



# University of Kentucky Department of Entomology Insects in the Classroom - Lesson Plan **Insects A-Z!**

For Intermediate Grades (4-5)  
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## **Activity Description**

Students use the Internet and other resources to learn about basic scientific classification and the diversity of life-cycles and structures among insects.

**Age Group:** Grades 4-5

**Time:** 1 hour total class time plus additional out-of-class time

**Materials needed:** no special materials needed, but students will need access to the Internet and reference books, especially insect field guides or entomology text books

## **Objectives**

- ❖ Students will use the Internet and other resources to find insect common names that begin with each letter of the alphabet.
- ❖ Students will determine to which scientific order each insect belongs and identify obvious characteristics that the insects possess which identify them as belonging to their respective orders
- ❖ Students will investigate the life cycle of each type of insect to determine if it has simple or complex metamorphosis. They will also determine what type of food the immature and adult stages eat.
- ❖ Students will provide the Internet address, book title, or other citation from which each insect common name was found

## **Academic Expectations**

The above objectives fall under KERA's Science Academic Expectations:

- 2.2 Identify, analyze, and use patterns such as cycles and trends to understand past and present events and predicting possible future events.

## **Program of Studies**

- S-4-LS-3 Students will understand that organisms have different structures that serve different functions. These structures are used to sort organisms into groups.
- S-4-LS-5 Students will understand that organisms have life cycles that are different for different organisms.

## **Core Content**

- SC-E-3.1.1 Things in the environment are classified as living, non-living, and once-living. Living things differ from non-living things. Organisms are classified into groups by using various characteristics (e.g. body coverings, body structures).
- SC-E-3.2.1 Plants and animals have life cycles that include the beginning of life, growth and development, reproduction, and death. The details of a life cycle are different for different organisms.

## ***Insects A-Z***

There are millions of species of insects in the world. In this activity, your students work together to find 26 different insect names: one for each letter of the alphabet! But your students aren't just going to make a list. They are also going to research some basic information about each insect, including life-cycle and scientific order name. This information will reinforce some of the KERA program of studies and core-content bullets for grades 4-5. Use this activity to introduce your students to scientific classification and to study the diversity of insect life-cycles and structures.

**Essential question for this activity:** "How do we use important characteristics (like life-cycle differences and structures) to organize insects into scientific groups?"

## ***Conquering the Alphabet***

Instead of having each student find 26 insect names, divide the alphabet among your students. You can do this however you like, but we suggest assigning each student 2 letters of the alphabet. Be careful not to assign a student 2 letters that are difficult to find names for. If you did that, one student could get stuck with 'X' and 'Z,' two of the hardest letters. A good strategy may be to assign each student one letter from each of these two sets of letters:

Easy letters: A, B, C, D, E, F, G, H, L, M, N, O, P, R, S, T, W

Hard letters: I, J, K, Q, U, V, X, Y, Z

It is okay if you assign some of these letters twice and end up with more than one insect name for certain letters of the alphabet, just as long as you end up with at least one for each letter. For some of the very hardest letters, like 'X' and 'Z,' you may want to give the students some extra help. In fact, "xerxes butterfly" is the only insect common name that we know of that begins with 'X,' so that may be a good one for you to work for your students as an example!

**What is a common name?** For this activity, a common name is any name used for an insect other than its scientific species name but that is more specific than the common name of its order. Sometimes, a single insect can have several acceptable common names. For instance, the insect with the species name *Harmonia axyridis* is commonly called the "multi-colored Asian lady beetle." It is also sometimes called the "Asian lady beetle." You could also simply call it a "lady beetle" or a "lady bug." Any of those common names would be acceptable, but "beetle" is probably not specific enough, since all insects in the order Coleoptera are beetles. Use your best judgment to determine if a student has given you an acceptable common name and use the resources below as a guide.

## ***Resources***

Each student needs to provide a reference for the place where they find each insect name. There are lots of places for your students to look for insect names. Here are some good places to look if your students are having trouble:

Online list of insect common names:

<http://esc-sec.org/englishcommonnames.htm>

Insect field guides:

**Simon & Schuster's Guide to Insects** by Arnett and Jacques

**Peterson Field Guide to Insects** by Borror and White

**National Audubon Society Field Guide to North American Insects & Spiders**

by Milne and Milne

**Butterflies and Moths (A Golden Nature Guide)** by Mitchell and Zim

## ***Insect Orders***

Like all living things, insects are organized into groups. As you remember, organisms are arranged into Kingdom, Phylum, Class, Order, Family, Genus, and Species. All insects belong to the Kingdom Animalia, the Phylum Arthropoda, and the Class Insecta. From there, insects are separated into a few dozen Orders. An example of an insect order is "Coleoptera." Coleoptera contains all of the beetles, and nothing but beetles. The insect order Lepidoptera contains all of the butterflies and moths, and nothing else. Orthoptera contains grasshoppers, crickets, and katydids.

