



## Grade 5 Lesson Plan: Sun Safety

### Objectives/Goals

- Students will identify strategies that they will use to protect themselves from harmful effects of the sun.
- Students will demonstrate responsible decision-making during skit performances.

### Materials

- Music as start/stop signal
- Tagging devices
- Pencils
- Exit slips

### Steps

*Introductions: Our Sun- the good AND the bad*

- What are some good things the sun provides for us?
  - We all need some sun exposure for Vitamin D. Vitamin D helps our bodies absorb calcium for stronger, healthier bones.
- What are some harmful effects of the sun?
  - Too much unprotected exposure to the sun's ultraviolet (UV) rays can cause skin damage, eye damage, immune system suppression, and skin cancer. Even people in their twenties can develop skin cancer.
  - UVA and UVB rays are both dangerous. The rays react with the melanin in our skin when unprotected.
- How can we protect ourselves?
  - Everyone needs sun protection
  - Use sunscreen
  - Avoid the strongest rays of the day (10am-4pm in northern hemisphere)
  - Cover up (clothes and hats)
  - Wear sunglasses

## Health Smart Virginia Sample Lesson Plan

- Check medicines – some medicines increase exposure by making skin more sensitive.
- Find or bring shade

### *Activity 1 – Sun Safety Tag*

- Identify 1 tagger as the UVA ray tagger and 1 as the UVB ray tagger.
- Choose 3 helpers: They can be sunscreen, clothes, sunglasses, etc.
- On signal students are at the beach trying to avoid getting tagged by the UV rays. When tagged, a student will get sunburned if not helped as quickly as possible by one of the helpers.
- Switch taggers and helpers every few minutes so students can play different roles.

### *Skit Creation (5-10 minutes)*

- In a group of 3-4, students will create a short skit to demonstrate their method of sun protection
- Skits need to include the following:
  - Last 1-2 minutes
  - Everyone must speak
  - Must set the scene (where are you? Outside – pool, beach, park, home, etc.?)
  - Describe multiple sun prevention strategies within from different members (see above)
- Students will present their skits to the class.
- Ensure an emotionally safe environment where students feel safe to share and discuss.

### *Closure*

- Review harmful effects of the sun
- Have students complete attached exit slip and turn in on their way out.

### **Assessment Idea**

Observation during tag game and skit creation/presentation, and exit slip responses.

### **References**

- Kids Health <https://kidshealth.org/en/parents/sun-safety.html?WT.ac=ctg>
- Environmental Protection Agency <https://www.epa.gov/children/childrens-health-curriculum-lesson-4-be-sun-smart>

### **Handout**

The next page includes an exit slip for this lesson.

## EXIT SLIP – Sun Safety

Respond to the following two questions:

1. Name the two types of sun rays that can cause damage to our bodies.

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2. Name three ways that you can help protect yourself from the sun.

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## How to Be Safe When You're in the Sun

The weather is warming up, the days are longer and there's more time to be outside doing all kinds of fun things!

But if you're going to be out in the sun, especially on a hot day, you need to stay safe. Let's find out how.

### Don't Feel the Burn

Even though the sun is hot, it does cool things. It keeps us warm. It makes flowers and plants grow. It even gives us vitamin D so we can better absorb calcium into our bodies for strong bones.

It does all these things by sending down light, which includes invisible **ultraviolet** (say: ul-trah-VYE-uh-lit) **rays**. These are also called **UV rays**. Some ultraviolet rays pass through air and clouds and penetrate the skin. When your skin's been exposed to too many of these rays, you get what's known as a sunburn. Ouch!

Some people get a sunburn faster than others because of their coloring. If you have blond or red hair, light-colored skin, and light-colored eyes, you'll tend to get a sunburn more quickly than someone with dark eyes and skin. That's because you have less **melanin** (say: MEL-uh-nun). Melanin is a chemical in the skin that protects it from sun damage by reflecting and absorbing UV rays. People with darker skin have more melanin, but even if you have dark hair, dark eyes, or darker-toned skin, you can still get a sunburn. It will just take a little bit longer.

Sunburns look bad and feel worse. They can cause blisters on your skin. They can keep you inside feeling sore when everyone else is outside having fun. They increase your chance of getting wrinkly when you get older. And worst of all, they can lead to skin cancer when you are an adult. Because getting wrinkles and getting sick don't happen right away, they can seem like things that could never happen to you. But you still need to be careful.

### Prime Time

You don't need to hide from the sun completely or wrap up like a mummy to protect yourself. But you should take these two steps:

1. Always wear sunscreen.
2. Take frequent breaks from the sun by going indoors or moving into the shade.

These steps are especially important between **10:00 in the morning and 4:00 in the afternoon**, when the sun's rays are strongest.

Use a sunscreen with an SPF rating of 30 or higher. Put on sunscreen 15 to 20 minutes before going out in the sun. The letters SPF stand for sun protection factor, and the number rating tells you how much longer you can stay in the sun without getting sunburned.

But this isn't always true, so reapply sunscreen at least every 2 hours, just to be safe. Do this more often if you've been swimming or sweating a lot — even if the sunscreen is waterproof. And remember that you can get sunburned more quickly when you're swimming or boating because the reflection from the water intensifies the sun's rays.

Be sure to put sunscreen all over your body. This includes some places you might not think of, like the tops of your ears, the back of your neck, the part in your hair, your face, and the tops of your feet. You may need some help reaching the back of your body so ask your parents or friends to give you a hand. If you want to block the sun's rays, wear clothing that you can't see your hand through. You may still get burned through more sheer fabrics. Wear a baseball cap or other fun hat to block your face from the sun.

Don't forget that your eyes need protection from ultraviolet rays, too. Always wear sunglasses in the bright sun, and make sure they have a label saying that they block UV rays.

## Drink Up!

Drinking water is an important part of staying healthy, especially when it's hot outside. When you're sweating, you lose water that your body needs to work properly. And if you're playing a sport or running around in the sun, you lose even more water, because you sweat that much more.

So drink up and don't wait until you're thirsty — drinking before you feel thirsty helps keep the water level in your body from dropping too low (dehydration) when it's hot or you're sweating a lot with exercise. If you forget and suddenly feel thirsty, start drinking then. There are lots of cool-looking water bottles around, so get one you really like, fill it up, and drink up!

## Got That Hot Feeling?

If you're out in the hot sun or you're exercising on a hot day, it's easy to get **heat exhaustion**. Kids get heat exhaustion when their bodies can't cool themselves fast enough. A kid with heat exhaustion might feel overheated, tired, and weak.

Heat exhaustion can come on suddenly. A person may just collapse when playing soccer or tennis, for example. It can leave someone feeling really tired for days after it happens.

