

Food, Fiber and You Lab Choices

2017

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Mobile Science Lab Investigations and the Practices of Science, NGSS, Environmental Literacy, and CORE Curriculum

The investigations on the Mobile Science Labs allow are aligned with the NGSS, Environmental Literacy, and Common Core standards.

The investigations also allow students to explore the NGSS Science and Engineering Practices identified as essential for all students to learn. All investigations address one or more of these practices. To assist in deciding which practices are best addressed in each investigation, the following designation follows each lab choice description – Practices of Science (1,2,3,6,7) would indicate that the investigation was strongest in those practices of science, adding 5 to the list would indicate there is also a math component in the that investigation.

Due to time constraints, NGSS Practice of Science #8, “evaluating and communicating information”, will need to be completed back in the classroom as a follow-up activity. Questions are provided to the teacher for each investigation to assist with this.

There are many other opportunities for the classroom teacher to expand on the investigation by connecting reading and language arts skills based on the mobile lab investigation.

NGSS Science and Engineering Practices

1. Asking questions and defining problems
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations and designing solutions
7. Engaging in argument from back evidence
8. Obtaining, evaluating, and communicating information



1. Farmers Protect the Environment (Env)* (Grades 4-5)

This lesson supports the new Environmental Literacy standards as students discover four of the ways (manure pits, fencing, cover crops, and buffers) farmers protect the environment and the Chesapeake Bay. The team designs its own environmentally friendly farm.

This lesson supports the following practices and standards:

- NGSS Science and Engineering Practices (1,2,6,7)
- NGSS Disciplinary Core Idea:
 - ESS3.C Human impacts on Earth systems: Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and water systems. But individuals and communities are doing things to help



en planning walk-throughs, allow **25-30 minutes** per class. Allow **10 minutes** between classes for clean-up and set up time. **Kindergarten classes may only visit the lab one time.** Pre-school classes may “tour” the lab – allow 15-20 minutes.



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Indicator 2: Analyze the effects of human activities that deliberately or inadvertently alter the equilibrium of natural processes.
Agriculture in the Classroom

Standards Connections (ELA/Literacy/Writing):

Grade 4

- **RI.4.1** Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.
- **RI.4.3** 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.
- **RI.4.7** Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.
- **W.4.2** Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

Grade 5

- **RI.5.3** Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.
- **W.5.2** Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

➤ **Maryland Social Studies Standards Connections:**

- **MSDE 3.0.D.1 (Geography) Grade 4:** Describe how people adapt to, modify and impact the natural environment.
- **MSDE 3.0.D.1 (Geography) Grade 5:** Describe why and how people adapt to and modify the natural environment and the impact of those modifications.

2. Farmers Protect the Environment (Env Pri)* (Grades 2-3)

This session is similar to the one above for 4-5th grades but focuses on three practices (manure pits, fencing, buffers). The teams also design an environmentally friendly farm.



This lesson supports the following practices and standards:

- **NGSS Science and Engineering Practices (1,2,6,7)**
- **NGSS Disciplinary Core Idea:**
 - **ESS3.C Human impacts on Earth systems:** Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth’s resources and environments.
- **Environmental Literacy Connections:**
 - **Standard 5 Topic A Indicator 1:** Analyze the effects of human activities on earth’s natural processes.
 - **Standard 5 Topic A Indicator 2:** Analyze the effects of human activities that deliberately or inadvertently alter the equilibrium of natural processes.
- **Common Core Standards Connections (ELA/Literacy):**

Grade 2

 - **RI.2.1** Ask and answer questions such as who, what, where, when, why, and how to demonstrate understanding of key details in a text.
 - **RI.2.3** Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text.
 - **RI.2.7** Explain how specific images (e.g., a diagram showing how a machine works) contribute to and clarify a text.

Grade 3

 - **RI.3.1** Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.
 - **RI.3.3** Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.

