

SUGGESTED REFERENCES

- **What Do You See & How Do You See It?: Exploring Light, Color, and Vision**
Patricia Lauber, Leonard Lessin (Photographer),
Jerome Wexler (Photographer)
- *All About Vision*
<http://www.opticaladvisor.com>
- *Boston Foundation for Sight: The Boston Scleral Lens and How it Works*
<http://www.bostonsight.org/Bostonlens.html>
- *University of Southern California's Keck School of Medicine*
Information on the retinal prosthesis
<http://www.usc.edu/hsc/info/pr/>
- *St. Luke's Cataract and Laser Institute*
<http://www.stlukes-eye.com>

NATIONAL SCIENCE EDUCATION STANDARDS

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| <p>K - 4
History and Nature of Science
Science as a human endeavor</p> <p>Science and Technology
Understandings about science and technology
Abilities to distinguish between natural objects and objects made by humans</p> <p>Science in Personal and Social Perspective
Personal health</p> | <p>5 - 8
History and Nature of Science
Science as a human endeavor</p> <p>Science and Technology
Understandings about science and technology</p> <p>Science in Personal and Social Perspectives
Personal health
Risks and benefits
Science and technology in society</p> |
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*Source: National Science Education Standards, 1996, National Academy Press

CREDITS

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SCIENCE SCREEN REPORT FOR KIDS

VOLUME 14 ISSUE 6

A LOOK INTO THE HUMAN EYE



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SYNOPSIS

Eyes are one of the most overworked organs. We depend on our eyesight daily and often don't realize how much until something goes wrong. Vision impairments can be the result of heredity or trauma to the eye. Routine eye exams can detect and help prevent further loss of vision. The most common of vision impairments can easily be corrected with eyeglasses, contact lenses, and now surgery. Through research, scientists are discovering new ways to improve and restore vision.

This edition of SCIENCE SCREEN REPORT FOR KIDS explores how the eye functions and the problems that can affect vision. We will learn how vision impairments can be corrected and how modern science and technology are giving the blind a new look on life.

CURRICULUM UNITS

- BIOLOGY
- GENERAL SCIENCE
- LIFE SCIENCE
- PHYSIOLOGY

RUNNING TIME

16:10

BACKGROUND

Imagine seeing a beautiful rainbow, an adorable puppy or reading your favorite book. With the use of our eyes, we can explore the world around us.

In this edition of SCIENCE SCREEN REPORT FOR KIDS, we take a closer look into how our eyes work, some complications that can interfere with vision, and how science and technology are helping the blind see again.

In order to see, our eyes must work together with the brain. Through a series of steps similar to that of a camera, our eyes bring images into focus. As we look at an image, light enters our eye through the pupil. The cornea then bends the light rays and passes it through the lens to the retina. The retina acts like camera film. It captures the image and sends it to the brain through the optic nerve. Oddly, the image is sent upside down. It is the brain's job to interpret the image and turn it right side up for us to see.

When someone is having trouble seeing, they should go to the optometrist for an eye exam. Eye exams include several different tests such as the visual acuity test. This test determines how well you see at different distances. An optometrist also uses a special instrument called an ophthalmoscope to take a closer look at the inside of the eye. If a vision problem is found, the optometrist may suggest ways to correct the vision. The most common ways to correct vision is through the use of eyeglasses, contact lenses, and most recently, Lasik surgery. Lasik is a surgical procedure that uses a laser to correct vision problems such as myopia or nearsightedness, and hyperopia or farsightedness.

Other vision complications may be caused by age, health and heredity. Macular degeneration is a problem that affects the part of the retina called the macula. When this disease occurs, one has trouble focusing; all vision is impaired except for peripheral vision, or side vision. Another disease is glaucoma. A build up of fluid that creates pressure on the eye and optic nerve causes glaucoma. If left untreated, it will lead to blindness. One hereditary disorder that affects vision is retinitis pigmentosa. It affects the retina and makes it difficult to see when the light is dim and at night. Then, there is corneal disease. This disease affects the cornea making even blinking painful.

