



Activity 1-1

What's Your Biodiversity IQ?

AT A GLANCE

Take a “gee-whiz quiz” to find out how much you know about biodiversity, especially in Illinois.

OBJECTIVES

Define biodiversity, discuss facts and issues related to Illinois biodiversity, and list reasons why biodiversity is important.

SUBJECTS

English language arts, science

SKILLS

analyzing (discussing), interpreting (inferring, reasoning), applying (synthesizing)

LINKS TO ILLINOIS BIODIVERSITY BASICS CONCEPTUAL FRAMEWORK

biological diversity

VOCABULARY

biodiversity, ecosystems, genes, migration, species, plus review “What's Your Biodiversity IQ?” for words that may be unfamiliar

TIME

one class period

MATERIALS

copy of the “Student Pages” and copies of the “Answer Pages” for each group (or for each individual)

CORRELATION TO COMMON CORE STANDARDS AND NEXT GENERATION SCIENCE STANDARDS

English language arts: Writing Standards for Literacy in Science, Production and Distribution of Writing, 4
science: MS-LS2-5

Did you know that there are insects that masquerade as plant parts, birds that map their migration by the stars, and fungi that find their way into your favorite foods? In Illinois alone, there are more than 54,000 different species of organisms. When it comes to biodiversity, these and other fascinating facts prove that truth really is stranger than fiction.

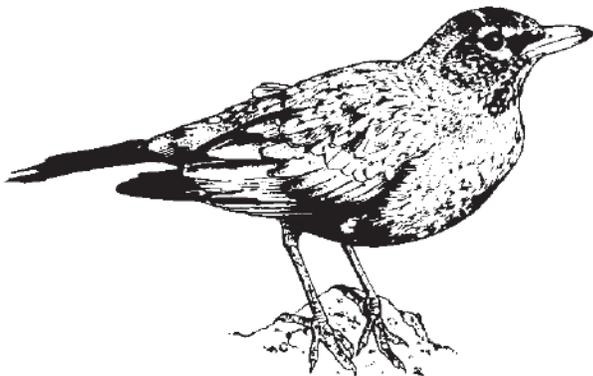
Have your students take the biodiversity quiz to learn about some of the tantalizing stranger-than-fiction tidbits that biodiversity has to offer. In the process, they'll become familiar with some important biodiversity basics.

BEFORE YOU BEGIN

For each group of three or four students, make a copy of the quiz and the answers. Or, if you wish to place the quiz in the student's portfolio, you may have each student take the quiz.

WHAT TO DO

- 1. Distribute the quizzes and review vocabulary.**
Divide the class into groups of three or four students and give each group a copy of the quiz. Review any words that may be unfamiliar to the students. For now, don't define the word “biodiversity.”
- 2. Give groups time to complete the quiz.**
Assure the students that this is not a real quiz; it's simply a fun introduction to biodiversity. Also tell them that their answers won't be graded and that it's OK if many of their answers are guesses.
- 3. Distribute answers to the quiz.**
Have the students score their tests. Afterward, discuss each of the questions and answers. How did they do? Were they surprised by any of the answers? Which ones? You may want to suggest that they take the quiz home to test family members and talk about the answers.





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What's Your Biodiversity IQ? (continued)

4. Develop a class definition of biodiversity and a list of reasons why it's important.

Explain to the students that the quiz was designed to point out some interesting facts about the natural world, as well as to introduce the concept of biodiversity. Ask the students what they think biodiversity means, and have them write their ideas on the board. Then use the background information, along with the glossary, to explain the three levels of biodiversity (genes, species and ecosystems).

Next, have the students use the information on the board and in the quiz to list reasons biodiversity is important. Afterward, combine their group lists to form a single class list. Your class list might include food, clothing, housing, ecosystem services, natural beauty, camping and hiking.

WRAPPING IT UP

Assessment

1. Write each letter of the alphabet on a separate slip of paper. Fold the slips, put them into a container and have each student pick one. Then have each student write a poem or limerick about an animal, plant or other life form that lives in Illinois and starts with his or her letter. As an option, have the students draw or cut out pictures to go along with their writings and compile them into a book. Possible titles for the book include *Biodiversity A to Z*, *An Encyclopedia of Biodiversity* or *A Poetic Look at Biodiversity*. You could also have the students present their poems to younger students.
2. Students can conduct research to write their own "Illinois Biodiversity IQ" quiz. They can test other students in the class or test students who are not currently studying biodiversity.

