Course	Agricultural Science II
Unit	Entomology
Lesson	Insect Collection
Estimated Time	Four 50-minute blocks

Student Outcome

Prepare an insect collection.

Learning Objectives

1. Describe how insects are collected.
2. Describe how insects are preserved.
3. Describe how insects are labeled.
4. Describe how insects are pinned.
5. Determine how the wings of butterflies and moths are spread.
6. Describe how insect collections are arranged.

Grade Level Expectations

Resources, Supplies & Equipment, and Supplemental Information

Resources

1. PowerPoint Slides
   - PPt 1 – Location of Insects
   - PPt 2 – Killing Jar
   - PPt 3 – Mounted Insect and Label Placement
   - PPt 4 – Pin Placement for Different Insects
   - PPt 5 – Pinning Blocks
   - PPt 6 – Spreading Board
   - PPt 7 – Spreading an Insect
2. Activity Sheets
   - AS 1 – Making a Killing Jar
   - AS 2 – Labeling Insects
   - AS 3 – Spreading the Wings of Butterflies and Moths
   - AS 4 – Making an Insect Collection
3. *Entomology* (Student Reference). University of Missouri-Columbia: Instructional Materials Laboratory, 1991.
4. *Entomology Curriculum Enhancement.* University of Missouri-Columbia: Instructional Materials Laboratory, 2003.

Supplies & Equipment

- ❑ A pre-made or commercial insect collection or pictures
- ❑ A piece of wood damaged by termites, grain or flour damaged by weevils, bees or flies in a jar or an ant farm, or pictures of damage or diseases caused by or carried by insects
- ❑ Samples of insect pins, preservation jars filled with alcohol, or envelopes
- ❑ Rubber insect or a real one to demonstrate pinning
- ❑ See AS 1 through AS 4 for materials and equipment needed to complete the activity sheets.

Supplemental Information

1. Internet Sites
   - ❑ Collecting Insects. Department of Entomology, University of Nebraska-Lincoln. Accessed June 10, 2008, from http://entomology.unl.edu/tmh/ent115/labs/collecting.htm.
   - ❑ Insects and Diseases Publications. University of Missouri Extension. Accessed June 10, 2008, from http://extension.missouri.edu/explore/agguides/pests/.

Interest Approach

Ask students where they think insects can be found: homes, lawn, garden, woods, water, and urban areas. Using PPt 1, Location of Insects, ask students to name insects they could find in the given areas in the picture. Examples include: tomato worms and corn bores in garden, grubs in lawn and garden, fleas on the dog, and mosquitoes in water.

Have a pre-made or commercial insect collection displayed as an example. If this isn't possible, examples of collections can be illustrated through pictures.

Display visual aids such as: a piece of wood damaged by termites; grain or flour damaged by weevils; bees or flies in a jar or an ant farm; or pictures of damage or diseases caused by or carried by insects.

Communicate the Learning Objectives

1. Describe how insects are collected.
2. Describe how insects are preserved.
3. Describe how insects are labeled.
4. Describe how insects are pinned.
5. Determine how the wings of butterflies and moths are spread.
6. Describe how insect collections are arranged.

Instructor Directions	Content Outline
Objective 1 *Discuss with students the different places where insects can be found. Remind students that many people are afraid of insects. Stress that most insects are not dangerous. Tell them that it is very common to be apprehensive about insects until you become more familiar with them and the ways to handle them. Use PPt 2 to illustrate a killing jar. Have students make a killing jar using AS 1.* ☐ PPt 2 – Killing Jar AS 1 – Making a Killing Jar	**Describe how insects are collected.** 1. Prepare a killing jar 2. Locate insects 3. Catch insects a. Bare hands b. A net c. Boxes, jars, or envelopes 4. Place insects in a killing jar

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Objective 2 *Discuss the procedures for preserving insects. Samples of insect pins, preservation jars filled with alcohol, or envelopes can be used as visual aids.*	**Describe how insects are preserved.** 1. Pinning – This is the most common method used for most insects. 2. Liquid – Liquid is used for soft-bodied insects that shrivel when dried. 3. Envelopes – Envelopes can be used for slender and fragile insects such as dragonflies.
Objective 3 *Discuss the procedures for labeling insects. Point out what information must appear on the labels and what information is extra. Refer to PPt 3. Have students complete AS 2.* ☐ PPt 3 – Mounted Insect and Label Placement AS 2 – Labeling Insects	**Describe how insects are labeled.** 1. Locality and ecological labels – made of stiff white paper about 1/4 by 3/4 inches a. All insects collected **must** have a locality label that contains the date and place where the insect was caught. The name of the collector may be included on the locality label. b. Information about the insect's environment and habitat may be on a second label called an ecological label. c. Labels and insects are mounted on the pin at the correct heights – Insect – 1-inch mark – Locality label – 5/8-inch mark – Ecological label – 3/8-inch mark d. They should be positioned parallel with the body of the insect or point e. Labels can be read from either the right or left so long as all labels are read in the same direction. 2. Identification labels – 1 square inch in size a. Are placed directly in an insect collection b. Identify groups of insects by order or identify each specimen when insects are arranged and labeled by species c. Are placed alongside a group or at the base of an individual insect pin d. Contain the order of the group of insects or the scientific name of the insect, the name of the collector, and the date of capture 3. Slide label – used for insects mounted on sides.

