Garden Wars:
Invaders, Protectors, & Partners

Grade: *7* **|** ***Time:*** *(3-5) 60 minute periods*

Standards:

Georgia Performance Standards in Science
S7CS3d; S7CS4 a; S7CS5a; S7CS6c; S7CS9f; S7L4a.

Next Generation Science Standards
LS2.A: LS1.B:

Common Core Literacy Standards
ELA CC6-8RST3; ELA CC6-8RST4; ELA CC6-8WHST2

Supplies:

(for ladybug catcher design challenge)

Fabric choices: 8 pillow cases (BYO gauze, tulle, net)
Structural choices: 8 hangers (BYO pipe cleaners)
Handle choices: 8 dowel rods (BYO wooden spoons)
Fasteners: duct tape, string (BYO clips, needle/thread)
Tools: BYO scissors, needle nose pliers

(for ladybug viewing- per team of two)

BYO: bug viewer (see garden starter kit)
BYO: field microscope (see garden starter kit)
BYO: field guide from Lost Ladybug Project web site
BYO: science journal (1 per student)
BYO: cooler with ice to slow ladybugs for observation

(for pollinator garden, to attract monarch butterflies)

8 common milkweed seed packs (A. syriaca)

to mark off sampling areas for the organism survey (per student or team of two)

BYO: meter stick or tape measure
BYO: yarn OR string and corner sticks OR hula hoop OR picture frame (same size for each team of students

for classifying ecological relationships

BYO: flip pad or whiteboard
BYO: 3 index cards marked + - , ++, or + o (per student)

Garden Connection:

Students will grow garden plants to attract ladybugs, monarch butterflies, bees and other beneficial insects and to explore inter-relationships. Students will also release beneficial insects to control garden pests organically.

STEM Connection:

Students will participate in an engineering design challenge to design and build ladybug catchers for the "Lost Ladybug" citizen science project.

Overview

Students will investigate role of pests and predators in an organic garden by observing symbiotic relationships. Students will also participate in the Lost Ladybug citizen science project and design a project to attract and/or release beneficial insects, such as green lacewings or ladybugs, to eat aphids.

Essential Questions

In a garden ecosystem, which relationships are competitive, harmful or beneficial? How have plants adapted to compete and survive? What effect do pollinators have on a garden habitat? How can organic gardeners reduce predators and encourage pollinators for cultivated plants?

Engage

Students will participate in the Lost Ladybug project, including an engineering design challenge to create a ladybug catcher or net, and investigation of captured ladybugs to identify species and report data to the citizen science database. Students may also observe leaves collected from the garden to look for evidence of plant / animal interactions, speculating what happened to the leaf.

Explore

Student teams will go out to the school garden and create a list of all the organisms they find in a defined area (organism survey) to find out which species are part of the garden ecosystem and how they interact with one another. Students will log their data in a Science, Garden or Field Journal.

Explain

Students will be able to use their observation notes to suggest reasons why some organisms are present in the garden in greater numbers than others, and to describe the relationship between animals and plants in the garden as beneficial to both species (mutualism), beneficial to one species without harming the other (commensalism), or harmful to one species (parasitism).

Environmental Stewardship

Students will select an area of the schoolyard or garden to create a pollinator or wildlife habitat by removing invasive species, planting natives, adding brush piles for shelter, and/or adding a water source, as needed.

Students will release ladybugs, green lacewings, or other beneficial insects captured or purchased for the purpose of controlling garden pests organically.

Evaluate

A rubric for assessing student performance expectation is provided.

Extend

Students may also create a cinquain about one of the harmful or beneficial organisms observed in the garden, by brainstorming words to describe an organism, and then rhyming other words to describe the organism and its habitat.

Ex

Standards

GEORGIA PERFORMANCE STANDARDS IN SCIENCE

S7CS3. Students will have the computation and estimation skills necessary for analyzing data and following scientific explanations.

d. Draw conclusions based on analyzed data

S7CS4. Students will use tools and instruments for observing, measuring, and manipulating equipment and materials in scientific activities.

a. Use appropriate technology to store and retrieve scientific information in topical, alphabetical, numerical, and keyword files, and create simple files.

