Investigating Insects

LEVEL: Grades 3-12
SUBJECTS: Science, Language Arts
SKILLS: Collaborating, comparing similarities and differences, comprehending, describing, developing vocabulary, discussing, drawing, evaluating, identifying, locating, matching, observing, recording

MATERIALS

Clipboards or cardboard for students to write on; hand lenses or magnifying glasses; a small envelope for each small group; transparency of the ***Parts of an Insect*** sheet located in the Appendixes; photocopies of the attached ***Insect Observation***, ***Insect Facts***, ***Insect Game Cards***, and ***Insect Game - Insect Clues*** sheets. **Optional**: pictures of insects, insect interaction, and insect damage from books, magazines, universities, the Internet.

VOCABULARY

abdomen, antennae, bug, camouflage, class, compound eye, entomologist, insect, larvae, leg, order, parasite, phylum, predator, prey, simple eye, thorax

RELATED LESSONS

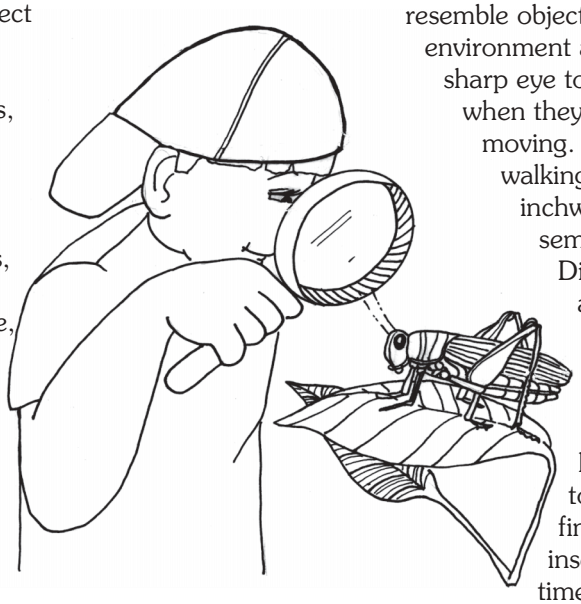
Managing Pests
Buzzy, Buzzy Bee

SUPPORTING INFORMATION

About 1 million insects have been classified by entomologists (people who study insects). Every year 7,000 to 10,000 new species of insects are discovered. Insects can be found almost everywhere. Stop and watch an insect for awhile, observe it, and learn about some of its habits or behaviors. You may find them fascinating and amazing little animals. Did you know that some insects taste with their feet? Or that some have "ears" on their legs or the sides of their bodies? Or that a flea can jump about 13 inches (33 centimeters [cm]).

Looking for Insects

Finding insects can be a challenge at times. Many insects are colored to blend with their background. For example, many moths are colored like the bark of trees and many beetles, flies, and bees are colored like the flowers they visit. Most beetles that live in the ground are black or brown. This coloring protects them from their enemies. Some insects resemble objects in their environment and it takes a sharp eye to detect them when they are not moving. For example, walking sticks and inchworms resemble twigs. Different insects are active during different times of the year. If you know where to look you can find some insects at any time of the year.



Insects can be found indoors on ceilings, pets, plants, infesting food, clothing, and other materials and in corners that are difficult to reach. Insects can be found in a variety of places outdoors. An obvious place to look is on plants. Different insects may be found on different parts of the plant. Insects also can be found in concealed places such as under stones or other objects, in leaf litter or other debris, under the bark of trees, and in dead logs. They also can be found in the ground and water, and around porch lights.

BRIEF DESCRIPTION

Students become entomologists by observing insects in their nearby surroundings. After observing and analyzing, they learn by playing a game how some insect interactions can be useful to people.

OBJECTIVES

The student will:
- distinguish between insects and noninsects and explain the reasons;
- observe and record at least five behaviors of insects;
- identify five beneficial insects; and
- describe one way each of these insects are helpful to people.

ESTIMATED TEACHING TIME

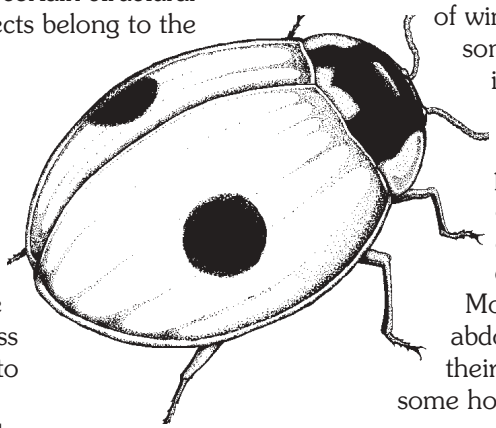
Three sessions: 40 minutes each. (Note: In most locations, this activity works best in the late spring, summer or early fall when insects are abundant.)

