

Aquatic Lab Choices

2017

Mobile Science Lab Investigations and the Science and Engineering Practices, NGSS, Environmental Literacy, and Common Core Standards

The investigations on the Mobile Science Labs 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, 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)

Maryland
Agriculture in the Classroom





Aquatics Lab Choices

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:** Societal activities have had major effects on Earth's systems. Societal activities can also help reduce their impacts.

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

- **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 State 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.5.1** 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.
- **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) farmers use. 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 (K-2):** Things people do can affect the environment but they can make choices to reduce their impacts.
- **ESS3.C Human impacts on Earth systems (3-5):** Societal activities have had major effects on Earth's systems. Societal activities can also help reduce their impacts.

2017

- **Environmental 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.2.3** 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

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• **RI.3.3** 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.3.7** 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. Aqua Terra Column (Aqua)* (Grades 3-5)

Students build an aqua terra column to investigate the connection and interaction between terrestrial and aquatic ecosystems. (Classroom teacher to provide one clean 2 liter plastic bottle with lid for each team of students or one per student if the teacher want each student to have his/her own bottle.)

This lesson supports the following practices and standards:

- **NGSS Science and Engineering Practices (1,2,3,6,7)**
- **NGSS Disciplinary Core Idea:**
 - **LS4.D Biodiversity and Humans:** Populations of organisms live in a variety of habitats. Change in those habitats affects the organisms living there.
- **Environmental Literacy Connections:**
 - **Standard 4 Topic A Indicator 1:** Explain how organisms are linked by the transfer and transformation of matter and energy at the ecosystem level
 - **Standard 4 Topic D Indicator 2:** Use models and provide examples to show how species' interactions may generate ecosystems that are stable for hundreds or thousands of years.
- **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.
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 - **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.



4. Clear or Cloudy (Cloudy)* (Grades 3-5)

Many water problems are caused by mismanagement of our water supply. Untreated

4. Clear or Cloudy (Cloudy)* (Grades 3-5)

Many water problems are caused by mismanagement of our water supply. Untreated sewage and waste are dumped into lakes and rivers contaminating them. Students complete this investigation to determine the best method to clean a polluted water sample.

This lesson supports the following practices and standards:

- **NGSS Science and Engineering Practices (1,2,3,4,6,7)**
- **NGSS Disciplinary Core Ideas:**
 - **ESS3.C Human impacts on Earth systems:** Societal activities have had major effects on the land, ocean, atmosphere, and even outer space. Societal activities can also 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 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.
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 - Grade 5**
 - **RI.5.1** Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.
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5. Integrated Pest Management (IPM)* (Grades 3-5)

Farmers use a variety of methods to protect their crops. This investigation introduces students to pheromones and insect traps as one method of controlling insects. Students pretend to be an insect and discover how they can communicate with other insects.

Math connections allow students to calculate their insect population.

This lesson supports the following practices and standards:

- **NGSS Science and Engineering Practices (1,2,3,4,5,6,7)**
- **NGSS Disciplinary Core Ideas:**
 - **LS1.A Structure and Function:** Organisms have both internal and external macroscopic structures that allow for growth, survival, behavior, and reproduction
 - **LS1.D Information Processing:** Different sense receptors are specialized for particular kinds of information; Animals use their perceptions and memories to guide their actions.
 - **ESS3.B Natural Hazards:** A variety of hazards result from natural processes; humans cannot eliminate hazards but can reduce their impacts.
- **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





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- **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 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.
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- **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).

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.
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- **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

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➤ **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.

6. The Gulf Oil Spill (Oil)* (Grades 3-5)

The effect of oil spills can be disastrous to aquatic life, wildlife, agriculture, the economy, and recreation. Students use a variety of materials to clean up a simulated oil spill and then draw conclusions as to the most effective clean-up material.

This lesson supports the following practices and standards:

- **NGSS Science and Engineering Practices (1,2,3,4,6,7)**
- **NGSS Disciplinary Core Ideas:**
 - **ESS3.A Natural Resources:** Energy and fuels humans use are derived from natural sources and their use affects the environment. Some resources are renewable over time, others are not.
 - **ETS1.A Defining and Delimiting Engineering Problems:** Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.