- **RI.3.3** Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.
 - **RI.3.7** Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur).
- **Maryland Social Studies Standards Connections:**
- **MSDE 3.0.D.1 (Geography) Grades 2 and 3:** Explain how people modify, protect, and adapt to their environment.

3. The Science of Chocolate (Chocolate)* (Grades 3-5)



Students act as food scientists as they discover the properties of chocolate, investigate the taste and production of chocolate, and explore the concept of viscosity. (*Students will be taste-testing less than 1/16 of a teaspoon of cocoa and sugar and a drop of vanilla.*)

This lesson supports the following practices and standards:

- **NGSS Science and Engineering Practices (1,3,4,5,6,7)**
- **NGSS Disciplinary Core Idea:**
 - **PSI.B Chemical Reactions:** When two or more different substances are mixed, a new substance with different properties may be formed.
 - **LS1.A Structure and Function:** All organisms have external parts. Plants have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow.
- **Common Core Standards Connections (ELA/Literacy):**
 - Grade 3**
 - **RI.3.1** Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.
 - **RI.3.3** Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.
 - **RI.3.4** Determine the meaning of general academic and domain-specific words and phrases in a text-relevant to a grade 3 topic or subject area.
 - **RI.3.7** Use information gained from illustrations and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur).
 - Grade 4**
 - **RI.4.1** Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.
 - **RI.4.3** 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.
 - **RI.4.4** Determine the meaning of general academic and domain-specific words and phrases in a text-relevant to a grade 4 topic or subject area.
 - **RI.4.7** Interpret information presented visually, orally, or quantitatively and explain how the information contributes to an understanding of the text in which it appears.
 - Grade 5**
 - **RI.5.1** Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.
 - **RI.5.3** Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.
 - **RI.5.4** Determine the meaning of general academic and domain-specific words and phrases in a text-relevant to a grade 5 topic or subject area.
- **Maryland Social Studies Standards Connections:**
 - **MDSE 4.0.A.2 (Grade 3):** Explain the production process.
 - **MSDE 4.0.A.2 (Grade 4):** Explain how economic resources are used to produce goods and services to satisfy economic wants in Maryland.

4. The Art of Making Cheese (Cheese)* (Grades 3-5)

Milk is used to make familiar products that we eat such as ice cream, yogurt, and cheese. In this experiment, students make cottage cheese using a process that causes the casein in milk to curdle. (With the classroom teacher's permission, students may be allowed to taste a sample of the cottage cheese they make.)

This lesson supports the following practices and standards:

- **NGSS Science and Engineering Practices (1,3,6)**
- **NGSS Disciplinary Core Idea:**
 - **PSI.B Chemical Reactions:** When two or more different substances are mixed, a new substance with different properties may be formed.



➤ **NGSS Disciplinary Core Idea:**

- **PSI.B Chemical Reactions:** When two or more different substances are mixed, a new substance with different properties may be formed.

➤ **Common Core Standards Connections (ELA/Literacy):**

Grade 3

- **RI.3.1** Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.
- **RI.3.3** Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.
- **RI.3.4** Determine the meaning of general academic and domain-specific words and phrases in a text-relevant to a grade 3 topic or subject area.

Grade 4

- **RI.4.1** Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.
- **RI.4.3** 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.
- **RI.4.4** Determine the meaning of general academic and domain-specific words and phrases in a text-relevant to a grade 4 topic or subject area.

Grade 5

- **RI.5.1** Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.
- **RI.5.3** Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.
- **RI.5.4** Determine the meaning of general academic and domain-specific words and phrases in a text-relevant to a grade 5 topic or subject area.

➤ **Maryland Social Studies Standards Connections:**

- **MDSE 4.0.A.2 (Grade 3):** Explain the production process.
- **MSDE 4.0.A.2 (Grade 4):** Explain how economic resources are used to produce goods and services to satisfy economic wants in Maryland.