S7CS5. Students will use the ideas of system, model, change, and scale in exploring scientific and technological matters.

a. Observe and explain how parts can be related to other parts in a system such as predator/prey relationships in a community/ecosystem.

S7CS6. Students will communicate scientific ideas and activities clearly.

c. Organize scientific information using appropriate simples tables, charts, and graphs, and identify relationships they reveal.

S7CS9. Students will investigate the features of the process of scientific inquiry.

Students will apply the following to inquiry learning practices:

f. Scientists use technology and mathematics to enhance the process of scientific inquiry.

S7L4. Students will examine the dependence of organisms on one another and their environments.

c. Organize scientific information using appropriate simples tables, charts, and graphs, and identify relationships they reveal.

NEXT GENERATION SCIENCE STANDARDS

LS2.A: Interdependent Relationships in Ecosystems

In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction. (MS-LS2-1) Similarly, predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and nonliving, are shared. (MS-LS2-2)

LS1.B: Growth and Development of Organisms

Animals engage in characteristic behaviors that increase the odds of reproduction. (MS-LS1-4) Plants reproduce in a variety of ways, sometimes depending on animal behavior and specialized features for reproduction. (MS-LS1-4)

COMMON CORE LITERACY STANDARDS

ELACC6-8RST3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

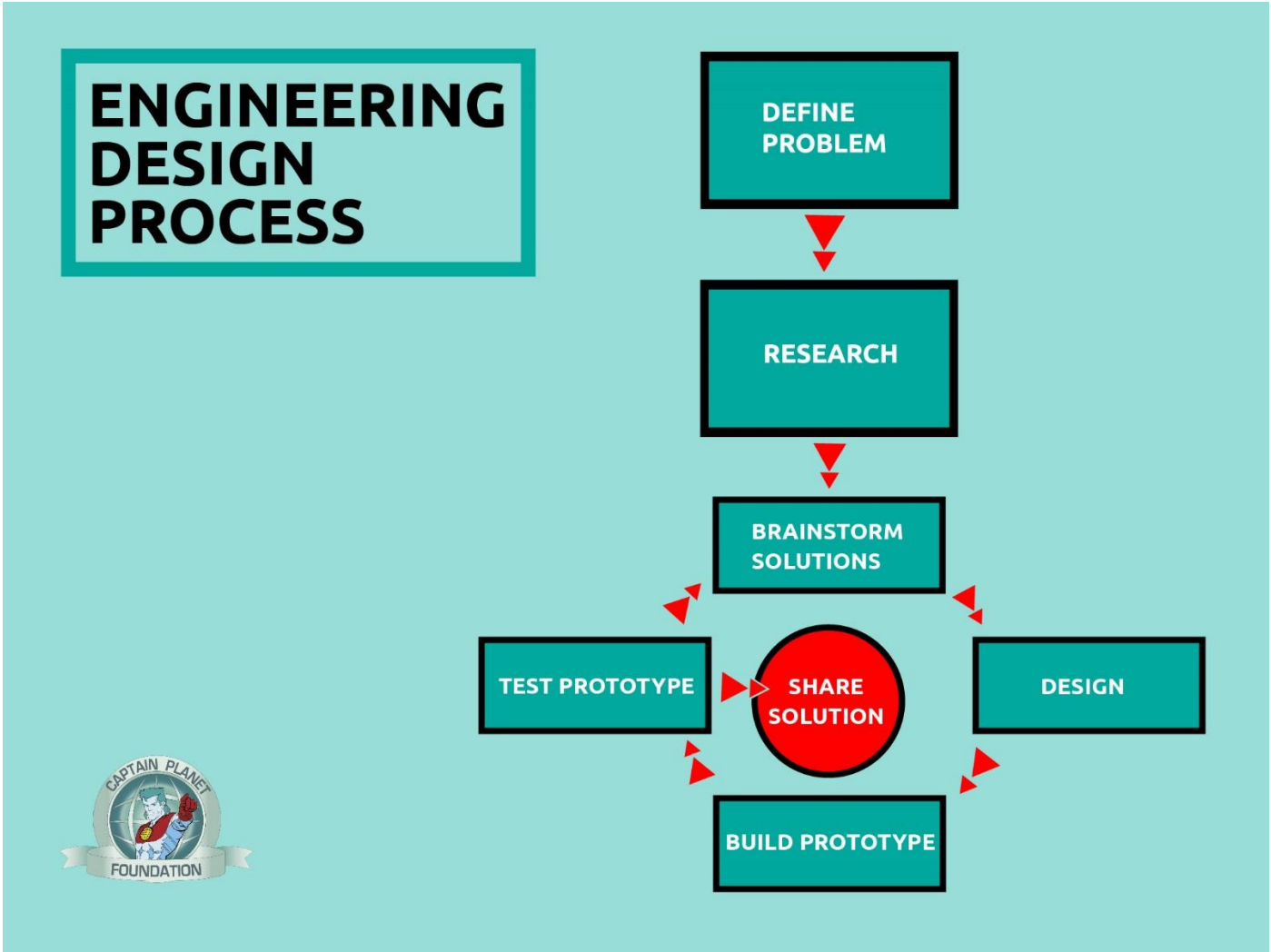
ELACC6-8RST4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.