➤ **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.

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

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

➤ **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.

7. Measuring Water Quality (H₂O Qual)* (Grades 3-5)

Chemical tests are performed to determine the water quality of selected water samples. The tests performed measure pH, dissolved oxygen, nitrate and ammonia levels.

his lesson supports the following practices and standards:

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

➤ **NGSS Disciplinary Core Ideas:**

- **ESS3.C Human impacts on Earth systems:** Societal activities have had major effects on the land, ocean, atmosphere, and even outer space. Societal activities can also help protect Earth's resources and environments.
- **PS1.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 2:** Analyze the effects of human activities that deliberately or inadvertently alter the equilibrium of natural processes.
- **Standard 7 Topic A Indicator 1:** Investigate factors that influence environmental quality.

➤ **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.
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 - **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.

8. Salt Water Layers (Salt Water)* (Grades 3-5)

Students are challenged as they try to determine which water sample is salt water. A simulated estuary enables students to discover how salt and fresh water mingle to create brackish water.

This lesson supports the following practices and standards:

- **NGSS Science and Engineering Practices (1,2,3,4,6,7)**
- **NGSS Disciplinary Core Idea:**
 - **LS4.D Biodiversity and Humans:** Populations of organisms live in a variety of habitats. Change in those habitats affects the organisms living there.
- **Environmental Literacy Connections:**
 - **Standard 7 Topic A Indicator 1:** Investigate factors that influence environmental quality.
- **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.
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Grade 4

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 - **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.

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- **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.

9. Soak It Up (Soak)* (Grades 3-5)

Students act as soil scientists as they try to discover if the water holding capacity of soil can be improved. Data is collected using metric measurements. This investigation promotes careful following of directions and teamwork.

This lesson supports the following practices and standards:

- **NGSS Science and Engineering Practices (1,2,3,4,6,7)**
- **NGSS Disciplinary Core Idea:**
 - **ESS3.C Human Impacts on Earth's Systems:** Societal activities have had major effects on the land, ocean, atmosphere, and even outer space. Societal activities can also 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.
- **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.
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 - Grade 4**
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 - **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.
- **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.



10. Super Slurper (Slurper)* (Grades 3-5)

Students examine the absorbency of several household products and then investigate the water holding properties of a commercial agricultural product and a pure chemical. The results of this experiment are related to new developments in the agricultural industry and served as a precursor to the development of disposable diapers.

This lesson supports the following practices and standards:

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- **NGSS Science and Engineering Practices (1,3,4,6,7)**
 - **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.
 - **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 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.
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 - **RI.5.1** Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.
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 - **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.

11. Well Contamination ~ From Where to Where? (Well)* (Grades 3-5)

An imaginary town is experiencing pollution in some of its wells. Students collect data as they analyze potentially contaminated wells and the possible source of contamination. Conclusions are drawn as students report to the town council their findings.

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.
 - **ESS3.C Human Impacts on Earth's Systems:** Societal activities have had major effects on the land, ocean, atmosphere, and even outer space. Societal activities can also help protect Earth's resources and environments.

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➤ **Environmental Literacy Connections:**

- **Standard 5 Topic A Indicator 2:** Analyze the effects of human activities that deliberately or inadvertently alter the equilibrium of natural processes.
- **Standard 7 Topic A Indicator 1:** Investigate factors that influence environmental quality.

➤ **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.
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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.

➤ **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.

12. Wetlands in a Pan (Wetlands)* (Grades 3-5)

Students experiment with a wetland model and discover the benefits wetlands provide as well as the consequences that may arise from their destruction.

This lesson supports the following practices and standards:

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

➤ **NGSS Disciplinary Core Ideas:**

- **ESS3.C Human Impacts on Earth's Systems:** Societal activities have had major effects on the land, ocean, atmosphere, and even outer space. Societal activities can also help protect Earth's resources and environments.
- **LS1.A Structure and Function:** Organisms have both internal and external macroscopic structures that allow for growth, survival, behavior, and reproduction.
- **LS2.C Ecosystem Dynamics, Functioning, and Resilience:** When the environment changes, some organisms survive and reproduce, some move to new locations, some move into the transformed environment, and some die.
- **LS4.C Adaptation:** Particular organisms can only survive in particular environments.
- **LS4.D Biodiversity and Humans:** Populations of organisms live in a variety of habitats. Change in those habitats affects the organisms living there.



