



TEACHER'S GUIDE

AN ALABAMA OUTDOOR CLASSROOM PROGRAM

2ND GRADE



This Teacher's Guide Belongs To:

SAMPLE

Junior Wildlife Scientist Teacher’s Guide

The Junior Wildlife Scientist (JWS) Teacher’s Guide provides the framework for the Junior Wildlife Scientist program and suggestions on how to make the most of it for your students.

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JWS Nature Journal Activities’ Lesson Plans Format

Each lesson plan includes:

- ☑ **Activity Goal** – the purpose of the activity
- ☑ **Activity Tips** – what time of year is best for conducting the activity, which learning station(s) in the outdoor classroom you should use to conduct the activity, and what materials you need for the students to complete the activity
- ☑ **Learning Objectives** – specific tasks and concepts students should understand after completing the activity
- ☑ **AL CoS Standards & Correlations** – specific Alabama Department of Education Course of Study Standards for math, science, social studies, and English language arts that the activity helps to teach
- ☑ **Background Information** – important information about the topic(s) covered in the activity and how it relates to entomology and being an entomologist
- ☑ **Optional Educational Resources** – additional resources that can be used in conjunction with the activity including trade books, topical videos, educational sing-a-longs, and Alabama Wildlife Federation Student Exploration Links (See page 5)
- ☑ **Procedural Instructions** – step-by-step instructions for conducting the activity
- ☑ **Activity Page Answers** – answers for the questions asked on each activity page
- ☑ **Expansion Options** – additional activities and AWF Student Exploration Links relevant to the topic of the activity that can be used to expand the lesson

Alabama Department of Education Course of Study Standards

The Junior Wildlife Scientist Nature Journal activities help teach ALSDE standards for English Language Arts, Science, Social Studies and Math.

What Does an Entomologist Do?

Language Arts (2021): See ELA Chart (pg. 7) - R1, R2, R3, 15, 30

JWS Pledge

Language Arts (2021): See ELA Chart (pg. 7) - R1, R2, 37

Explore Nature with Your Senses

Language Arts (2021): See ELA Chart (pg. 7) - R1, R3, 20, 21, 25, 37

Field Investigation: How Pollinators Pollinate

Language Arts (2021): See ELA Chart (pg. 7) -R1, R2, R3, R4, 15, 18, 20, 21, 22, 24, 25, 30, 37, 45

Science (2015): 6. Design and construct models to simulate how animals disperse seeds or pollinate plants (e.g., animals brushing fur against seed pods and seeds falling off in other areas, birds and bees extracting nectar from flowers and transferring pollen from one plant to another).

Digital Literacy & Computer Science (2018): R1, R2, R3, R5, 12

How a Flower Creates a Seed

Language Arts (2021): See ELA Chart (pg. 7): R1, R2, R3, R4, 15, 18, 20, 21, 22, 24, 25, 30, 37

Digital Literacy & Computer Science (2018): R1, R2, R3, R5, 12

Wonders of Wildlife: Eastern Bumble Bee

Language Arts (2021): See ELA Chart (pg. 7) - R1, R2, R3, R4, 15, 18, 20, 22, 24, 25, 30, 37

Digital Literacy & Computer Science (2018): R1, R2, R3, R5, 12

Butterfly Word Art

Language Arts (2021): See ELA Chart (pg. 7) - R1, R2, R3, R4, 18, 20, 21, 22, 24, 25, 30, 37, 45

Digital Literacy & Computer Science (2018): R1, R2, R3, R5, 12

Alabama Ecology: Alabama's Amazing Biodiversity

Language Arts (2021): See ELA Chart (pg. 7) - R1, R2, R3, 15, 20, 21, 22, 25, 37

Digital Literacy & Computer Science (2018): R1, R2, R3, R5, 12

Field Investigation: Evidence of Wildlife

Language Arts (2021): See ELA Chart (pg. 7) - R1, R2, R3, 20, 21, 22, 25, 37

Mathematics (2019): 16. Create a picture graph and bar graph to represent data with up to four categories.

Dig Into Plants: Is It Really a Plant?

