (plants and animals).
- Items assessing the structures and functions of major parts of plants should be limited to the stem (nutrient transport and support), leaf/needle (food production), root (water and nutrient transport), flower (reproduction), seed (reproduction), and fruit (reproduction).
- Students need to understand and be exposed to the life cycles of various plant organisms (i.e., radishes, oak tree, grass).
- Many students confuse dead and nonliving. Something that is dead (a leaf that has fallen off of a tree) is considered living because it was once living. Something that is nonliving (metal and plastic) was never living.

<table>
<thead>
<tr>
<th>Weeks 28-29</th>
<th>Plant Reproduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning Targets/Skills</td>
<td>Identify processes of sexual reproduction in flowering plants, including pollination, fertilization (seed production), seed dispersal, and germination.</td>
</tr>
<tr>
<td><strong>Students will:</strong></td>
<td>• identify the reproductive structures of a flower and their functions.</td>
</tr>
<tr>
<td></td>
<td>o stamen/anther (male parts) – makes pollen</td>
</tr>
<tr>
<td></td>
<td>o pistil/carpel (female parts) – produces ovules</td>
</tr>
<tr>
<td></td>
<td>o ovule – becomes a seed</td>
</tr>
<tr>
<td></td>
<td>o ovary – becomes a fruit</td>
</tr>
<tr>
<td></td>
<td>• identify and describe processes of reproduction (sexual) in flowering plants.</td>
</tr>
<tr>
<td></td>
<td>o pollination – the transfer of pollen from the male parts (stamens) to the female parts (pistils) of a flower</td>
</tr>
<tr>
<td></td>
<td>o fertilization (seed production) – the joining of an egg cell and a sperm cell</td>
</tr>
<tr>
<td></td>
<td>o seed dispersal – the transport of seed from one location to another</td>
</tr>
<tr>
<td></td>
<td>o germination – the sprouting of a plant from a seed</td>
</tr>
</tbody>
</table>

#### Teacher Hints for “Plant Reproduction”:
- Germination and pollination are introduced in 3rd grade. Fertilization and seed dispersal are introduced in 4th grade.
- Use a hand lens to observe pistils and stamens. Make inferences about which flowers have been pollinated.
- Dissect fruits, such as apples and oranges, to find evidence of fertilization.
- Take a Sock Walk. Wear a sock on the outside of your shoe. Walk around the school yard to gather seeds for observation in the classroom. Have discussions about seed dispersal. Germinate the seeds collected by planting the socks in potting soil. Watch them grow!
- Additional information about the biology of plants can be found at [http://www.mbgnet.net/bioplants/main.html](http://www.mbgnet.net/bioplants/main.html).
- Caution: Germinating seeds in a window creates the misconception that seeds require light to grow.
### Week 30

**Animal Life Cycles**

**Students will:**
- **explore** life cycles of various animals living in Florida.
- **describe** complete metamorphosis (4 stages) using animals that undergo this change (e.g., butterflies, frogs, flies, ants).
- **describe** incomplete metamorphosis (3 stages) using animals that undergo this change (e.g., grasshoppers, cockroaches, dragonflies).
- **compare and contrast** differences in body structures of the different stages (egg, larva, pupa, adult, nymph).
- **differentiate** between the major stages in life cycles of Florida animals including, but not limited to, those that undergo incomplete and complete metamorphosis.

**Teacher Hints for “Animal Life Cycles”:**
- Students are to be comfortable with classifying animals into major groups according to physical characteristics and behaviors (e.g., mammals, birds, reptiles, amphibians, fish, or arthropods (insects, spiders, lobsters, shrimp, crab, crayfish); vertebrate or invertebrate; live birth or egg laying; scales, feathers, or fur).
- Students need to understand and be exposed to the life cycles of various animals (e.g., human, chicken, butterfly, frog).
- Students need to understand the difference between complete metamorphosis (development through four stages: egg, larva, pupa, adult) and incomplete metamorphosis (development through three stages: egg, nymph, adult).
- Some animals that go through complete metamorphosis are butterflies, bees, flies, and beetles. Some animals that go through incomplete metamorphosis are dragonflies, cockroaches, and grasshoppers.
- Additional incomplete/complete metamorphosis examples can be found at [http://www.mrsscienceteacher.com/Metamorphosis/Metamorphosis.html](http://www.mrsscienceteacher.com/Metamorphosis/Metamorphosis.html).
- Stress with students that both humans and invertebrates are animals.