Heat stroke is a more serious heat-related illness and can cause someone to stop sweating; to have red, hot skin; and to have a high temperature. The person might become uncoordinated, confused, or even lose consciousness. It requires emergency medical attention.

Be sure to tell an adult if you're hot and you have a headache or feel dizzy or nauseated (like you're going to throw up). The grown-up will want to get you out of the sun, give you liquids to drink, and take you to a doctor, if necessary.

The good news is that the sun doesn't have to be your enemy if you wear your sunscreen, drink your water, and take breaks when you start to feel too hot. And don't forget your sunglasses. Not only do they protect your eyes from the sun, they make you look so cool!

Reviewed by: Steven Dowshen, MD

Date reviewed: July 2013

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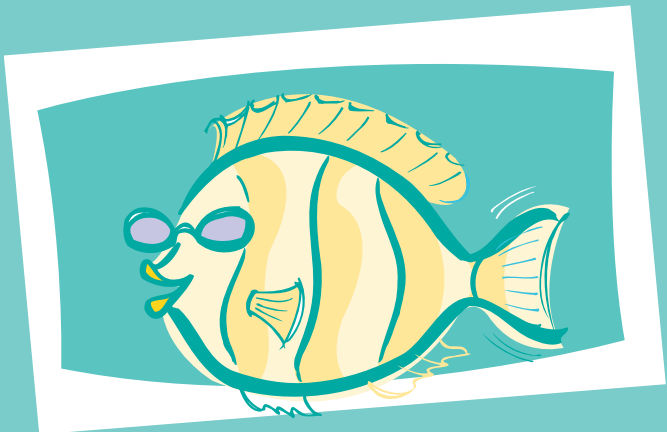
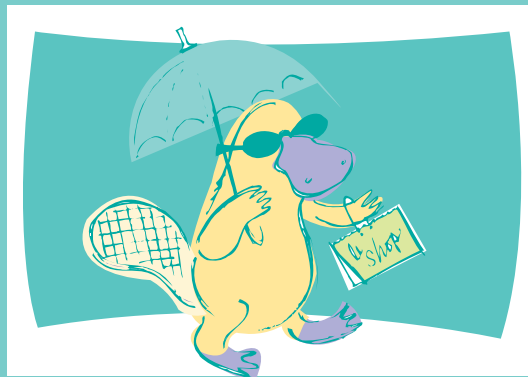
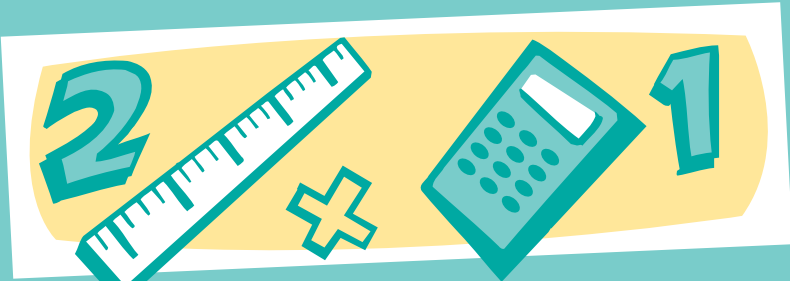
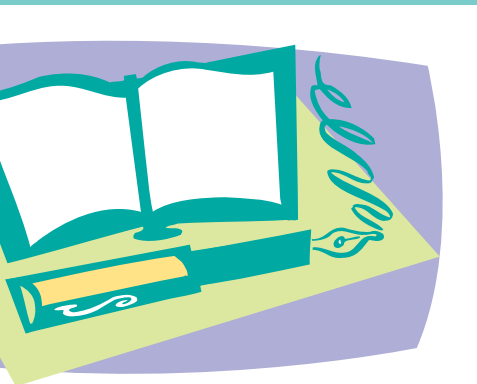
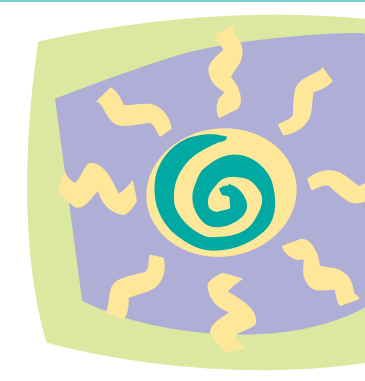
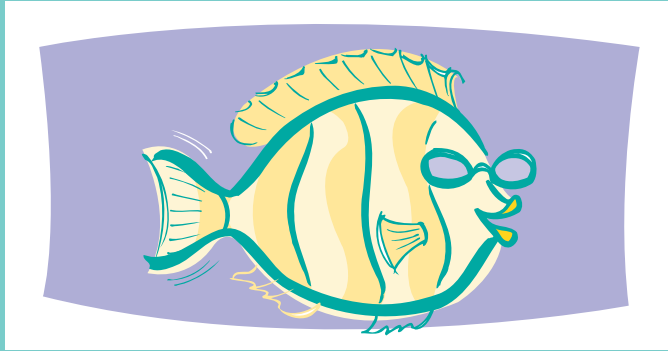
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grades 3-5



**SunWise**<sup>®</sup>  
a program that **radiates** good ideas  
A Partnership Program of the U.S. Environmental Protection Agency  
[www.epa.gov/sunwise](http://www.epa.gov/sunwise)





## 3-5 EDUCATIONAL STANDARDS



### EDUCATIONAL STANDARDS

		SUNWISE ACTIVITY TITLE		SUBJECT		
English Language Arts	Write Informative Texts to Convey Ideas and Information Clearly (W.3.2; W.4.2; W.5.2)	X			English/LA, Health, Science	
	Conduct Short Research Projects to Build Knowledge (W.3.7; W.4.7; W.5.7)		X		English/LA, Social Studies	
	Integrate Information from Print or Digital Sources (W.3.8; W.4.8; W.5.8)		X		English/LA, Science, Social Studies	
	Draw on Information from Multiple Print or Digital Sources (W.4.9; W.5.9)			X X	English/LA, Social Studies	
	Report on a Topic Using Facts and Relevant Details (SL.3.4; SL.4.4; SL.5.4)			X	Health	
	Engage in Collaborative Discussions (SL.3.1; SL.4.1; SL.5.1)	X	X	X	English/LA, Health, P.E.	
	Determine the Meaning of Words (RI.3.4; RI.4.4; RI.5.4)		X		Health, P.E., Social Studies	
	Health Concepts	X		X	Math	
	Influence Factors on Health Behaviors	X		X	Math	
	Health Information and Products			X	Math, Health, Science	
Health	Interpersonal Communication	X			P.E., Health	
	Decision-making Skills	X		X	Science, English/LA	
	Goal-setting Skills			X	Science, English/LA	
	Health Enhancing - Behaviors and Risks	X		X	Science	
	Personal, Family, and Community Health	X		X	Social Studies, Science	
	Mathematics	Measurement and Data			X	Math, Social Studies, English/LA, Science
		Numbers and Operations			X	English/LA, Social Studies
		Operations and Algebraic Thinking			X	English/LA, Science
		<b>Supplemental</b>				
		Sunny Crossword		English/LA		
		WordWise		English/LA		
		<b>UV Meter Activities</b>				
		What Works? Effectively Blocking UV Rays		Science		
		Chart and Graph UV Intensity		Math, Science		
		Reflecting UV Radiation		Math, Science		