Close observation of insects will reveal the display of a variety of behaviors. Typical behaviors include eating, sleeping, building a home, resting, mating, flying, drinking, hiding, caring for their young, communicating, and escaping from predators. Some insects may appear to be dead when they could be playing dead to protect themselves from a predator. Some beetles fold up their legs, fall to the ground, and remain motionless.

Scientific Classification

Most people probably do not think of insects as animals. One system groups living things into five main categories called "kingdoms." (Classification of systems is still under discussion.) Insects are included in the animal kingdom. No one knows for sure how many kinds of animals there are in the world today. Scientists have classified and named about 1.5 million kinds of animals. Because there are so many, the animal kingdom is divided into major groups called "phyla" (singular, phylum). Each phylum has a name and the members of each phylum have certain structural characteristics in common. Insects belong to the phylum *Arthropoda*.

Each phylum is further subdivided into groups called "classes." Similar to phylum, each class has a name and the members of each class have certain structural characteristics in common. The subdividing continues. Each class is divided into orders, orders into families, families into genera (singular, genus), and genera into species.



Insects

Insects belong to the class *Insecta*. Their distinguishing characteristics include a segmented body that is more or less elongated, one pair of antennae (singular, antenna), three pairs of legs, one or two pairs of wings, and a hardened body wall. The body wall serves as a shell to protect the insect's internal organs and acts as a skeleton (called exoskeleton). The segmented body has three distinct body regions: head, thorax and abdomen (see the ***Parts of an Insect*** sheet).

The head includes the eyes, antennae and mouth parts. Insects generally have two kinds of eyes: simple (called ocelli) and compound. Most insects have three simple eyes located on the upper front part of the head. Some insects have only two simple eyes and some have none. A pair of compound eyes are located on the sides of the head (dorsolaterally). These eyes are often very large and occupy most of the head. The antennae (one pair) are located on the front of the head below the simple eyes. Antennae function as sensors for feeling, smelling and, in some cases, hearing or tasting. They vary greatly in form and in the number of segments and are often used to distinguish different insect groups. The mouth parts are located toward the front part of the head and vary considerably in different insect groups. Mouth parts usually include an upper and lower lip, pairs of jawlike mandibles and maxillae, and a tonguelike structure. The kind of mouth parts an insect has determines how it feeds (sucking or chewing).

The middle section of the insect is called the thorax. It is divided into three segments: prothorax, mesothorax, and metathorax. Each segment typically has one pair of legs on each side of the body. Each leg has five or more segments with movable joints between the segments. Legs are often used in identification because they vary considerably in size and shape in different insects. The mesothorax and the metathorax usually have a pair of wings. Some insects have only one pair of wings (generally on the mesothorax) and some are wingless. Insects are the only invertebrates (no backbone) with wings. Wings vary in size, shape, texture, veins (thickened lines in wings), and position held at rest. Most insect wings are very thin (like cellophane), but some are thick or leathery. Many wings are covered with hair and some have scales. Most insects fold their wings back over their abdomen when they are at rest. Some hold their wings vertically above their body and some hold them outstretched.

The abdomen is the last segment of the insect body and consists of 10 or 11 parts. Many insects have a pair of feelers, called "cerci," on the last part of the abdomen. Many insects have less than 10 parts because some are fused together.

Most insects are relatively small. They range in length from 0.01 to 13 inches (0.03 to 33 cm). About 75 to 90 percent are less than one-quarter inch (0.64 cm) in length. The wingspread varies from 0.02 inches to nearly one foot (0.05 to 30.5 cm). Some of the largest insects are very slender and some beetles have a body that is nearly as large as a man's fist.

Noninsects

Also included in the phylum *Arthropoda*, but in different classes, are crustaceans (shrimp, crabs, crayfish, and others), centipedes, millipedes, spiders, scorpions, mites, and many other animals. Although most people probably call these animals insects (except possibly for the crustaceans), they are not insects.

