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### What are insects?

#### Insect Concepts:

- Animals can be divided into two groups: vertebrates and invertebrates. Vertebrates have backbones; invertebrates do not.
- Animals are further classified into phylum, class, order, family, genus, and species.
- Arthropods make up the largest phylum.
- Insects make up the largest class of arthropods.
- Arthropods have an exoskeleton, segmented body parts, jointed legs, and symmetrical bodies.
- Insects have survived throughout time because they are small, they eat almost anything, and they can live almost anywhere.
- Prehistoric insects have been found preserved in hardened resin called amber.

#### Vocabulary Words: nature classification arthropod insect

\*symmetry \*vertebrates \*invertebrates \*taxonomy

Classification
Kingdom
Phylum
Class
Order
Family
Genus
Species

**Read:** *Lots of Science Library Book #1.*

#### Classification – Graphic Organizer

**Focus Skill:** classifying

**Paper Handouts:** 2 sheets of 8.5” x 11” paper a copy of Graphic 1A

**Graphic Organizer:** Stack two sheets of paper together and make a Hot Dog. Cut along the fold. Stack the four sheets of paper together and make a Layered Look Book with eight layers and 1” tabs. Cut out the words in Graphic 1A. Glue them on the Layered Look Book beginning on the top tab: *Classification, Kingdom, Phylum, Class, Order, Family, Genus, and Species.*

On the top and bottom section of the Kingdom tab, sketch the country where you live. On the bottom section of the Phylum tab, sketch the state (province or district) where you live. On the bottom section of the Class tab, write the name of your city. On the bottom section of the Order tab, write your street name. On the bottom section of the Family tab, write your house number. On the bottom section of the Genus tab, write your surname. On the bottom section of the Species tab, write your first name. Review how and why scientists classify living things.

Complete . Include examples for each classification.

**Note:** For post office box and rural route addresses, replace street signpost with P.O. Box or R.R.; replace house number with the number of post office box or number of rural route.



## Insect Trap

**Focus Skills:** observation and identification

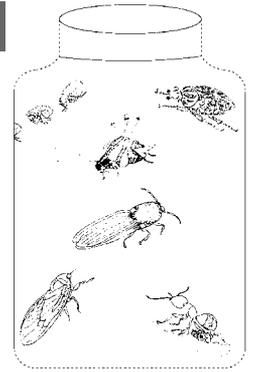
**Activity Materials:** glass jar      hand shovel      flat stone or brick  
four small rocks

**Paper Handouts:** 8.5" x 11" sheet of paper      a copy of Graphics 1B–C

**Activity:** Dig a hole in the ground large enough to hold the glass jar. Place the jar in the ground. Be sure the rim of the jar is level with the top of the hole. Place some leaves and grass in the jar. Place four rocks around the rim of the jar and put the flat stone on the four small rocks. Check the jar every few hours. Do not keep insects captive for more than 24 hours. Release them at the location where they were collected, when possible.

**Graphic Organizer:** Fold Graphic 1B into a Shutter Fold. Cut on the dotted lines. Cut out Graphic 1C and glue the pictures on the front of the Shutter Fold. Open the Shutter Fold.

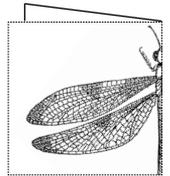
-  Draw pictures of insects you found in your insect trap.
-   Complete . Identify the insects and label them.
-    For each insect found in the trap, sketch it and record the following information: time of day it was found and qualitative description.



## Symmetry

**Paper Handouts:** 8.5" x 11" sheet of paper      a copy of Graphic 1D

**Activity:** An insect has a symmetrical design. One side is a mirror image of the other. Fold on the center line and cut through both sides of Graphic 1D. Now, open it. Is one side of the fold the same as the other side? Look around the room and find things that are symmetrical.



## Make a Pond

**Activity Materials:** Choose which pond best suits your needs:

Pond A: pond liner (liner size is based on your pond size and can be found at home improvement stores), aquatic plants (available at aquarium, pet, or garden stores)

Pond B: plastic tub (you can choose any size), aquatic plants (available at aquarium, pet, or garden stores)

**Activity:** Ponds are a perfect habitat for many insects. Many man-made ponds are elaborate, but you can make a simple pond. Discuss the best outside area for your pond and choose Pond A or Pond B materials and directions.

Pond A: Dig a hole 18 inches deep. Cut pond liner and place the liner in the hole so that the lining overlaps the edges. Place a little soil in the bottom of the hole. Place heavy rocks or bricks around the perimeter of the hole to keep the liner in place. Fill with water. Add aquatic plants and pondweed. Observe your pond throughout your study of *The World of Insects*.

