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## TEACHING INSECTS: A Four Lesson Plan to Introduce Insects to Kids

Heather Wilkins

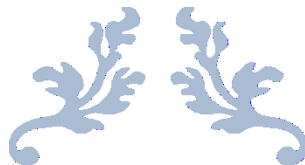
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# TEACHING INSECTS

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A Four Lesson Plan to Introduce Insects to Kids



APRIL 23, 2019

MASTERS DEGREE PROJECT FOR UNIVERSITY OF NEBRASKA- LINCOLN ENTOMOLOGY  
DEPARTMENT

Work by Heather Wilkins

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*We have all of us, men and animals, some special gift.*

*One child takes to music... another is quick with figures.*

*It is the same with insects.*

*One kind of Bee can cut leaves, another builds clay houses....*

*In human beings, we call the special gift genius.*

*In an insect, we call it instinct.*

*Instinct is the animal's genius.*

*-Jean-Henri Fabre*

### **Introduction**

This teaching guide is meant to be flexible for grades, time, and scope. The lesson plan is designed for grades 2 – 3, but with additional materials can be expounded on for higher grades or simplified for lower grades. It can be used by utilizing all the suggested materials, assignments, and supplements, or can be easily pared down if say you can't find a book or don't have internet access for videos.

It is a compilation of videos, books, printable pages, interactive activities, and experiments to teach children using fun and interesting methods. It approaches insects with methods for kinetic, auditory, and visual learners to grasp the information. There are links to printables that I should not duplicate, but am free to share.

- ❖ Invest in magnifying glasses for the kids to look at the insects up close for themselves.

- ❖ Collect clear containers with lids. These are easy to buy or have the kids bring in one.
- ❖ It is best to read through the lesson before hand to make sure all printables and materials needed are on hand.
- ❖ Consider the class terrarium in the second lesson in advance.
  - There are insects to fit any niche (ba dum-dum). There are many options to consider in how to do this project to adjust for the “ick” factor, budget, time, and space requirements.
  - One option to consider instead of the terrarium project is buying a kit online or from a bait or pet shop if you would prefer a premade kit to creating one.

# Teaching Standards

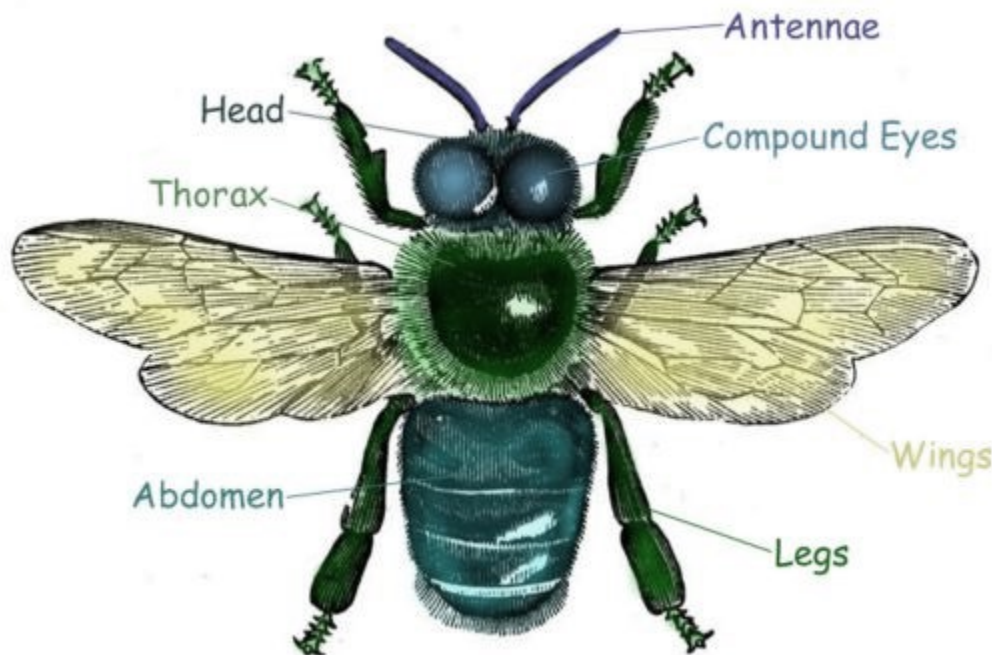
<b>Next Generation Science Standards</b>	<b>Next Generation Sunshine State Standards for Science</b>	<b>Nebraska Science Standards K-2</b>
<b>LS1.A: Structure and function</b>	<b>SC.2. N.1.1</b> <b>Raise questions about the natural world</b>	<b>SC2.1.1. a</b> <b>Ask questions that relate to a science topic</b>
<b>LS1.B: Growth and development of organisms</b>	<b>SC.2. N.1.2</b> <b>Compare the observations made by different groups using the same tools.</b>	<b>SC2.1.1. b</b> <b>Conduct simple investigations</b>
<b>LS2.A: Interdependent relationships in ecosystems</b>	<b>SC.2. N.1.3</b> <b>Ask "how do you know?"</b>	<b>SC2.1.1. d</b> <b>Describe objects, organisms, or events using pictures, words, and numbers</b>
<b>LS3: Heredity: Inheritance and variation of traits</b>	<b>SC.2. N.1.5</b> <b>Distinguish between empirical observation</b>	<b>SC2.1.1.e</b> <b>Collect and record observations</b>
<b>LS4.D: Biodiversity and humans</b>	<b>SC.2. P.8.1</b> <b>Observe and measure objects in terms of their properties</b>	<b>SC5.1.1. f</b> <b>Develop a reasonable explanation based on collected data</b>
<b>ETS1.A: Defining and delimiting an engineering problem</b>	<b>SC.2. L.16.1</b> <b>Observe and describe major stages in the life cycles of plants and animals, including beans and butterflies.</b>	<b>SC5.1.1. g</b> <b>Share information, procedures, and results with peers and/or adults</b>

<b>ETS1.B: Developing possible solutions</b>	<b>SC.K2.CS-CS.1.3</b> <b>Describe how models represent a real-life system (e.g., globe or map).</b>	<b>SC2.3.1.c</b> <b>Identify external parts of plants and animals</b>
<b>ETS1.C: Optimizing the design solution</b>		<b>SC2.3.1.b</b> <b>Identify the basic needs of living things (food, water, air, space, shelter)</b>
		<b>SC2.3.1. d</b> <b>Observe and match plants and animals to their distinct habitats</b>
		<b>SC2.3.2. a</b> <b>Describe how offspring resemble their parents</b>
		<b>SC2.3.2. b</b> <b>Describe how living things change as they grow</b>
		<b>SC5.3.3. b</b> <b>Identify the role of producers, consumers, and decomposers in an ecosystem</b>
		<b>SC5.3.3. d</b> <b>Recognize all organisms cause changes, some beneficial and some detrimental, in the environment where they live</b>
		<b>SC2.3.4. a</b> <b>Recognize seasonal changes in animals and plants</b>

# Insect Points for Instructor

What is an Insect? Insects belong to a group of animals called arthropods. Arthropods have jointed legs and a hard body wall. Some other animals that belong to the arthropod group are shrimps, spiders, crabs and lobsters. Insects differ from other arthropods because they have six legs and three main body parts: head; thorax; and abdomen.

Insect Anatomy. All insects are invertebrates (they have no backbone). All insects have 3 main body parts (head, thorax, and abdomen). All insects have 6 legs (3 sets of 2 legs) All insects have compound eyes (many faceted eyes that allow the insect to see almost everywhere at once). All insects have adapted to their environment through the development of unique features, stingers, wings, mouth parts, etc.



## Insect Development

Metamorphosis is the change in shape and habits of an insect as it grows from egg to adult. There are three ways that insects develop, no metamorphosis (ametabolous), incomplete metamorphosis (hemimetabolous), and complete metamorphosis (holometabolous). Insects often move, breathe and eat differently in each stage of development to help them to survive changes in food supply, temperature or other harsh conditions.



No metamorphosis is when the insect's size is the only change as it matures. The cycle is from egg, to larva, to adult. An incomplete metamorphosis is when the young nymph looks like the adult but without wings and reproductive capacity. The incomplete metamorphosis reaches adult stage at the final molt. The cycle is from egg, to nymph to adult. A complete metamorphosis is when there are four stages from egg and adult. An example of this is the butterfly. The complete cycle is egg to larva, to pupa, to adult.

### Where do insects live?

Everywhere. Antarctica, by volcanoes, in deserts, underwater, and everywhere in between. Insects need food, water, warmth in winter, and shelter. The differences and adaptations allow them to survive. A recent entomological article estimates that at least 75% of all animal species in the world are insects [Why most animals are insects](#).

## Key Vocabulary Instructor Should Become Familiar With:

adaptation - a special or unique shape, behavior or body part that helps an insect survive

antennae -a pair of "feelers," one on each side of the head, used to help an insect sense its environment

arthropods - animals, including insects, that have jointed legs and a hardened outer shell

camouflage - color or pattern that conceals an insect by matching its background

caterpillar - larva of a butterfly or moth

chrysalis - pupa of a butterfly, the life stage between caterpillar and adult; usually has a camouflaged covering and is exposed to weather

cocoon - protective case made of silk fibers secreted by a larva, in which it will pupate

dormant - inactive, as during very cold weather

entomologist - person who studies insects entomology - the scientific study of insects

exoskeleton - external, waterproof, protective body covering that houses and supports internal organs, muscles and other tissues

insectivorous - feeding on insects

invertebrates – means that there is no internal skeleton, just an exoskeleton.

larva (plural, larvae) - the young form of an insect with complete metamorphosis

Metamorphosis- changes in the shape, structure and habits of an insect as it grows into an adult

molting - shedding an insect's hard outer skin as its body grows larger

nymph – a stage in incomplete metamorphosis in which the insect resembles the adult but lacks wings and cannot reproduce

pheromone- chemicals capable of acting like hormones outside the body of the secreting individual, to impact the behavior of the receiving individuals.

pollinate - to fertilize a plant by moving pollen to the female structures of a flower

pupa (plural, pupae) - a stage of complete metamorphosis between larva and adult

taxonomy - the scientific study of naming and grouping living things

# Subject one *Introduction and Anatomy*

## Videos

[All About Insects for Children: Bees, Butterflies, Ladybugs, Ants and Flies for Kids](#)

[Facts about insects for kids/ classroom learning video](#)

### Additional Video Links

[National Geographic kids- Insects](#) This is a “best insect video compilation” that they have put together via YouTube. It is in the form of a tv show with a host commenting between the videos.

## Focal Books

- *Magic School Bus Presents: Insects* by Tom Jackson
- *Eyewitness insects* by Laurence Mound focus on pgs. 6-9,
- *Insects. All about their bodies, senses, life stages, and more!* by Seymour Simon
- *About Bugs (We Both Read- level 2)* By Sheryl Scarborough

## Additional Read Aloud Books

- *The Very Hungry Caterpillar* by Eric Carle
- *The Grouchy Ladybug* by Eric Carle
- *Bugs A to Z* by Caroline Lawton
- *Insects Are My Life* by Paul Brett Johnson and Megan McDonald
- *A Ladybugs Life* by John Himmelman and Melissa Stewart
- *Backyard Insects* by Ronald Goor and Millicent E. Selsam
- *Bugs! Bugs! Bugs!* by Bob Barner

## Objectives

Students will:

- Examine the basic anatomy of insects: wings, legs body segments, antennae, eyes, and exoskeleton
- Contrast insects with other animals to identify them
- Learn about life cycles for insects

## Assignments

### 1. Make a KWL information organizer

*Topic: What do we know about insects?*

Make a Chart labeled K. W. and L at top. Have the kids sit with you to fill it in. “K” means what we know, “W” is what we are wondering, and “L” is for what we learned. First sitting fill in any answers for “K” what we know as we can always go back and correct what they know, and also the “W” what we wonder. Then after learning correct any wrong know and fill in the “L”s. This can be done on any paper, chalkboard, or writing board.

### 2. Insect identification sorting jar

Print two jars and cut out sheet. Have child cut apart the squares and glue them in the correct jar.

### 3. Insect Anatomy Sheet

*Print and fill out worksheet*

### 4. Create an Insect Project

*Teacher Preparation*

Some research may be necessary to familiarize yourself with insects and their body parts. Print the diagrams that show the body parts (head, thorax, abdomen, eyes, antennae, and legs). These parts are generally similar on all insects. The wings, hair, mouth parts, and stingers will vary for each of our insects:

***Butterfly, bee, fly, wasp, ant, flea.***

*Materials Needed:*

- pipe cleaners

- paper towel rolls
  - clay, yarn, cardboard, plastic bottles, tape, other found or collected objects
  - insect diagrams
- chart paper or black/interactive white board
- pencils
  - insect cards
  - construction paper and pencils.

### ***The Activity***

Split the students into smaller groups of 2-3 students. Have the materials ready for each group. Remind the students their insect must have the same body parts all insects have and in addition, they need to choose one of the following behaviors for their insect and design a specific body part to meet the needs of the behavior.

These behavior choices are; *hive dweller, burrower, nectar gatherer, bloodsucker, parasite, and meat eater*. They may use their imagination to add additional features that will help their insect live in the environment they choose.

*Instruct the students:*

- Using construction paper, create an anatomy chart (design) for your insect.
  - Your design must contain all the main parts all insects have plus the body part(s) for your chosen behavior.
  - You may then add additional body parts to your ultimate insect.
  - When you have finished your design, the instructor will hand you your building materials.
- Using the building materials, build your insect from your design.
- Be prepared to name your insect and explain your insect's adaptation.

5. Insect writing activity: asks the kids to list three things they learned from the lesson. It is below. Print out enough for the class.

**Post Instructional Evaluation**

- Did students classify their insects correctly?
- Did students participate in discussions?
- Did students include all body parts in their insects?
- How did students play with their insects?
- Was there enough time for students to be successful?
- What would you do differently?

# Lesson Two *Insect Development and Survival*

## Objectives

Students will:

- Learn about insect life cycles
- Learn how insect survive

## Videos

[time lapse of ladybug life cycle](#)= this is quite a good video of the whole life.

[how insects move](#)

[The Magic Schoolbus: Bugs, Bugs, Bugs! DVD](#) has three 30-minute episodes in it. It can be bought on DVD, can be found individually on Netflix or the individual episodes can be found in book form. These are not real, but they have some basic insights into insect life.

1. *The Magic Schoolbus Gets Ants in its Pants*, (Season 1, Episode 12) goes into an ant hill.
2. *The Magic Schoolbus Butterfly and the Bog Beast* (Season 2 Episode 5) It is a good one for explaining about habitats.
3. *The Magic Schoolbus in a Beehive* (Season 3, Episode 4) explores a beehive.

## Books

- *Bugs! Bugs! Bugs! (DK Reader Level 2)* by Jennifer Dussling
- *Eyewitness insects* by Laurence Mound focus on pgs. 24-29 for life cycles, 30-41 for up close info on insect classifications, then 42-59 for habitats.

- *Insects. All about their bodies, senses, life stages, and more!* by Seymour Simon
- *The Magic School Bus Explores the World of Bugs* by Joanna Cole pgs. 4-5, 11-13 just read the boxes

### **Additional read-aloud books**

- *A Butterfly is Patient* by Dianna Hutts Aston and Sylvia Log
- *Backyard Bugs* by Robin Kittrell Laughlin

### **Assignments**

1. Make another KWL Chart for what was learned this lesson.  
Topic: Where do Insects live?
2. Terrarium for viewing insects for a few weeks
  - Aquarium, or large glass jar with about 2 inches of dirt inside.
  - Several small plants to repot in aquarium.
  - Small shallow dish of water to bury in the dirt
  - Insects the kids catch and bring in from home in lidded jars or plastic lidded containers with small air holes. Another option is to purchase some crickets from a bait or pet store and put them in or catch your own insects.
  - Mesh, screening, tin foil with tiny air holes punched into, or the like to cover top of aquarium or container. It should not be loose so be sure it can be secured with a rubber band or something similar so the insects do not escape.
  - Instructions:  
Set up the terrarium with dirt, and then let the kids add the plants, place the water dish and prepare the top. Add the insects and then quickly cover. The kids are allowed to observe what happens over a few days to a week period of time. The kids can



use one of the draws and write sheets included to write a few sentences on what they saw and draw their favorite insect.

#### Alternative short-term terrarium

Make a smaller scale terrarium with two clear cups. Fill one cup half full with dirt, add a stick, a leaf, a small rock, and a bottle cap full of water. Poke a few small air holes in the bottom of the other cup. Catch an insect, add to the dirt filled cup and scotch tape the cups together. Observe the insect for a day or so and then release it.

3. Watch video on life cycles found at: [life cycle video](#). This will help them with The Bug Cycle lesson that follows as it covers both types of insect metamorphosis.
  
4. Adopt an Insect Project =This lesson requires the reading of the book *The Magic School Bus: Explores the World of Bugs* first. The project encourages students to learn more about their favorite bugs in depth. If the book is not able to be used, then look online for each of the insects and either print out or have the students look up information on the insect. [Individual insect facts](#) is an excellent source.

This lesson includes printables with five pages for each of the topic insects. Simply print the pages as needed.

#### Before the lesson

It is good to familiarize yourself with the book and the insects that the kids are studying as you will know where to look for information. The Magic Schoolbus book has lots of information but supplementation might be needed.

*Insect choices as topics are: mosquitoes, ants, bees, dragonflies, fireflies, water boatmen, praying mantis, ladybugs, and butterflies.*

- a) Have each student pick his or her favorite bug (or assign them) from *The Magic School Bus: Explores the World of Bugs*. Each topic insect has the same printable pages; one that lists descriptors, one comparison page, a fact page, a life cycle page, and two draw-and-write pages.
- b) Using the book or fact page as a reference, ask each student to draw a poster of the life cycle of his or her chosen bug.
- c) Using one of the draw-and-write printables have students make a list of their bugs' favorite foods, natural environment, and predators. They can then draw a picture of what they found the most interesting.
- d) When students have finished, have each present his or her insect to the class with their most interesting thought on the insect.
- e) Hold a classroom discussion about the chosen bugs.  
How many students chose the same insect?  
Were there any very unusual bugs selected?  
Have students actually seen examples of their favorite insect outside?  
How does each bug contribute to our lives?

## **Post Instructional Evaluation**

- Did the students understand the life cycle?
- Were students able to fill out the insect pages correctly?
- Did the terrarium peak their curiosity?

- Did the children make accurate insects?
- How can I improve this lesson topic?
- What would I like to do differently?
- Was there an aspect that needed more information?

# Lesson Three *Insect Movement and Senses*

## Objectives

- Learn How and Why Insects Move
- Learn About Insect Senses

## Insect movement for instructor

- Walking and running =

Rigid exoskeleton = Each leg works as a strut for their body giving insects wavelike gaits unless they are running. At slow speeds only one leg is moved at a time with the other five stabilizing. At intermediate speeds two legs may lift simultaneously but only one leg from each body segment. When they run, they move three legs simultaneously with the front and back legs on one side staying in place along with the middle of the opposite side and then reversing the action for movement. This is called a tripod gait.

Hydrostatic (soft like caterpillars) exoskeleton = they use peristaltic (inner muscle) contractions within their body to pull the hind legs forward and then push the front of the body forward. It is also wavelike if you look closely at it. Their legs are used to dig in and push off and not for balance.

- Flight = not all insects fly. [How do insects fly?](#)
- Swimming and skating = Depending on the type of insect, the middle or back legs are used as oars to swim or dive. These legs are usually flattened out on the end or have special long stiff hairs that work similarly. Larvae or pupae in water like mosquito larvae swim by wiggling. Dragonfly larvae propel themselves using a system where gill intake water and their abdominal muscles contract to push water out the back like a jet pack. Some insects like water striders have whirls of hairs

on their feet that prevent them from breaking surface tension so they can literally skate (walk) on water.

## External Body Plan

The integument or body wall of an insect is used for muscle attachment and protection from damage and from losing moisture. The exoskeleton is made up of two layers, the epidermis, and the cuticle. The epidermis consists of living cells. These cells secrete the outer layer, the cuticle, which is composed of protein and chitin. Caterpillars and soft-bodied insects have cuticles that are mostly endocuticle, which remains flexible. Hard-bodied insects have a harder exocuticle, with the endocuticle underneath.

*An insect's body is made of three main body parts: a head, thorax, and abdomen.*

The **head** is the center of coordination and feeding, with antennae, eyes, and mouthparts.

The **thorax** is the center of locomotion, containing legs (1 pair per segment) and wings, if present (on the last two thoracic segments). Front wings may be modified to very hard (beetles) or leathery (grasshoppers), and function as armor. [The ladybug video shows close ups of unfurling and using wings.](#)

The **abdomen** contains reproductive structures, most of the spiracles (openings for breathing, also present on the thorax), and cerci, which are sensory structures, much like antennae. Respiration is not through the bloodstream or mouth. Oxygen enters insects through their spiracles (holes on the side of the body) and branches out through a network of tubes into every cell in the body.

[The video how insects breathe shows this up close.](#)

## Internal Systems

Insects have open circulation (no veins). The only artery is the dorsal aorta, which pumps blood from the back of the insect up to the head.

Insects are cold-blooded. Any activity depends on a certain amount of body heat. Often, flying insects must "warm up" their bodies by flapping their wings before being able to take off. In very hot temperatures, insects must find shade so as not to overheat. Many insects, including moths, butterflies, and bees can funnel heat produced from flying into the abdomen, where abdominal spiracles and the body wall allow heat to escape.

For example, dragonflies at rest alter their posture depending on whether they're hot or cold. If hot, they position themselves upright to make as little surface area as possible exposed to direct sun. If they are too cool, they rest flat on a surface and slightly angle themselves to get maximum sun exposure.

## **Senses info for Instructors**

Insects Senses are used like ours, to gather information around them. Their senses allow them to elude predators, gather food and water, and find mates.

*Vision*= Two compound eyes and ocelli (simple eyes that only can detect changes in light, or to view the horizon to evade predators). Compound eyes are faceted and are used to perceive changes forms or pattern (like landing on a flower blowing in the wind), sensing the direction and speed they are moving in, seeing from a distance to get there, perceive colors and patterns (i.e. for finding mates, certain flowers or even the patterns on flowers to find the nectar or food).

*Touch* = sensilla (small hairs usually found on legs, around mouth, on antennae and on wings) The hairs are attached to nerves that can send super -fast to cause rapid responses like cockroaches to run away.

*Hearing*= Chordotonal organs, tympanic membrane. These are also found on legs, abdomen, thorax and even wings. Hearing is used to avoid predators and find mates. Think of crickets chirping for mates and moths evading the sonic location of bats.

*Smell*= sensilla on antennae. Used to smell for mates or determine the suitability of mates, hosts for predatory insects, and food location. This only works if upwind.

*Taste*= sensilla (sensors) on mouth and tarsi (i.e. fly feet, yes that is why they walk on food), on bees' antennae, and on the ovipositor (lays eggs).

## **Movement Videos**

### **[Insects are found Everywhere](#)**

**[Biology of insect songs videos](#)**- Read the script ( found in printables section) aloud and as you hit a sound clip play it.

### **[ladybug flies in slow motion](#)**

### **[Kung Fu mantis](#)**

### **[How insects breathe \(mantis\)](#)**

## **Books**

- *The Magic School Bus Explores the World of Bugs* by Joanna Cole
- *Eyewitness insects* by Laurence Mound focus on pgs.12-21
- *Insects. All about their bodies, senses, life stages, and more!* by Seymour Simon pgs. 18-21
- *Insects and Spiders* by Matthew Robertson pgs. 36-43

- *How Do Insects Move? (Insects Close-Up)* by Megan Kopp

## **Additional read-aloud books**

- *A Beetle is Shy* by Dianna Hutts Aston and Sylvia Log
- *On Beyond Bugs! All About Insects* by Tish Rabe

## **Assignments**

### **1. Make a KWL chart**

Topics: Are insect senses like ours? Why is it important to have these senses? Where do insects live? Do insects hide? How do insects move? Motivation for insect's movement? (migrating, mating, predators, food...)

### **2. Mouthparts Comparison Experiment and Printable Assessment.**

Different insects possess different types of mouthparts. These mouthpart types can be compared with the functions of common objects:

chewing mouthparts (grasshoppers) - scissors

sucking mouthparts (stinkbugs) - turkey baster

stabbing mouthparts (deer fly, mosquito) - boxed drink straws

coiled mouthparts (butterfly) – paper party blower

sponging mouthparts (housefly) - dishwashing wand-sponge

The experiment is a show how different mouth parts work. It is done by using the mentioned descriptors and something that could be used to simulate eating it paper for the scissors or a cup of water for the dishwashing wand sponge. Have the kids guess what the insects could



eat with each mouth type. The assessment is done by filling in the printable *What's In Your Mouthpart* sheet.

\*(Some insects with stabbing mouthparts can transfer diseases. This can be shown by first sucking up colored water with a turkey baster, let it out, then uptake clear water with the baster. The clear water will become slightly colored.)

### 3. Insect Scavenger Hunt

This printable hunt is done outside on school grounds. There are three different hunts to choose from super simple to much more complex. All three collect insects, so the kids will need plastic containers with lids to gather them.

In order to identify them google your state insects. For example, in Florida I would google Florida insect identification. This will lead you to local identification sources like the cooperative extension, a local university or community group. These sources usually have pictures. If you are truly stuck sometimes you can find it based on a description like brown sticklike water insect.

### 4. Fly Taste Test.

Flies use their feet to taste, so they walk over food to see if they want to eat it. Prior to the taste test you will want to make a small plan for foods you want to use. You can pick anything you want, but try to find different types like meat, fruit, veggie, and a dessert. Alternately it can be four types of meats or anything else you want.

Right before the experiment ask the kids what kind of food they think the flies will prefer and do a vote with a simple hand count to see their opinion. Lay the on a paper plate, then take it outside and have the class observe flies as they come to the plate. Set a timer for 15 to 20 minutes as the duration or longer if you wish. Have the kids mark the

preference to what the flies stay to eat which can be done by counting to 5 after they land on the printable. Pairing the kids so that there is one observer and one documenter works well.

After the experiment go in and compare the results of the experiment to the previous hand count to see if it was the same or different and discuss why.

## 5. Descriptors of Movement Printable

**Insects are masters of movement:** This is a matching game printable. Match the insects with motions. There are sometimes overlaps, for example, many can run. This is meant to get them thinking. Some suggested answers are: roaches run, bees swarm, moths fly, mantids strike, diving beetles swim, caterpillars crawl, dragonflies dart, maggots squirm, water boatmen paddle, mole crickets burrow, mosquito larvae wriggle, fleas jump, whirligigs spin, water striders skate, army ants march, and backswimmers dive.