Portfolio

Either at the beginning or end of a unit, the quiz can serve as documentation of the students' general knowledge of biodiversity, if you have each student take the quiz separately. Have the students note why they answered as they did and record their own definition of biodiversity on the quiz.

Extensions

1. Create a bulletin board or other display featuring the class definition of biodiversity and magazine photos and student artwork that illustrate biodiversity. Students should choose photos and create artwork that portray the different levels of biodiversity. Encourage students to connect facts from the quiz with their artwork or photos. If the class continues studying biodiversity, the bulletin board can be updated to include new knowledge and ideas.
2. Have students develop a TV or radio informational program of one to three minutes to help people understand the meaning of biodiversity. They can use the IQ test as part of the program content. Remind students that the more creative and entertaining their spots are, the more likely others are to get the message. When they've finished, have them share their efforts with the rest of the class.
3. Create a collage or diorama about Illinois biodiversity. Create and hang mobiles featuring Illinois species in the classroom.
4. Have each student select a quiz question that he/she answered incorrectly or a question that interests him/her. Ask the students to research the subject of the question and use the information they find to write a paragraph that either explains the correct answer or gives more details on the subject.
5. You can turn this activity into a quiz show game with you as the host. Give each group a copy of the quiz and choose a spokesperson for each team. Then start the game by reading a quiz question aloud. Give the groups a minute or so to discuss possible answers. Have team spokespersons raise their hands to indicate their team's readiness to answer the question and have the groups answer on a first-come, first-served basis. Score one point for each correct answer per question. If the first group misses an answer, other groups may try. Tally the points on the board and see which team wins!



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What's Your Biodiversity IQ? (continued)

Resources

- Borror, D. J. and R. E. White. 1970. *A field guide to insects*. Houghton Mifflin Company, Boston. 404 pp.
- Hoffmeister, D. F. 1989. *Mammals of Illinois*. University of Illinois Press, Urbana, Illinois. 348 pp.
- Illinois Department of Natural Resources. *Illinois' living alphabet*. Illinois Department of Natural Resources, Springfield, Illinois. Poster.
- O'Toole, Christopher. 1995. *Encyclopedia of insects*. Checkmark Books, New York. 160 pp.
- Schwartz, C. W. and E. R. Schwartz. 1981. *The wild mammals of Missouri*. University of Missouri Press, Columbia, Missouri. 356 pp.
- Wilson, Edward O. 1992. *The diversity of life*. Belknap Press, Cambridge, Massachusetts. 424 pp.
- World Almanac Books. 1995. *1996 world almanac and book of facts*. World Almanac Books, New York. 976 pp.

***“Biodiversity, or natural riches, is a new term
that describes something very old.”***

—Alfredo Ortega, writer



Activity 1-1

What's Your Biodiversity IQ? — ANSWERS

Each correct answer is worth one point, even if there is more than one correct answer per question. Maximum possible = 62 points.

1. Which of the following animals could the fastest human outrun in a 100-yard race?

- c. American woodcock
- e. wild turkey

Lots of animals are quick on their feet (or wings, or scales, or fins), but speed doesn't necessarily count much these days in the race for survival. Cheetahs, for example, are the fastest land animals in the world (may reach speeds of about 70 miles per hour)—but they're also among the world's most endangered. The fastest humans can finish a 100-yard dash in under 10 seconds. That calculates to about 25 miles per hour; although humans can't sustain that speed long-term. The warthog and domestic cat can both attain speeds of about 30 miles per hour. The wild turkey can run at about 20 miles per hour, and the American woodcock flies slowly at about five miles per hour maximum.

2. Which of the following actually exist?

- a. ants that "herd" aphids for food
- b. slime molds that creep across the ground
- c. trees that can grow with their roots under water

Certain kinds of ants eat the sugary substances excreted by aphids, which are insects that suck plant juices. The ants actually herd colonies of aphids by moving them from place to place and protecting them from enemies. Some slime molds have two distinct phases in their life cycle. In the reproductive phase they are stationary, like a plant with a stalk. From this stalk they produce spores. These slime molds may also exist as mobile amoeba-like organisms that feed by engulfing material. Baldcypress trees grow in swamps in southern Illinois, as well as in the southern United States. These huge trees can grow with their roots continually submerged because of their unique feature, called "knees."

