

Get SunWise

An
EPA-sponsored
school program
instills healthy
sun habits.

Teaching science content and providing health and safety instruction often go hand-in-hand. Take the Sun, for example. During an astronomy unit you tell students not to look directly at the Sun, but you can also set an example for children by encouraging sun-safe habits every day.

Providing sun-safe environments, schedules, and activities; teaching and modeling sun-safe behaviors; and implementing a sun-safe school policy are ways that schools can help protect children from sun overexposure and lay the foundation for a healthy lifestyle at an early age. Fortunately, successful strategies—including classroom activities and schoolwide guidance—are easily available to schools and teachers through the United States Environmental Protection Agency's (EPA) SunWise program, a free program to schools that register as a SunWise partner.

In this article, you'll learn about the SunWise program and find examples of classroom activities that can be used as part of your solar science curriculum.

A Teacher-Friendly Model

Based on Australia's SunSmart campaign, the SunWise program is now operating in schools in all 50 states, the District of Columbia, and Puerto Rico, teaching K–8 students about ozone depletion and UV (ultraviolet) radiation. The program also teaches students how to protect themselves from overexposure to the Sun by, for example, limiting one's time outside at midday; seeking shade; using sunscreen; and wearing a hat, sunglasses, and other cover-up apparel.

Becoming a SunWise partner school is easy—any elementary or middle school in the United States may participate and receive a free tool kit full of ready-to-use, cross-curricular classroom activities, a resource list, a UV-sensitive Frisbee, policy guidelines, and information about sun safety.

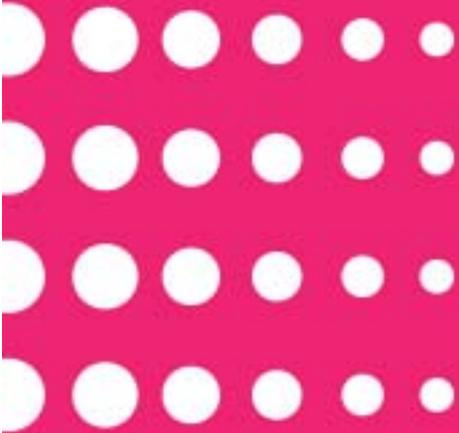
The structure of the school day enables SunWise lessons to be taught and implemented right away. The SunWise tool kit provides maximum teaching flexibility—elements can be used as stand-alone teaching tools or to complement existing classroom activities and/or school curricula. The tool kit's activities are standards-based, inquiry-based, and innovative in their design. Furthermore, they provide another vehicle through which classes and schools can involve parents and the community in a common cause.

Additional activity options include daily reporting of the UV Index or actual UV intensity; sponsoring "Safe Fun in the Sun" days; and inviting health professionals, environmentalists, and meteorologists to speak with schoolchildren. Tapping into the resources and expertise of the EPA is an additional advantage for schools interested in improving their students' sun-safety knowledge.

Measure Your Shadow

There are 41 age-appropriate activities to choose from in a SunWise tool kit. Activities are categorized for grades K–2, 3–5, and 6–8. The following activity, "Measure Your Shadow," developed for grades 3–5, is based on the rule of thumb, "Watch your shadow; no shadow, seek shade!"

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The objective of this activity is to demonstrate to students what causes a shadow, how shadows change from morning to evening, and how students can tell by the length of their shadows what times of day they should seek protection from the Sun’s harmful UV rays.

For this activity, you’ll need at least three 15-minute intervals during a clear sunny day and the following supplies:

- A schoolyard with dark cement or blacktop;
- Chalk;
- A meterstick;
- Paper and pencil; and
- A watch or clock.

To begin, ask students to predict if their shadow will change throughout the day and how. Instruct students

to make a chart on a piece of paper to record the times they trace their shadows and the size of their shadows. The chart will need two columns and three rows. The top of the chart should be labeled “time” and “measurement.” The side of the chart should be labeled “first shadow,” “second shadow,” and “third shadow.” If necessary, draw the chart on the board to show how it should look.