### **Post Instructional Evaluation**

Do the children understand how insects move?

Did they understand why insects move as they do?

Were the children able to see similarities and differences in the senses of insects and people?

How can this lesson be improved upon?

Were there any weak areas?

# Subject Four *Habitat and “Jobs”*

## Objectives

- What use do insects have in the world?
- Where do insects live?
- How do insects survive adverse conditions?

## Instructor Notes

Insects are small and adaptable. They do some of the most needed but gross jobs in the animal kingdom. This involves handling wastes such as feces and dead plants and animals, converting plant material to enriched soil, pollinating plants in their search for food, natural population control of other insects and animals' populations, and also serve as a key food source for many other animals. It is no wonder that  $\frac{3}{4}$  of the animal species in the world are insects.

Insects live in a large variety of habitats, but they prefer warm climates because they are cold blooded. Some examples of habitats are rainforests, caves, grasslands, deserts, gardens and streams. In each habitat the insect will find a niche and adapt to find a way to survive. Their small size makes for a better survival rate as they take up little resources and space, and their adaptability makes them more able to survive changing conditions.

So, what do insects do when the weather is severe like in winter or in a desert?

## Vocabulary

*Colony*= a gathering of insects of the same species that live together and work together to support the group.

*Diapause*= How insects as adults bury themselves to shield themselves from cold and go into a form of hibernation.

*Dormant*=

## Videos

[Why are insects important?](#)

[Insect respect- value of insects](#)

[Where do insects go during the winter?](#)

[beetles beat the Sahara heat](#)

[nature's scuba divers](#)

## Books

*National Geographic Kids Everything Insects* by Carrie Gleason

*What Do Insects Do* by Pamela Chanko and Susan Cañizares

*Where Do Insects Live* by Susan Cañizares and Mary Reid

## Additional Read-Alouds

- *Pet Bugs: A Kid's Guide to Catching and Keeping Touchable Insects* by Sally Stenhouse Kneidel
- *Roberto the Insect Architect* by Nin Laden

## Assignments

- 1.) ***Make a KWL chart.*** Topics: *Where do insects live? What are insect jobs? How do insects hide?*
- 2.) ***Predictions about insects hiding activity-*** This activity is an outdoor one that will get them thinking about insect camouflaging. Before the day, you will want to look for an area that has both grass and sand or dirt. You will also need to gather the materials and print out the worksheet. All the beans should be dried beans.

Materials for the activity:

*Dried split peas, yellow lentils, black beans, pinto beans, lima beans, navy beans, black eye peas, a medium size bowl, and small plastic cups.*

The premise is that the beans are insects and the children are birds. The beans will be thrown on the ground and the “birds” will try to find the “insects”. Each child will get a cup and they will put in 3 beans of each type and a worksheet. Discuss with the kids how birds have great vision, how they eat insects, and explain how insects hide from birds using size and coloring. Have the children fill in their prediction on their worksheet, then walk out to the area chosen with the cups of beans.

Each child will pour their beans into the bowl (keeping their cups) and the teacher will scatter the beans through the area both on grass and soil. The children will then gather all the beans they can find in their cups. After a time, have the children bring their cups back to the classroom and count how many of each kind they found and document them on the worksheet.

Have small groups compare what they found and see what happened. Were some beans easier to find than others? Did some beans just get lost? ETC.

### 3.) ***Habitat worksheets*** =

The objective is to see what type of insects live in what kind of habitat to compare similarities and differences. Print out enough of the worksheets “What insects live in the \_\_\_\_\_” that each child will have two different worksheets available. If desired, just preselect two that are different like streams and desert or to offer variety print all six kinds.

Have the children fill in two of the worksheets for example grasslands and rainforest, then fill in the two worksheets. Then ask the students how their insects were similar and how they were different in the different habitats.

Habitat Insect Links: Print info sheets on each insect and staple together for information by location

[Prairie Insects](#) = Grasslands

[Rainforest Insects](#)

[Desert Insects](#)

[Garden Insects](#)

[Stream Insects](#)

[Cave Insects](#); [cave cricket](#), [cave moth](#), [cockroaches](#),  
[cave beetle](#), [another cave beetle](#)

4.) *My Favorite Insect Worksheet*

5.) *Insects Crosswords Worksheet*

### **Post Instructional Evaluation**

Did the kids seem to understand where insects are found?

Do the kids understand niches for surviving?

Do the kids understand the huge importance of insects to them?

Were there weaknesses in the lessons that could be improved upon?

Was there any issue with the lessons?

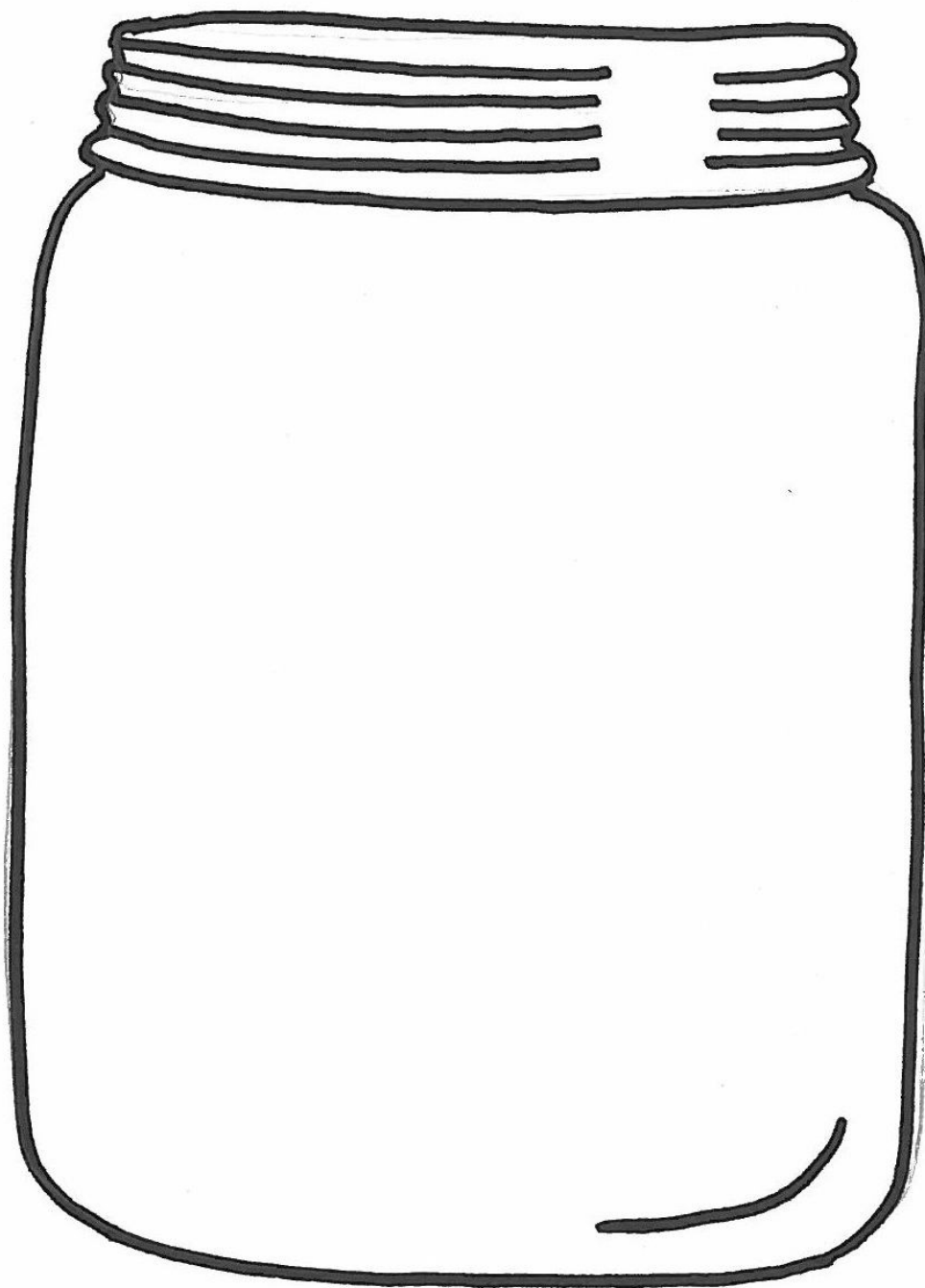
How well overall was the lesson plan?

Directions: Write three things you learned today.

Name: \_\_\_\_\_

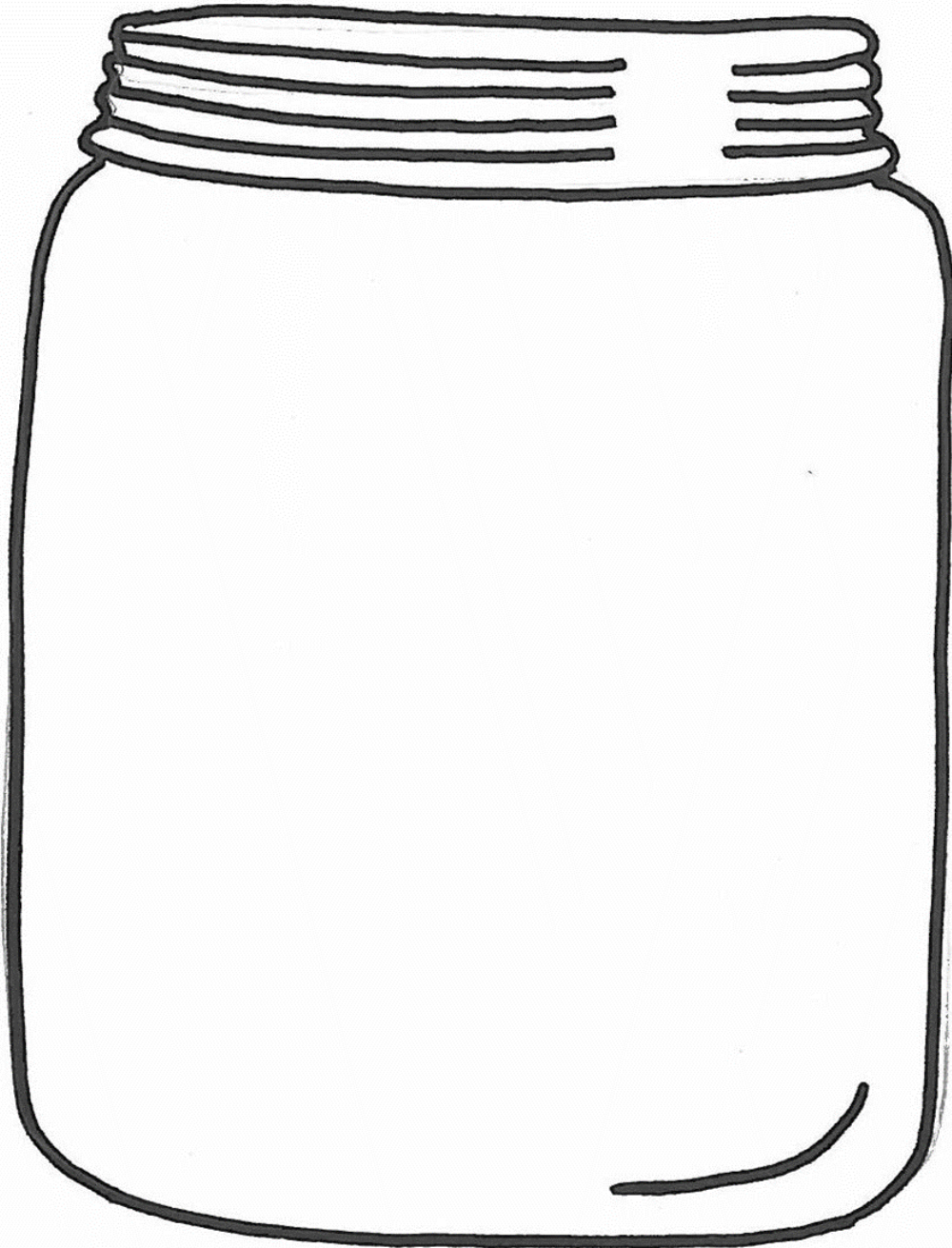
Handwriting practice lines consisting of solid top and bottom lines with a dashed middle line. There are 10 sets of these lines for writing practice.

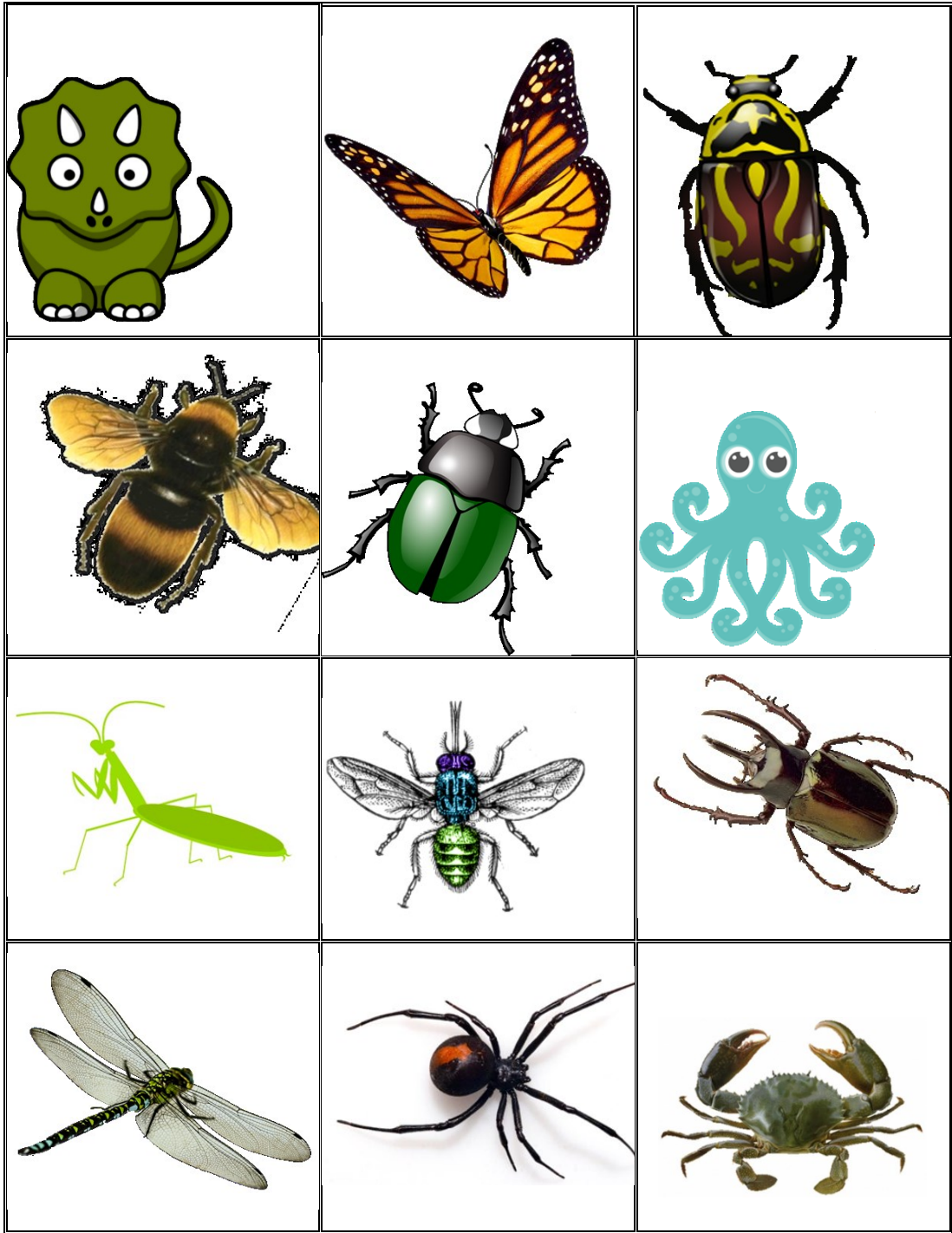
# Insects





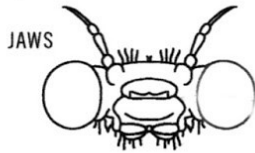
## Non-Insects





# WHAT'S IN YOUR MOUTHPART?

## HANDOUT



JAWS



BUTTERFLY



LEAVES



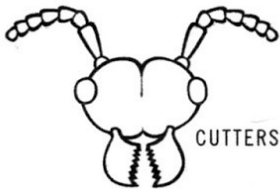
PROBOSCIS



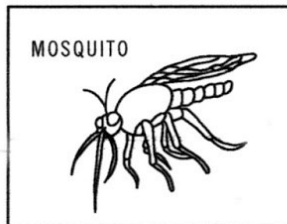
HOUSE FLY



NECTAR



CUTTERS

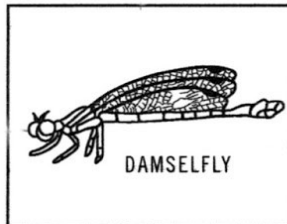


MOSQUITO



FOOD SCRAPS

HOLLOW, PIERCING  
MOUTHPARTS



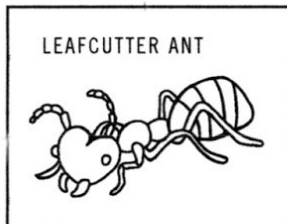
DAMSEFLY



MOSQUITO



SPONGE-LIKE  
MOUTHPARTS WITH  
SUCTION PROBOSCIS



LEAFCUTTER ANT



BLOOD

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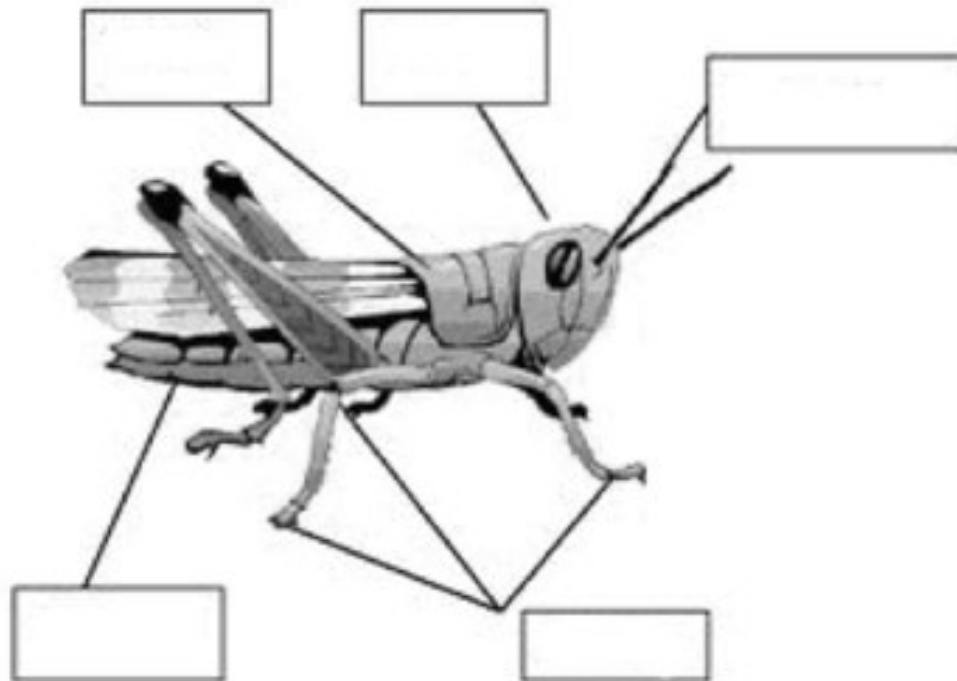


(Orkin LLC, 2015)

# INSECTS

## Body Sections

Write each one on its proper box.



Head

Thorax

Abdomen

Antennae

Six legs

How many sections or parts do the insects have? \_\_\_\_\_

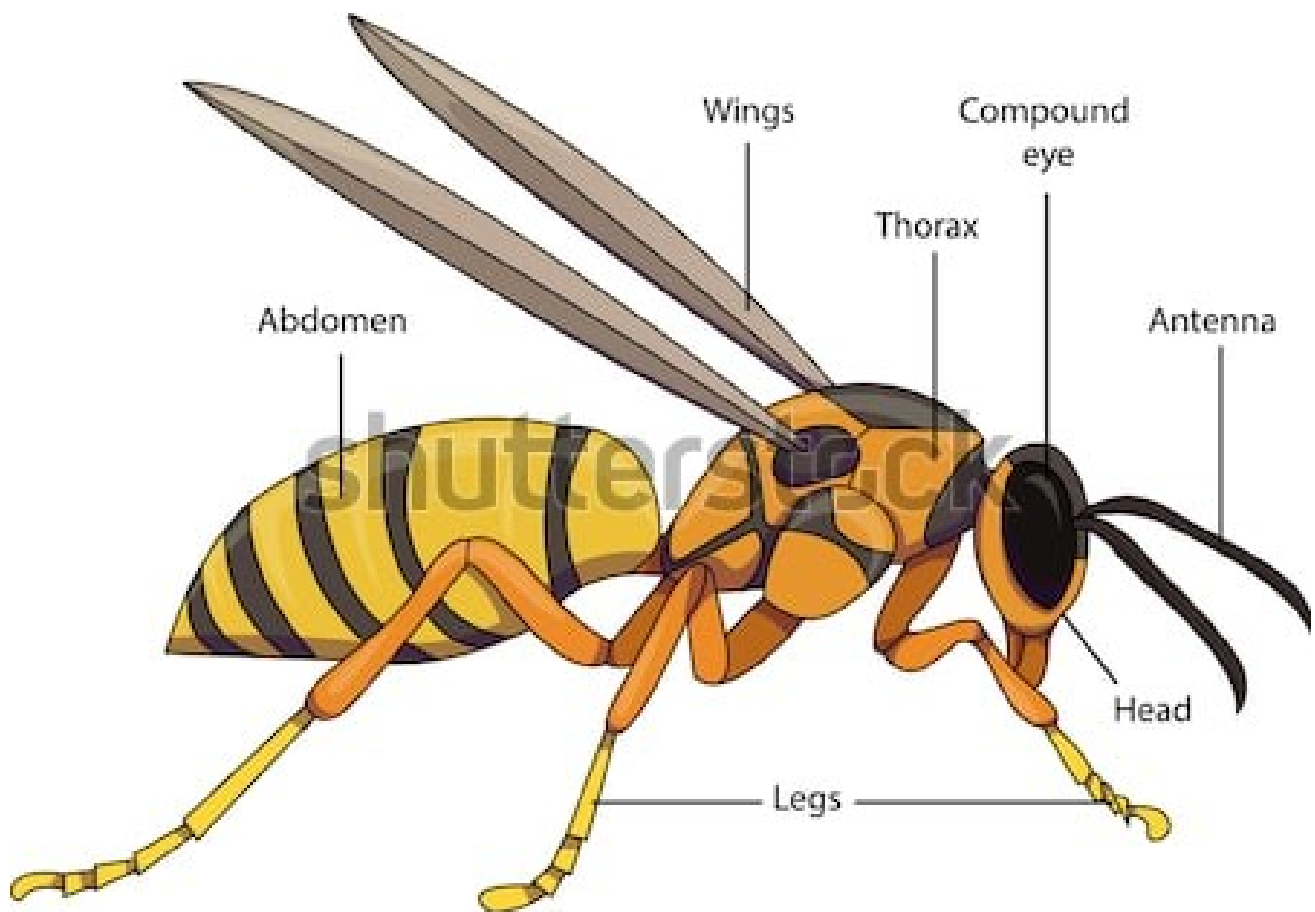
The insects use their antennae for \_\_\_\_\_ and \_\_\_\_\_

All insects have \_\_\_\_\_ pairs of legs.