3. Which of the following animals can consume at least half of its body weight in food each day?

- a. little brown bat
- b. masked shrew
- c. ruby-throated hummingbird

These small animals need huge amounts of food each day to survive. In fact, a mother little brown bat that is feeding babies must consume more than her body weight in insects each night.

4. Which of the following best describes the word "biodiversity?"

- c. the variety of all life on earth

The variety of life on earth includes plants, animals, microorganisms, ecosystems, genes, habitat diversity and more.

5. United States Fish and Wildlife Service agents at O'Hare International Airport in Chicago once found which of the following?

- c. 10 baby turtles

Agents at O'Hare found the baby turtles rolled up in a sock inside the back of a camera. Annual trade in wildlife and wildlife products is estimated at \$10 billion and up to 25 percent of the trade is illegal. That amounts to \$2.5 billion in black market wildlife trade — one of the largest black markets in the world!

6. Scientists studying bug zappers have learned some interesting facts. Which of the following are among them?

- c. Bug zappers could be bad news for certain bird, fish, bat and flower species.
- d. There are more than four million bug zappers being used in the United States.

A study at the University of Delaware on bug zappers came up with some "shocking" results. It revealed, for example, that many species of mosquitoes are not attracted to bug zappers at all. Instead, the zappers' blue light attracts harmless insects in droves, many of which provide food for birds, bats and fishes. Some



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What's Your Biodiversity IQ?— ANSWERS (continued)

of the insects that zappers zap are also important to plants, which need the insects for pollination.

7. **Blackpoll warblers are tiny birds that migrate between North America and South America each year. Which of the following statements about them are true?**

- a. They use the stars for navigation.
- d. If they burned gasoline instead of body fat for fuel, they'd get 720,000 miles to the gallon.

Animals that migrate often have remarkable navigational skills. Many use the sun, stars, land patterns and other means to reach their destination, which may be thousands of miles and several countries away. And many migrators are able to get where they're going on very little fuel. For example, migrating birds often travel huge distances and eat very little along the way. They have incredibly energy-efficient bodies that "burn" body fat for fuel. Some birds, such as the tiny blackpoll warbler, get the equivalent of thousands of miles per gallon of fuel! But being able to get from point A to point B doesn't matter much if the habitat an animal is traveling to has been destroyed. That's one reason why international efforts to conserve habitat are so important.

8. **Which of the following can be considered an enemy of the Great Lakes?**

- a. zebra mussel
- b. spiny water flea
- c. mercury
- d. sea lamprey

The Great Lakes are the world's largest source of fresh water. But this incredible ecosystem is facing serious threats. Nonnative species, such as the zebra mussel, sea lamprey and spiny water flea, compete for food or threaten the health of native animals. Chemicals, such as mercury, that end up in the Great Lakes, often last forever and even enter the food chain, making fish in certain areas unsafe for humans and other animals to eat.

9. **What's the most serious threat to biodiversity?**
b. habitat loss

All over the world habitats are being turned into agricultural land, harvested for wood and fuel, and destroyed or changed to build roads, schools, malls and other human developments. Because the human population is growing so quickly and consuming so many natural resources, habitat loss is occurring at a rapid pace.

10. **The items on the left have been (or are being) developed into important medicines for humans. Match each item with the medicine made from it by writing the letters in the appropriate blanks.**

- b** bread mold (antibiotic)
- c** willow tree (pain reliever)
- d** vampire bat saliva (medicine to unclog arteries)
- a** mayapple (heart medicine)
- e** coneflower (immune system booster)

Biodiversity is like a gigantic pharmacy. Consider plants: more than one-fourth of the drugs commonly used today were originally derived from plants. Animals are a potentially important source of medicines, too. In fact, you never know where a future medicine might pop up. Who would have thought that vampire bat saliva could be useful? No wonder researchers are looking to biodiversity to find treatments and cures for cancer, AIDS and a host of other diseases.

11. **Which of the following are true statements about little brown bats?**

- a. Baby bats weigh 20 to 25 percent of their mother's weight at birth.
- b. Heart rate during flight can reach 1,000 beats per minute.
- d. A little brown bat may live 20 to 30 years.

Bats are amazing animals. Though bats reproduce at a relatively slow rate, the large size of the babies, called pups, helps to increase the chance of survival. Little brown bats only eat insects they catch while flying. All this activity produces a heart rate of up to



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What's Your Biodiversity IQ?— ANSWERS (continued)

1,000 beats per minute. They also have an unusually long life span for a small mammal and may live 20 to 30 years.