## 3-5 EDUCATIONAL STANDARDS



### EDUCATIONAL STANDARDS

		SUNWISE ACTIVITY TITLE	SUBJECT	
Physical Education	Demonstrates Competency in a Variety of Motor Skills and Movement Patterns	Sun Scoop	English/LA, Health, Science	
	Applies Knowledge of Concepts Related to Movement and Performance	SunWise Word Scramble	English/LA	
	Demonstrates the Knowledge and Skills to Achieve and Maintain Fitness	SunWise Virtual Vacation	English/LA, Social Studies	
	Exhibits Responsible Personal and Social Behavior That Respects Self and Others	The Sun Shines Around the World	English/LA, Science, Social Studies	
Science	Earth and Climate (3-ESS2-2)	Sun Myths from the Internet	English/LA, Social Studies	
	Earth and Space Science: The Sun is a Star (5-ESS1-1)	SunWise Fashion Show	Health	
	Earth's Systems (5-ESS2-1)	UV Frisbee Fun	English/LA, Health, P.E.	
	Plants and Animals Have Structures That Serve Function in Survival (4-LS1-1)	Personal Skin Assessment	Health, P.E., Social Studies	
	Daily Changes in the Length and Direction of Shadows; Different Positions of the Sun (5-ESS1-2)	Sun Safety Survey	Math	
	Engineering, Technology, and Application of Science (3-5-ETS1)	SunWise Word Problems	Math	
	Social Studies	Culture	Measure Your Shadow	Math, Health, Science
		People, Places, and Environment	Speedy Sun Relay Race	P.E., Health
Individual Development and Identity		Sun Science	Science, English/LA	
Global Connections		The Ozone and Me	Science, English/LA	
		UV Frisbee Science	Science	
	Map a SunWise Town	Social Studies, Science		
	Be a SunWise Traveler	Math, Social Studies, English/LA, Science		
	A SunWise Legend	English/LA, Social Studies		
	Keep an Eye on Sun Safety	English/LA, Science		
	<b>Supplemental</b>			
	Sunny Crossword	English/LA		
	WordWise	English/LA		
	<b>UV Meter Activities</b>			
	What Works? Effectively Blocking UV Rays	Science		
	Chart and Graph UV Intensity	Math, Science		
	Reflecting UV Radiation	Math, Science		

\*Please note that the standards listed in the above table have been paraphrased. For more information on the standards used, please refer to the Educational Standards section of the Tool Kit (page 3).



## Sun Scoop

### Directions

Use a video camera, computer, pencil and paper, or any other recording device to develop a news story. Story angles could include the health effects of overexposure to the sun, sun protection, or how the UV Index works.

Gather the facts (who, what, when, where, why, and how) using resources such as the Internet, encyclopedias, or your local newspaper. Interview an expert. This could be a science teacher, nurse, or local weather forecaster. Write a lead and the rest of the story. As a guide, answer the three questions below. Be prepared to share your news story with your class.

Talk with the editor of your school or local paper about printing the news story. Ask your teacher or principal if you can read it over the PA system during morning announcements.

### Vocabulary Words

*Story Angle*—The topic or approach to a news story.

*Who, What, When, Where, Why, and How*—Questions that form the basic building blocks of any news story. A story might answer some or all of these questions.

*Lead*—The most important part of the story. The lead is always the first paragraph and it explains some of the Who, What, When, Where, Why, and How questions.

### Questions

- 1 What questions will you ask the expert? Justify your reasoning regarding how you chose those particular questions.
- 2 What is the most important part, or lead, of your story? Give three reasons why you chose that particular lead.
- 3 Construct an argument to support why you chose the facts you selected to include in your story.



# Sun Scoop

## Estimated Time

30–60 minutes

## Supplies

Video camera, computer, or  
any other recording device (optional)  
Paper and pencils  
Research materials (encyclopedias,  
newspapers, or computers)

## Learning Objective

The objective of this activity is to have students work collaboratively to conduct short research projects to understand that: 1) the sun is a star and appears larger and brighter than other stars because it's closer to Earth; 2) the sun is important to humans and other life on Earth; and 3) the sun can also be harmful to life on Earth, especially humans.

This activity uses research and journalism to raise awareness about the science and risk of the sun's harmful UV rays and about ways to be sun safe. Assess what students have learned by asking them to include the following in their story: at least three ways to be sun safe; the effects of ignoring these precautionary measures; and some background information about the sun and UV radiation.

## Directions

Provide students time to research the sun and the ways it helps and harms life on Earth. If possible, arrange for a science teacher, nurse, or local weather forecaster to come to your classroom to serve as an “expert” for students to interview. Have the students respond to the questions below as a class and then write their stories individually or in groups.

## Questions and Answers

- 1 What questions will you ask the expert? Justify your reasoning regarding how you chose those particular questions. *Students should list 3–5 questions and provide justification for each.*
- 2 What is the most important part, or lead, of your story? Give three reasons why you chose that particular lead. *Students should select one fact as the lead and give three reasons why they chose that particular lead.*
- 3 Construct an argument to support why you chose the facts you selected to include in your story. *Students should list the facts they will include in their story and construct an argument to support why each fact was chosen.*

## Additional Resources

The National Elementary Schools Press Association.  
[www.nespa.ua.edu](http://www.nespa.ua.edu)

The New York Times Newspaper in  
Education Program.

[www.nytimes.com/learning/teachers/NIE/](http://www.nytimes.com/learning/teachers/NIE/)



# SunWise Word Scramble

## Directions

Unscramble this list of words.

