

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 reflection off objects. We would live in darkness. Today, we also use light to carry coded messages; and it is the foundation of modern telecommunications technology.

This program 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 reflections.

CURRICULUM UNITS:

Astronomy
Earth Science
Physics
Engineering
Space Science

CAREER OPPORTUNITIES:

Astronomer
Engineer
Photographer
Physicist

PROGRAM OVERVIEW:

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 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 can 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 always be redirected.

Unless something gets in the way, light goes on forever. Today, light is an indispensable part of modern communications. Telephones, fax machines, and 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 understanding.

ISSUES AND CRITICAL THINKING:

PRIOR TO SHOWING THE PROGRAM:

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.

Read a book such as, *Day Light, Day Night*, by Stacy Schuett or *Exploring Light and Color*, by Heidi Gold-Dworkin. For older students try a book such as *Eyewitness: Light*, by David Bumie.

Brainstorm ideas about how life would be different without any light. Write a narrative story about an imaginary experience of a day without light.

CRITICAL THINKING EXERCISES:

After Showing the DVD

Discuss wavelengths.

Discuss how we know that white light is made up of different wavelengths of colored light.

Discuss what other kinds of devices besides fiber optics use reflected light.

Discuss how the heat from the sun drives the weather.

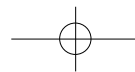
Research the relationship between the sun and the earth during a solar eclipse. How often does a solar eclipse happen and why?

Illustrate the position of the sun and the moon and write a paragraph explaining a solar eclipse.

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.

Discuss how laser lights have impacted our world.

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.



GLOSSARY:

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 degrees, the equivalent of -273.16 degrees Celsius.

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 a corresponding point on the next wave.

The Wonders of Physics & Chemistry



Show Me Science

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THE SCIENCE OF LIGHT



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