### Weeks 31-32

**Heredity**

**Students will:**
- **explain** that some characteristics (traits) of plants are inherited by offspring from parents (e.g., type of plant, color of flower, leaf shape, size).
- **explain** that some characteristics (traits) of plants are affected by the environment in both positive and negative ways (e.g., fires, humans, pollution).
- **explain** that some characteristics (traits) of animals are inherited by offspring from parents (e.g., freckles, height, dimples, eye color).
- **explain** that some characteristics (traits) of animals are learned/acquired by the environment (e.g., hair color and length, playing an instrument, reading).
- **explain** that environmental factors such as climate, disease, light, temperature, predator-prey relationships, and food supply, can affect some characteristics of organisms.

**Recognize that animal behaviors may be shaped by heredity and learning.**

**Students will:**
- **give examples** of how animal behaviors may be shaped by heredity or learning.
  - instinctive/inherited behaviors: hibernation, migration, hunting, protecting young, courtship, grooming, verbal communication, fighting, etc.
  - learned behaviors: using tools, language, hunting, playing sports, writing, etc.
- **form** conclusions that many animal behaviors are a combination of both heredity and learning.
- **differentiate** between learned/acquired behaviors and inherited/innate behaviors.

**Teacher Hints for “Heredity”:**
- The term characteristics should be used in conjunction with the term traits. For assessment purposes, the term characteristics will be used instead of the term traits.
## Teacher Notes

All optional curriculum resources can be found on the 5th Grade Science Canvas Site
### NGSSS BODY OF KNOWLEDGE: NATURE OF SCIENCE/LIFE SCIENCE

**Unit of Study:** Interdependence

**PACING:** Weeks 33 – 35
April 16 – May 4

### Prerequisite Learning

- **Kindergarten:** none
- **First Grade:** SC.1.L.16.1, SC.1.L.17.1
- **Second Grade:** SC.2.L.17.1, SC.2.L.17.2
- **Third Grade:** SC.3.L.17.1, SC.3.L.17.2

### Topics

#### Week 33

**Seasonal Changes**

**Learning Targets/Skills:**

Compare the seasonal changes in Florida plants and animals to those in other regions of the country.

- **Students will:**
  - **review** how plants respond to different stimuli (heat, light, and gravity).
  - **compare** ecosystems in Florida to ones found in other regions of the country (e.g., deciduous forest, ocean, grassland, wetland).
  - **discuss** environmental and biological triggers that initiate an organism’s response to seasonal change both in Florida and in different regions of the country (e.g., temperature, precipitation, dormancy, molting, breeding, camouflage).
  - **differentiate** the seasonal changes of Florida plants to those in other regions of the country (e.g., dormancy, leaves changing color and falling off, flowering season).
  - **differentiate** the seasonal changes of Florida animals to those in other regions of the country (e.g., color change, body covering change, hibernation, migration, camouflage).

**Week 34**

**Food Chains**

**Learning Targets/Skills:**

Explain that animals, including humans, cannot make their own food and that when animals eat plants or other animals, the energy stored in the food source is passed to them.

- **Students will:**
  - **review** that all living things need energy to survive.
  - **explain** that plants make their own food (photosynthesis) and are called producers.
  - **explain** that animals, including humans, cannot make their own food and are called consumers.
  - **explain** that when animals eat plants or other animals, the energy stored in the food source is passed to them.

**Teacher Hints for “Seasonal Changes”**:

- Compare seasonal changes of plants and animals in Florida with the seasonal changes in plants and animals from various regions of the United States.
- Living organisms have regular patterns and routines that involve obtaining food and carrying out life history stages such as breeding, migrating, molting, and hibernating.
- The acquisition, utilization, and storage of energy reserves (and other resources) are critical to lifetime reproductive success.
- Plants and animals are adapted to survive and reproduce within the ever-changing environments.

**Week 34**

**Food Chains**

Trace the flow of energy from the Sun as it is transferred along the food chain through the producers to the consumers.

- **Students will:**
  - **describe** that all life on Earth is dependent upon the sun.
  - **trace** the flow of energy from the sun as it is transferred along the food chain through the producers to the consumers (e.g., sun → grass → rabbit → fox).
  - **explain** that some energy is lost from one organism to the next in the form of heat.
  - **classify** consumers as herbivores, carnivores, or omnivores.
  - **describe** the relationship between plants as producers and animals as consumers.