There are two other phyla closely related to the *Arthropoda*. Phylum *Annelida* includes earthworms, marine worms and leeches. *Annelida* do not have segmented appendages or a hard exoskeleton. Phylum *Onychophora* (On-y-cho-phor-a) is sometimes called the missing link between *Annelida* and *Arthropoda* because the animals in this phylum are similar to both. They resemble annelids because they are wormlike or sluglike; they resemble arthropods, with their segmented antennae and hard exoskeleton (as well as internal similarities not discussed in this lesson). Onychophorans live in moist environments and are only found in the Southern Hemisphere.

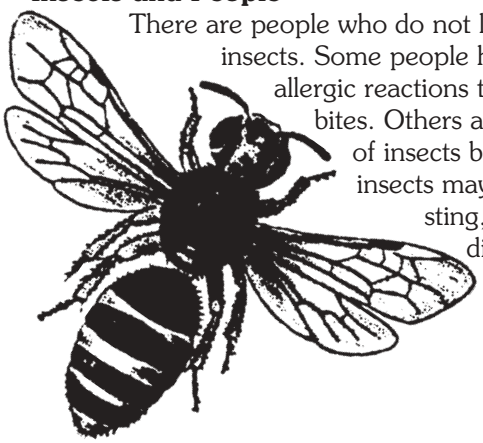
How can you tell if something that creeps, crawls and/or flies is an insect? If the animal is an invertebrate (no backbone) and it has wings, it is an insect. Insects are the only invertebrates with wings. If it does not have wings, the easiest body parts to look for (without using a microscope) are the legs (three pair), the segmented body (three parts), and the antennae (one pair). For example, these are not insects:

- Millipedes and centipedes are elongated, wormlike animals. Most millipedes have 30 or more pairs of legs and centipedes have 15 or more pairs of legs. The distinguishing feature is the number of legs.

- Scorpions have a long segmented tail and four pair of legs. Some scorpions are tailless. The distinguishing feature is the number of legs.

- Spiders have only two body regions, cephalothorax and abdomen. The mouthparts, eyes and four pair of legs are located on the cephalothorax. They have eight simple eyes. The abdomen is unsegmented. Spiders do not have wings. The distinquishing features are number of body regions and legs, kind of eyes, and unsegmented abdomen.

Insects and People



There are people who do not like insects. Some people have allergic reactions to insect bites. Others are afraid of insects because insects may bite, sting, carry diseases to people and other animals, or be destructive. Different insects may attack plants by feeding on them, thereby injuring, introducing disease, and/or killing the plant. Insects may attack people's possessions including home, food and clothing, resulting in damage, destruction or contamination of them.

Only a small fraction of insects are harmful. The vast majority are either benign or beneficial to people. Many insects are essential to the pollination of plants, including orchard trees, vegetables and other crops (see the FLP lesson "Buzzy, Buzzy Bee"). Some insects provide products of commercial value (e.g., honey, beeswax, silk, shellac, dyes, and more). Insects are an important food source for birds, fish and other animals. In Africa, some people roast and eat termites. There are stores in the United States that sell chocolate-covered bees and ants and fried caterpillars and grasshoppers. Parasitic and predaceous insects help keep noxious species under control. Some insects are used to treat diseases and some are used in studies of heredity, evolution, stream pollution, and other biological problems. Some insects are scavengers and feed on decomposing plants and animals. They convert the plants and animals into simpler substances, returning valuable nutrients to the soil for plant growth. Some insects spend part or all of their lives in the soil. Tunneling by insects aerates (adds oxygen) the soil. The soil's organic content is enriched by the excrement and decay of dead insects.

Insect Control

When insects interfere with human activity, people consider them a pest. A variety of methods are available to control insect pests. The methods can be categorized as pest prevention, nonchemical pest control, and chemical pesticide control. It is less expensive to prevent pests than it is to control them.

Like people, insects need food, water, air and shelter to live. Indoor and outdoor pest prevention involves removing these survival elements. There are a number of pest prevention actions, including caulking cracks, installing screens on windows and doors, and bathing pets regularly to keep insects out of the house; removing piles of newspapers, garbage, wood, or other debris where insects may hide; sweeping away standing puddles of water as a breeding place for insects; destroying diseased vegetation, both indoors and outdoors; buying only healthy indoor and outdoor plants; and more. By taking the time and making the effort to prevent pests, you can minimize pest problems and the need for pest control.