Language Arts (2021): See ELA Chart (pg. 7) - R1, R2, R3, R4, 15, 18, 20, 21, 22, 24, 25, 30, 37

Digital Literacy & Computer Science (2018): R1, R2, R3, R5, 12

STEAM Activity: Design a Seed

Language Arts (2021): See ELA Chart (pg. 7) - R1, R2, R3, 15, 18, 20, 22, 30

Mathematics (2019): 15) Measure lengths of several objects to the nearest whole unit

Science (2015): 6) Design and construct models to simulate how animals disperse seeds or pollinate plants (e.g., animals brushing fur against seed pods and seeds falling off in other areas, birds and bees extracting nectar from flowers and transferring pollen from one plant to another)

Seasonal Plant and Wildlife Observations

Language Arts (2021): See ELA Chart (pg. 7) - R1, R2, R3, 16, 21, 37

Mathematics (2019): 23) Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m.

Explore Outdoors: Visit a Botanical Garden or Arboretum

Language Arts (2021): See ELA Chart (pg. 7) - R1, R2, R3, 20, 25, 37

Social Studies (2010): 5) Differentiate between a physical map and a political map.

ALSDE Course of Study Standards Chart for English Language Arts

Second Grade ELA Course of Study Standards Correlations for Junior Wildlife Naturalist Nature Journal Activities	What Does an Entomologist Do?	JWN Pledge	Explore Nature with Your Senses	Field Investigation: How Pollinators Pollinate	How a Flower Creates a Seed	Wonders of Wildlife: Eastern Bumble Bee	Butterfly Word Art	AL Ecology: Alabama's Amazing Biodiversity	Field Investigation: Evidence of Wildlife	Dig Into Plants: Is It Really a Plant?	STEAM Activity: Design a Seed	Seasonal Plant and Wildlife Observations	Explore Outdoors: Visit a Botanical Garden or Arboretum
R1. Utilize active listening skills during discussion and conversation in pairs, small groups, or whole-class settings, following agreed-upon rules for participation.	X	X	X	X	X	X	X	X	X	X	X	X	X
R2. Use knowledge of phoneme-grapheme correspondences and word analysis skills to decode and encode words accurately.	X	X		X	X	X	X	X	X	X	X	X	X
R3. Expand background knowledge and build vocabulary through discussion, reading, and writing.	X		X	X	X	X	X	X	X	X	X	X	X
R4. Use digital and electronic tools appropriately, safely, and ethically for research and writing, both individually and collaboratively.				X	X	X	X		X				
15. Utilize new academic, content-specific, grade-level vocabulary, making connections to previously learned words and relating new words to background knowledge.	X			X	X	X		X	X	X			
16. Describe word relationships and nuances in word meanings, including relating them to their opposites and distinguishing shades of meaning in similar or related words.												X	
18. Use dictionary definitions and information found within the text to help determine meaning of unfamiliar or multi-meaning words.				X	X	X	X		X	X			
20. Use grade-level academic and domain-specific vocabulary to gain meaning from text.			X	X	X	X	X	X	X	X	X		X
21. Use grade-level academic and domain-specific vocabulary in writing.			X	X	X		X	X	X	X		X	
22. Use content knowledge built during read-alouds and independent reading of informational and literary texts by participating in content-specific discussions with peers and/or through writing.				X	X	X	X	X	X	X			
24. Identify the main idea and supporting details of literary and informational texts.				X	X	X	X		X				
25. Identify and use various text features to locate ideas, facts, or supporting details in both written and digital formats.			X	X	X	X	X	X	X	X			X
30. Read and comprehend literary and informational texts.	X			X	X	X	X		X	X			
37. Write legibly.		X	X	X	X	X	X	X	X	X		X	X
45. Demonstrate understanding of standard English language conventions when writing.				X			X						

Digital Literacy & Computer Science (2018) Standards

- R1) Identify, demonstrate, and apply personal safe use of digital devices.
- R2) Recognize and demonstrate age-appropriate responsible use of digital devices & resources as outlined in school/district rules.
- R3) Assess the validity and identify the purpose of digital content.
- R5) Locate and curate information from digital sources to answer research questions.
- 12) Conduct basic keyword searches to gather information. "

What Does an Entomologist Do?

