

## SKILLS

Sorting, classifying, comparing

## NATIONAL SCIENCE STANDARD

### Content Standard C

#### Life Science

Students should develop an understanding of the characteristics of living organisms.

## NATIONAL SCIENCE STANDARD

### Content Standard G

#### History and Nature of Science

Students should develop an understanding of science as a human endeavor.

## OBJECTIVES

Students will learn that scientists classify living things according to similarities and differences. Students will be able to list the characteristics of arthropods. Students will be able to list the characteristics of insects. Students will be able to name the five classes of arthropods and give an example of an arthropod in each of the classes.

## ASSESSMENT

Given pictures or models of arthropods students will be able to sort them into the classes.

## MATERIALS

- “Invertebrate Pictures” template
- Chart paper or blackboard
- Plastic arthropod models (optional)

## BACKGROUND

One of the most important jobs of being a scientist is to sort and classify. The science of classification is called **systematics**. Systematics gives scientists the tools to communicate clearly about the natural world. Living organisms are grouped according to how closely related they are (their evolutionary history). These groups start out very large and become increasingly specific until finally scientists name individual species. Each species has a scientific name that is recognized anywhere in the world no matter what language is spoken.



## SUBJECTS

SCIENCE



## TIME

Preparation  
10 minutes

Teaching  
60 minutes

Evaluation  
10 minutes



## VOCABULARY

(see definitions on  
page 3 of lesson)

mammal  
exoskeleton  
vertebrae  
arthropod  
thorax  
abdomen  
antennae  
millipede  
centipede  
crustacean  
arachnid  
systematics

Most people think that mammals are the most important and numerous group of animals on the earth. If asked to name a list of animals most people will name mammals long before they name any other group. In reality mammals are a relatively small group, and insects are a much, much larger group. There are about 4,500 species of mammals and over a million known species of insects. Eighty percent of the world's animals are insects.

If an animal has an exoskeleton, segmented body and jointed legs, and is symmetrical on both sides of its body (bilaterally symmetrical) then it fits into the group scientists call **arthropods**. Insects are the largest group of arthropods. There are five major groups of arthropods. Scientists call each of these groups a **class**. Insects are the largest class.

## LESSON PRESENTATION

**Activity:** Challenge students to fill one notebook-size sheet of paper (both sides) with the names of as many animals as they can think of in **ten minutes**. Ask them to be as specific as possible (for example, instead of "bird," write "cardinal"). At the end of ten minutes ask them to stop writing and count how many animal names they listed.

Ask students how many **mammals** were on the list. Have them write that number on paper and circle it. Ask how many **insects** were on the list. Have them write that number on paper and circle it.

**Do not share the following information with students until they have finished the above exercise.**

**Explain:** Most people think that mammals are the most important and numerous group of animals on the earth. If asked to name a list of animals most people will name mammals long before they name any other group. In reality mammals are a relatively small group, and insects are a much, much larger group. There are about 4,500 species of mammals and over a million known species of insects. Eighty percent of the world's animals are insects.

**Ask:** "Does your list reflect what most people think?"  
"Why do you think that most people do not think of insects when they are asked to make this list?"

**Ask:** "Do you know what characteristics scientists use to classify an animal as an insect?"

Have students brainstorm before the list is put on the board.

Insects have:

- An exoskeleton
- Three body parts: head, thorax, abdomen
- Six legs attached to the thorax
- Many adult insects have two or four wings also attached to the thorax
- Many adult insects have two antennae attached to the head

**(write this list on the board or large chart so students can refer to it)**

**Activity:** Divide the students into small groups and give each group the Invertebrate Photographs (from the downloadable PDF template) to sort. Ask them to sort the pictures into piles of insects and non-insects. Discuss the process. Was it easy or hard since they already knew the characteristics of insects?

Ask the students to sort the non-insects into piles.

Ask how each group made the decisions they did.

Ask how all of the animals in the piles are related to each other.

**Explain:** All the insects have skeletons on the outside of their bodies. This is called an exoskeleton. Other animals have exoskeletons as well. If an animal has an exoskeleton, segmented body and jointed legs, and is symmetrical on both sides of its body (bilaterally symmetrical) then it fits into the group scientists call **arthropods**. There are five major groups of arthropods. Insects are the largest group of arthropods. Scientists call each of these groups a **class**.

1. Millipedes
2. Centipedes
3. Crustaceans: crabs, lobsters and shrimp
4. Arachnids: spiders, mites, ticks, scorpions
5. Insects

One of the most important jobs of being a scientist is to sort and classify. The science of classification is called **systematics**. Systematics gives scientists the tools to communicate clearly about the natural world. Living organisms are grouped according to how closely related they are (their evolutionary history). These groups start out very large and become increasingly specific until finally scientists name individual species. Each species has a scientific name that is recognized anywhere in the world no matter what language is spoken.

## DEFINITIONS

**abdomen**—one of three regions of an insect's body.

**antennae**—sensory organs attached to and extending from the head.

**arachnid**—class of arthropods including spiders, scorpions, ticks, and mites. Arachnids have eight legs in four pairs and one or two body regions.

**arthropod**—an animal that has an exoskeleton, segmented body and jointed legs, and is symmetrical on both sides of its body (bilaterally symmetrical).

**centipede**—arthropods that have a worm-like flattened body with many segments and one pair of antennae. They have many legs with one pair on most body segments.

**crustacean**—arthropods such as sowbugs, crayfish, lobsters, and crabs that have 10 or more legs in pairs, two body regions, and two pairs of antennae.

**exoskeleton**—skeleton on the outside of an animal's body. Arthropods have exoskeletons.

**mammal**—one of a relatively small class of vertebrate animals. Mammals produce milk for their young. Most also give birth to live young and have hair or fur. There are about 4,500 species of mammals.

**millipede**—class of arthropods that have a worm-like cylindrical body with many segments. Most body segments have two pairs of legs. Millipedes have one pair of antennae.

**systematics**—the science of classification. Living organisms are grouped according to how closely related they are (their evolutionary history). These groups start out very large and become increasingly specific until finally scientists name individual species.

**thorax**—one of the three regions of an insect's body. An insect's wings and legs are attached to the thorax.

**vertebrae**—bones that make up the backbone of a vertebrate animal.