- nsu \_\_\_\_\_
- cksluobn \_\_\_\_\_
- nrsbun \_\_\_\_\_
- lmeo \_\_\_\_\_
- sgalusnses \_\_\_\_\_
- nlgosevelestirh \_\_\_\_\_
- tha \_\_\_\_\_
- niksreclnac \_\_\_\_\_
- aebhc \_\_\_\_\_
- ratluloietvysra \_\_\_\_\_
- swlrknie \_\_\_\_\_
- neswisu \_\_\_\_\_
- coptert \_\_\_\_\_
- luberlma \_\_\_\_\_
- esdha \_\_\_\_\_
- znoeo \_\_\_\_\_
- ntirfelceo \_\_\_\_\_
- mmnaaleo \_\_\_\_\_
- ntvopeerin \_\_\_\_\_

## Questions

- 1 What does UV stand for? Can you see or feel UV rays?
  
- 2 What forms a thin shield around the Earth and protects us from the sun's harmful UV rays?
  
- 3 At what time is the sun at its highest point in the sky?
  
- 4 During what hours should you limit your exposure to the sun?
  
- 5 What are some effects of too much exposure to the sun?



# SunWise Word Scramble

## Estimated Time

15–20 minutes

## Directions

By unscrambling the SunWise words the students will be exposed to key vocabulary associated with sun safety. Have a sun safety discussion before you assign the task to start the students thinking about certain sun safety vocabulary.

## Questions and Answers

- 1** What does UV stand for? Can you see or feel UV rays? *Ultraviolet. No.*
- 2** What forms a thin shield around the Earth and protects us from the sun's harmful UV rays? *The thin shield around the Earth is known as the ozone layer.*
- 3** At what time is the sun at its highest point in the sky? *Solar noon.*
- 4** During what hours should you limit your exposure to the sun? *You should limit your exposure to the sun between 10 a.m. and 4 p.m.*
- 5** What are some effects of too much exposure to the sun? *Some of the effects of too much exposure to the sun are wrinkles, skin cancer, and eye damage.*

## Unscrambled SunWise Words

sun  
sunblock  
sunburn  
mole  
sunglasses  
long sleeve shirt  
hat  
skin cancer  
beach  
ultraviolet rays  
wrinkles  
sunwise  
protect  
umbrella  
shade  
ozone  
reflection  
melanoma  
prevention

## Physical Education Variation

The teacher should write the 19 scrambled words from the Tool Kit activity in chalk on a concrete play surface without letting students see the words. Students line up about 50 yards away and take turns trying to decipher the first word. The first student runs to the first word. If s/he can decipher the word, s/he writes it next to the scrambled version. If s/he doesn't, s/he runs back and hands the chalk to the next student until all words have been revealed. Teachers might want to mention the words to students ahead of time when discussing sun safety with the class. Older students may choose to create their own word scramble. Divide students into groups. One group creates 15 scrambled sun safety words; another group must unscramble the words. Groups then trade off. The first group timed as the fastest wins. Larger classes might require 30 or more words. Additional words can be found throughout the SunWise Tool Kit.



## SunWise Virtual Vacation

### Directions

People all over the world enjoy the sun in very different ways. Some may enjoy the beach, while others may take hiking trips in the mountains. No matter where you go, it is important to be SunWise.

Plan a pretend class trip to anywhere in the world. Use the suggested websites on this page to “travel” to your chosen place. Make sure you pack everything you need to protect yourself against the sun’s harmful UV rays. Write a letter to your classmates and tell them about your trip and what you have learned. In your letter, answer the 10 questions below. Read your letter to the class.

Have fun on your trip! You’ll discover many things about different people, their countries, and the sun.

### Some suggested vacation spots:

Galapagos

[www.galapagos.org](http://www.galapagos.org)

Puerto Rico

[www.seepuertorico.com](http://www.seepuertorico.com)

Spain

[www.spain.info](http://www.spain.info)

India

[www.incredibleindia.org](http://www.incredibleindia.org)

Kenya

[www.porini.com/kenya.html](http://www.porini.com/kenya.html)

Australia

[www.australia.com](http://www.australia.com)

Antarctica

[www.expeditions.com/destinations/antarctica](http://www.expeditions.com/destinations/antarctica)

### Other resources to help you pick a place to visit:

[www.geographia.com](http://www.geographia.com)

<http://kids.nationalgeographic.com>

### Resources to learn about the weather at your vacation spot and SunWise practices:

[www.weather.com](http://www.weather.com)

[www.intellicast.com](http://www.intellicast.com)

[www.weatherbase.com](http://www.weatherbase.com)

[www.epa.gov/sunwise/kids/kids\\_actionsteps.html](http://www.epa.gov/sunwise/kids/kids_actionsteps.html)



## SunWise Virtual Vacation

**When writing your letter to the class, answer the following questions:**

- 1 How did you protect your skin and eyes while on your vacation?
- 2 What did you pack for your trip?
- 3 What did you do on your trip?
- 4 What do people in the country (or state) that you visited do for recreation? Where do they vacation?
- 5 What kind of outdoor activities do they like?
- 6 What is the climate like?
- 7 How do the local people stay cool (or warm)?
- 8 How do people protect their skin and eyes?
- 9 What kind of clothes do people wear?
- 10 What types of houses do people live in?



# SunWise Virtual Vacation

## Estimated Time

45 minutes (students may work in preassigned groups of 3 or 4 students)

## Supplies

Map of the world  
Computers

## Learning Objectives

This activity gives students the opportunity to learn about different cultures, develop Internet research skills, and think about their sun exposure during recreational activities (and associated risks). Assess the students by asking them to compose a letter to their classmates that includes the answers to the questions and tips for sun safety.

## Directions

Divide the students into small groups. Discuss possible “vacation” spots they would like to visit. Have each group pick a location and use the suggested websites to research the answers to the questions. You may want to develop a list of possible sites and make sure there are no duplicate locations. Students will write a letter to their classmates to report on their findings, being sure to include the answers to the 10 questions.

## Questions and Answers

*Answers should reflect students’ research on their location.*

- 1** How did you protect your skin and eyes while on your vacation? *Use sunscreen, wear sunglasses, wear a wide-brimmed hat, etc.*
- 2** What did you pack for your trip?
- 3** What did you do on your trip?
- 4** What do people in the country (or state) that you visited do for recreation? Where do they vacation?
- 5** What kind of outdoor activities do they like?
- 6** What is the climate like?
- 7** How do the local people stay cool/warm?
- 8** How do people protect their skin and eyes?  
*Answers should reflect students’ research on their location and include precautionary actions such as using sunscreen, wearing sunglasses, and limiting time in the midday sun.*
- 9** What kinds of clothes do people wear?
- 10** What types of houses do people live in?