12. Without fungi, which of the following would you not be able to do?

- a. eat pizza topped with mushrooms
- b. bake bread
- c. live in a world free of dead things lying all over the place
- d. put blue cheese dressing on your salad

While some forms of fungi may seem less than noble—athlete's foot fungus, for example—the world could not function long without these humble life forms. Fungi and bacteria play a key role in breaking down organic matter and recycling it back into usable nutrients. Without them, dead things would definitely pile up! Besides, without fungi we wouldn't have tasty treats such as mushrooms, yeast bread or blue cheese.

13. Which of the following statements are true?

- c. More than 5,000 different kinds of potatoes have been identified in South America's Andes Mountains.

The potato actually originated in South America. In Peru, some family farmers grow as many as 12 kinds of potatoes. Most supermarkets sell only four or five potato varieties. In the United States, Idaho and Washington produce the most potatoes.

14. Which of the following are actual species of animals found in Illinois?

- a. antlion
- b. hoary elfin butterfly
- c. pimpleback
- d. hoop snake



These are just a few examples of some of the many strange and wonderful creatures of Illinois. The antlion is an insect that can be found throughout the state. Its larva hides in the bottom of a small, cone-shaped pit dug in dirt or sand, waiting to eat ants and other small insects that fall in. The hoary elfin butterfly is a small, gray-brown butterfly that is endangered in Illinois. It lives in northeastern Illinois, most often along the shore of Lake Michigan, and is one of the first butterflies of spring. The pimpleback mussel is found statewide. It can live up to 100 years. No snakes actually form hoops and roll like a hula hoop although there is a mud snake that is sometimes called a hoop snake.

15. If you decided to throw a party to celebrate the diversity of life on earth and wanted to send an invitation to each species, how many invitations would you need?

- d. more than 1.5 million

Scientists have estimated that as many as 100 million species may actually exist—they just haven't gotten around to identifying all of them yet.

16. Which of the following statements about short-tailed shrews are true?

- a. Your cat may bring one to you.
- b. They use a form of echolocation, like bats.
- c. Shrews are known as the "tigers of the small animal world."
- d. Shrews are venomous.

Short-tailed shrews are seldom seen in nature because of their size and ability to hide, although, house cats seem to find their share. Short-tailed shrews make up for their poor eyesight by using a form of echolocation to find their food. Shrews are without a doubt one of the most ferocious mammal predators. Once they catch their prey, their venomous saliva immobilizes it.



Activity 1-1

What's Your Biodiversity IQ?— ANSWERS (continued)

17. If the number of species on earth was represented by physical size, which of the following would most accurately illustrate the proportion of insects to mammals?

- c. There are approximately 250 insect species to every mammal species—and that includes only the insects we know about. Scientists think there are millions more species yet to be discovered.

18. Biodiversity includes:

- a. the color of your eyes
- b. the creatures in your neighborhood soil
- c. Illinois
- d. your classmates

Biodiversity describes the incredible variety of life on earth—and that includes the diversity among genes (which control inherited traits like the color of your eyes), species (from huge whales to tiny soil creatures) and ecosystems (from lush cypress swamps to the harsh environmental conditions of a prairie).

19. If we gave a prize for “the strongest creature for its size,” which of the following would win?

- c. ant

An ant can carry a load up to 50 times its body weight.

20. Which of the following would people have to do without if there were no bees?

- a. almonds
- b. honey
- c. cucumbers
- d. apples
- e. celery



Bees are worth billions of dollars to the agriculture industry. Each year bees pollinate millions of acres of almond and apple trees, cucumbers and celery. Other favorite foods we'd miss without bee pollinators include watermelons, avocados, plums, pears, blueberries, cranberries, cherries and cantaloupes.

21. Which of the following is an example of an ecosystem service?

- a. a ladybird beetle that protects your garden by eating aphid pests
- c. a wetland that filters dirty water
- d. an ocean that controls the earth's climate

Ecosystem services include the “free services” provided by ecosystems around the world—and which most of us take for granted. For example, wetlands help control floods, filter pollutants from water and provide habitat for all kinds of birds, fishes and other animals. Ladybird beetles eat aphids, which are common garden pests. And oceans act as a giant thermostat, interacting with the atmosphere and land to control earth's climate.

22. Some of the world's most fascinating creatures live in really unusual places. Which of the following is sometimes a home for another living thing?

