

TEACHERS GUIDE

TO “EIGHT-LEGGED SUPERHEROES”

Multidisciplinary classroom activities based on the Young Naturalists nonfiction story in *Minnesota Conservation Volunteer*, September–October 2018, www.mndnr.gov/mcvmagazine.

Minnesota Conservation Volunteer magazine tells stories that connect readers to wild things and wild places. Subjects include earth science, wildlife biology, botany, forestry, ecology, natural and cultural history, state parks, and outdoor life.

Education has been a priority for this magazine since its beginning in 1940. “One word—Education—sums up our objective,” wrote the editors in the first issue. Thanks to the MCV Charbonneau Education Fund, every public library and school in Minnesota receives a subscription. Please tell other educators about this resource.

Every issue now features a Young Naturalists story and an online Teachers Guide. As an educator, you may download Young Naturalists stories and reproduce or modify the Teachers Guide. The [student portion of the guide](#) includes vocabulary cards, study questions, and other materials.

Readers’ contributions keep *Minnesota Conservation Volunteer* alive. The magazine is entirely financially supported by its readers.

Find every issue online. Each story and issue is available in a searchable PDF format. Visit www.mndnr.gov/mcvmagazine and click on *past issues*.

Thank you for bringing Young Naturalists into your classroom!

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Multidisciplinary classroom activities based on the Young Naturalists nonfiction story in *Minnesota Conservation Volunteer*, September–October 2018, www.mndnr.gov/mcvmagazine.



SUMMARY. With a wide range of sizes, shapes, habits, and habitats, spiders are among Minnesota’s most fascinating animals. “Eight-Legged Superheroes” introduces Young Naturalists to the biology and natural history of spiders, and profiles nine common spiders.

SUGGESTED READING LEVELS. Third through middle-school grades

MATERIALS. KWL organizer; optional resources include magnifying glasses (optional), terrarium (optional), video viewing equipment (see Web Resources), yarn or other material and supplies for weaving or knitting (optional), materials for researching and presenting reports, yardstick or tape measures, and other print and online resources your media specialist may provide.

PREPARATION TIME. One to two hours, not including time for extension activities

ESTIMATED INSTRUCTION TIME. 30 to 60 minutes (not including extensions)

MINNESOTA ACADEMIC STANDARDS APPLICATIONS. “Eight-Legged Superheroes” activities described below may be used to achieve some or all of the following Minnesota Department of Education standards:

SCIENCE (GRADES 3, 5, 7)

Nature of Science and Engineering (Benchmarks: 3.1.1.2.1; 3.1.1.2.3; 3.1.1.2.4; 3.1.3.4.1)

Earth Science (Benchmark: 5.3.4.1.3)

Life Science (Benchmarks: 3.4.1.1.1; 3.4.1.1.2; 5.4.1.1.1; 5.4.2.1.2; 5.4.4.1.1; 7.4.2.1.1;

7.4.2.1.2; 7.4.2.1.3; 7.4.4.1.2)

ENGLISH LANGUAGE ARTS (GRADES 3-8)

Reading Benchmarks: Informational Text (Grades 3-8)

Key Ideas and Details (Benchmarks 3.2.1.1; 3.2.2.2; 4.2.1.1; 4.2.2.2; 5.2.1.1; 5.2.2.2; 6.5.1.1; 7.5.1.1; 8.5.1.1)

Craft and Structure (Benchmarks 3.2.4.4, 4.2.4.4., 5.2.4.4; 6.5.4.4; 7.5.4.4; 8.5.4.4)

Integration of Knowledge and Ideas (3.2.7.7; 3.2.9.9; 4.2.7.7; 4.2.9.9; 5.2.7.7; 4.2.8.8; 5.2.8.8; 5.2.9.9) Writing Benchmarks (Grades 3-8)

Text Types and Purposes (Benchmarks 3.6.3.3; 4.6.3.3; 5.6.3.3; 6.7.3.3; 7.7.3.3; 8.7.3.3)

Research to Build and Present Knowledge (Benchmarks 3.6.7.7; 4.6.7.7; 5.6.7.7; 6.7.7.7; 7.7.7.7; 8.7.7.7)

Language Benchmarks (Grades 3-8)

Vocabulary Acquisition and Use (3.10.4.4; 4.10.4.4; 5.10.4.4; 6.11.4.4; 7.11.4.4; 8.11.4.4; 6.11.6.6; 7.11.6.6; 8.11.6.6)

Reading Benchmarks: Literacy in Science and Technical Subjects (Grades 6-8)

Key Ideas and Details (Benchmarks 6.13.1.1;; 6.13.2.2;)

Writing Benchmarks: Literacy in Science and Technical Subjects (Grades 6-8)

Research to Build and Present Knowledge (Benchmark 6.14.7.7))

MATHEMATICS (GRADE 3)

Algebra (Benchmark: 3.2.2.2)