ELACC6-8WHST2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes

Background Information

The Lost Ladybug Project (http://www.lostladybug.org/)

- Description from the Lost Ladybug Project website: Across North America, ladybug species composition is changing. Over the past twenty years, native ladybugs that were once very common have become extremely rare. During this same time, exotic ladybugs from other parts of the world have greatly increased both their numbers and range, sometimes invading and out-competing the native varieties. This is happening very quickly and scientists don't know how, or why, or what impact these changes will have on the role that ladybugs play in reducing plant-feeding insect populations (such as aphids). Ask students to join in searching for the elusive nine-spot ladybug and other native ladybug species, as part of a citizen science project intended to prevent additional indigenous species from becoming rare, vulnerable or threatened.
- The release of ladybugs or lacewings to control garden pests such as aphids should take place in the early morning or after sunset to prevent fly-aways.
- Designing and constructing a ladybug catcher as part of an engineering design challenge requires responding to the definition of the problem including any constraints (i.e.: Make a ladybug net or catcher that will be effective based on your research into ladybug habitats and needs, and which can be constructed by selecting no more than three items from available materials, one being no more than one yard of fabric, netting, or pillowcase). Other constraints might include timeframe or budget (with a price assigned to each available item).



Biodiversity

- Biodiversity, short for biological diversity, is the term used to describe the variety of life found on Earth and in natural processes. Biodiversity refers both to the genetic variation within a particular species and the variety of species in an ecosystem. When students conduct an All-Organism Inventory, they will be assessing biodiversity. *For more information see:* http://www.ecokids.ca/PUB/eco_info/topics/biodiversity/index.cfm

Beneficial Insects

- Beneficial insects (sometimes called beneficial bugs) are any of a number of species of insects that perform services valued by humans such as pollination and pest control. The concept of beneficial is subjective and only arises in light of desired outcomes from a human perspective. Insects are not inherently good or bad. In farming and agriculture, where the goal is to raise selected crops, insects that hinder the production process are classified as pests, while insects that assist production are considered beneficial. In horticulture and gardening, the desired outcomes with beneficial insects are pest control, habitat integration, pollination, and aesthetics (beauty).

For more information about beneficial insects, including examples, see the websites listed below:

- http://www.beautifulwildlifegarden.com/guide-to-attracting-native-bees.html
- http://www.organicgardening.com/learn-and-grow/top-10-beneficial-bugs-garden
- http://www.gardeninsects.com/
- http://insects.about.com/od/insectpests/tp/top10beneficialinsects.htm
- Garden Insect Guide (matches pest problems to biological solutions): http://cherokee.ces.ncsu.edu/files/library/20/ControlingGardenIns_UT.pdf

What's Invasive? Project to identify and remove invasive species that can out-compete native spp: (www.whatsinvasive.org)

- Description from website: Invasive species are a threat to native plants and animals, crowding natives, consuming food sources, or acting as fire hazards. Having groups such as schools run short-term "campaigns" is highly effective for locating and removing invasive species. Join the fight against invasive species!
- Download the app to student cell phones or tablets, to collect and record data about numbers and locations of invasive species found on school grounds, and to upload photos.
- Note that a web version of the project can be used with a desktop computer, if tablets and cell phones for field use are unavailable.

