



USU 4-H Insect Tote



BIG IDEA:

Environments are made up of diverse populations of organisms.

UNDERSTANDINGS:

Focusing on small organisms, such as insects, help us to see interactions we may not otherwise observe.

ESSENTIAL QUESTIONS:

How does diversity help maintain a healthy environment?

How do small organisms, like insects, contribute to the environment as a whole?

THREE DIMENSIONS, UTAH SCIENCE STANDARDS, AND INTENDED LEARNING OUTCOMES:

See pg. 9-13

Supplies

- Paper*
- Pencils*

Insect Body Parts p. 2

- Large and Small Plastic Insects
- Insect X-rays and picture cards
- Colored paper*
- Glue or tape*
- Assortment of Craft Materials (optional)*

Observing Insects p. 4

- Insect Catcher Goblets
- Magnification Boxes
- Garden Insects Key Chains
- Butterfly net*
- Cameras (optional)*

Mealworm Habitats p. 6

- Mealworms (can be purchased at pet stores)*
- Clear plastic cups with a cover and air holes*
- Bran flakes or oatmeal*
- Pinecone or crumpled paper*
- Apple or potato pieces*

Secret Smells p. 7

- Film canisters (or other small, opaque containers)*
- Cotton balls with strong smelling materials*

Symmetrical Lady Bugs p. 8

- Lady bug boards and dots

*Not included in tote

**Activity 1: Insect Body Parts**

Time: 20 min

Grade Level: 2-5

Materials:

- Large and Small Plastic Insects
- Insect X-rays and picture cards
- Paper and Pencil
- Colored Paper
- Glue or tape
- Assortment of craft materials (optional)

To Do:

1. Begin by asking if students know the three main parts of an insect (head, thorax, and abdomen). Identify these body parts using the large and small plastic insects.
2. Distribute the insect X-rays and picture cards. Have students identify the three main body parts. Help students observe and work to identify other body parts (legs, wings, compound eyes, proboscis, antennae, etc.) Ask students to look for features that are common between different insects (make sure students discover or learn that the wings and legs always attach to the thorax, there are always six legs). What are features that made each insect unique?
3. Let students use colored paper and an assortment of materials to create an insect, focusing on the three body parts of an insect. Encourage students' creativity; keep in mind that the legs and wings always attach to the thorax.
4. Have students name their insects and create a habitat and diet specific to their insect. Let students share their creations with the class or in groups.

REFLECT:

- What are the parts an insect's body called?
- How is your insect like a real insect?
- People often call all insects bugs when in reality only some insects are bugs. What makes some insects bugs?

APPLY:

All adult insects have three body parts: head, thorax and abdomen. The wings and legs are always attached to the thorax. (Arthropods, which are not insects, have two body parts:



Insect Body Parts Continued

head and abdomen.) Insects always have six legs. (Spiders, ticks and other Arthropods have eight.)

The term bug only applies to a particular group of insects. Hemiptera are considered the true bugs. True bugs have a mouth like a straw called a stylet to suck plant juices or insects' or animals' blood. All the little creatures commonly called "bugs" are named and organized very particularly by taxonomists.

**Activity 2: Observing Insects**

Adapted from *Bugs! A Creepy Crawly Adventure* from Aggie Adventures.

Time: 15+ min

Grade Level: 2-5

Materials:

- Insect Catcher Goblets
- Magnification Boxes
- Garden Insects Key Chains
- Butterfly net
- Cameras (optional)
- Paper and Pencils

To Do:

1. For this activity you will need to choose a site for an insect observation outing. Consider doing your observations in a vegetable garden to better use the Garden Insects Key Chain. When you arrive at the site, give each student paper and a pencil. Distribute the containers, magnification boxes and cameras. Let the observations begin.
2. Have students record the date, time of day, and weather conditions on their paper and look for insects in the area. Look for them on the ground in grassy areas. Turn over any rocks or wood you find. Don't forget to look in the air. Insects are everywhere. Turn over leaves; look on tree bark and under rocks, logs, and decaying leaves. Any insect that flies into their area counts!
3. Students should try to determine the type of insects they are observing (e.g., beetle, ant, cricket, and caterpillar), and when the time is right they should choose an insect and draw or photograph it. Students should try to identify the insect using the Garden Insects Key Chains. When campers get back to the classroom, discuss what everyone found.
4. Consider compiling a class book of the pictures and drawings of the insects the students found. You may want to make copies for each student.

