

Teachers Guide

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“Wild Vision” Multidisciplinary Classroom Activities

Teachers guide for the Young Naturalists article “Wild Vision” by Mary Hoff. Illustrations by Taina Litwak. Published in the September–October 2005 *Minnesota Conservation Volunteer*, or visit www.dnr.state.mn.us/young_naturalists/vision.

Young Naturalists teachers guides are provided free of charge to classroom teachers, parents, and students. This guide contains a brief summary of the article, suggested independent reading levels, word count, materials list, estimates of preparation and instructional time, academic standards applications, preview strategies and study questions overview, adaptations for special needs students, assessment options, extension activities, Web resources (including related Conservation Volunteer articles), copy-ready study questions with answer key, and a copy-ready vocabulary sheet. There is also a practice quiz in Minnesota Comprehensive Assessments format. Materials may be reproduced and/or modified to suit user needs. Users are encouraged to provide feedback through an online survey at www.dnr.state.mn.us/education/teachers/activities/ynstudyguides/survey.html.



Summary “Wild Vision” introduces young readers to one of the five senses across the animal kingdom, from protozoa to large vertebrates. Topics include: pigmentation, simple and compound eyes, stereoscopic vision, and ultraviolet light, and the anatomy of the eye. Key concepts are presented through text, illustrations, and photographs.

Suggested reading levels: intermediate through middle grades

Total words: 1,688

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Materials: Paper, poster board, pencils, pens, markers, and print resources from your media center. See extension activity 2 lesson plan for more materials.

Preparation time: One to two hours, not including time for extension activities

Estimated instructional time: Two 50-minute class periods (not including extensions)

Minnesota Academic Standards applications: “Wild Vision” may be applied to the following Minnesota Department of Education Academic Standards:

Language Arts

I. Reading and Literature

- A. Word Recognition, Analysis and Fluency
- B. Vocabulary Expansion
- C. Comprehension

II. Writing

- A. Types of Writing
- B. Elements of Composition
- C. Spelling
- D. Research
- E. Handwriting and Word Processing

III. Speaking, Listening and Viewing

- A. Speaking and Listening
- B. Media Literacy

Science

Grade 5: Life Science, Biological Populations Change Over Time

Grade 6: Physical Science: Energy Transformations

Grade 7: Life Science: Cells, Flow of Energy and Matter, Biological Populations Change Over Time, and Human Organisms

Arts: Artistic Expression: Visual Arts

Complete Academic Standards are available at www.education.state.mn.us. Teachers who find other connections to academic standards are encouraged to contact *Minnesota Conservation Volunteer*.

Preview Begin your preview with a water KWL (Ogle, 1986). Use the **KWL** strategy to find out what your students already know (**K**) about vision, what (**W**) they would like to learn, and eventually, what they learned (**L**) while reading the article and related materials, and through participating in extension activities. Display your **K** and **W** ideas on poster board or paper (see Vocabulary preview, below). Add to your **L** list as you read and discuss the article. See www.teach-nology.com/web_tools/graphic_org/kwl.

Next, allow students time to skim the article before reading. Ask them to highlight the italicized words. These are the key concepts and should be discussed before reading. Perhaps some of these terms are included in your **K** list. If students are not familiar with some of the terms, include them in the **W** list. Eventually, these terms can be moved to the **L** list.

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Vocabulary preview Vocabulary demands of “Wild Vision” are considerable. Therefore, you may wish to review the attached list and italicized words, and add other words based on your students’ needs. Many connections to vocabulary in the article may be made during the KWL activity. For example, you may write vocabulary from the article in green ink and other ideas in black. Key terms may also be written on flashcards for review before evaluation. Students may also make flashcards of key terms for review with partners or at home.

Study questions overview Study questions parallel the story (the answer to the first question appears first in the article, followed by the second, and so on). This is an important organizational tool for students and should be emphasized before you begin working on the study questions. Preview the entire guide with your class before you read the article. You may wish to read the story aloud and complete the study questions in class or in small groups. The questions may be assigned as homework, depending on the reading ability of your students. Inclusion teachers may provide more direct support to special needs students (see Adaptations below). The study questions may also be used as a quiz. Note: Items 1, 7, and 8 require analytical thinking.

