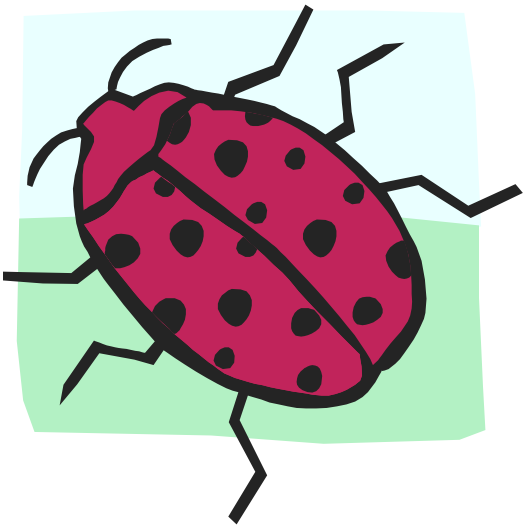
Insects Don't Bug Us



An Environmental Study Unit for Kindergarten – 2nd Graders

MUHLENBERG
COLLEGE

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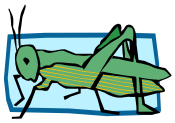
Table of Contents

Insects Don't Bug Us!

Author: Laurie Rosenberg, Muhlenberg College
Grade Level: K-2nd
Lesson Time: Four 30 minute time blocks.
Suggested Class Structure: Guided discussion and demonstration, short field study outside, hands on activities
Subject Areas: Science and Language Arts

GOAL



Students will gain an understanding of what makes insects a unique part of the animal kingdom. They will receive an introduction to the types of insect families, and practice using observation of body shapes and mouthparts to classify insects. They will gain an understanding of how insects' adaptations help them survive and thrive in a variety of habitats. They will be introduced to the many roles insect play in natural communities.

MATERIALS

- ☐ The book *Bugs Are Insects*, by Anne F. Rockwell, and other optional books listed in the *Resources* section on page 4 and 5.
- ☐ An "insect costume" consisting of wings made from kraft paper attached to a set of suspenders, an attachable "abdomen" made from kraft paper and legs--stuffed socks tied to a belt for attaching them, antennae made from pipe cleaners, "compound eyes" made from old sunglasses with small plastic eyes glued over the surface, a "mouthpart" consisting of a paper party blower, and an "exoskeleton" medallion made out of a piece of plastic cut from an old milk jug.
- ☐ PowerPoint Slides of Insect types.
- ☐ Insect Flash Cards made from copies of pictures from insect trade books. You could also use good quality plastic insect models.
- ☐ Pictures of insect mouthparts
- ☐ "Tools" representing insect mouthparts—straw, ice tongs, clothespin with sponge
- ☐ Golden Guide to Insects, 4-H Insect Key, Peterson's First Guide to Insects and Caterpillars (See "Resources" section on pages 4 and 5 for details)
- ☐ Field collecting equipment--Berlese funnel, old white sheet, insect nets, forceps, bug boxes, observation chambers, hand lenses, plastic spoons
- ☐ Flip chart, stand and large crayons
- ☐ "Bug Notes" journal for each student
- ☐ White tagboard cutouts of various shapes (for the optional extension)
- ☐ Copies of "Invent and Insect" data sheet (for the optional extension)

ADVANCE PREPARATION

- ✓ Make insect costume
- ✓ Get trade books and field guides
- ✓ Make insect flash cards
- ✓ Download "Insects" PowerPoint from Graver Web site or borrow the CD from the college
- ✓ Run off "Bug Notes" journals
- ✓ Acquire field study equipment
- ✓ Run off and mount insect mouthpart pictures
- ✓ Gather insect mouthparts equipment—straws, sponge, clothespin, ice tongs, tweezers
- ✓ Cut out tagboard shapes for the optional "Invent and Insect" activity

PROCEDURES – Outline and Narrative

Introduction - What Makes an Insect? - 15 min.

Ask the students if they know how to tell if something is an insect. Discuss ideas for a few minutes. The basic characteristics of insects are: exoskeleton, (no backbone, skeleton is actually like armor), segmented body parts, (insects have three main body segments—head, thorax and abdomen), six legs, antennae, and compound eyes. Most insects also have one to two pairs of wings.

Use the insect costume and dress one of the kids up like an insect to review the major characteristics of insects.

Different Kinds of Insects--PowerPoint and Classification Activity – 20 min.

The next activity explores the many different shapes and arrangements insects have on the basic pattern mentioned above. The insect groups in the PowerPoint presentation are called *orders*--groups of insects with similar body shapes and life patterns. For example, all moths and butterflies have caterpillar larvae, and wings that are relatively large compared to their body size. Butterflies have antennae with knobs at the top and moths have feathery antennae.

Show the students the insect PowerPoint and discuss the characteristics of each group. Follow the outline that is listed in the lesson appendix. An alternative to the PowerPoint is to read the book *Bugs Are Insects*, by Anne Rockwell. Information on this book is listed in the "Resources" section of the lesson plan.

Next, pass out the 4-H insect key and the insect flash cards or plastic insect models to small groups of students. Have them see if they can match the picture on their card or their model with one of the insects in the key. If there is time groups can try to match several examples.

Field Trip to Collect Insects – 45 min. (On school grounds or at Graver Arboretum)

Gather outside and review how to use the collection equipment. Students should work in groups of 10 or less and rotate through three areas for 15 minutes each. The Berlese Funnel should be set up ahead of time. Students can search through the collection trays for those insects. They can also look through garden soil and the lawn areas.

Students with the sweep nets should go into an area where there is long grass. Sweep nets are not to be used in bushy areas, as the twigs from the bushes can snag the nets.

Students can use the beat nets for collecting near bushes and small trees, and look on the forest floor under logs and rocks. These should be returned to their original location after observation.

Recording the Results of the Insect Hunt – 15 min.

Gather the whole class together with the lists of insects they have collected. Tell the class they are going to see if any patterns emerge from the information they have gathered. Some examples of patterns include—number of large bugs vs. small bugs, numbers of different kinds of bugs, numbers of bugs in certain habitats, numbers of colored bugs, bugs with camouflage, etc. The class can decide the categories or patterns and then record their data on a large sheet to take back to school.