(JWS Nature Journal pg. 2)

Activity Goal

The purpose of this lesson is to

- Introduce students to the field of entomology
- Give students the opportunity to discuss what an entomologist does
- Get students excited about becoming a JWS Entomologist

Activity Tips

- **When:** This should be the first JWS nature journal activity that you conduct with your students in August.
- **Where:** This is an indoor discussion.

Learning Objectives

- Students will be able to recognize the term “entomology” as the study of insects.
- Students will be able to explain what an entomologist is and the types of jobs an entomologist might have.

AL COS Standards & Correlations

Language Arts (2021)

See ELA Chart (pg. 7): R1, R2, R3, 15, 30

Background Information

Entomology is the study of insects and an entomologist is someone who studies insects. Some entomologists work in the field where they study insects’ habitats and diets and how they interact with one another. Others may study how their presence or absence impacts humans. Some study in labs where they work to describe new species. There are even entomologists that study medical records and data to better understand, prevent, and treat diseases caused/ spread by insects.

There is tremendous insect diversity on the planet – 10 quintillion species! There are more insects in the world than there are animals of all other kinds, including humans! Insects belong to a larger group of invertebrates (animals with no backbone) called arthropods. This group includes animals that we tend to also call insects like spiders, millipedes, and roly-polies. These animals are not truly insects. Insects are also invertebrates but they all have six legs (spiders have 8) and three body parts (a millipede has two). Most insects also have antennae and wings. The term “bugs” usually refers to insects and arthropods in general. While this is not technically correct to call all insects bugs, it is generally acceptable to use the terms interchangeably. A bug is actually a specific type of insect in the Order Hemiptera - including cicadas, aphids, planthoppers, leafhoppers, assassin bugs, bed bugs, and shield bugs.

While all insects have their place in the ecosystem, there are species that are considered to be “good” insects while others are considered “bad” insects. Generally, insects that are harmful to humans, crops, or forests are called pests. These are the insects that we want to control. “Good” insects include the ones that naturally control the “bad” ones as well as the ones that we benefit directly from. For instance, ladybugs are predatory insects that specialize in eating the aphids that destroy crops and other plants. And ants, bees, beetles, butterflies, moths, and wasps are all pollinators that help wildflowers, food crops, and trees to reproduce. Humans rely heavily on pollinators for food and other basic necessities.

Optional Educational Resources

- Read *The Bug Club* by Elise Gravel (ISBN: 978-1770464155) to engage students and get them excited about bugs.

- Use *The Big Book of Bugs* by Yuval Zommer (ISBN: 978-0500650677) to pick an interesting insect to read about to the students. Ask them if they have ever heard of this animal or if they know of an animal that has similar characteristics. This can also be used throughout the journal to explore new bugs along the way.
- Use the YouTube video “Inspect an Insect” by SciShow Kids (3:45 min.) @ www.youtube.com/watch?v=3166nK3Gym8&ab_channel=SciShowKids to help introduce the characteristics of insects and why insects are important.
- Use the YouTube video “What is an Entomologist?” by Royal Entomological Society (1:28 min.) @ www.youtube.com/watch?v=Q-38ocCB0ss&ab_channel=RoyalEntomologicalSociety to introduce students to the field of entomology.



Procedural Instructions

Possible Questions to Start Discussion for Indoor Discussion

- What is an insect or bug?
- What do you think of when you hear the word insect?
- Do you have a favorite insect or bug? A least favorite insect?
- Where do you typically find bugs or insects?

Indoor Discussion

1. Discuss with students what entomology is and what entomologists do. Review the characteristics that insects have – no backbone, three body parts, six legs, and typically wings and antennae.
2. Discuss with students that insects are quite diverse. Consider showing your students how big of a number 10 quintillion (10,000,000,000,000,000) is by having them count how many zeroes are in it (19).
3. Explain that bugs are insects, but not all insects are bugs. It is not critical that they understand which insects are technically bugs, only that there is a difference between the words. It is okay for students to still refer to insects as bugs.
4. Review the “Did You Know” Box content.
 - **Agricultural Entomologist** (protects crops from pests)
 - **Apiologist** (studies bees)
 - **Lepidopterist** (studies butterflies)
 - **Taxonomic Entomologist** (discovers new species)
 - **Medical Entomologist** (researches spread of diseases from pests)
 - **Urban Entomologist** (studies insects found in homes and businesses)
 - **Veterinary Entomologist** (protects animals from diseases from pests)

Explain to your students that through the Junior Wildlife Scientist Program, they will become a...

- Kindergarten – JWS Biologist
- 1st Grade – JWS Zoologist
- 2nd Grade – JWS Entomologist
- 3rd Grade – JWS Herpetologist
- 4th Grade – JWS Ornithologist
- 5th Grade – JWS Ecologist

Possible Closing Discussion Questions

- Do any of you know anyone that has a job in the entomology-related fields mentioned?
- In which type of entomology-related career would you be most interested?
- Do you think you will like studying insects this year?

Expansion Options

The activities in this journal serve as expansions on this topic. Each one will cover a different topic related to entomology and what an entomologist does. The background information in the Teacher’s Guide for each activity will include tips for helping your students connect the dots between what they are learning and how it relates to entomology.

Field Investigation: How Pollinators Pollinate

(JWS Nature Journal pg 5-6)

Activity Goal

The purpose of this lesson is to:

- Introduce students to the process of pollination
- Educate students about pollinators and their important role in their ecosystems
- Give students the opportunity to search for a pollinator outdoors

Activity Tips

- **When:** This activity should be conducted in the spring when flowers are blooming and pollinators are active.
- **Where:** Use any area in your outdoor classroom that you can find a pollinator. Your best chance will be at the pollinator or butterfly garden or wherever else flowers are blooming.
- **What:** Bring pencils or crayons for students to draw and write their observations. Q-tips and magnifying glasses are helpful for collecting pollen and viewing pollinators but are not required.

Learning Objectives

- Students will be able to identify common types of pollinators.
- Students will be able to identify some of the components of flowers associated with pollination.
- Students will be able to describe how pollination is important to humans.
- Students will be able to describe the steps of pollination.

AL COS Standards & Correlations

Science (2015)

6. Design and construct models to simulate how animals disperse seeds or pollinate plants (e.g., animals brushing fur against seed pods and seeds falling off in other areas, birds and bees extracting nectar from flowers and transferring pollen from one plant to another).

Language Arts (2021)

See ELA Chart (pg. 7): R1, R2, R3, R4, 15, 18, 20, 21, 22, 24, 25, 30, 37, 45

Digital Literacy & Computer Science (2018)

See list at bottom of pg. 7

Background Information

All living things, including plants, need to be able to reproduce (create a “copy” or “baby”) to create the next generation or the species will die out and no longer exist. One of the ways that plants can reproduce is by creating and distributing seeds that contain genetic material (information about “mom” and “dad”) along with “building instructions” to create a new “baby” plant that has the same traits and characteristics as the “parent” plants. Seed-producing plant species (a group of plants with the same traits and characteristics that can exchange genetic material and reproduce) require genetic material from a male and female of the same species to reproduce.

For some plant species, the stamen (“male” part) and the pistil (“female” part) can be found in the same flower of a plant, while other species of plants can have all male parts in their flowers or all female parts in their flowers. The stamen produces a yellow, sticky powder called pollen that must be transferred to the pistil through a process called pollination in order to produce a seed. Since plants cannot pull their roots out of the ground and move around to visit other plants, they use their flowers to attract pollinators (animals like birds, bees and butterflies that transfer pollen from plant to plant and flower to flower) to help them.

The pollen becomes attached to parts of a pollinator’s body and is deposited on other plants as the pollinator searches for nectar to eat. Plants must be the same species for pollination to occur. Plants that are not the same species cannot pollinate each other. For example, only pollen from a dandelion can pollinate another

dandelion—pollen from a lily or red bud tree would not work. Pollination is an important process for the production of new plants including vegetables and fruits. Research shows that over 150 of our food crops are pollinator-dependent and over 1/3 of all of the food we eat requires pollinators.

Many of the insects that entomologists study are considered to be pollinators. The pollinators are dependent on the plants and the plants are dependent on the pollinators.