Adaptations Read aloud to special needs students. Abbreviate the study questions or highlight priority items to be completed first. If time allows, remaining items may be attempted. For example, items 2, 3, 4, 6, and 10 will give students some basic knowledge of vision. Peer helpers, paraprofessionals, or adult volunteers may lend a hand with the study questions. With close teacher supervision, cooperative groups can also offer effective support to special needs students, especially for extension activities.

Assessment You may use all or part of the study guide, combined with vocabulary, as a quiz. Other assessment ideas:

1. Have students draw and label an eyespot, compound eye with ommatidia, and simple eye, then write an essay comparing and contrasting them.
2. Provide a drawing of each eye. Ask students to label the parts (a word bank may be helpful).
3. Poster presentations give students the opportunity (individually or in groups) to select an organism, describe its eyes, and explain how it uses vision to survive.

Extension activities

1. This Florida State University site provides a variety of interdisciplinary activities that fit well with the article: microscopy.fsu.edu/optics/activities/teachers/animalvision.html
2. What makes the tarsier unique in the animal kingdom? See the Philadelphia Zoo’s site at www.philadelphiazoo.org/index.php?id=8_2_1 for fascinating vision facts about this and other animals. Ask students to pick an organism, research its sense of vision, and report in writing,

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orally, through art or any combination media. See excellent lesson plans for grades 6–8 biology at school.discovery.com/lessonplans/programs/eye. Posters will turn your room into a natural history museum.

3. See ebiomed.com/gall/eyes/EyeAWLS.html for a comprehensive list of vision information and activities on the Web.
4. Visit your local zoo to observe the animals you have been studying. Many zoos will provide topic-specific programs at your request.

Web resources Animal vision is the subject of much research. Students have access to hundreds of excellent sites. Here are a few to get you started:

The Tech:

www.thetech.org/exhibits/online/color/animal

U.S. Department of Energy Ask a Scientist:

www.newton.dep.anl.gov/archive.htm

San Diego Natural History Museum:

www.sdnhm.org/kids/eyes/localeyes.html

Boston University dictionary of vision:

www.liden.cc/Visionary

Many related articles are available on the DNR’s Web site, at www.dnr.state.mn.us. Some recent *Conservation Volunteer* articles (see www.dnr.state.mn.us/volunteer) include:

September–October 2004

“Gallery of Game” (Young Naturalists article with teachers guide)

www.dnr.state.mn.us/young_naturalists/gallery

“Flying Squirrel”

www.dnr.state.mn.us/volunteer/septoct04/mpsquidrel.html

September–October 2003

“Big Brown Bat”

www.dnr.state.mn.us/volunteer/sepoct03/profile.html

March–April 2003

“Return of the Osprey”

www.dnr.state.mn.us/volunteer/marapr03/osprey.html

References Ogle, D.S. K-W-L Group Instructional Strategy. In A.S. Palincsar, D.S. Ogle, B.F. Jones, and E.G. Carr (Eds.), *Teaching Reading as Thinking* (Teleconference Resource Guide, pp.11–17). Alexandria, Va.: Association for Supervision and Curriculum Development, 1986.

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Study Questions

“Wild Vision,” by Mary Hoff. Illustrations by Taina Litwak
Minnesota Conversation Volunteer, September–October 2005
www.dnr.state.mn.us/young_naturalists/vision

Name _____ Period _____ Date _____

1. Why could you argue that vision is the most important of the five senses? _____

2. What do pigments do? _____

3. Name three organisms that have eyespots and explain how eyespots work. _____

4. Explain the difference between compound and simple eyes. _____

5. Most spiders have ____ simple eyes.

6. Explain stereoscopic vision. _____

7. What advantage does stereoscopic vision provide?

8. Why is it important for frogs to sense movement? _____

9. What is the tapetum and how does it help deer survive? _____

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10. Describe the relationship between butterflies, plants, and ultraviolet light? _____