"Invent and Insect" (Optional Activity for 2nd grade and above) – 45 min.

Give small groups of students a set of identical tagboard cutout shapes and crayons. (Make different shapes for each group.) Assign each group to an area/habitat where their insect inventions will live. They should design their cutouts to look like an insect that lives in their

assigned habitat. The whole group needs to agree on the design, and everyone in the group should color their shapes the same way. The students should fill out an "Inventors" data sheet for their insect inventions. The "inventors" should then place the cardboard insects in the habitat where the "collectors" can find them.

Next, the groups should switch roles and become collectors. They should go to another group's area to find their insect inventions. Upon finding the insects, the collector group fills out the collectors' data sheet, using observation and inference to figure out what the invented insects eat, how they avoid predators, what makes them alike, and how individuals are different from each other.

As a wrap up, ask the groups to compare the ideas and answers of the collectors vs. the inventors. Discuss why they might be different.

Extensions

Read the book, *It's a Good Thing There Are Insects* by Allan Fowler and follow up with a brainstormed list of how insects help the environment—pollination; food for birds, fish and other animals; predator insects keep pest insects under control; and humans get several useful products from insects such as honey, red chochineal dye, and silk. Also, many people enjoy watching insects in their backyard and are fascinated by the colors and patterns of the insect world.

Do the "Insect Mouth Parts" lesson from the State College School District Primary Integrated Pest Management curriculum, http://paipm.cas.psu.edu/pdf/PrimAnimal.pdf, page 16.

Assessment

"Bug Notes" journals, insect worksheets (See the lesson appendix page 9 for a complete list of worksheets.)

PA Academic Standards for Environment and Ecology Covered by the Unit:

4.3.4 Environmental Health

C. Understand that the elements of natural systems are interdependent.
- Identify some of the organisms that live together in an ecosystem.

4.4.4 Agriculture and Society (If the extension is done)

A. Know that food and fiber originate from plants and animals.
- Identify an agricultural product based on its origin.
- Describe several products and tell their origins.

4.5.4 Integrated Pest Management

A. Know types of pests.
- Identify classifications of pests.
- Identify and categorize pests.
- Know how pests fit into a food chain.

4.6.4 Ecosystems and Their Interactions

A. Understand that living things are dependent on nonliving things in the environment for survival.
- Identify plants and animals with their habitat and food sources.
- Describe how animals interact with plants to meet their needs for shelter.
- Identify animals that live underground.

4.7.4 Threatened, Endangered and Extinct Species

A. Identify differences in living things.
- Explain why plants and animals are different colors, shapes and sizes and how these differences relate to their survival.

B. Know that adaptations are important for survival.
- Explain how specific adaptations can help a living organism to survive.

PA Academic Standards for Science and Technology Covered by the Unit

3.1.4 Unifying Themes

A. Know that natural and human-made objects are made up of parts.
   - Identify and describe what parts make up a system. *(parts of an insect and their functions)*

C. Illustrate patterns that regularly occur and reoccur in nature.
   - Identify observable *patterns (e.g., growth patterns in insects, patterns of insect distribution).*
   - Use knowledge of natural patterns to predict next occurrences *(e.g. by looking at an insect's mouthparts and other adaptations, you can predict what type of food it eats).*

3.2.4 Inquiry and Design

A. Identify and use the nature of scientific and technological knowledge.
   - Provide clear explanations that account for observations and results. *(Use observations of an insect's size and shape to classify it to the level of order—for example: butterflies and moths, termites and ant, bees and wasps, crickets, grasshoppers and kaytydids, etc.)*
   - Relate how new information can change existing perceptions. *(Discuss how student's ideas about insects changed after they closely observed the insects and organized and recorded their observations.)*

B. Describe objects in the world using the five senses.
   - Recognize observational descriptors from each of the five senses (e.g., see-blue, feel-rough).
   - Use observations to develop a descriptive vocabulary.

3.3.4 Biological Sciences

A. Know the similarities and differences of living things.
   - Identify life processes of living things (e.g., growth, digestion, react to environment).
   - Know that some organisms have similar external characteristics (e.g., anatomical characteristics; appendages, type of covering, body segments) and that similarities and differences are related to environmental habitat.

B. Know that living things are made up of parts that have specific functions.
   - Identify examples of unicellular and multicellular organisms. *(Insects are multicellular organisms)*

RESOURCES

Books for the teacher:

Bowden, Marcia. *Nature for the Very Young*. New York: John Wiley & Sons, Inc. 1989.

Dennee, JoAnne and Julia Hand. *Exploring the Secrets of the Meadow-Thicket*. Montpelier, Vermont: Common Roots Press. 1994.

Lawlor, Elizabeth P. *Discover Nature Close to Home*. Harrisburg, PA: Stackpole Books. 1993.

Newton, Tracy L. *Catch the Bug, 4-H Entomology Leader's Guide, Unit 1*. The Pennsylvania State University. 1996.

Newton, Tracy L. *Catch the Bug, 4-H Entomology Member's Guide, Unit 1*. The Pennsylvania State University. 1996.

Outdoor Biological Instructional Strategies, (OBIS), available from the Lawrence Hall of Science, University of California #5200, Berkeley, CA 94720-5200. Phone: 510-642-7771, e-mail: gems@uclink.berkeley.edu. Also available from Delta Education, Inc., P.O. Box 915, Hudson, NH 03051; Phone: 800-442-5444. To see an overview of OBIS, go to http://www.lhs.berkeley.edu/OBIS/

Rockewell, Robert E., et. al. *Hug a Tree And Other Things To Do Outdoors With Young Children.* M. Rainer, MD: Gryphon House, Inc. 1986.

Ross, Kathy. *Crafts for Kids Who are Wild About Insects*. Brookfield, Connecticut: The Millbrook Press, Inc. 1997.

Sullivan, S. Adams. *Bats, Butterflies and Bugs*. Boston: Little, Brown and Company. 1990.

Williams, Robert A. et.al. *Mudpies to Magnets. A Preschool Science Curriculum*. Mt. Ranier, Maryland: Gryphon House, Inc. 1987.