## Physical Education and Social Studies Variation:

After choosing their vacation location, have students try or demonstrate the native sports and activities of that country. This activity can be coordinated with social studies lessons or an all-school cultural event. Try bocce ball, petanque, speedaway, rugby, badminton, croquet, or soccer, or make up your own versions of rugby, lacrosse, and games that will be new to participants and age appropriate. They can even dress in the country’s native clothing or discuss how citizens in these countries protect their skin. This event might also be used as an outreach vehicle to include parents or community members who have experience with activities native to other countries.







## The Sun Shines Around the World

### Directions

Use encyclopedias, magazines and periodicals (National Geographic, for example), books, and the Internet to research your assigned country and answer the questions below. Share your findings with your class.

### Vocabulary Words

*Custom*—A habit or an established way of doing something.

Nomadic people, like the Bedouins of Jordan, wear clothing that covers almost all of their skin. This clothing is traditional, and also helps them stay protected from the sun.

### Questions

- 1 What is the name of the country you researched?
- 2 What continent is the country in?
- 3 What types of houses do the people of this country live in? How do the houses help the people of this country protect themselves from the sun?
- 4 What kinds of clothes do the people of this country wear?
- 5 Describe one custom that people in this country practice to protect themselves from the sun.
- 6 What are three differences between your state or hometown and the country you researched?

In Latin America and Spain, many people take siestas or noontime breaks to stay out of the sun when its rays are most powerful.



# The Sun Shines Around the World

## Estimated Time

20–45 minutes

## Supplies

Map of the world (for display)  
Research materials (encyclopedias, travel or geography magazines, or computers)

## Learning Objective

This activity teaches students about a variety of ways people all over the world protect themselves from the sun's harmful UV rays. Assess comprehension by having students describe ways individuals from the country investigated practice sun safety.

## Directions

Assign each student or pair of students a country to research or have them choose their own. Instruct students to respond to the questions. Have students share their findings with the class.

## Questions and Answers

*Answers should match the country researched.*

## Additional Resources

[www.geographia.com](http://www.geographia.com)

Geographia offers a variety of information on housing, clothing, and customs of countries throughout the world.

<http://kids.nationalgeographic.com>



## Sun Myths from the Internet

### Directions

While exploring the Internet, read a story about the origin of the sun according to Japanese history. Also visit the SunWise website to learn about the Action Steps for Sun Protection.

Visit the website “*Windows to the Universe.*”

Follow the steps to find the story:

- Open the internet browser on your computer.
- Type this address into the Location Toolbar:  
*www.windows.ucar.edu*
- When you are at a home page called “Windows to the Universe,” click on the “*Culture*” tab.
- Now click on “*Myth.*”
- Now click on “*Sun.*”
- At the top of the page you can choose a reading level.
- Finally, click “*Japanese: Amaterasu*” to read the story about the sun from Japanese culture.

Now visit the SunWise website:

- Type this address into the Location Toolbar:  
*www.epa.gov/sunwise/kids/kids\_actionsteps.html*
- Scroll down the page to read about the many ways to stay protected while in the sun.

### Vocabulary Words

*Myth*—An invented story; a belief that is often false about a person, place or thing; a traditional or legendary story, especially one that involves gods or heroes and explains certain occurrences.



# Sun Myths from the Internet

## Estimated Time

30–45 minutes

## Supplies

Computers

## Learning Objective

While becoming familiar with the Internet, the students will learn about how different cultures perceive the origins and history of the sun. The students will also visit the SunWise website to gain further exposure to the World Wide Web while reading about the various steps they will take to be safe in the sun. Assess what they have learned by asking them to write their own story about the origin of the sun, making sure to incorporate the SunWise Action Steps.

## Directions

- Visit the website “*Windows to the Universe*,” [www.windows.ucar.edu](http://www.windows.ucar.edu). Follow the steps on the Student Page to find the story. Suggest a reading level according to their abilities.
- Now visit the SunWise website, [www.epa.gov/sunwise/kids.html](http://www.epa.gov/sunwise/kids.html). Follow the link for the SunWise Action Steps.
- Have students write a story about the origin of the sun.



## SunWise Fashion Show

### Directions

Hold a fashion show with your classmates. Model clothes that are good examples of what to wear to protect against the sun's harmful ultraviolet (UV) rays in all seasons.

Choose spring and summer clothing such as knee-length shorts, wide-brimmed hats, long-sleeved or elbow-length shirts, and sunglasses. Don't forget the colorful zinc oxide. Choose fall and winter clothing such as long-sleeved shirts, long pants, light jackets or coats, hats, and sunglasses.

Decide who will be the fashion show's hosts. The hosts will explain to the audience what each model is wearing and point out the outfit's sun-safe features.

Another group of students will DJ the fashion show. They will play the music for each model's walk down the runway or stage.

### Questions

- 1 Why should you wear protective clothing in the sun?
- 2 Can you get a damaging dose of sun in the fall and winter? Why or why not?

Don't forget that your lips absorb UV rays and are particularly cancer prone. Wear lip balm with SPF 30+ sunscreen when you go outside.



# SunWise Fashion Show

## Estimated Time

Preparation time at teacher's discretion  
1 hour

## Supplies

Summer clothes  
Fall and winter clothes  
Music/Radio  
Runway or stage area  
SunWise items such as sunglasses,  
umbrella, wide-brimmed hats,  
zinc oxide, SPF 30+ sunscreen, etc.

## Learning Objective

The objective of this activity is to familiarize students with some of the clothing that protects against the sun's harmful rays. Assess the students' understanding by asking them what they wear during different seasons. Ask students what they will wear now that they know how to be SunWise.

## Directions

Hold a fashion show. Students will model good examples of clothes to wear in each of the seasons which protect against the sun's harmful UV rays. The fashion show can be held indoors or outdoors, depending on the weather.

Discuss the different clothes that are worn throughout the year and other items to wear. Depending on the class size, have three students model clothes for each season. Spring and summer clothing could be knee-length shorts, wide-brimmed hats, long-sleeved or elbow-length shirts, and sunglasses. Fall and winter clothing can include long-sleeved shirts, long pants, light jackets or coats, hats, and sunglasses. Students can carry a bottle of SPF 30+ sunscreen and zinc oxide (for the nose).

Choose students to be the fashion show hosts. The hosts will explain to the audience what each model is wearing.

Another group of students will DJ the fashion show. They will play the music for each model's walk down the runway or stage.

## Questions and Answers

- 1 Why should you wear protective clothing in the sun? *Suggested answer: to prevent skin cancer, wrinkled skin, sunburn, and eye damage.*
- 2 Can you get a damaging dose of sun in the fall and winter? *Yes. Why? The sun's rays are still strong in the fall and winter, and UV is reflected off snow and ice. UVA is consistently present all year.*



## UV Frisbee® Fun

### Directions

Before having UV Frisbee Fun, predict how much time it will take the UV Frisbee to change color once it is exposed to sunlight.