5. Strawberry DNA (DNA)* (Grades 4-5)

Students put their scientific skills to work as they create strawberry slurry and extract the DNA from the strawberry in an effort to understand how biotechnology enables scientists to change characteristics in food products.



This lesson supports the following practices and standards:

➤ **NGSS Science and Engineering Practices (1,3)**

➤ **NGSS Disciplinary Core Idea:**

- **PSI.B Chemical Reactions:** When two or more different substances are mixed, a new substance with different properties may be formed.

➤ **Environmental Literacy Connections:**

- **Standard 5 Topic A Indicator 1:** Analyze the effects of human activities on earth's natural processes.

➤ **Common Core Standards Connections (ELA/Literacy):**

Grade 4

- **RI.4.1** Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.
- **RI.4.3** 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.
- **RI.4.4** Determine the meaning of general academic and domain-specific words and phrases in a text-relevant to a grade 4 topic or subject area.
- **RI.4.7** Interpret information presented visually, orally, or quantitatively and explain how the information contributes to an understanding of the text in which it appears.

Grade 5

- **RI.5.1** Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.
- **RI.5.3** Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.
- **RI.5.4** Determine the meaning of general academic and domain-specific words and phrases in a text-relevant to a grade 5 topic or subject area.
- **RI.5.7** Draw on information from multiple print or digital sources, demonstrating the ability to locate, evaluate, and use information from different media or formats and to resolve conflicting information.

- *RI.5.7 Determine the meaning of general academic and domain-specific words and phrases in a text-relevant to a grade 5 topic or subject area.*
- *RI.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.*

6. Fiber Up for a Clean Sweep (Fiber)* (Grades 3-5)

Nutrition and the fiber content of favorite foods are explored in this scientific investigation as students act as food nutritionists and test 6 different foods in order to determine if fiber is present.



This lesson supports the following practices and standards:

- *NGSS Science and Engineering Practices (1,3,4,5,6,7)*
- *NGSS Disciplinary Core Idea:*
 - *PS1.B Chemical Reactions: When two or more different substances are mixed, a new substance with different properties may be formed.*
- *Common Core Standards Connections (ELA/Literacy):*
 - Grade 3**
 - *RI.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.*
 - *RI.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.*
 - *RI.3.4 Determine the meaning of general academic and domain-specific words and phrases in a text-relevant to a grade 3 topic or subject area.*
 - Grade 4**
 - *RI.4.1 Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.*
 - *RI.4.3 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.*
 - *RI.4.4 Determine the meaning of general academic and domain-specific words and phrases in a text-relevant to a grade 4 topic or subject area.*
 - Grade 5**
 - *RI.5.1 Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.*
 - *RI.5.3 Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.*
 - *RI.5.4 Determine the meaning of general academic and domain-specific words and phrases in a text-relevant to a grade 5 topic or subject area.*

7. How Well Do You Wash? (Wash)* (Grades 3-5)

Students apply “germs (glitterbug lotion)” to their hands and then perform several hand washing tests to determine which method most effectively removes the “germs”. A special light source helps to detect the “germs” remaining. (Knowledge of percent is beneficial.)



This lesson supports the following practices and standards:

- *NGSS Science and Engineering Practices (1,3,4,5,6,7)*
- *NGSS Disciplinary Core Idea:*
 - *PS1.A Structure of Matter: Because matter exists as particles that are too small to see, matter is always conserved even if it seems to disappear.*
- *Common Core Standards Connections (ELA/Literacy):*
 - Grade 3**
 - *RI.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.*
 - *RI.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.*
 - Grade 4**
 - *RI.4.1 Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.*
 - *RI.4.3 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.*
 - Grade 5**
 - *RI.5.1 Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.*

Grade 5

- **RI.5.1** Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.
 - **RI.5.3** Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.
- **Maryland Social Studies Standards Connections:**
- **MDSE 4.0.A.3 (Grade 3):** Explain how technology affects the way people live, work, and play.

