

TEACHERS GUIDE

to “Super Senses”

Multidisciplinary classroom activities based on the Young Naturalists nonfiction story in *Minnesota Conservation Volunteer*, January-February 2024, 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 words, study questions, and other materials.

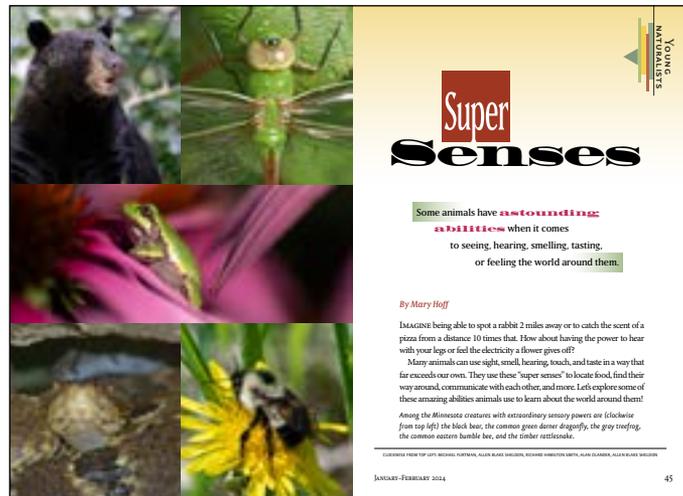
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Thank you for bringing Young Naturalists into your classroom!

“Super Senses”

Multidisciplinary classroom activities based on the Young Naturalists nonfiction story in *Minnesota Conservation Volunteer*, January-February 2024, mndnr.gov/mcvmagazine.



SUMMARY. Animals rely on sight, smell, hearing, taste, and touch to survive and thrive in their world. And some are far better at it than we are! This Young Naturalists feature offers a window into the “super senses” of some common Minnesota creatures.

SUGGESTED READING LEVELS. Third through middle school grades

MATERIALS. KWL organizer; optional resources include dictionaries, video viewing equipment, Internet access and other print and online resources your media specialist may provide.

PREPARATION TIME. 10–15 minutes, not including time for extension activities.

Estimated instruction time. 30–60 minutes, not including extension activities.

MINNESOTA ACADEMIC STANDARDS APPLICATIONS. “Super Senses” activities described below may be used to support some or all of the following Minnesota Department of Education standards for students in grades 3–8:

ARTS

ARTISTIC PROCESS: CREATE OR MAKE (Benchmarks 0.2.1.5.1, 4.2.1.5.1, 6.2.1.2.1)

ENGLISH LANGUAGE ARTS (GRADES 3-8)

Reading Benchmarks: Informational Text

Key Ideas and Details (Benchmarks 3.2.1.1, 3.2.2.2, 4.2.1.1, 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 (Benchmarks 4.2.9.9, 5.2.7.7, 5.2.9.9, 6.5.7.7)

WRITING BENCHMARKS (GRADES 3-8)

Text Types and Purpose (Benchmarks 3.6.2.2, 3.6.3.3, 4.6.2.2, 4.6.3.3, 5.6.1.1, 5.6.2.2, 5.6.3.3, 6.7.1.1, 6.7.2.2, 6.7.3.3, 7.7.1.1, 7.7.2.2, 7.7.3.3, 8.7.1.1, 8.7.2.2, 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 (Benchmarks 3.10.4.4, 4.10.4.4, 5.10.4.4, 6.11.4.4, 6.11.6.6, 7.11.4.4, 7.11.6.6, 8.11.4.4, 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)

SPEAKING, VIEWING, LISTENING AND MEDIA LITERACY (GRADES 3-8)

Comprehension and Collaboration (Benchmarks 3.8.1.1, 3.8.3.3, 4.8.1.1, 5.8.1.1, 6.9.1.1, 7.9.1.1, 8.9.1.1)

Presentation of Knowledge and Ideas (Benchmarks 3.8.4.4, 3.8.6.6, 4.8.4.4, 4.8.6.6, 5.8.4.4, 5.8.6.6, 6.9.6.6, 7.9.6.6, 8.9.6.6)

SCIENCE (*CODING IS BASED ON THE 2019 COMMISSIONER APPROVED DRAFT OF MN ACADEMIC STANDARDS IN SCIENCE)

