



Prairie Insect Survey

In a Nutshell



Students will be introduced to common insects and insect orders. Students will use their knowledge of insect orders to survey prairie insects found in the prairies on the Refuge.

Grades 2 & 3
Seasons Fall, Spring, Summer
Location Refuge-wide

Learning Objectives

After participating in this activity, students will be able to:

- describe how scientists organize living things into groups based on similar physical characteristics.
- list at least 2 physical characteristics of at least 3 insect orders presented (butterflies/moths, dragonflies, bees/ants, flies, grasshoppers, beetles, true bugs).
- explain that the greater the variety of insect orders collected on the prairie the healthier the habitat.

Literature Connections

Bugs for Lunch by Margery Facklam

1000 Facts on Bugs by Barbara Taylor

Butterfly Eyes and Other Secrets of the Meadow by Joyce Sidman

Do Bees Sneeze? by James K. Wangberg

Insects do the Strangest Things by Leonora and Arthur Hornblow

Bugs: Look Closer by Sue Malyan

The Bug Scientists by Donna M. Jackson (1200L)

What is the Animal Kingdom? by Bobbie Kalman (IG700L)

¿Qué fase s el ciclo de vida?



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By Bobbie Kalman (IG700L)

How Do Flies Walk Upside Down? by Melvin & Gilda Berger

Joyful Noise by Paul Fleischman

Pre-Visit Suggestions

Introduce students to the word “taxonomy” by reviewing the characteristics of animal groups. Ask students to closely compare the most common insect orders they may encounter in the prairie.

On-site Activities

Students will use insect sweep nets and hand lenses to catch and observe prairie insects and record insect data about the species they have found.

Classroom Connection

Spend an afternoon collecting insects around the school yard. Incorporate the data in math class by comparing the insects students caught on the prairie with the insects found in the school yard. Introduce students to the concept of diversity by asking them to compare the data they collected from each site. Use bar graphs and pie charts to determine which habitat (prairie or school yard) had the greatest variety of insect families and which had a greater population of insects.

Build a “virtual” insect collection in the classroom. Start the collection using the attached drawings. Encourage students to research information about the insects on the drawings. Then ask students to color the drawings to be life-like representations of the insects. Invite students to bring magazines or internet pictures of other insects to add to the classroom collection.

Teacher Resources

Pet Bugs: A Kid's Guide to Catching & Keeping Touchable Insects by Sally Kneidel

More Pet Bugs: A Kid's Guide to Catching & Keeping Insects & Other Small Creatures by Sally Kneidel

Milkweed, Monarchs and More: A Field Guide to the Invertebrate Community in the Milkweed Patch by Ba Rea

The Song of Insects by Lange Elliot and Wil Hershberger



Prairie Insect Survey Pre-visit Activities

Materials

- Tree of Life Poster
- Animal Photographs- one from each class of vertebrates
- Common Prairie Insect Order Sheets- one per student
- Insect Riker Mounts
- Pencils

Introduction

Introduce students to the word “Taxonomy”. Simple definition: the organization of living things into groups based on similarities. Ask students to think about characteristics they would use when asked to sort a group of items? Students’ answers should include physical characteristics that most likely will not change. **What is the purpose of grouping animals into categories? It creates one name for each living organism scientist can use when categorizing organisms.**

*Categories: Kingdom, Phylum, Class, Order, Family, Genus, Species.
Memory helper: King Phillip Came Over For Good Soup.*

To introduce the categories, begin with the largest: **Kingdom**. Explain to students that most living things can be divided into two groups (Kingdoms) based on how they obtain food. A living thing will either make its own food (Plants) or it must find food to eat (Animals). When a Kingdom is determined, for example the animal Kingdom, it can be broken into smaller groups, or **Phyla**, depending on the physical characteristics of the living organism. Introduce students to the two largest Phyla: Invertebrates and Vertebrates. Explain to students the different characteristics between these two groups (backbone versus no backbone). After determining the Phyla, continue to break down the groups further into **Classes**. Using the Tree of Life poster and pictures of animals as clues, ask students to list the 5 major classes of vertebrates. On the board write “mammals”, “birds”, “reptiles”, “amphibians”, and “fish” under the vertebrate category. Ask students which animal pictures are a representative of each class. Add the animal pictures under each class and discuss a few of their major characteristics. Ask students to name a few of the invertebrate classes, writing the names on the board (example: “insects”, “spiders”, and “crustaceans”). Point these classes out on the Tree of Life poster.