The insects don't have bones, they have a hard covering called \_\_\_\_\_

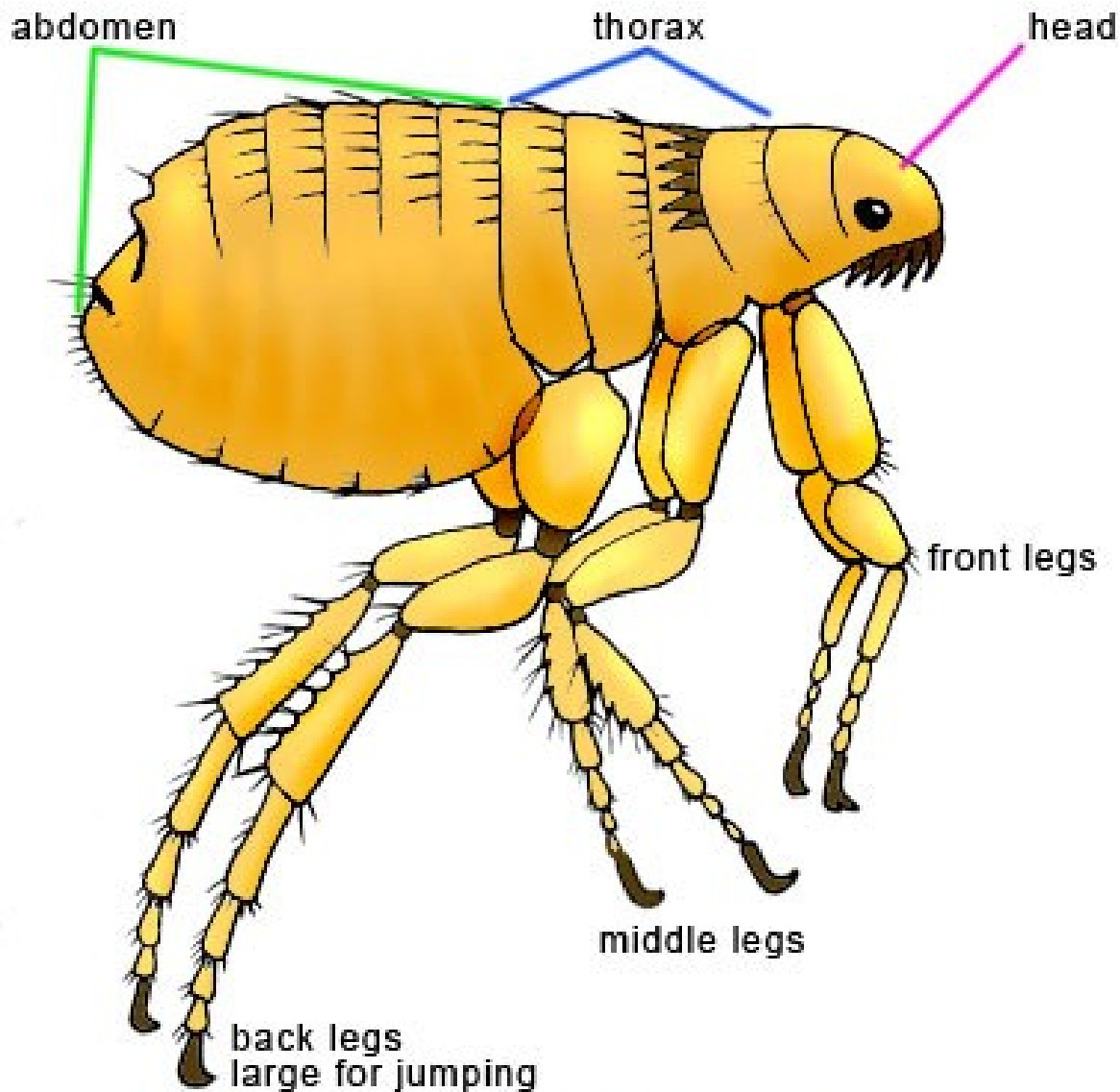
The birds are different to the insects because birds have \_\_\_\_\_  
and insects have \_\_\_\_\_

# WASPS



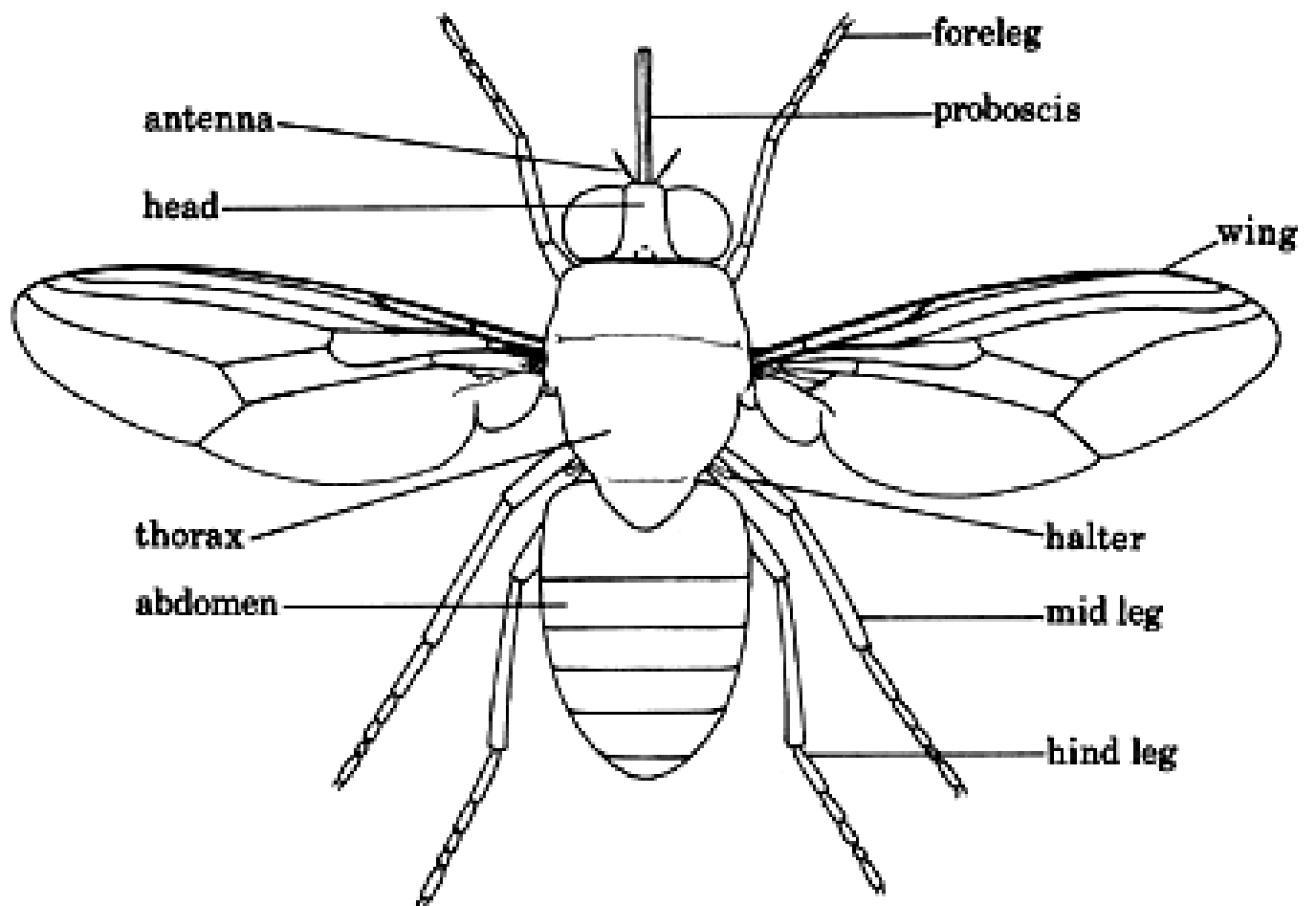
www.shutterstock.com • 774347713

# Fleas

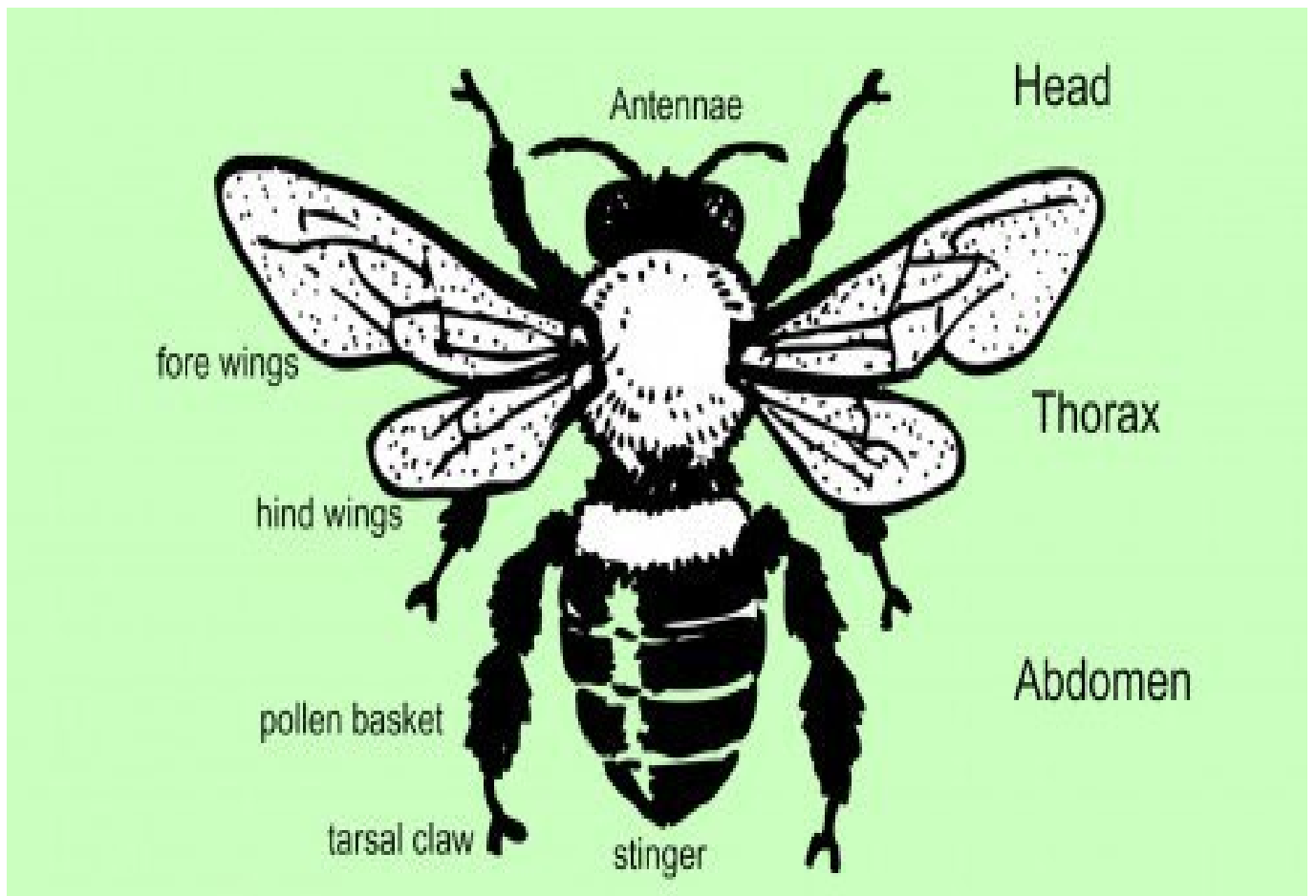


copyright O'Meara - Pet Informed

# Fly

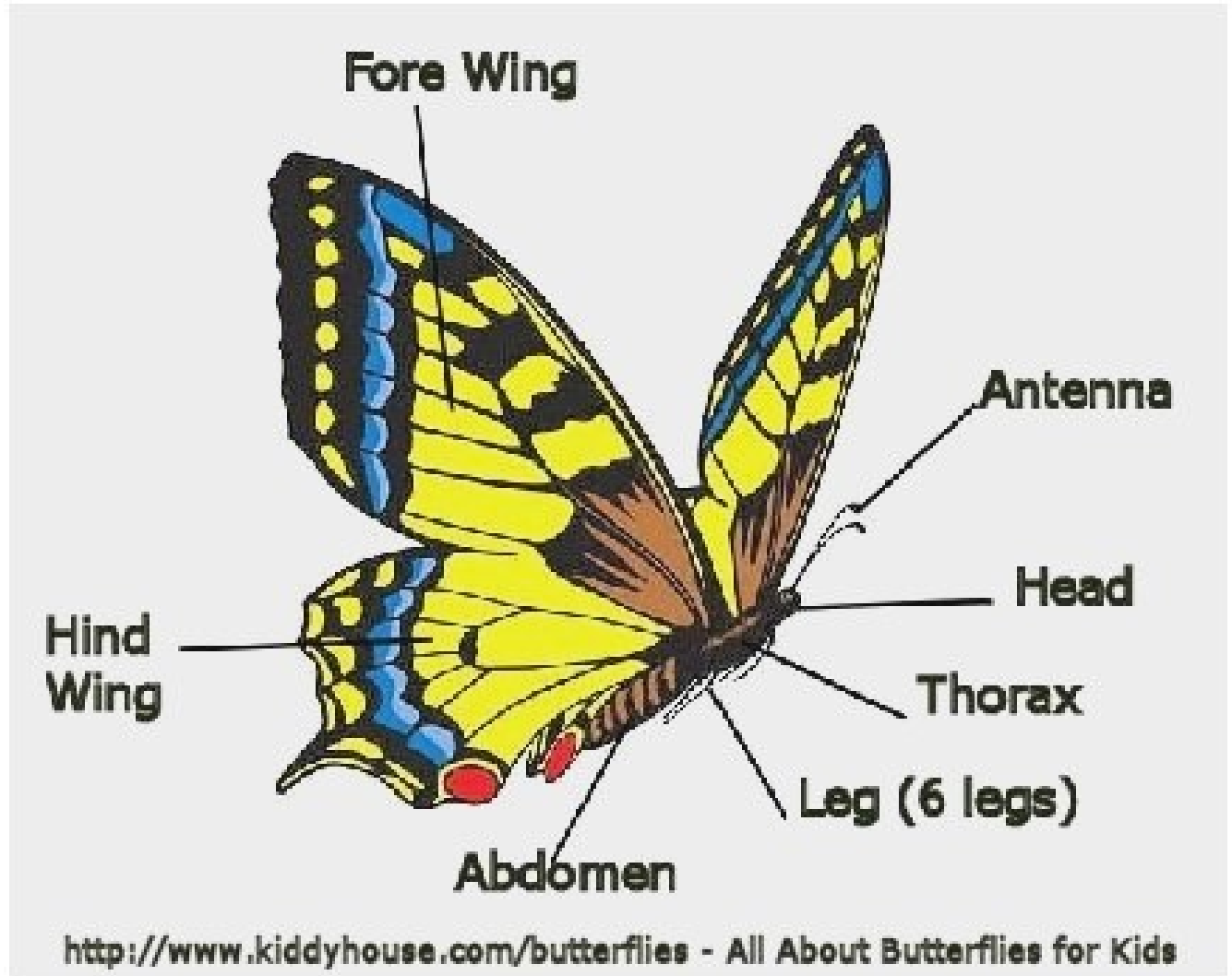


# Honey Bees

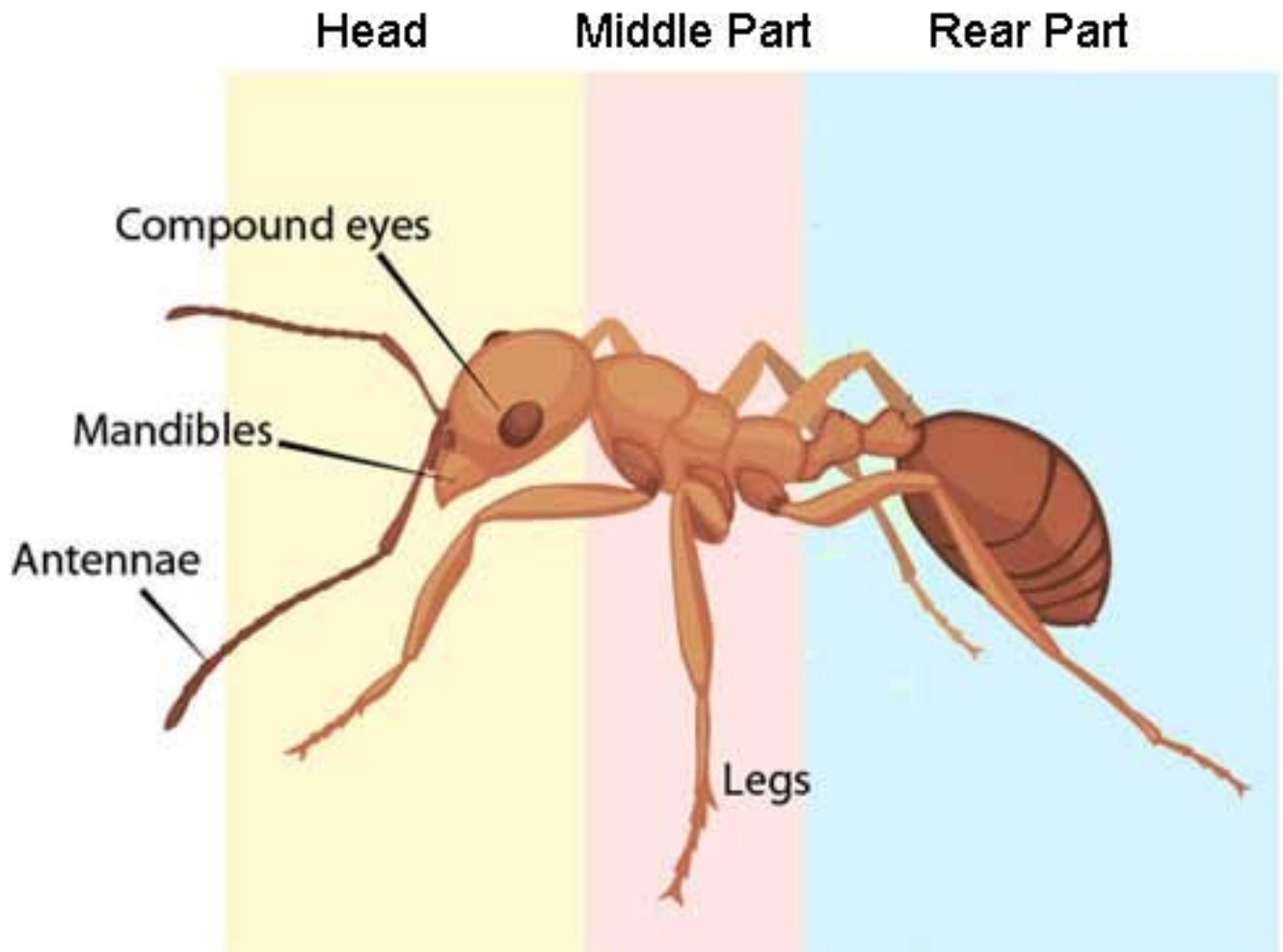




# Butterflies



# Ants



## Script for Biology of Insect Song clips

### Biology of singing

Singing insects produce sounds in a variety of ways. Members of the order Orthoptera (grasshoppers, crickets, and locusts) typically create sounds by “stridulation,” which is the rubbing of one body part against another. Among crickets and katydids, the base of the forewings are specially modified for sound production ([see the image to the right](#)). A sharp edge or “scraper” is located on the upper surface of the lower wing and is rubbed against a row of bumps known as the “file” on the underside of the upper wing. Sounds produced in this fashion range from melodic trills or chirps of crickets to the high-pitched raspy squawks, buzzes, and shuffles of katydids and grasshoppers.

During sound production, crickets and katydids elevate their wings and then move them back and forth rapidly. The wings vibrate as a result of the scraper rubbing against the file and setting the wings in motion. [Play Video of Snowy male tree cricket singing](#).

Although our native grasshoppers do not stridulate with their wings, many do stridulate using their hind legs against the closed wings.

Singing males can be recognized by the rapid up-and-down motion of their hind legs, one going up while the other is going down. Sounds produced in this fashion are quite and shuffling in quality. Cicadas produce the loudest of insect sounds. [Play marsh meadow grasshopper sound clip](#).

## **Insect hearing**

The singing Orthopterans possess oval eardrums, or tympana. Crickets and katydids have tympana on the front legs at the base of the tibia ([white arrows in image to left](#)). Locusts have tympana covered by the wings and located on the sides of the first abdominal segment. Cicadas have exposed eardrum on their abdomen. You would think that cicadas would deafen themselves producing such loud sounds right next to their ears. As it turns out, just as the male cicada starts to sing, he contracts a small muscle that folds the ear shut. Certainly, an ingenious way to protect his hearing.

## **Song structure and recognition**

Each species has its own distinct song, which is recognized by all individuals of the same species. Songs are told apart both by their dominant frequency and by the details of their timing patterns. [Play Katydid sound clip.](#)

When the weather is warmer insects' songs change and go faster. Because of this people can count the number of chirps in 13 seconds, add 40 to that number and come close to the temperature in degrees. Now let's try. We are going to count the number of chirps we hear. Ready? [Play song of the snowy tree cricket clip but pause it at the 15 second mark. Count the first part which is at 55 degrees F. Then play the second part and count again. It is at 73 degrees F.](#)

## **Function of songs**

The great majority of insect songs that we hear in nature are the "calling songs" of males, produced primarily to attract mates. Calling songs may have other functions as well. In some species, the calling song may serve to attract males to a group chorus whose combined sounds attract females to the area.

Alternatively, the mating song may function to keep males optimally spaced within singing colonies.

Males of certain species, especially field crickets, also have special “courtship songs,” which are given in the presence of a female. These often sound similar to the calling song, but with obvious changes in the timing. For instance, in the Spring and Fall Field Crickets, the calling song is a measured series of repeated chirps, while the courtship song is a sputtering ramble of rapidly delivered notes. [Play Fall field cricket sound bit](#),

## **Courtship, Mating, and Life Cycle**

Among most of our singing insects, the male attracts a female by singing his calling song. When he becomes aware of her approach, he either stops singing altogether, or else he switches to a special “courtship song” that further engages the female.

## **Chorusing Behavior**

Within colonies, calling often has contagious elements. For instance, the first male to begin singing in a group often elicits singing in other males. Singing insects may also synchronize their songs. In the Columbian Trig, males in colonies call together but synchronize imperfectly, to create a unique throbbing sound. [Play the Columbian trigs sound clip](#), [And the last sound clip of the common true katydid](#)

## Scavenger Hunt 1

See if you can find examples of the following items in the time allotted (an hour or more). Do not kill your insects (they will be released at the end of the scavenger hunt). A point value has been assigned to each item according to its significance. Good luck!

√	Item	Notes	Points
	An ant		2
	A bee or wasp		2
	A fly		2
	A grasshopper		2
	A mosquito		2
	A stink bug		2
	A butterfly		2
	An insect eating a plant		2
	A june bug		2
	A cricket		2
	A moth		2
	An insect without wings		5
	An insect with wings		5
	An insect with 3 or more colors		5
	An insect with 1 color		5
	Insect eggs		10

Score \_\_\_\_\_

## Scavenger Hunt 2

See if you can find examples of the following items in the time allotted (an hour or more). Do not kill your insects (they will be released at the end of the scavenger hunt). A point value has been assigned to each item according to its significance. Good luck!

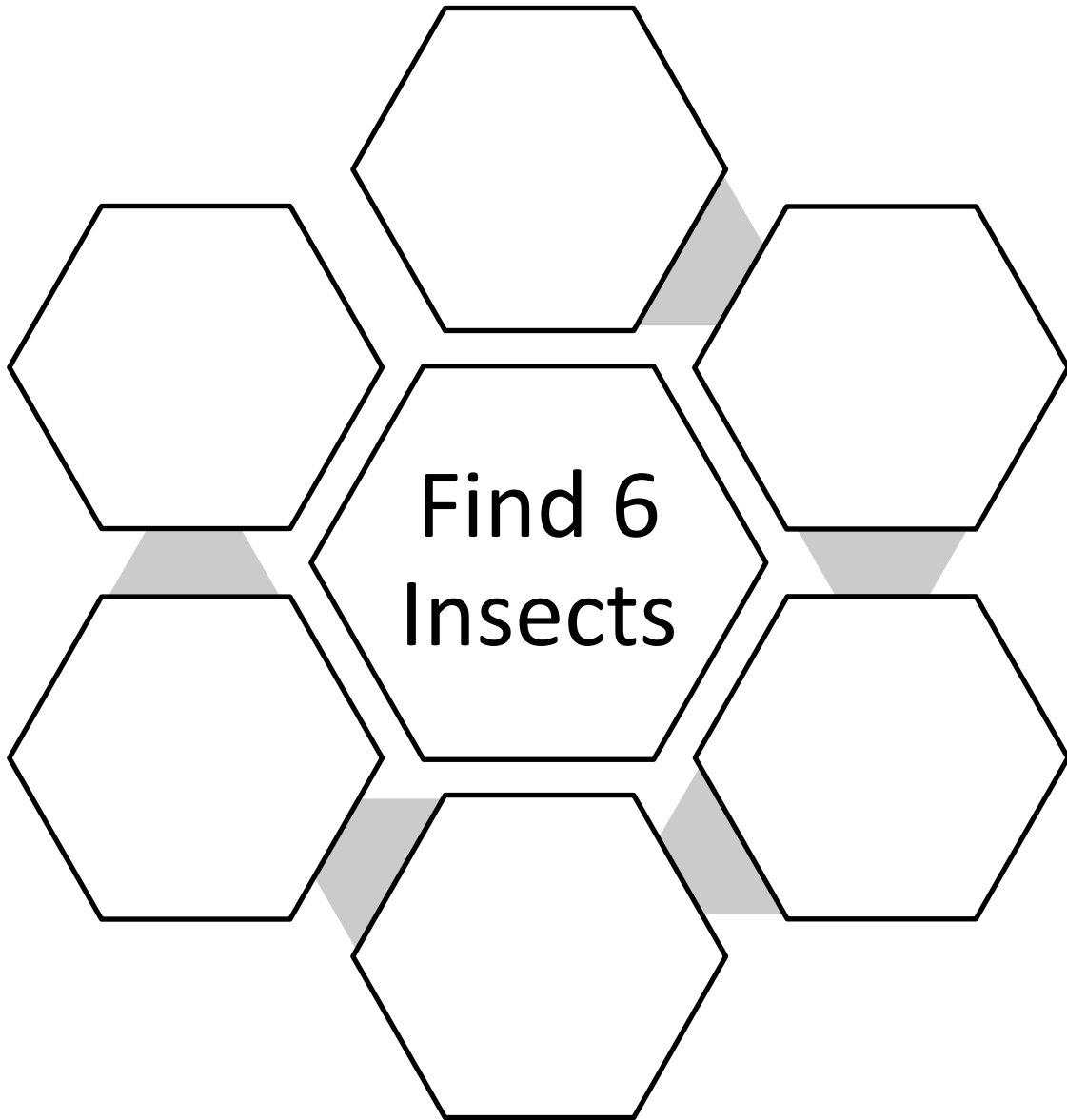
√	Item	Description	Points
	An insect eating a plant		2
	An insect eating another insect		2
	An insect pollinating a flower		2
	An insect drinking nectar from a plant		2
	An insect drinking water		2
	An insect colored to blend into its background		2
	An insect with complete metamorphosis		2
	An insect with incomplete metamorphosis		2
	An insect that lives in a "society"		2
	An insect with 2 wings		2
	An insect with 4 wings		2
	An insect without wings		2
	An insect with 4 or more colors		5
	An insect with only 1 color		5
	An example of the larval stage		5
	An example of the pupal stage		5

Score \_\_\_\_\_

### Scavenger Hunt 3

Name \_\_\_\_\_

Find 6 different insects and draw them or write their names.





## Unscramble These Insect

1. Everywhere a \_\_\_ goes, it leaves germs. l y f
2. \_\_\_ make wax and honey and live in hives. e b s e
3. \_\_\_ feed off the blood of many animals, including cats, dogs and even humans. e s l f a
4. \_\_\_ eat wood. s t m e i r e t
5. You might see a \_\_\_ after dark, because it glows. y f r e i l f
6. \_\_\_ are red or yellow in color, have 2-24 black spots and eat aphids. g s d y a u l b
7. \_\_\_ begin their lives as caterpillars. t f u i e b e t l r s
8. \_\_\_ usually live near freshwater streams and ponds and eat mosquitoes. o n g f s i r a d l e
9. \_\_\_ are well camouflaged as twigs or sticks. i w s k l a t g k n c s i
10. \_\_\_ resemble a leaf and their song slows down as the temperature gets colder. i a t k s d y d
11. \_\_\_ live in colonies, build hills and always enjoy a good picnic lunch. s a t n
12. \_\_\_ live everywhere people do, and their bite causes an itchy red bump. u s m o q s t i e o
13. \_\_\_ are usually black or brown in color, resemble a grasshopper and chirp. k t c e s r c i
14. \_\_\_ are known to sting, have wings and pollinate flowers. p s w a s
15. \_\_\_ may be found on a human's head and cause itching. c e l i

## Unscramble These Insects Answer key

1. Fly
2. Bees
3. Fleas
4. Termites
5. Firefly
6. Ladybugs
7. Butterflies
8. Dragonflies
9. Walking sticks
10. Katydid
11. Ants
12. Mosquitoes
13. Crickets
14. Wasps
15. Lice

## Insects Move

Name: \_\_\_\_\_

Write the letter of a correct match next to each problem.