Pond B: Place a plastic tub outside and fill it with water. Place aquatic plants in the tub, making sure your plants have enough water. Observe your pond.



# Experiences, Investigations, and Research

Select one or more of the following activities for individual or group enrichment projects. Allow your students to determine the format in which they would like to report, share, or graphically present what they have discovered. This should be a creative investigation that utilizes your students' strengths.



1. Fold a sheet of paper in half. Open the paper and place two dabs of poster paint in the middle of the fold. Fold the paper carefully and smooth the crease. Open the sheet of paper and describe the symmetrical design. Investigate and describe a butterfly's wings in the same manner.



2. Research how scientists use amber and impression fossils to understand prehistoric insects.



3. *Who, What, When, Where*: Research Carl Linnaeus, the father of taxonomy. Make a 4 Door Book to report your data.



4. Visit a natural history museum and view its insect collection.



5. Use a nature guidebook or real insects to observe their symmetrical design.



6. Read: *Carl Linnaeus: Father of Classification* by Margaret Jean Anderson 



7. Using an Internet Search Engine, visit The Franklin Institute. Click your way to *Classification of Plants & Animals*.



8. Using an Internet Search Engine, research taxonomy.



9. Using an Internet Search Engine, research the cockroach.

# Notes





### Who studies insects?

#### Insect Concepts:

- Naturalists are people who study and observe nature.
- People who specialize in the study of insects are called entomologists.
- Naturalists and entomologists observe, listen, record, and sketch what they see.
- Insect research can be conducted in a natural setting or in a controlled lab environment.

**Vocabulary Words:** collection      naturalist      \*identification      \*entomology

**Read:** *Lots of Science Library Book #2.*

**Teacher’s Note:** Choose one type of Insect Collection for the students to work on during this program. Two types of insect collections are made of paper found in the Graphics Pages. The paper insects can be stored in boxes or in a book. These types of insect collections are described below in Options 1 and 2. The other type of insect collection involves finding or ordering real insects. This is explained below in Option 3.

#### Insect Collection – Option 1

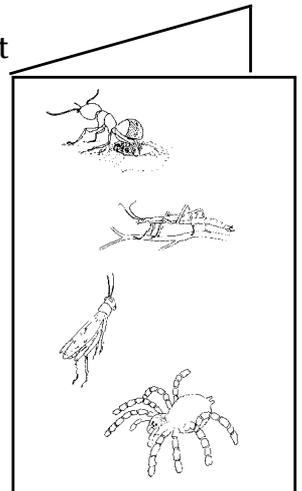
**Paper Handouts:** 9 sheets of colored construction paper.

**Graphic Organizer:** Make nine Display Box Organizers. See page 5. Glue them together side by side as shown. Directions for the paper insects are located in various lessons. You will be adding to this collection through Lesson 19. This will be referred to as the *Paper Insect Collection*. A separate Display Box Organizer will be made for Arachnids in Lesson 22.

#### Insect Collection – Option 2

**Paper Handouts:** 4 sheets of 8.5” x 11” paper      a copy of Graphic 2A

**Graphic Organizer:** Make a Bound Book out of the four sheets of paper. Cut out Graphic 2A and glue it on the cover of the Bound Book. Title it *Insects and Arachnids*. You will add paper insects to this through Lesson 19. Later, in Lessons 22–24, you will use this same Bound Book to add arachnids. This will be referred to as the *Insect and Arachnid Bound Book*.



## Insect Collection – Option 3

**Activity Materials:** display board or several foam meat trays      long straight pins

**Paper Handouts:** 5 sheets of 8.5" x 11" paper

**Graphics Organizer:** Fold each sheet of paper into a Hamburger. Cut on the folds. Make Display Boxes with each half sheet of paper. Glue nine of them together as shown. Cut pieces of display board to fit inside each Display Box. This display is for mounting real insects. You will add insects through Lesson 19. Directions are found in the lessons. Later in Lessons 22–24, you will add arachnids to your collection. This will be referred to as the *True Insect and Arachnid Collection*.

Use the following guidelines when mounting insects.

- 1) Pin beetles through right wing cover.
- 2) Pin true bugs through scutellum\*.
- 3) Pin flies slightly to the left of the thorax.
- 4) Pin bees, wasps, and ants through the middle of the thorax.
- 5) Pin grasshoppers, dragonflies, butterflies, and moths through the thorax.
- 6) Pin plant bugs, cicadas, water skaters, and assassin bugs through the scutellum.
- 7) To mount very small insects, cut small triangles of cardboard. Place a dot of glue on the point of the triangle and glue the insect to this point. The triangle can then be pinned to a mount board.