Insect Order Activity

Next, explain to students they will be breaking down the insect class and taking an even closer look at eight of its **Orders**. Divide the class into small groups or pairs depending on the number of insect collection boxes available. Hand out one copy of the *Common Prairie Insect Orders: How They Look Different* observation sheet to each student. Instruct students to compare insect orders and record in words or drawings at least 3 characteristics of each order found on the paper. Remind students to focus on the differences between the orders, as this will help them tell the orders apart when they catch insects on the prairie. Collect observation sheets when students complete them; they will be used during the refuge field trip.

For Example:

Beetle	Butterfly	Fly	Bees	True Bugs
hard shell	4 large wings	big eyes	enlarged abdomen	X or shield on their back
shell may also be wings	proboscis mouth	2 pointed wings	color	biting mouth

Wrap-up

Discuss with students the logistics for the upcoming field trip; appropriate clothing to wear for outdoor weather, activities they will do during the field trip, etc. Remind students about what it means to be a naturalist.

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Prairie Insect Survey
On-site Activity

Materials

- One insect sweep net per student team
- One insect collecting jar per student team
- Cooler of ice in small bags or instant ice packs (in case of an insect sting)
- Copy of the Prairie Insect Survey Data Sheet- one per student
- Whiteboard & markers
- Pencils

Introduction

(30 minutes)

Explain to students that for this activity they will conduct a prairie insect survey like real Entomologists (insect scientists). Ask teachers to divide students into groups. Explain to students that they will use the insect sweep nets to collect a variety of prairie insects which they will examine and count. Let students know whether or not they should bring the insects back to the classroom. Provide each team with a net and insect jar. Show each team the proper way to carry their equipment (handle pointing down) to prevent injury and protect the equipment. Lead your group out to the prairie!

Outside, demonstrate for the students the correct way to use a sweep net. With a student helper, show the other students several ways they may place insects into their jar without injuring the insect. Emphasize to students that this is a learning experience, and it is very common for some insects to escape. Students should avoid bees and wasps, as these insects will sting. Show students how to release bees and wasps safely out of the net if they need to. Bring along a cooler with ice or instant ice packs to use in case someone is stung. Ask teams to spread apart and start their insect surveys!

Insect “Sweep Up” and Investigation

(60 minutes)

As students begin to collect insects, transfer a variety of the insects into the small “bug boxes”. After 20 - 30 minutes have passed, gather students back in the classroom to allow them the opportunity to examine their collection. Pass out the Prairie Insect Survey Data Sheets to each team and ask students to estimate the number of insects they caught in each order listed.

Wrap-up

(30 minutes)

Discuss the following questions.

- Which insects seem to be most common on the prairie? Which group was least common? Why do you think this is the case? Tabulate a class total for each insect order and, if there is enough time, ask students how they might represent their data visually. On-site, or back in the classroom, help them illustrate their class totals using a bar graph, a pictograph, and/or a pie chart, see examples on next page.
- Which prairie insects were hardest to catch? Why?
- Why do you think there are so many bees and wasps on the prairie?
- Did you catch anything other than insects in your net? Why might spiders like to live in the prairie?

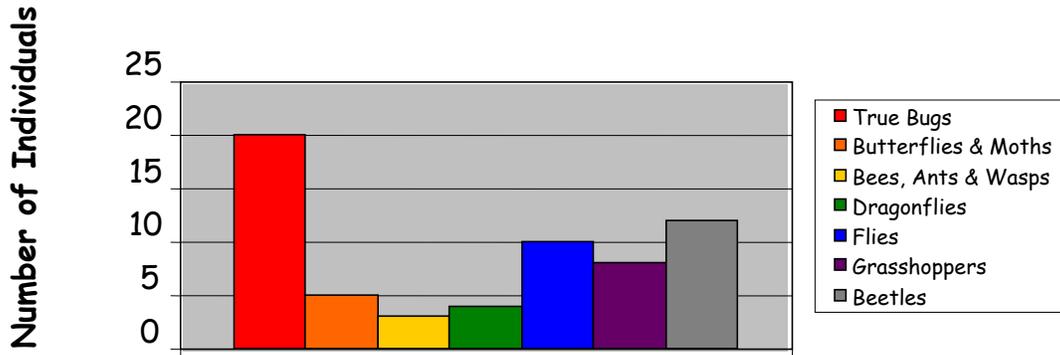
If time allows, have students release their insects. They should definitely release their insects into the same habitat they were caught in, and if possible, the same area.