**Benchmarks**

SC.4.L.17.1: Embedded Nature of Science SC.4.N.1.1

SC.4.L.17.2: Embedded Nature of Science SC.4.N.1.1

SC.4.L.17.3: Embedded Nature of Science SC.4.N.3.1
### Teacher Hints for “Food Chains”:
- Although photosynthesis is taught in 3rd grade, a review of this concept is recommended.
- Students should understand that the arrows in a food chain diagram represent the direction in which energy is transferred (e.g., the sun’s energy is used by grass for photosynthesis. This energy is transferred to the rabbit when it eats the grass. The energy then transfers to the fox when it eats the rabbit.).
- Decomposers are no longer part of the science curriculum in the elementary grades.
- Food webs and food pyramids are no longer part of the science curriculum in the elementary grades.

### Week 35

**Environment**

<table>
<thead>
<tr>
<th>Recognize ways plants and animals, including humans, can impact the environment.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Students will:</strong></td>
</tr>
<tr>
<td>- <strong>describe</strong> the positive (helpful) and negative (harmful) impact plants may have on the environment.</td>
</tr>
<tr>
<td>- positive – decor, medicine, oxygen, erosion control, food source</td>
</tr>
<tr>
<td>- negative – invasive species, poisonous plants, reduction in diversity</td>
</tr>
<tr>
<td>- <strong>describe</strong> the positive (helpful) and negative (harmful) impact animals may have on the environment.</td>
</tr>
<tr>
<td>- positive – migration, predator-prey, pets, food source</td>
</tr>
<tr>
<td>- negative – overpopulation, poisonous/dangerous animals, destruction)</td>
</tr>
<tr>
<td>- <strong>describe</strong> ways that humans help and harm the environment.</td>
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</tbody>
</table>

### Teacher Hints for “Environment”:
- It is recommended that human and animal discussions on the helpful and harmful impacts that each of on the environment be conducted separately.

### 04 VST 3

**Life Science**

**April 30-May 4**

**STEM Week – Week 36** (See the Grade 4 Canvas site for STEM lesson)
**Teacher Notes**

| All optional curriculum resources can be found on the 5th Grade Science Canvas Site |
### NGSSS BODY OF KNOWLEDGE: NATURE OF SCIENCE

<table>
<thead>
<tr>
<th>Unit of Study: Practice of Science</th>
<th>PACING: Weeks 37 – 39 May 14 – May 30</th>
</tr>
</thead>
</table>

#### Prerequisite Learning
- Kindergarten – SC.K.N.1.1, SC.K.N.1.2, SC.K.N.1.3, SC.K.N.1.4, SC.K.N.1.5
- First Grade – SC.1.N.1.1, SC.1.N.1.2, SC.1.N.1.3, SC.1.N.1.4, SC.1.E.5.3
- Second Grade – SC.2.N.1.1, SC.2.N.1.2, SC.2.N.1.3, SC.2.N.1.4, SC.2.N.1.5, SC.2.N.1.6

<table>
<thead>
<tr>
<th>Topics</th>
<th>Learning Targets/Skills</th>
<th>Benchmarks</th>
<th>Academic Language</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Weeks 37-39</strong></td>
<td><strong>Science Processes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>This topic is continued on the next page.</td>
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</table>

#### Learning Targets/Skills
- Explain that science does not always follow a rigidly defined method ("the scientific method") but that science does involve the use of observations and empirical evidence.
- Explain that science focuses solely on the natural world.

**Students will:**
- explain the role of a scientist (ask questions and find answers).
- explain that scientific investigations do not always follow a rigidly defined method (e.g., scientific method, observation, investigation, research).
- explain that science does involve the use of observations and evidence.

- Keep records that describe observations made, carefully distinguishing actual observations from ideas and inferences about the observations.

**Students will:**
- record observations of an object and/or an event in a science notebook using a variety of data collection tools (e.g., diagrams, charts, graphs).
- make inferences based on observations.
- distinguish observations from inferences.

- Compare the observations made by different groups using multiple tools and seek reasons to explain the differences across groups.

- Compare the methods and results of investigations done by other classmates.

**Students will:**
- demonstrate proper use of scientific tools to ensure accuracy of measurements.
- engage in a common team investigation using metric measurement tools (e.g., beakers, graduated cylinders, ruler, meter stick, tape measure, thermometer, scale, gram weights).
- compare the methods and results of other team investigations.
- formulate opinions, new ideas, and conclusions based on team comparisons.
- seek reasons to explain any differences that may have occurred.
- critique others' work in a written manner to make recommendations of how to improve future investigations.