Cover the UV Frisbee as you carry it outside, and start timing as soon as you expose it to the sun.

### Questions

- 1 How long did the UV Frisbee take to change color once it was exposed to sunlight? How close was your prediction?
- 2 What made the UV Frisbee change color?
- 3 Can UV light do the same thing to your skin?
- 4 What did you learn to do for yourself by covering the UV Frisbee?
- 5 What are two ways that you can protect yourself from the sun's harmful UV rays?







# UV Frisbee® Fun

## Estimated Time

30 minutes

## Supplies

UV Frisbee

Stop watch

Additional non-UV Frisbees (optional)

## Learning Objective

The objective of this activity is to demonstrate the effects of UV radiation while exercising. Assess the students' understanding of the effects of UV radiation by asking them to list some possible outcomes of overexposure to the sun's harmful UV rays.

## Directions

Use the UV Frisbee included in the SunWise Tool Kit to show students the effects of UV radiation. For information about UV radiation and the health effects of sun overexposure, please review the *SunWisdom* section of the Tool Kit. Go over this information with the class prior to the activity.

Before you begin your UV Frisbee Fun, ask the students to predict the amount of time it will take the UV Frisbee to change color once it is exposed to outdoor light. Cover the UV Frisbee as you carry it outside and start timing as soon as you expose it to the sun. Once exposed to the sun, the Frisbee will begin changing color almost immediately.

Ask the students to remember their predictions and compare them to the actual time it took the UV Frisbee to change colors. Discuss the effects of UV radiation and the importance of being protected from the sun's harmful UV rays.

## Questions and Answers

- 1 How long did the UV Frisbee take to change color once it was exposed to sunlight? How close was your prediction? *The UV Frisbee should change color almost immediately. Answers will vary.*
- 2 What made the UV Frisbee change color? *Exposure to the sun's UV rays.*
- 3 Can UV light do the same thing to your skin? *Yes.*
- 4 What did you learn to do for yourself by covering the UV Frisbee? *Protect my skin and eyes from the sun's harmful UV rays.*
- 5 What two ways can you protect yourself from the sun's harmful UV rays? *Answers will vary and may include using sunscreen SPF 30 or higher, wearing long-sleeved shirts, seeking shade, and wearing sunglasses.*

Now, search for a sun-safe spot on your playground and have some UV Frisbee Fun! If your class is large, use additional Frisbees.



## Personal Skin Assessment

Risk Factor	Yes	No
Light or fair skin		
Blue, green, or hazel eye color		
Blonde or red hair		
Freckles when in the sun		
Burn when in the sun		
40 or more moles		
Family or personal history of skin cancer		
Living in the Sunbelt area of the United States where UV rays are very strong (Arizona for example)		
Living in high altitudes		
Two or more blistering sunburns		
Taking medications that increase the skin's photosensitivity (some antibiotics and antihistamines)		

Adapted from Project S.A.F.E.T.Y., *Risk and Risk Factors*, Elementary Safety Lesson Five.



# Personal Skin Assessment

## Estimated Time

30 minutes

## Supplies

Markers or crayons

Magazines (optional)

Glue (optional)

## Learning Objective

After completing this activity, students will understand the need to be careful about exposure to the sun's harmful UV rays. Students who possess several risk factors will develop a heightened sense of their own risk. To assess student comprehension of the risk and prevention message, form groups of three to make fliers, posters, or collages for the classroom or school that depict individuals practicing sun safety.

## Directions

Teachers are cautioned to be sensitive to the privacy concerns of students during this activity. Also be aware that students may answer no to all the questions, thereby allowing for the misconception that they are not at risk for overexposure to UV radiation. Instruct students to evaluate their own risk factors, checking off yes or no in each column. Have students raise their hands in response to each question as you read it aloud. Using the fact sheets (located in the *SunWisdom* section of the Tool Kit) as your guide, discuss the prevention steps with the class. Stress the importance of protection from the sun's harmful UV rays, especially for individuals who have several risk factors. Remind students that everyone is equally at risk for eye damage.

The skin is the largest, most visible organ of the body and is the fastest growing part of the body. It makes up 16 percent of the body's weight.

# Sun Safety Survey

## Directions

Are you SunWise? Are your classmates? Is your family? Find out what you know about being SunWise.

## Sun Safety Survey Questions

Circle an answer for each of the questions below.

### Self

Do you think the sun can hurt your skin?

*yes no*

I think I look healthier with a tan.

*true false*

When I am outside in the sun during the summer, I wear sunscreen.

*true false*

Sun protection factor (SPF) indicates the level of protection a sunscreen provides from UVB. Which SPF number is the minimum I should use?

*4 30 40 I don't know*

I need to use the most sun protection when the UV Index is:

*1 5 11+ I don't know*

### School

How sun-safe are our school grounds?

*not sun-safe*

*somewhat sun-safe*

*sun-safe*

*100 percent sun-safe*

What are the rules for using sunscreen and wearing hats in our school?

### Home

How many people in your home have ever had a sunburn? How many times?

Do people in your home wear sunscreen, sunglasses, or a hat? If so, when?

*After completing your individual sun safety survey, follow along as your class tallies up its responses. When you are finished, answer the questions below.*

## Questions

- 1 What percentage of the class believes the sun can hurt their skin?
- 2 What percentage of the class believes they look healthier with a tan?
- 3 Make a bar graph depicting the percentage of the class that chooses each sunscreen SPF. What was the most popular response? How many more people choose the most popular response over the least popular response?
- 4 What percentage of the class chose a UV Index level of 11+ as requiring the most sun protection?
- 5 How many of your classmates think your school grounds are at least "sun-safe?"
- 6 Read the example SunWise word problem, and then write your own.

My family of five went camping this summer. My brother and my father both got sunburned. Forty percent of my family was not SunWise.

My family of \_\_\_\_\_ went to \_\_\_\_\_ this summer. My \_\_\_\_\_ got sunburned. \_\_\_\_\_ of my family was not SunWise.

# Sun Safety Survey

## Estimated Time

20 minutes

## Supplies

Pencil

Calculator (optional)

Graph paper (optional)

## Learning Objective

The objective of this activity is to help students understand the variety of ways they can protect themselves from the sun's harmful UV rays. After completing this activity, students will understand that using sunscreen, hats, sunglasses, and the UV Index are examples of SunWise behavior. Assess whether the students understand they must protect themselves from the sun's harmful UV rays by asking them whether the activity taught them something new about being sun safe. Finally, ask your students what they will do differently now.