Management Connection- Biodiversity

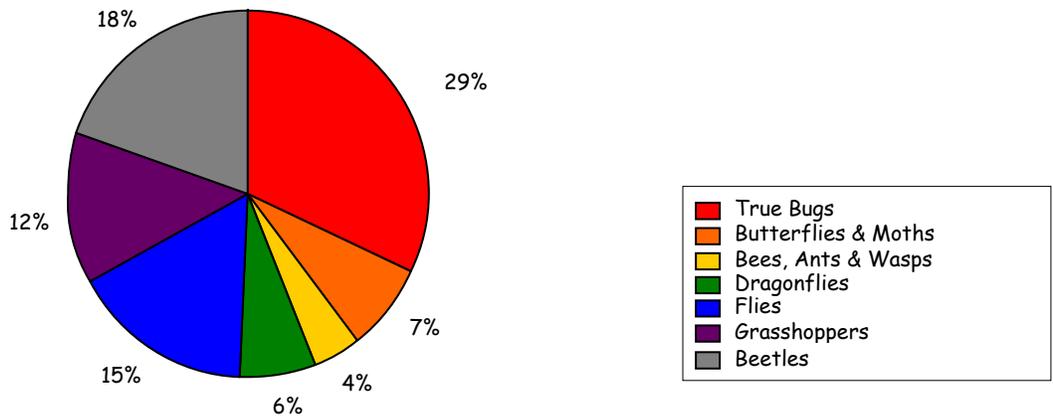
The health of a natural habitat can be determined in a number of ways: the presence (or absence) of certain plants or animals, physical or chemical parameters, or the variety of species present. This biological variety, called **biodiversity**, is often used by biologists as a measure of health in native and restored prairies. Biodiversity of species is usually measured within one animal or plant group. For example, the biodiversity value is a simple calculation: the total number of different insect species collected (or orders collected for a simplified study) divided by the total number of insects found.

See graphs below for demonstrating this connection.

Number of Insects Caught (Organized by Order)



Percentages of Insect Orders Caught



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Naturalist: _____ Date: _____ Location: _____



Prairie Insect Guide



Use words, drawings, and color to describe the differences between each insect order.

Insect Order	Description of Order (use words and drawings)
Flies	
Bees/Ants/Wasps	
Dragonflies	
Butterflies/Moths	
Beetles	
True Bugs	
Grasshoppers/ Crickets	

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Naturalist: _____ Date: _____ Location: _____

Weather: _____



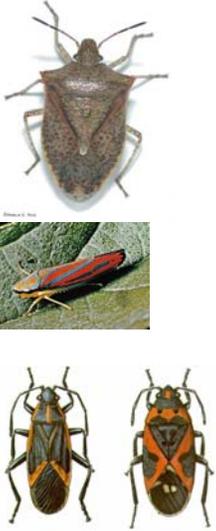
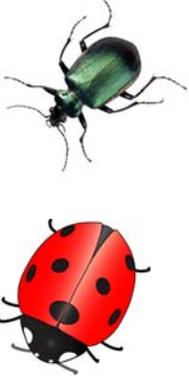
Prairie Insect Survey



Insect Order	Tally	Totals
Flies		
Bees/Ants/Wasps		
Dragonflies		
Butterflies/Moths		
Beetles		
True Bugs		
Grasshoppers/ Crickets		

Common Prairie Insect Orders

How they Look Different (Answer Key)

