Lesson 1
—*Day 1*

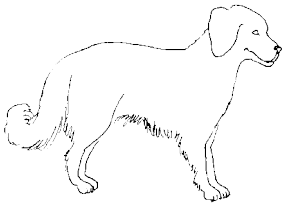
Materials:
Student Page (SP) Lesson 1 Day 1
5 sheets of 8.5"x11" paper

Vocabulary Words:
Hand out the vocabulary strip for this lesson. Encourage your students to use the words while talking about the material and in their written work.

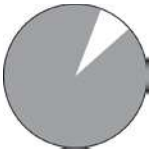
vertebrates
invertebrates
classified
taxonomy
arthropods
exoskeleton
segmented
insects
resin
fossilized

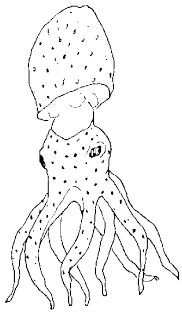
The animal kingdom can be divided into two types of animals: vertebrates and invertebrates.

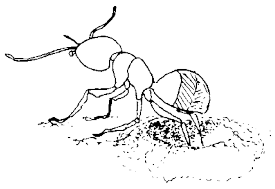
Vertebrates (**vur** tuh brits) are animals with a backbone, such as mammals, birds, reptiles, fish, and amphibians.



Invertebrates are animals without a backbone, from one-celled organisms to giant squids that reach 60 feet long. Invertebrates make up about 96% of the animal kingdom.



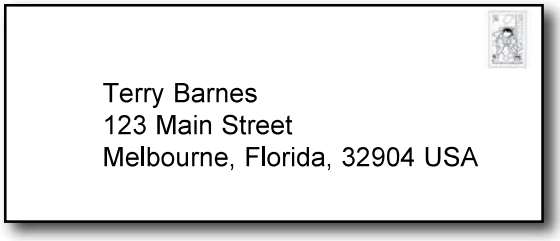




Animals are **classified** or grouped by their similarities and differences. By classifying animals, scientists can study and better understand their structure and behavior.

We use classification all the time. Think about your mailing address. The following information helps in speedy mail delivery:

Country—USA
Zip Code—32904
State—Florida
City—Melbourne
Street Name—Main Street
House Number—123
Last Name—Barnes
First Name—Terry

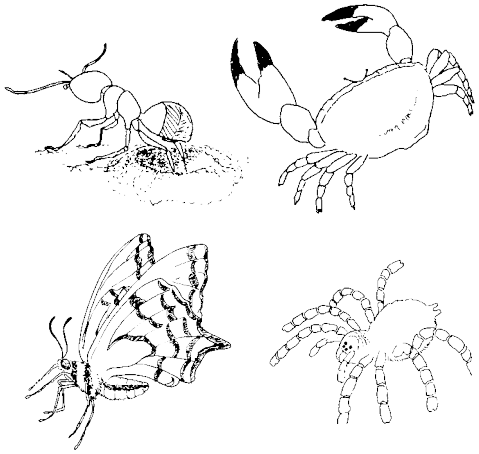


In a similar manner, scientists use a system of classification to identify animals.

Kingdom—Animal
Phylum—Arthropod
Class—Insect
Order—Hymenoptera
Family—Apidae
Genus—Apis
Species—Mellifera

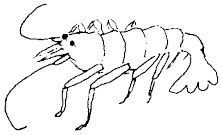
Taxonomy (tak **son** uh mee) is the science of classifying living things. Carl Linnaeus (1707-1778) is considered the father of taxonomy. Although his original system of naming and classifying living things has gone through many changes, it is still used today.

Arthropods make up the largest phylum group in the animal kingdom. The word arthropod means "jointed limbs." The main characteristics of arthropods are:

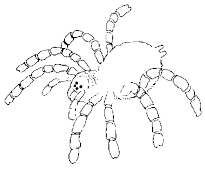


1) an outside skeleton called an **exoskeleton** (ek soh **skel** i ton)
2) legs and other parts attached to the body are jointed and can bend
3) bodies are **segmented**, divided into distinct parts
4) one side of the body is a mirror image of the other side

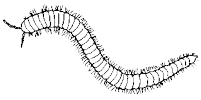
Arthropods consist of five main classes:



1) crustaceans—crabs, lobsters, shrimp, crayfish, sowbugs, barnacles

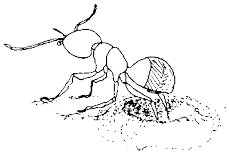


2) arachnids—spiders, scorpions, ticks

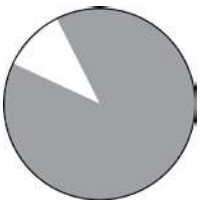


3) diplopods—millipedes

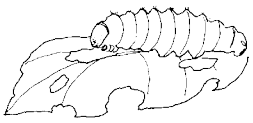
4) chilopods—centipedes



5) **insects**—ants, butterflies, bees, beetles, cockroaches



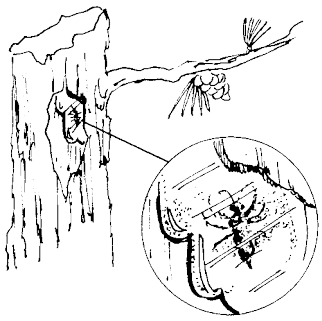
About 80% of all known animals are insects.



Insects adjust easily to their environment because of their size. They are so small that they can live and feed on resources that are too small for other animals. During its lifetime, a caterpillar probably eats the equivalent of what a cow eats in one bite.

Another reason for insects' success in survival is that they eat almost anything. Insects feed on meat, vegetables, fruit, blood, wood, waste products, and juices of flowers. Insects also have an extremely high rate of reproduction.

Studies of fossilized insects show that today's insects have very similar characteristics to those that lived in prehistoric times.



Pine trees produce a semi-solid substance called **resin**. Insects are sometimes trapped in this gummy substance. **Fossilized** resin is called amber. Insects have been found perfectly preserved in amber.

Fast Food Folds

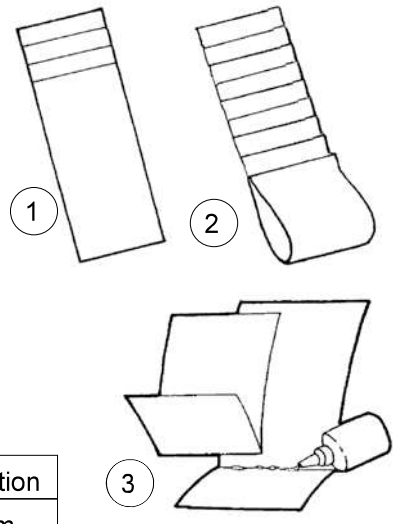
In the *Common Sense Science* curriculum, you will make visual materials to help you record and review the information taught in each lesson. In order to make these materials, I am going to teach you some basic Fast Food Folds.

Hand out 3 sheets of 8.5"x11" paper and teach your students how to make a Hamburger, Hot Dog, and Taco fold.

Classification Layered Book

Hand out Student Page (SP) Lesson 1 Day 1 and 2 sheets of 8.5"x11" paper.

Stack the two sheets of paper together and make a Hot Dog. Cut in half along the fold. Use one half of the Hot Dog to make a Layered Book. Stack the four sheets of paper together by placing each sheet one inch higher than the sheet in front. Bring the bottom of the sheets upward and align the edges so that all the layers or tabs are the same distance apart. When all the tabs are equal distance, fold the papers and crease well. Open the papers and glue them together along the fold.



Cut out the words in image 1A. With the fold at the top, glue each on the Layered Book beginning on the top tab: *Classification*, *Kingdom*, *Phylum*, *Class*, *Order*, *Family*, *Genus*, and *Species*.

Classification
Kingdom
Phylum
Class
Order
Family
Genus
Species

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

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

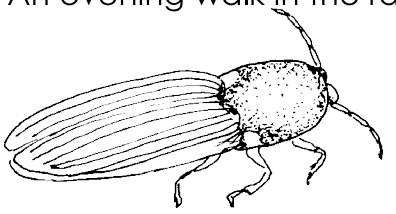
Lesson 1
—*Day 2*

Materials:
Student Page (SP) Lesson 1 Day 2
Pages 1-5
manila file folder or 12"x18" cardstock
glass jar
hand shovel
flat stone or brick
4 small rocks

Vocabulary Words:
Hand out the vocabulary strip for this lesson. Encourage your students to use the words while talking about the material and in their written work.

species
exoskeleton
molt
head
thorax
abdomen

An evening walk in the rain forests of Ecuador may provide you with an impressive view of green and orange flashing lights. This light show is produced by a large click beetle that is the size of your finger.