- **LS4.C Adaptation:** Particular organisms can only survive in particular environments.
- **LS4.D Biodiversity and Humans:** Populations of organisms live in a variety of habitats. Change in those habitats affects the organisms living there.

➤ **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.
- **Standard 6 Topic B Indicator 1:** Describe and explain that many changes in the environment designed by humans bring benefits to society as well as cause risks.

➤ **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.3.7** 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).

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.

➤ **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.

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.

When listing your selections on the class schedule, just use the shortened (Title) for lab choice. Lab teacher has the option of changing a lab selection when it seems not to be age appropriate.

GREAT BLUE HERON





1. Crabs and the Chesapeake Bay (Crabs-int)* (Grades 3-5)

Students examine crab models, describe the appearance and function of their

Aquatic Lab Walk Through Selections

body parts, and discover facts about how they survive in their environment.



This lesson supports the following practices and standards:

- **NGSS Science and Engineering Practices (1,2,3,4,5)**
- **NGSS Disciplinary Core Ideas:**
 - **ESS3.C Human Impacts on Earth's Systems:** Societal activities have had major effects on the land, ocean, atmosphere, and even outer space. Societal activities can also help protect Earth's resources and environments.
 - **LS1.A Structure and Function:** Organisms have both internal and external macroscopic structures that allow for growth, survival, behavior, and reproduction.
 - **LS1.D Information Processing:** Different sense receptors are specialized for particular kinds of information; Animals use their perceptions and memories to guide their actions.
 - **LS4.C Adaptation:** Particular organisms can only survive in particular environments.
- **Environmental Literacy Connection:**
 - **Standard 4 Topic B Indicator 1:** Analyze the growth or decline of populations and identify a variety of responsible factors.
- **Common Core Standards Connections (ELA/Literacy):**
 - 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.
 - **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).
 - 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.
 - **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.5.3** 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.

2. Crabs and the Chesapeake Bay (Crabs-pri)* (Grades 1-2)

Students examine crab models, describe the appearance and function of their body parts, and label crab diagrams.

This lesson supports the following practices and standards:

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

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.

macroscopic structures that allow for growth, survival, behavior, and reproduction.

- **LS4.C Adaptation:** Particular organisms can only survive in particular environments.

macroscopic structures that allow for growth, survival, behavior, and reproduction.

- **LS4.C Adaptation:** Particular organisms can only survive in particular environments.

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

Grade 1

- **RI.1.3** Describe the connection between two individuals, events, ideas, or pieces of information in a text.
- **RI.1.7** Use the illustrations and details in a text to describe its key ideas.

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

3. Oysters and the Chesapeake Bay (Oysters)* (Grades 2-5)

Students examine oyster shells to describe their properties, learn about the oyster's environmental impact on the Chesapeake Bay, and create their habitat.

This lesson supports the following practices and standards:

➤ **NGSS Science and Engineering Practices (1,2,3,5)**

➤ **NGSS Disciplinary Core Ideas:**

- **ESS3.C Human Impacts on Earth's Systems:** Societal activities have had major effects on the land, ocean, atmosphere, and even outer space. Societal activities can also help protect Earth's resources and environments.
- **LS1.A Structure and Function:** Organisms have both internal and external macroscopic structures that allow for growth, survival, behavior, and reproduction.
- **LS1.B Growth and Development of Organisms:** Reproduction is essential to every kind of organism. Organisms have unique and diverse life cycles.
- **LS4.C Adaptation:** Particular organisms can only survive in particular environments.
- **LS4.D Biodiversity and Humans:** Populations of organisms live in a variety of habitats. Change in those habitats affects the organisms living there.

➤ **Environmental Literacy Connections:**

- **Standard 4 Topic B Indicator 1:** Analyze the growth or decline of populations and identify a variety of responsible factors.
- **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.2.3** 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.3.3** 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).

