**NGSS Lesson Planning Template**

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| **Grade: 3rd** | **Topic: Heredity: Inheritance and Variation of Traits** | **Lesson (number/title): 3** |
| **Brief Lesson Description: *Introduction/Foundational Lesson*****Students will explain variation in traits in a group of similar organisms by collecting and observing ladybugs, and using these observations to identify the species of each specimen.** |
|  **Performance Expectation(s):**

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| 3-LS3-1. | Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms. |

\*\*\* Engineering Standards Option in EXPLORE |
|  **Specific Learning Outcomes:*** The learner will explain why members of a group of similar organisms have different traits.
* The learner will observe specimens to identify the species.
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| **Narrative / Background Information** |
| **Prior Student Knowledge:** * Organisms have characteristics that can be similar or different. Young animals are very much, but not exactly, like their parents and also resemble other animals of the same kind. Plants also are very much, but not exactly, like their parents and resemble other plants of the same kind.
* What are traits and inheritance?
* Offspring inherit 50% of their characteristics from each parent.
* Ladybug life cycle, body parts, and benefits for garden (eat aphid pests, can be used as natural pest control instead of pesticides) <http://www.lostladybug.org/files/9%20LLP%20All%20About%20LadybugsPDF.pdf>
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| **Science & Engineering Practices:****Analyzing and Interpreting Data** | **Disciplinary Core Ideas:**[**LS3.A: Inheritance of Traits**](http://www.nap.edu/openbook.php?record_id=13165&page=158)* [Many characteristics of organisms are inherited from their parents.](http://www.nap.edu/openbook.php?record_id=13165&page=158)

[**LS3.B: Variation of Traits**](http://www.nap.edu/openbook.php?record_id=13165&page=160)* [Different organisms vary in how they look and function because they have different inherited information.](http://www.nap.edu/openbook.php?record_id=13165&page=160)
 | **Crosscutting Concepts:**Patterns |
| **Possible Preconceptions/Misconceptions*** Students may think all organisms of a specific species look exactly the same
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| **LESSON PLAN – 5-E Model** |
| **ENGAGE: Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions*** **Each student draws and colors a picture of a ladybug.**
* **Small groups compare pictures and decide what traits each picture has in common and discusses any traits that may be different.**
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| **EXPLORE: Lesson Description – Materials Needed / Probing or Clarifying Questions*** [**http://baynature.org/2014/12/04/ladybugs-make-home/**](http://baynature.org/2014/12/04/ladybugs-make-home/)

**Show picture and explain to students that all of these insects are ladybugs.*** **Small groups discuss what traits each ladybug has in common and discusses any traits that may be different.**
* **Explain Lost Ladybug project and visit website**

**http://www.lostladybug.org/index.php*** [**http://www.lostladybug.org/files/13%20LLP%20Curriculum%204-H%203-6%206-6-09SKE.pdf**](http://www.lostladybug.org/files/13%20LLP%20Curriculum%204-H%203-6%206-6-09SKE.pdf)

**Complete UNIT THREE: Getting Ready to Collect Ladybugs and Collecting Ladybugs Habitat 1** **\*\*\* Creating sweep nets could be used as an engineering experiment to have students design, build and**  **test best method to collect ladybugs.*** **Use sweep nets to collect ladybugs**

**Tips for collecting:** [**http://www.lostladybug.org/howto.php**](http://www.lostladybug.org/howto.php) |
| **EXPLAIN: Concepts Explained and Vocabulary Defined****AT THE TIME THIS LESSON PLAN WAS CREATED, THE LOST LADYBUG PROJECT SITE WAS NOT COMPLETELY BUILT OUT, SO RESOURCES HAVE BEEN ADDED IN PLACE OF COMPONENTS THAT WERE UNDER CONSTRUCTION. WHEN THE SITE IS COMPLETE, IT CAN REPLACE OTHER RESOURCES.*** **Review ladybug anatomy**

[**https://s-media-cache-ak0.pinimg.com/originals/db/b2/c9/dbb2c93f75f4c8010344bf37aa9ef2b4.jpg**](https://s-media-cache-ak0.pinimg.com/originals/db/b2/c9/dbb2c93f75f4c8010344bf37aa9ef2b4.jpg)* **Introduce ladybug identification website**

[**http://www.discoverlife.org/20/q?guide=Ladybug**](http://www.discoverlife.org/20/q?guide=Ladybug)* **Practice as a group using pictures of ladybugs from Google Images**
* **Students use website to attempt to identify their ladybugs**
* **Create a display table for class data on posterboard, computer, etc.**
* **Students click SEE MAP button on left side of screen.**
* **Students use the map to tell if this species is found in Kansas.**
* **Students visit the species list on the Lost Ladybug site, find the species they identified, and click the map icon next to it to compare and contrast this map to the previous map. Explain that each dot on the Lost Ladybugs map is where someone sent a picture of a ladybug from.**

[**http://www.lostladybug.org/summary-page-555.php**](http://www.lostladybug.org/summary-page-555.php)* **Students take pictures of the ladybugs they have identified and submit them on the Lost Ladybug site.**
* **Guide students to understand that the specimens they collected are a SAMPLING that should closely represent the percentage of each species of ladybug that make up the entire population in the garden.**

**\*\*\* Math Connection—lessons on percentages and population sampling**[**http://www.lostladybug.org/files/13%20LLP%20Curriculum%204-H%203-6%206-6-09SKE.pdf**](http://www.lostladybug.org/files/13%20LLP%20Curriculum%204-H%203-6%206-6-09SKE.pdf)**Complete UNIT TWO: Ladybug Sampling and the Concepts of Native and Introduced Species:****Two Games*** **Guide students to understand that the difference in ladybugs’ appearances is a result of mutations throughout generations.**

[**http://readingevolution.com/evolution.html**](http://readingevolution.com/evolution.html)**Closing if done for the day:*** **Is inheritance of traits in ladybugs similar or different than how humans inherit their traits from their parents? Explain.**
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| **ELABORATE: Applications and Extensions*****Day 2 (optional)**** ***When students receive their results from Lost Ladybug, compare results with the identification they made earlier in the lesson. If the identifications don’t match, students research the two different species and identify how the two are different. Then students refer back to the picture they took of the species and explain where they were mistaken in their identification.***
* ***Are there other animals where two species closely resemble one another? How do scientists identify the different species? Is this method similar to or different from the way ladybug species are identified?***

**Closing:** |
| **EVALUATE:** **Formative Monitoring (Questioning / Discussion):*** **Why do ladybugs have different appearances? Use the words INHERIT and TRAITS in your explanation.**

**Summative Assessment (Quiz / Project / Report):** |
| **Elaborate Further / Reflect:** |

**Materials Required for This Lesson/Activity**

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| **Quantity** | **Description** | **Potential Supplier (item #)** | **Estimated Price** |
| **1 per student or student group** | **pillowcases** |  |  |
| **2 per pillowcase** | **Wire hangers** |  |  |
| **1 per pillowcase** | **2-3 foot piece of wood or dowel** |  |  |
|  | **Crayons, scissors** |  |  |
| **2-3 rolls** | **Duct tape** |  |  |
| **1** | **pliers** |  |  |
| **1 per student or group** | **posterboard** |  |  |
| **3-4** | **Plastic tubs** |  |  |
| **1 per student or student group** | **Jars or vials** |  |  |