Books for the students:

Allen, Judy and Tudor Humphries. *Are You a Grasshopper?* New York: Kingfisher. 2002.

Allen Judy and Tudor Humphries. *Are You a Ladybug?* New York: Kingfisher. 2000.

Carle, Eric. *The Very Quiet Cricket*. New York: Philomel Books. 1990.

Ehlert, Lois. *Waiting for Wings*. New York: Harcourt, Inc. 2001.

Feltwell, John. *Butterflies and Moths*. New York: Dowling Kindersley, Inc. 1997.

Fowler, Allan. *It's a Good Thing There Are Insects.* Chicago: Childrens Press. 1990.

Heller, Ruth. *How to Hide a Butterfly & Other Insects*. New York: Putnam Publishing Group. 1985.

Murawski, Darlyne A. *Bug Faces*. Washington, D.C.: National Geographic Society. 2000.

Oppenheim, Joanne. *Have You Seen Bugs?* New York: Scholastic Press. 1998

Pallotta, Jerry. *The Icky Bug Alphabet Book.* Watertown, MA: Charlesbridge Publishing. 1986.

Parker, Nancy Winslow and Joan Richards Wright. *Bugs.* New York: Mulberry Books. 1987.

Parker, Steve. *Insects*. New York: Dorling Kindersley, Inc. 1992.

Rockwell, Anne. *Bugs Are Insects*. New York: Harper Collins Publishers, Inc. 2001.

Ross, Michael Elsohm. *Cricketology.* Minneapolis: Carolrhoda Books, Inc. 1996.

Silver, Donald M. *One Small Square Backyard.* New York: Learning Triangle Press. 1993.

Silverstein, Alvin and Virginia. *Life In A Bucket of Soil.* Mineola, NY: Dover Publications, Inc. 1972.

Stone, Lynn M. *Homes and Habits of Insects*. Vero Beach, FL: The Rourke Book Company, Inc. 2001.

Taylor, Barbara. *Animal Close-Ups, Insects*. Columbus, OH: Peter Bedrick Books. 2002.

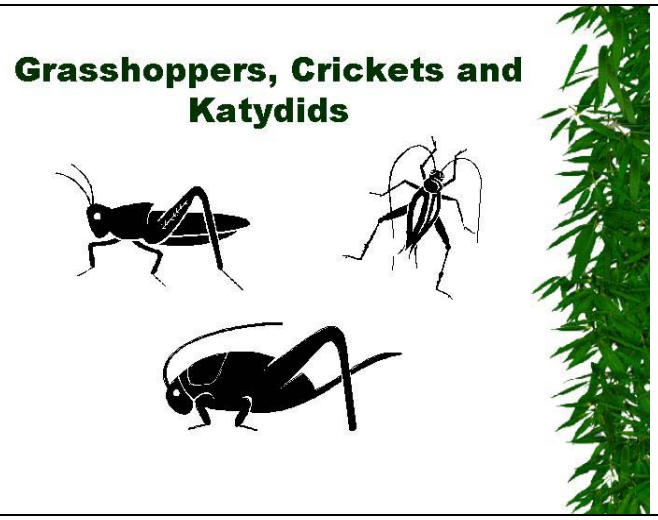
Zim, H. S. *Golden Guide to Insects.* New York: St. Martin's Press. 2001.

Websites for the teacher:

Web sites: Since the Web is constantly changing, check Muhlenberg's Outreach Web site for updated listings. **http://www.muhlenberg.edu/cultural/graver/**

Pennsylvania IPM Program. *School IPM – Education.* [http://paipm.cas.psu.edu/schools/schoolEduc.htm] A very comprehensive list of links and PDF materials for teachers to use as resources for teaching about IPM. They also offer a traveling "Bugmobile" program. For more information, contact Lyn Garling, IPM Education (Schools and Community) Coordinator. Office: 506 ASI Building, University Park. Phone: (814) 863-8884. E-mail: ljg5@psu.edu.

Insects PowerPoint Outline

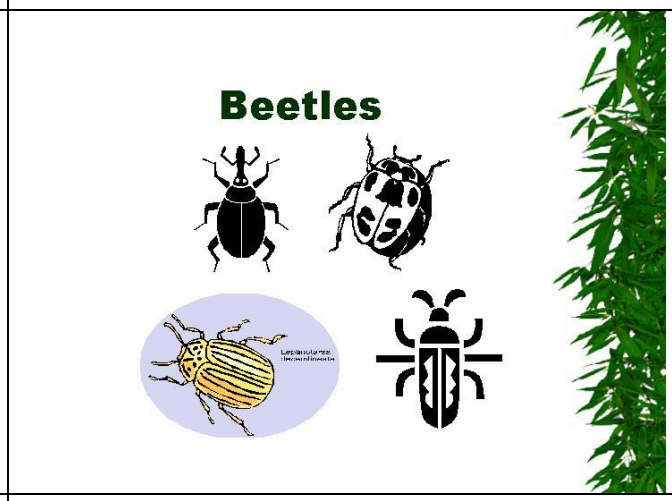


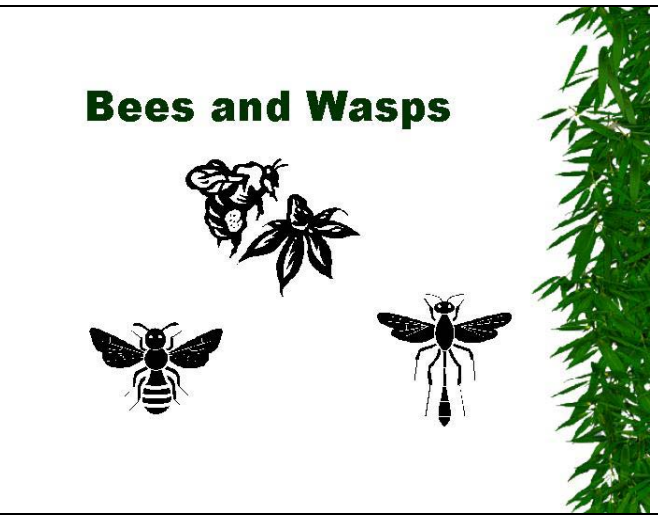
These insects are in the group *Orthoptera.* The key characteristics of this group are:

- Chewing mouthparts
- Leathery wings folded and flattened against their backs
- Usually fairly large compared to some other insect groups
- The young and adults look very similar
- Antenna quite prominent

Beetles are in the group *Coleoptera*. They are one of the most common living things on earth. The key characteristics of this group are:

- A hard shell-like covering over their folded wings
- Chewing mouthparts
- Range in size from tiny to large
- Antennae are short and have a variety of forms
- Life cycle consists of larva that look very different from the adults.