1.		Dive	a.	Fleas
2.		March	b.	Moths
3.		Skate	c.	Dragonflies
4.		Run	d.	Roaches
5.		Swarm	e.	Diving Beetles
6.		Strike	f.	Mantids
7.		Swim	g.	Water Boatmen
8.		Crawl	h.	Maggots
9.		Dart	i.	Water Striders
10.		Squirm	j.	Mosquito Larvae
11.		Paddle	k.	Whirligigs
12.		Burrow	l.	Backswimmers
13.		Wiggle	m.	Bees
14.		Jump	n.	Ants
15.		Spin	o.	Caterpillars
16.		Fly	p.	Whirligigs
17		Wriggle		Mole Crickets

Score \_\_\_\_\_

## Insects Move Answer Key

Fleas- jump

Moths- fly

Dragonflies- dart

Roaches- run

diving beetles- swim

mantids -strike

water boatmen- paddle

maggots- squirm

water striders- skate

whirligigs- spin

backswimmers- dive

bees- swarm

ants- march

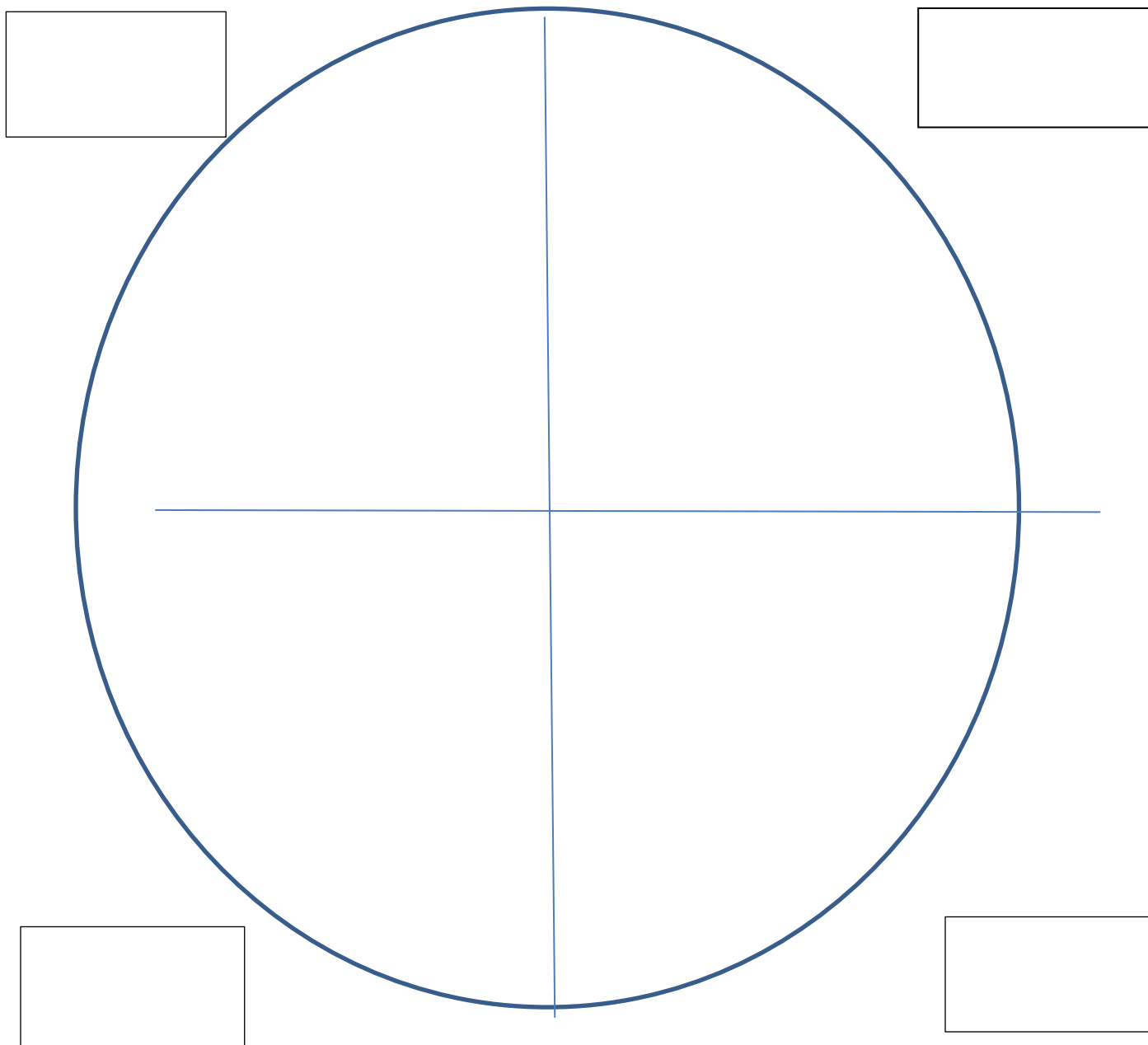
caterpillars- crawl

mole crickets- burrow

mosquito larvae- wriggle

# Fly Food Experiment

Draw the food on each part of the circle. As a fly eats put a line in the box beside the food.



## Fly Food Experiment Worksheet

Name \_\_\_\_\_

1) What foods did you use?

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2) What do you think the flies will prefer?

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3) How long did it take for flies to come?

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4) How did the flies act?

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5) Did the flies prefer one food over another?

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## Predictions about Insects Worksheet

**Question: Will the size and color of an insect protect it from being eaten?**

<i>"Insect"</i>	<i>Easy to Find?</i>		<i>Number Found</i>
	<i>Yes?</i>	<i>No?</i>	
<i>Yellow lentils</i>			
<i>Black beans</i>			
<i>Pinto beans</i>			
<i>Lima beans</i>			
<i>Navy beans</i>			
<i>Black-eyed peas</i>			
<i>Split peas</i>			

Were some colors easier to see? \_\_\_\_\_

Were some sizes easier to see? \_\_\_\_\_

Why? \_\_\_\_\_

# Insects That Live in the Rainforest

1) \_\_\_\_\_

2) \_\_\_\_\_

3) \_\_\_\_\_

4) \_\_\_\_\_

5) \_\_\_\_\_

**Draw your favorite rainforest insect.**



# Insects That Live in Caves



1) \_\_\_\_\_

2) \_\_\_\_\_

3) \_\_\_\_\_

4) \_\_\_\_\_

5) \_\_\_\_\_

**Draw your favorite cave insect.**

# Insects That Live in Grasslands



1) \_\_\_\_\_

2) \_\_\_\_\_

3) \_\_\_\_\_

4) \_\_\_\_\_

5) \_\_\_\_\_

**Draw your favorite grasslands insect.**

# Insects That Live in Deserts



1) \_\_\_\_\_

2) \_\_\_\_\_

3) \_\_\_\_\_

4) \_\_\_\_\_

5) \_\_\_\_\_

**Draw your favorite desert insect.**

# Insects That Live in Gardens



1) \_\_\_\_\_

2) \_\_\_\_\_

3) \_\_\_\_\_

4) \_\_\_\_\_

5) \_\_\_\_\_

**Draw your favorite garden insect.**

# Insects That Live in Streams



1) \_\_\_\_\_

2) \_\_\_\_\_

3) \_\_\_\_\_

4) \_\_\_\_\_

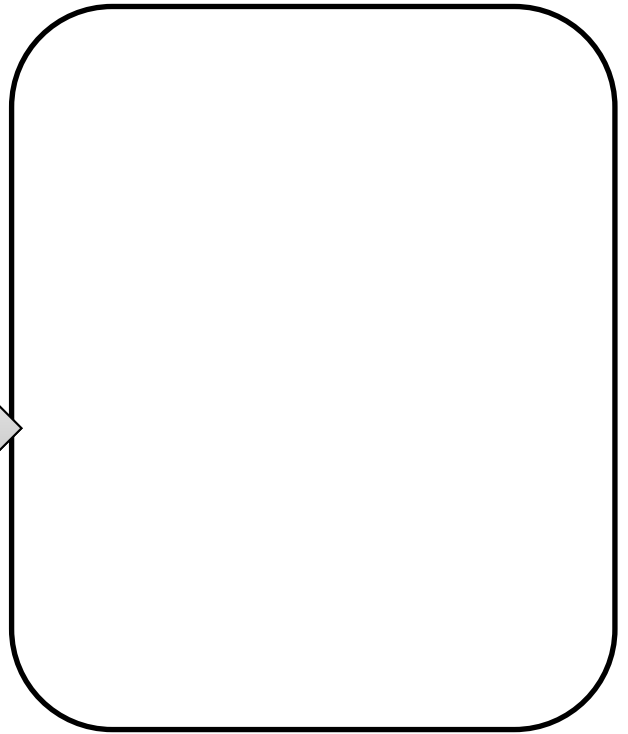
5) \_\_\_\_\_

**Draw your favorite stream insect**

# My Favorite Insect!

Name \_\_\_\_\_

My favorite insect looks like this



My favorite insect is

\_\_\_\_\_.

I like this insect because \_\_\_\_\_.

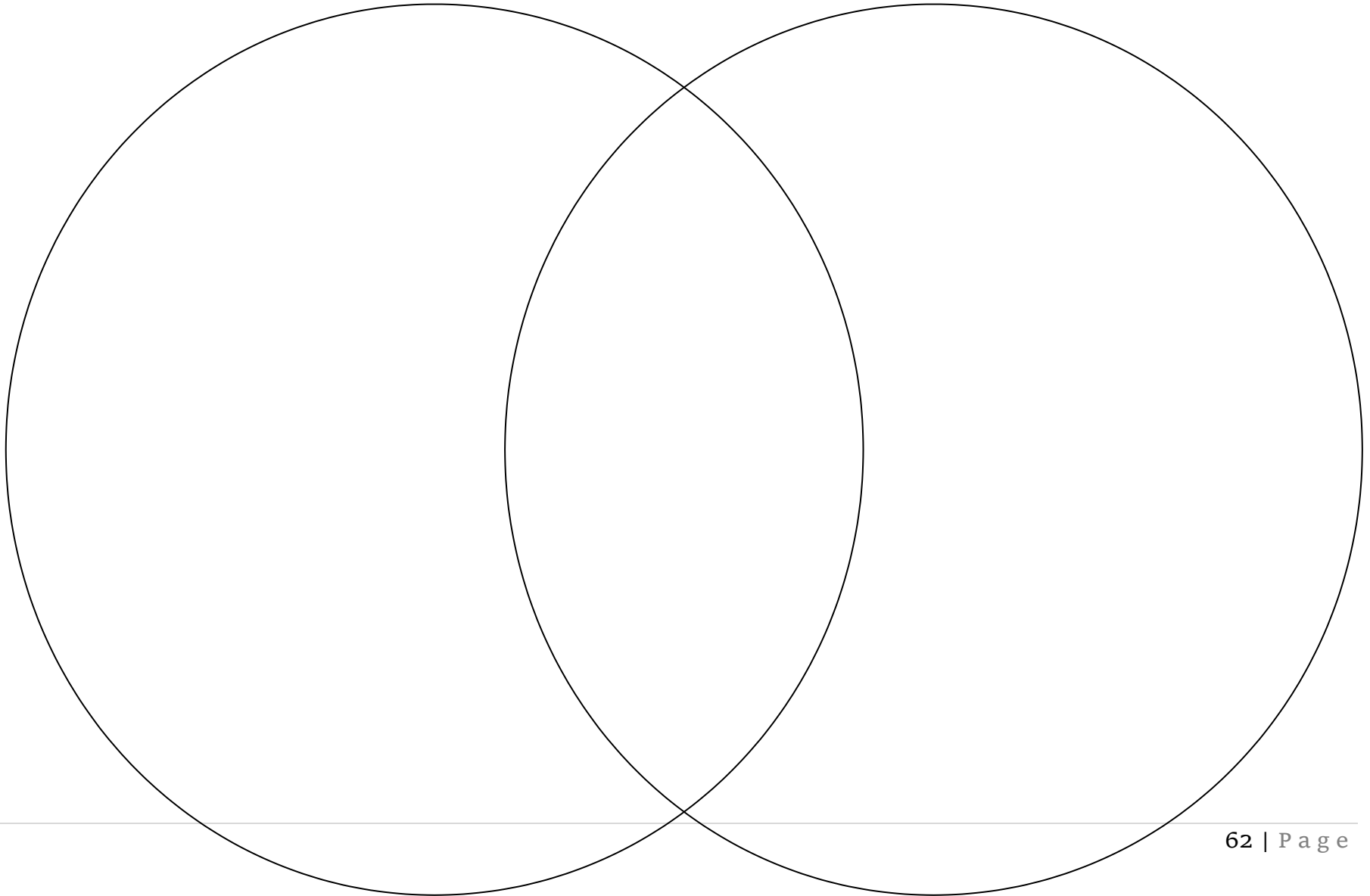
If I could keep this insect, I would name it \_\_\_\_\_.

# Mosquitoes

Can	Have	Are

Name \_\_\_\_\_ Date \_\_\_\_\_

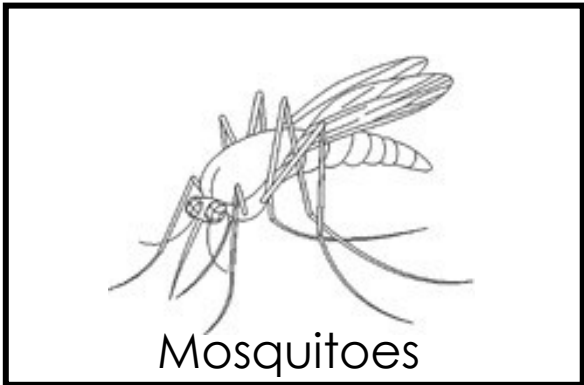
Directions: Compare and contrast the mosquito with another insect.





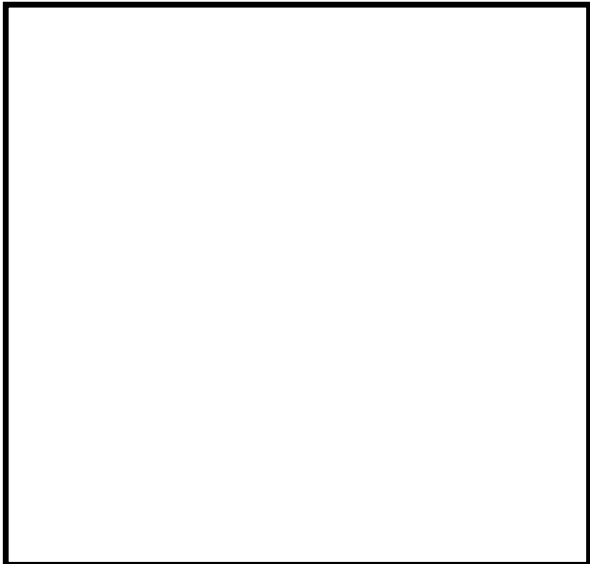
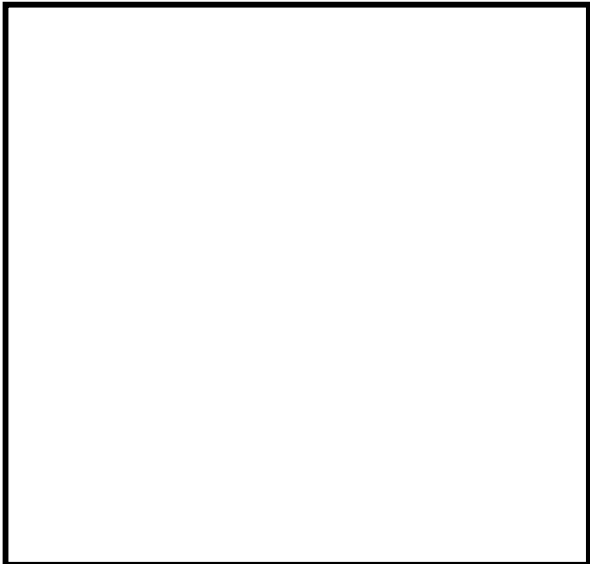
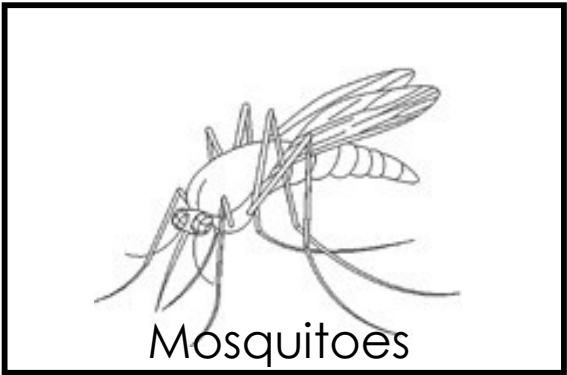
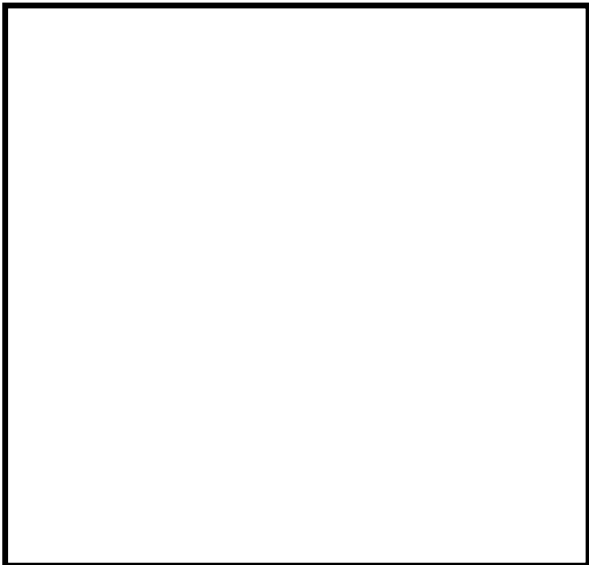
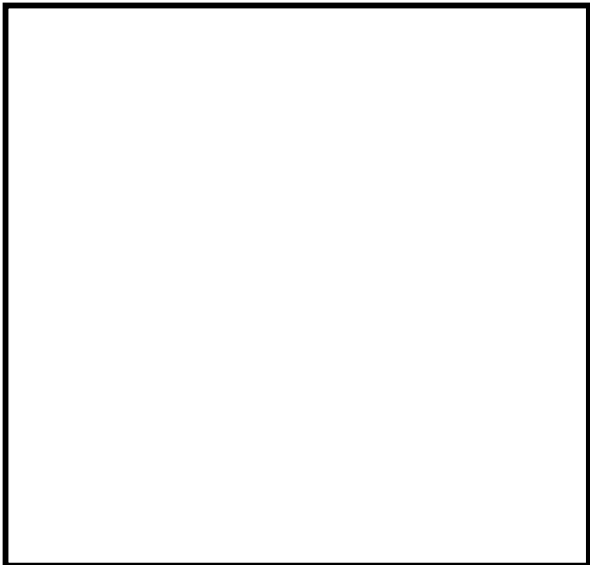
Name \_\_\_\_\_

Directions: Write four facts you learned about mosquitoes.

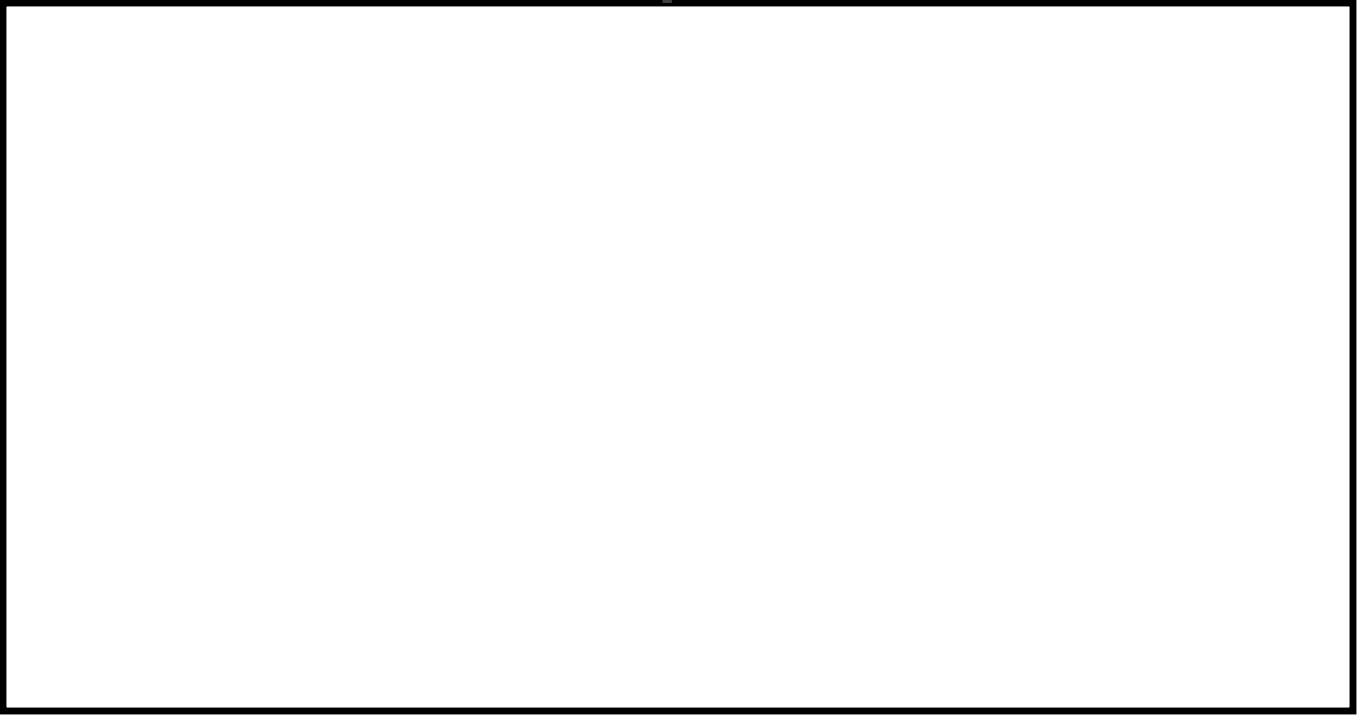


Name \_\_\_\_\_

Directions: Draw the life cycle of mosquitoes.



# Mosquitoes



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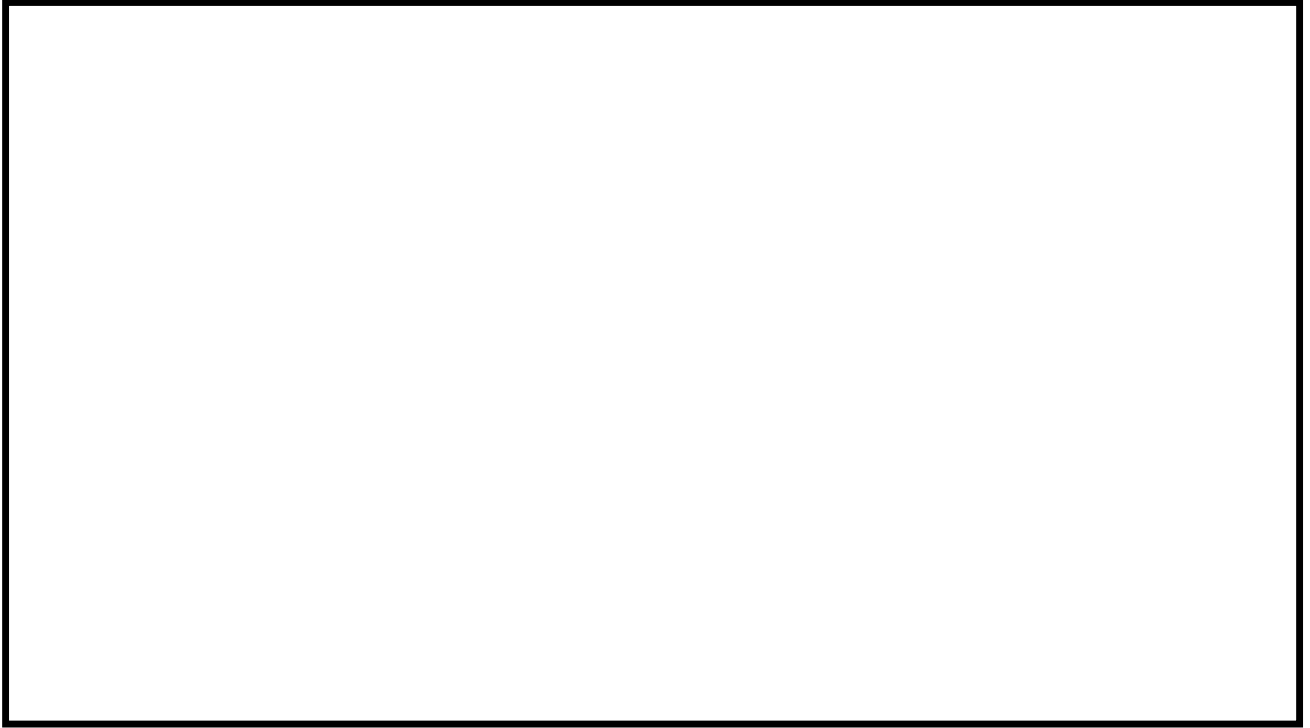
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# Mosquitoes



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Ants

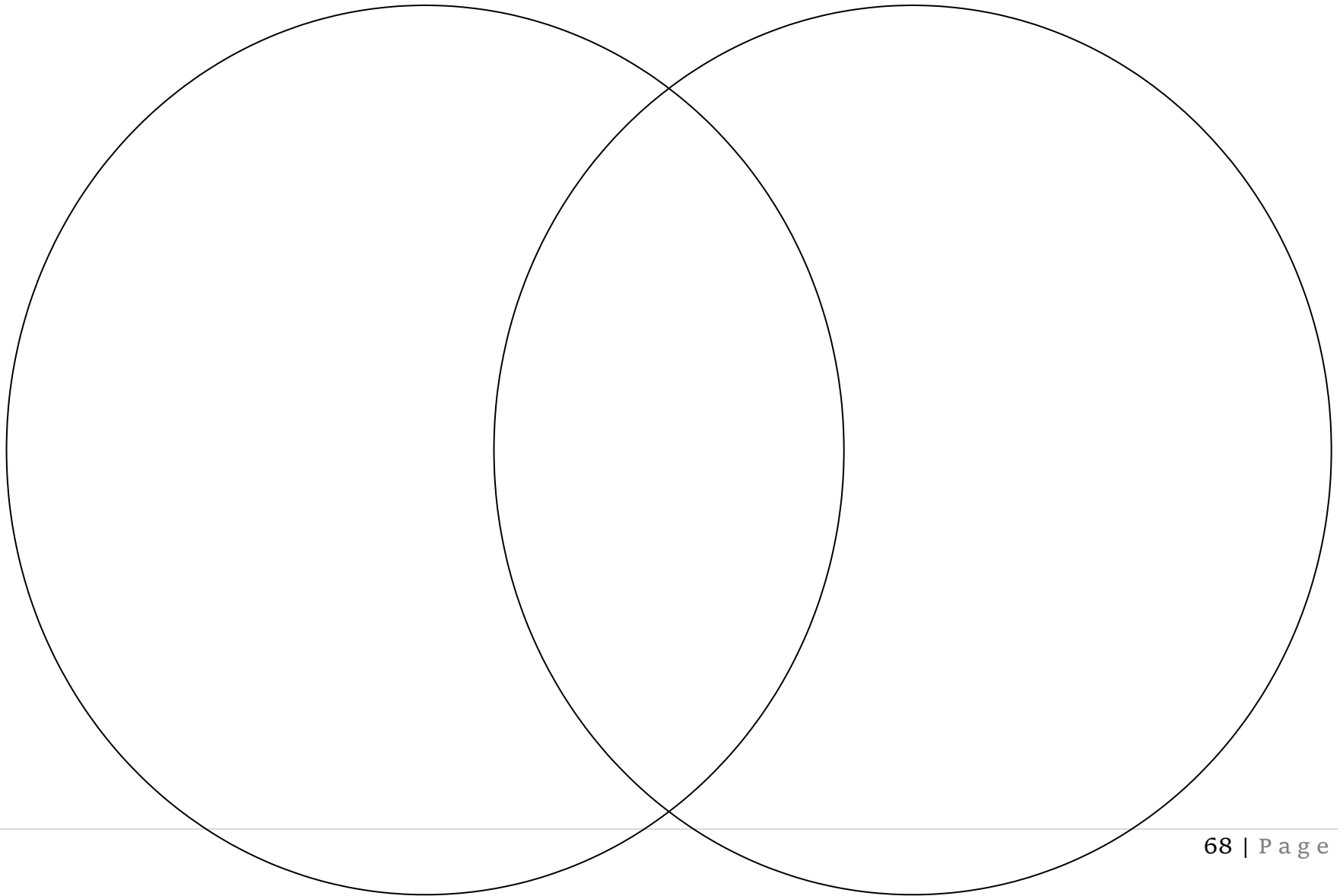
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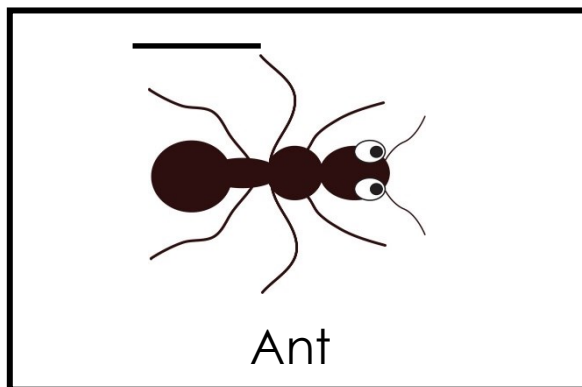
Name \_\_\_\_\_ Date \_\_\_\_\_

Directions: Compare and contrast the ant with another insect.



