

Data Collection Activity 2: Field Guide

Scientific Background

During an experiment, scientists typically make observations or measurements and collect results as they work. This information, known as data, can take many forms. Data may be written notes, a set of numbers, maps, or drawings generated during an experiment. Scientists use tables, charts, graphs and notebooks to record data. It is important to accurately record all relevant data, even data that seem surprising or wrong.

One tool that can be used to help collect data is a *field guide*. A field guide is a book that can be used when observing animals or plants to help distinguish between similar types of species. This lesson allows students to create a field guide by observing arthropods in **Backyard Bugs** and collecting data about the bugs.

This lesson is best implemented with the following **Backyard Bugs**:

Antlion larva	Centipede	Cockroach	Giant water bug
Mantis	Millipede	Monarch butterfly	Monarch caterpillar
Spider	Stick insect	Tachinid fly	Viceroy butterfly
Whirligig beetle			

Vocabulary

Antlion	abdomen, adult, cocoon, complete metamorphosis, egg, jaws, larva, metamorphosis, prey, pupa
Centipede	appendage, Arthropod, exoskeleton, feeler, invertebrate, jaws, jointed, poison, predator, prey, segment, simple eyes, terrestrial
Cockroach	abdomen, adapted, antennae, cerci, climate, compound eyes, exoskeleton, flexible, habitat, head, hemimetabolous, incomplete metamorphosis, jointed, leathery, membranous, molt, mosaic, nymph, ommatidia, omnivore, organ, pronotum, sensors, terrestrial, thorax
Giant Water Bug	aeration, breathing tube, desiccation, digest, elongate, Heteroptera, incomplete metamorphosis, internal organs, mouthparts, nymph, toxin
Mantis	adult, camouflage, carnivore, elongate, exoskeleton, hatch, mantid, mesothorax, molt, nymph, predator, prey, prothorax, tropical
Millipede	appendage, anal valve, burrow, carbon dioxide, coil, defecation, detritus, exoskeleton, gnathochilarium, jointed, organic, poisonous, pre-anal ring, predator, segment, sexual maturity, soil, stink glands
Monarch Butterfly and Caterpillar	abdomen, adult, antennae, behavior, breed, caterpillar, chrysalis, complete metamorphosis, cremaster, egg, female, inherit, instar, knobbed, larva, latex, mandible, migration, nectar, pollinate, predator, prey, proboscis, prolegs, pupa, scales, species, sperm, spinneret, true legs, ventral, wing

Vocabulary, continued

Spider	anchor, ballooning, bridge line, bristle, burrow, cephalothorax, chelicerae, claw, digest, disperse, dragline, exoskeleton, eye, fang, hub, molt, orb web, pedipalp, poison, prey, silk, spinneret, spiral, venom, vibrate
Stick Insect	camouflage, capitulum, feigning, herbivore, incomplete metamorphosis, nymph, regenerate, slender, suction pads, vegetation
Tachinid Fly	abdomen, bristle, complete metamorphosis, Diptera, halteres, host, lapping mouthparts, larva, maggot, parasite, parasitoid, vital organs
Viceroy Butterfly	adult, caterpillar, carrion, complete metamorphosis, dorsal, environment, model, Müllerian mimicry, predator, prey, unpalatable, wingspan
Whirligig Beetle	carnivore, Coleoptera, compound eyes, grasping, Gyrinidae, hind legs, paddle-like, predator, prey, scavenger, specialized

*Vocabulary definitions can be found in the **Backyard Bugs** Glossary.*

Thinking Question

What other data could be included in a field guide?

Exploratory and Extension Activities

Additional Exploratory and Extension activities are available in the *Backyard Bugs* Teacher's Guide.

Bug Sorting

Use different bugs from ***Backyard Bugs*** to investigate sorting and grouping. Create cards with words or pictures representing each of the bugs. Discuss various ways to sort the bugs. For example, "What do they eat?" (plants, animals, or decaying material), or, "Where do they live?" (pond, stream, soil, trees, or flowers). Using large sheets of paper, students can create Venn diagrams to graph their sorting and grouping of bugs.

Writing a Biography

Write a biography of one of the ***Backyard Bugs***. The focus can be on the life cycle phases, where it lives, what it eats, who its predators are, and how it reproduces.

Name: _____

Data Collection Activity 2: Field Guide

My Field Guide for the _____

Draw a picture of the arthropod. Label its features.