8. Sugar Sheriffs (Sugar)* (Grades 3-5)



Students discover the nutritional content of some of their favorite beverages as they experiment with density. The lesson ends with learning how to read nutrition labels on beverages and hopefully selecting drinks that will be good for you.



This lesson supports the following practices and standards:

- **NGSS Science and Engineering Practices (1,3,4,5,6,7)**
- **NGSS Disciplinary Core Idea:**
 - **PS1.A Structure of Matter:** Because matter exists as particles that are too small to see, matter is always conserved even if it seems to disappear.
- **Common Core Standards Connections (ELA/Literacy):**
 - Grade 3**
 - **RI.3.1** Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.
 - **RI.3.3** Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.
 - **RI.3.4** Determine the meaning of general academic and domain-specific words and phrases in a text-relevant to a grade 3 topic or subject area.
 - **RI.3.5** Use text features and search tools (e.g., key words, sidebars, hyperlinks) to locate information relevant to a given topic efficiently.
 - Grade 4**
 - **RI.4.1** Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.
 - **RI.4.3** 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.
 - **RI.4.4** Determine the meaning of general academic and domain-specific words and phrases in a text-relevant to a grade 4 topic or subject area.
 - **RI.4.7** Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.
 - Grade 5**
 - **RI.5.1** Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.
 - **RI.5.3** Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.
 - **RI.5.4** Determine the meaning of general academic and domain-specific words and phrases in a text-relevant to a grade 5 topic or subject area.
 - **RI.5.7** Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.

9. Snack Attack (Snack)* (Grades 3-5)



Students discover the nutritional content of some of their favorite foods as they experiment to discover which ones contain fat. The lessons ends with learning how to read nutrition labels and hopefully selecting snacks that are good for you!



This lesson supports the following practices and standards:

- **NGSS Science and Engineering Practices (1,2,3,4,6,7)**
- **NGSS Disciplinary Core Idea:**
 - **PS1.A Structure of Matter:** Because matter exists as particles that are too small to see, matter is always conserved even if it seems to disappear.
- **Common Core Standards Connections (ELA/Literacy):**
 - Grade 3**

➤ **Common Core Standards Connections (ELA/Literacy):**

Grade 3

- **RI.3.1** Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.
- **RI.3.3** Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.
- **RI.3.5** Use text features and search tools (e.g., key words, sidebars, hyperlinks) to locate information relevant to a given topic efficiently.

Grade 4

- **RI.4.1** Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.
- **RI.4.3** 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.
- **RI.4.7** Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.

Grade 5

- **RI.5.1** Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.
- **RI.5.3** Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.
- **RI.5.7** Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.

10. Sticky Bean (Sticky)* (Grades 3-5)

Isolated soy protein and calcium hydroxide are used to produce a vegetable based glue made from soybeans. The glue because of its long polymer chains makes a good adhesive. Students test the strength of their glue against Elmer's glue using a peel test, tensile strength test, and shear strength test.

This lesson supports the following practices and standards:

➤ **NGSS Science and Engineering Practices (1,2,3,4,6,7)**

➤ **NGSS Disciplinary Core Idea:**

- **PS1.B Chemical Reactions:** When two or more different substances are mixed, a new substance with different properties may be formed.

➤ **Common Core Standards Connections (ELA/Literacy):**

Grade 3

- **RI.3.1** Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.
- **RI.3.3** Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.
- **RI.3.4** Determine the meaning of general academic and domain-specific words and phrases in a text-relevant to a grade 3 topic or subject area.

Grade 4

- **RI.4.1** Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.
- **RI.4.3** 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.
- **RI.4.4** Determine the meaning of general academic and domain-specific words and phrases in a text-relevant to a grade 4 topic or subject area.

Grade 5

- **RI.5.1** Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.
- **RI.5.3** Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.
- **RI.5.4** Determine the meaning of general academic and domain-specific words and phrases in a text-relevant to a grade 5 topic or subject area.