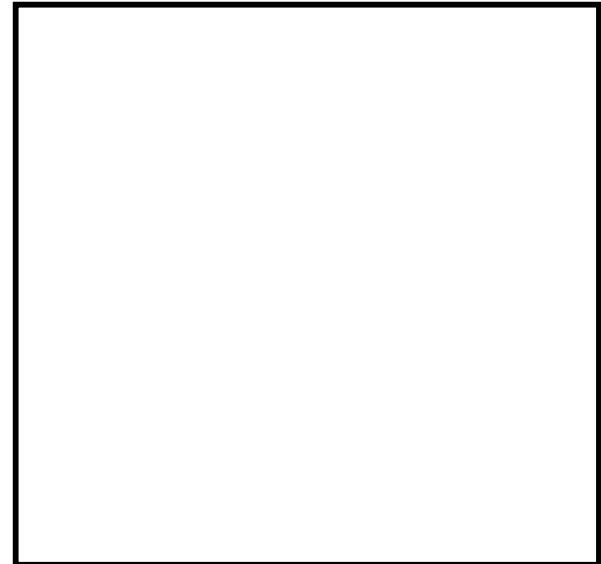
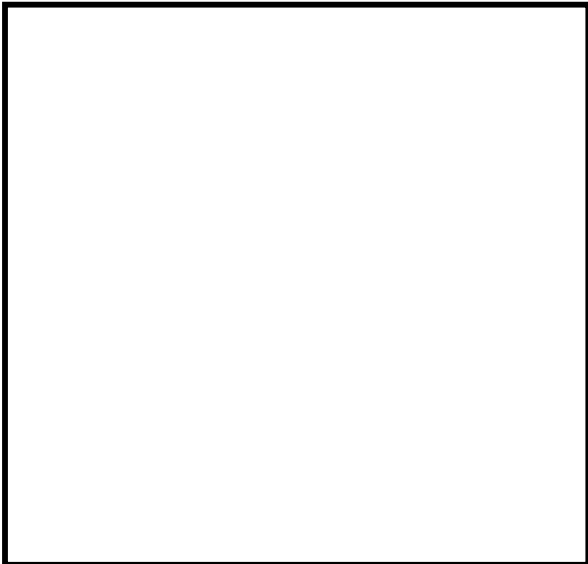
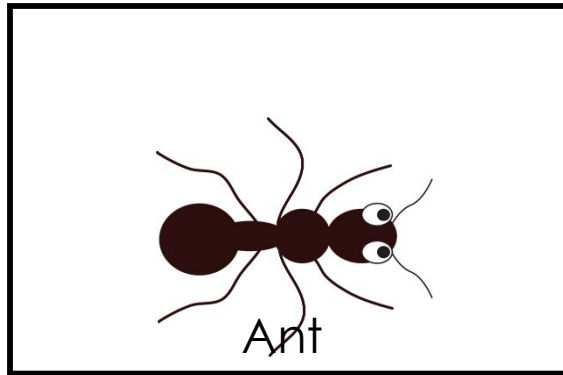
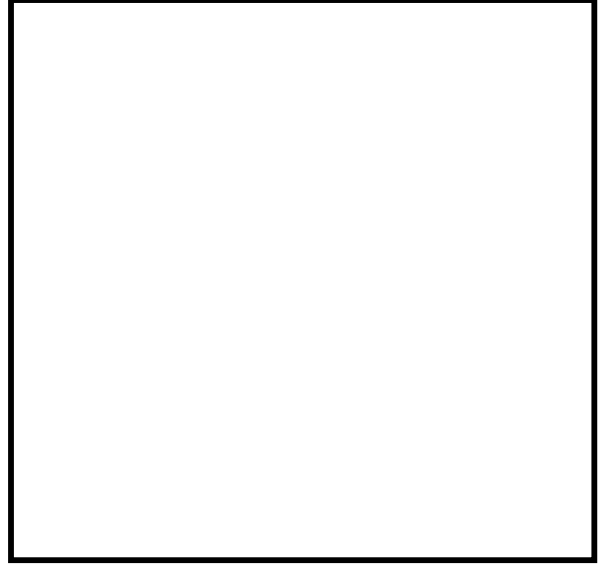
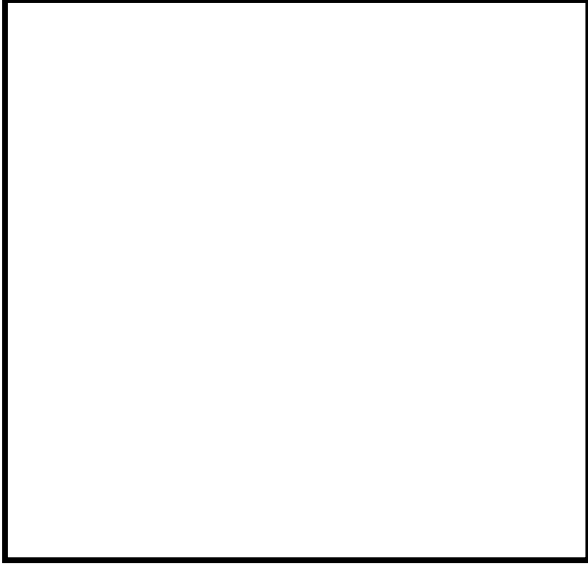
Name \_\_\_\_\_ Date \_

Directions: Write four facts you learned about ants.



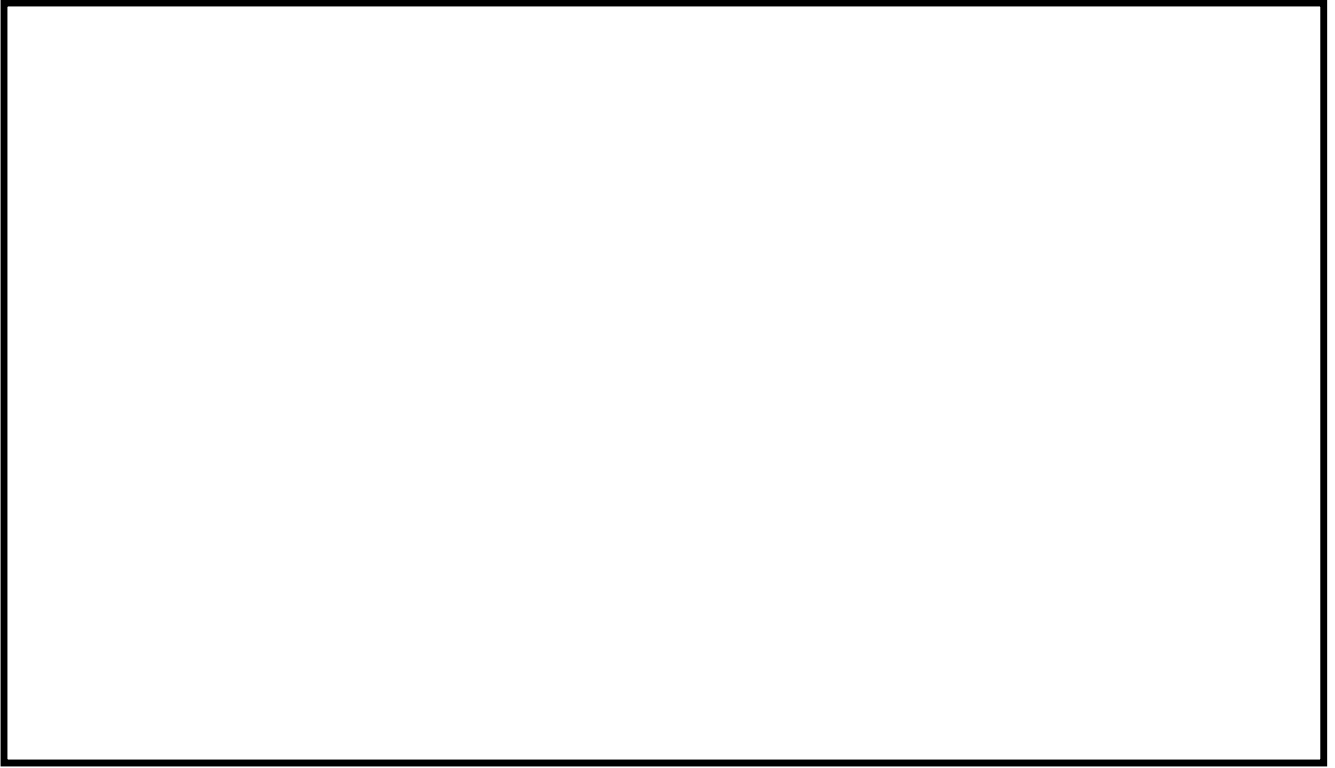
Name \_\_\_\_\_ Date \_\_\_\_\_

Directions: Draw the life cycle of ants.





# Ants



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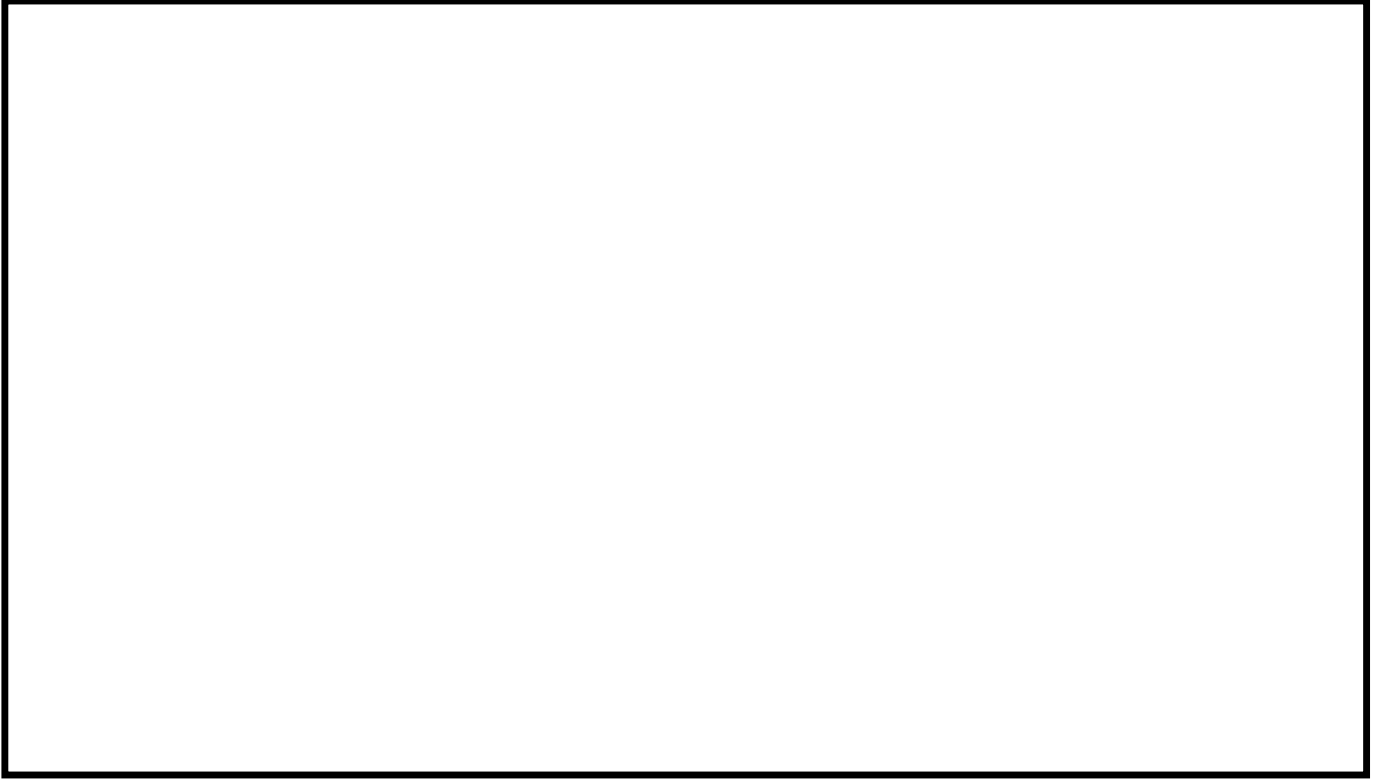
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# Ants



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# Honey Bees

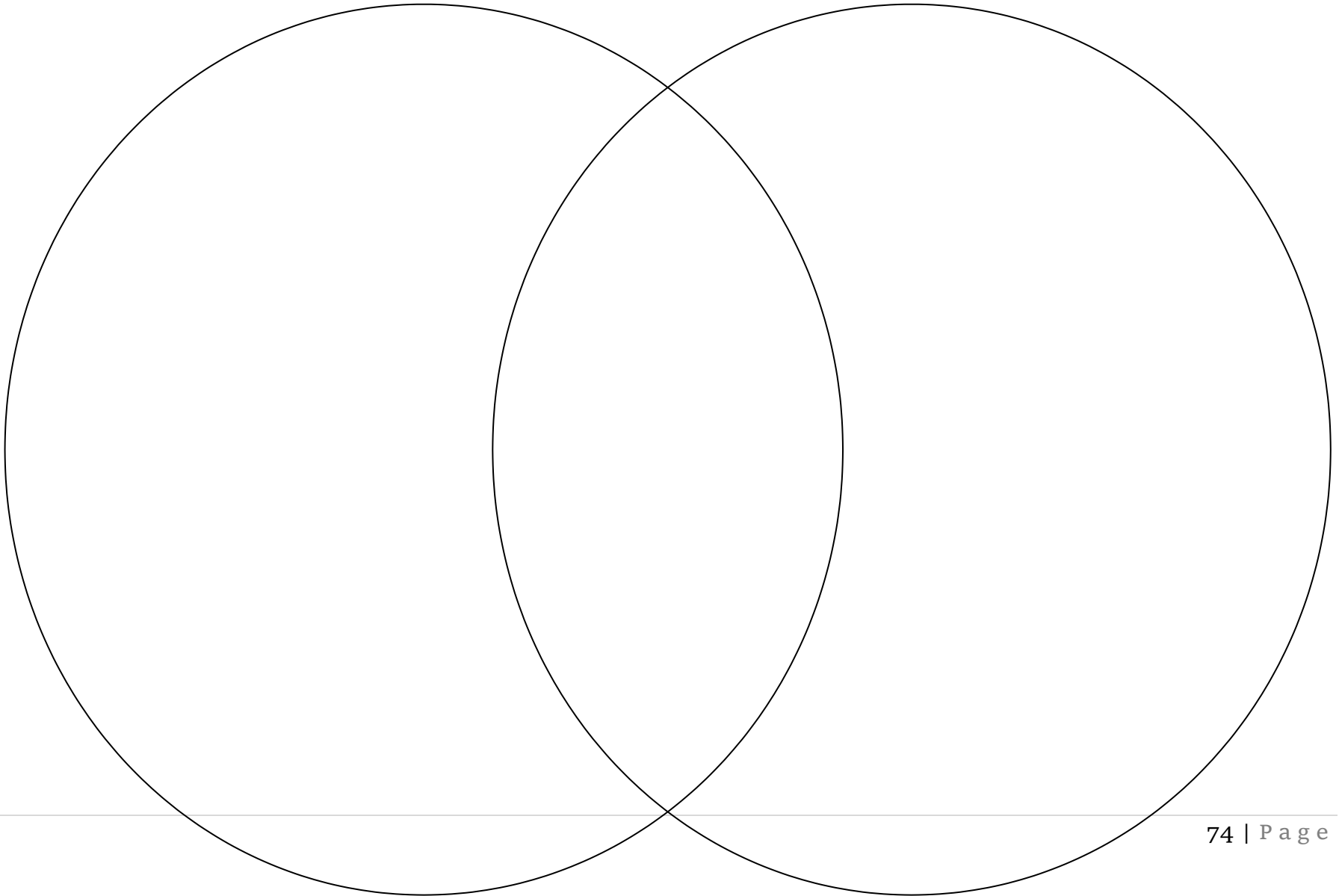
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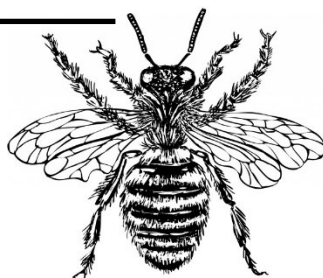
Name \_\_\_\_\_ Date \_\_\_\_\_

Directions: Compare honey bees with another insect.



Name \_\_\_\_\_ Date \_

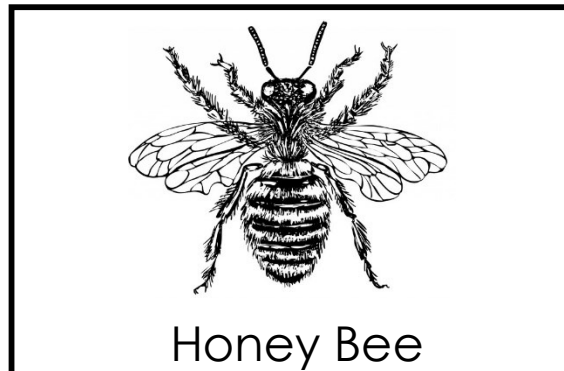
Directions: Write four facts you learned about honey bees.



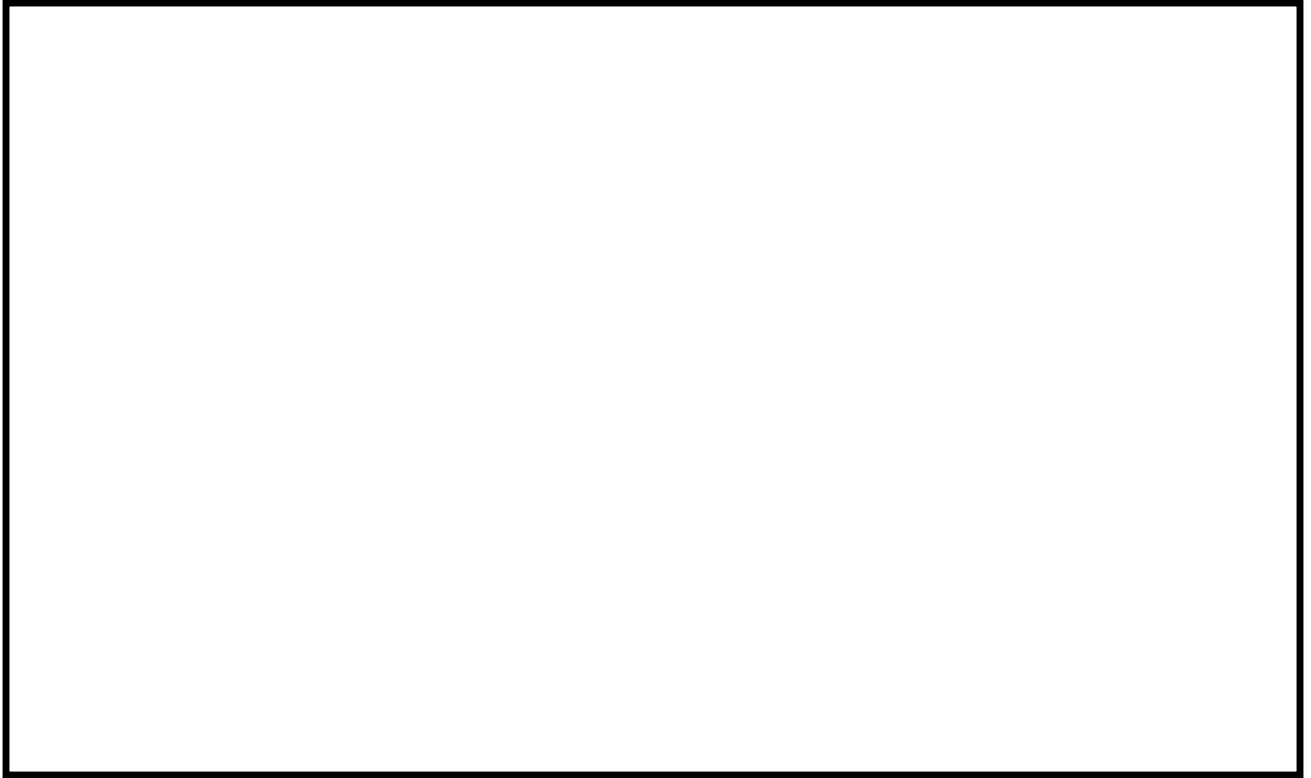
Honey Bee

Name \_\_\_\_\_ Date \_\_\_\_\_

Directions: Draw the life cycle of honey bees.