SCIENCE AND ENGINEERING PRACTICES

2. Developing and using models

6. Constructing explanations and designing solutions

7. Engaging in argument from evidence

8. Obtaining, evaluating, and communicating information

CROSS CUTTING CONCEPTS

2. Cause and effect

6. Structure and function

DISCIPLINARY CORE IDEAS

Life Sciences 1: From molecules to organisms: Structures and processes;

Life Sciences 2: Ecosystems: Interactions, energy, and dynamics; 3: Heredity: Inheritance and Variation of Traits; 4. Biological Evolution: Unity and Diversity

Engineering, Technology, and the Application of Science: 1: Engineering design; 2: Links among Engineering, Technology, Science, and Society

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

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Preview. What do your students already know about wild turkeys? Give them a chance to share their thoughts and observations. Then divide them into small groups to do a KWL activity. Give each student a copy of the organizer (see teach-nology.com/web_tools/graphic_org/kwl/). Within the groups, have students describe what they already know about wild turkeys and what they wonder about them and encourage each to write down their thoughts on the organizer. As you read and discuss the article and carry out extension activities, they can then record what they learn. If you'd like to try something different, you might wish to check out the [THC and KLEW](#) frameworks.

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 you students and invite them to guess what they think they 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.

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.

ASSESSMENT. You may use all or part of the study guide, combined with vocabulary, as a quiz. Other assessment ideas include: (1) Have students write multiple-choice, true-false, or

short-answer questions based on the article. Select the best items for a class quiz. (2) Create a game-show setting. Have students take turns providing clues about an animal features in the article until another student guesses the animal. Encourage them to start with subtle clues and work toward more obvious ones. (3) Have students imagine and draw a fictional creature that has three or more of the “super senses” featured in the article. Have them describe in writing where their imaginary creature lives and how it uses its super supply of super senses to find food and shelter, evade predators, care for its young, etc.

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. Choose an animal not featured here. Research how it senses its world. In what ways are its senses similar to those of like humans? In what ways are they different?

2. Check in with your own senses! In your indoor or outdoor classroom, discuss how humans use our senses to explore, understand, and interact with the world around us. Provide each student with a handout that lists the five senses with space underneath each. Go for a nature walk, pausing occasionally to let students record what they see, hear, feel, and smell. For safety’s sake, avoid tasting things—but after duly noting the hazards of tasting things, invite students to describe what they imagine their surroundings (soil, bark, leaves, etc.) might taste like. At the end of the hike invite students to share what they recorded, making lists on the board. Which senses have the most items? Which senses might students practice using more?

3. Humans have developed a variety of devices that enhance our ability to see (eyeglasses, telescopes, microscopes, periscopes, etc.). Provide a basic lesson in how lenses and mirrors work. Have students choose one device and investigate how it uses these tools to enhance human vision. Students can be asked to develop a model to represent their understanding and communicate their ideas to others.

4. If students could have one super sense, what would it be? How might they use it to make the world a better place for themselves, others, and the planet? Invite them to draw a picture of themselves using their super sense for good, then take turns sharing with the class. Or students could be asked to write a creative narrative of their use of this super sense, using descriptive details and other literary techniques to convey the experience or event.

5. Play charades! Have students take turns acting out an animal from the story using its super sense as the other students try to guess which animal and which super sense

they're featuring. Or have students select one of the animals featured in the story and create a mini-exhibit for a classroom "Super Senses Museum." Students can orally share what they have learned with museum guests.

6. A big challenge in robotics is to give a machine the ability to sense its environment. Invite students to choose one of the five senses and research how robotics engineers have given their creations the ability to see, hear, touch, smell, or taste.

7. To what extent do people who design and develop devices for human use find inspiration for their engineering in real-life animals? Introduce the concept of biomimicry and invite students to develop a concept for a useful tool for humans based on one of the super senses featured in the story. Older students might first research existing applications, such as the design of flexible pyroelectric materials inspired by the pit-viper, or a vision-screening device inspired by the octopus, or a new fire-detection technology inspired by the jewel beetle.

8. Scientists are working to understand how the olfactory receptors in a mosquito's antennae communicate with the parts of its brain called the glomeruli. Invite older students to investigate what scientists have learned about which kinds of chemical compounds in human odors light up the "human-detecting" glomeruli. Based on what they learn, ask students to design a mosquito repellent or trap to reduce mosquito bites or the spread of mosquito-borne illnesses.

