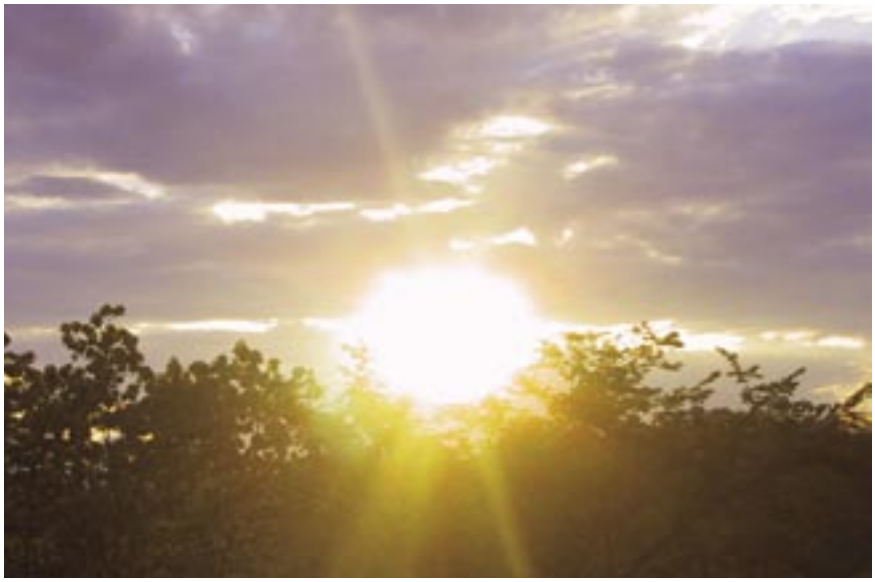
The Sun's Energy



Understanding the connection between the Sun's energy and sustaining life is difficult for preschoolers, but learning about these concepts through both long- and short-term activities captures children's short attention spans. Activities such as growing plants in sunlight and without light, playing with light and shadow, and making "sun prints" explore light—in this case how the Sun's light is different from lamplight.

The concept of how energy from the Sun supports life on Earth is a complex idea. The book *Brown Cow Green Grass Yellow Mellow Sun* (Jackson 1995) introduces this in an appropriate way for young children, telling a simple story of grass using the Sun's energy to grow, a cow eating the grass and growing, and people drinking the cow's milk.

Although children's grasp of these concepts will vary, having direct experiences with a variety of materials and being encouraged to think about what they experience and observe is a foundation that supports children's later learning. Activities about light and sunlight address sections of the National Science Education Content Standards B, C, and D.

Outdoors on a sunny day, begin a discussion about sunlight with the familiar subject of our senses. Remind young children repeatedly that they should not look directly at the Sun to avoid damaging their eyes. Ask your students, "How can we sense the sunlight? Can we taste (hear, smell, see, feel) it?" Pretend to taste the sunlight and sniff it. This unusual behavior will focus students' attention on something they have experience with but probably never thought about—"What is light?" With great expression, feel the sunshine on your skin and ask your students to tell you how it feels to them. Depending on the climate and season, children may answer, "Good!" or "Too hot." Ask students to relate what happens if they get too much sunshine on their skin and if other light sources have the same effect.

CAUTION

Engage the students in a discussion of how sunlight helps us. Aside from providing energy to plants, sunlight warms the Earth and allows us to see. *How is the light from the Sun similar to the light from a lamp?* Both are necessary for us to see. *What would happen at night if we didn't have lamps? How is the light from a lamp different from the sunlight?* This discussion gets students thinking about different types of energy. Prepare the materials for the following activity ahead of time so your class can take advantage of a sunny day and use the Sun's energy to make art.

Peggy Ashbrook **(scienceissimple @yahoo.com)** ***is the author of*** **Science Is Simple: Over 250 Activities for Preschoolers** ***and teaches preschool science in Alexandria, Virginia.***

Resources

Jackson, E. 1995. *Brown cow green grass yellow mellow sun*. New York: Hyperion.

National Research Council (NRC). 1996. *National science education standards*. Washington, DC: National Academy Press.

Making Sun Prints

Objective:

To understand that although we can't see the ultraviolet light part of sunlight, it can have an effect on plants, our skin, and light-sensitive chemicals.

Materials:

- Sun-reactive paper, available from craft supply stores and science suppliers (this paper has a chemical coating that reacts in ultraviolet light to change color)
- Flat objects such as leaves, shapes cut from aluminum foil, or opaque tracing templates (flat objects cover the paper more thoroughly to make a more distinct picture)
- Plexiglas sheet to hold the paper in place (inexpensive poster frames are a good source; this is optional—holding the paper flat makes a more well-defined print)
- Pan of water large enough to wash the paper in

Teacher Preparation:

In advance, make an outdoor "sun print" to use as an example of a well-defined print. Follow instructions below, only letting the print sit in the Sun for five minutes.