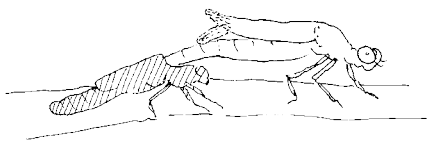
This amazing click beetle is only one of the more than 800,000 species of insects that inhabit our world. A **species** is a group of organisms that can reproduce in nature.

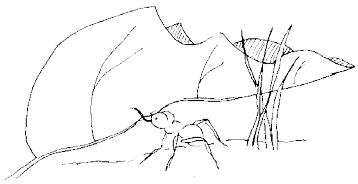
Like all arthropods, insects like the click beetle have an outside skeleton called an **exoskeleton**. *Exo* comes from the Greek word meaning "outside." The exoskeleton is light weight but strong. It acts like a suit of armor.

Just as a tank has a hard covering to protect the people inside, an insect's exoskeleton protects its soft body tissues from potential dangers.

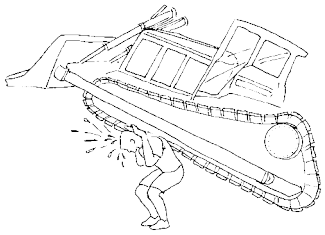
Exoskeletons cover an insect's entire body—even the feet, eyes, and antennae. However, an exoskeleton does not grow with an insect. Therefore, an insect must **molt**, or shed, its exoskeleton several times during its lifetime as its size changes.

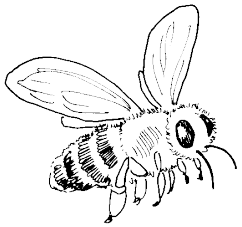
As a young insect grows, a new, soft skeleton forms underneath its exoskeleton. Eventually, the exoskeleton splits and the insect crawls out, complete with its new exoskeleton.



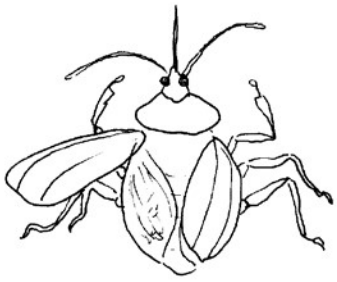


Insects are small but can be amazingly strong. A leaf-cutter ant can carry an object 30 times its own weight. That is equivalent to a human carrying a bulldozer.





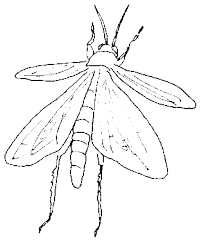
A bumblebee can carry more than its weight in nectar and pollen. In comparison, a jumbo jet can carry only about 40% of its weight in cargo and passengers.



An insect's body is made of three parts: head, thorax, and abdomen. Specialized eyes, antennae, and mouthparts are located on an insect's **head**.

An insect's **thorax** (**thawr** aks) is attached to its head. Six legs are attached to the thorax. Most adult insects also have one or two pairs of wings attached to the thorax, but some insects have no wings at all. Some species of insects only have wings during a certain stage of life. In other species, only one sex has wings.

Some insects' legs, such as praying mantises, are suited for grasping.

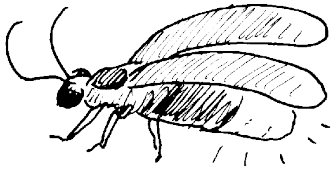


Fleas and grasshoppers have strong legs adapted for jumping.

An insect's **abdomen** (**ab** duh muhn) is attached to its thorax. The abdomen houses organs used for elimination, digestion, and reproduction.

Did you know that not all insects are bugs? True bugs have front wings that cover the hindwings. So not all insects are bugs, but all bugs are insects.

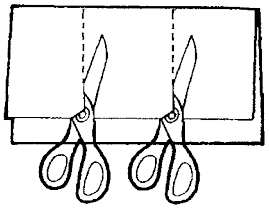
Fireflies, or lightning bugs, are neither true bugs nor true flies; they are a kind of beetle. The end section on their abdomen flashes a greenish light. They use their light to send messages to potential mates. Each species has a unique code.