# Honey Bees



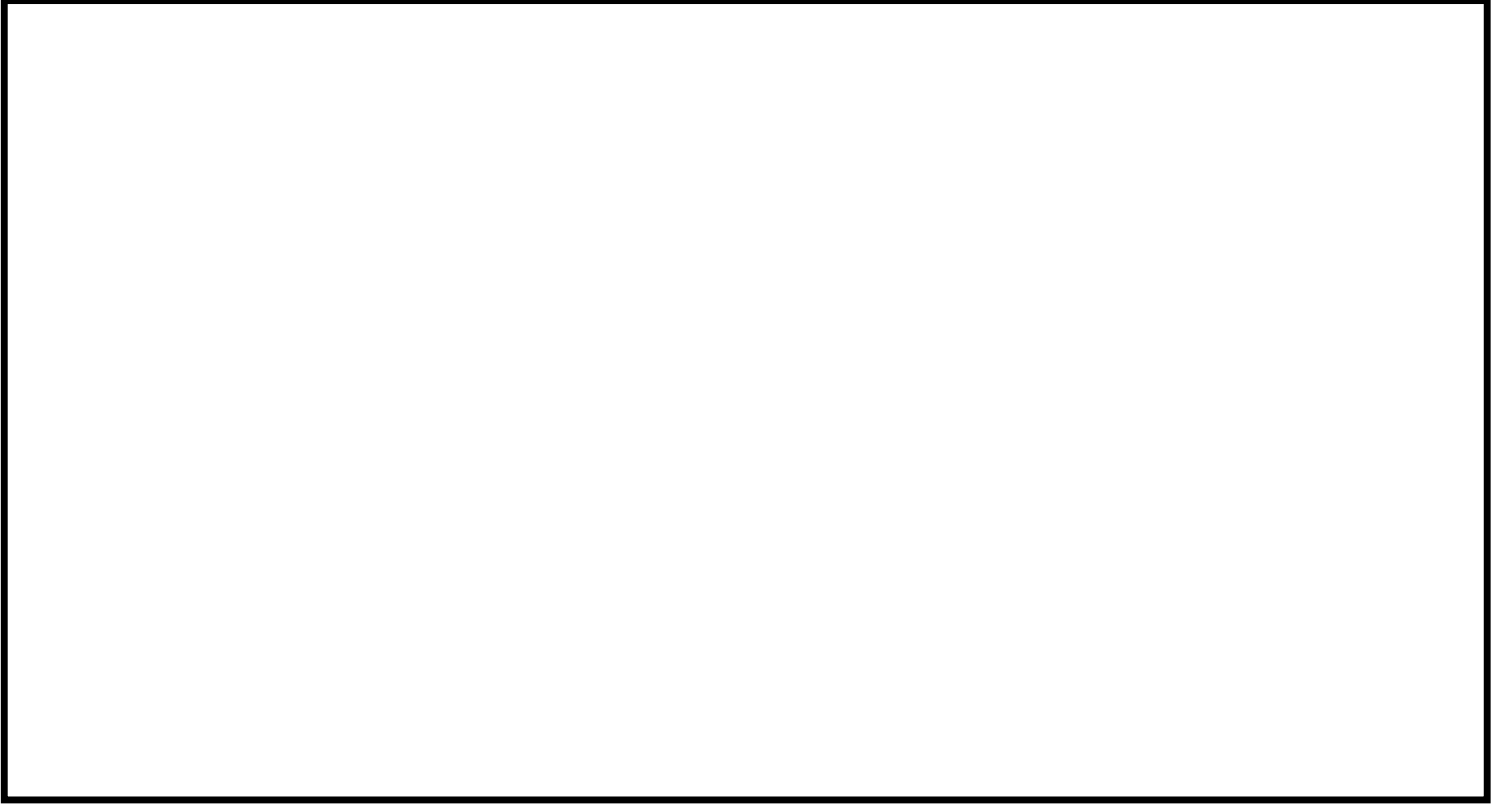
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# Honey Bees



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By \_\_\_\_\_



# Dragonflies

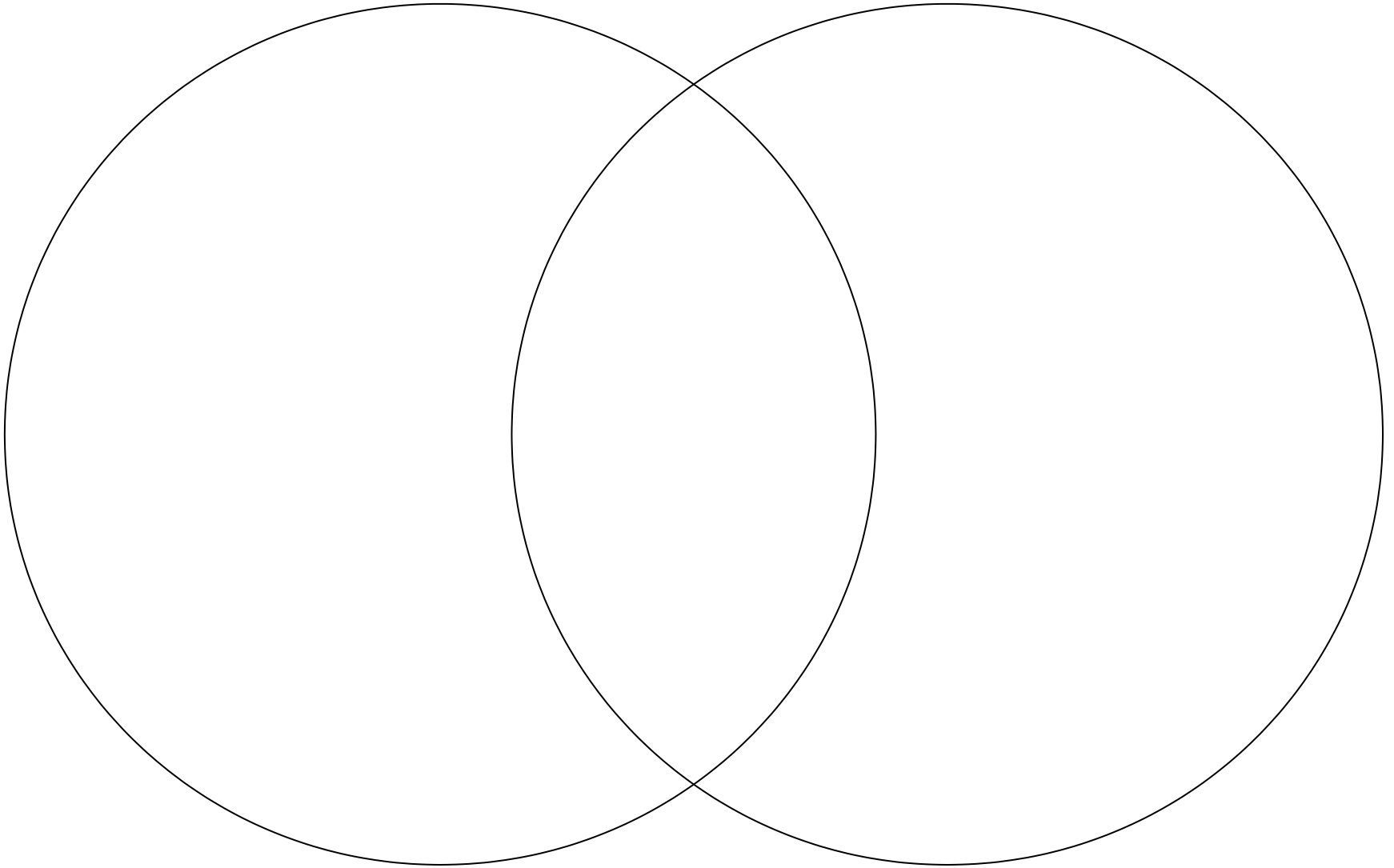
can

have

are

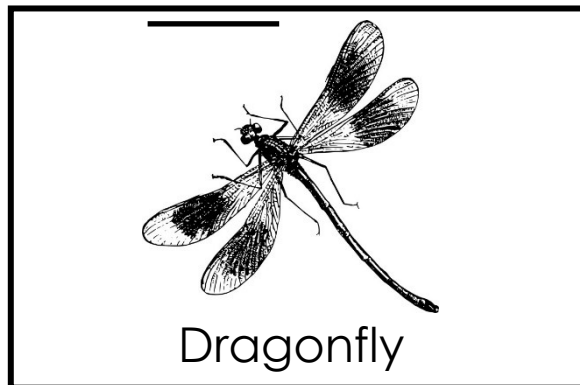
Name \_\_\_\_\_ Date \_\_\_\_\_

Directions: Compare and contrast the dragonfly with another insect.

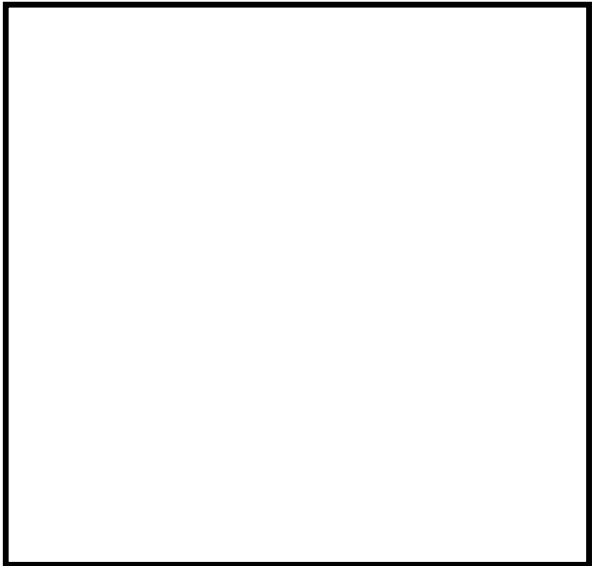
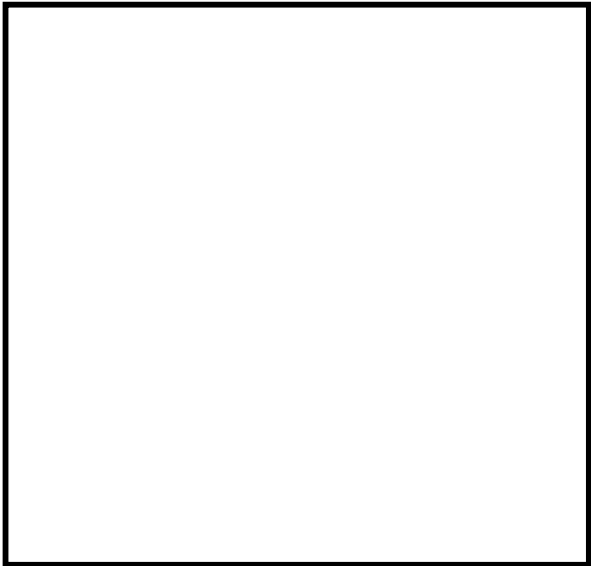
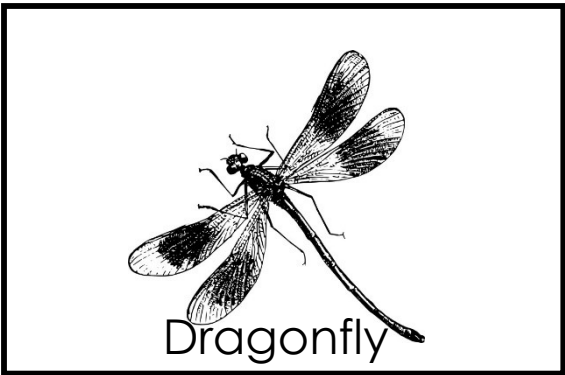
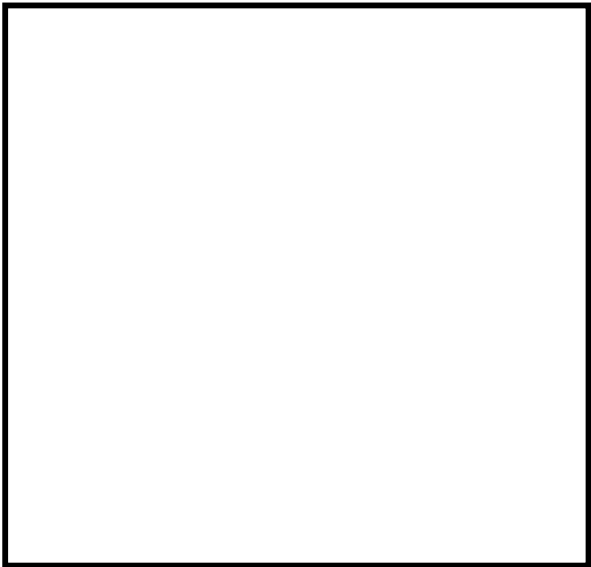
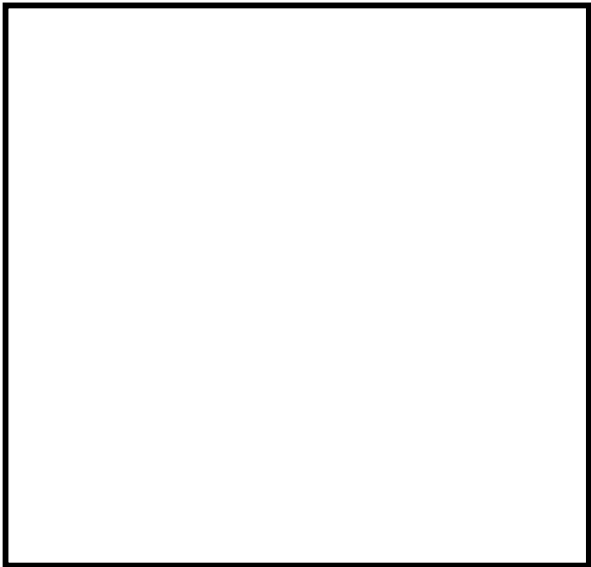


Name \_\_\_\_\_ Date \_

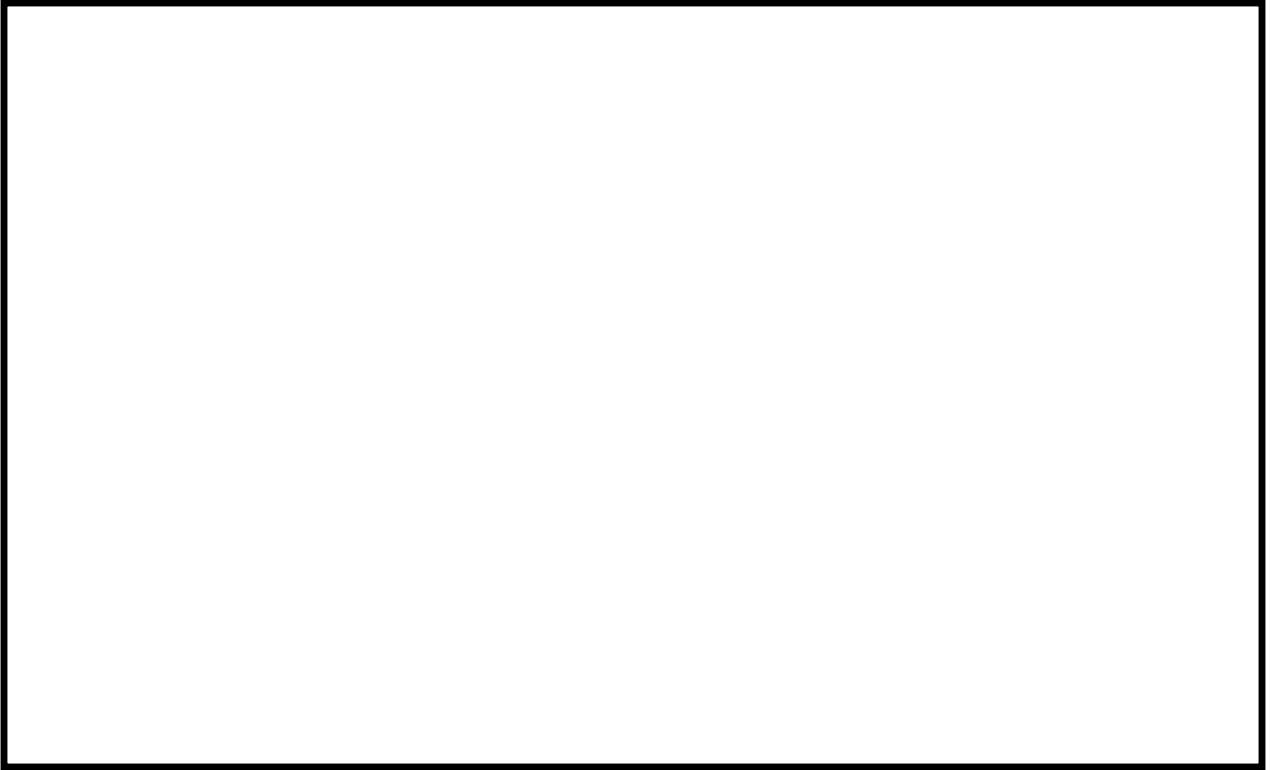
Directions: Write four facts you learned about dragonflies.



Directions: Draw the life cycle of dragonflies.



# Dragonflies



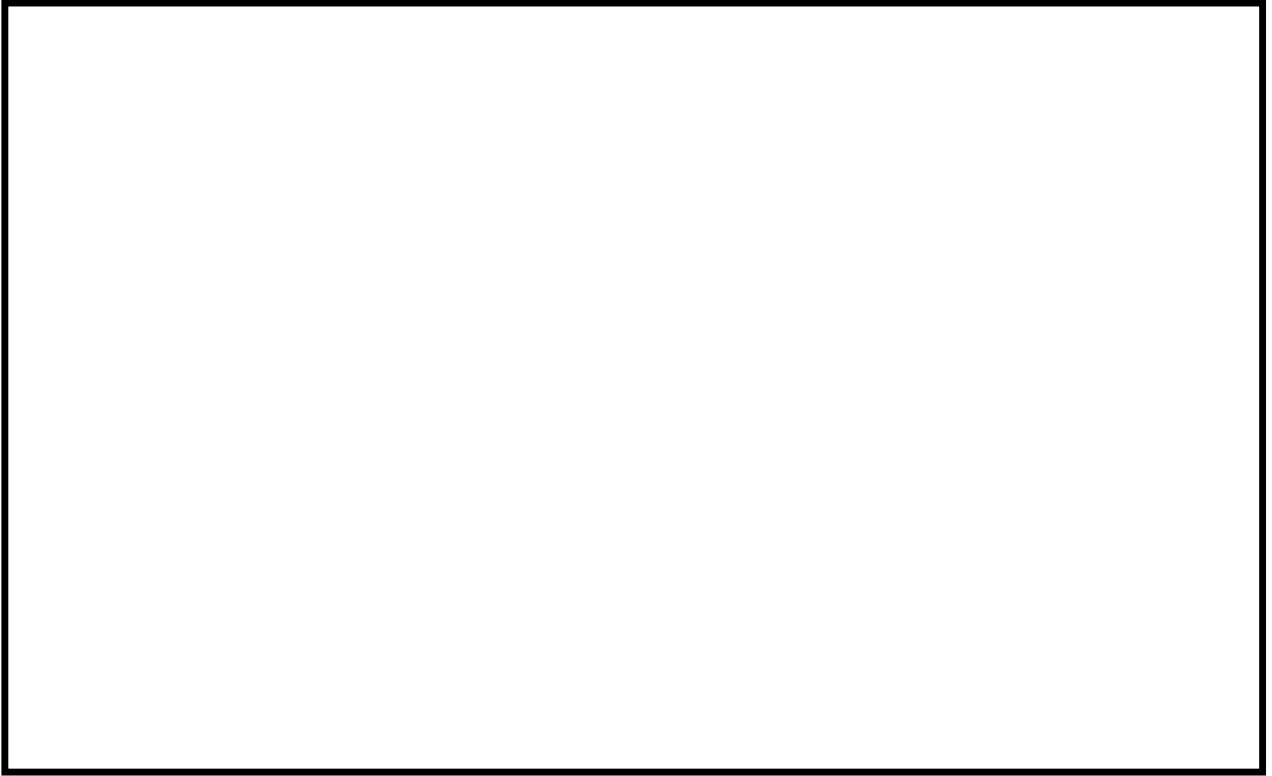
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# Dragonflies



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# Fireflies

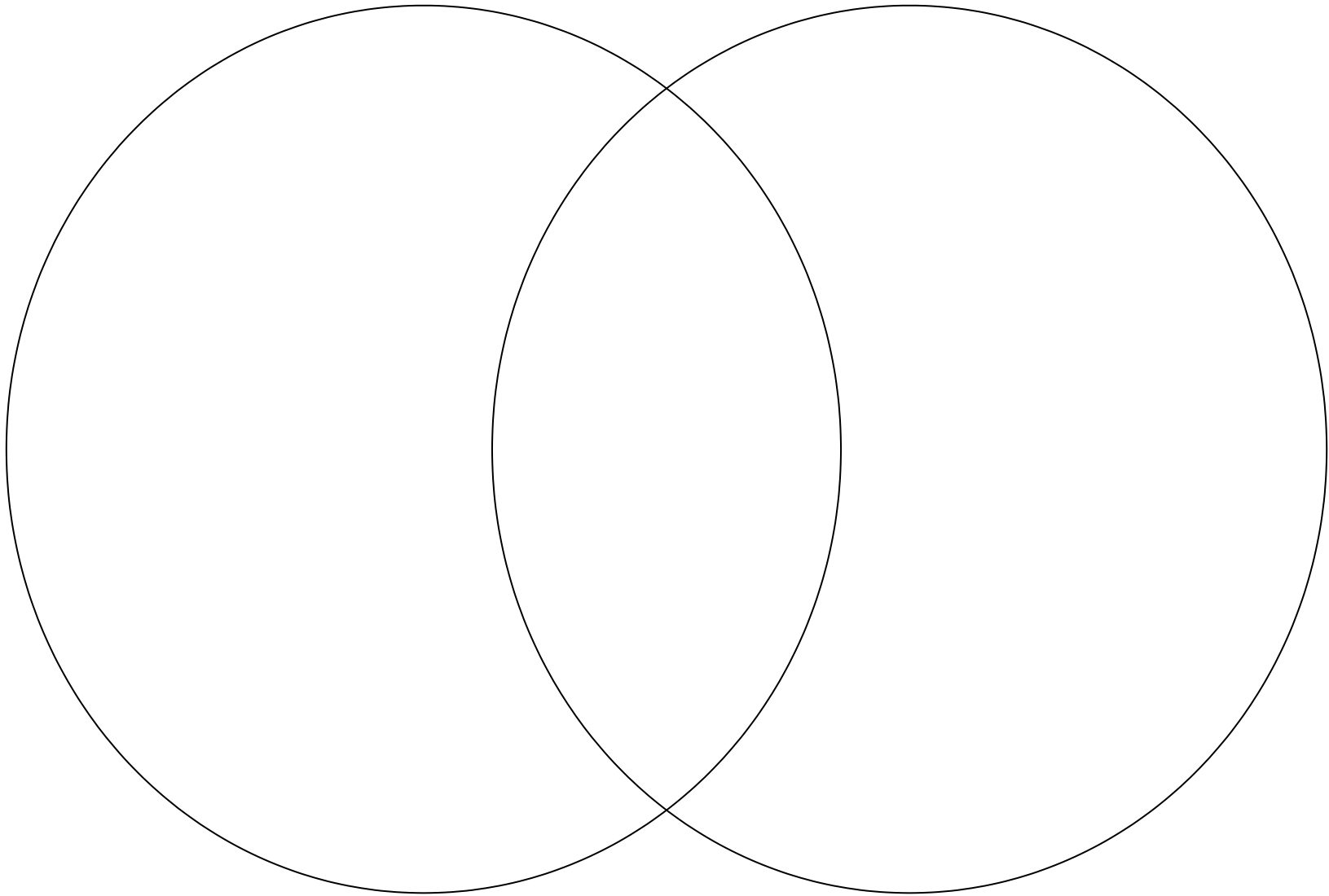
can

have

are

Name \_\_\_\_\_ Date \_\_\_\_\_

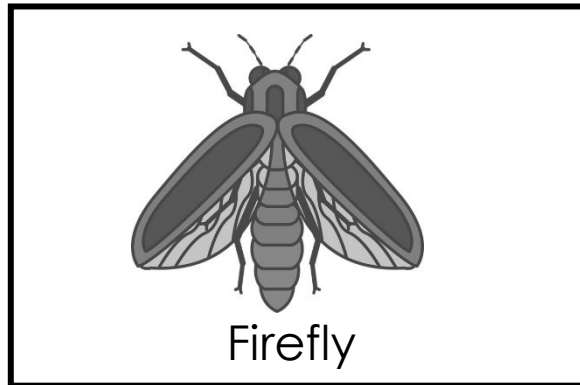
Directions: Compare fireflies with another insect..





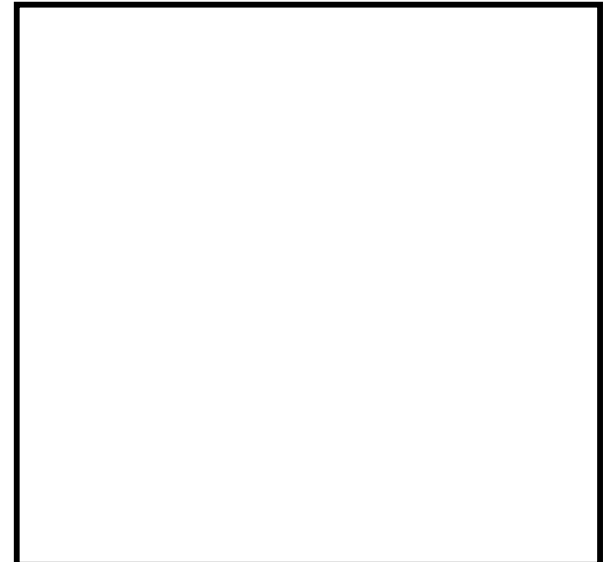
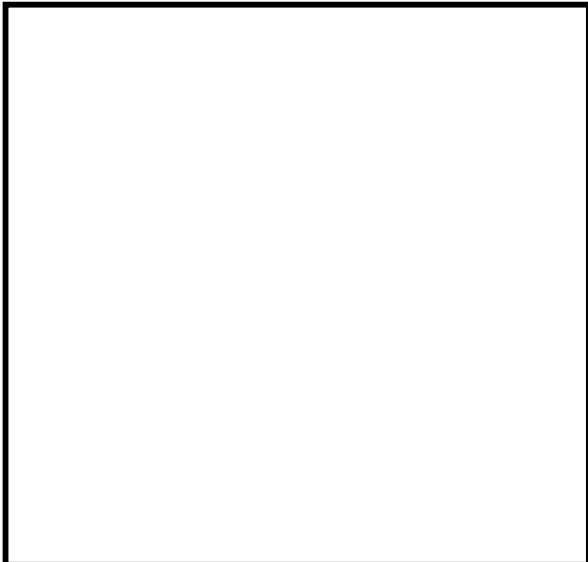
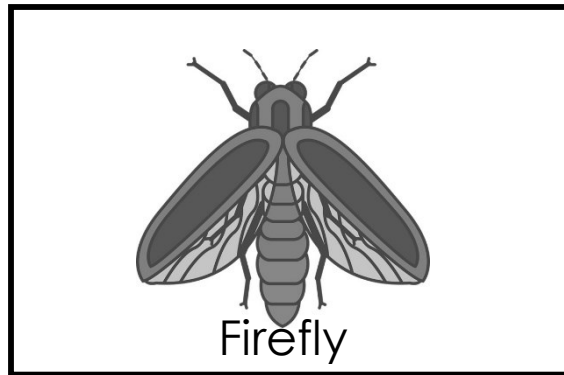
Name \_\_\_\_\_ Date \_\_\_\_\_  
Directions: Write down four things you learned about fireflies.