When most insects become a problem the first and most important step is to determine the pest problem. Once the problem is identified, the next step is to determine how much control is necessary and to know what control options are available. Many pests can be and are controlled without risking the health of people, domestic animals, and wildlife and without harming the environment.

Some insects that become pests can be controlled using methods that do not contain chemical pesticides. This is called nonchemical pest control. Many nonchemical methods are generally thought to pose little or no hazards to people, domestic animals, wildlife, or the environment. There are numerous nonchemical methods varying from the simple fly swatter to the use of a pest's natural enemies. The use of natural enemies - parasites, predators or disease-causing organisms - to control pests is called biological control. Some scientists collect predatory and parasitic insects, termed beneficial insects, and raise them in laboratories. When pest insects are present, the beneficial insects are released into gardens and fields after careful examination to ensure that they do not create their own problem.

Some rather unusual places use beneficial and predatory insects. The Tropical Discovery Rainforest Exhibit at the Denver Zoo uses predatory insects and mites in their Integrated Pest Management program to control pest insects and mites. (This is a controlled environment and may not be representative of agricultural practice in the outside world.) Typical releases include:

- Cryptolaemus Beetle (to control mealy bugs and scale insects - typical release = 500);
- predatory mites (to control spider mites - typical release = 10,000);
- parasitic wasps (to control aphids - typical release = 2,000);
- predatory mites (to control thrips - typical release = 40,000);
- parasitic wasps (to control greenhouse whiteflies - typical release = 2,500);
- Green Lacewing in its egg and larvae stage (to control aphids, whiteflies, spider mites, mealy bugs, thrips, soft scale insects, caterpillar species, and more - typical release = 5 units of larvae and 20,000 eggs); and
- predatory wasps (to control Oleander Scale - typical release = 20,000).

It is sometimes necessary to use chemical pesticides to control insect infestations to protect the world's food supply. The most widely used chemical pesticides are the man-made, carbon-based compounds called synthetic pesticides. They have very specific uses and are applied to control unwanted pests such as insects, plants and plant diseases. Before applying pesticides, users must make a careful choice of product, know correct dosage and method of application, and ensure careful disposal of containers and unused contents. For more detailed information about pest control see the FLP lesson "Managing Pests."

Like people, insects come in a variety of shapes and sizes. By looking beyond the fear or dislike of insects, students will be able to see the beauty, uniqueness and importance of insects.

GETTING STARTED

Make a transparency of the ***Parts of an Insect*** sheet. Photocopy the ***Insect Observation*** sheet for individual or pairs of students. Photocopy ***Insect Facts***, ***Insect Game Cards***, and ***Insect Game - Insect Clues*** sheets - one for each group of four to five students. Cut apart the ***Insect Game Cards*** and place all the cards in an envelope for each group. Gather clipboards or cardboard for students to write on. **Optional**: Various pictures of insects, including insect interaction and insect damage from books, magazines, or newspapers.

PROCEDURE

SESSION ONE

1. Tell students they are going to learn about insects by observing them. In order to do that, they need to know what an insect looks like and where to look for them. Show the transparency ***Parts of an Insect***. Point out the various body parts and share the appropriate sections of the Supporting Information.

2. Explain to students that many people use the terms insect and bug interchangeably as though they are one and the same. Many people believe that if it creeps, crawls or flies it must be an insect/bug. Read the following to your students and ask them if it is true or false: "All bugs are insects, but all insects are not bugs." *(true)*

   Explain that insects belong to the phylum *Arthropoda* and the class *Insecta*. (Students should understand that a class is a subdivision of a phylum. Share the Supporting Information under the heading Scientific Classification.) Within the class *Insecta* there is an order called *Hemiptera*, commonly called bugs. (Students should understand that an order is a subdivision of a class.) Bugs are insects and, therefore, have the body parts identified in Step 1. As one order, bugs have specific characteristics that distinguish them from other orders within the class *Insecta*. For example, bugs only have sucking mouth parts while other orders of insects can have sucking or chewing mouth parts. Ask once again if the statement "All bugs are insects, but all insects are not bugs," is true or false. (Note: Students do not need to be able to distinguish a bug from other insects. They should know, however, that bug and insect are not interchangeable terms.)