Science and technology are finding new ways for patients blinded from corneal disease to see again. Dr. Perry Rosenthal, founder of the Boston Foundation for Sight, created a special contact lens called the Boston Scleral Lens. This lens rests on the cornea and provides a cushion of artificial tears that alleviates the pain caused by corneal disease.

Scientists have made another advance in restoring vision for those suffering from retinitis pigmentosa. At the University of Southern California's Keck School of Medicine, they have designed an implant that replaces the retina. The chip stimulates the optic nerve, which sends images to the brain.

The eye is a wonderful organ. We are fortunate to live in a time where technology and research can aide in correcting and improving vision. As scientists and medical researchers continue their studies, they will be able to bring the world into focus so that everyone can enjoy the world's beauty and wonders.

ADVANCED ORGANIZERS

Prior to showing the video, students should have some understanding of the following Benchmarks for Science Literacy, Oxford University Press, which are excerpted and, in some cases, abbreviated below. Refer to the Benchmarks for more information.

Benchmark 1: The Nature of Science

Section B - Scientific Inquiry

Know by Grade 5

- When similar investigations give different results, the scientific challenge is to judge whether the differences are trivial or significant, and it often takes further studies to decide. Even with similar results, scientists may wait until an investigation has been repeated many times before accepting the results as correct.

Section C - The Scientific Enterprise

Know by Grade 8

- Computers have become invaluable in science because they speed up and extend people's ability to collect, store, compile, and analyze data, prepare research reports, and share data and ideas with investigators all over the world.

Benchmark 8: The Designed World

Section F - Health Technology

Know by Grade 5

- Technology has made it possible to repair and sometimes replace some body parts.

*Benchmarks can be further researched at www.project2061.org/tools/benchol/bolintr.htm

CRITICAL THINKING EXERCISES

- Read aloud a story about eyeglasses, eye exams or vision. The following is a suggestion: *Arthur's Eyes* by Marc Brown
- Draw a diagram of the eye using paper or a Styrofoam ball, and label its parts.
- Conduct an experiment to demonstrate how other senses become more alert when another sense is missing. For example, set up a "smelling" station and allow students to sniff different spices. Are the taste buds alerted? Have students record their experience in a journal.
- Write a descriptive paragraph about how the eye sees images. Create a visual to accompany the paragraph illustrating this process.
- Visit a website, such as the one below, to watch a video clip about macular degeneration.
<http://www.pbs.org/saf/previous/watchonline401.htm>
Scientific American Frontiers: Smart Glasses
- Choose two different eye impairments to compare and contrast. Pair up students to describe and explain their comparison charts.

VOCABULARY

- Cornea** Transparent part of the eye that covers the iris and pupil
- Glaucoma** Pressure in the eye that causes damage to the retina and gradual loss of vision
- Hyperopia** Vision impairment known as farsightedness; inability to see images up close
- Lasik** Surgery performed with a laser to correct vision
- Macular degeneration** Disease that affects part of the retina called the macula
- Myopia** Vision impairment known as nearsightedness; inability to see images far away
- Ophthalmoscope** Instrument used to view the inside of the eye including the retina
- Optic nerve** Transmits electrical impulses from the retina to the brain
- Optometrist** One who examines the eye and prescribes lenses to correct vision impairments
- Peripheral vision** Side vision
- Photoreceptor cells** Nerve cells that send images from the retina to the brain
- Pupil** Dark opening of the iris of the eye
- Retina** Part of the eye that receives images
- Retinitis pigmentosa** Hereditary vision disorder that affects the retina
- Sclera** Tough insensitive part of the eye
- Tunnel vision** Vision that appears as though one is looking through a tunnel
- Visual acuity** The ability to see images at different distances; a strong sense of sight

CAREER POSSIBILITIES

- BIOLOGIST
- NEUROSCIENTIST
- OPHTHALMOLOGIST
- OPTICIAN
- OPTOMETRIST