## Directions

In preparation for this activity, create a simple chart on the chalkboard listing the Sun Safety Survey questions (including all possible answers) along the left vertical axis and numbers by five along the top horizontal axis. After the students answer the questions on their individual Sun Safety Survey, compile the data from the entire class. Appoint one student to be the reporter and a different student to be the recorder. The reporter should read each question aloud. The students should respond as a group by a show of hands. The recorder should record the responses, and with the help of the teacher, calculate totals for Sun Safety Survey questions. Now, instruct your class to make some statistical generalizations about their SunWise behavior.

## Questions and Answers

- 1 What percentage of the class believes the sun can hurt their skin? *Answers will vary.*
- 2 What percentage of the class believes they look healthier with a tan? *Answers will vary. Ask if people look healthier with wrinkles. Explain that up to 90 percent of visible changes to the skin commonly thought to be caused by aging are actually caused by sun exposure.*
- 3 Make a bar graph depicting the percentage of the class that chooses each sunscreen SPF. What was the most popular response? How many more people choose the most popular response over the least popular response? *Answers will vary.*
- 4 What percentage of the class chose a UV Index level of 11+ as requiring the most sun protection? *Answers will vary.*
- 5 How many of your classmates think your school grounds are at least "sun-safe?" *Answers should include the total number of students with responses "sun-safe" and "100 percent sun-safe."*
- 6 Read the example SunWise word problem, and then write your own. *Answers will vary.*



## SunWise Word Problems

### Directions

Answer the following word problems about sun-safe products and behavior.

- 1 If you buy a dozen wide-brimmed hats for \$132.00, how much do you pay per hat?
- 2 If you stand on the corner and sell the hats you bought in question #1 for \$15 each to people at risk of being overexposed to the sun's UV rays, how much will you make in profit?
- 3 Sunscreen A comes in a 36 oz. bottle and sells for \$6.24. Sunscreen B comes in a 28 oz. bottle and costs \$6.08. Sunscreen C comes in a 42 oz. bottle and costs \$6.85. Which sunscreen is cheaper per ounce?
- 4 A new SunWise school is being built for grades 1–6. A school board regulation states that each first and second grade classroom can have no more than 20 students. Classrooms for the other grades (3–6) can have no more than 28. If the community where they're building the school has 220 SunWise students in the first and second grade, and 616 in the other four grades, how many rooms should the new building have?



# SunWise Word Problems

## Estimated Time

40–50 minutes

## Learning Objective

This activity will reinforce the prevention message of sun safety. Assess whether students understand the importance of protecting themselves from harmful UV rays by asking them to make a list of all the SunWise products they can think of. Use items from the problems as a starting point.

## Directions

Have the class solve the following word problems. (The variables in the problems below are not scientifically accurate.)

Did you know that more than one million Earths could fit inside the sun?

## Questions and Answers

- 1 If you buy a dozen wide-brimmed hats for \$132.00, how much do you pay per hat? *\$11.00*
- 2 If you stand on the corner and sell the hats you bought in question #1 for \$15 each to people at risk of being overexposed to the sun's UV rays, how much will you make in profit? *\$48.00*
- 3 Sunscreen A comes in a 36 oz. bottle and sells for \$6.24. Sunscreen B comes in a 28 oz. bottle and costs \$6.08. Sunscreen C comes in a 42 oz. bottle and costs \$6.85. Which sunscreen is cheaper per ounce? *Sunscreen C*
- 4 A new SunWise school is being built for grades 1–6. A school board regulation states that each first and second grade classroom can have no more than 20 students. Classrooms for the other grades (3–6) can have no more than 28. If the community where they're building the school has 220 SunWise students in the first and second grade, and 616 in the other four grades, how many rooms should the new building have? *33 classrooms*



## Measure Your Shadow

### Directions

Using the sun as your light, you are going to trace your shadow. But first, on a piece of paper, make a data chart with two columns and three rows. On the top of your data chart label one column “time” and the other “measurement.” On the side of your data chart at the start of each row, write “first shadow,” “second shadow,” and “third shadow.”

Choose a partner and stand in the sun. With a piece of chalk, your partner will trace your shadow starting from your feet. Write your name inside your traced shadow and record the time and the length measurement of your shadow in your chart.

Later in the day, have your partner trace your shadow again. Remember to position your feet in the same spot and face in the same direction as before.

Repeat a third time. Remember to face the same direction as before.

### Questions

- 1 What makes your shadow?
- 2 Do you always have a shadow?
- 3 Have you ever seen your shadow at night? How did that happen? Can you think of other ways you might see your shadow at night?
- 4 Is your shadow always the same size? If your shadow isn't always the same size, give your reasoning for your shadow being a different size.
- 5 Record the number of hours and minutes between your first, second, and third shadow measurement. Make a prediction about what will happen to the length of your shadow over this time period. (You will be checking your answer as you record your measurements!)
- 6 What is the difference between the measurements?
- 7 What is the shadow rule?







# Measure Your Shadow

## Supplies

- Chalk (have a different color for each time the students trace their shadow)
- Paper and pencil
- School yard with dark cement or blacktop
- A clear sunny day
- Watch or clock
- Yardstick/meter stick

## Estimated Time

At least three 15-minute intervals during one day

## Learning Objective

The objective of this activity is to have students understand the movements of the Earth over the course of a day and demonstrate why this movement causes a shadow. Have students collect evidence on how shadows change from morning to evening, and how they can tell by the length of their shadows what times of day they should seek protection from the sun's harmful UV rays. Ask the students to predict how their shadows will change during the day. Once the day is over, ask them to compare their prediction to the actual shape and size of their shadows. Assess what they have learned by asking them to explain the shadow rule.

## Directions

Instruct the students to make a data chart on a piece of paper to record the time they traced the shadows and the size of the shadows. Also, each student should record his/her own height for comparison. The data chart will need two columns and three rows. The top of the data chart should be labeled "time" and "measurement." The side of the data chart should be labeled "first shadow," "second shadow," and "third shadow." If necessary, draw the data chart on the board to show how it should look.

You should take the students outside three times during the day (once around noon). Have students choose a partner. Instruct the students to trace their partner's shadow using a piece of chalk on the cement surface of the schoolyard. They should begin tracing the shadow from the feet. They should write their names inside their shadows. Students should use the yardstick to measure the length of the shadows each time they trace them. Students should record the measurement and time in their charts.

When everyone goes back outside later in the day, have each student stand on the feet of their own shadow and have their partner retrace their new shadow on top of the original. Again, they should record the measurement and time in their data charts.