Additional Resources to Use with Students

- ***Lesson plans that explore pollinators and the role of pollination:*** http://pollinatorlive.pwnet.org/teacher/lessons.php
- ***Videos:***
- "Pollinators – Putting Food on the Table." http://vimeo.com/77811127 (Summary: Show students the incredible importance of pollinators to agriculture and landscapes with this video filmed in Colorado's Yampa Valley. Students build a pollinator garden and learn how little of their picnic would be possible without pollinators. For the standards-aligned lesson plan that accompanies this video, go to NatureWorksEverywhere.org. Running time – 3:33).
- "Garden Pests and Helpers" http://www.ket.org/education/video/kthga/kthga_000112.htm (Summary: This video explains how creatures living in a garden can work against it as well as provide benefits to it. Running time – 3:26).
- "Desert Blooms and Marathon Moths – Plants are Cool, Too! Episode 4" https://www.youtube.com/watch?v=8IPQTs0cfqw (Summary: Giant hawk moths fly for miles each night in search of flower nectar -- and are thus critically important as pollinators of desert wildflowers. Dr. Chris Martine joins Krissa Skogen (Chicago Botanic Garden) in New Mexico's White Sands National Monument to find plant romance happening by the light of the full moon. Running time – 14:43)

Teacher Preparation

- Become familiar with the Lost Ladybug and What's Invasive? citizen science projects.
- Obtain a variety of materials for making ladybug catchers or sweep nets as an engineering design challenge.
- Gather materials for students to delineate study areas (mark boundaries) for the organism survey.
- Select which field guides students will use and make copies. The Lost Ladybug Project web site contains a field guide.
- Find leaves with aphids on them or ones that have been affected by garden pests, for observation by students.
- Obtain chart paper for the symbiotic relationships lesson (not necessary if using the whiteboard) and make index cards labeled with the types of symbiotic relationships (+ +; + - ; or - -).
- Obtain mail-order native ladybugs for observation, if desired, as well as plants that attract pest-controlling insects (such as dill, yarrow, coriander, tansy, and fennel), and science/field journals for students. Milkweed seeds (host plants for monarch butterflies and sole food of the larvae) are included with the lesson supply kit.

LESSON PROCEDURES

Engage

Select one or all of the following activities for students to do.

Option 1: The Lost Ladybug Project Engineering Design Challenge (Building a Ladybug Net or Catcher)
To prepare students to participate in The Lost Ladybug Project, divide the class into teams of four students, and provide time and Internet-connected computer access for researching ladybug habitat, diet and needs. Then have each team use their knowledge of ladybug needs to design, build, test, and re-tool a ladybug catcher as an engineering design challenge. In such a challenge, students research or review the insects they wish to catch, brainstorm designs for a catcher device, draw a model of the catcher they plan to build, create a prototype, test the prototype, re-design and re-tool the prototype, re-test the prototype after re-design, and explain the advantages of their design to others. A diagram of the iterative design process is found in the Teacher Background information and should be shared with students.

An engineering design challenge also typically includes the definition of the problem to be solved and a list of constraints. The problem for this activity could be determined in a class discussion, or provided as follows: In order to identify ladybugs and observe insect diversity in the garden, what sort of catcher device would be most effective to use? The constraints will consist of the available materials from which students may choose, possibly the quantity of materials they may select (especially if there is only one repository of materials for the entire class to choose from), and the specific time allowed for the designing, building, testing and redesigning process. Remember to allow time for re-design- a critically important part of the process – as well as for explanation and presentation of each team's design.

Option 2
Allow students to collect leaves with aphids on them or other damage from a garden pest. Ask students what they think might have happened to each leaf and who the culprit might have been. Chart student responses.