- a. a caterpillar's abdomen
- b. a termite's gut
- c. a white-tailed deer's intestine
- d. a human's forehead

The larva of a tomato hornworm may become host to the eggs of the parasitic ichneumon wasp. As the wasp larvae develop, they use the caterpillar for food. Deep within a termite's gut lives a tiny protozoan that helps to digest the termite's woody diet. The white-tailed deer belongs to a group of hoofed mammals that have bacteria living in their digestive tracts. The primary type of bacteria changes through the year to insure the deer can always digest the available food source, that is, green plants in the spring and summer and bark, twigs, grain and acorns in fall and winter. Without knowing it, most human beings have mites on their forehead. Mites are slender creatures with a wormlike body and a spidery head. A mite is so small it is almost invisible. One species (*Demodex folliculorum*) dwells in the hair follicles, and another (*Demodex brevis*) lives in the sebaceous glands.



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What's Your Biodiversity IQ?— ANSWERS (continued)

23. If you had a job that put you in charge of saving all Illinois species on the edge of extinction, how many endangered and threatened species would you need to save?

d. 480

You'd be pretty busy conserving habitats for 480 species. And that's only the number of species of plants and animals listed as threatened and endangered in Illinois by the Illinois Endangered Species Protection Board (2015). Some scientists estimate that up to 27,000 species become extinct worldwide each year, and we never even knew that most of them existed.

24. The eastern prairie fringed orchid was once common in the prairies of Illinois. Which of the following statements explains why this plant is now endangered in Illinois?

c. Habitat loss due to agriculture and development.

Habitat loss is the number one threat to plants and animals. Most of the wet prairie habitat favored by the orchid has been drained and used for agriculture or development. In Illinois, only 0.07 percent of native prairies remain undisturbed.

25. Which of the following environments on our planet are too harsh to support life?

e. none of the above

Amazingly, life has been discovered in all of these harsh environments. Newly identified microorganisms called "extremeophiles" thrive in unimaginable conditions, like boiling sulfur springs and polar ice fields.

***“When it is asked how much it will cost to protect the environment,
one more question should be asked:***

How much will it cost our civilization if we do not?”

*—Gaylord Nelson
politician, conservationist*

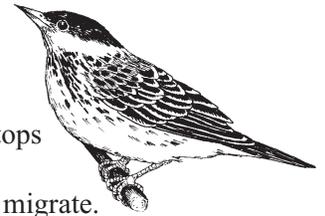


Student Page

What's Your Biodiversity IQ?

Here's your chance to find out what you know about the world's diverse plants, animals and natural places. For each question, circle all the correct answers.

- Which of the following animals could the fastest human outrun in a 100-yard race?**
 - cheetah
 - warthog
 - American woodcock
 - domestic cat
 - wild turkey
- Which of the following actually exist?**
 - ants that "herd" aphids for food
 - slime molds that creep across the ground
 - trees that can grow with their roots under water
 - none of the above
- Which of the following animals can consume at least half of its body weight in food each day?**
 - little brown bat
 - masked shrew
 - ruby-throated hummingbird
 - none of the above
- Which of the following best describes the word "biodiversity?"**
 - endangered species
 - different kinds of planets in the solar system
 - the variety of all life on earth
 - biographies about famous biologists
- United States Fish and Wildlife Service agents at O'Hare International Airport in Chicago once found which of the following?**
 - 18 California kingsnakes
 - 45 pounds of elephant ivory
 - 10 baby turtles
 - 16 vampire bats
- Scientists studying bug zappers have learned some interesting facts. Which of the following are among them?**
 - Insects are attracted to bug zappers because of the zappers' smoky smell.
 - Bug zappers are great for ridding summer nights of mosquitoes.
 - Bug zappers could be bad news for certain bird, fish, bat and flower species.
 - There are more than four million bug zappers being used in the United States.
- Blackpoll warblers are tiny birds that migrate between North America and South America each year. Which of the following statements about them are true?**
 - They use the stars for navigation.
 - They make frequent pit stops at fast-food restaurants.
 - They don't really need to migrate.
 - If they burned gasoline instead of body fat for fuel, they'd get 720,000 miles to the gallon.
- Which of the following can be considered an enemy of the Great Lakes?**
 - zebra mussel
 - spiny water flea
 - mercury
 - sea lamprey
- What's the most serious threat to biodiversity?**
 - scientists collecting specimens
 - habitat loss
 - tourists
 - pollution





Student Page

What's Your Biodiversity IQ? (continued)

10. The items on the left have been (or are being) developed into important medicines for humans. Match each item with the medicine made from it by writing the letters in the appropriate blanks.