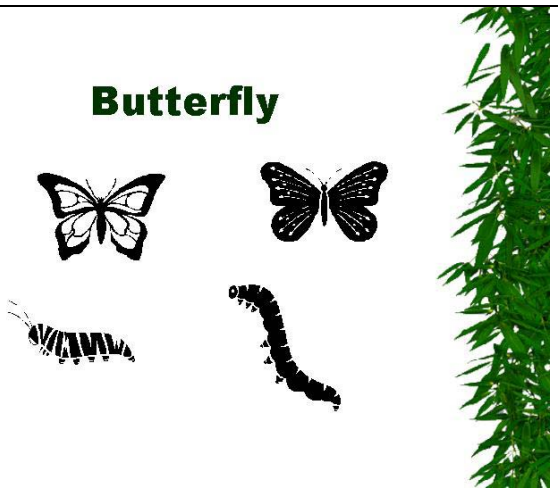


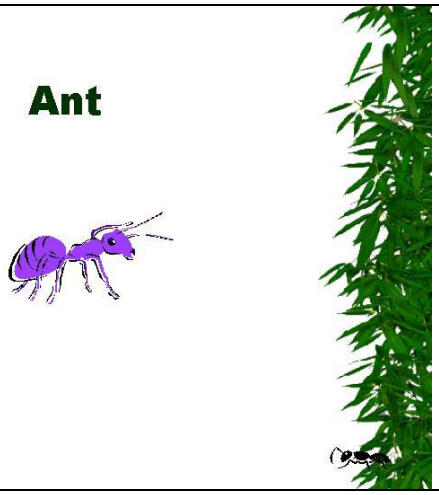
Bees and wasps belong to the group *Hymenoptera*. The key characteristics of this group are:

- Two pairs of transparent wings; the hind wings are smaller than the forewings.
- The middle of their body often has a constricted appearance.
- Chewing and sucking mouthparts
- Females often have a stinger
- Often live in colonies, but not all types do.
- Grub-like larvae

These insects belong to the group *Lepidoptera*. The key characteristics of this group are:

- Adults have two prominent pairs of scaly wings. Larvae are wingless.
- Larvae have chewing mouthparts. Most adults have sucking mouthparts, although some adults have no mouthparts at all, they only live long enough in this stage to mate before they die.
- Butterflies have antennae with knobs on the end; moths have feathery antennae.
- Most larvae form a chrysalis or cocoon for the pupa stage before tuning into an adult.





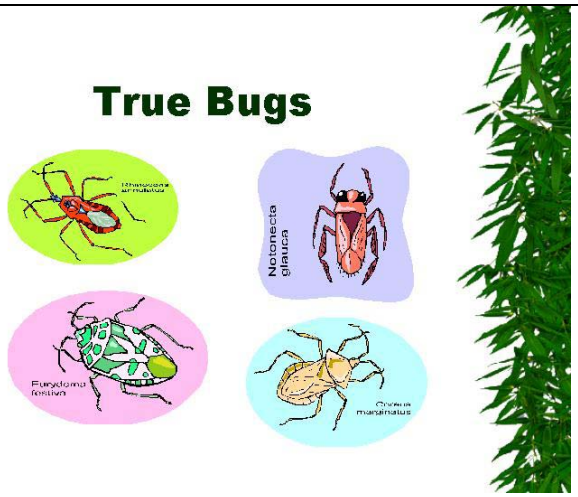
Ants are also in the insect group *Hymenoptera*. They have many of the same characteristics of this group that are mentioned in slide number three above, (chewing mouthparts, constricted waist, living in colonies.)

However, most ants are wingless, only the queen of the ant colony and reproducing males have wings, the rest of the colony is made up of infertile, wingless females.

These insects are in the group *Hemiptera*. The key characteristics of this group are:

- Folded wings that form an "X" pattern on their backs. This sometimes appears as a small triangle just behind the midsection (thorax).
- Piercing and sucking mouthparts.
- Young look similar to the adults

Note: They are sometimes called *true bugs* but there is nothing more "true" about them than any other bug.



Dragonflies

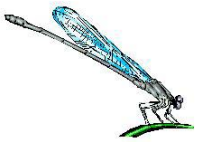
Dragonflies belong to the group *Odonata*. Their key characteristics are:

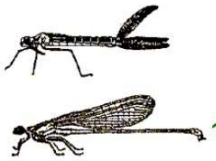
- Long, transparent, showy wings with visible patterns made by the wing membranes.
- Wings equal in size
- Long, slender bodies (note: dragonflies do not have a stinger, although in extreme circumstances they could bite.)
- Short antennae, often barely visible unless you look closely
- Eyes very large in proportion to head size
- Immature stage, called *nymph,* lives in water.
- Voracious predators of mosquitoes and other flying insects, they catch their prey in midair.

Damselflies also belong to the group *Odonata.* The key difference between dragonflies and damselflies is the way they hold their wings:

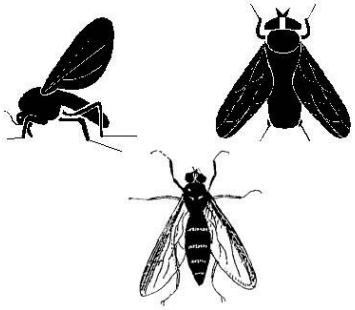
- When flying and at rest, dragonflies' wings are extended like an airplane
- Damselflies wings are folded together

Damselflies





Flies



Flies belong to the group *Diptera.* The key characteristics of this group are:

- Sizes ranging from tiny to medium size
- Sucking or lapping mouthparts
- Second pair of wings very small in size, often not visible to the naked eye. The second pair of wings serves as a balancing device; flies are very quick to take off and maneuver in the air.
- Small antennae
- Large eyes in proportion to the head size
- Development includes grub-like larvae and pupae.