Question to ask students:

- What do you think damaged this leaf?
- If there is evidence of an insect on the leaf, was it harmful or helpful? How? Defend your reasoning.

Option 3
Allow students to observe and record interactions among plants, among animals, or among plants and animals in the garden ecosystem. Give students the definition for "symbiosis" (a long-term interaction between different species that interact in close proximity). Write the following on the whiteboard or chart paper in three rows: +,+; +,0; and +,-. These symbols represent the three main types of symbiosis: mutualism, commensalism, and parasitism. In small groups, using the prefixes of each word, ask students to classify each observed interaction as a symbiotic relationship that benefits both species (mutualism, +,+), or that benefits one species while the other species is not affected (commensalism, +,0), or that benefits one species and harms the other (parasitism, +,-).

Give students index cards (or have each student make three cards) with each type of symbiotic relationship on it. When a species interaction is described, students will vote on its classification by taping the appropriate card under the species interaction description on the whiteboard or chart paper. Once the symbiotic relationships that students observed have been identified, point out that additional ecological relationships NOT generally considered to be symbiotic, including predation (not a long-term relationship as one species is eaten) and competition (not considered to direct interaction between species as the focus is a fight over an external resource). Confirm correct classifications of species interactions with students and compare with their predictions.

Questions to ask students:

- Explain symbiosis
- Explain the difference between mutualism, commensalism, and parasitism, as well as predation and competition

Option 4

Tell students that they will explore the role of pollination in a garden ecosystem.
Have students watch the video, "Pollinators – Putting Food on the Table." http://vimeo.com/77811127
Students should review information from the Pollinator Partnership to find out which plants are pollinated by wind or water and which are pollinated by animals such insects, birds or bats: http://pollinator.org/Resources/facts.Primer.pdf

Questions for students to consider:

- Why are pollinators essential to the health of the garden?
- What are some pollinators that were highlighted in the video?
- How does the process of pollination works.
- Which type of symbiotic relationship exists between a plant and a pollinator? (You may need to do Option 4 of the Engagement section if students are not familiar with symbiosis).
- Think about what you ate for dinner. Is there any food that you wouldn't be able to eat if pollinators didn't exist?

Allow students to create a photomontage of pollinators in the garden by observing and photographing plants; then identifying the pollinators those plants attract.

Explore

Select one or all of the following exploration activities for students to do:

Exploration 1: Ladybug Collection and Data Reporting

1. Obtain and observe locally-collected or purchased ladybugs or green lacewings from a vendor such as Insect Lore, which can provide native species (coupon for redemption included in this lesson supply kit). Identify, draw and label species based on information from the Lost Ladybug Project web site.
2. Collect local ladybugs using catchers or nets made during the Engage activity, log the results into a field journal, chart results, and report the findings on The Lost Ladybug Project website (http://www.lostladybug.org/form/page-1-form-558.php).

3. Release captured or purchased beneficial insects in the garden for aphid (pest) control. Remember to release near or after sunset so they will not fly away. Design and conduct an experiment to determine what impact the beneficial insects have on reducing garden pests. This activity is best done during late spring, summer or early fall. Identification tools from the Lost Ladybug Project web site include a basic field guide, posters, ladybug dichotomous keys, and journals to help distinguish similar ladybug species: http://lostladybug.org/identification-tools-1083.php

Questions to ask students after they have used their ladybug sweeper to collect bugs in garden or tall weed areas:

- How many types of insects were unintendedly collected (non-ladybugs)?
- How many ladybugs did you find (total number, all species)?
- How many different ladybug species did you find? How do you know?
- How many different ladybug species did you recognize?
- How many different ladybug species did you NOT recognize?
- Did you find all of your ladybugs in the same kind of habitat (If collecting in different places throughout schoolyard)
- On which day did you find more ladybugs? (If collecting on different days)
  If you found differences, depending on date or place, why might that be? (habitat, weather, season)
- Are there other factors that could have caused these differences? (If collecting in different habitats on different days)