Procedure:

1. Make an indoor "sun print" as a rehearsal for making the prints outside. Place a flat object on top of the paper (colored side up), cover the paper and object with a Plexiglas sheet, and leave it in the light for at least 20 minutes inside before stopping the chemical reaction by gently washing the paper in a pan of water. As the paper dries, the color becomes brighter.
2. Show students both the outdoor and the indoor prints and compare them. Ask, "Where do you think the brighter one was made?" and "Why is the color so much brighter than the one we made inside?" Students may think of the Sun if they are asked to think of the brightest light they know.
3. To make prints outdoors, choose a book to read in a shady spot, set up a pan of water in the shade, and set up the Plexiglas covering for the sun prints in a sunny spot. The chemical coating on the paper begins reacting immediately—so work with a group of six or less at a time, and have students choose their objects ahead of time. Leaves or a pattern of small stones make beautiful silhouettes. Quickly write each student's name on their paper as you remove it from the package.
4. Instruct students to place their object on their paper. Covering the paper with a sheet of Plexiglas keeps everything from blowing away while the print develops, or weigh down with pennies. Describing what is going to happen—"I'm going to put Saul's paper here and he is going to quickly put his objects onto the paper"—helps students work more quickly.
5. While waiting for the images to form (about five minutes), move into the shade and read a short book about light. Ask open-ended questions about the Sun and how its energy is the source of energy for almost all life. *What do we need to grow and where do we get it? What do plants need to grow? Where do they get it?* The Sun's energy is making the special paper change color.
6. After five minutes, have the children quickly pick up their papers and put them into the pan of water and step back to allow others to do the same.
7. Gently swish the papers around to wash the chemicals off the paper to stop the reaction. Spread the papers out individually to dry.
8. When the prints are dry, the students can compare them to the one made inside. Understanding is demonstrated when children attribute the change in the paper's color to exposure to sunlight.

Extend understanding of sunlight the next time the class eats together by remarking how the food is made from plants—plants that used energy from the Sun to grow. The next time the class goes outside on a sunny day, take a prism with you to show the class that the visible part of sunlight can be separated into a rainbow of colors. With these experiences under their belts, students will begin making connections between the Sun's energy and life on Earth.

The Early Years

What's happening at *http://science.nsta.org/earlyyearsblog.*

Sign on and share your thoughts on these topics:

Water Water Everywhere

Dreaming of warm weather too? Water play allows children to explore science concepts such as flow, gravity, states of matter, and buoyancy, but safety is paramount. What variations in water play have you seen children invent? What are health concerns we all need to be aware of? Tips to make cleanup easier? What would your dream water investigation setup look like?

Ecosystems

Nature is a popular topic in the early childhood classroom, but many schools are limited in how far "into the great outdoors" they can reach. Have you found ways to creatively explore ecosystems and nature with your students—inside or out? What environmental science topics excite your students and get them clamoring for science? Share your ideas!

Read more and join the conversation at *http://science.nsta.org/earlyyearsblog.*

Discussions are ongoing in these subject areas:

- Activity Ideas
- Assessment and Standards Issues
- Classroom Management
- Finding Resources
- Integrating Science
- Teaching Strategies

Teacher's Picks

Marie Faust Evitt

Marie Faust Evitt, a teacher at the Mountain View Parent Nursery School in Mountain View, California, finds that children love rainbows, providing a great opportunity to explore the science of light and color. Here are some of her favorite resources that present the science accurately at an age-appropriate level.

Books

All the Colors of the Rainbow. Allan Fowler. 1998. Children's Press.
Even complicated concepts are understandable in this simple text about how rainbows are formed: "Mixing light is similar to mixing paint. If you mix red and yellow, you get orange. So orange lies between red and yellow in a rainbow."

The Rainbow and You. E.C. Krupp. 2000. HarperCollins.
The character Roy G. Biv leads children through the scientific explanations of rainbow formation. The author includes brief summaries of global rainbow legends from the ancient Greeks to the American Navajo.

A Rainbow All Around Me. Sandra L. Pinkney. 2002. Scholastic.
Bold close-up photos of children from a rainbow of ethnic groups expand exploration of color into skin color. The book invites children to reflect on the many moods, emotions, and sensations evoked by color, including nonrainbow colors like pink, tan, and brown. It concludes, "Colors! They're in everything I see! We are the rainbow—YOU and ME!"

Internet

What Are Those Squiggly Lines? Using Light to Learn About the Universe
http://fuse.pha.jhu.edu/~wpb/spectroscopy/spec_home.html
See the "Basics of Light" page to familiarize yourself with the concept of light as energy and the "Electromagnetic Spectrum" page to see a graphic showing that visible light waves are just a portion of the entire electromagnetic spectrum.