REFLECT:

- What insects did you find and draw/photograph?
- Where did you find the insects?



Observing Insects Continued

- Were there any areas that seemed to have more insects than others? Are there areas with fewer insects? Why do you think that is?
- What kinds of insects did everyone catch?
- Can you describe some of their differences and similarities?
- What kind of environment do you think these insects live in?

APPLY:

Many insects are considered pests by humans. Insects commonly regarded as pests include those that are parasitic (mosquitoes, lice, bed bugs), transmit diseases (mosquitoes, flies), damage structures (termites), or destroy agricultural goods (locusts, weevils).

Despite the large amount of effort focused at controlling insects, human attempts to kill pests with insecticides can backfire. If used carelessly the poison can kill all kinds of organisms in the area, including insects' natural predators such as birds, mice, and other insectivores.

Although pest insects attract the most attention, many insects are beneficial to the environment and to humans. Some insects, like wasps, bees, butterflies, and ants, pollinate flowering plants.



Activity 3: Mealworm Habitats

Adapted from *Bugs! A Creepy Crawly Adventure* from Aggie Adventures.

Time: 15 min

Grade Level: 4-5

Materials:

- Mealworms (can be purchase at pet stores)
- Clear plastic cups with a cover and air holes
- Bran flakes or oatmeal
- Pinecone or crumpled paper
- Apple or potato pieces

To Do:

1. Start with a clear plastic cup with a cover, $\frac{1}{8}$ " bran flakes in bottom of container and a crumpled piece of paper, pinecone and a piece of apple or potato (which must be replaced before it becomes moldy). Mealworms do not need water. They will obtain all of the water they need from the piece of potato or apple. However, remember to change your apple slice every few days.
2. To pick up a mealworm (mealworms will not bite), use a plastic spoon to scoop it up. If you choose to pick it up with your fingers, use your thumb and forefinger on either side of the worm and gently squeeze. They may squirm and wiggle their abdomens.
3. When holding mealworms, keep your hand over the container or table to avoid dropping the mealworm on the floor.

REFLECT:

- What exactly is a mealworm?
- How are mealworms born and who eats them?
- Where does your mealworm like to stay? Does it like dry or wet? Light or dark?

APPLY:

A mealworm is the larval stage of a black beetle. Mealworms are like most insects, and they hatch from eggs. The adult female mealworm lays about 275 eggs, which hatch in one to two weeks. During the larva stage, mealworms will undergo repeated molting between bouts of eating various vegetation or dead insects. This takes place 9-20 times as it gets too big for its current exoskeleton. During its last molt, it loses its carapace before curling into its pupae form. Mealworms can live for over two years. They spend either one or two years as larvae and then turn into beetles. Many predators eat mealworms including rodents, lizards, beetles, spiders, and birds.

**Activity 4: Secret Smells**

Time: 20 min

Grade Level: 3-5

Materials:

- Film canisters (or other small container)
- Cotton balls with strong smelling materials
 - Ex: vinegar, olive oil, garlic, vanilla extract, perfume, citrus juice, pickle juice, menthol, root beer, peanut butter, scented soap/lotion, chocolate, mouthwash

To Do:

1. Prepare film canisters with scented cotton balls. Prepare at least two containers of each smell as students will use those smells them to find a partner/group.
2. Introduce the students to the idea of insects using smell to communicate. Ask if they have ever seen a swarm of ants around a piece of food? How did they know it was there? How did the ant who found it tell all its friends? Though insects cannot talk, they do communicate. One way they do so is through their sense of smell.
3. Distribute the scented cotton balls randomly to every student. Tell your students that they are going to be insects and that one other person has the same scent as they do and the object of the activity is to find that person using only their sense of smell.
4. No talking is allowed. Ask campers to take one film canister, and lift the lid just long enough to smell the scent. Then ask them to go from person to person, sniffing containers, to try to identify the student who has the scent that matches their own.
5. If weather permits, conduct the activity outside to make it more challenging.

