

Lesson: Bee-Healthy Farm

Grade Level: 3rd-5th Grade, Environmental Literacy

Overview: In this lesson, students will learn the importance of a healthy diet for living organisms. Students will learn about the importance of agriculture and how humans can affect food crops. Students will learn that the key role to a healthy agriculture is having a thriving population of pollinators. The class will hear stories from STEM-related careers in the agricultural industry and the importance of pollinators for our food. Students will gain knowledge and design their own pollinator garden. Students will choose different types of plants based on; native and non-native species, color, and growing season. Students will use math to measure their garden bed and will use formulas to find the area/perimeter of their garden bed. Students will be able to share the similarities and differences of their pollinator garden beds.

Science Content & Standards:

Pennsylvania New Academic Standards for Science-

<https://www.pdesas.org/Page/Viewer/ViewPage/11>

Environmental Literacy and Sustainability- Agriculture and Environmental Systems and Resources

Standard- 3-5ELS1-3: Analyze how living organisms, including humans, affect the environment in which they live, and how their environment affects them.

Standard- 3-5ELS1-4: Make a claim about the environmental and social impacts of design solutions and civic actions, including their own actions.

Science Practices:

<https://www.nextgenscience.org/sites/default/files/Appendix%20F%20%20Science%20and%20Engineering%20Practices%20in%20the%20NGSS%20-%20FINAL%20060513.pdf>

APPENDIX F – Science and Engineering Practices in the NGSS

Practice 1 Asking Questions and Defining Problems

- Ask questions about what would happen if a variable is changed.
- Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships.
- Use prior knowledge to describe problems that can be solved.
- Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost.

Practice 6 Constructing Explanations and Designing Solutions

- Construct an explanation of observed relationships (e.g., the distribution of plants in the backyard).
- Use evidence (e.g., measurements, observations, patterns) to construct or support an explanation or design a solution to a problem.

- Apply scientific ideas to solve design problems.

Math Content & Standards:

PA CORE STANDARDS Mathematics

<https://www.pdesas.org/Page/Viewer/ViewPage/14?SectionPageItemId=659>

2.1 Numbers and Operations-C) Numbers & Operations — Fractions

2.4 Measurement, Data, and Probability- (A)Measurement and Data

Standard- CC.2.1.3.C.1: Explore and develop an understanding of fractions as numbers.

Standard- CC.2.1.4.C.1: Extend the understanding of fractions to show equivalence and ordering.

Standard- CC.2.1.5.C.1: Use the understanding of equivalency to add and subtract fractions.

Standard- CC.2.4.3.A.5: Determine the area of a rectangle and apply the concept to multiplication and to addition.

Standard- CC.2.4.3.A.6: Solve problems involving perimeters of polygons and distinguish between linear and area measures.

Math Practices:

Pennsylvania Common Core State Standards for Mathematical Practices.

https://static.pdesas.org/content/documents/Math_Practices_and_Grade_Progressions_rev%201-24-13.pdf

- Look for and make use of structure.
- Model with mathematics.
- Use appropriate tools strategically.

Math & Science Connection:

Relationships and Convergences Found in the Common Core State Standards in Mathematics (practices), Common Core State Standards in ELA/Literacy*(student portraits), and A Framework for K-12 Science Education (science & engineering practices) *Venn Diagram NSTA Science, Math, & ELA* <https://static.nsta.org/ngss/PracticesVennDiagram.pdf>

- **S2. Develop and use models**
- **M4. Model with mathematics**
- **S5. Use mathematics & computational thinking**

Materials:

- Printed student resources pdfs, listed in resources tab.
- Pencil

- Ruler
- Colored pencils

Resources:

- Student reading passage:
 - *Bee-Healthy Farms* Student Reading passage
- My Bee-Healthy Garden Graphing Worksheet
- Pollinator plants arranged by bloom time pdf
- Student resource videos:
 - “Plant a Pollinator Garden” by National Geographic, https://youtu.be/M76sB_YPoU0
 - “The Arboretum at Penn State: Pollinator and Bird Garden” by PSU https://youtu.be/TeHd4AAq_Uc
- Read aloud, [‘The Farm That Feed Us’](#) by Nancy Castaldo

Learning Objectives:

- Students will learn about the importance of a healthy nutritional diet for humans and pollinators.
- Students will learn about the negative and positive environmental impacts humans have made.
- Students will learn about ways to create a pollinator friendly garden.
- Students will create and design a pollinator nutritional garden.
- Students will measure and use formulas such as area/perimeter to find the dimensions of their garden.

Procedure:

1. The teacher will introduce the lesson by having students read and discuss, “*Bee-Healthy Farms*” reading passage, located in the google folder. The teacher can use the following questions to guide students into a introduction discussion for this lesson;
 - a. “What is the difference between **Pollen** and **Nectar**?”
 - b. “Do you think bees are similar to us in regards to choosing what we eat?”
2. The class will then watch the short video, “*Plant a Pollinator Garden*” from National Geographic. The teacher can guide students through a classroom discussion about the video;
 - a. “Why do you think it is important to plant native pollinator plants?”
 - b. “Why should we promote the growth of pollinators?”
3. The teacher will then hand out to students the “Pollinator Plants Arranged by Bloom” list, located in the google folder. The teacher will also demonstrate to students how to read and interpret the list. The teacher can use the following guided questions when explaining how to interpret the data.
 - a. “What do you think **Native** means?”
 - b. “How do you know if some plants have multiple visiting **pollinators**?”
 - c. “Do you think a pollinator garden should bloom all year round? Why?”

4. Using the bloom sheet, model to students how to use the list to design a graphed garden on the *My Bee-Healthy Garden Graphing Worksheet*.
5. Students should use colored pencils to create a colorful garden bed that correlates with the plant's bloom colors.
6. Once the class has completed their pollinator garden. Students can share and explain their garden designs.
7. The teacher can complete the lesson by reading out loud to class, "*The Farm That Feeds Us*" by Nancy Castaldo.