\_\_\_\_\_

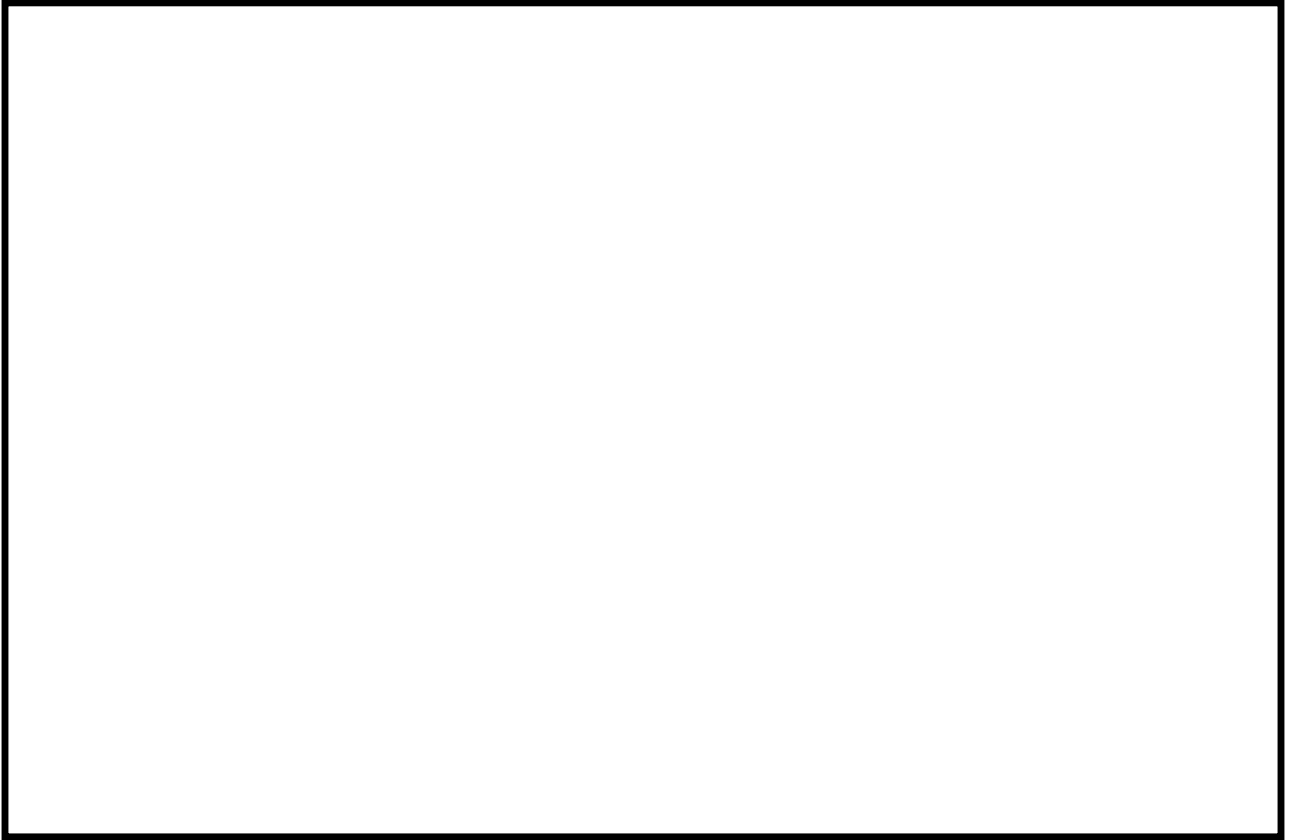


Name \_\_\_\_\_ Date \_\_\_\_\_

Directions: Draw the life cycle of fireflies.



# Fireflies



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# Fireflies



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# Water Boatman

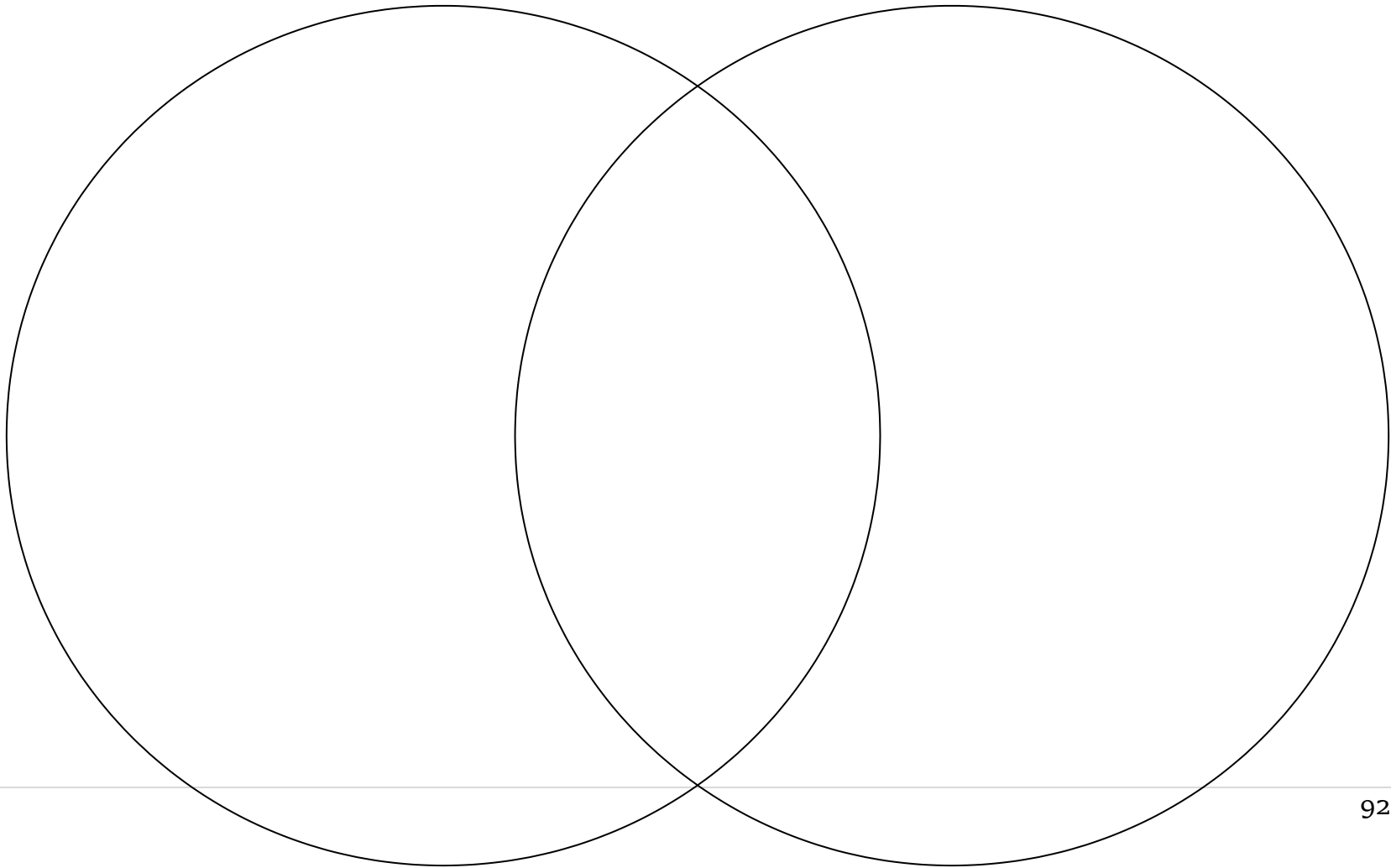
can

have

are

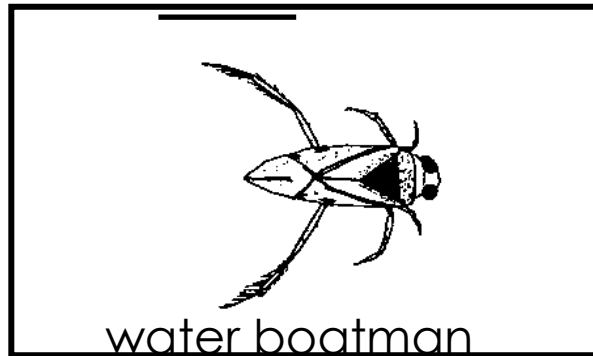
Name \_\_\_\_\_ Date \_

Directions: Compare water boatman with another insect.



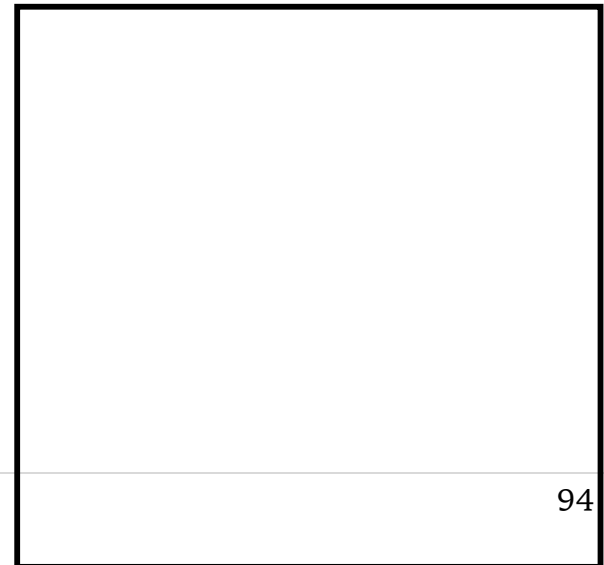
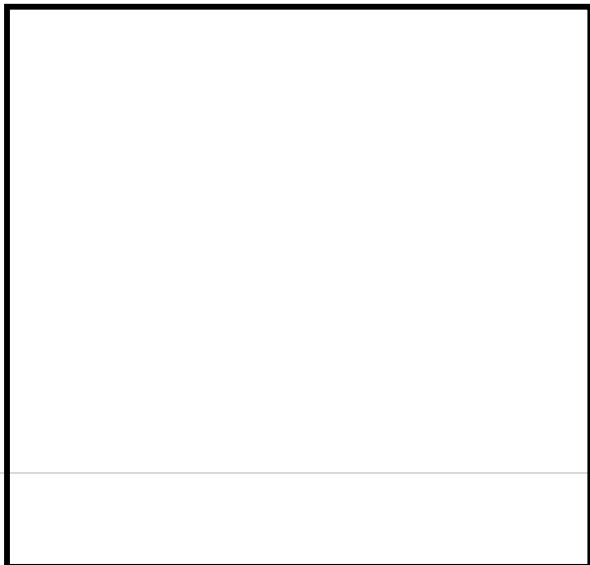
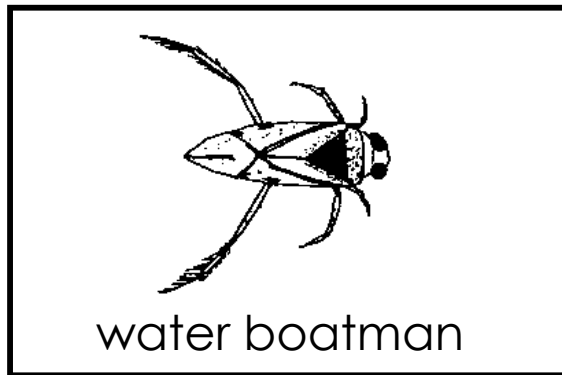
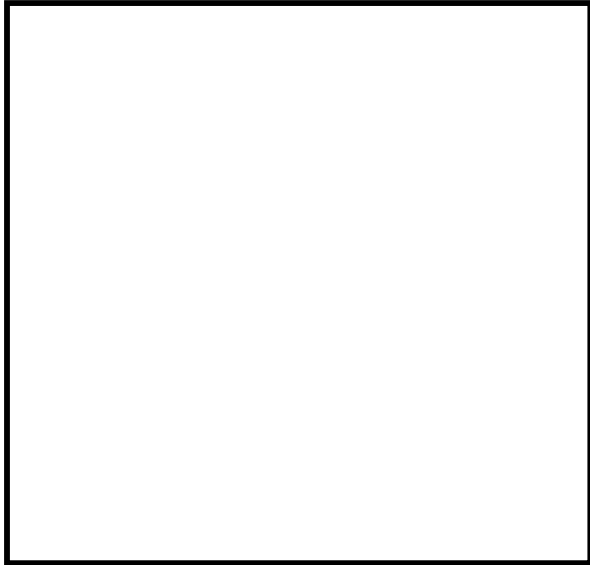
Name \_\_\_\_\_ Date \_\_\_\_\_

Directions: Write four facts you learned about water boatman.



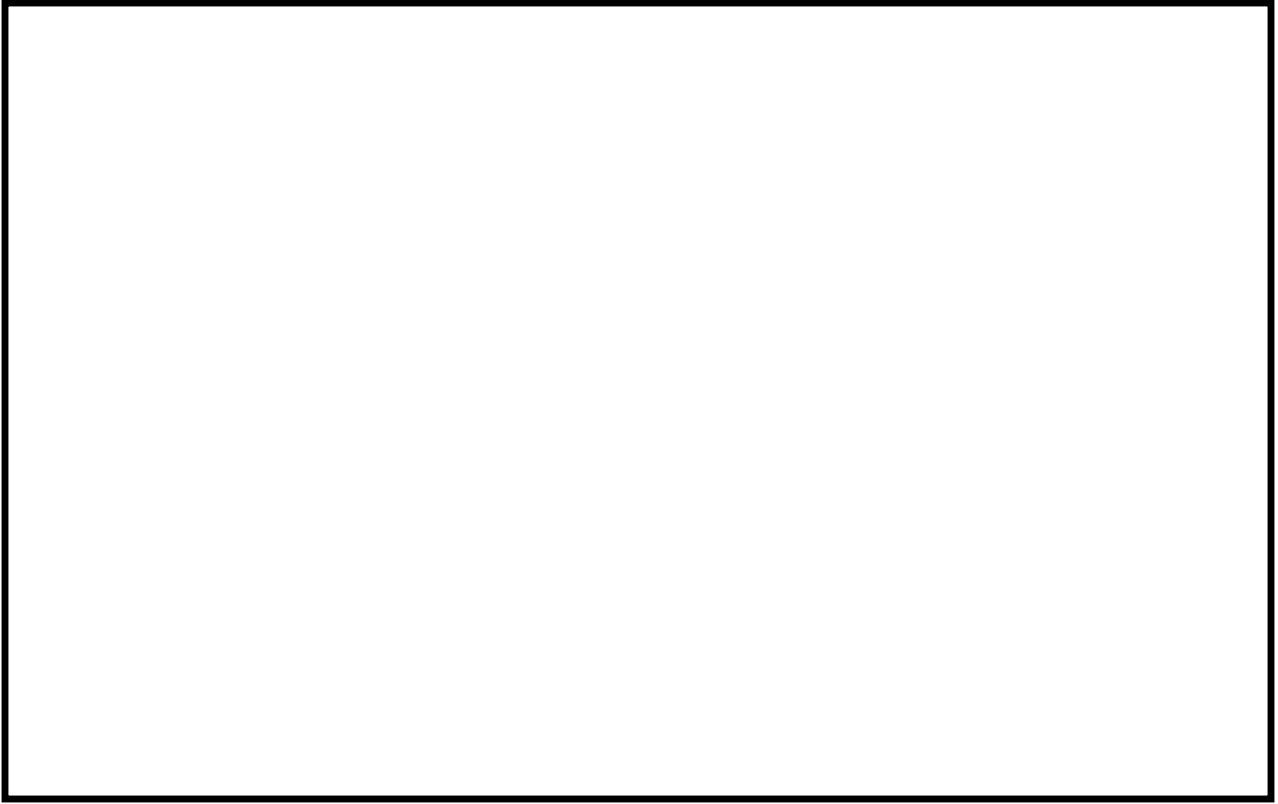
Name \_\_\_\_\_ Date \_\_\_\_\_

Directions: Draw the life cycle of the water boatman.





# Water boatman



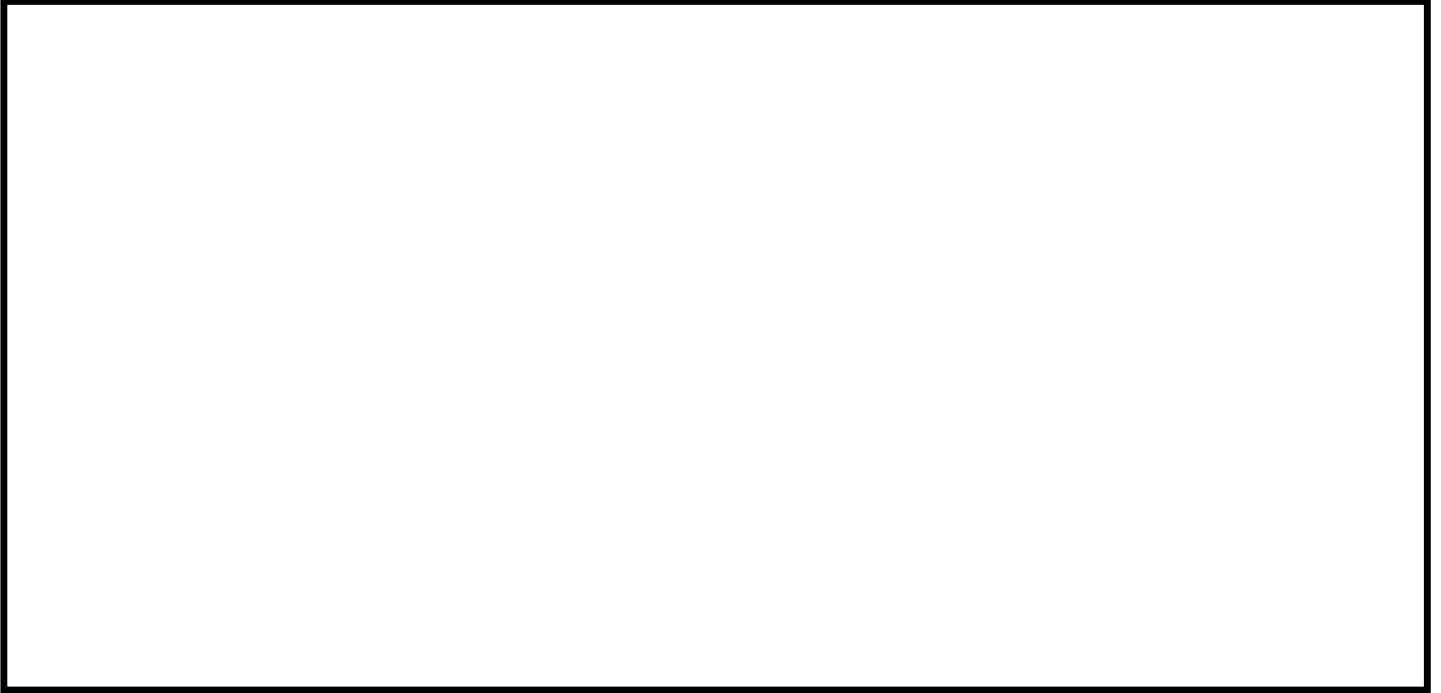
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# Water Boatman



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# Praying Mantis

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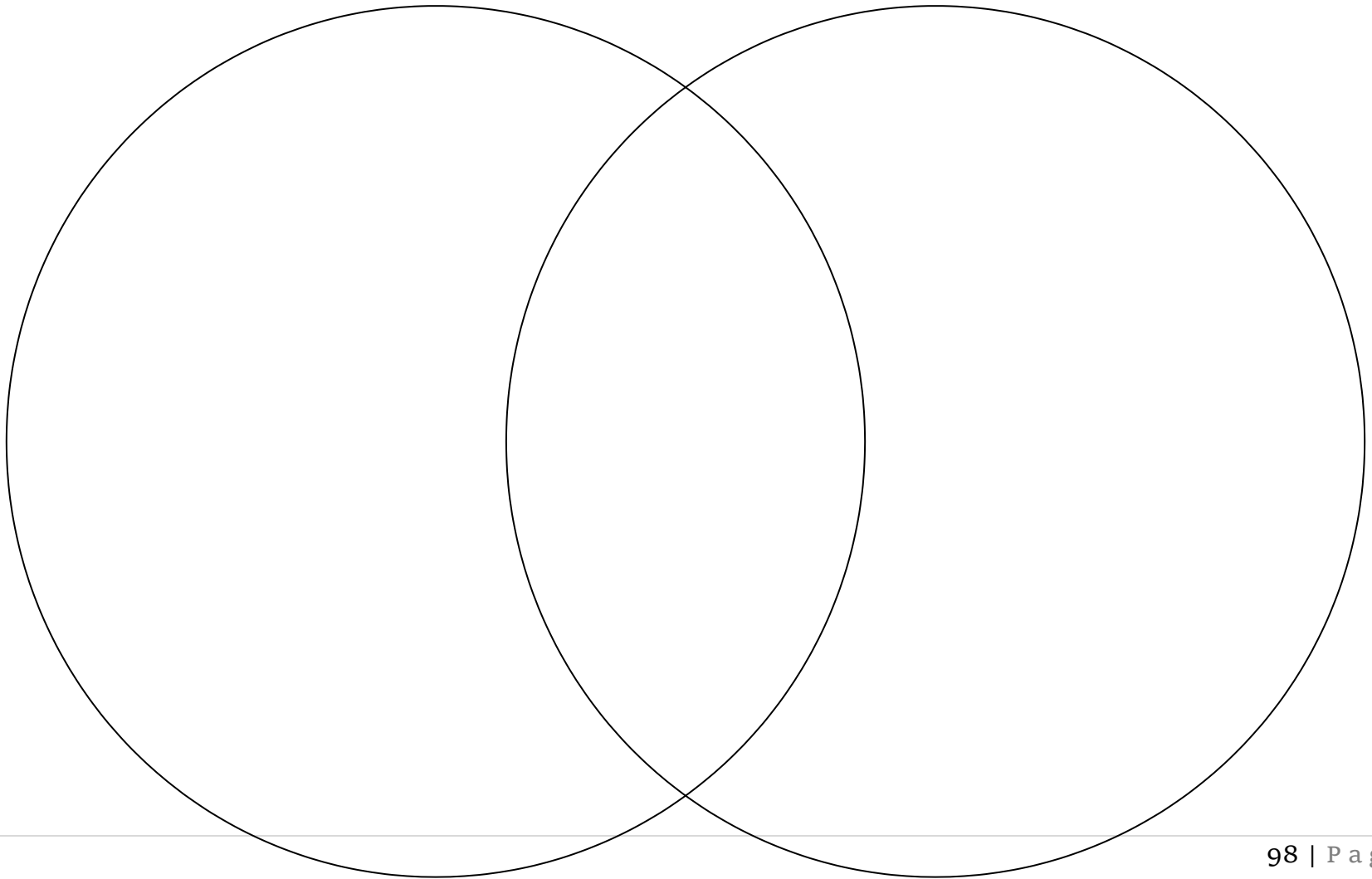
have

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Name \_\_\_\_\_ Date \_\_\_\_\_

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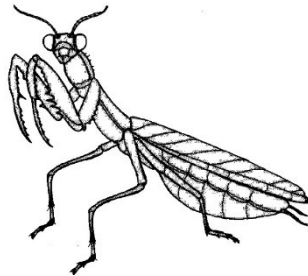
Directions: Compare praying mantis with another insect.



Name \_\_\_\_\_ Date \_\_\_\_\_

Directions: Write four facts you learned about praying mantis.

\_\_\_\_\_



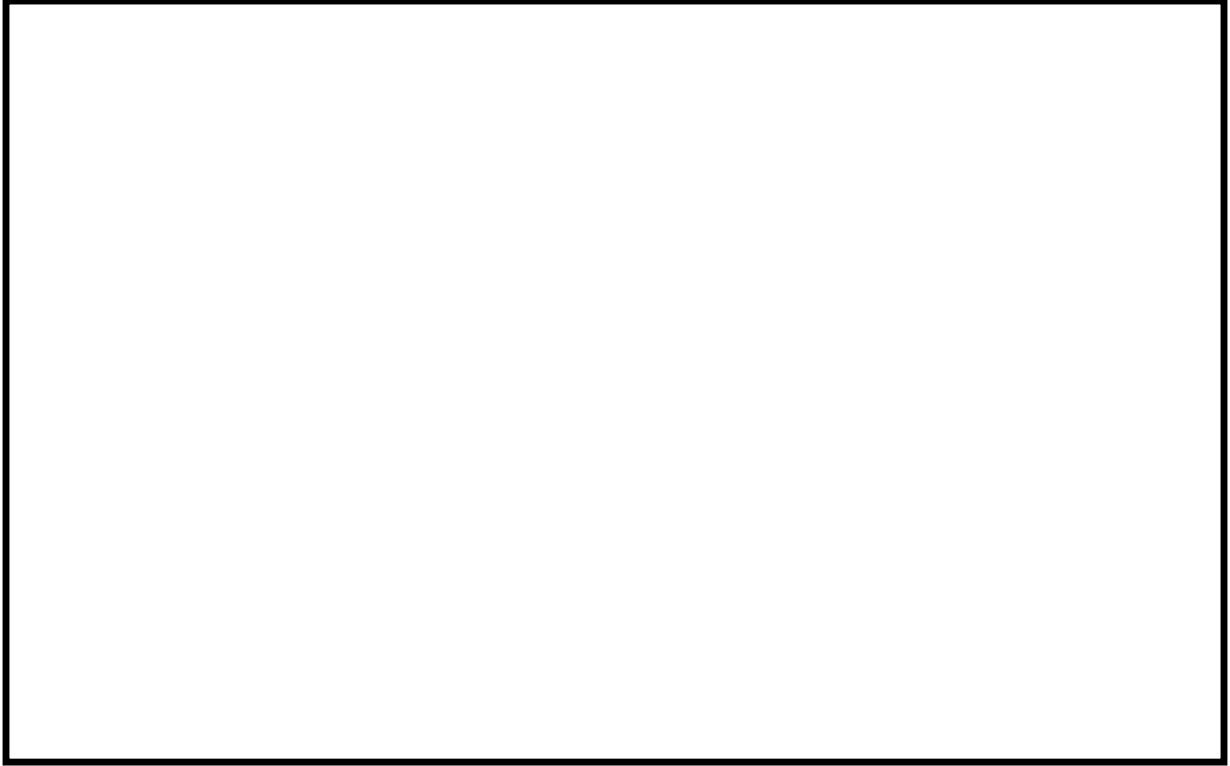
Praying Mantis

Name \_\_\_\_\_ Date \_\_\_\_\_

Directions: Draw the life cycle of the praying mantis



# Praying Mantis



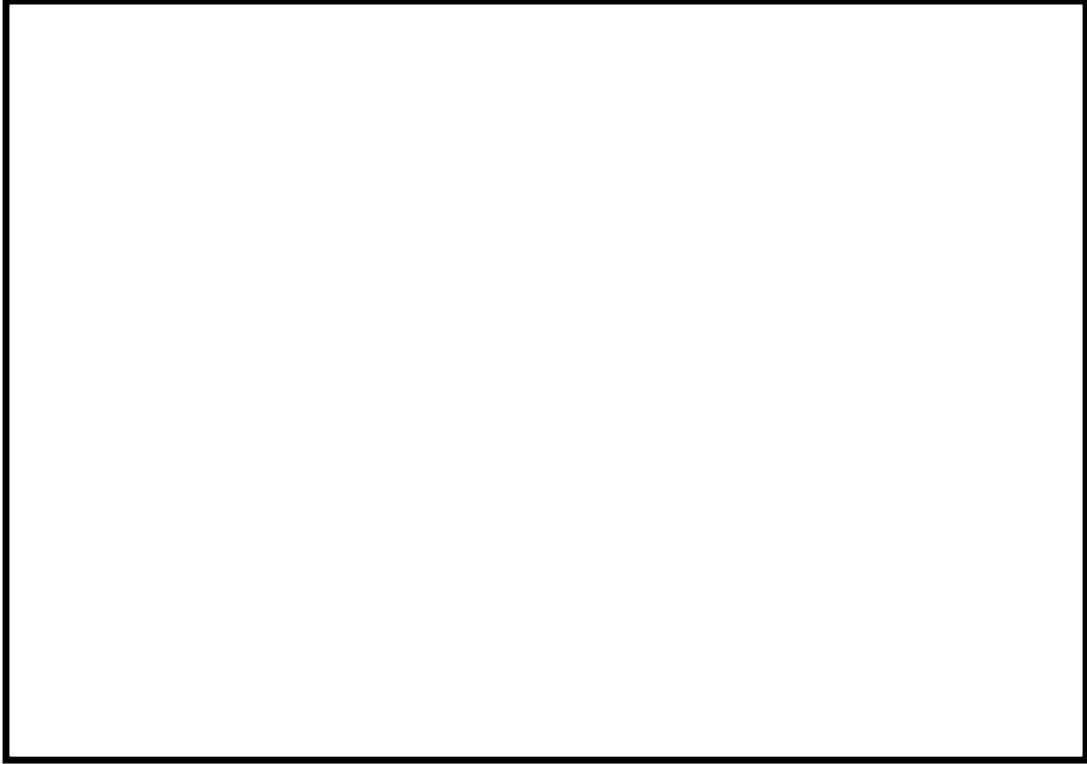
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# Praying Mantis