___ bread mold	a. heart medicine
___ willow tree	b. antibiotic
___ vampire bat saliva	c. pain reliever
___ mayapple	d. medicine to unclog arteries
___ coneflower	e. immune system booster

11. Which of the following are true statements about little brown bats?

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- Heart rate during flight can reach 1,000 beats per minute.
- Little brown bats drink the blood of birds and small mammals.
- A little brown bat may live 20 to 30 years.

12. Without fungi, which of the following would you not be able to do?

- eat pizza topped with mushrooms
- bake bread
- live in a world free of dead things lying all over the place
- put blue cheese dressing on your salad

13. Which of the following statements are true?

- Potatoes originated in Ireland.
- The United States grows most of its baking potatoes in Washington.
- More than 5,000 different kinds of potatoes have been identified in South America's Andes Mountains.
- The French fry, invented by Madame Bonaparte during the French Revolution, became one of Napoleon's favorite snacks.

14. Which of the following are actual species of animals found in Illinois?

- antlion
- hoary elfin butterfly
- pimpleback
- hoop snake

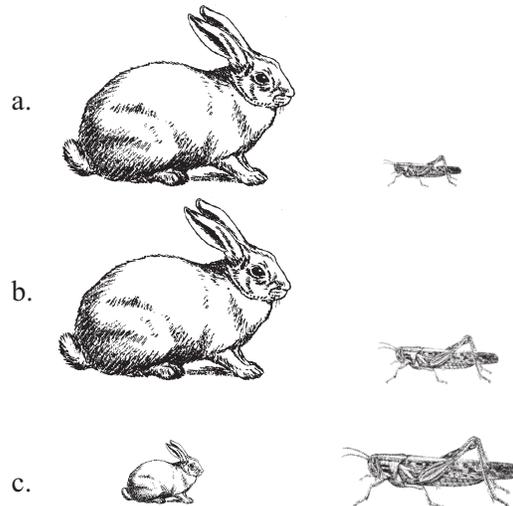
15. If you decided to throw a party to celebrate the diversity of life on earth and wanted to send an invitation to each species, how many invitations would you need?

- 150
- about 3,000
- 652,983
- more than 1.5 million

16. Which of the following statements about short-tailed shrews are true?

- Your cat may bring one to you.
- They use a form of echolocation, like bats.
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Student Page

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18. Biodiversity includes:

- a. the color of your eyes
- b. the creatures in your neighborhood soil
- c. Illinois
- d. your classmates

19. If we gave a prize for “the strongest creature for its size,” which of the following would win?

- a. bobcat
- b. bald eagle
- c. ant
- d. turtle

20. Which of the following would people have to do without if there were no bees?

- a. almonds
- b. honey
- c. cucumbers
- d. apples
- e. celery



21. Which of the following is an example of an ecosystem service?

- a. a ladybird beetle that protects your garden by eating aphid pests
- b. a company that rakes people's yards
- c. a wetland that filters dirty water
- d. an ocean that controls the earth's climate

22. Some of the world's most fascinating creatures live in really unusual places. Which of the following is sometimes a home for another living thing?

- a. a caterpillar's abdomen
- b. a termite's gut
- c. a white-tailed deer's intestine
- d. a human's forehead

23. If you had a job that put you in charge of saving all Illinois species on the edge of extinction, about how many endangered and threatened species would you need to save (based on what we know today)?

- a. 12
- b. 250
- c. 917
- d. 480

24. The eastern prairie fringed orchid was once common in the prairies of Illinois. Which of the following statements explains why this plant is now endangered in Illinois?

- a. The extreme temperatures due to global warming prevent this sensitive plant from producing seeds.
- b. People dig up the plants to use in their flower beds.
- c. Habitat loss due to agriculture and development.
- d. It is the favorite food of white-tailed deer.

25. Which of the following environments on our planet are too harsh to support life?

- a. boiling sulfur springs, where temperatures are commonly 212° Fahrenheit (100° Celsius)
- b. deep-sea hydrothermal vents called “smokers,” where the temperature can reach 662° Fahrenheit (350° Celsius)
- c. the frigid ice of the Arctic and Antarctic
- d. all of the above
- e. none of the above