Exploration 2: Conduct an Insect Inventory in the Garden or Schoolyard

Take students out to the garden and have them create a list of some of the organisms they notice there (organism survey) to find out which species are part of the garden ecosystem and how they interact with one another and the garden environment. Have students log their data into their Field Journal. Suggested data to gather: name of organism, quantity of organisms observed, type of organism (e.g., plant, insect, mammal, reptile, bird, amphibian, fungi, other), organism behavior (its interaction with the environment or another organism), where the organism was observed, role of the organism (pest, pollinator, decomposer, scavenger, invasive species, etc.), and a sketch/photo. Remind students not to tease, hurt, poke, or swat the organisms they observe. Stress the importance of keeping completed and detailed accounts of what is observed. Time limit: 15 minutes.

Have students use meter sticks or tape measures and yarn, hula hoops, picture frames or other measuring devices to define areas for observing organisms in the garden (or schoolyard). These study areas can be any size, as long as all are consistent. For example, in a 3 meter by 3 meter garden bed, each student team could observe insect species in a different 30 cm x 30 cm square.

Online field guides:
Birds: http://www.allaboutbirds.org/guide/search
Bugs: http://bugguide.net/node/view/3/bgpage
Various guides: http://www.enature.com/fieldguides/
Monarch larva: http://www.mlmp.org/Resources/LarvalFieldGuide/Default.aspx

Exploration 3: Analyze health of the school garden

Have students conduct an assessment of the health and vitality of the school's garden based on their understanding of predator-prey relationships, pollination, and ecosystems. Based on their assessment of the garden, have students submit recommendations on how to increase the health of the garden.

Explain from Evidence

Students should be able to identify the species of plants and animals that are observed most frequently in the garden. Students can use their observation notes to suggest reasons why some species are present in greater numbers than others. Students can explain some factors that affected the number of organisms observed (such as weather conditions, time of day).

Have students use their observation notes to explain the inter-relationship between animals and the plants in the garden, whether beneficial or harmful. Students should be detailed in their description of animal behavior and cite evidence (interpreted data) for their arguments.

Have students focus on different environmental "zones" in the garden ecosystem (e.g., compare moist environments with dry environments, shady areas with sunny areas, elevated parts of the habitat, such as tree foliage, with lower parts, such as in the grass or on the soil. Have students use their observation notes to determine whether certain species are usually found in a specific zone. They can research how different species are adapted to different environmental conditions, and create an environmental map of the garden that outlines the many environments that make up the garden ecosystem.

Environmental Stewardship:

Create a Garden to Attract Pollinators and Beneficial Insects

1. Students will select an area of the schoolyard or garden to create a pollinator or wildlife habitat by removing invasive species, planting native plants to attract pollinators, adding brush piles for shelter, or adding a water source for wildlife, as needed. ***Video connection:*** "Garden Pests and Helpers" http://www.ket.org/education/video/kthga/kthga_000112.htm

2. Have students remove the non-native, invasive plants from the garden or schoolyard and contribute to a place-based database of unwanted plants on the What's Invasive? app, to assist a citizen science research project.

3. Allow students to design a garden planting plant that will attract pest-controlling beneficial insects (including lacewings, ladybugs, hover flies, ground beetles, and/or assassin bugs) by planting dill, yarrow, coriander, tansy and fennel. Plant species that attract monarch butterflies. Native species of milkweed is the sole diet of monarch larvae, though a number of nectar plants are needed for adult butterflies, such as cosmos, daisies, coneflower, salvia, marigold, zinnia, coreopsis, and verbena, as described here: http://www.monarchprogram.org/butterfly-gardening-and-rearing/ Also consider this information on creating a pollinator habitat: http://www.pollinator.org/guides.htm

4. Release beneficial insects originally ordered for observation during the Engagement activity (native ladybugs or green lacewings) so they can control pests in the garden. Note that release after dark will reduce the incidence of fly-aways.

Evaluate

- A performance-based assessment rubric is provided with this lesson.
- In addition, the teacher may review students' field journals.
- Have students answer the following questions to review the big ideas:
  1. Explain how biodiversity benefits an ecosystem.
  2. Describe the pests and predators observed in the garden and how they interacted with the environment and other organisms. How can garden pests be warded off without using harmful pesticides?
  3. Explain the role of pollinators in a garden ecosystem. Which pollinators were observed in your schoolyard garden? Describe their interactions with plants.
  4. Describe some ways to attract beneficial insects to the garden.
- Students can complete the graphic organizers on the following page, beginning during the Engagement phase.