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Ladybugs

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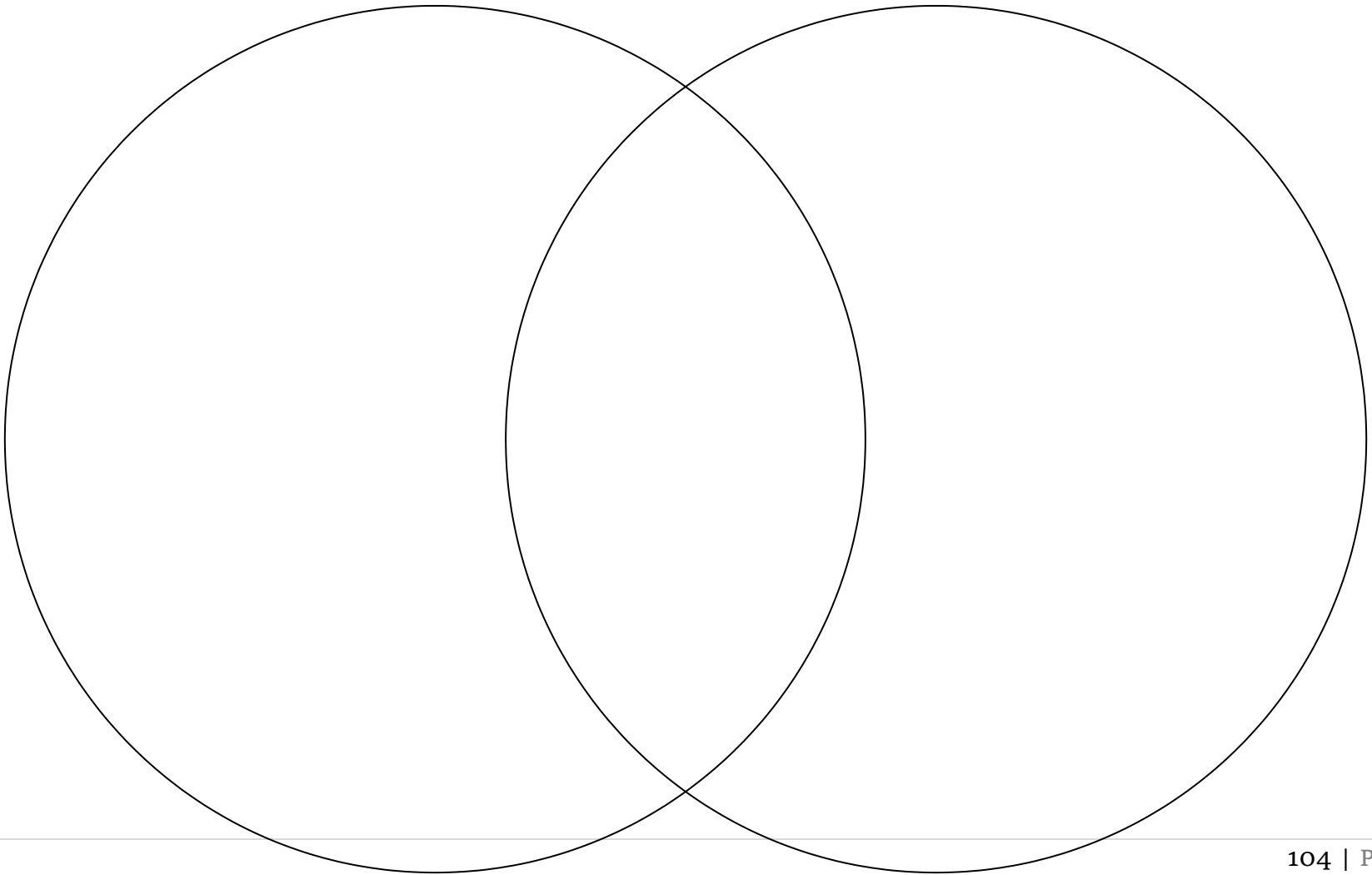
have

are

Name \_\_\_\_\_ Date \_\_\_\_\_

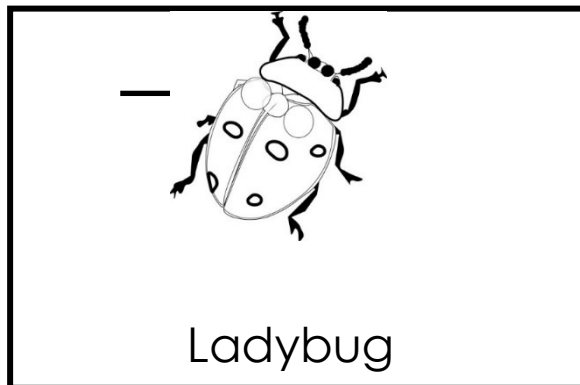
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Directions: Compare ladybugs with another insect.



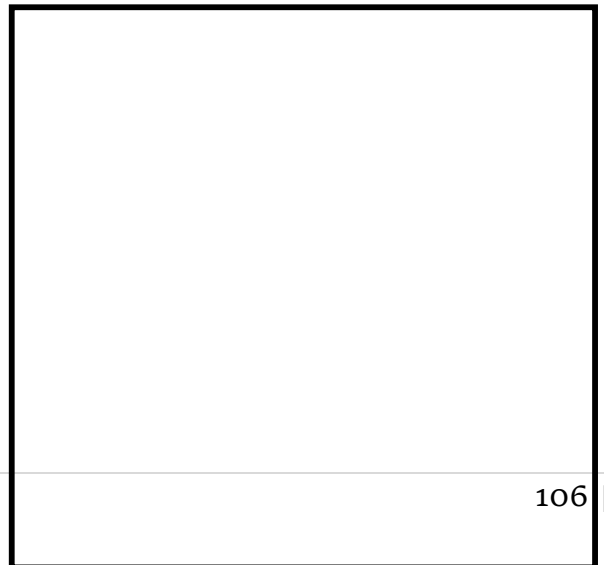
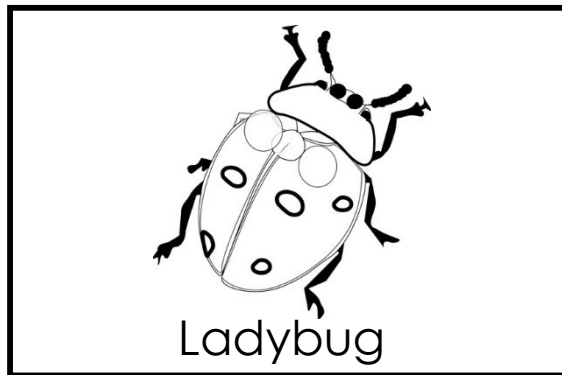
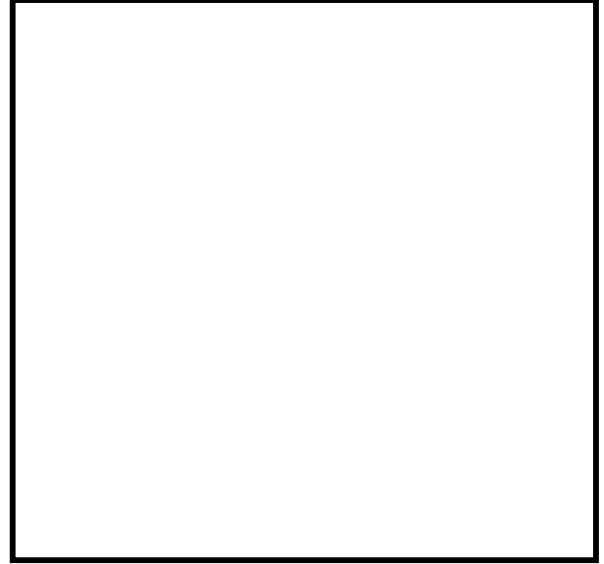
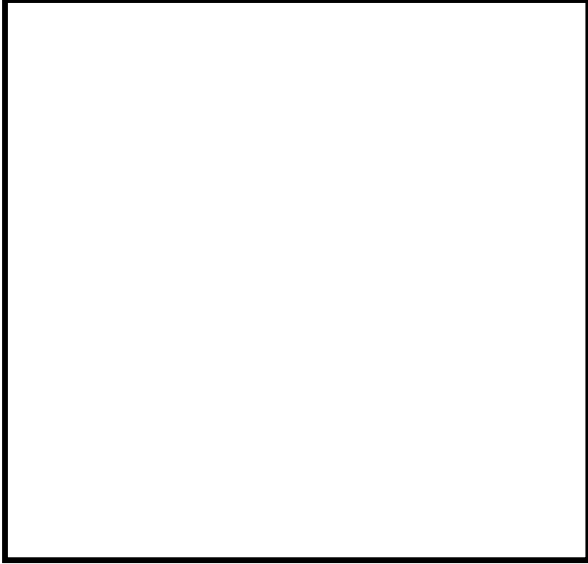
Name \_\_\_\_\_ Date \_

Directions: Write four facts you learned about ladybugs.

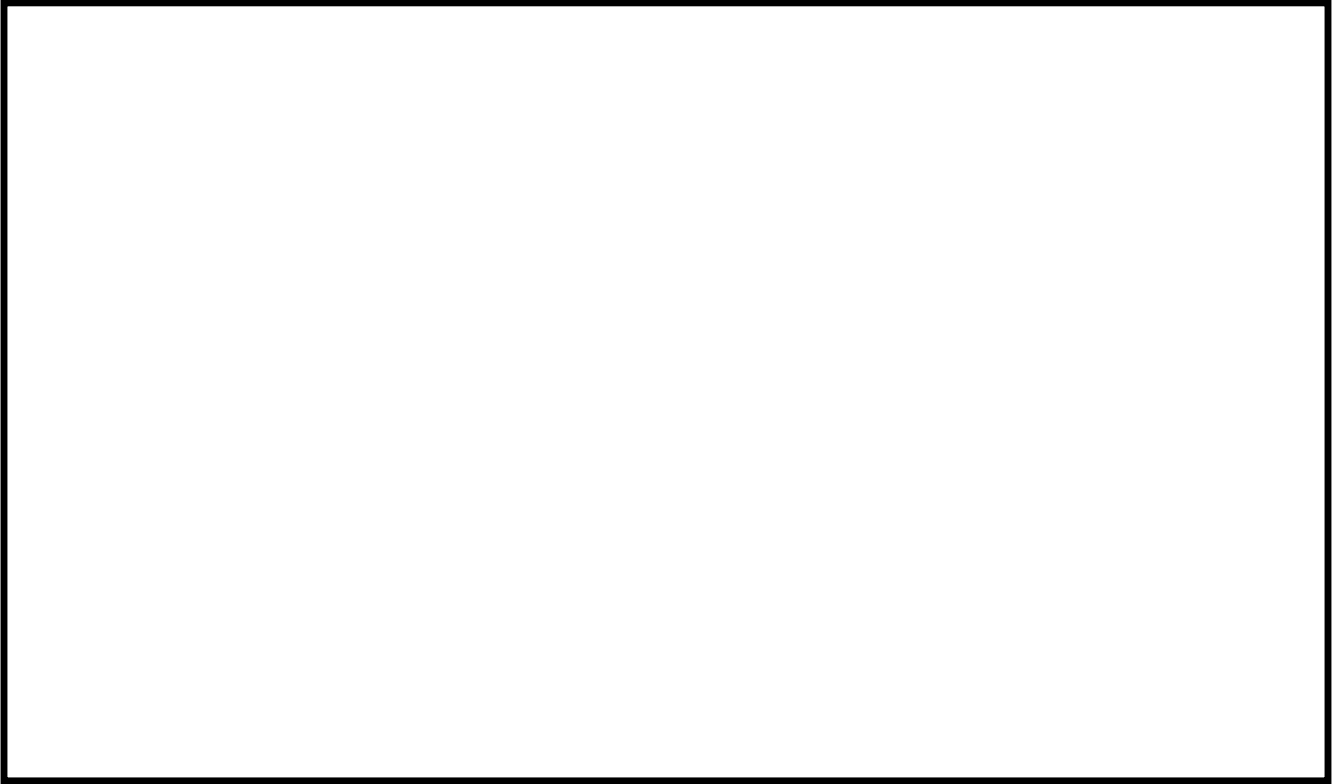


Name \_\_\_\_\_ Date \_\_\_\_\_

Directions: Draw the life cycle of ladybugs.



# Ladybugs



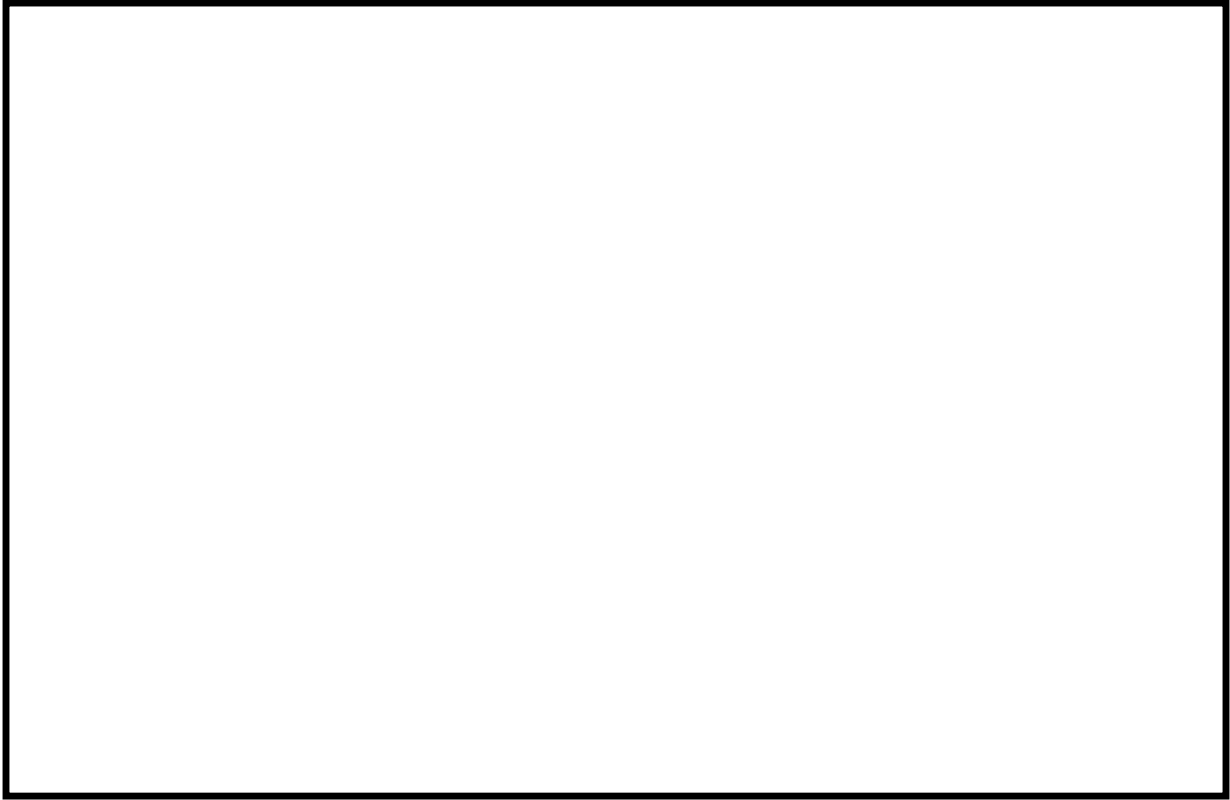
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# Ladybugs



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# Butterflies

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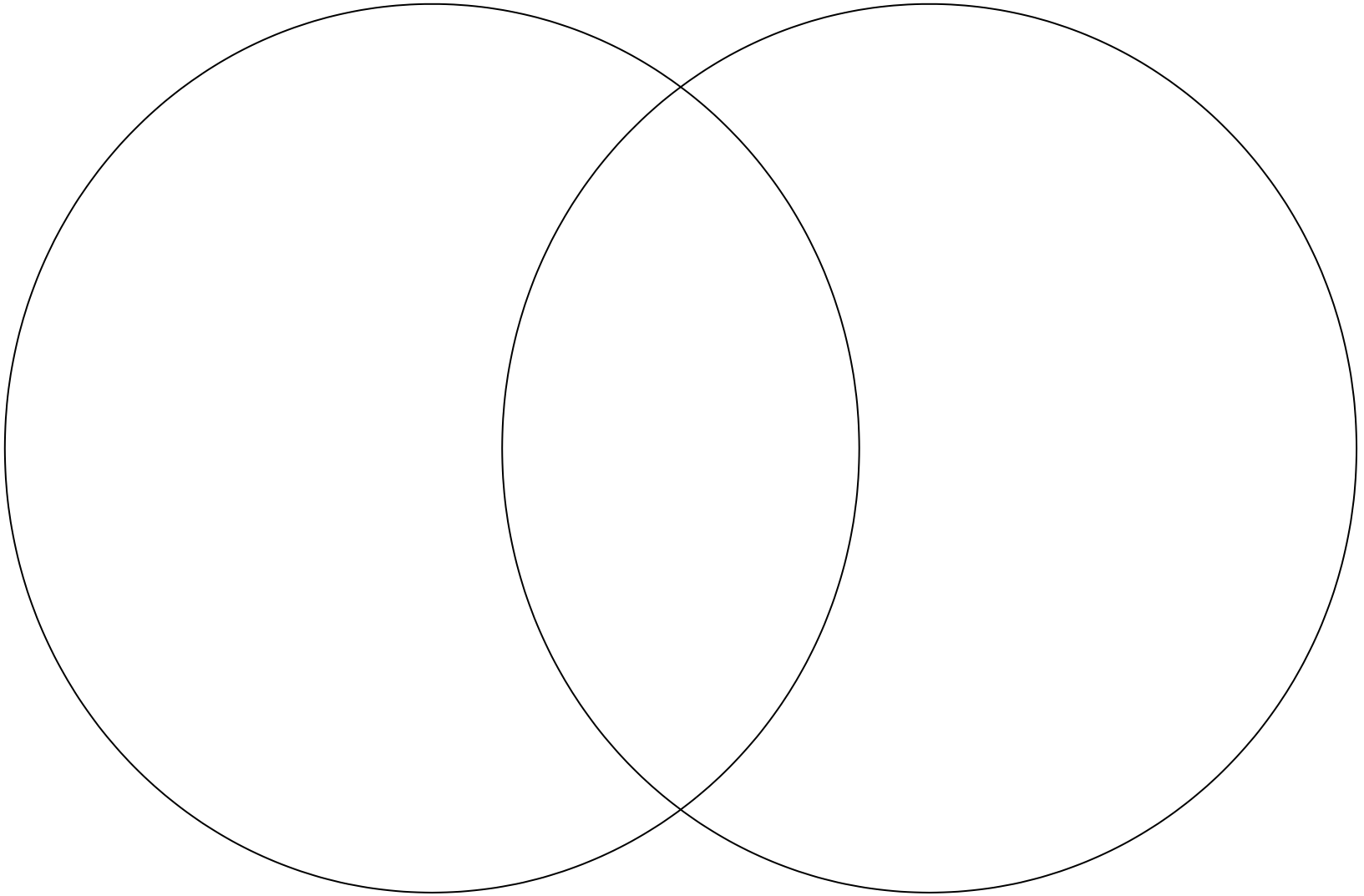
have

are

Name \_\_\_\_\_

Date \_\_\_\_\_

Directions.: Compare butterflies with another insect.





Name - \_\_\_\_\_

Date \_\_\_\_\_

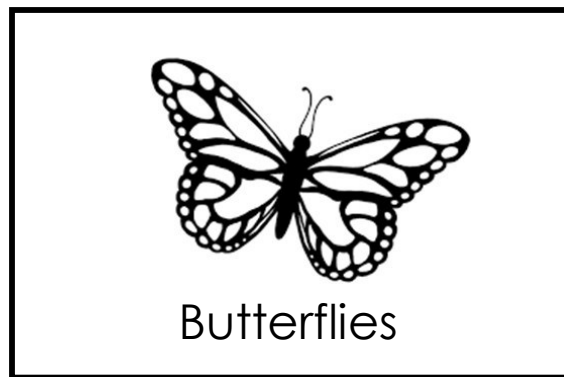
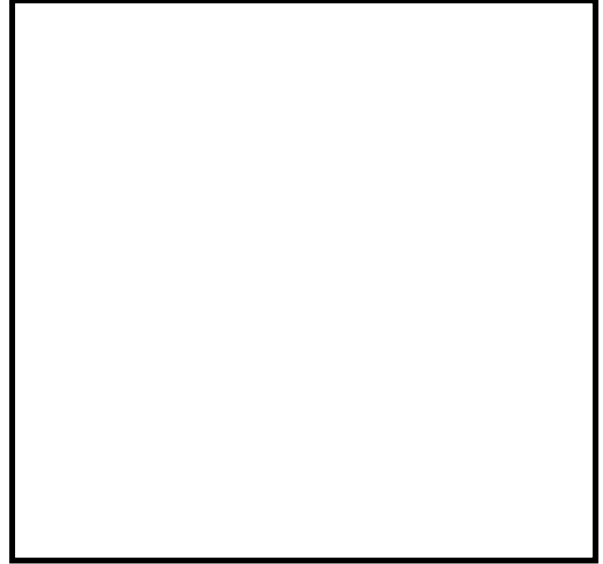
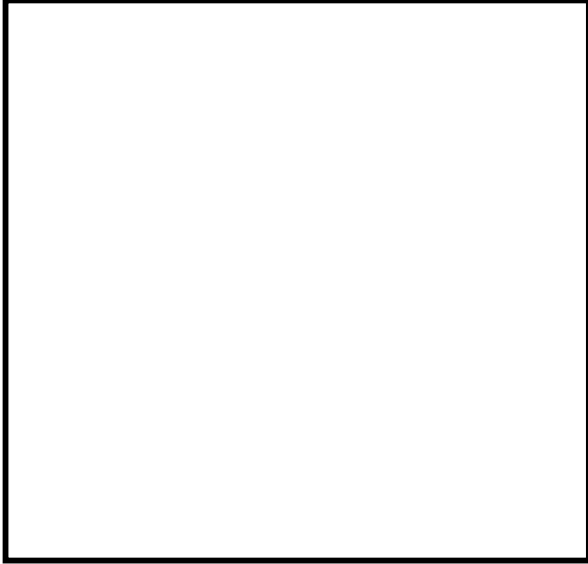
Directions: Write four facts you learned about butterflies.



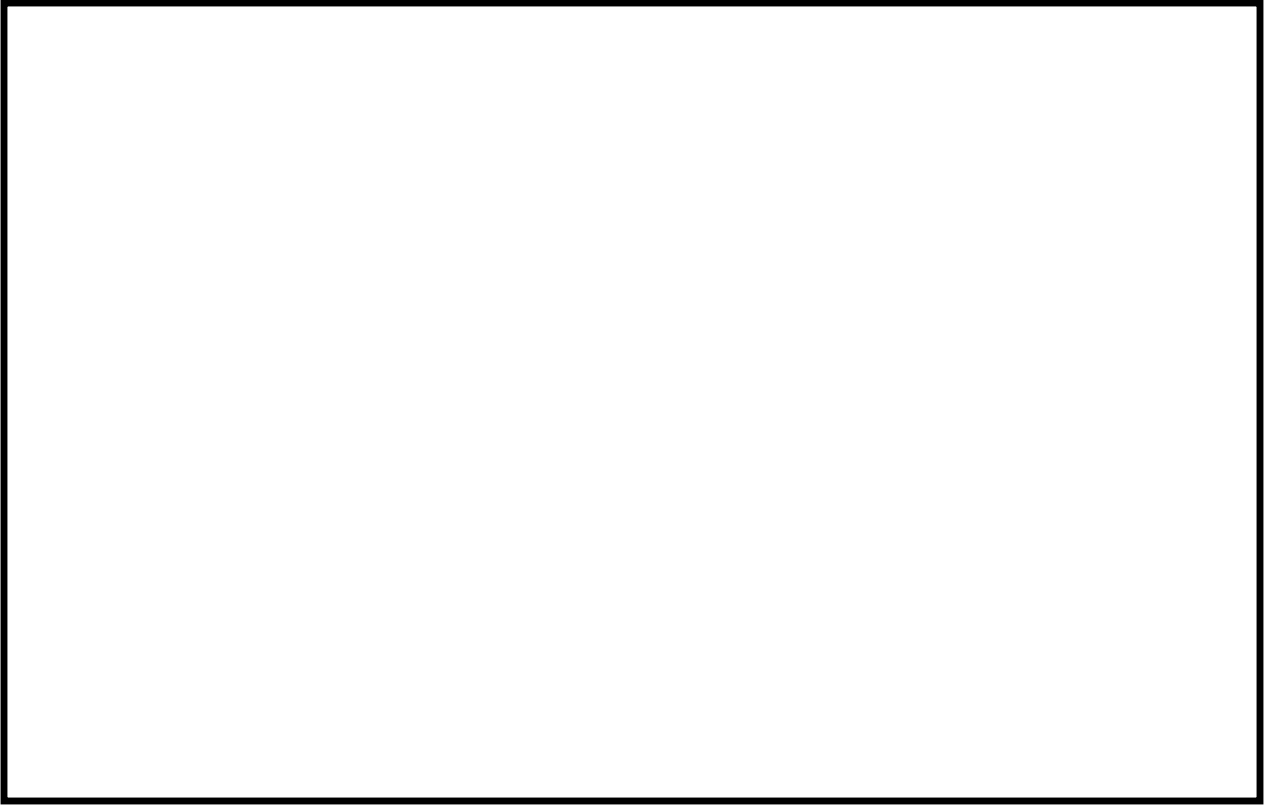
Butterflies

Name \_\_\_\_\_ Date \_\_\_\_\_

Directions: Draw the life cycle of a butterfly



# Butterflies



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# Butterflies