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

2017

4. Who Lives

des K-4)

Animals and plants living in the wetlands are adapted to their environment in many

4. Who Lives

des K-4)

Animals and plants living in the wetlands are adapted to their environment in many ways. Students are introduced to these plants and animals and then “roll” and “stamp” their own wetland environment.

This lesson supports the following practices and standards:

- **NGSS Science and Engineering Practices (1,2,3,5)**
- **NGSS Disciplinary Core Ideas:**
 - **ESS3.C Human Impacts on Earth’s Systems:** Things people do can affect the environment but they can make choices to reduce their impacts.
 - **LS1.A Structure and Function:** Organisms have both internal and external macroscopic structures that allow for growth, survival, behavior, and reproduction.
 - **LS4.C Adaptation:** Particular organisms can only survive in particular environments.
 - **LS4.D Biodiversity and Humans:** Populations of organisms live in a variety of habitats. Change in those habitats affects the organisms living there.
- **Environmental Literacy Connections:**
 - **Standard 4 Topic B Indicator 1:** Analyze the growth or decline of populations and identify a variety of responsible factors.
 - **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):**
 - Kindergarten**
 - **RI.K.3** With prompting and support, describe the connection between two individuals, events, ideas, or pieces of information in a text.
 - **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.1.3** Describe the connection between two individuals, events, ideas, or pieces of information in a text.
 - **RI.1.7** Use the illustrations and details in a text to describe its key ideas.
 - 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.
 - **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.3.3** 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).
 - 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.
 - **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.

5. Wetland Charm (Wet Charm)* (Grades K-3)

After a BIG BOOK experience, students discover the animals and plants that make up a wetland habitat as well as the benefits provided by a wetland when they make a “charm” to take with them.

This lesson supports the following practices and standards:

- **NGSS Science and Engineering Practices (1,2,7)**
- **NGSS Disciplinary Core Ideas:**
 - **ESS3.A Natural Resources:** Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do.



ESS2.C Natural Resources: Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do.

- **ESS2.C The roles of water in Earth's surface processes:** Water is found in many types of places and in different forms on Earth.
- **ESS3.C Human Impacts on Earth's Systems:** Things people do can affect the environment but they can make choices to reduce their impacts.
- **LS4.C Adaptation:** Particular organisms can only survive in particular environments.

➤ **Environmental Literacy Connections:**

- **Standard 5 Topic A Indicator 2:** Analyze the effects of human activities that deliberately or inadvertently alter the equilibrium of natural processes.
- **Standard 8 Topic A Indicator 1:** Understand and apply the basic concept of sustainability to natural and human communities.

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

Kindergarten

- **RI.K.1** With prompting and support, ask and answer questions about key details in a text.
- **RI.K.2** With prompting and support, identify the main topic and retell key details of a text.
- **RI.K.3** With prompting and support, describe the connection between two individuals, events, ideas, or pieces of information in a text.
- **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.1.1** Ask and answer questions about key details in a text.
- **RI.1.2** Identify the main topic and retell key details of a text.
- **RI.1.3** Describe the connection between two individuals, events, ideas, or pieces of information in a text.
- **RI.1.7** Use the illustrations and details in a text to describe its key ideas.

Grade 2

- **RI.2.1** Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text.
- **RI.2.2** Identify the main topic of a multi-paragraph text as well as the focus of specific paragraphs within the 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.3.2** Determine the main idea of a text; recount the key details and explain how they support the main idea.
- **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).



6. Bug Out (Bugs)* (Grades K-5) ~ After a “bug” dress up, students group themselves according to their own bug smell or “pheromone”. Session ends with students creating a “bug rubbing.”

This lesson supports the following practices and standards:

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

➤ **NGSS Disciplinary Core Ideas:**

- **LS1.A Structure and Function (K-2):** All organisms have external parts that they use to perform daily functions.
- **LS1.A Structure and Function (3-5):** Organisms have both internal and external macroscopic structures that allow for growth, survival, behavior, and reproduction.

- **LS1.A Structure and Function (3-5):** Organisms have both internal and external macroscopic structures that allow for growth, survival, behavior, and reproduction.
- **LS1.D Information Processing (K-2):** Animals sense and communicate information and respond to inputs with behaviors that help them grow and survive.
- **LS1.D Information Processing (3-5):** Different sense receptors are specialized for particular kinds of information; Animals use their perceptions and memories to guide their actions.



