

- members.aol.com/WSRNet/D1/hist.htm
A time line of the various discoveries and inventions related to the field of optics.
- www.opticalres.com/kidoptx.html
Optic for Kids! explains how many useful things depend on being able to produce, control and detect light.
- www.kodak.com/global/en/consumer/education/lessonPlans/pinholeCamera/pinholeCanBox.shtml
Kodak, the film company, tells you how to make your own camera from a can or box and tells you what kind of film to use and where you can get it.

Suggested Print Resources

- Brain, Marshall. *How Stuff Works*. John Wiley & Sons, Hoboken, NJ; 2001.
- Leary, Catherine. *Awesome Experiments in Light & Sound*. Sterling Publications, New York, NY; 2000.
- Macaulay, David. *The New Way Things Work*. Houghton Mifflin, New York, NY; 1998.
- Tocci, Salvatore. *Experiments With Light (True Books: Science Experiments)*. Children's Press, Chicago, IL; 2002.



Photography

Grades 3-6

Journey to Mammoth Island, a whimsical place where investigating scientific principles is always an adventure. Olive, a young girl, assisted by the Island's mammoth population and a visiting inventor helps the locals discover why and how machines work. Science facts are clearly demonstrated, giving kids an opportunity to see how important everyday machines are linked together by the science that drives them. Students come to see that science is a way of organizing information about the world, explaining why things work the way they do and allowing us to predict what might happen in new situations.

This guide provides a brief synopsis of the program, background on the science concepts presented, discussion topics, additional activities, vocabulary and suggested print and Internet resources.

TEACHER'S GUIDE

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Program Summary

In *Photography*, local inhabitants of Mammoth Island are attempting to memorialize the winner of their annual golf tournament with a portrait. Since their only painter never seems to complete a painting, a young Islander named Olive begins to experiment with light when she notices its effect on the grass growing on the golf course. Before long, she stumbles on the principles involved in photography, and a visiting inventor helps her build a camera of mammoth-sized proportions!

To make images with a camera, you need light, a lens and sheet of glass that is coated with light-sensitive chemicals. (Certain silver compounds have the right properties.) When light from the bright parts of the image is focused through the lens and onto the silver compounds spread on the glass plate, the silver compounds change. This exposes an image on the plate.

The next step is processing the image. This is done in a photographic darkroom. In the darkroom, the plate is washed in more chemicals: first, in the developer, which causes the image to adhere, and then in the fixer, which washes away any remaining silver compounds and makes the image permanent. Once the initial image, called a negative, has been fixed to the plate, you can print the picture. On a negative, all the light spots are dark and all the dark spots are light. In other words, it is the opposite of a natural, or positive image.

Printing the picture is done by using a lamp to shine light through the negative. This light is focused through a lens onto a sheet of paper that has been coated in the same kind of chemicals as the plate. After developing and fixing the image to the paper, you have a photograph ready for display!

Olive soon realizes that her huge camera with its cumbersome glass plates has some drawbacks and wonders if they could somehow make it easier to manage. The inventor tells her about coated strips of plastic called film that replace the glass plates and he explains the concept of the single-lens reflex camera, or SLR. While many cameras use two different sets of lenses (one to view the image and one to throw it onto the film), the single-lens reflex camera uses only one set of lenses. First, light from the object you want to photograph travels through the camera's lens, and then it hits a mirror that sits in front of the film. The mirror reflects the light up through a viewing screen and into a piece of glass called a prism. The prism's job is to bounce the light around inside it, flip the image on the screen so it appears right side up again, and send it out through the viewfinder on the top of the camera. This means the photographer can see the image that will be captured by the film.

Glossary

The following words are included for teacher reference and for use with students to extend the subject matter in the show.

absorb — The action of light changing into heat energy when entering a medium.

convex lens — A lens with a surface that curves outward that causes light to focus and form an image. *(Continued)*

effort — The force applied to get work done.

energy — The ability to do work.

force — A push or a pull on an object that causes a change in motion.

lens — Special pieces of glass or other transparent materials that are shaped to bend or focus light, changing the way things look.

light — Energy that is visible to the human eye.

magnifying glass — A simple optical device that bends light rays to make things look bigger than they are.

light — Energy that is visible to the human eye.

wave — A vibration that moves energy from one place to another.

reflect — The action of light bouncing off a medium.

single-lens-reflex (SLR) camera — A camera which allows the photographer to see exactly the same image that is exposed to the film.

pentaprism — A five-sided piece of glass that bounces the light around inside it, then sends it out through the viewfinder on the top of the camera.

photography — The process of taking a picture by exposing an image, processing the image, and then producing a print of the image.

work — To move or change something. Doing work takes energy. When you use force to make something move, you are doing work.

Pre-viewing Discussion

- How do cameras work?
- Why is light so important to us? What are some ways that humans use light?

Follow-up Questions & Activities

- Using sun-sensitive photographic paper, make sun prints with collected objects of different shapes and sizes, making sure to choose many opaque objects.
- Have students analyze images from a number of different cameras (disposable, digital, 35 mm, instant) and assess them for quality.
- As a group, brainstorm a list of ways that humans use light. Create a bulletin board to illustrate the many ways in which light is controlled and used for energy and communication (photos, movies, television, holograms, lasers, solar energy systems, eyeglasses, microscopes, telescopes, optical fiber telephone systems, CDs, etc.). Ask students to choose topics to research more fully and write reports to present to the class.

Suggested Internet Resources

Periodically, Internet Resources are updated on our Web site at www.LibraryVideo.com

- www.howstuffworks.com/
Students can use the topical index on this site to find many answers to their questions about how different types of cameras work. *(Continued)*