11. Yeast Action (Yeast)* (Grades 3-5)

11. Yeast Action (Yeast)* (Grades 3-5)

Fungi organisms called yeast are used in bread making. Students set up an experiment to observe the conditions that create the best environment for yeast to grow.

This lesson supports the following practices and standards:



➤ **NGSS Science and Engineering Practices (1,3,4,6,7)**

Disciplinary Core Idea:

LS3.B Chemical Reactions: When two or more different substances are mixed, a new substance with different properties may be formed.

➤ **Common Core Standards Connections (ELA/Literacy):**

Grade 3

- **RI.3.1** Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.
- **RI.3.3** Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.
- **RI.3.4** Determine the meaning of general academic and domain-specific words and phrases in a text-relevant to a grade 3 topic or subject area.

Grade 4

- **RI.4.1** Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.
- **RI.4.3** 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.
- **RI.4.4** Determine the meaning of general academic and domain-specific words and phrases in a text-relevant to a grade 4 topic or subject area.

Grade 5

- **RI.5.1** Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.
- **RI.5.3** Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.
- **RI.5.4** Determine the meaning of general academic and domain-specific words and phrases in a text-relevant to a grade 5 topic or subject area.

12. Using Genetics to Improve Agriculture (Genetics)* (Grades 3-5)

Hands-on activities introduce students to the fundamentals of genetics as they develop a basic understanding of the role of chromosomes and how genes are inherited from parent to offspring.



This lesson supports the following practices and standards:

➤ **NGSS Science and Engineering Practices (1,2,3,4,6,7)**

➤ **NGSS Disciplinary Core Idea:**

- **LS3.B Variation of Traits:** Different organisms vary in how they look and function because they have different inherited information; the environment also affects the traits that an organism develops.

➤ **Common Core Standards Connections (ELA/Literacy):**

Grade 3

- **RI.3.1** Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.
- **RI.3.3** Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.
- **RI.3.4** Determine the meaning of general academic and domain-specific words and phrases in a text-relevant to a grade 3 topic or subject area.
- **RI.3.5** Use text features and search tools (e.g., key words, sidebars, hyperlinks) to locate information relevant to a given topic efficiently.

Grade 4

- **RI.4.1** Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.
- **RI.4.3** 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.
- **RI.4.4** Determine the meaning of general academic and domain-specific words and phrases in a text-relevant to a grade 4 topic or subject area.
- **RI.4.7** Interpret information presented visually, orally, or quantitatively (e.g., in charts.

- **RI.4.4** Determine the meaning of general academic and domain-specific words and phrases in a text-relevant to a grade 4 topic or subject area.
 - **RI.4.7** Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.
- Grade 5**
- **RI.5.1** Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.
 - **RI.5.3** Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.
 - **RI.5.4** Determine the meaning of general academic and domain-specific words and phrases in a text-relevant to a grade 5 topic or subject area.
 - **RI.5.7** Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.

Important Scheduling Information

When planning a schedule, allow a minimum of **50-60 minutes** for scientific investigations. Allow 10 minutes between classes for clean-up and set up. If the need arises to change entirely from one experiment to another (this is NOT recommended) an additional 30 minute break must be allotted for the change-over. A 30 minute lunch break for the teacher must be included.

Prior to coming out to the lab, please divide your class into 12 equal teams for each of the 12 work stations.

A parent volunteer is needed for each morning and afternoon (not each class) to help prepare materials, cut yarn, refill containers, and assist with classes.

1. The Cow in Patrick O'Shanahan's Kitchen (K-4)

After enjoying a delightful, realistic fiction tale, students discover some amazing cow facts and make and taste real butter.