3. If students have had little or no experience identifying insects, you may find them observing noninsects. To help minimize the observation of noninsects and to reinforce a student's knowledge

of insect body parts, share the Supporting Information under the heading Noninsects. Before sharing the specific examples under that heading ask students about some of the examples. For example, "Do you think a spider is an insect? Why or why not?"

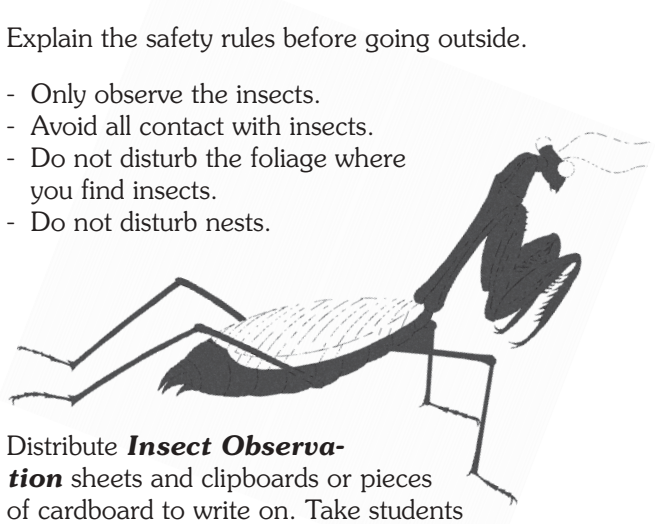
4. To find out what students know about insects, ask:

   - Do insects and people do any of the same things? *(Such as eat, drink, rest, grow, die.)*

   - Where would be a good place to find insects doing these things at this time of year?

5. Explain the safety rules before going outside.

   - Only observe the insects.
   - Avoid all contact with insects.
   - Do not disturb the foliage where you find insects.
   - Do not disturb nests.



6. Distribute ***Insect Observation*** sheets and clipboards or pieces of cardboard to write on. Take students outside to investigate the insects in the school ground or nearby park or field. Students should carefully look for insects in the soil, flowers, grass, shrubs and trees (top and bottom of leaves, stems, twigs, branches) as well as on and in buildings and playgrounds. Without disturbing them and using hand lenses, if necessary, students should observe insect behavior and appearance. Some insects may be colored to match their environment (camouflaged), so careful observation is necessary. Students may see insects in their immature life-forms such as eggs, caterpillars, grubs or worms, nymphs, cocoons, and pupae that are unfamiliar.

7. In the appropriate boxes on the ***Insect Observation*** sheet, students carefully sketch insects and label their body parts. Students should look for insects demonstrating the behaviors listed and record the locations where observed. Probably not every behavior listed will be observed in one session. Other unlisted insect activities may be observed. Extra spaces are provided on the sheet to record and sketch these activities.

SESSION TWO

1. Review or introduce any vocabulary words not discussed in Session One.

2. Discuss with students the insect observations on their sheets. All living things, including insects, do certain things to survive. List the answers to the following questions in a visible place.

   - What are some of the things insects do to survive? *(Insects do different things such as eating, reproducing, camouflaging, jumping, flying, hibernating [winter dormant period], estivating [summer dormant period], emitting odor.*)

   - If insects appeared to be doing nothing, what behaviors might they have been demonstrating? *(resting, hiding)*

   - Did anyone observe all of the behaviors listed?

   - If an insect was observed to be eating, how was it eating? *(chewing, sucking)* What was it eating?

   - Where were the insects located?

   - Did anyone observe two or more insects together? What did they seem to be doing?

   - How can we know if insects are communicating? *(Making sounds or scents, motions or light flashes. Some kinds of communication cannot be easily noticed.)*

   - What are some insect behaviors you recorded on your ***Insect Observation*** sheet that you might not observe at other times of the year? Why?

   - What is the most interesting behavior you observed? Why?

   - What is at least one behavior insects demonstrated that you were unaware of before?

   - How have your thinking and feelings about insects changed?

3. Using these answers, students should complete a chart that lists the following categories: ways insects survive, behaviors of insects, things insects eat, places insects can be found, kinds of insect communication, other interesting facts about insects. (The categories might change based on the students' observations.)

SESSION THREE

1. Arrange students in groups of four or five to play a game about insects. Give each group one copy of the ***Insect Facts***. Explain that each student will become an expert on one insect. After students have selected their insect, they should read to their group the information about the insect.