Lesson Appendix

Copy Masters for:

Bug Notes Journal/Log Book Copy Masters

Cover Page
Insects of the Grass
Insects of the Forest
Insects of the Shrubs
Insects of the Soil
Final Buzz
The End

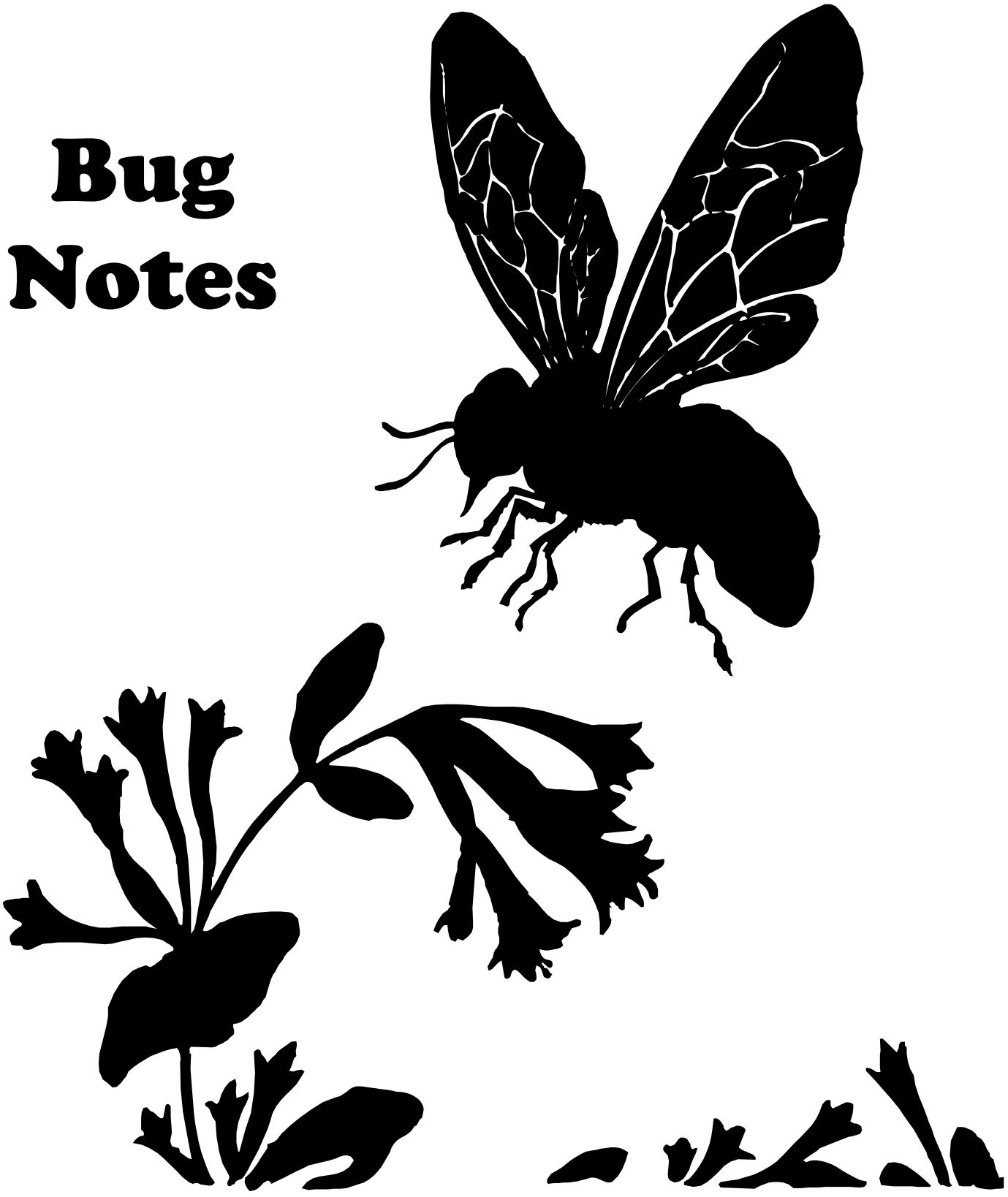
Invent and Insect Data Sheets

Insect *Inventor* Data Sheet
Insect *Collector* Data Sheet

Insect Worksheets

Insects Word Search and Answer Key
Insect Body Diagram
Identify the Insects
Insect Homes
Insect Look Alikes
If I Were an Insect
If I Were an Insect Drawing
Stars of the Insect World
What Insects Eat
Insect Identification Practice

Bug Notes

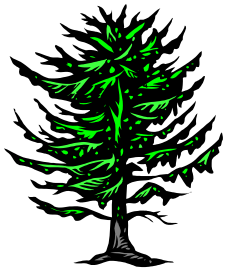


Insects of the Grass

Draw or write the insects you find.

Insects of the Forest

Draw or write the insects you find.

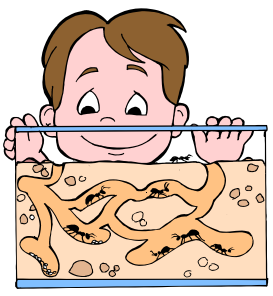


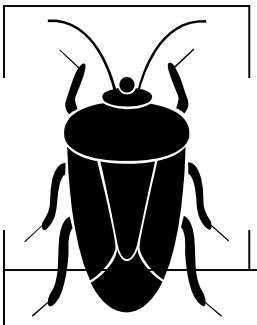
Insects of the Shrubs

Draw or write the insects you find.

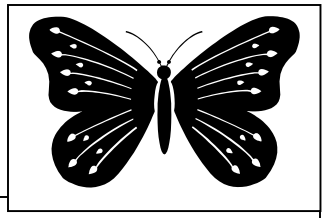
Insects of the Soil

Draw or write the insects you find.