This lesson supports the following practices and standards:

- **NGSS Science and Engineering Practices (1,2,3)**
- **NGSS Disciplinary Core Ideas:**
 - **PS1.A Structure of Matter (K-2):** Matter exists as different substances that have observable different properties.
 - **PS1.A Structure of Matter (3-4):** Because matter exists as particles that are too small to see, matter is always conserved even if it seems to disappear.
- **Common Core Standards Connections (ELA/Literacy):**

Kindergarten

- **RL.K.1** With prompting and support, ask and answer questions about key details in a text.
- **RL.K.7** With prompting and support, describe the relationship between illustrations and the story in which they appear (e.g., what moment in a story an illustration depicts).

Grade 1

- **RL.1.1** Ask and answer questions about key details in a text.
- **RL.1.7** Use illustrations and details in a story to describe its characters, setting, or events.

Grade 2

- **RL.2.1** Ask and answer such questions as who, what, where, when, why, and how to determine understanding of key details in a text.
- **RL.2.7** Use information gained from the illustrations and words in a print or digital text to demonstrate understanding of its characters, setting, or plot.

Grade 3

- **RL.3.1** Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for answers.
- **RL.3.7** Explain how specific aspects of a text's illustrations contribute to what is conveyed by the words in a story.

explicitly to the text as the basis for answers.

- **RL.3.7** Explain how specific aspects of a text's illustrations contribute to what is conveyed by the words in a story.

Grade 4

- **RL.4.1** Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.

➤ **Maryland Social Studies Standards Connections:**

- **MSDE 4.0.A.2 (Grade K):** Identify that resources are used to make products.
- **MDSE 4.0.A.2 (Grades 1-3):** Explain and examine the production process.

2. Football and Agriculture (Foot)* (Grades K-5)

Students learn how football and agriculture are connected and make their own Football Charm. Super Bowl Ravens' gear is connected to the farm! (offered September to first week in February)

This lesson supports the following practices and standards:

➤ **NGSS Science and Engineering Practices (1,2,3)**

➤ **Environmental Literacy Connections:**

- **Standard 4 Topic C Indicator 1:** Explain how the interrelationships and interdependencies of organisms and populations contribute to the dynamics of communities and ecosystems.

➤ **Common Core Standards Connections (ELA/Literacy):**

Kindergarten

- **RI.K.7** With prompting and support, describe the relationship between illustrations and the text in which they appear (e.g., what person, place, thing, or idea in the text an illustration depicts).

Grade 1

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e works)

- **RI.1.7** Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur).

➤ **Maryland Social Studies Standards Connections:**

- **MSDE 4.0.A.2 (Grade K):** Identify that resources are used to make products.
- **MDSE 4.0.A.2 (Grades 1-3):** Explain and examine the production process.
- **MSDE 4.0.A.2 (Grade 4):** Explain how economic resources are used to produce goods and services to satisfy economic wants in Maryland.



3. Take Me Out to the Ball Game (Ball)* (Grades K-5)

Students learn how the world of baseball and agriculture are connected and make a Baseball Charm to take home. (offered 2nd week in February through June)

This lesson supports the following practices and standards:

➤ **NGSS Science and Engineering Practices (1,2,3)**

➤ **Environmental Literacy Connections:**

- **Standard 4 Topic C Indicator 1:** Explain how the interrelationships and interdependencies of organisms and populations contribute to the dynamics of communities and ecosystems.

➤ **Common Core Standards Connections (ELA/Literacy):**

Kindergarten

- **RI.K.7** With prompting and support, describe the relationship between illustrations and the text in which they appear (e.g., what person, place, thing, or idea in the text an illustration depicts).

Grade 1

- **RI.1.7** Use the illustrations and details in a text to describe its key ideas.

Grade 2

- **RI.2.7** Explain how specific images (e.g., a diagram showing how a machine works) contribute to and clarify a text.

Grade 3

- **RI.3.7** Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur).

➤ **Maryland Social Studies Standards Connections:**

- **MSDE 4.0.A.2 (Grade K):** Identify that resources are used to make products.

how key events occur).