Instructor Directions	Content Outline

Objective 4
 	
Discuss the procedures for pinning insects. Pinning is a way to mount and preserve insects indefinitely. The actual pinning of an insect can be demonstrated for the students. A rubber insect can be used and re-used, if a real one is not desired. Students might practice some pinning in class. Refer to PPt 4 for pin placement and PPt 5 for pinning blocks. PPt 3 can be used to point out insect and label placement on pins.
 	
☐ PPt 3 – Mounted Insect and Label Placement
 	
☐ PPt 4 – Pin Placement for Different Insects
 	
☐ PPt 5 – Pinning Blocks
	Describe how insects are pinned.
	
	1. Pinning should be done as soon as insects are collected.
	2. The insect is held between the thumb and forefinger of one hand while the pin is inserted with the other hand.
	3. Insects are pinned in particular places depending on the type of insect.
	4. Insects and labels are mounted on the pin at certain heights: 1, 5/8, and 3/8 inches. A pinning block can be used to make mounting easier.
	5. Small insects are mounted on a point.
	   a. Points are small, triangular pieces of cardboard mounted on the pin.
	   b. The insect is glued to the extended point of the triangle.
	   c. Insects are attached with glue or household cement.

Objective 5 *Discuss the procedures for spreading the wings of butterflies and moths. To illustrate the spreading technique, use the butterfly provided at the end of this lesson to make a model out of stiff paper or cardboard. The paper wings can be spread into the proper positions as the students watch. Students can practice with the model later. The use of a spreading board can be demonstrated if one is available. Refer to PPt 6 and PPt 7. Have students complete AS 3.* ☐ PPt 6 – Spreading Board ☐ PPt 7 – Spreading an Insect	**Determine how the wings of butterflies and moths are spread.** The steps for spreading the wings of a butterfly or moth on a spreading board are given below. If a spreading board is not available, turn the insect upside-down to spread the wings on a flat surface. 1. Hold the specimen by grasping it by the thorax, the middle section of the insect. Holding it right side up, insert a pin through the middle of the thorax. Move it to the 1–inch position on the pin. The pinned specimen is then lowered onto the spreading board. The pin should go into, and maybe even through, the bottom of the groove. Push the pin through the board until the underside of the wings is even with the top piece of the spreading board. Pin narrow strips of paper over the wings on each side. 2. Remove the pin on one side at the lower end of the strip of paper. Raise the front wing until the rear edge is at a right angle to the body. Forceps, a pin, or some

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AS 3 – Spreading the Wings of Butterflies and Moths	other tool may be helpful in doing this. Be careful not to tear or puncture the wing. When the wing is in place, insert a pin through the strip of paper just in front of the tip of the wing. Pin the lower edge of the paper strip back into place. 3. Repeat this procedure with the other front wing. 4. Use forceps, a pin, or some other tool to raise the hind wing on one side until the space between the two wings is reduced. The front and hind wings of these insects will overlap at the base with the front edge of the hind wing under the rear edge of the front wing. Move the pin in the lower part of the paper strip until it is just below the tip of the hind wing. 5. Repeat this procedure with the hind wing on the other side. 6. Now, position the antennae so that they appear balanced. Put pins alongside the antennae to hold them in place. 7. Fasten the legs close to the body at right angles to the body. This is done by placing a strip of paper across the entire body. 8. The insect is left in position until it is dry. This will depend on the size of the insect, the temperature, and the humidity.
Objective 6 *Discuss the procedures for arranging insect collections. An insect collection that is already made can be displayed for the students, if one is available. Have students complete AS 4.* AS 4 – Making an Insect Collection	**Describe how insect collections are arranged.** There is no exact way to organize an insect collection. The way the insects are arranged will depend on the size of the collection, the types of insects collected, and the preference of the individual. However it is done, the collection should be neat and orderly and the insects easily seen. Insect collections are arranged in display boxes for study and storage. There are several kinds of display containers. 1. Mounting a. The most common type used. b. Made of wood or heavy cardboard. c. Measure about 9 x 12 x 3 inches and have a tight-fitting lid. d. The bottom is lined with a soft and sturdy material (usually sheet cork, balsa wood, Styrofoam, or corrugated cardboard).

