

## SKILLS

Sorting, classifying, comparing

## NATIONAL SCIENCE STANDARD

### Content Standard C

#### Life Science

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

## OBJECTIVES

Students will learn that scientists classify living things according to similarities and differences. Students will be able to list the characteristics of insects. Given photographs or plastic models of arthropods, students will be able to sort the insects from the non-insects.

## ASSESSMENT

Given models or photographs of arthropods, students should be able to sort for insects, and explain why they made their choice.

## MATERIALS

- “Invertebrate Photographs” 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.

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



## SUBJECTS

SCIENCE



## TIME

Preparation  
10 minutes

Teaching  
60 minutes

Evaluation  
10 minutes



## VOCABULARY

(see definitions on  
page 3 of lesson)

entomologist

exoskeleton

vertebrae

arthropod

thorax

abdomen

antennae

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**

Use the assortment of invertebrate pictures that accompany the “Are You One of Us?” lesson (downloadable as the PDF file, Invertebrate Photographs Template). Divide the students into small groups. Each group should have 15-20 pictures. Ask the students to sort the pictures into piles. Give the students a specific time limit and have them work cooperatively.

**Sort:** Ask the students to sort the pictures in any manner they choose. When they are finished they must be able to state reasons for the categories they choose. Ask each group to talk about how they sorted their pictures.

**Explain** to the students that they are “doing what scientists do.” One of the most important jobs that scientists do is to sort and classify. Scientists must have a system for grouping and naming living things when they are discovered. All scientists all over the world, no matter what language they speak, must use the same system for grouping and naming living things. One very large group of animals in which only half of the estimated species have been classified is insects. Scientists who study insects are called **entomologists**.

**Discuss:** Ask the students if there are some similar things about all of the animal pictures that they sorted. What are they?

**Explain** that there is one characteristic that all of the animals share that cannot be seen by looking at the pictures. These animals do not have skeletons inside their bodies. These animals have their skeleton on the outside of their bodies. It is called an **exoskeleton**. Ask the students where their skeletons are. Ask them to bend their bodies forward and run their fingers along their backbones. Can they feel the **vertebrae**?

**Explain:** Humans have backbones with vertebrae and skeletons on the inside.

What other animals have their skeletons on the inside?

**Explain:** All of the animals in the pictures have skeletons on the outside. A skeleton on the outside is called an exoskeleton. These animals are called **arthropods**. One big class of animals with skeletons on the outside is the insects.

**Sort:** Ask the students to work again in their small groups. Ask them to sort the pictures into piles. One pile will be an insect pile and one pile for other arthropods. Encourage the students to work cooperatively and talk about how they are making the decision that something is an insect.

**Brainstorm:** Ask, “How did you decide that something is an insect? What body parts does an insect have?”

**Insects have:**

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

**Sort:** Have the students sort their piles again. What changes do they need to make in order to have one pile of pictures with only insects and one pile with other arthropods?

Ask students to name as many insects as they can. If spiders or other non-insects are named, remind students to check the list of the characteristics that make an insect. Create a separate list for the non-insects. If time permits, discuss the animals on this list that are arthropods but not insects.

## **DEFINITIONS**

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

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

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

**entomologist**—scientist that studies insects.

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

**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.