True Bugs	Butterflies & Moths	Bees Ants & Wasps	Flies	Grasshoppers	Dragonflies & Damselflies	Beetles
<p>wings fold to make an X flattened body</p> 	<p>wings: wide, many colorful, covered in scales thick body 2 antennae</p> 	<p>black yellow warning patterns wasps thin waist bees "furry" and chubby</p> 	<p>2 wings mostly black</p> 	<p>large hind legs green, brown, gray accordion looking wings</p> 	<p>wings: elongated, no scales, transparent, less colorful long thin bodies no antennae</p> 	<p>wings: form hard outer "shell", fold in straight line down the back long or short antennae variety of colors</p> 

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Naturalist: _____ Date: _____ Location: _____

Weather: _____

School Yard Insect Survey Data Sheet

Collection Date:

Collecting Team:

Insect Order	tally	totals
Flies		
Bees/Ants/Wasps		
Dragonflies		
Butterflies/Moths		
Beetles		
True Bugs		
Grasshopper/ Crickets		

Prairie Insect Survey Rainy Day Alternatives

Materials

- Riker mounts
- “How do they look different” data sheets
- Pencils
- “All about Bugs” DVD
- Insect Jeopardy game and board
- Plastic insects
- Small nets
- Insect jars
- Prairie Insect Survey data sheets

Insect Order Activity

Students will be taking an even closer look at eight Orders of the Class Insect. Divide the class into small groups or pairs depending on the number of insect collection boxes available. Hand out one copy of the *Common Prairie Insect Orders: How They Look Different* observation sheet to each student. Instruct students to compare insect orders and record in words or drawings at least 3 characteristics of each order found on the paper. Remind students to focus on the differences between the orders, as this will help them tell the orders apart when they catch insects on the prairie.

For Example:

Beetle	Butterfly	Fly	Bees	True Bugs
hard shell	4 large wings	big eyes	enlarged abdomen	X on their back
shell may also be wings	proboscis mouth	2 pointed wings	Black and yellow colors	biting mouth

If students have already done this activity in the classroom, review. As a class, have them compare the different orders of insects. Write comparisons on the board, or have the students write the comparisons down in columns you have created on the board.

Insect “Sweep Up”

Students will be doing a simulated insect sweeping activity. Before the students arrive, scatter the plastic insects throughout the visitor center; some in easy spots and others in hard to spot places. The students will be going on a scavenger hunt to collect the insects. They can use small nets if you wish. They should collect their insects in their jar, and after 15 minutes of searching, gather them back in the classroom. Pass out the Prairie Insect Survey Data Sheets to each team and ask students to count the number of insects they caught in each order listed.

Wrap-up

Ask students how they might represent their data visually. Help them illustrate their class totals using a bar graph, a pictograph, and/or a pie chart. Use the examples on page 5.

Video

Show the video “All About Bugs” in the auditorium or in the classroom. It is 23 minutes long.

Insect Jeopardy

Play insect jeopardy using the game board. This game takes about half an hour. The directions and questions are found starting on page 12.

Insects Clever Catch Ball

Divide the class into two teams. Line up the teams facing each other in a large space of the visitor center or outside. Instruct the students, beginning at one end of the line, to toss the Insects Clever Catch Ball to the student directly opposite them. If the student can correctly answer the question closest to where his/her right thumb lands when they catch the ball, they collect 1 point for their team. If the student answers incorrectly, the group will not receive a point and the ball must be tossed to the next player in line on the opposite team. Keep track of each team’s points and play until all 39 questions have been answered or you run out of time. Remind students to listen carefully because questions might be repeated making it easier to gain points for their team. Questions and answers that will be on the ball are found starting on page 12. Create a set of your own questions students may choose from, if you prefer not to let students repeat questions.

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Insects Clever Catch® Question and Answer Sheet...