2. Distribute an envelope, with the cut-apart ***Insect Game Cards*** and the ***Insect Game - Insect Clues*** sheet, to each group. Each team will now have five of each of the five different insect game cards.

3. Students mix up or shuffle the insect game cards, dealing them out equally to each of the team members. Taking turns, students try to place their insect game cards over the correct clue on the ***Insect Game - Insect Clues*** sheet. Students may place only one card in any given turn. Students pass if they are unable to match any clues with the insect game cards in their hands. If necessary, students may refer back to the ***Insect Facts*** or ask the student who is the expert about a particular insect for information.

4. When students have finished the game, ask:

   - Can you imagine a world without bees? How would this affect food production? *(Much of the pollination and fertilization of food crops is done by bees.)*

   - What is at least one interesting fact learned about one of the five insects as a result of playing this game?

   - How did you feel about these insects before you played the game? What is the popular opinion about these and other insects?

   - After playing this game, in what way has your opinion of these insects changed? What will you do the next time you see a bee, trichogramma wasp, ladybug, praying mantis, or lacewing?

   - List five examples of ways in which bees, trichogramma wasps, praying mantises, ladybugs, and green lacewings are helpful to people. Explain.

EVALUATION OPTIONS

1. Evaluate students' ***Insect Observation*** sheets for understanding and completeness. Evaluate the groups' ability to complete the insect game.

2. Have students illustrate the ways five insects are useful to humans by drawing and labeling the insects. Have them explain the benefits of the five insects.

3. Have students list several survival behaviors that insects share with humans.

4. Design and create an insect that is beneficial and explain why. The insect can be real or imaginary. Provide students with a variety of art materials and supplies.

5. Photocopy the ***Insect Observation*** sheet again and have students conduct the observation activity for a second time or even once a month. Ask them to make comparisons for the different seasons of the year regarding the locations (indoor, outdoor, on a plant, in the ground, and so on) and the types of behaviors observed. How have the students' knowledge, observation skills, and attitudes toward insects changed through this activity?

6. Have students use the dictionary to look up definitions of insect and bug. Do they agree with the definitions? Why or why not?

7. Have students write in a journal before and after the activity. They could write about their knowledge of insects and/or their attitude about insects.

EXTENSIONS AND VARIATIONS

1. After students observe insect behaviors, have them use insect sweep nets to collect insects in different locations. (Purchase nets from a scientific supply company, borrow, or make them.) Shake nets onto sheets of light-colored fabric or paper spread on the ground and then gather insects into bug boxes or jars for closer examination. When finished, be sure to release insects back into their original environment.

2. Invite an entomologist, agricultural or extension agent, master gardener, or other insect specialist to speak to your class. Ask the speaker to bring live insects and magnifiers or microscope slides of insects and microscopes, if they have them. Ask them to discuss beneficial insects, organic gardening, biological control of insect pests, integrated pest management techniques, or insect classification. Have students prepare questions ahead of time.

3. In the spring, order a praying mantis egg case from a garden shop or catalog. Place in a ventilated insect cage and wait until the eggs hatch. You can raise the praying mantises in the classroom. Feed them crickets, meal worms or other live insects. Students can observe incomplete metamorphosis when the young hatch into nymphs, which look like small adults. Compare this life cycle with the complete metamorphosis of bees or butterflies. (There are three life-stages to incomplete metamorphosis: egg, nymph and adult. Nymphs emerge from the egg looking much like the parents but without wings. There are four stages to complete metamorphosis: egg, larva, pupa, and adult. A wormlike larva hatches from the egg and looks completely different from the parents. The larva may spin a cocoon or develop some other protective covering around its body when it becomes a

pupa. The pupal covering cracks open and the adult insect emerges.)

4. Have students make insect traps to survey the flying insect population of your school ground. (Note: Insects will get stuck and perish with this observation technique.) Yellow sticky traps can be purchased at garden or hardware stores or made from inexpensive materials. Make cards or boards that are yellow on both sides and about 10" x 6". Poke a hole in the top for a string or attach the card to a stick. Place the cards in different locations of the school ground, hanging some from branches, sticking others under bushes or in grasses. Coat both sides lightly, but completely with Tanglefoot®, which can be purchased at garden centers. Or, make your own "stick-um" by mixing together 1-1/2 cups rosin (from athletic supply store), 1 cup linseed oil, and 1 tablespoon melted paraffin. Insects will be attracted to the yellow color and will become trapped on the sticky surface. Are different kinds of insects found in different locations? **Optional**: Have students use different colors for the traps to learn to which color insects are most attracted.