➤ **Environmental Literacy Connection:**

- **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):**

Kindergarten

- **RI.K.2** With prompting and support, identify the main topic and retell key details of a text.
- **RI.K.3** With prompting and support, describe the connection between two individuals, events, ideas, or pieces of information in a text.
- **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.1.2** Identify the main topic and retell key details of a text.
- **RI.1.3** Describe the connection between two individuals, events, ideas, or pieces of information in a text.
- **RI.1.7** Use the illustrations and details in a text to describe its key ideas.

Grade 2

- **RI.2.2** Identify the main topic of a multi-paragraph text as well as the focus of specific paragraphs within the 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.3.2** Determine the main idea of a text; recount the key details and explain how they support the main idea.
- **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).

Grade 4

- **RI.4.2** Determine the main idea of a text and explain how it is supported by key details; summarize 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.5.3** 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.

7. After a story ~ Crabby & Nabby, Pearlie Oyster, or Harry the Horseshoe

Crab ~(C&N, PO, or HHC)* (Grades K-2) students make a Bay Charm.

This lesson supports the following practices and standards:

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

➤ **NGSS Disciplinary Core Ideas:**

This lesson supports the following practices and standards:

- **NGSS Science and Engineering Practices (1,2)**
- **NGSS Disciplinary Core Ideas:**
 - **ESS3.A Natural Resources:** Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do.
 - **ESS3.C Human Impacts on Earth's Systems:** Things people do can affect the environment but they can make choices to reduce their impacts.
 - **LS1.A Structure and Function:** All organisms have external parts that they use to perform daily functions.
 - **LS4.C Adaptation:** Particular organisms can only survive in particular environments.

➤ **Environmental Literacy Connections:**

- **Standard 5 Topic A Indicator 2:** Analyze the effects of human activities that deliberately or inadvertently alter the equilibrium of natural processes.
- **Standard 8 Topic A Indicator 1:** Understand and apply the basic concept of sustainability to natural and human communities.

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

Kindergarten

- **RI.K.1** With prompting and support, ask and answer questions about key details in a text.
- **RI.K.3** With prompting and support, describe the connection between two individuals, events, ideas, or pieces of information in a text.
- **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.1.1** Ask and answer questions about key details in a text.
- **RI.1.3** Describe the connection between two individuals, events, ideas, or pieces of information in a text.
- **RI.1.7** Use the illustrations and details in a text to describe its key ideas.

Grade 2

- **RI.2.1** Ask and answer such questions 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.

8. Popcorn Capers (PC)* (Grades K-3) – A big book experience followed by a mini-lesson to determine what causes certain objects to sink or float.

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:** Matter exists as different substances that have observable different properties. Different properties are suited to different purposes. Objects can be built up from smaller parts.

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

Kindergarten

- **RI.K.1** With prompting and support, ask and answer questions about key details in a text.
- **RI.K.2** With prompting and support, identify the main topic and retell key details of a text.
- **RI.K.3** With prompting and support, describe the connection between two individuals, events, ideas, or pieces of information in a text.
- **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.1.1** Ask and answer questions about key details in a text.
- **RI.1.2** Identify the main topic and retell key details of a text.
- **RI.1.3** Describe the connection between two individuals, events, ideas, or pieces of



- *RI.1.1 Ask and answer questions about key details in a text.*
 - *RI.1.2 Identify the main topic and retell key details of a text.*
 - *RI.1.3 Describe the connection between two individuals, events, ideas, or pieces of information in a text.*
 - *RI.1.7 Use the illustrations and details in a text to describe its key ideas.*
- Grade 2**
- *RI.2.1 Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text.*
 - *RI.2.2 Identify the main topic of a multi-paragraph text as well as the focus of specific paragraphs within the 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.3.2 Determine the main idea of a text; recount the key details and explain how they support the main idea.*
 - *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).*

When planning a schedule, walk-through selections need **25-30 minutes** per class. Allow 10 minutes between classes for clean-up and-set up.