Take students outside three times during the day—once early, once midday, and once later in the afternoon. Observation periods at these times allow students to see a change in the size of their shadows. Remember to model—and have children practice—sun-safe behaviors when you go outside, such as applying sunscreen and wearing appropriate cover-up apparel. Have students choose a partner. Instruct students to trace their partner’s shadow, beginning at the

The Scoop on Sunscreen

An activity to help students visualize the meaning of “Sun Protection Factor”

SPF 60? UV Rays? Sunscreen lotion packages are an alphabet of initials and numbers. But, after slathering on your favorite lotion, have you ever stopped to consider what the information on the packaging actually means? This activity helps students visualize what it means when a lotion label says “Sun Protection Factor” or “SPF” and reinforces the importance of using sunscreen.

We did this activity with first-, second-, and third-grade students in a summer enrichment program at Indiana University of Pennsylvania in Indiana, Pennsylvania. Part of the program was a Sun study in which students participated in many hands-on activities. The study was a mix of original activities and activities from the SunWise curriculum, some of which were adapted to fit our needs, such as this sunscreen-testing activity.

Through the Sun study, students had learned that *some* exposure to the Sun is healthy and necessary, but overexposure to the Sun can cause serious health effects and that sunscreens can help protect your skin when you are out in the sun.

On the day of this activity, students came to class wearing items that protect them from the Sun. The teacher wore oversized sunglasses and a hat with a large brim, and she carried a beach umbrella and a bag with a bottle of sunscreen in it.

To begin, the teacher discussed the clothing everyone was wearing, making a chart on the board to show additional ways to protect us from the Sun, such as staying out of the midday sun and reapplying sunscreen after swimming. The class discussed how overexposure to the Sun can cause sunburn, wrinkles, and lead to skin cancer. The teacher and students then recounted instances when they or people they knew had suffered from particularly bad sunburns.

The teacher explained that sunscreen products each have an *SPF*, or Sun Protection Factor, and that this number tells you how many times longer you can stay out in the sun wearing sunscreen than you can with no sunscreen protection.

Next, students were divided into groups of about five. I provided each group with a sunscreen of a different SPF (4, 8, 30, and 45). **Make sure you obtain Material Safety Data Sheets (MSDS), available from the sunscreen manufacturers, before using any substance in the classroom. Also, be aware of any student allergies when using sunscreens in the classroom.**



On an index card, students wrote the name of the product, recorded the SPF number, and described what that meant. They then made observations about their brand (some were colored, some felt oily, some were sprayed on, some were waterproof, some smelled like

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feet, on the cement surface of the schoolyard with chalk. They should write their names inside their shadow tracings.

Students should then use the meterstick to measure the length of their shadows each time they trace them. Students should record the measurement and time of day on their charts.

As students return for each subsequent shadow measurement, have each student stand on the feet of their first shadow to retrace their new shadow on top of the original.

The Shadow Rule

Once all three measurements have been completed, ask students to compare their initial predictions to the actual shape and size of their shadows and discuss the differences in shadow size at the different times of day.

coconuts, etc.) and made predictions about how effective their sunscreen would be against the Sun's UV rays.

The teacher instructed students to put a thin layer of sunscreen on a sheet of acetate transparency film (the kind used for overheads) and then place this sheet face up on top of a sheet of UV-sensitive paper (ordered from a science catalog). UV-sensitive paper turns from light blue to white when exposed to sunlight.

We took the paper-transparency setups outside and exposed them to sunlight for at least five minutes and then observed them. Some of the papers turned white, some changed just a little, and some stayed blue. Students found that the higher the SPF of the sunscreen applied to the transparency, the less the UV-sensitive paper changed color. Students could easily see that some sunscreens (SPF 30) were more effective than others (SPF 4), but found it difficult to distinguish between results from sunscreens that were close in SPF (such as 30 and 45).

Students had fun comparing the sunscreens. During a class discussion, each group described their results and then said if they thought if their product was a good one.

After all the groups were finished, the class decided which sunscreens were the best products. Next, we compiled the data in a graph and compared our results to those presented in a sunscreen article from *Consumer*

How to Become a SunWise School

For more information about, or to register for the SunWise program, visit the website at www.epa.gov/sunwise. You can also contact Linda Rutsch at (202) 343-9924 or e-mail: rutsch.linda@epa.gov or Paula Selzer at (202) 343-9361, e-mail: selzer.paula@epa.gov.

Students will observe longer shadows early and late in the day and shorter shadows during midday.