Extend

Students may create a Cinquain about one of the harmful or beneficial organisms observed in the garden, by brainstorming words to describe an organism, and then rhyming other words to describe the organism and its habitat. Sample graphic organizers are provided below.

Name:_____ Date _____ Teacher: _____

I know . . .	I expect to learn . . .
I learned . . .	**What new questions I have . . .**

Group Reflection – Student Sheet

What did my group do?	What did I do?
What questions do we still have?	**How well did we work together?**

Reflection Window
Date: _____

We worked at a level: _____

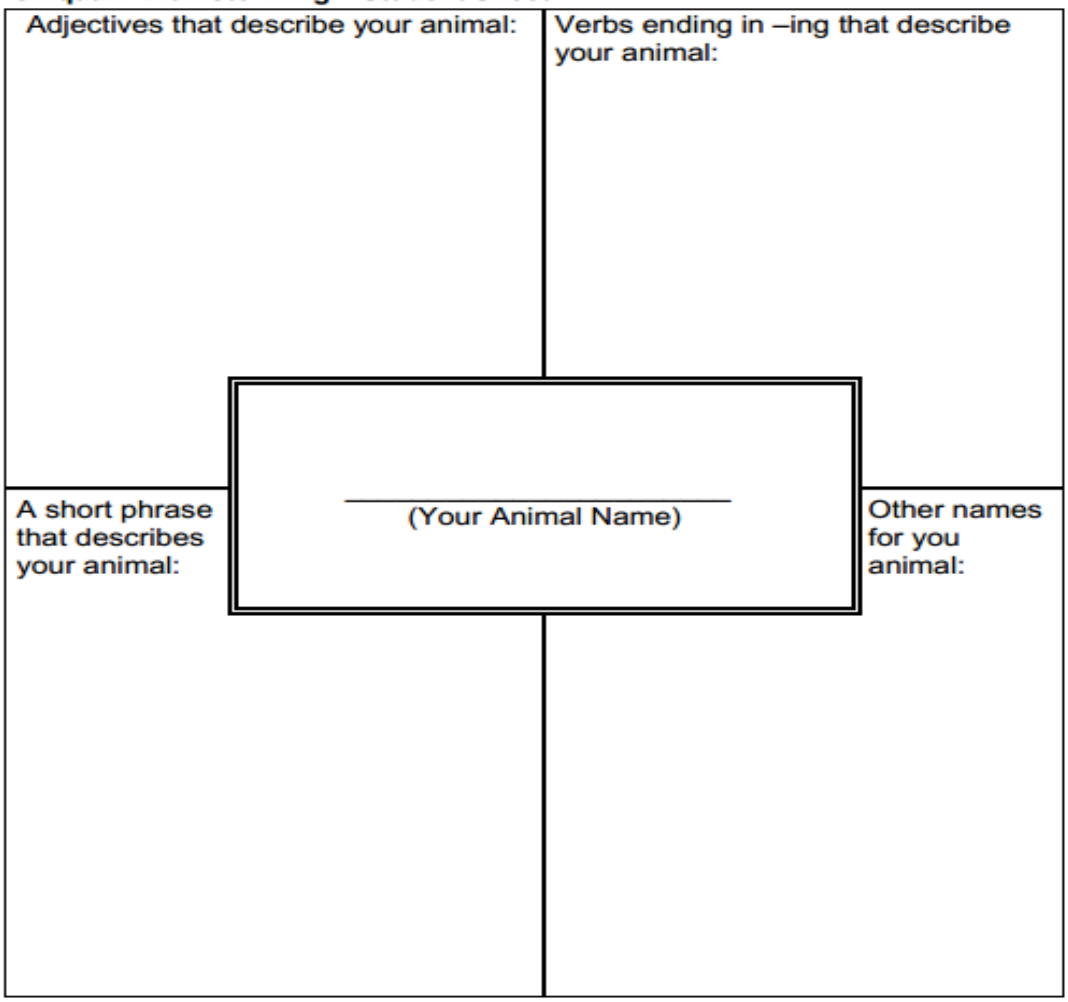
3 – Everyone contributed and cooperated.
2 – Most of us contributed and cooperated.
1 – Some of us contributed and cooperated.

