

SUGGESTED REFERENCES

- Electronic Stuff
www.howstuffworks.com
- *Electricity*
Science and Nature Books
EDU Resources.net
www.eduresources.net/technology/electricity/bte10.htm
- Energy Education
www.green-e.org
- Molecular Expressions
Electricity & Magnetism, Introduction
Micro.magnet.fsu.edu/electromag/java/transformer

NATIONAL SCIENCE EDUCATION STANDARDS

- K - 4 Physical Science**
Earth and Space Science
- 5 - 8 Physical Science**
Earth and Space Science

CREDITS

The producers thank Channel 4 Television Corporation/4 Learning for materials used in this program.

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SCIENCE SCREEN REPORT FOR KIDS

VOLUME 13 ISSUE 3 THE SCIENCE OF LIGHT



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SYNOPSIS

Light. Where would we be without it? Humans can only see a small portion of the electromagnetic spectrum streaming from the sun, but without that visible light reflecting off objects, we'd live in darkness. Today, we also use light to carry coded messages; and it is the foundation of modern telecommunications technology.

This edition of SCIENCE SCREEN REPORT FOR KIDS looks at the sun in terms of the light it produces, exploring how it affects life on earth, and showing how a solar eclipse takes place. The video demonstrates how we see color, how light can be reflected, and how the light of lasers can be bent to carry information.

CURRICULUM UNITS

- ASTRONOMY
- EARTH SCIENCE
- PHYSICS
- ENGINEERING
- SPACE SCIENCE

RUNNING TIME

17:05

BACKGROUND

We depend on the energy of the sun, in particular the narrow band of the electromagnetic spectrum that we can see, visible light. Without it, we'd be in the dark.

This report looks at light and at its source, the sun. Heat from the sun warms the oceans and creates the weather. Light from the sun enables us to see. When directed through a prism, white light is broken up into a rainbow of colors. These different frequencies determine the colors we see because surfaces either reflect or absorb different wavelengths. When red light is reflected, for example, we see the color red.

Some surfaces, like mirrors, reflect all light. Using a camera, a mirror and a dancer, the video demonstrates how light is reflected, discussing angles of incidence and reflection, and using an animation to vividly illustrate how light, which always travels in straight lines, can be redirected.

A solar eclipse is shown, and an animation illustrates how the moon is able to eclipse the sun and cast its shadow on the earth. The video examines ancient stories that tell how such an event might occur, and an experiment shows why an eclipse is possible despite the different sizes of the moon and the sun.

Unless something gets in the way, light goes on forever. Today, light is an indispensable part of modern communications. Telephones, fax machines, and the Internet all rely on light to carry information. This is demonstrated by showing how laser light travels through fiber optic cable, and how the light is being reflected inside the glass fiber.

We have always relied on visible light from the sun and other sources to provide us with information about the world. Today, because we use light in communications, we depend on it more than ever to help us live fuller lives and to support our quest for greater scientific understanding.

ADVANCED ORGANIZERS

Prior to showing the program:

1. Build upon students' background knowledge by conducting an open discussion about light. Create a KWL chart outlining K - what they know; W- what they want to know; and L - what they want to learn.
2. Read a book such as, *Day Light, Night Light*, by Stacy Schuett or *Exploring Light and Color*, by Heidi Gold-Dworkin. For older students try a book such as *Eyewitness: Light*, by David Burnie
3. Brainstorm ideas of how life would be different without any light. Write a narrative story about an imaginary experience of a day without light.

CRITICAL THINKING EXERCISES

1. After showing the video:
 - a| Discuss wavelengths.
 - b| Discuss how we know that white light is made up of different wavelengths of colored light.
 - c| Discuss what other kinds of devices besides fiber optics use reflected light.
 - d| Discuss how the heat from the sun drives the weather.
2. Research the relationship between the sun and the earth during a solar eclipse. How often does a solar eclipse happen and why?
3. Illustrate the positions of the sun and the moon and write a paragraph explaining a solar eclipse.
4. Have students use prisms to explore how they separate white light, or visible light, into the colors of the rainbow. Ask students how prisms and raindrops are similar. Explain that they both separate light creating the colors of the rainbows, or the electromagnetic spectrum.
5. Discuss how laser lights have impacted our world.
6. Separate students into groups and have them analyze how an overhead projector works. Each group is responsible for drawing a diagram of the overhead and its necessary components along with an explanation of how it works. Groups can present their analysis to the class.

VOCABULARY

- Corona.** The atmosphere of the sun
- Eclipse.** Total or partial shadowing of one heavenly body by another
- Emit.** To give off
- Filter.** A device to suppress waves of certain frequencies
- Frequency.** The number of complete cycles per second of an electromagnetic wave
- Incident ray.** Light that is falling or striking on something
- Kelvin.** A temperature scale where absolute zero is 0° , the equivalent of -273.16° C
- Laser.** A device that emits an amplified monochrome beam of light
- Nuclear fusion.** The union of atomic nuclei to form heavier nuclei with the release of huge quantities of energy
- Prism.** A three sided crystal that breaks up light into a rainbow
- Transparent.** Clear enough for light to pass through
- Wavelength.** The distance between one point on a wave to the corresponding point on the next wave

CAREER POSSIBILITIES

- ASTRONOMER
- ENGINEER
- PHOTOGRAPHER
- PHYSICIST