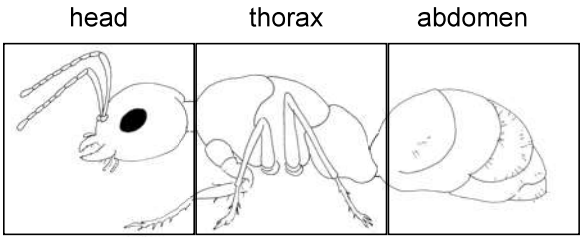


All About Insects Display

Hand out Student Page (SP) Lesson 1 Day 2 Pages 1-3 and a manila file folder or 12"x18" cardstock.

Fold the file folder or cardstock into a Hot Dog, with the fold at the top. Make a 3 Tab Book by opening and cutting up the two creases on the top section to the fold.





Cut out images 1A-C. With the fold at the top, glue image 1B on the center of the cover. Glue images 1A and 1C on each side. You will be adding to this book in Lessons 3, 4 and 5. It will be referred to as the *All About Insects Display*.

Insect Trap Activity

Materials: glass jar, hand shovel, flat stone or brick, four small rocks.

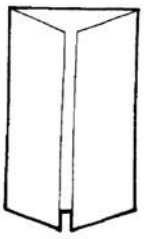
Dig a hole in the ground large enough to hold the glass jar. Place the jar in the ground. Be sure the rim of the jar is level with the top of the hole. Place some leaves and grass in the jar. Place four rocks around the rim of the jar and put the flat stone on the four small rocks. Check the jar every few hours.

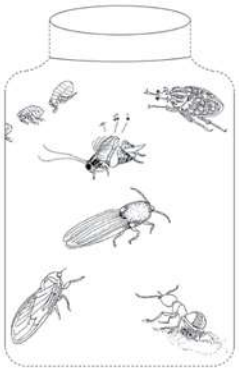
Do not keep insects captive for more than 24 hours. Release them at the location where they were collected when possible.

Insect Trap Shutter Fold

Hand out Student Page (SP) Lesson 1 Day 2 Pages 4 and 5.

Fold Student Page 1D into a Shutter Fold.





Cut on the dotted lines. Cut the images of 1E on the dotted lines and glue the pictures on the front of the Shutter Fold.

Choose the directions that fit the age of your student. If you are teaching multiple grades, start with the younger student's directions.

Inside the Shutter fold:


Draw pictures of the insects you found in your insect trap.


Draw pictures of the insects and label them.


Draw the insects. Write a description of each and label them. Record the time of day found.

Lesson 1
—*Day 3*

Materials:
Collect materials for the activities you choose:
- pond liner
- aquatic plants
- bricks
- soil
- plastic tub
- egg carton
- 4 black pipe cleaners
- sheet
- tweezers
- jar
- magnifying glass

Choose one or more activities to complete today:

1. Make a Pond

   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

   Materials: 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), bricks, soil

   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 pond weed. Observe your pond throughout your study of insects.

   Pond B

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

   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.

2. Insect Body Parts

   Materials: egg carton, 4 black pipe cleaners

   Cut out three sections of the egg carton in one piece. Punch holes and put the pipe cleaners through the middle carton (thorax) for legs. Bend the legs at the joints. Put another pipe cleaner in the head for antennae, make a V, and twist. With felt marker, draw the eyes and mouth. Review the body parts of an insect.

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

4. Trees are hosts to many different kinds of insects on their trunk, leaves, branches, flowers, fruits, and seeds. Place an old, light–colored sheet on the ground under a tree.

   Grasp a branch and shake it gently but firmly. With tweezers, pick up the insects and put them in a jar. Look at them with a magnifying glass.

5. Many of our foods contain insects. Research the laws that govern standards for the Food Defect Action Levels (FDAL) set by the Department of Health and Human Services to determine how many insect parts can legally be in processed foods.
6. Read: *Carl Linnaeus: Father of Classification* by Margaret Jean Anderson. (gr. 4-6)

Incredible Insects

The longest insect in the world is the giant stick insect of Indonesia. It grows to about 13 inches long, about the length of two new pencils.