I think this because

- Students can create a Cinquain about one of the harmful or beneficial organisms observed in the garden. Students will brainstorm words to describe the organism and then rhyming words to describe the organism and its habitat. Sample graphic organizers are listed below.

Name:_____ Date: _____ School: _____

Cinquain Brainstorming – Student Sheet



_____
(Subject)

_____ _____
(Adjective) (Adjective)

_____ _____ _____
(ing Verb) (ing Verb) (ing Verb)

_____
(A short phrase that describes your subject)

_____
(Synonym for the Subject)

Garden Wars:
Invaders, Protectors, & Partners

Grade: *7* **|** ***Time:*** *(3-5) 50 minute periods*

Level of Mastery → / Benchmark or Performance Measure	 **EMERGING** **Not yet proficient** **1 point**	 **COMPETENT** **Partially proficient** **4 points**	 **PROFICIENT** **Mastered task** **5 points**	**TOTAL POINTS**
Lost Ladybug Project	Caught ladybugs, but did not log results or report findings to the Lost Ladybug Project database.	Caught ladybugs, logged results, but not according to all of the guidelines on the Lost Ladybug website, and reported findings to the Lost Ladybug Project database.	Caught ladybugs, logged detailed results according to the guidelines outlined on the Lost Ladybug Project website, and reported findings	
Leaf Observation	Observed the leaf, but did not attempt to provide an explanation of which type of pest caused the leaf damage or the reasoning to explain why this pest is harmful to the leaf.	Observed the leaf, provided partial explanation of which type of pest could have caused the leaf damage, and/or provided disconnected reasoning to explain why pest is harmful	Observed the leaf, provided a detailed explanation of which type of pest could have caused the leaf damage, and provided sufficient reasoning to explain why this pest is harmful to the leaf.	
Classification of Symbiotic Relationships	Correctly identified 1-2 types of organism interactions (mutualism, commensalism, parasitism, predation, and competition).	Correctly identified 3-4 types of organism interactions (mutualism, commensalism, parasitism, predation, and competition).	Correctly identified all five types of organism interactions (mutualism, commensalism, parasitism, predation, and competition).	
Role of Pollination in the Garden	Poorly explained the process of pollination and why pollinators are essential to the health of the garden.	Adequately explained the process of pollination and why pollinators are essential to the health of the garden.	Thoroughly explained the process of pollination and why pollinators are essential to the health of the garden.	
Organism Survey	Gathered data to include 2-4 out of 8 requirements, logged data into field journal, and may or may not have compared results with peers.	Gathered data to include 5-7 out of 8 requirements, logged data into field journal, and compared results with peers.	Gathered data according the eight requirements, completely logged data into field journal, and compared results with peers.	
What's Invasive Citizen Science Project	Participation in the removal of invasive plants was low and did not log any of necessary data into the What's Invasive App.	Medium participation in the removal of invasive plants and did not log all of necessary data into the What's Invasive App.	High participation in the removal of invasive plants and logged all of necessary data into the What's Invasive App.	
Garden Health Assessment	Rarely provided useful ideas when participating in the group and class discussions.	Sometimes provided useful ideas when participating in the group and class discussions.	Routinely provided useful ideas when participating in the group and class discussions.	
Environmental Stewardship	Rarely focuses on the task of planning and planting a beneficial insect garden or wildlife habitat Poor understanding of what attracts pollinators and beneficial insects	Focuses on the task of planning and planting a beneficial insect garden or establishing a wildlife habitat some of the time. Adequate understanding of what attract beneficial insects	Consistently focused on the task of planning and planting a beneficial insect garden or wildlife habitat. Excellent understanding of necessary components for pollinator garden or wildlife habitat.	