Complete the chart for the arthropod.					
Scientific Name					
Number of Wings	None <input type="checkbox"/>	Two <input type="checkbox"/>	Four <input type="checkbox"/>		
Type of Wings	Thick, leathery <input type="checkbox"/>	Membranous <input type="checkbox"/>	Scaly <input type="checkbox"/>	No Wings <input type="checkbox"/>	
Number of Legs	3 pairs <input type="checkbox"/>	4 pairs <input type="checkbox"/>	More than 8 <input type="checkbox"/>		
Type of Legs	Walking <input type="checkbox"/>	Swimming <input type="checkbox"/>	Jumping <input type="checkbox"/>	Grasping <input type="checkbox"/>	
Locomotion	Walk <input type="checkbox"/>	Swim <input type="checkbox"/>	Jump <input type="checkbox"/>	Fly <input type="checkbox"/>	
Habitat	Water <input type="checkbox"/>	Soil <input type="checkbox"/>	Forest <input type="checkbox"/>	Grass-lands <input type="checkbox"/>	Other <input type="checkbox"/>
Mouthparts	Chewing <input type="checkbox"/>	Piercing <input type="checkbox"/>	Proboscis <input type="checkbox"/>	Reduced <input type="checkbox"/>	
Other Characteristics					

Answer Key
Data Collection Activity 2: Field Guide

My Field Guide for the _____

Draw a picture of the arthropod. Label its features.
<i>Student answers may vary.</i>

See below the chart for student answers.

Complete the chart for the arthropod.					
Scientific Name					
Number of Wings	None <input type="checkbox"/>	Two <input type="checkbox"/>	Four <input type="checkbox"/>		
Type of Wings	Thick, leathery <input type="checkbox"/>	Membranous <input type="checkbox"/>	Scaly <input type="checkbox"/>	No Wings <input type="checkbox"/>	
Number of Legs	Six <input type="checkbox"/>	Eight <input type="checkbox"/>	More than 8 <input type="checkbox"/>		
Type of Legs	Walking <input type="checkbox"/>	Swimming <input type="checkbox"/>	Jumping <input type="checkbox"/>	Grasping <input type="checkbox"/>	
Locomotion	Walk <input type="checkbox"/>	Swim <input type="checkbox"/>	Jump <input type="checkbox"/>	Fly <input type="checkbox"/>	
Habitat	Water <input type="checkbox"/>	Soil <input type="checkbox"/>	Forest <input type="checkbox"/>	Grass-lands <input type="checkbox"/>	Other <input type="checkbox"/>
Mouthparts	Chewing <input type="checkbox"/>	Piercing <input type="checkbox"/>	Proboscis <input type="checkbox"/>	Reduced <input type="checkbox"/>	
Other Characteristics					

Answer Key

Arthropod Name	Number of Wings	Type of Wings	Number of Legs	Type of Legs	Loco-motion	Habitat	Mouth-parts
Antlion larva	none	none	six	walking	walk	sandy soil	piercing
Centipede	none	none	more than 8	walking	walk	ground, bark	piercing
Cockroach	4	thick/membranous	6	walking	walk	moist ground, vegetation, buildings	chewing
Giant water bug	4	thick/membranous	6	swimming	swim	fresh water	piercing
Mantis	4	thick/membranous	6	walking	walk	vegetation	chewing
Millipede	none	none	more than 8	walking	walk	moist ground, vegetation	chewing
Monarch butterfly	4	scaly	6	grasping	fly	forest, prairie	proboscis
Monarch caterpillar	wingless	none	6	walking	walk	prairie, milkweeds	chewing
Spider	wingless	none	8	walking	walk	Vegetation, buildings	piercing
Stick insect	Usually wingless		6	walking	walk	forest	chewing
Tachinid fly	2	membranous	6	walking	fly	vegetation	Sponging, lapping
Viceroy butterfly	4	scaly	6	walking	fly	marsh	proboscis
Whirligig beetle	4	thick	6	swimming	Swimming	fresh water	chewing

Arthropod Name	Species Name or Classification group	Other Characteristics
Antlion larva	Myrmeleo	Student answers will vary.
Centipede	Chilopoda	
Cockroach	Periplaneta americana	
Giant water bug	Lethocerus americanus	
Mantis	Tenodora aridifolia	
Millipede	Diplopoda	
Monarch butterfly	Danaus plexippus	
Monarch caterpillar	Danaus plexippus	
Spider	Aphonopelma	
Stick insect	Diaperomera femorata	
Tachinid fly	Diptera	
Viceroy butterfly	Limenitis archippus	
Whirligig beetle	Gyrinidae	