Question	Answer
1. How many legs do insects have?	six
2. What are the three body parts of an insect?	head, thorax, abdomen
3. Is a bumblebee an insect?	Yes
4. Is a spider an insect?	No
5. What do we call the process in which eggs or larvae turn into adult insects?	metamorphosis
6. If an insect sheds its exoskeleton, but doesn't change into a different form, we call it a _____.	nymph
7. What are the four stages of complete metamorphosis?	egg, larva, pupa, adult
8. What are the three stages of incomplete metamorphosis?	egg, nymph, adult
9. The hard, outer part of an insect's body is called its _____.	exoskeleton
10. Insects have two _____ on their heads that help them smell.	antennae
11. Some insects have _____ to help them fly.	wings
12. Spiracles are openings in the insect's body that help it _____.	breathe air
13. To which body part are an insect's legs connected?	thorax
14. Which is the largest group of insects?	beetles
15. Is a grasshopper an insect?	Yes
16. What is your favorite kind of insect?	open answer
17. Is a tadpole an insect?	No
18. Some butterflies _____ to a warmer climate in winter.	migrate
19. What 3 things do all insects need to live?	1. air 2. a place to live 3. food and water
20. The environment that an insect lives in is called its _____.	habitat
21. Name an insect that is green?	grasshopper, praying mantis, etc.

Insects Clever Catch® Question and Answer Sheet...

Question	Answer
22. Name an insect that is yellow and black?	bumble bee, wasp, etc.
23. Name an insect that makes noise?	cricket, bee, etc.
24. What are some good things that insects do for us?	pollinate flowers, eat other insects ...
25. Why are some insects different colors?	open answer
26. What would the world look like if you were the size of an insect?	open answer
27. How long do insects live?	Some live for many years; some live for only a few hours
28. What are some habitats for insects?	water, trees, grass, soil, etc.
29. Insects that live together in large groups live in a _____.	colony, hive
30. True or False: Ants can pull 52 times their own weight.	True
31. Name an insect that is a pest.	cockroach, carpenter ant, termite, etc.
32. Is a worm an insect?	No
33. TRUE OR FALSE: All insects have wings	False
34. Do some insects eat other insects?	Yes
35. Name a poisonous insect.	scorpion, bee, mosquito, etc.
36. Caterpillars wrap themselves in a _____ where they change into butterflies.	chrysalis or cocoon
37. Fly larvae are called _____.	maggots
38. Name an insect with a stinger.	scorpion, bee, wasp, yellow jacket, etc.
39. Which insect makes a food that we like to eat?	bees – they make honey

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INSECT JEOPARDY

Use the game board provided at the refuge or set up as described below.

HOW TO SET UP:

- Using a dry-erase board, write the categories at the top, with the point amounts listed underneath. Then, as the game is played, you can erase each number that is chosen. Example:

BUTTERFLIES	BEES & ANTS	BEETLES	DRAGONFLIES	WILD!
100	100	100	100	100
200	200	200	200	200
300	300	300	300	300
400	400	400	400	400
500	500	500	500	500

- Split the students into two teams.
- Have them choose a team name (preferably a MN animal name).
- Each team needs to choose a captain who will speak for the group.
- Have an adult keep tally of the points for each team.

HOW TO PLAY:

- Flip a coin to see who goes first.
- Explain that the points indicate the difficulty of the question.
- An individual from the first team chooses a category and point value. Take turns asking each student to choose.
- Decide how you want each team to answer: As a group (the team can decide what to answer but **ONLY** the captain can give the answer, after everyone has agreed) **OR** individually (with no help from their teammates).
- If they get it right, they get the points.
- If they get it wrong, there is no penalty. However, the other team can now try and answer the question. The other team can discuss the question as a group but then **ONLY** the captain can give the answer, after everyone has agreed.
- If the other team gives the wrong answer as well, the question is dropped and the answer is given. The team who was next to pick a question is now able to take their turn.
- Clarify wrong answers!

HOW TO END:

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The game ends when either all the clues are chosen, or each student has had a turn to choose a question.