\* **Note:** The scutellum is a small triangle found between the wings and just behind the thorax.

## Catching Flying Insects

**Focus Skill:** identifying

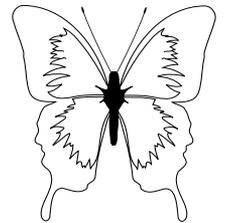
**Paper Handouts:** 8.5" x 11" sheet of paper      a copy of Graphic 2B

**Activity Materials:** clear plastic cup or jar      magnifying glass  
piece of cardboard a little larger than the mouth of the jar

**Activity:** The best way to catch flying insects is to let them land on a leaf and then place the cup upside down over it. The insect will fly upward, so quickly place the piece of cardboard under the cup and pull away from the leaf. Observe the insect with a magnifying glass.

**Graphic Organizer:** Make a Trifold Book. Glue Graphic 2B on the cover. Color the butterfly. Open the Trifold Book.

1. Draw pictures of the flying insects you caught or observed.
2. Complete . Identify the insects and label the sketches.
3. Choose three insects and on each section of the Trifold Book (top, middle, bottom), sketch one insect and record the following information: location where insect was found and plants in the area.



## Insect Net

**Activity Materials:** 5-gallon nylon paint strainer (affordable and available at paint stores)  
wire coat hanger      36" wooden dowel      duct tape

**Activity:** Form the coat hanger into a square. Sew the paint strainer onto the square coat hanger. Tape the coat hanger net to the wooden dowel. To catch insects, use a smooth sweeping motion back and forth. When an insect is caught, quickly flick your wrist. See page 62.



# Experiences, Investigations, and Research

Select one or more of the following activities for individual or group enrichment projects. Allow your students to determine the format in which they would like to report, share, or graphically present what they have discovered. This should be a creative investigation that utilizes your students' strengths.



1. Discover where insects live and why. Look indoors where food, especially grain, is stored. Look in more secluded areas, such as closets and basements. Look outdoors in a variety of places such as a manicured yard, a vacant lot, and the woods. Look on plants and under logs, rocks, and bark. Did you find more insects inside or outside? where traffic was heavy or light? where plants were manicured or wild? Why? Where did you find the least number of insects? Why? Did you find live insects? Did you find dead insects?



2. *Who, What, When, Where*: Research the life of naturalists Jean Henri Fabre or Thomas Say.



3. Research insects and their impact throughout history. Example: bubonic plague and locust-induced famines.



4. Investigate the pros and cons of collecting insect specimens.



5. Research insects that are endangered or extinct. Explain the causes and effects of insect extinction.



6. Read *Children of Summer: Henri Fabre's Insects* by Margaret Jean Anderson



7. Using an Internet Search Engine, research Jean Henri Fabre. Write two paragraphs on this French entomologist and author.