Final Buzz



How many big bugs did you find? _____

How many small bugs did you find? _____

What was the most common bug? _____

Did you find any mystery bugs? _____

What were your bugs' colors? _____

_____ _____

_____ _____

Did any of the bugs...

_____ Hide **_____ Look like something in their home**

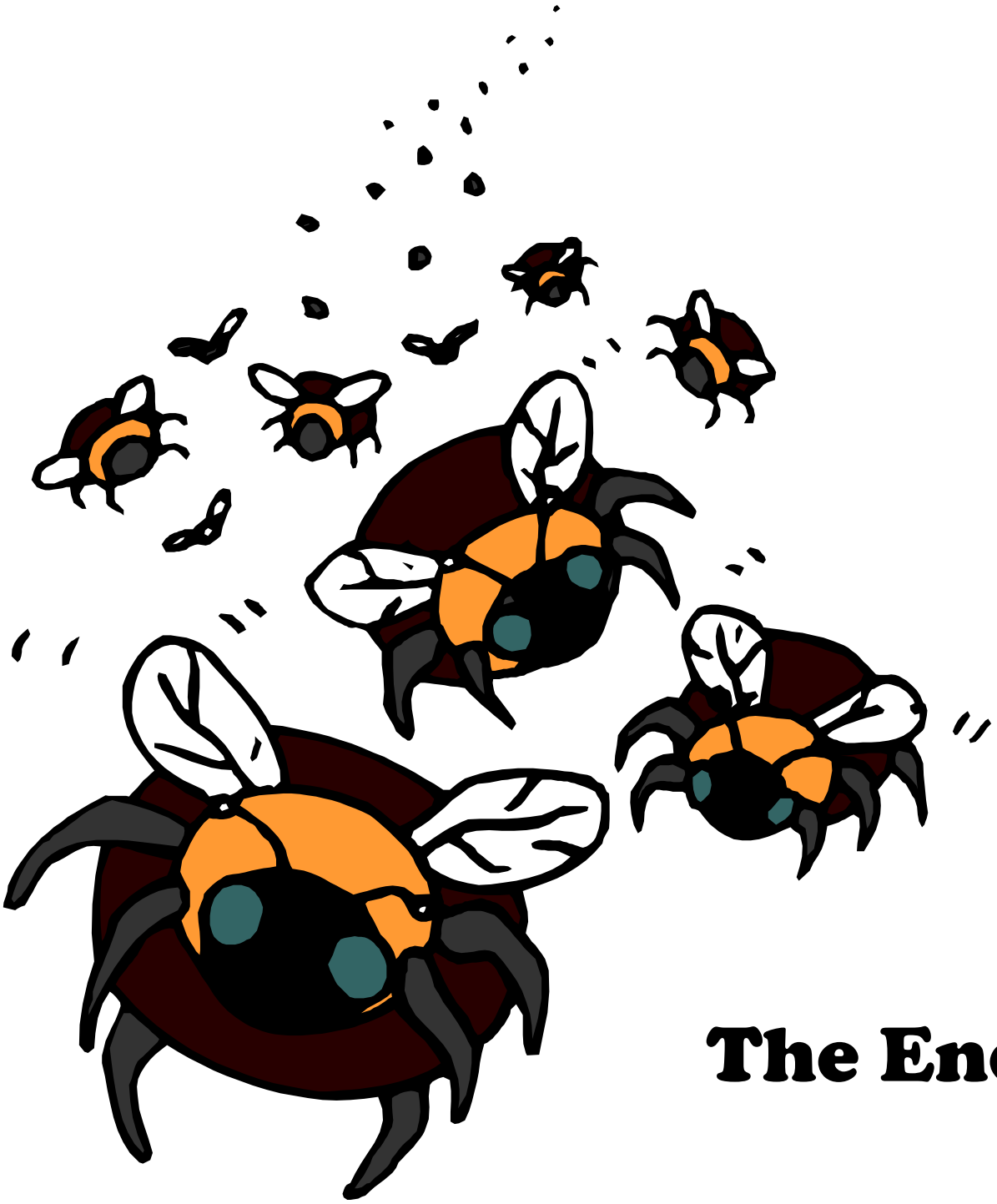
_____ Run away **_____ Make a noise**

What were the plant-eating bugs? _____

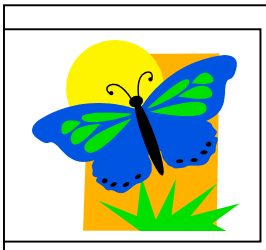
_____ _____

What bugs eat other insects? _____

_____ _____



The End



Insect *Inventor* Data Sheet

Draw a Picture of your Insect and Answer the Questions Below

What is your insect called? _____

Where do they make their homes? _____

What do their homes look like? Draw a picture of their home.

What do they eat? _____

What eats them? _____

How do they protect themselves from their enemies?

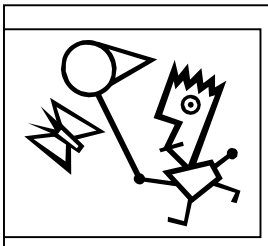
_____

Are they all alike or are there some differences? _____

What are the differences?

_____

Anything else you want us to know about your insect?



Insect *Collector* Data Sheet

Look Carefully at the Critter You Collected

Draw a Picture of your Insect and Answer the Questions Below

What do you think your insect should be called? _____

Where do these insects make their homes? _____

What do their homes look like? Draw a picture of their home.

What do you think they eat? _____

What do you think eats them? _____

How do they protect themselves from their enemies?

_____

Are they all alike or are they different from each other in some way? _____

What are the differences?

_____

Anything else interesting you noticed about your insect?