Butterflies

100 points

- Name one species of butterfly found in MN Monarch, swallowtail, Blue, comma, etc
- What do butterflies eat? Nectar
- What do butterflies start out their life as? Caterpillar

200 points

- All butterflies have six legs and feet. True or False? True
- Are butterflies cold blooded or warm blooded? Cold Blooded
- What do butterflies use to smell? Antennae

300 points

- Butterflies use what body part to taste food. Feet
- What is another name for a butterfly larva? Caterpillar
- How do butterflies survive the winter? Migrate or hibernate

400 points

- Name the three body parts of the butterfly Head, thorax, abdomen
- What is a butterfly's mouthpart called? Proboscis
- What are the four stages of a butterfly's life called? Metamorphosis

500 points

- What body part do butterflies use to breathe? Spiracles on the abdomen
- What color flower do butterflies prefer? Red, yellow, pink, or purple
- Name the four stages of metamorphosis. Egg, larva, pupa, adult or

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egg, caterpillar,
chrysalis, butterfly

Bees, Ants and Wasps

100 points

- Name the two colors on a bee Black and yellow
- What do honeybees eat in the winter? Honey!
- True or False: Bees have a tongue True

200 points

- True or false: Ants are very clean animals True
- What do ants use their antennae for? Touch and smell
- What body part do ants use to hear? Use feet to sense vibrations

300 points

- True or false: Bees fly 14 miles per hour True
- Name the only insect that produces food that humans eat honeybees
- Do ants live alone or in groups? Group

400 points

- How many stomachs do ants have? 2
- What is an ant's mouthpart called? Mandible
- How do bees tell other bees where and how far away food is? "dancing"

500 points

- What color can bees not see? Red
- What is the queen bee's job? She only lays eggs
- How many mother ants are in one ant colony? 1

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Beetles

100 points

- Name one species of beetle ladybird, tiger, click, Japanese, diving, bark, ground, water, etc.
- Beetles live on land and in water, Y or N Yes
- All beetles have claws on each foot, Y or N Yes

200 points

- Beetles are the largest order of insects True or False? True
- What do beetles eat? Each species eats its own food, but altogether eat everything
- A firefly is a type of beetle, T or F True

300 points

- What is the hard outer shell of a beetle called? Exoskeleton
- What is the name of a beetle larva? Grub
- Name a beetle predator Birds, ants, wasps, snakes, toads, Fish, frogs, salamanders

400 points

- What body part do beetle wings attach to? Thorax
- How many wings do beetles have? 4
- Name one way beetles communicate sound, vibrations, chemical release

500 points

- Name the only continent where beetles do not live Antarctica
- How do beetles eat their food? By chewing it

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- How do you tell beetles from other insects? Their wings meet in a straight line down their back

Dragonflies

100 points

- How many wings do dragonflies have? 4
- What do dragonflies eat? Mosquitoes and tiny insects
- How many legs do dragonflies have? 6

200 points

- Do dragonflies bite people? No
- Can dragonflies fly backwards? Yes
- A green darner is a type of dragonfly, T or F True

300 points

- What is a dragonfly nymph? A young dragonfly
- Where do young dragonflies live? In a lake or wetland
- Where do female dragonflies lay their eggs? in still water-not rivers!

400 points

- What body part do dragonfly wings attach to? Thorax
- Name a dragonfly predator? Birds, snakes, frogs, fish
- How fast do dragonflies fly? Around 30 miles per hour

500 points

- How long have dragonflies been on the earth? Since the time of the dinosaurs
- Dragonflies are also called "mosquito hawks" True-they eat lots of mosquitoes!

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True or False?

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WILD!

100 points

- Name an insect with stripes Bees, caterpillars, butterflies
- Name one characteristic of a grasshopper Large legs, jaws for chewing, wings
- Name an insect that lives in the ground Ants, yellow jackets

200 points

- Name one characteristic of a butterfly Four wings, colorful, proboscis, wings have scales
- Name an insect that is poisonous when eaten Monarch Butterfly
- Name an insect that is camouflaged Many-grasshopper, leafhopper, Most beetles, ants

300 points

- What is another name for a butterfly larva? Caterpillar
- Name an insect that spends the first part of its life in the water Dragonfly, mosquito, damselfly, midge, mayfly
- Where do butterflies lay their eggs? On the undersides of leaves

400 points

- Name the order of insects that have an X marking on their back True Bugs
- Name an insect that migrates Monarch, Green darner dragonfly
- Name an insect that hibernates Ladybug, woolly bear, mourning cloak butterfly

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500 points

- Name an insect that communicates by sound Cicadas, crickets, grasshoppers
- Name an insect that communicates by light Firefly
- Name an insect that communicates by dancing Bees