5. Have students research each of the insects in the game and write new clues. Play the game again with the new clues. For example, praying mantises usually wait for their prey with the front legs in an upraised position giving the impression of praying. Their prothorax is greatly lengthened. Clues could include: Position of front legs gives impression of prayer. Has greatly lengthened prothorax.

6. Research natural pesticides (such as arsenic, pyrethrum, rotenone). Discuss advantages and disadvantages of these natural materials (toxicity, selectiveness, effectiveness, dosage). Ask students whether natural pesticides can be used for pest control by organic producers.

7. Play the game with the entire class. Make large copies of the ***Insect Game - Insect Clues*** and ***Insect Game Cards*** sheets. Display the ***Insect Game - Insect Clues*** sheet in a place where students can easily get to it. Cut apart the ***Insect Game Cards*** sheet and place them in a pile face down. Divide students into relay teams. One student from each team walks quickly to the pile of cards, selects one, tapes it to the correct clue on the game board, and returns to their team. The next student continues the game. Play continues until all the cards are used.

8. Design and plant a butterfly garden on your school ground.

9. Insects may be a part of peoples' diets. Have students research insects that are included in diets of different cultures. Or have the students find insect recipes. Possible Web sites for insect recipes are found in the Resources. Other sites can be found by using any search engine on the Internet and typing in insect recipes.

10. Scientists believe that insects first appeared on Earth at least 400 million years ago. Based on what students learned about insects, ask them why they think insects have been able to survive so long. Have students research insects to confirm their reasons and discover other reasons.

ADDITIONAL RESOURCES

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Carle, Eric. *The Grouchy Ladybug*. HarperCollins Publishers. 1996. ISBN: 0060270888 (lib.) 0064434508 (pbk.).

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Evans, Arthur, and Charles Bellamy. *An Inordinate Fondness for Beetles*. University of California Press. 2000. ISBN: 0520223233.

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Parker, Janice. *Cockroaches, Cocoons, and Honeycombs: The Science of Insects*. Raintree/Steck-Vaughn. 2000. ISBN: 073980135X.

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Insect Game Answer Key

Ladybug	Honeybee	Praying Mantis	Honeybee	Ladybug
Honeybee	Green Lacewing	Trichogramma Wasp	Praying Mantis	Trichogramma Wasp
Praying Mantis	Trichogramma Wasp	Ladybug	Praying Mantis	Green Lacewing
Ladybug	Honeybee	Green Lacewing	Ladybug	Honeybee
Green Lacewing	Trichogramma Wasp	Praying Mantis	Green Lacewing	Trichogramma Wasp

 Conceptual Framework Reference: I.D.1., III.B.3.d., III.B.4.c., III.B.5.a., VI.B.3., VII.B.1., VII.B.3.

INSECT OBSERVATION

Name(s): _____

Directions: Working alone or with a partner, take this sheet, a pencil, and a hand lens outside and carefully look for insects. Remember that insects have a segmented body (three parts), six legs, one pair of antennae, and may have one or two pairs of wings. These are the characteristics that can be easily identified. Without touching them or disturbing them in any way, watch for a while. **See if you can determine what they are doing.** Be patient! Careful observation is a skill worth developing. Sketch the insects that you find doing the activities listed below and record their location. In your sketch, label the following body parts: head, thorax, abdomen, legs, antennae, and compound eyes. If you find insects doing other things, use the "other" boxes on this chart to sketch them and say what they seem to be doing. You **MAY NOT** find all of the behaviors listed.

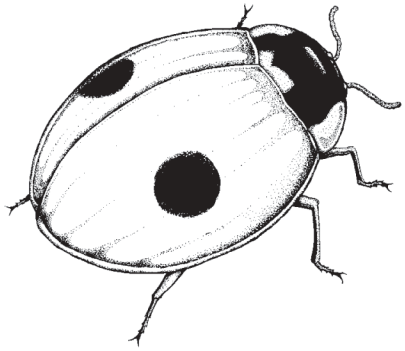
Behavior or activity	Location	Sketch of insect (label body parts)	Behavior or activity	Location	Sketch of insect (label body parts)
Eating			Communicating		
Drinking			Flying		
Resting (waiting)			Raising young		
Hiding			Other? (for example, pollinating)		
Dying			Other?		
Building a home			Other?		