REFLECT:

- Was it easy to find your partner?
- How confident were you that you'd found your partner?
- Were there any distractions or barriers to the "communication" process?

APPLY:

There are still many things entomologists (scientists who study insects) do not know about insects, like how they communicate, but have learned a lot through observation. Insects communicate by touch, smell, sound, and sight. They primarily communicate with members of the same species; they use different signals to find mates, give warnings about danger, and tell about food sources. They also use signals to ward off predators or attract prey.



Additional Activities

- Play the Inflatable Bug Catch Game
- Play Bug Bingo
- Read *Take a Walk with Butterflies and Dragonflies*
- Make and Ant farm using the Ant Farm Instructions
- Learn about butterflies and moths using the field guide
- Try to navigate a room or obstacle course using the red bug eyes
- Make temporary kaleidoscopes out of materials you find on you insect hunt.
- Use the bumble bee and lady bug stuffed animals to review what has been learned.
Have questioner pass the bumble bee to whoever they want to ask the next question and have answerers pass the lady bug to who they want to answer next.

Contents of Insect Tote

Contents of Insect Tote

- Bumble Bee and Lady Bug Stuffed Animals
- Large Plastic Bugs (4)
- Small Plastic Bugs (28)
- Bug Catcher Goblets (one is missing the rounded, see through cap)
- Garden Insects Key Chain (5)
- Bug Eyes? (red cylinder with 2 clear attachments) (4)
- Bug Catch Game
- Insect X-rays and picture cards
- Butterflies and Moths Field Guide (5)
- Clear Magnification Boxes (10)
- Kaleidoscope with a Container (2)
- Bug Bingo Boxes (4)
- Take a Walk with Butterflies & Dragonflies
- Ant Farm Instructions



Three Dimensions, Utah Science Standards, and Intended Learning Outcomes

Note: These applications of National and State Science Standards are not comprehensive. They are meant to serve as suggestions. While only standards for elementary levels have been listed, standards for more advanced grade levels can also be applied. Additionally, this tote is an excellent tool to facilitate inquiry for any age group.

THREE DIMENSIONS

K-LS1-1. Interdependent Relationships in Ecosystems: Animals, Plants, and their Environment (Activity 1: Insect Body Parts, Activity 2: Observing Insects, Activity 3: Mealworm Habitats)

Use observations to describe patterns of what plants and animals (including humans) need to survive.

Science and Engineering Practices:

- Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions.
- Scientists look for patterns and order when making observations about the world.

Disciplinary Core Ideas:

- All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow.

Crosscutting Concepts:

- Patterns in the natural and human designed world can be observed and used as evidence.

K-ESS3-1. Interdependent Relationships in Ecosystems: Animals, Plants, and their Environment (Activity 2: Observing Insects, Activity 3: Mealworm Habitat)

Use a model to represent the relationship between the needs of different plants and animals (including Humans) and the places they live.

Science and Engineering Practices:

- Use a model to represent relationships in the natural world.

Disciplinary Core Ideas:

- Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do.

Crosscutting Concepts:

- Systems in the natural and designed world have parts that work together.

K-ESS2-2 Interdependent Relationships in Ecosystems: Animals, Plants, and their Environment



(Activity 1: Observing Insects, Activity 3: Mealworm Habitat)

Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.

Science and Engineering Practices:

- Construct an argument with evidence to support a claim.

Disciplinary Core Ideas:

- Plants and animals can change their environment.

Crosscutting Concepts:

- Systems in the natural and designed world have parts that work together.

1-LS3-1 Structure, Function, and Information Processing (Activity 1: Insect Body Parts)

Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.

Science and Engineering Practices:

- Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena.