SOCIAL STUDIES (GRADE 4)

Geography: Human Environment Interaction (Benchmark 4.3.4.9.1)

ARTS (GRADES 3-8)

Artistic Foundations (Benchmarks 0.1.3.5.1; 4.1.2.5.1; 4.1.3.5.1; 6.1.3.6.1)

Artistic Process: Create or Make (Benchmarks 0.2.1.5.1; 4.2.1.2.1; 4.2.1.5.1; 6.2.1.2.1; 6.2.1.5.1)

Artistic Process: Perform or Present (Benchmarks 0.3.1.2.1; 0.3.1.5.1)

Current, complete Minnesota Academic Standards are at www.education.state.mn.us. Teachers who find other connections to standards are encouraged to contact *Minnesota Conservation Volunteer*.

PREVIEW. (1) You might use this [spiders video](#) to introduce this topic. (2) You might follow with a [KWL activity](#). To find out what your students already know (K) about spiders, divide the class into small groups to brainstorm their ideas. Give each student a copy of the organizer (see www.teach-nology.com/web_tools/graphic_org/kwl/) and encourage each to make notes during the group discussion. Ask what students would like to learn, or what questions they have,

about the topic (W). Record their questions on poster board for reference. As you read and discuss the article you will begin to compile the (L) lists, or what they learn while reading the article and related materials and participating in extension activities. KWL gives you the opportunity to introduce interdisciplinary connections you will make during extension activities. If you use the article in science or art class, you may wish to focus your prereading activity on academic standards that apply for that class.

VOCABULARY PREVIEW. You can find a copy-ready vocabulary list at the end of this guide. Feel free to modify it to fit your needs. Share the words with your students and invite them to guess what the words mean. Tell them you will be reading a story that will help them understand these words so they can use them in the future! As your students encounter these vocabulary words in the story, you may want to encourage them to infer meaning using context clues, such as other words in the sentence or the story's illustrations. Students also could be encouraged to compare their inferences as to what the words mean with their earlier guesses and with the definitions from the vocabulary list.

You might wish to use the study cards (adapted from [Strategic Tutoring](#)) found at the end of the [Study Questions](#) for this Young Naturalists feature. On one half of the card, in large letters, is a key vocabulary word or phrase with smaller letters framing the word or phrase in a question or statement. On the other half is the answer to the question or the rest of the statement. Cut along the horizontal line, fold in the middle, and tape or staple, then use like flash cards. We've included a few blanks so you or your students can add new words or phrases if you'd like.

STUDY QUESTIONS OVERVIEW. Preview the study questions with your class before you read the article. Then read the story aloud. Complete the study questions in class, in small groups, or as an independent activity, or use them as a quiz.

ADAPTATIONS. Read aloud to special needs students. Abbreviate the study questions or focus on items appropriate for the students. Adapt or provide assistance with extension activities as circumstances allow.

ASSESSMENT. You may use all or part of the study guide, combined with vocabulary, as a quiz. Other assessment ideas include: (1) Ask students to describe what they learned about spiders. See the "learned" list from your KWL activity. (2) Have students write multiple-choice, true-false, or short-answer questions based on the article. Select the best items for a class quiz. (3) Posters and presentations are an excellent strategy for allowing students to demonstrate what they have learned.

EXTENSION ACTIVITIES. Extensions are intended for individual students, small groups, or your entire class. Young Naturalists articles provide teachers many opportunities to make connections to related topics, to allow students to follow particular interests, or to focus on specific academic standards.

1. Grab magnifying glasses and go on a spider hunt! Look in the grass, in shrubs, on the edges of buildings, in the corners of rooms. When you spy a spider, observe it closely. What does it look like? What is it doing? Which of the spiders in the feature story does it most resemble? If you have a spider field guide or access to iNaturalist, see if you can identify the species.
2. Explore spiders in myth and legend. Introduce students to the story of Arachne, of native stories related to spiders, and of Spiderman. Invite students to write a spider story of their own.
3. Dig deep into the chemistry of silk. What makes it so strong? How do humans use spider silk, and why is it good for such uses?
4. Find a spider and put it into a terrarium or other roomy container. Add a fly or other insect and observe its hunting and eating behavior.
5. The article describes eight ways today's spiders use silk. Use your imagination to describe other uses future spiders might evolve to use silk. Draw a picture to illustrate this use.
6. Use this unit as an opportunity to explore systems thinking with your students. What are the elements of the system in which a spider lives? What are the consequences if the spider is removed from the system? If another element is removed from the system? You might use [Be Nice to Spiders](#) as a starting point or a spark for your own ideas.
7. Spiders are expert fiber makers and weavers. How about humans? Invite students to research different types of fibers humans use to make textiles, as well as the origin and uses of weaving in different cultures, then try their own weaving or knitting project.
8. Every species of spider described in this article is identified with two names (common and scientific). Learn more about the science of taxonomy and how it helps biologists communicate.
9. There are many great resources for students to learn more about spiders. Using the resources listed in the Web Resources section, ask students to read about spiders from one or more additional sources. Younger students can practice comparing and contrasting information. Older students can be prompted to integrate knowledge and ideas from multiple sources, through writing an informational report or through a presentation to their classmates