## Measure Your Shadow

### Discussion

Discuss 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 noticeable shadows throughout the day; however, our shadows are much shorter closer to noon when the sun is overhead. 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 from the sun's damaging UV rays. Also mention that visible light, not UV rays, causes shadows. UV rays are present even on cloudy days. Nevertheless, the shadow rule is a good indication of UV intensity. Tell the students the shadow rule, "Watch your shadow. Short shadow, seek shade!"

### Questions and Answers

- 1 What makes your shadow? *The rays of the sun shining on one side of your body generate a shadow that is projected away from your body.*
- 2 Do you always have a measurable shadow? *Yes. When the sun is overhead at noon, the projection of the shadow is much shorter than it is during the rest of the day.*
- 3 Have you ever seen your shadow at night? How did that happen? Can you think of other ways you might see your shadow at night? *Yes. When there is a full moon, the light can create a shadow, but the moon does not emit UV rays. Other sources of light, such as a street lamp, can create a shadow, but they also do not emit UV rays.*
- 4 Is your shadow always the same size? If your shadow isn't always the same size, give your reasoning for your shadow being a different size. *No. Your shadow is long in the early morning and late afternoon; your shadow is short during midday. This is because of the Earth's movement over the course a day.*
- 5 Record the number of hours and minutes between your first, second, and third shadow measurement. Make a prediction about what will happen to the length of your shadow over this time period. *Students should count the hours and minutes on a watch or clock to find the number. They should predict that the length of their shadow will change throughout the day.*
- 6 What is the difference between your measurements? *Students should subtract to find the answer.*
- 7 What is the shadow rule? *"Short shadow, seek shade!"*

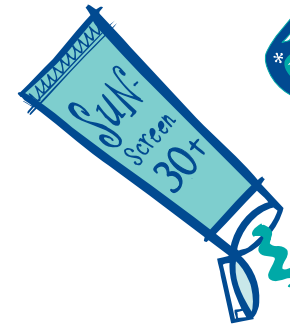
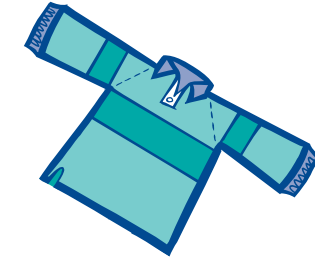




## Speedy Sun Relay Race

### Directions

One student in your group will be the “model.” The model’s job is to dress in sun-safe clothes as fast as possible with the help of the team. Across the field will be a pile of clothes. Each team member, besides the model, will take turns running to the pile, selecting one sun-safe item, and running it back to the model. The first team to have a completely SunWise model is the winner!



Don't forget that your lips absorb UV rays and are particularly cancer prone. Wear lip balm with SPF 30+ sunscreen when you go outside.



# Speedy Sun Relay Race

## Estimated Time

30 minutes

## Supplies

A field or other open space with 20 yards of room  
One set of the following SunWise and non-SunWise clothes and items for each team:

Long-sleeved shirt (preferably with collar)

Long pants (optional)

Hats (wide-brimmed, cowboy)

Sunglasses

Empty bottles of sunscreen, some with

SPFs of 30 and higher, some with lower SPFs

Umbrella (optional)

Various other articles of clothing that are

not sun safe, like tank tops, shorts, baseball caps, visors, etc.

*Note: Make sure that the clothes are large enough for each student to put on and take off easily.*

## Learning Objective

This activity will challenge students to think quickly about sun-safe behavior by selecting correct sun-safe clothes in a competitive environment. Students will learn that wearing SunWise clothes is another way to be safe in the sun, and they'll get some exercise, too! As an assessment, have the class examine the non-winning teams' clothes after the race and suggest corrections.

## Directions

Organize the class into teams of five or more and line them up at the start of the racecourse. Place the piles of clothes at the other end of the racecourse.

Have each team select one student to be the SunWise model. This student will stay at the start point of the race, donning sun-safe clothes. The other team members should each take turns running to the pile of clothes, selecting one item, and running it back to the model to wear.

The first team to have a completely and appropriately dressed SunWise model, and that is able to explain why the model is SunWise, is the winner. The SunWise models should be wearing a protective hat, long-sleeved shirt, long pants (optional), and sunglasses, and be carrying a bottle of sunscreen of SPF 30 or higher.



# Sun Science

## Directions

The sun's light has an effect on everything. Try these experiments to see what the sun's effect will be over a week's time.

- Put a sheet of newspaper by the window in the direct sunlight. Put another piece in the shade.
- Place a whole piece of fruit, such as an apple, in the sun, and another in the shade.
- Put some solid objects with interesting shapes on a piece of construction paper. You can try spelling your name with plastic letters. Leave the paper in the sun for a week, then remove the objects.



## Questions

- 1 How does the sun affect the newspaper over the course of a week?
- 2 How does the sunlight affect the fruit's decomposition?
- 3 What do you see on the construction paper after a week?





# Sun Science

## Estimated Time

Ten minutes to set up the experiments, one week for them to run, and 30 minutes for discussion.

## Supplies

Newspaper

Construction paper

Paper or plastic letters or other uniquely shaped objects

Apple or other thick-skinned fruit

## Learning Objective

This activity will make a mental and visual connection for students between the damaging effects that the sun has on the experimental objects, and what the sun's harmful UV rays can do to their own skin cells. The students will also have visual evidence of how being protected will guard against or prevent sun damage. Assess the students' comprehension by asking them to predict the effects of the sun on their skin, eyes, and other objects over a period of time. Students should show understanding of the differences of the sun's effects on organic versus inorganic matter.

## Directions

Have the students place a sheet of newspaper in a sunny spot and another in the shade. Leave the paper for a week. Place an apple or other whole

piece of fruit in the sun as well. Have the students place some uniquely shaped solid objects on pieces of construction paper in the sun. They can use plastic letters to spell out their names. Leave the objects out for a week. After a week, view and discuss the results of these experiments with the class. Once the students have had the opportunity to view the sun's effect on various items, ask them to imagine how the sun affects their skin when they are exposed to its harmful rays without protection. Remind them that the fruit is made of cells just like they are.

## Questions and Answers

- 1 How does the sun affect the newspaper over the course of a week? *The newspaper left in the sun is faded /yellowed. Assess whether students make the connection between the fading of the paper, and the sun's possible effects on their own skin.*
- 2 How does the light affect the fruit's decomposition? *The fruit in the sun decomposed faster than the fruit left in the shade. Assess whether the students comprehend that the sun's harmful UV rays can have some of the same unhealthy effects on their own skin cells.*
- 3 What do you see on the construction paper after a week? *The objects protected the portion of the paper they covered from fading. