

Science Unit 3



Grade 2

Insects
Unit Plan



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**Science Unit 1
Insects
Grade 5
Marking Period 1**

Unit Overview

The **Insects Module** provides experiences that heighten students' awareness of the diversity of animal forms. They come to know firsthand the life sequences of a number of insects. In each investigation an insect is introduced, and students observe structures and behaviors, discuss their findings, and ask questions. Students observe life cycles of insects and compare the stages of metamorphosis exhibited by each species.

Primary Interdisciplinary Connections: writing, math, reading, social studies, technology
21st Century Theme: Global Awareness

Unit Rational

This unit provides experiences that heighten students' awareness of the diversity of animal forms. They come to know firsthand the life sequences of an number of insects.

UNIT GOALS

Students will develop a curiosity and interest in insects and respect for them as living things. They will experience some of the great diversity of forms in the animal kingdom/ They will become familiar with some of the life sequences that different types of insects exhibit (simple and complete metamorphosis). Students will observe similarities and differences in the larvae, pupae, and adults of insects that go through complete metamorphosis. They will observe the behaviors of insects at different stages of the life cycle and provide for the needs of insects (air, water, food, and space.) Students will acquire the vocabulary associated with insect life.

Unit Essential Questions:

- What are some similarities and differences in the larvae, pupae, and adults of insects that go through metamorphosis (complete or incomplete)?
- What are the behaviors of insects at different stages of their life cycle?
- How do specific structures aid in the survival of insects throughout their life cycle?
- How are insect life cycles related to the life cycles of other living organisms?

Enduring Understanding:

Students will understand that.....

- Living things have predictable and observable stages in their life cycles. All living things need shelter, food, water, light, and air. Specific insects have specific needs at different times in their life cycle. Physical structures, functions and needs of living things change throughout their life cycles.

Knowledge:

Students will know....

- All insects have three body parts—head, thorax and abdomen.
- All living things need air, food, water, and space to survive. Specific insects have specific needs.
- The structures of some insects change as the insects grow.

Skills:

Student will be able to

- Generate questions and predictions using observations and exploration about the natural world.
- Generate and follow simple plans using systematic observations to explore questions and predictions.

<ul style="list-style-type: none"> • All insects have structures that are similar to one another and that carry out similar functions throughout their life cycles. 	<ul style="list-style-type: none"> • Collect data using observations, simple tools and equipment. Record data in tables, charts, and bar graphs. Compare data with others to examine and question results. • Construct a simple explanation by analyzing observational data. Revise the explanation when given new evidence or information gained from other resources or from further investigation. • Share simple plans, data, and explanations with an audience and justify the results using the evidence from the investigation. • Use mathematics, reading, writing, and technology when conducting an investigation and communicating the results. • Identify the basic needs of all insects for survival. • Conduct simple investigations to determine and describe how insects and various other organisms respond to different kinds of stimuli. • Conduct simple investigations using artificial habitats to describe how the survival of insects is affected by the environment. • Identify and describe the structures of insects and various other organisms that enable them to function in their environment. • Compare and contrast the structures on different kinds of insects at different stages of development. • Observe common structures of different insects. Describe the similarities and differences among the structures. Recognize that the structure is related to the function it performs.
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Evidence of Understanding:

Pre- Assessment

Investigation 1: Mealworms

Investigation 2: Waxworms

Investigation 3: Milkweed Bugs

Investigation 5: Butterflies

Notebook and Journal Entries

Writing Prompts

Performance Assessments

Teacher Observations/Anecdotal Notes

- Assess ability to hypothesize orally and in writing
- Assess ability to draw conclusions from experimentation
- Observations of small group activities
- Student and teacher rubrics to assess collaboration with others

Homework

Unit Assessment

Preconceptions /Misconceptions

Insects

- Insects live on land
- An insect has six legs, attached to the abdomen
- Bees gather honey from flowers.
- Spiders, insects, ticks, and all other creepy crawlies are bugs
- Insects try to attack people
- Insects aren't really animals.
- Insects sing like we do, with their mouths.
- Small insects with wings are baby insects that will grow up to be adults.
- All insects and spiders are bad and should be killed

List other that you discover in your class:

Before beginning unit administer pretest. Check that all materials are available, usable, and ready

Standards Addressed in Unit 1

New Jersey Common Core Standards

5.1 Science Practices	All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.
Strand A	Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world. Who, what, when, where, why, and how questions form the basis for young learners' investigations during sensory explorations, experimentation, and focused inquiry
5.1.4.A.1	Fundamental scientific concepts and principles and the links between them are more useful than discrete facts.
5.1.4.A.2	Outcomes of investigations are used to build and refine questions, models, and explanations.
Strand B	Generate Scientific Evidence Through Active Investigations: Observations and investigations form young learners' understandings of science concepts.
5.1.4.B.1	Building and refining models and explanations requires generation and evaluation of evidence.
5.1.4.B.2	Tools and technology are used to gather, analyze, and communicate results.
5.1.4.B.3	Evidence is used to construct and defend arguments
5.1.4.B.4	Reasoning is used to support scientific conclusions.
Strand C	Reflect on Scientific Knowledge: Interacting with peers and adults to share questions and explorations about the natural world builds young learners' scientific knowledge.
5.1.4.C.1	Scientific understanding changes over time as new evidence and updated arguments emerge.
5.1.4.C.2	Revisions of predictions and explanations occur when new arguments emerge that account more completely for available evidence.
Strand D	Participate Productively in Science: Science practices include drawing or "writing" on observation clipboards, making rubbings, or charting the growth of plants.
5.1.4.D.1	Science has unique norms for participation. These include adopting a critical stance, demonstrating a willingness to ask questions and seek help, and developing a sense of trust and skepticism.
5.1.4.D.2	In order to determine which arguments and explanations are most persuasive, communities of learners work collaboratively to pose, refine, and evaluate questions, investigations, models, and theories (e.g., scientific argumentation and representation).
5.1.4.D.3	Instruments of measurement can be used to safely gather accurate information for making scientific comparisons of objects and events.
5.3 Life Science	All students will understand that life science principles are powerful conceptual tools for making sense of the complexity, diversity, and interconnectedness of life on Earth. Order in natural systems arises in accordance with rules that govern the physical world, and the order of natural systems can be modeled and predicted through the use of mathematics.
Strand A	A. Organization and Development : Living organisms are composed of cellular units (structures) that carry out functions required for life. Cellular units are composed of molecules, which also carry out biological functions.
5.3.2.A.1	Living organisms: • Exchange nutrients and water with the environment. • Reproduce. • Grow and develop in a predictable manner.
Strand B	Matter and Energy Transformations : Food is required for energy and building cellular materials. Organisms in an ecosystem have different ways of obtaining food, and some organisms obtain their food directly from other organisms
5.3.2.B.1	A source of energy is needed for all organisms to stay alive and grow. Both plants and animals need to take in water, and animals need to take in food.

Strand D	Heredity and Reproduction : Organisms reproduce, develop, and have predictable life cycles. Organisms contain genetic information that influences their traits, and they pass this on to their offspring during reproduction.
5.3.2.D.1	Plants and animals often resemble their parents.
5.3.2.D.2	Organisms have predictable characteristics at different stages of development.

Next Generation Science Standards

Performance Expectations

- 3-LS1-1.** Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death. *[Clarification Statement: Changes organisms go through during their life form a pattern.] [Assessment Boundary: Assessment of plant life cycles is limited to those of flowering plants. Assessment does not include details of human reproduction.]*
- 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. *[Clarification Statement: Patterns are the similarities and differences in traits shared between offspring and their parents, or among siblings. Emphasis is on organisms other than humans.] [Assessment Boundary: Assessment does not include genetic mechanisms of inheritance and prediction of traits. Assessment is limited to non-human examples.]*

NGSS Science and Engineering Practices

Developing and Using Models

Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.

- Develop models to describe phenomena. (3-LS1-1)

Analyzing and Interpreting Data

Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used.

- Analyze and interpret data to make sense of phenomena using logical reasoning. (3-LS3-1)

Connections to Nature of Science

Scientific Knowledge is Based on Empirical Evidence

- Science findings are based on recognizing patterns. (3-LS1-1)

Disciplinary Core Ideas

LS1.B: Growth and Development of Organisms

- Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles. (3-LS1-1)

LS3.B: Variation of Traits

- Different organisms vary in how they look and function because they have different inherited information. (3-LS3- 1)

Cross Cutting Concepts

Patterns

- Similarities and differences in patterns can be used to sort and classify natural phenomena. (3-LS3-1)
- Patterns of change can be used to make predictions. (3-LS1-1)

Common Core State Standards

CCSS: English Language Arts	
<i>Reading Informational Text</i>	
RI.2.10	By the end of the year, read and comprehend informational texts, including science and technical texts, in the grades 2-3 text complexity band proficiently, with scaffolding as needed at the high end of the range.
CCSS: Writing-	
W.1.8	With guidance and support from adults, recall information from the experiences to gather information from provided sources to answer a question.
W.2.2	Write informative/explanatory texts in which they introduce a topic, use facts and definitions to develop points and provide a concluding statement or section.
CCSS: Speaking and Listening:	
SL.1.5.	Add drawing or other visual displays to descriptions when appropriate to clarify ideas, thoughts, and feelings
SL.2.1	Participate in collaborative conversations with diverse partners about grade 2 topics and texts with peers and adults in small and large groups.
CCSS: Mathematics	
2.MD.10	Draw a picture graph and a bar graph (with single unit scale) to represent a data set with up to four categories

Overview Investigation 1 – Mealworms		
<p align="center"><u>Summary</u></p> <p>Students will observe mealworms change from larvae to pupae to adults. They will describe larval segments legs, and other structures of mealworms. They will learn the three parts of an insect- head thorax, and abdomen. Students will communicate observations of the structure and behavior of insects in words and drawings. Students will provide for the needs of living insects –air water, and space.</p>		
<p><u>Core Conceptual Ideas</u></p> <ul style="list-style-type: none"> • Insects need air, food and space • Insects have characteristic structures and behaviors • The life cycle of the beetle is egg, larvae, pupa, and adult which produce eggs. • Live organisms need to be treated with care and respect. 	<p><u>Performance</u></p> <ul style="list-style-type: none"> • Observe mealworms change from larvae to pupae to adults. • Describe larval segments legs, and other structures of mealworms. • Learn the three parts of an insect- head thorax, and abdomen. • Communicate observations of the structure and behavior of insects in words and drawings. • Provide for the needs of living insects –air water, and space. 	
<p><u>New Vocabulary</u></p> <p>Egg, larvae, pupa, adult, abdomen, air, antenna(e), darkling beetle, dead, dropping, food, head, leg, life cycle, living, mealworm, molt, segment, space, thorax, water, wing</p>	<p><u>Language Development</u></p>	
<p><u>Extensions</u></p> <p>Science Extension (see website for extensions)</p>	<p><u>Assessments</u></p> <p>Pre-Assessment Survey Embedded Assessment - Science Notebook Benchmark Assessment- <i>I-check 1</i></p>	
<p align="center"><u>Focus Questions</u></p> <ul style="list-style-type: none"> • What do insects need? • What are the structures and behavior of mealworms? • How do mealworms grow and change? • What are the structures and behavior of mealworm larvae, pupae, and adults? • How do new mealworms begin? 		
Teacher Preparations	Body of Evidence	Time Frame
-Read “At A Glance” TE -Read “-Background for the Teacher” -Read “Teaching Children about Mealworms?” -Review “ Materials”, “Getting Ready” and “Guiding the Investigation” -View Teacher Prep video -Prepare materials Note: some materials may take several days to be prepared, check and plan ahead Scores sent to District Data to be recorded in Genesis	-Pre- Assessment -Notebook Investigation Entry - Reading: -Writing Response -Journal Entry -Student Observation/Anecdotal Notes -Homework (Suggestions) - Cross Curriculum -Extensions I-check 1	4 sessions *note this investigation and the following ones will be ongoing for observations 1 session = 45 minutes
<p>Suggested Center Activities: Foss suggested websites, word wall activities, extensions, additional supporting Science Activities, Spelling City</p>		
<p>Culminating Activity: Students should begin planning and working on culminating project.</p>		

Overview Investigation 2 - Waxworms

Summary

Students continue their study of insects. They meet waxworms and observe their structure and behaviors. They will attend to their needs. They will compare waxworm with mealworm. Observe the life cycle.

Core Concepts:

- Insects need air, water and space
- The structures and behaviors of waxworms change as they grow
- Larvae produce silk.
- Waxworms and mealworms have similar structures and behaviors.

Performance:

- Observe waxworms change from larvae to pupae to adults.
- Describe larval segments legs, and other structures of waxworms.
- Learn the three parts of an insect- head thorax, and abdomen.
- Communicate observations of the structure and behavior of insects in words and drawings.

New Vocabulary

Bristle, clasper, cocoon, moth, proleg, silk, spiracle, stage, wax moth, waxworm

Language Development

segment

Extensions

Science: (see website for extensions)

Assessments

Embedded Assessment - Science Notebook
Benchmark Assessment
I-Check 2

Focus Questions

- What are waxworms?
- What do waxworms need?
- How do waxworms grow and change?
- What are the structures and behaviors of waxworm larvae, pupae, and adults?
- What is the life cycle of waxworms?

Teacher Preparation	Body of Evidence	Time Frame
-Set up materials for the week -Read “-Background for the Teacher” -Read “Teaching Children about Waxworms?” -Watch Teacher Video Demo of Inv.2 - Review “Materials” and “Getting Ready”	-Notebook Investigation Entry Student resource book: -Journal Entry -Student Observation/Anecdotal Notes -Homework (Suggestions) - Cross Curriculum Extensions - Readorium I-Check 2	3 sessions
Suggested Center Activities: Spelling City, Foss suggested websites, word wall activities, extensions, additional supporting Science Activities,		
Culminating Activity: Continue working on culminating project.		

Overview Investigation 3 – Milkweed Bugs

Summary

Students observe the tiny yellow or orange milkweed bug eggs in vials and guess what they are. They prepare milkweed bug habitats for the nymphs and outfit them with food (sunflower seeds), water, air and space. They hang their habitats up in the classroom. Students care for the bugs and observe the changes that occur as the bugs mature. They will observe egg hatching, molting, feeding, growth, laying, and death – leading to the opportunities to develop the concept of life cycle.

Core Concepts:

- Insects hatch from eggs
- Live organisms need to be treated with care
- Needs of insects include air, food, and space and these are met in different ways for different insects
- As insects grow, they molt their hard external covering
- Insects have three body parts head, thorax, and abdomen
- Insects and other animals have different structures that help them grow and survive
- The life cycle of some insects is egg, nymph stages, and adult which produces eggs.

Performance:

- Generate evidence that paramecium are single celled, living organisms.
- **Describe differences between living cells that are organisms and living cells that are NOT organisms.**
- Modify the characteristics of life to include cells.

New Vocabulary

Bug female, habitat, insect, male, mating, milkweed bug, molting, nymph, proboscis, water fountain

Language Development

There are key terms associated with insects

Extensions

Science Extension
(see website for extensions)

Assessments

Embedded Assessment - Science Notebook
Benchmark Assessment
I-check 3

Focus Questions

•

Teacher Preparation	Body of Evidence	Time Frame
-Read “-Background for the Teacher” -Read “Teaching Children about Milkweed Bugs?” - - Watch Video Demonstration of Inv. 3 -Review “ Materials” “Getting Ready” and “Guiding the Investigation” -Prepare materials	-Notebook Investigation Entry -Journal Entry -Student Observation/ Anecdotal Notes -Homework (Suggestions) - Cross Curriculum -Extensions - Readorium I-Check 3	4 sessions
<i>Suggested Center Activities:</i> Spelling City, Foss suggested websites, word wall activities, extensions, additional supporting Science Activities,		
<i>Culminating Project:</i> Continue monitoring student progress of projects.		

Overview Investigation 5 – Butterflies (4 is skipped)

Summary

Students are introduced to a painted lady caterpillar (larvae stage) and observe it closely to determine its structures. They monitor its behaviors- eating, moving, molting, until it pupates in a chrysalis. The painted lady pupae are transferred to a net cage to prepare for the emergence of adult painted ladies. Students observe butterflies feeding at a sugar water fountain watch for mating, and search for eggs. With luck some eggs will hatch and tiny larvae will emerge to start the life cycle again.

Core Concepts:

- Insects hatch from eggs
- Live organisms need to be treated with care
- Needs of insects include air, food, and space and these are met in different ways for different insects
- Butterflies construct chrysalises when they pupate.
- Adult insects have common structures, including six legs and three body parts
- The life cycle of the butterfly is egg, larva, pupa, and adult which produce eggs.

Performance:

- .Observe the structure and behavior of the painted lady
- Observe complete metamorphosis in the butterfly and compare to other insects
- Observe the three parts of an insect
- Compare larval segments, legs and other structure of painted lady butterflies to other insects
- Provide for the needs of insects

New Vocabulary

Butterfly, caterpillar, chrysalis, nectar, painted lady, proboscis, pupate, waste

Language Development

Insect body parts

Extensions

(see website for extensions)

Assessments

Embedded Assessment
 • Science Notebook
 Benchmark Assessment
 • I-Check 5

Focus Questions

- What are the basic units of life and how are those units organized to form complex organisms?
- What makes up a human, and other complex organisms?
- What are the two major subdivisions of cells?
- What are the defining structures of cells?
- How are complex organisms organized from atoms to an organism?
- Why is the cell considered the basic unit of life?
- Why is life aquatic?

Teacher Preparation	Body of Evidence	Time Frame
-Prepare materials for the week. - Read “At A Glance” TE -Read “Teaching Children about Metamorphosis” - -Read <i>Getting Ready and Guiding the Investigation</i> -Watch Teacher Video Demo of Inv.5 - Review “Materials” -Administer and Record information from assessments	-Notebook Investigation Entry -Reading in Science Resource Cell: Basic Unit of Life pg 27 -Journal Entry -Student Observation/Anecdotal Notes -Homework (Suggestions) - Cross Curriculum Extensions - Rising Readorium • I-Check 5	3 sessions
Suggested Center Activities: Spelling City, Foss suggested websites, word wall activities, extensions, additional supporting Science Activities,		
On Going Project: Students work on a culminating project through-out the unit to be assessed at the end of unit.		

Body of Evidence

This guide is intended to support the collection of Body of Evidence Opportunities. A student's Body of Evidence should, at a minimum, include work from the listed prompts and in-class investigations that demonstrate a student's level of proficiency. Additionally, the FOSS pre-assessment given at the beginning of the unit, the I-Check Exams given after each investigation, and the end of unit exam should be included in the body of evidence.

Materials

The Foss kit comes with most of the supplies that are needed to teach the unit. Be aware that the classroom teacher or school site must supply a few items. These are indicated in the materials list for each part of the investigation with an asterisk (*). Here is a summary of those items.

DRAWER 1—PERMANENT EQUIPMENT

2 Basins, clear plastic, 6-liter 1 Bottle brush 4 Class calendars, laminated 50 Cups, plastic 36 Cup lids 1 Dowel with pointed end, 1 Forceps, plastic 32 Hand lenses, 3-power 1 Hole punch, 2 Paintbrushes, 24 Plastic bags

★ 1 Set of posters, insect life cycles, 18/set 20 Pushpins 72 Vials, 12-dr., with caps 1 Teacher Guide 1 Teacher Preparation Video

• FOSS Science Stories 1 big book and student books

DRAWER 1—CONSUMABLE EQUIPMENT 1 Bag of cotton balls, 100/bag 147 Labels, removable 1 Piece of netting 100 Rubber bands, #14 40 Zip bags, 4-liter

EQUIPMENT 📦 **CONDITION**

★ These items may need occasional replacement.

DRAWER 2—PERMANENT

EQUIPMENT 📦 **CONDITION** 1 Butterfly cage with vial holder 2 Cap and washer sets 8 Cardboard pieces

★ 1 Container, plastic, 4-liter, with lid 2 Jars, plastic, 2-liter, with lids 70 Paper plates

★ 1 Screen 4 Pieces of window screen 10 Pieces of tubing, flexible plastic, 12.5 cm 1 Syringe, 30-ml

DRAWER 2—CONSUMABLE EQUIPMENT

2 Bottles of glycerin, 118 ml/bottle (4 oz.) 2 Bags of coarse sand, 1 kg/bag 1 Vial of cricket seeds 1 Bag of potting soil, 2 kg/bag 1 Bag of sunflower seeds, shelled, 200 g/bag

Resources:

Writing Prompts:

1. Write a report about an insect.
 - describe the insect
 - explain its life cycle
 - describe what it needs to survive
 - tell if it is helpful or harmful and why
 - include an illustration or model of your insect
2. Explain the steps involved in making the milkweed bug's habitat. *Remember to use the signal words: first, next, then and finally in your explanation. Draw and label an illustration of your bug's habitat.

Quick Writes:

- | | |
|-------|--|
| 1 - 1 | Describe how your meal worm felt. |
| 1 - 2 | Explain the three parts of an insect. |
| 1 - 3 | Do you think we could get our meal worm to live forever? Explain why or why not. |
| 2 - 1 | Tell me how waxworms and mealworms are different. |
| 2 - 2 | Do you think a waxworm would make a good pet? Why or why not? |
| 2 - 3 | Predict what your waxworm will turn into. |
| 3 - 1 | Tell me what you think insects need to survive. |
| 3 - 2 | Compare the milkweed habitat to your home. |
| 3 - 3 | Explain why the milkweed bug is an incomplete metamorphosis. What is missing? |
| 5 - 1 | Tell me what you know about caterpillars. |
| 5 - 2 | Explain what is happening inside the chrysalis. |
| 5 - 3 | If I were a butterfly, I |
| 6 - 1 | Explain why some crickets chirp and others don't. Describe your favorite insect. |

Word Wall

abdomen	stage	immature	waste
adult	thorax	male	wing
beetle	bristle	mature	butterfly
culture	clasper	nymph	caterpillar
darkling beetle	cocoon	growth	chrysalis
dead	insect	hatch	mallow
dropping	moth	leg	nectar
head	proleg	living	proboscis
insect	stage	mating	silk
larva	antenna	metamorphosis	spinneret
life cycle	beak	mulberry	spiracle
living	behavior	pupate	egg
mealworm	bug	silkworm	female
molt	habitat	pupa	segment

Content Books-

- Foss Student Resource Book with Unit
- See Reading Extensions in TE
- Foss Reading Supplemental Books

Foss Website: www.fossweb.com (additional resources and web sites found there)

Spelling City: www.spellingcity.com

United streaming

<http://www.discoveryeducation.com/?ref=streaming&returnUrl=http%3A%2F%2Fstreaming%2Ediscoveryeducation%2Ecom%2Findex%2Ecfm>

BrainPop (see if your school has license for this) <http://www.brainpopjr.com/>