It is usually fairly easy to determine the order to which an insect belongs. For example, it is difficult to confuse most butterflies and moths (order Lepidoptera) with other insects. Sometimes, though, scientists have to examine specific characteristics to figure out what order an insect belongs to. For example, there are many types of flies (all flies are in the order Diptera) that are the same size, shape, and color as bees (all bees, ants, and wasps are in the order Hymenoptera). But when you look closely, you can see that all flies have only 2 wings while bees always have 4 wings.

For each insect that a student reports for this activity, they need to find out what order the insect belongs to. Since they will have the common name, it is usually very easy to find out the order. Using a search engine, if the common name "tree cricket" is searched along with the word "order," several web pages appear which list the order as "Orthoptera."

**Characteristics:** Now for the hard part! As mentioned above, each insect order has a few characteristics which help distinguish it from other orders. Your student needs to write down one of these characteristics for each insect that they find AND the function of that characteristic (because every structure has a function!). To do this, they will need to research in an insect field guide, text book, or website some of the characteristics that distinguish each order. For instance: if a student uses a "monarch butterfly" for the letter "M," they will need to report that the monarch is in the order Lepidoptera and that it has "scaly wings," one of the characteristics which helps distinguish Lepidoptera from other insects. One of the functions of scales: they give vivid color to butterflies, useful for attracting mates. Or, your student may report that the monarch has "siphoning mouthparts." All butterflies have siphoning mouthparts. These

mouthparts are specifically adapted for feeding on nectar, and no other insects have these mouthparts. Individual characteristics may have more than one function. It is okay if a student lists just one, or more.

You may want to share the following website from Texas A&M with your students: <http://insects.tamu.edu/fieldguide/orders.htm>

It contains a list of all of the insect orders along with a description of their distinguishing characteristics.

### ***Metamorphosis***

Your students probably know that insects go through a metamorphosis as they grow. All insects go through either a “simple” or “complex” metamorphosis.

Insects like grasshoppers and cockroaches go through simple metamorphosis. For insects with simple metamorphosis, the young insect resembles the adult and usually eats the same type of food as the adult. Insects like butterflies and beetles have complex metamorphosis. Their immature forms look very different from the adults and often eat different foods. For instance: a caterpillar is the immature form of a butterfly. Caterpillars have chewing mouthparts and feed on leaves. Butterflies have siphoning mouthparts and feed only on nectar.

For this activity, your students will determine what type of metamorphosis each insect has and what type of food the immature form eats and what type the adult eats. They can find this type of information in insect field guides and on the Internet. You can check if they are correct by visiting the website from Texas listed above (<http://insects.tamu.edu/fieldguide/orders.htm>), which gives the important characteristics for each order, including type of metamorphosis.

**Important note:** different texts may use different terms to describe metamorphosis type. “Simple metamorphosis,” “incomplete metamorphosis,” “minimal metamorphosis,” “gradual metamorphosis,” and “no metamorphosis” all mean the basically same thing. Similarly, the terms “complete” and “complex” metamorphosis are used interchangeably.