INSECT FACTS

Honeybees Bees have fuzzy bodies and special leg structures which collect pollen from flowers. They can taste with their feet! They take pollen and nectar from flowers back to the hive where they make and store honey. They protect themselves and the hive with stingers on their abdomens.

Green Lacewing This pale, green insect has large, transparent, lacy wings folded tentlike over its body. Adults feed on nectar and aphids. They suck the body fluids out of insect pests. The larvae are very hungry predators that feed on aphids, small caterpillars, and beetles. The larvae have long pincers for feeding. Each egg is attached to a leaf by a long threadlike stalk.

Ladybug Also known as a ladybird beetle, this insect often is red with black spots. Adults have big appetites and can eat 50 aphids a day. The larvae can eat 150 aphids a day. Another favorite prey is the mealy bug, which, like aphids, causes damage to plants. Ladybugs don't die in the winter, but may hibernate in large groups under loose bark.

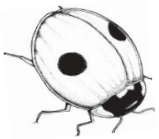
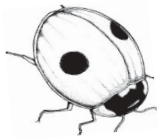
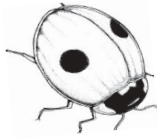
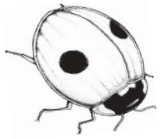
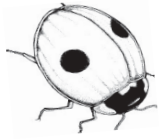
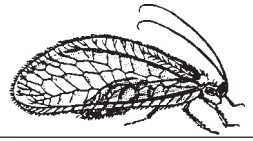


Trichogramma Wasp (tree-ko-GRAM-ma) These wasps lay eggs in or on other insects, such as aphids or caterpillars. When the eggs hatch, the wasp larvae develop inside the host (aphids or caterpillar) larvae and feed on them, eventually killing them. By this time, the wasps have developed into adults. Trichogramma wasps are thin and delicate and have long antennae. They don't sting people!

Praying Mantis The praying mantis is well camouflaged and can hold still for long periods of time. The eggs are found inside hardened masses of foam. They are great predators and feed on a variety of insects, including other praying mantises. The front legs have strong spines for grasping prey. The mouth parts are designed for chewing.

INSECT GAME CARDS

(Cut cards apart.)

HONEYBEE 	HONEYBEE 	HONEYBEE 	HONEYBEE 	HONEYBEE 
PRAYING MANTIS 	PRAYING MANTIS 	PRAYING MANTIS 	PRAYING MANTIS 	PRAYING MANTIS 
TRICHOGRAMMA WASP 	TRICHOGRAMMA WASP 	TRICHOGRAMMA WASP 	TRICHOGRAMMA WASP 	TRICHOGRAMMA WASP 
LADYBUG 	LADYBUG 	LADYBUG 	LADYBUG 	LADYBUG 
GREEN LACEWING 	GREEN LACEWING 	GREEN LACEWING 	GREEN LACEWING 	GREEN LACEWING 

INSECT GAME - INSECT CLUES

(Do not cut apart.)

HIBERNATES IN WINTER	LIVES IN HIVES	EGGS ARE PROTECTED IN HARDENED MASSES OF FOAM	TASTES WITH FEET	ADULT EATS 50 APHIDS A DAY
COLLECTS NECTAR AND POLLEN	SUCKS BODY FLUIDS FROM PREY	LONG ANTENNAE	EATS BROTHERS AND SISTERS	LAYS EGGS IN OR ON CATERPILLARS
MOUTH PARTS DESIGNED FOR CHEWING	EGGS HATCH IN HOST AND FEED ON IT	HAS SPOTS	IS WELL CAMOUFLAGED	ADULTS FEED ON NECTAR AND APHIDS
LARVAE EAT 150 APHIDS EACH DAY	FUZZY BODY COLLECTS POLLEN	EGGS ARE ATTACHED TO LEAVES WITH THREADLIKE STALKS	IS A TYPE OF BEETLE	STINGS ATTACKERS IF THREATENED
HAS LARGE GREEN LACY WINGS	BODY IS THIN AND DELICATE	HAS SPINY FRONT LEGS FOR GRASPING PREY	LARVAE HAVE LARGE PINCERS FOR FEEDING	DOES NOT STING HUMANS