Name:_____ Date:_____

Insects Word Search

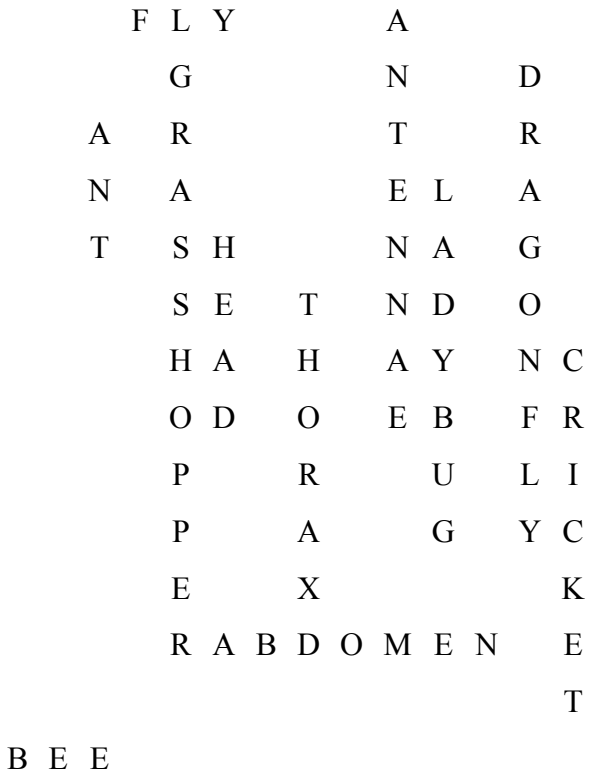
Find each of the following words.

FLY	ANT	ANTENNAE	BEE
ABDOMEN	LADYBUG	HEAD	GRASSHOPPER
CRICKET	THORAX	DRAGONFLY	

A Y B E F L Y E T S A Y E A L R
D B D E E G A F E B N O Y D S E
P R C A X R R Y E R T G L R N R
Y N R N U A D R E R E L R A C C
D N B T H S H N R E N A A G T S
C C C H Y S E P T R N D N O F G
X A D N O H A E H R A Y T N C D
T N H B C O D A O E E B E F R K
E F M A T P A T R Y N U N L I R
G E U H D P C E A O A G A Y C A
O C A R T E Y D X L Y S E U K D
L T E G X R A B D O M E N D E A
O T E O Y A T A G O B X A R T E
N B E E N A G E T E K N E C N A
T I R C N H Y Y C R E L E E A A
G D N E T X E F Y O A D T C P U

Answer Key-Insects Word Search

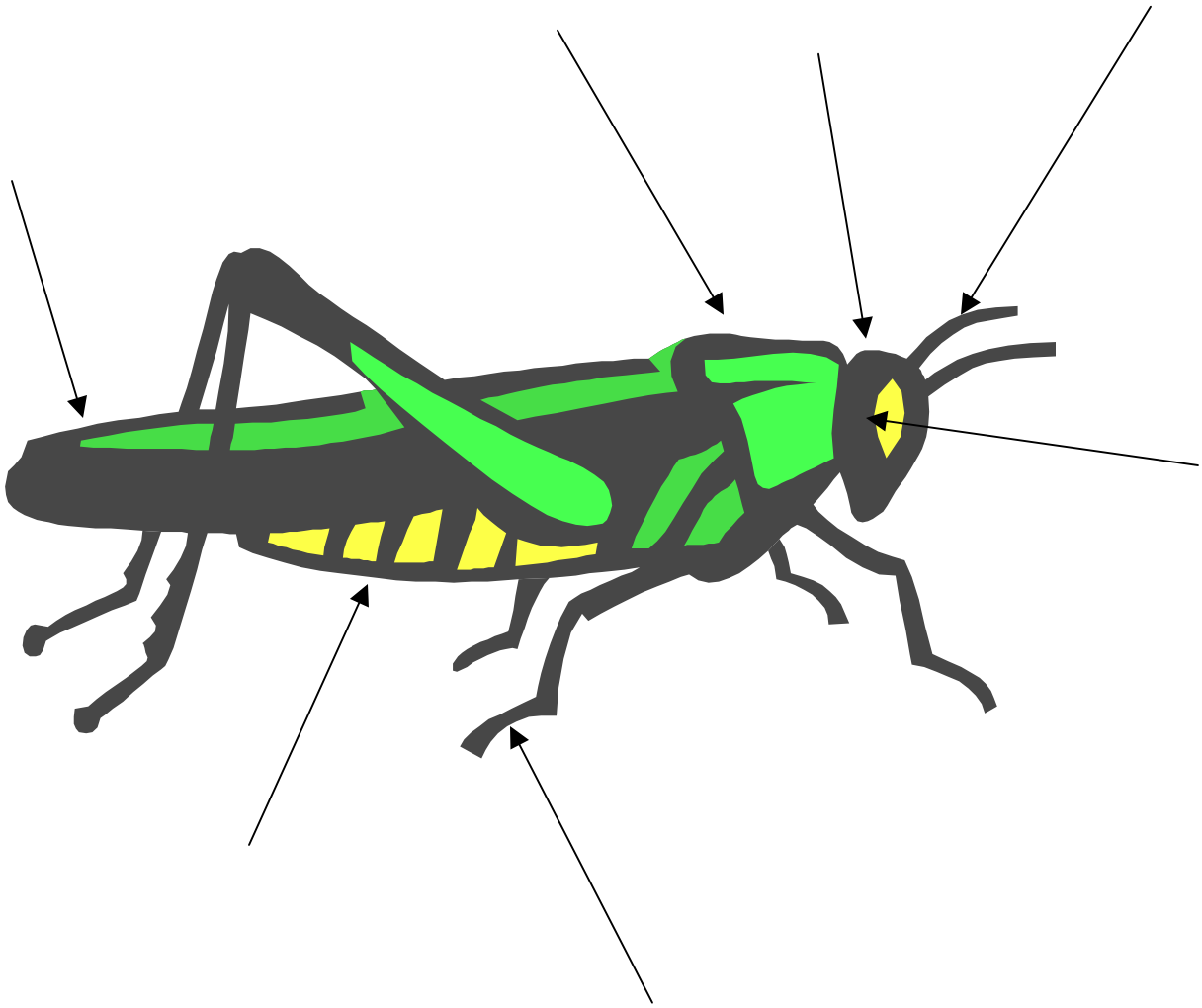
FLY	ABDOMEN	CRICKET	ANT
LADYBUG	THORAX	ANTENNAE	HEAD
DRAGONFLY	BEE	GRASSHOPPER	



Name:_____ Date:_____

Insect Body Diagram

Directions: Label the parts of the grasshopper using the word bank below.