**Benchmarks:**
- SC.4.N.1.3
- SC.4.N.1.5
- SC.4.N.1.6
- SC.4.N.2.1

**Academic Language:**
- evidence
- experiment
- investigation
- observation
- scientific method
- chart/data table
- diagrams
- findings
- graph
- inference
- observation
- records
- investigation
- metric
- scientific tools
- beaker
- graduated cylinder
- hand lens
- meter stick
- ruler
- scale
- stopwatch
- tape measure
- thermometer
- weights
Weeks 37-39

Science Process

Raise questions about the natural world, use appropriate reference materials that support understanding to obtain information (identifying the source), conduct both individual and team investigations through free exploration and systematic investigations and generate appropriate explanations based on those explorations.

Recognize that science involves creativity in designing experiments.

**Students will:**
- generate testable questions about the world that can be answered through observation and investigation.
- research topics related to the questions they generate (e.g., internet, leveled-readers, non-fiction resources, newspaper).
- form a hypothesis based on research.
- investigate student-generated questions, individually and in teams, through free exploration, experimentation (scientific method), or other types of investigations using appropriate science tools (metric measurement).
- form conclusions based on data obtained during investigations.
- identify any flaw(s) in the experimental design that may have affected the outcome.

Recognize and explain that scientists base their explanations on evidence.

Attempt reasonable answers to scientific questions and cite evidence in support.

**Students will:**
- define data and evidence (a collection of observable and measurable information gathered during an investigation).
- discuss previously acquired data/evidence to form a conclusion (a statement that explains whether the data does or does not support the hypothesis including an explanation of why).
- compare conclusions.
- recognize that sharing ideas and conclusions is a source of new information and knowledge for a scientist.
- explain that scientists base their explanations on data and evidence.

**Post-Assessment**

04 SMT 2

May 14 – 30

Return to page 9 to access the Practice of Science Resource Alignment suggestions that were not used during the Introduction to Practice of Science at the start of the school year.
### Science Process Skills: Basic and Integrated

<table>
<thead>
<tr>
<th>BASIC</th>
<th>INTEGRATED</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Observing:</strong></td>
<td>using your senses to gather information about an object or event; a description of what is actually perceived; information that is considered to be qualitative data</td>
</tr>
<tr>
<td><strong>Measuring:</strong></td>
<td>using standard measures or estimations to describe specific dimensions of an object or event; information considered to be quantitative data</td>
</tr>
<tr>
<td><strong>Inferring:</strong></td>
<td>formulating assumptions or possible explanations based upon observations</td>
</tr>
<tr>
<td><strong>Classifying:</strong></td>
<td>grouping or ordering objects or events into categories based upon characteristics or defined criteria</td>
</tr>
<tr>
<td><strong>Predicting:</strong></td>
<td>guessing the most likely outcome of a future event based upon a pattern of evidence</td>
</tr>
<tr>
<td><strong>Communicating:</strong></td>
<td>using words, symbols, or graphics to describe an object, action, or event</td>
</tr>
</tbody>
</table>

| **Formulating Hypotheses:** | stating the proposed solutions or expected outcomes for experiments; proposed solutions to a problem must be testable |
| **Identifying Variables:** | stating the changeable factors that can affect an experiment; important to change only the variable being tested and keep the rest constant |
| **Defining Variables:** | explaining how to measure a variable in an experiment |
| **Designing Investigations:** | designing an experiment by identifying materials and describing appropriate steps in a procedure to test a hypothesis |
| **Experimenting:** | carrying out an experiment by carefully following directions of the procedure so the results can be verified by repeating the procedure several times |
| **Acquiring Data:** | collecting qualitative and quantitative data as observations and measurements |
| **Organizing Data:** | making data tables and graphs for data collected |
| **Analyzing Investigations:** | interpreting data, identifying errors, evaluating the hypothesis, formulating conclusions, and recommending further testing when necessary |
HEALTH
HE.4.C.1.6
Students will:
Identify the human body parts and organs that work together to form healthy body systems.

LANGUAGE ARTS
LAFS.4.RI.1.3
Students will:
Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.

LAFS.4.RI.2.4
Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 4 topic or subject area.

LAFS.4.RI.4.10
By the end of the year, read and comprehend informational texts, including history/social studies, science, and technical texts, in the grades 4-5 text complexity band proficiently, with scaffolding as needed at the high end of the range.

LAFS.4.SL.1.1
Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others’ ideas and expressing their own clearly.
   a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion.
   b. Follow agreed-upon rules for discussions and carry-out assigned roles.
   c. Pose and respond to specific questions to clarify or follow up on information, and make comments that contribute to the discussion and link to the remarks of others.
   d. Review the key ideas expressed and explain their own ideas and understanding in light of the discussion.

LAFS.4.W.3.8
Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources.