11. When viewing wildlife, it is always wise to stay as still as possible because _____

12. Lures that reflect light attract fish because _____

Study Questions Answer Key

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1. Why could you argue that vision is the most important of the five senses? **Answers may vary, but should include: Vision helps many animals find food, shelter, and mates. It tells them where predators are.**
2. What do pigments do? **Pigments absorb light energy and send a signal to the brain.**
3. Name three organisms that have eyespots and explain how eyespots work. **Planaria, protozoa, and earthworms. Eyespots absorb light, allowing the organism to detect light and dark.**
4. Explain the difference between compound and simple eyes. **Compound eyes are made up of many tubes, called ommatidia, which don't see clearly, but are good at detecting motion. Simple eyes have a lens that focuses light on sensitive cells at the back of the eye. Simple eyes can see in great detail.**
5. Most spiders have 8 simple eyes.
6. Explain stereoscopic vision. **In animals with two eyes, each eye sees a different view. When the brain combines the two views into one, it's called stereoscopic vision.**
7. What advantage does stereoscopic vision provide? **Answers will vary, but should include: Stereoscopic vision gives animals the ability to judge how far away objects are. For prey animals it's important to know if they are in danger. For predators it's important to know if they are close enough to pounce on prey.**
8. Why is it important for frogs to sense movement? **Answers will vary, but should include: They use vision to catch flying insects and escape from predators.**
9. What is the tapetum and how does it help deer survive? **The tapetum is a layer of light-reflective cells in some animals' eyes. It helps the deer see at night.**
10. Describe the relationship among butterflies, plants, and ultraviolet light. **Some plants need insects such as butterflies to pollinate their flowers. They attract insects by producing colorful flowers along with food in the form of nectar and/or pollen. Insects can see ultraviolet light, which allows them to see patterns in flowers and recognize them as a food source.**
11. When viewing wildlife, it is always wise to stay as still as possible because birds and mammals can sense movement.
12. Lures that reflect light attract fish because **the lure will look like the shiny scales of a minnow.**

Minnesota Comprehensive Assessments Practice Items

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Minnesota Conversation Volunteer, September–October 2005

www.dnr.state.mn.us/young_naturalists/vision

Name _____ Period _____ Date _____

1. Ultraviolet light is
 - A. visible to humans.
 - B. invisible to humans.
 - C. visible to some birds.
 - D. B and C

2. If you shine a light at your dog its eyes will shine because
 - A. it is excited to see you.
 - B. its tapeta reflect the light.
 - C. you are seeing the whites of its eyes.
 - D. dogs have shiny eyes.

3. Experienced deer hunters do not wear _____ or _____ clothing.
 - A. red or orange.
 - B. yellow or green.
 - C. blue or purple.
 - D. gray or black.

4. Osprey need keen vision to
 - A. see fish below the surface of the water.
 - B. avoid predators.
 - C. find a mate.
 - D. care for their young.

5. The lens of a simple eye is curved. Why?
 - A. Its shape fits the eye.
 - B. The curve directs light to the back of the eye.
 - C. It is stronger than a flat lens.
 - D. No one knows why.

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1. Ultraviolet light is **D. B visible to humans** and **C visible to some birds**.
2. If you shine a light at your dog its eyes will shine because **B. its tapeta cells reflect the light**.
3. Experienced deer hunters do not wear **C. blue** or **purple** clothing.
4. Osprey need keen vision to **A. see fish below the surface of the water**.
5. The lens of a simple eye is curved. Why? **B. The curve directs light to the back of the eye**.

Vocabulary

“Wild Vision,” by Mary Hoff. Illustrations by Taina Litwak
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field of vision the space or range within which objects are visible to the eye at a given time

goldfinch a small bird, native to Minnesota

osprey a large raptor that lives primarily on live fish

predators animals that catch and eat other animals

prey animals that are eaten by predators

thrive to flourish or improve physically

visibility the possibility of being seen under certain conditions of distance and light

woodcock a ground-dwelling bird of the forests of Minnesota that lives mostly on worms and grubs