➤ **Maryland Social Studies Standards Connections:**

- **MSDE 4.0.A.2 (Grade K):** Identify that resources are used to make products.
- **MSDE 4.0.A.2 (Grades 1-3):** Explain and examine the production process.
- **MSDE 4.0.A.2 (Grade 4):** Explain how economic resources are used to produce goods and services to satisfy economic wants in Maryland.

4. Forest & Me (F&M)* (Grades 2-5)

Through interaction with a story, pictures, text and discussion, students will realize the many benefits trees provide. The lesson closes with students making a bracelet to remind them of these benefits.

This lesson supports the following practices and standards:

- **NGSS Science and Engineering Practices**
- **NGSS Disciplinary Core Ideas:**
 - **LS1.A Structure and Function:** All organisms have external parts. Plants have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow.
- **Environmental Literacy Connections:**
 - **Standard 4 Topic C Indicator 1:** Explain how the interrelationships and interdependencies of organisms and populations contribute to the dynamics of communities and ecosystems.
- **Common Core Standards Connections (ELA/Literacy):**
 - Grade 2**
 - **RL.2.1** Ask and answer such questions as who, what, where, when, why, and how to determine understanding of key details in a text.
 - **RI.2.3** Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text.
 - Grade 3**
 - **RL.3.1** Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for answers.
 - **RI.3.3** Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.
 - Grade 4**
 - **RL.4.1** Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.
 - **RI.4.3** 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.
 - Grade 5**
 - **RI.5.3** Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.
- **Maryland Social Studies Standards Connections:**
 - **MSDE 3.0.D.1 (Geography) Grades 2 and 3:** Explain how people modify, protect, and adapt to their environment.
 - **MSDE 3.0.D.1 (Geography) Grade 4:** Describe how people adapt to, modify and impact the natural environment.
 - **MSDE 3.0.D.1 (Geography) Grade 5:** Describe why and how people adapt to and modify the natural environment and the impact of those modifications.



5. Extra Cheese Please (ExCh)* (Grades 2-5)

This story line shares mozzarella's journey from calf to pizza and explains how cheese is actually produced. Session includes a cheese making demonstration and a sequencing activity.

This lesson supports the following practices and standards:

- **NGSS Science and Engineering Practices (1,2,3)**
- **NGSS Disciplinary Core Ideas:**
 - **PS1.A Structure of Matter:** Matter exists as different substances that have observable different properties.
- **Environmental Literacy Connections:**
 - **Standard 4 Topic C Indicator 1:** Explain how the interrelationships and interdependencies of organisms and populations contribute to the dynamics of communities and ecosystems.
- **Common Core Standards Connections (ELA/Literacy):**
 - Grade 2**

communities and ecosystems.

➤ **Common Core Standards Connections (ELA/Literacy):**

Grade 2

- **RI.2.3** Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text.

Grade 3

- **RI.3.3** Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.

Grade 4

- **RI.4.3** 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.

Grade 5

- **RI.5.3** Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.

➤ **Maryland Social Studies Standards Connections:**

- **MDSE 4.0.A.2 (Grades 2-3):** Explain and examine the production process.
- **MSDE 4.0.A.2 (Grade 4):** Explain how economic resources are used to produce goods and services to satisfy economic wants in Maryland.



6. How Groundhog's Garden Grew (GGG)* (Grades K-4)

Students participate in telling a story using props and puppets and culminate the activity as they recall story elements and make a “healthy hand” reminding them to eat more fruits and vegetables each day.

This lesson supports the following practices and standards:

➤ **NGSS Science and Engineering Practices (1,2,3)**

➤ **NGSS Disciplinary Core Ideas:**

- **LS1.C Structure of Matter (K-2):** Animals obtain food they need from plants or other animals. Plants need water and light.
- **LS1.C Structure of Matter (3-4):** Food provides animals with the materials and energy they need for body repair, growth, warmth, and motion.