WEB RESOURCES

GENERAL TEACHER AND STUDENT RESOURCES

[Minnesota DNR Teachers' Resources](#)

[DNR Kids Page](#)

GENERAL SPIDER INFORMATION

[KidZone Spider Facts](#)

[iNaturalist Minnesota Spiders page](#)

[Spiders of Minnesota Checklist](#)

[Paradamoetas fontanus conservation in Minnesota](#)

[Phidippus insolens conservation in Minnesota](#)

SPIDER SILK

[Graphic: A Spinner's Secrets](#)

[Artificial Spider Silk](#)

[Curious Kids: Spider Webs](#)

[How to Spin Synthetic Spider Silk](#)

VIDEOS

[TED Talk: The Magnificence of Spider Silk](#)

[Spider Mom](#)

[Spider silk research](#)

[Cellar spider laying eggs](#)

[Cellar spiders](#)

RELATED MCV ARTICLES

[Wild Engineers: Minnesota Animals Shape Their World](#)

[Squeaks and Whistles, Grunts and Hummms...](#)

STUDY QUESTIONS ANSWER KEY

1. All spiders:

a. hunt

b. live in trees

c. spin webs

d. a and c

2. Name three ways spiders are like insects. Name three ways they are different. **Answers may vary. Some ways spiders are like insects: they are small, they are invertebrates, they have eyes, they have legs. Some ways spiders are different from insects: they have eight legs instead of six, they have two main body parts instead of three, they have more eyes, their mouthparts are like hollow needles, they don't have wings.**

3. Long legs help a spider **move quickly**. Short, powerful legs help a spider **jump**.

4. What are eight ways spiders use silk? **To build a web to trap prey; to make a sticky ball to throw at prey; to wrap up prey; to build a shelter; to make a rope to travel along; to make a container for eggs; to make a container for sperm; to float in the wind.**

5. Match the trait to the type of spider:

Orb weaver - builds circular webs with spokes

Jumping spider - can leap up to 30 times their body length

Cellar spider - has super-long legs

Grass spider - makes funnel-shaped webs

Crab spider - females are twice the size of males

Ground spider - chases its prey

Cobweb spider - hunts mainly at night

6. What sense does a grass spider use to tell when it has captured an insect in its web?

- a. Sight
- b. Sound
- c. Smell
- d. Touch**
- e. Hearing

7. How do jumping spiders use silk? **They spin a thread that acts as a safety line in case they fall when they jump to capture a meal.**

8. What do grass spiders and cobweb spiders have in common that sets them apart from crab spiders and ground spiders? **They capture their prey in webs. (Other answers may be acceptable.)**

9. How does a crab spider use its long legs?

- a. To leap to quickly capture prey
- b. To run across its web to eat a captured insect
- c. To escape predators
- d. To capture insects that are attracted to the flower it's sitting on**

10. What do special eye structures help wolf spiders do? **Hunt in the dark.**

11. True or false: Some spiders know how to swim. **True.**

Bonus: Jumping spiders can leap 30 times their body length. In feet and meters, how far would you be able to leap if you had that skill? **Answers vary, but should be 30 times the student's height. Optional activity: After students calculate their own distances, pace off the distances and mark them to help students get a sense of what various distances look like in real life.**

MINNESOTA COMPREHENSIVE ASSESSMENTS ANSWER KEY.

1. True or False: All spiders spin webs. **False. All spiders spin silk, but not all use the silk to spin webs.**

2. What tool are spiders' mouthparts most like:

- a. a scissors
- b. a hollow needle**
- c. a knife
- d. a tweezer
- e. a grinder

3. How long of a strand of silk can a spider carry inside its body? **0 inches. The spider produces the proteins that make silk inside its body, but they don't turn into silk until they are pushed out of its body as a thin stream of liquid.**

4. How does the ability to change color help a goldenrod crab spider thrive? **It makes it harder for prey and predators to see it, so it can better catch a meal and avoid**

becoming one.

5. Compare and contrast wolves and spiders. **Answers may vary. Similarities include: They are brown, they are hairy, they hunt and eat other animals. Accept other, more creative answers as well, such as “They live in Minnesota, they are animals, etc.” Differences are endless, but could include: one is a vertebrate and one is an invertebrate; one has two eyes and the other has eighteyes.**

VOCABULARY LIST

ambush attack by surprise

bulbous shaped like a bulb

diverse different

larvae immature insects

solidify turn to a solid

spigots devices that control the flow of a liquid

submerged under water

venom a harmful substance injected into a victim