LAFS.4.W.3.9
Draw evidence from literary or informational texts to support analysis, reflection, and research.
   a. Apply grade 4 Reading standards to literature (e.g., “Describe in depth a character, setting, or event in a story or drama, drawing on specific details in the text [e.g., a character’s thoughts, words, or actions].”)
   b. Apply grade 4 Reading standards to informational texts (e.g., “Explain how an author uses reasons and evidence to support particular points in a text”).

MATHEMATICS
MAFS.4.MD.1.1
Know relative size of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, mL; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two column table. For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), …

MAFS.4.MD.2.4
Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.

TECHNOLOGY
Creativity and innovation
Students will:
Demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology.

Communication and collaboration
Use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.

Research and informational fluency
Apply digital tools to gather, evaluate, and use information.

Critical thinking, problem solving, and decision making
Use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

Digital Citizenship
Understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.

Technology operations and concepts
Demonstrate a sound understanding of technology concepts, systems, and operations.

MAKING CONNECTIONS
Health (NGSSS) / Language Arts (LAFS) / Mathematics (MAFS) / Technology (ISTE)
Students will:

Make sense of problems and persevere in solving them. (SMP.1)
Solving a mathematical problem involves making sense of what is known and applying a thoughtful and logical process which sometimes requires perseverance, flexibility, and a bit of ingenuity.

Reason abstractly and quantitatively. (SMP.2)
The concrete and the abstract can complement each other in the development of mathematical understanding: representing a concrete situation with symbols can make the solution process more efficient, while reverting to a concrete context can help make sense of abstract symbols.

Construct viable arguments and critique the reasoning of others. (SMP.3)
A well-crafted argument/critique requires a thoughtful and logical progression of mathematically sound statements and supporting evidence.

Model with mathematics. (SMP.4)
Many everyday problems can be solved by modeling the situation with mathematics.

Use appropriate tools strategically. (SMP.5)
Strategic choice and use of tools can increase reliability and precision of results, enhance arguments, and deepen mathematical understanding.

Attend to precision. (SMP.6)
Attending to precise detail increases reliability of mathematical results and minimizes miscommunication of mathematical explanations.

Look for and make use of structure. (SMP.7)
Recognizing a structure or pattern can be the key to solving a problem or making sense of a mathematical idea.

Look for and express regularity in repeated reasoning. (SMP.8)
Recognizing repetition or regularity in the course of solving a problem (or series of similar problems) can lead to results more quickly and efficiently.
The Science Curriculum Map has been developed by teachers for ease of use during instructional planning. Terminology found within the framework of the curriculum map is defined below.

**Next Generation Sunshine State Standards (NGSSS):** a set of content and process science standards that define with specificity what teachers should teach and students should know and be able to do; adopted by the Florida State Board of Education in 2008

**NGSSS Body of Knowledge:** the broadest organizational structure used to group content and concepts within the curriculum map and include the following: Nature of Science, Earth Science, Physical Science and Life Science (also known as Reporting Category)

**Standard/Big Idea:** an overarching organizational structure used to describe the scope of a selected group of benchmarks; for example, *The Characteristics of Science Knowledge, Earth Systems and Patterns, Forms of Energy, and Interdependence*

**Unit of Study:** an overarching organizational sub-structure comprised of a collection of topics used to group content and concepts for a more narrow focus

**Topics:** a grouping of benchmarks and skills that form a subset of scientific concepts covered in each unit of study

**Benchmarks:** the required NGSSS expectations presented in the course descriptions posted on CPALMS by FLDOE

**Learning Targets/Skills:** the content knowledge, processes, and enabling skills that will ensure successful mastery of the benchmarks

**Vocabulary:** the content terminology and other academic language and phrases that support mastery of the learning targets and skills; for teacher- and student-use alike

**Prerequisite Learning:** the benchmarks assigned to previous grade levels that support learning within the current grade level

**Pacing:** a recommendation of time frames for initial delivery of instruction and assessment in preparation for “fair game” benchmark evaluation that occurs on the grade 5 Statewide Science Assessment (SSA)

**Teacher Hints:** a listing of considerations when planning for instruction; may include suggestions or ideas for review

**Resource Alignment:** a listing of available, high quality and benchmark-aligned materials including labs, strategies, lessons, and videos from textbook and other media sources

**STEM Week:** a period of time dedicated to the implementation of an interdisciplinary, standards-rich experience that poses an age-appropriate, real-world problem to be solved through collaborative and creative measures

**Formative Assessment Strategies:** techniques that can be used before, during, and after instruction to evaluate student learning

The District Science Office recommends that all students engage in hands-on, minds-on science experiences DAILY.