9. Do some humans have super senses? Invite older students to explore what heightened sensory abilities look like in the real world by working in teams to investigate one of the following: the mutation of the bitter taste receptor gene TAS2R38, tactile hypersensitivity, tetrachromacy, hyperosmia, and hyperacusis. Students can report back what they learn and discuss the advantages and disadvantages of super senses in humans. Or they might be asked to construct an argument, supported by evidence, regarding their position as to whether super senses in humans are advantageous or disadvantageous. Additionally, students might find it interesting to learn more about synesthesia along with the research underway to uncover connections between the senses that can be used to improve existing senses and possibly create new ones. This article may be a good starting point.

WEB RESOURCES

MINNESOTA DNR WEB PAGES

[Fish Sense \(MinnAqua Fishing Lesson\)](#)

[Sights, Sounds, and Smells \(Exploring the Forest Through Our Senses\)](#)

GENERAL TEACHER AND STUDENT RESOURCES

[Minnesota DNR Teachers' Resources](#)

WEB RESOURCES:

[These Dogs Are Wild](#)

[Color by Nature](#)

[Eight-Legged Superheroes](#)

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

VIDEOS

[Animal Super Senses \(BBC Earth\)](#)

[Super Senses: The Secret Power of Animals \(NatG](#)

[Super Senses](#)

OTHER MATERIALS

[How Can Animals Use Their Senses to Communicate? \(Smithsonian\)](#)

[Amazing Animal Super Senses \(BBC Earth\)](#)

[The Hidden Sensory World of Animals \(Ed Yong\)](#)

STUDY QUESTIONS ANSWER KEY

1. Which animal from the story hears with its legs? **Common house spider**
2. Which animal from the story tastes with its legs? **Monarch butterfly**
3. Why is the skin inside an animal's nose important for smelling? **It sends messages to the brain when it detects molecules given off by food or another animal.**
4. Nostrils are to a vulture as **_clubbed antennae_** are to a burying beetle.
5. Name three ways a gray wolf uses its smelling super sense. **To find food, to tell where other wolves have been, to tell when another wolf is ready to mate.**
6. How does 3-D vision benefit a zebra spider?
 - a) it allows it to see dead things far away
 - b) it helps it see in the dark
 - c) it helps it build its web
 - d) it helps it pounce just the right distance to capture prey**

7. How many eyes does a zebra spider have?

- a) 2
- b) 3
- c) 6
- d) 8**

8. How does polarized light help a pavement ant find its way home? **It helps it figure out where the sun is.**

9. True or false: a zebra spider is an animal. **True**

10. Match the super sense with the animal(s) that use it.

Can smell food a mile away – **black bear**

Has eyes that seem to glow in the dark – **bobcat**

Can see front and back at the same time – **common green darner**

Uses polarized light to tell direction – **pavement ant, common green darner**

Senses heat given off by prey – **timber rattlesnake**

11. How does sound help a bat find insects to eat? **When the sound the bat gives off hits an insect it bounces back to the bat's ears. The direction of the reflected sound tells the bat which way to fly to find its prey.**

12. Which sense do Eimer's organs use?

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

Challenge question: The 20 animals featured in this story are grouped into categories based on the type of exceptional sense they have. Think of another way to categorize them and divide them up according to your scheme.

MINNESOTA COMPREHENSIVE ASSESSMENTS ANSWER KEY.

1. True or false: a bobcat's eyes give off light in the dark. **False. The glow comes from reflected light.**
2. Which part of the eye turns light into nerve signals? **The retina.**
3. Which part of the nose turns scents into nerve signals? **The lining.**
4. According to the story, which of these travel in waves?
 - a. Sound
 - b. Light
 - c. Odors
 - d. A & B**
 - e. All of the above
5. Name three animals from the story that eat insects. **Answers may vary, but options include common house spier, big brown bat, common green darner, and zebra spider.**
6. How do feathers help a barred owl hear? **They form a pathway that channels sound toward its ear openings.**

VOCABULARY LIST

carcass – dead animal

denizen – one who hangs out in a particular spot

membrane – a thin layer of material

murky – hard to see through

nasal – related to the nose

perceives – becomes aware of

sonar – a system for detecting objects that relies on sound waves bouncing off of them

voracious – very hungry