➤ **Common Core Standards Connections (ELA/Literacy):**

Kindergarten

- **RL.K.1** With prompting and support, ask and answer questions about key details in a text.

Grade 1

- **RL.1.1** Ask and answer questions about key details in a text.

Grade 2

- **RL.2.1** Ask and answer such questions as who, what, where, when, why, and how to determine understanding of key details in a text.

Grade 3

- **RL.3.1** Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for answers.

Grade 4

- **RL.4.1** Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.

➤ **Maryland Social Studies Standards Connections:**

- **MSDE 3.0.D.1 (Geography) Grades 2 and 3:** Explain how people modify, protect, and adapt to their environment.



7. Sheep Surprise (SS)* (Grades K-4)

A delightful “wordless” tale about a sheep on his motorcycle that help students understand the production process from sheep to sweater. This session ends with students making a colorful sticker bookmark.

This lesson supports the following practices and standards:

➤ **NGSS Science and Engineering Practices (1,2,3)**

➤ **Common Core Standards Connections (ELA/Literacy):**

Kindergarten

- **RI.K.3** With prompting and support, describe the connection between two individuals, events, ideas, or pieces of information in a text.

Grade 1

- **RI.1.3** Describe the connection between two individuals, events, ideas, or pieces of information in a text

Grade 1

- **RI.1.3** Describe the connection between two individuals, events, ideas, or pieces of information in a text.

Grade 2

- **RI.2.3** Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text.

Grade 3

- **RI.3.3** Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.

Grade 4

- **RI.4.3** 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.

➤ **Maryland Social Studies Standards Connections:**

- **MSDE 4.0.A.2 (Grade K):** Identify that resources are used to make products.
- **MDSE 4.0.A.2 (Grades 1-3):** Explain and examine the production process.
- **MSDE 4.0.A.2 (Grade 4):** Explain how economic resources are used to produce goods and services to satisfy economic wants in Maryland.

8. Seeds, Seeds, Seeds (Seeds)* (Grades K-5)

Students examine seeds and match them to the foods they eat.

This lesson supports the following practices and standards:

➤ **NGSS Science and Engineering Practices (1,2,3)**

➤ **NGSS Disciplinary Core Ideas:**

- **LS1.A Structure and Function:** All organisms have external parts. Plants have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow.

➤ **Common Core Standards Connections (ELA/Literacy):**

Kindergarten

- **RI.K.3** With prompting and support, describe the connection between two individuals, events, ideas, or pieces of information in a text.

Grade 1

- **RI.1.3** Describe the connection between two individuals, events, ideas, or pieces of information in a text.

Grade 2

- **RI.2.3** Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text.

Grade 3

- **RI.3.3** Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.

➤ **Maryland Social Studies Standards Connections:**

- **MSDE 4.0.A.2 (Grade K):** Identify that resources are used to make products.
- **MDSE 4.0.A.2 (Grades 1-3):** Explain and examine the production process.



9. Beanie Baby (BB)* (Grades K-5)

Students plant seeds in a new growing medium (soil moist) and watch for the first signs of growth.

This lesson supports the following practices and standards:

➤ **NGSS Science and Engineering Practices (1,2,3)**

➤ **NGSS Disciplinary Core Ideas:**

- **LS1.A Structure and Function:** All organisms have external parts. Plants have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow.

➤ **Common Core Standards Connections (ELA/Literacy):**

Kindergarten

- **RI.K.3** With prompting and support, describe the connection between two individuals, events, ideas, or pieces of information in a text.

Grade 1

- **RI.1.3** Describe the connection between two individuals, events, ideas, or pieces of information in a text.

Grade 2

- **RI.2.3** Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text.

Grade 3

- **RI.3.3** Describe the relationship between a series of historical events, scientific ideas or



concepts, or steps in technical procedures in a text.

Grade 3

- **RI.3.3** *Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.*

Grade 4

- **RI.4.3** *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.*

Grade 5

- **RI.5.3** *Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.*