Disciplinary Core Ideas:

- Young animals are very much, but not exactly like, their parents. Plants also are very much, but not exactly, like their parents.
- Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways.

Crosscutting Concepts:

- Patterns in the natural and human designed world can be observed, use to describe phenomena, and used as evidence.

2-LS4-1 Interdependent Relationships in Ecosystems (Activity 1: Insect Body Parts, Activity 2: Insect Observation, Activity 3: Mealworm Habitat)

Make observations of plants and animals to compare the diversity of life in different habitats.

Science and Engineering Practices:

- Make observations (firsthand or from media) to collect data which can be used to make comparisons.
- Scientists look for patterns and order when making observations about the world.

Disciplinary Core Ideas:

- There are many different kinds of living things in any area, and they exist in different places on land and in water.

3-LS4-3 Interdependent Relationships in Ecosystems: Environmental Impacts on Organisms (Activity 4: Secret Smells)

Construct and argument with evidence that in a particular habitat some organisms can



survive will, some survive less well, and some cannot survive at all.

Science and Engineering Practices:

- Construct and argument with evidence.

Disciplinary Core Ideas:

- For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all.

Crosscutting Concepts:

- Cause and effect relationships are routinely identified and used to explain change.

3-LS4-2 Inheritance and Variation of Traits: Life Cycles and Traits (Activity 1: Insect Body Parts, Activity 4: Secret Smells)

Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding, mates, and reproducing.

Science and Engineering Practices:

- Use evidence (e.g., observations, patterns) to construct an explanation.

Disciplinary Core Ideas:

- Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing.

Crosscutting Concepts:

- Cause and effect relationships are routinely identified and used to explain change.

4-LS1-1 Structure, Function, and Information Processing (Activity 1: Insect Body Parts, Activity 4: Secret Smells)

Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

Science and Engineering Practices:

- Construct an argument with evidence, data, and/or a model.

Disciplinary Core Ideas:

- Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.

Crosscutting Concepts:

- A system can be described in terms of its components and their interactions.

4-LS1-2 Structure, Function, and Information Processing (Activity 4: Secret Smells)

Use a model to describe that animals receive different types of information through their senses. Process the information in their brain, and respond to the information in different ways.

Science and Engineering Practices:



- Use a model to test interactions concerning the functioning of a natural system.

Disciplinary Core Ideas:

- Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions.

Crosscutting Concepts:

- A system can be described in terms of its components and their interactions.

UTAH SCIENCE STANDARDS**K-Grade 2**

Standard 1 (Activity 1: Insect Body Parts, Activity 2: Insect Observation, Activity 3: Mealworm Habitat, Activity 4: Secret Smells):

- The Processes of Science, Communication of Science, and the Nature of Science. Students will be able to apply scientific processes, communicate scientific ideas effectively, and understand the nature of science.

Standard 4 (Activity 1: Insect Body Parts, Activity 2: Insect Observation, Activity 3: Mealworm Habitat, Activity 4: Secret Smells):

- Life Science. Students will gain an understanding of Life Science through the study of changes in organisms over time and the nature of living things.

Grade 3

Standard 2 (Activity 1: Insect Body Parts, Activity 2: Insect Observation, Activity 3: Mealworm Habitat):

- Students will understand that organisms depend on living and nonliving things within their environment.

Grade 4

Standard 5 (Activity 2: Insect Observation):

- Students will understand the physical characteristics of Utah's wetlands, forests, and deserts and identify common organisms for each environment.

Grade 5

Standard 5 (Activity 1: Insect Body Parts, Activity 4: Secret Smells):

- Students will understand that traits are passed from the parent organisms to their offspring, and that sometimes the offspring may possess variations of these traits that may help or hinder survival in a given environment.



INTENDED LEARNING OUTCOMES (ILO'S):

1. Use science process and thinking skills.
2. Manifest science interests and attitudes.
3. Understand important science concepts and principles.
4. Communicate effectively using science language and reasoning.
5. Demonstrate awareness of the social and historical aspects of science.
6. Understand the nature of science.