



Insects and Biodiversity

7th Grade

Duration

Pre-Visit: 40-60 min

Visit: 20-30 min

Post-Visit: 20-30 min

Location

Nature Gardens

Supplies

- Worksheets
- Pencils
- Scissors
- Colored pencils (optional)
- Clipboards (optional)

Standards

Science Grade 7

Investigation and Experimentation 7.a.c

Next Generation Science Standards

LS2.C: Ecosystem Dynamics, Functioning, and Resilience

Vocabulary

Biodiversity

Kingdom

Phylum

Class

Order

Classification



Concepts

- Organisms are classified into smaller and smaller groups.
- Classification is a way to organize and communicate information about many different organisms, including their evolutionary relationships.
- Insects are the largest and most diverse class of animals on earth.
- Biodiversity is in all environments, including urban habitats like Los Angeles.

Objectives

- Students will understand what classification is.
- Students will identify insects to order by observing distinguishing characteristics.
- Students will collect and analyze data to explore the biodiversity of Los Angeles.

Outline

1. Before visiting, review classification and discuss its importance. Introduce the Class Insecta and its diversity. Use the *Exploring Class Insecta* graphic organizer to familiarize students with some common orders of insects. Discuss and practice identifying insects to order.
2. At the Museum, explore the Nature Gardens, and have students observe (draw) and identify insects to order using the *Insect Observations* worksheet.
3. After visiting, use student data to create a graph and use it to explore the idea of biodiversity, and how data like this can be used to monitor the health of the ecosystem.

Pre-Visit

In the classroom, begin with a sorting activity:

Option 1: Ask students to list as many flying organisms as possible in 2 minutes and write them on the board (birds, insects, mammals, imaginary creatures, superheros, etc.). Then, have them work in pairs to sort the different organisms into groups based on shared characteristics.

Option 2: Have the students sort pictures of insects, or use the insect cards (without accompanying *Sorting Insects* worksheet) into groups based on shared characteristics.

When students are finished, discuss which characteristics they used to sort (Shape? Size? Color? Anatomy?) Then ask: Why might it be important to group or classify items, living or non-living?

Guide students toward understanding that grouping things helps us keep track of large amounts of information, it helps us stay organized. Explain that classification is a system scientists use to organize living things. Once organisms are classified, it is easier for scientists to communicate about organisms more accurately (scientific names) and can help indicate or understand organism's evolutionary relationships. Similarly to how we organize things at home or in the classroom, we use shared or similar characteristics to group living things (tie in relevant examples from the sorting activity).

Review levels of organization within the animal and plant kingdom: *Kingdom* > *Phylum* > *Class* > *Order* > *Family* > *Genus* > *Species* (You may find it helpful to give an example of an animal or plant, or explain that today we are going to be going through part of this process using insects).

Next, have students work in pairs to list as many types of insects as they can think of on a separate sheet of paper. Discuss with students that Class Insecta is the most diverse group of animals on earth and contains the highest number of species! Brainstorm some ways insects are important for our lives and ecosystem. Possible questions for discussion:

- In what ways might insects be important?
- How might we organize these groups of insects within their class?

Distribute the *Exploring Class Insecta* worksheet and ask students to complete the table using one of two methods:

Option 1: Create a presentation of insect orders and guide students through completion using direct instruction.

Option 2: Have students work independently or in groups to complete the worksheet using resources such as the internet research or reference reading such as books or pre-printed information sheets for from the Internet. Suggested sites include:

- <https://insects.tamu.edu/fieldguide/orders.htm>
- <http://www.ext.colostate.edu/mg/Gardennotes/313.pdf>
- <http://www.cals.ncsu.edu/course/ent425/library/compendium/index.html>

When students have completed the insect order chart, have them use the insect cards to practice identifying down to order—optionally use the *Sorting Insects* worksheet.

Teachers note: Some of these insects are tricky! If your class is engaged, it can serve as an opportune time to talk about the benefits and draw-backs of observing live vs. photographed animals for research; recording detailed observations and notes (including sketches) in the field; or biological concepts such as mimicry and diversity.