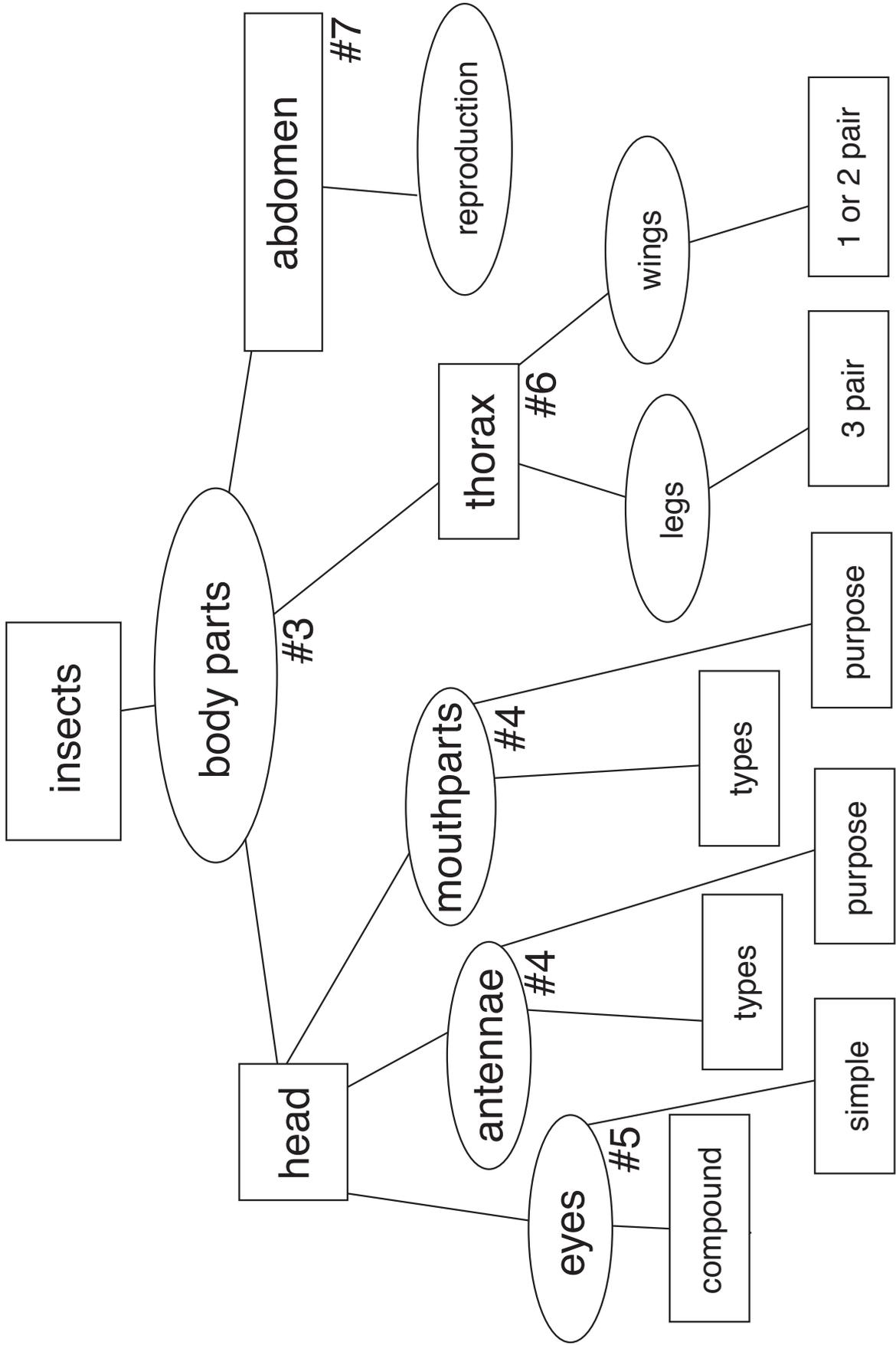


8. Using an Internet Search Engine, research entomology.

# Insects Concept Map

Lessons 3-7

Numbers Refer to Lesson Numbers





### *What are the characteristics of insects?*

#### **Insect Concepts:**

- Insects do not have internal skeletons, but they are covered with a protective exoskeleton.
- An exoskeleton does not grow with an insects. Insects molt, or shed, their exoskeletons numerous times as their bodies change sizes, or develop.
- An insect's body has three main segments or parts: head, thorax, and abdomen.
- Specialized eyes, mouthparts, and antennae are found on an insect's head.
- An insect's three pairs of legs are attached to its thorax.
- Insect legs are adapted for such tasks as grasping, jumping, digging, swimming, and collecting.
- Most adult insects have one or two pairs of wings attached to the thorax.
- A few species of insects have wings only during certain developmental stages, in some species, only one sex has wings.
- An insect's abdomen houses organs used for digestion, elimination, and reproduction.
- The females of some insect species have an ovipositor at the end of their abdomen for laying eggs.

**Vocabulary:** exoskeleton molts head thorax abdomen \*chitin (KYE tin)

**Read:** *Lots of Science Library Book #3.*



#### **All About Insects – Graphic Organizer**

**Paper Handouts:** 12" x 18" construction paper a copy of Graphics 3A–C

**Graphic Organizer:** Fold the construction paper into a Hot Dog. Glue Graphics 3A–C on the front. Cut the Hot Dog to make a 3 Tab Book. Throughout the next four lessons, you will be adding to this Graphic Organizer. You may fold the Graphic Organizer at the cuts for easy storage. It will be referred to as the *All About Insects Graphic Organizer*.

#### **Paper Insect Collection**

**Focus Skills:** graphing, identifying members of a group

**Paper Handouts:** a copy of Graphics 3D–E

**Graphic Organizer:** Cut out Graphic 3D. Color it and glue it together. Place the insect in one of the boxes of your *Paper Insect Collection*. Cut out Graphic 3E, the Insect Data Card. Read the data and graph the number of species. Place the Insect Data Card in the same box as the insect.