Optional Educational Resources

- *Pollination* by Dona Herweck Rice (ISBN: 978-1480745988)
- “Flowers and Their Pollinators: A Perfect Match!” by SciShow Kids (5:08 min. – specifically through 1:27 min) @ www.youtube.com/watch?v=pnBoM4idf1k&ab_channel=SciShowKids

Procedural Instructions

Possible Questions to Start Indoor Discussion

- What is a baby plant called? (seed or seedling)
- How do you think plants make babies?
- Do you know what the orange powder in the air at spring time is called? It often makes people sneeze. (pollen)
- How does pollen get from one plant to another? (wind, water, or animals)
- What are the animals that transfer pollen between plants called? (pollinator)
- Do you think pollinators are important?

Indoor Discussion

1. Visit AWF’s Ecosystem Investigation: Pollinators & Their Habitats webpage @ www.alabamawildlife.org/learn-about-pollinators-and-their-habitat/. This can be done as a class or by the students individually depending on your preference and available resources.
2. Have students answer questions 1-3 using the information in the Alabama’s Pollinators section of the webpage.
3. Have students answer question 4-5 using the Interesting Facts section of the webpage.

Outdoor Discovery

4. Take students outdoors to look for a flower with a pollinator on it. Have students answer question 6-7 to describe and draw the flower.
5. Have students draw a picture of the pollinator they saw for question 8. If you have magnifying glasses, they can be used to get a closer look at the pollinator.
6. Allow students to collect some pollen from any flower. If you have an abundance of flowers you may prefer that they do it individually. Otherwise, you can assist them in a single collection that all students can use as their example when drawing pollen in the second box on the activity sheet. Use a q-tip to collect pollen from the flower, or simply place a piece of paper underneath the flower and lightly tap the stem to make pollen fall out. If you have magnifying glasses, use them to take a closer look at the pollen. Have students draw the pollen for question 9.
7. Have students draw and describe the four steps of pollination including the flower, pollen, and the pollinator they saw in the outdoor classroom for question 10.

Possible Closing Discussion Questions

- Do you like apples? Blueberries? Almonds? Watermelon?
- Did you know that these fruits require pollinators?
- What do you think would happen to the plants if pollinators disappeared?
- What do you think would happen to the pollinators if plants disappeared?
- What would happen to humans if pollinators disappeared?

Activity Page Answers

1. Pollinator



2. Nectar
3. Ants, beetles, hummingbirds, moths
4. Over 150
5. They pollinate the plants that give us forest products like paper and cardboard. They help other animals by pollinating the plants that other wildlife use for their habitat needs including sources of food and cover. Many plants that require pollination help keep our ecosystems healthy because the plants they pollinate have roots that help prevent soil erosion, help filter and clean our waterways, and they help remove carbon dioxide from the air.
6. Details about the flower will vary based on what was found.
7. Drawings of the flower will vary based on what was found.
8. Details and drawings of the pollinator will vary based on what was found.
9. A drawing of pollen under a magnifying glass may look something like the image to the right. A drawing of pollen to the naked eye may just look like yellow dots.
10. Pollination process:
 1. Pollinator visits a flower.
 2. Pollen from the anthers stick to the pollinator.
 3. Pollinator visits another flower.
 4. Pollen is transferred to the stigma.



Expansion Options

- Have students take a guess at what types of pollinators pollinate the plants in your outdoor classroom based on the shapes of the flowers. You can use Pollinator.org’s Pollinator Syndromes Chart @ www.pollinator.org/pollinator.org/assets/generalFiles/Pollinator_Syndromes.pdf about pollinator syndromes to discuss the concept with your students as well as learn about which pollinators prefer the flower shapes present in your garden.
- Have students play the “Pollinator Matching Game” in which they try to match the pollinator to the type of flower it would pollinate based on the characteristics of the pollinator and flower @ www.santacruzmuseum.org/pollinator-matching-activity/.
- Conduct this Cheese Powder Pollination Activity from Around the Kampfire @ www.aroundthekampfire.com/2019/03/cheese-powder-pollination-activity-2nd-3rd-grade-science.html that mimics the function of an insect pollinating a flower.