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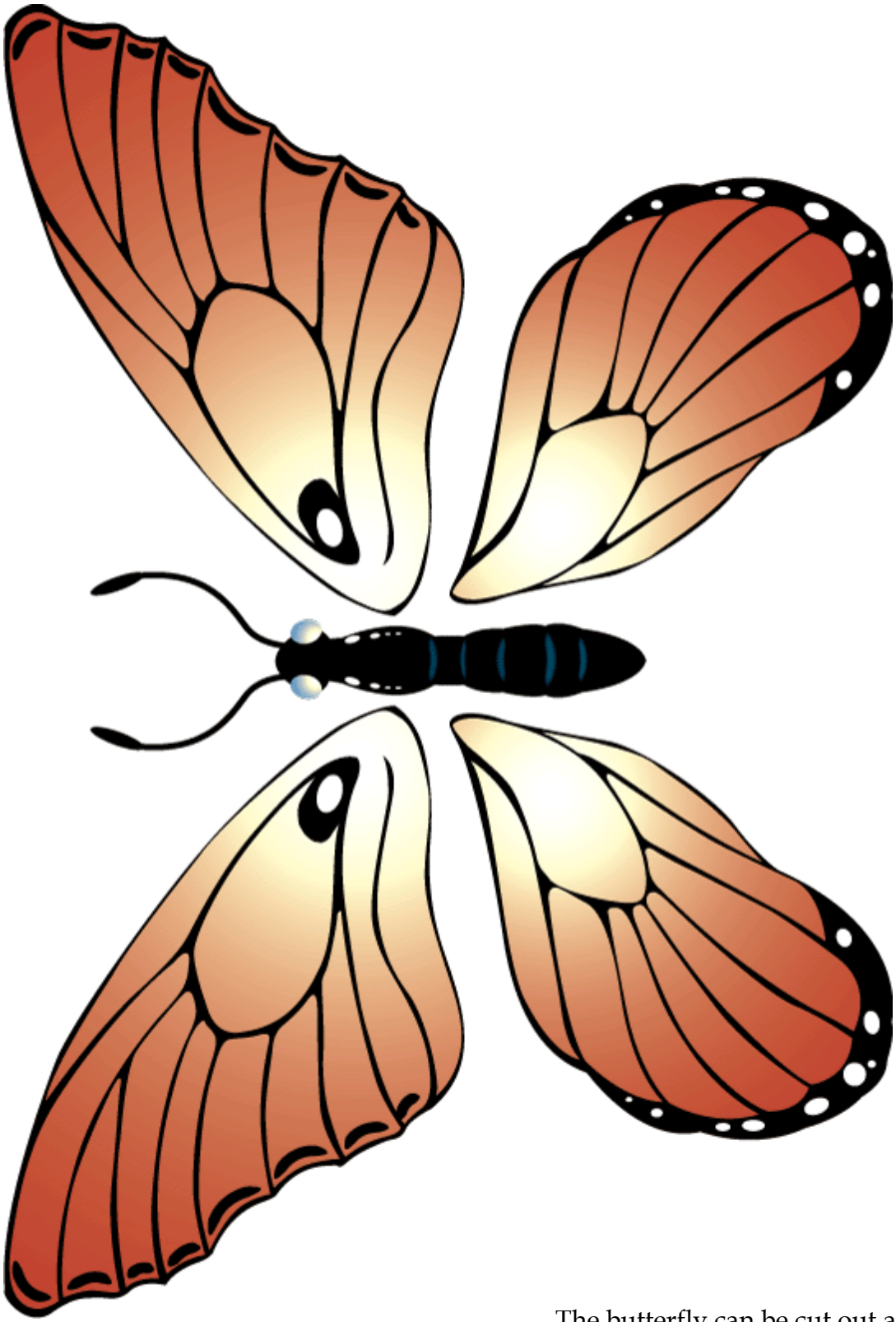
	2. Riker mount a. A box with a single glass top. b. Filled with cotton. c. Insects are seen easily. d. Mounts can be handled without damaging the specimens e. Only one side of the insect can be seen. f. Some insects tend to fade after extended exposure to the light. 3. Glass mounts a. A box with glass sides on the top and the bottom. b. Similar in material and size to the Riker mount. c. Contains no cotton. d. Both sides of the insect can be seen. e. Each glass mount contains only a few insects. 4. Plastic mounts a. Consist of two sheets of thick plastic. b. The insect in mounted between them. c. The edges are sealed with acetone or tape. d. Another method is to embed insects in a block of plastic. e. The process is very involved but the result is attractive and very durable. 4. Slide mounts a. Slide mounts allow insects or parts of insects to be studied in detail. b. Dark-colored samples are treated before mounting in order to be seen better. c. Various chemicals are used on the samples before mounting and viewing. Note: Insect collections may be attacked and damaged by beetles and other pests. Special repellents, which are placed in a small pillbox or on a piece of cloth, should be put in the corner of the display box or underneath the cotton in Riker mounts.
Application	Other activities: 1. Have a contest featuring the best insects collected in each of several categories (possibly by class vote). Some suggestions are the biggest, the smallest, the most colorful, the ugliest, the prettiest, the rarest, and the best mounted. These can be exhibited with a

Instructor Directions	Content Outline
	description label as a display for the class or school. Bonus points may be offered. 2. A covered terrarium can be set up at the beginning of the unit. It could contain a piece of wood and some termites, an ant farm, or a bee colony. Observe the insects throughout the Entomology course.
Closure/Summary	Insects can be found almost anywhere. Species are best identified by the use of keys or guides. Preparing an insect collection is a good way to study insects and learn about their environment.
Evaluation: Quiz	Answers: 1. b 2. b 3. d 4. c 5. c 6. a 7. d 8. c 9. A "point" is a small triangular piece of paper used for mounting small insects.



The butterfly can be cut out and used as a model for spreading wings.