As you discuss their comments, you will want to talk about how shadows are formed. A shadow is a dark figure or image cast onto the ground by our bodies intercepting the light of the Sun. Both the Sun and the Moon can create shadows. We have shadows throughout the day except at "high-noon" when the Sun is directly over our heads.



Reports. The teacher described the magazine's testing methods (*Consumer Reports* actually used volunteers and timed how long it took their skin to turn pink by exposing them to a sun lamp).

As an extension and art activity, students painted Sun designs on T-shirts using fabric paint with a small amount of UV-sensitive paint added. This paint, available from craft stores or from www.solarmagic.com, has no color until it is exposed to sunlight. It is water based and nontoxic and recommended for ages 5 and up; again, be sure to have a MSDS for the paint. For the T-shirt designs, we provided all kinds of clip art Sun designs for students to mix and match as they saw fit. This really inspired their creativity, and all the T-shirts were different.

By the end of the lesson, our students sounded like savvy consumers, chatting about which sunscreens they would use when going to the local community pool. As their teachers, we felt good that we helped students understand the importance of sun-healthy habits, a fact they could build on and apply in the future.

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Resources

Consumer Reports staff. 1998. A spectrum of sun protection. *Consumer Reports*, 63(5): 20–23.

Explain to the students that when their shadows are long (during the early and late parts of the day), the Sun is not as intense. When their shadows are short (during the middle part of the day), the Sun is more intense, and they are at a greater risk to the Sun's damaging UV rays.



Keywords: The Sun
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Sunlight is composed of both visible and invisible light. Ultraviolet light is found beyond the visible portion of light, just past the “violet” of the “roygbiv” we see in a rainbow, hence the name “ultraviolet.” UV rays are the portion of invisible light that causes sunburn. Luckily, most UV light is blocked by Earth's atmosphere, but some does get through and we need to protect ourselves.

Explain to students that UV rays are present even on cloudy days. Make sure you mention that *visible* light causes shadows, not UV rays. Nevertheless, the shadow rule is a good indication of UV intensity. After the discussion, share the shadow rule, “Watch your shadow; no shadow, seek shade!”

Assess what students have learned by asking them to explain the shadow rule and try to answer the following questions.

- What makes your shadow? *The rays of the Sun shining on one side of your body are blocked by your opaque body, creating a shadow projected away from your body.*
- Can the Moon make shadows? *Yes. When there is a Full Moon, the light can create a shadow, but the Moon does not emit UV rays.*
- Is your shadow always the same size? *No. Your shadow is long in the early morning and late afternoon and short at midday.*
- How much time passed between your first and last shadow? *Students should count the hours and minutes on a watch or clock to find the number.*
- What is the difference between your measurements? *Students should subtract to find the answer.*
- Explain what action steps for sun protection you should follow during the school day. *Limit time in midday sun; seek shade; always use sunscreen; wear a hat; cover up; wear sunglasses that block 99–100% of UV radiation; watch for the UV Index.*

Healthy Sun

Schools—led by teachers—need to start modeling sun-safe behaviors and attitudes early and should continue to do so consistently throughout K–12 schooling. Teachers can make a tangible difference by providing the necessary time in a day to apply sunscreen and put on a long-sleeved shirt, hat, and/or sunglasses before scurrying out to recess. Schools

Connecting to the Standards

This article and sidebar relate to the following *National Science Education Standards* (NRC 1996):

Content Standards

Grades K–8

Standard F: Science in Personal and Social Perspectives

- Personal health

can lay the foundation for healthy lifestyles among young people and can help shape social norms that promote sun safety.

Teachers who have participated in the program agree that SunWise provides a great path toward initiating sun safety. The ready-to-use materials are popular as well. Students are concerned about their world. SunWise stirs their creativity and helps them realize they can have an impact. ■

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Resources

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Internet

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www.sunblock.se/solen/Sol_och_skola.pdf
- Centers for Disease Control and Prevention *Guidelines for School Programs to Prevent Skin Cancer*
www.cdc.gov/mmwr/preview/mmwrhtml/rr5104a1.htm
- Environmental Health Center of the National Safety Council *Sun Safety*
www.nsc.org/ehc/sunSAFE.htm
- Environmental Protection Agency *SunWise School Program*
www.epa.gov/sunwise
- Science Under the Sun!
www.aad.org/SunSafety.pdf