## ***Insects A-Z: Examples***

### **Letter: R**

**Insect common name:** redspotted purple butterfly

**Order Name:** Lepidoptera

**Order characteristic:** siphoning mouthparts

**Function of this characteristic:** adapted for drinking nectar

**Metamorphosis:** complex

**Food of immature:** leaves

**Food of adult:** nectar

**Reference:** *Butterflies and Moths* by Mitchell and Zim, p. 57

### **Letter: B**

**Insect common name:** bee assassin

**Order Name:** Hemiptera

**Order characteristic:** piercing and sucking mouthparts

**Function of this characteristic:** adapted for piercing insect prey and sucking fluids from inside

**Metamorphosis:** simple

**Food of immature:** other insects

**Food of adult:** other insects

**Reference:** *National Audubon Society Field Guide to North American Insects & Spiders* by Milne and Milne, p. 473

### **Letter: I**

**Insect common name:** ichneumon wasp

**Order Name:** Hymenoptera

**Order characteristic:** chewing mouthparts

**Function of this characteristic:** adapted for chewing whole pieces of plant or animal material

**Metamorphosis:** complex

**Food of immature:** feeds on another insect as a parasite

**Food of adult:** nectar

**Reference:** <http://insects.tamu.edu/fieldguide/cimg327.html>

### **Letter: D**

**Insect common name:** deer fly

**Order Name:** Diptera

**Order characteristic:** halteres

**Function of this characteristic:** unlike most flying insects which have 4 wings, flies just have 2 wings. The back pair has become "halteres," structures used to keep balance while flying

**Metamorphosis:** complex

**Food of immature:** aquatic insects

**Food of adult:** blood from mammals (females) and plant juices (males)

**Reference:** *National Audubon Society Field Guide to North American Insects & Spiders* by Milne and Milne, p. 651

### **Letter: Z**

**Insect common name:** zebra butterfly

**Order Name:** Lepidoptera

**Order characteristic:** scales on wings

**Function of this characteristic:** scales provide color, which is useful for mate recognition and/or camouflage for butterflies and moths

**Metamorphosis:** complex

**Food of immature:** leaves

**Food of adult:** nectar

**Reference:** *Butterflies and Moths* by Mitchell and Zim, p. 43

**Letter: J**

**Insect common name:** Japanese beetle

**Order Name:** Coleoptera

**Order characteristic:** elytra

**Function of this characteristic:** elytra are hardened front wings used to cover and protect the back wings of beetles

**Metamorphosis:** complex

**Food of immature:** grass roots

**Food of adult:** leaves and fruit

**Reference:** **Simon & Schuster's Guide to Insects** by Arnett and Jacques, entry number 105

**Letter: W**

**Insect common name:** white tail dragonfly

**Order Name:** Odonata

**Order characteristic:** large, conspicuous eyes

**Function of this characteristic:** excellent eyesight allows dragonflies to capture flying insects

**Metamorphosis:** simple

**Food of immature:** aquatic insects

**Food of adult:** flying insects

**Reference:**

<http://www.uky.edu/Agriculture/CritterFiles/casefile/insects/dragonflies/dragonflies.htm#skimmer>

## ***Discussion***

When the students bring in their insect names the class should discuss as a group some of the things that they have found. First, compile a list of all the insect names found by the students and give this list to all students as a handout or project it on a screen. Also, hand out to each student a list of all of the order names represented by all of the common names. With this list of order names, discuss with the students the different characteristics that they found for these orders while doing their research. Different students should remember different characteristics that they found for different orders, and you should end up with a list of distinguishing characters for several insect orders. They should also add to this list whether or not each order has "simple" or "complex" metamorphosis.

### **Some things to discuss:**

1. Why do you think that mouthparts are an important way to distinguish insect orders?
2. Why do insects with complex metamorphosis often eat different things when they are young compared to when they are adults?
3. What order was the most represented on the total list of names brought in by the students?
4. Why is it important for organisms to have both common and scientific names?

# INSECTS A-Z!

Name \_\_\_\_\_

**Find Insect names:** Using the Internet, insect field guides, and other resources, find the common names of 2 different insects, one for each letter of the alphabet that you are assigned. In addition, find the scientific **Order** name for each insect plus one characteristic that distinguishes that insect order, the function of that characteristic, and determine whether each insect has simple or complex metamorphosis. You also need to find out what kind of food the adult and immature forms eat. Lastly, write down the internet address or book name and page number where you found your insect name.

## Letter:

<b>Insect Common Name:</b>	
<b>Order name:</b>	
<b>Order characteristic:</b>	
<b>Function of this characteristic:</b>	
<b>Metamorphosis:</b>	<input type="checkbox"/> simple <input type="checkbox"/> complex
<b>Food of immature:</b>	
<b>Food of adult:</b>	
<b>Reference:</b>	

## Letter:

<b>Insect Common Name:</b>	
<b>Order name:</b>	
<b>Order characteristic:</b>	
<b>Function of this characteristic:</b>	
<b>Metamorphosis:</b>	<input type="checkbox"/> simple <input type="checkbox"/> complex
<b>Food of immature:</b>	
<b>Food of adult:</b>	
<b>Reference:</b>	