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When students are finished, lead a discuss about what helped them identify the insects. Example discussion questions include:

- What characteristics did you look at when sorting insects?
- Which characteristics were easy to spot on the pictures, and which were challenging?
- What distinguishes one order of insects from another? (Was there any anatomy that specifically helped?)
- What might help make identification easier or more difficult in the field?

Teachers Note: These questions can be a class discussion or an exit ticket to be used as an individual assessment.

Museum Visit

At the Museum, gather students at the entrance of the Nature Gardens. Review the orders of insects covered in the classroom (you may choose to have students bring along their completed graphic organizers). Explain that using only their eyes, they are going to look use the *Insect Observations* worksheet, to find at least three insects to observe (draw) and identify the order. Using a Museum map of the garden, they should also identify the section of the garden in which they observed the insect.

Post-Visit

Back in the classroom, use the *Analyzing Data* worksheet and have students combine their data to total the number orders the classroom found, and how many insects were found each order. Have students create a bar graph representing this data, then discuss what this graph represents. Questions for discussion are on the worksheet. Additional questions include:

- What might be learned by repeating this project and graph at a later date?
- What might repeating this project at a later date help us determine about the biodiversity of Los Angeles? (Is it changing or staying the same? Why might this be happening?)

Variations & Extensions

- On the graphic organizer, have the students label distinguishing characteristics of the order on their insect drawing.
- If you use Nature Journals or Science Notebooks with your students, have them collect data directly into their notebooks.
- Examine and explore the garden habitat data in the analysis portion of the activity. Were insects more abundant in some parts of the garden than others? Why might this be? Introduce micro-habitats.
- Repeat the Museum portion of the lesson at your schoolyard and compare the data, or compare the data from multiple classrooms. Were they different? What might be some reasons for similarities or differences?
- Explore what biodiversity means, and why it might be important.

Lepidoptera

Odonota

Hymenoptera



Orders are listed at the top of each column. All of the insects pictured here were found locally in Los Angeles.

Insect Cards

Coleoptera

Orthoptera

Diptera



Orders are listed at the top of each column. All of the insects pictured here were found locally in Los Angeles.

Insect Cards



Sorting Insects

Group these bugs!

Using your graphic organizer for reference, sort the cards into their proper orders using the boxes below:

<p>Lepidoptera</p>	<p>Orthoptera</p>
<p>Hymenoptera</p>	<p>Diptera</p>
<p>Coleoptera</p>	<p>Odonota</p>



Exploring Class Insecta

Order <i>What does this name mean?</i>	Examples <i>What common insects belong to this group?</i>	Characteristics <i>What major characteristics identify this group?</i>	Illustrations <i>Draw an example member of this group.</i>
Orthoptera			
Coleoptera			
Lepidoptera			



Exploring Class Insecta

Order <i>What does this name mean?</i>	Examples <i>What common insects belong to this group?</i>	Characteristics <i>What major characteristics identify this group?</i>	Illustrations <i>Draw an example member of this group.</i>
Diptera			
Hymenoptera			
Hemiptera			



Exploring Class Insecta

Order <i>What does this name mean?</i>	Examples <i>What common insects belong to this group?</i>	Characteristics <i>What major characteristics identify this group?</i>	Illustrations <i>Draw an example member of this group.</i>
Dermiptera			
Odonata			
Blattoidea			



Explore the Nature Gardens

Find three insects to draw and identify to order (try not to repeat an order!). Be sure to indicate what characteristics you observed that led you to your identification, and record of where in the Nature Gardens you observed the specimen.

Specimen 1 Order:

Location Observed:

Specimen 2 Order:

Location Observed:

Specimen 3 Order:

Location Observed:

Combine Class Data

Fill in the data table below using data from the entire class.

Orders Documented	Number of Insect Representatives Found

Graph

Create a bar graph below representing data above. Be sure to clearly label your axis!



Analysis

Use the data and graph to answer the following questions.

1. What orders were most present?
2. What orders did were not represented? What might be some reasons this data is absent?
3. What does this graph suggest to us about the biodiversity of Los Angeles?
4. Surveys of animals and plants in nature are a common way scientists collect data. Why might surveys be such an important tool?