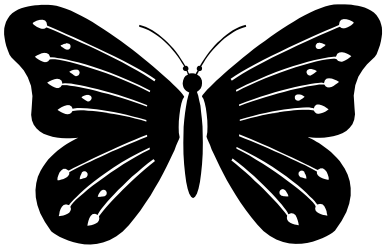


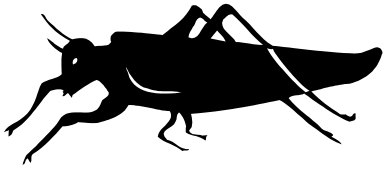
Word Bank:	
Eyes (compound)	Antennae
Legs	Head
Thorax	Abdomen
Wings	

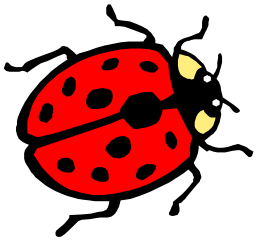
Name:_____ Date:_____

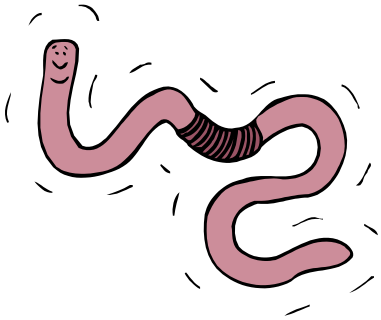
Identify the Insects

Directions: Circle the pictures that are insects. Put an "X" through the pictures that are NOT insects.









Name:_____ Date:_____

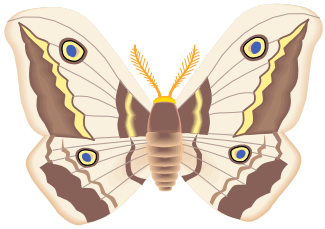
Insect Homes

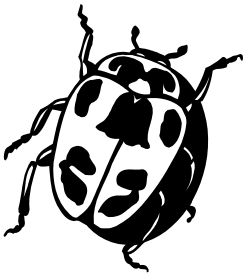
Directions: Using the background provided, draw insects that would like to live here.

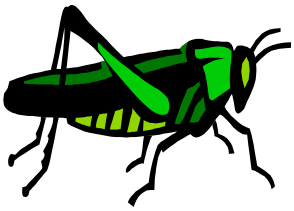
Name:_____ Date:_____

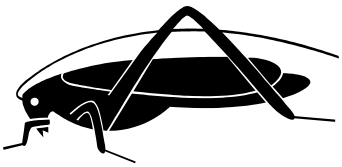
Insect Look Alikes

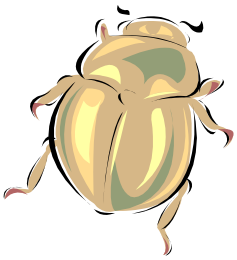
Directions: Do any of these insects look alike? Draw a line between the insects that look alike (four lines in all).









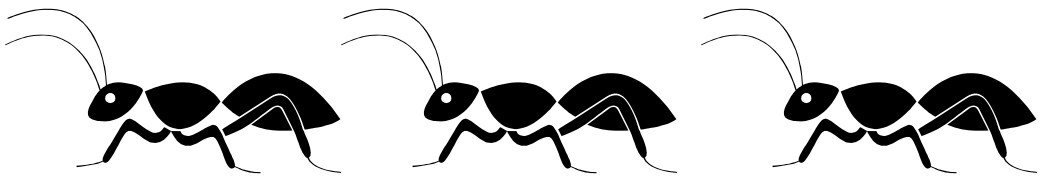


Name:_____ Date:_____

If I Were an Insect

Directions: Finish the first sentence by telling what insect you would be. Then describe the insect you chose to be. Also, tell where you would live, what you would eat, and how you would avoid predators.

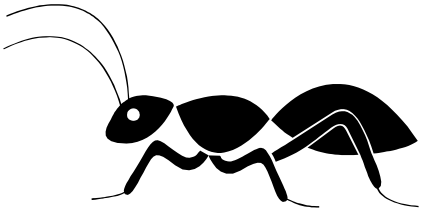
If I were an insect I would be a…

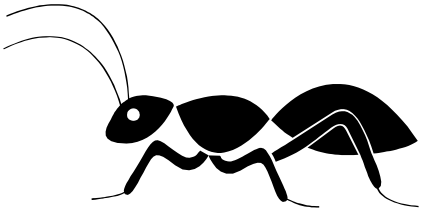


Name:_____ Date:_____

If I Were an Insect – Drawing

Directions: If you were in an insect what would you look like? Draw an insect that you would be. Draw what it would look like and anything else that relates to the insect.





Name:_____ Date:_____

Stars of the Insect World

Directions: Draw a line from the picture along the sides to what that insect does that is helpful.

This insect eats aphids that eat many of our plants!

This insect eats mosquitoes that annoy us every summer!

This insect makes honey for us!

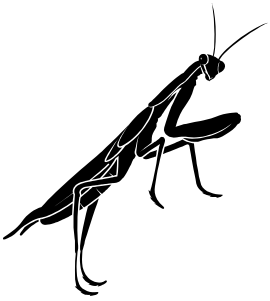
This insect is eaten by birds!

This insect is fun to watch flying over flowers in our gardens!

Name:_____ Date:_____

What Insects Eat

Directions: Draw a line from the insect to what it eats.

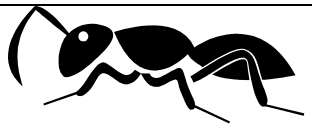


Eats Plants	Eats Other Insects
	

Name:_____ Date:_____

Insect Identification Practice

Directions: Fill in the chart as best you can for the insects you found.

Insect	**What Do I See?** **(hard shell, wings, warning colors), body parts**	**What is it?** **(Kind of insect)**	**How do I know?** **(wing pattern, size, jumping legs, warning colors, hard shell)**
	3 body parts Antennae 6 legs	Ant	No wings Narrow waist Bent antennae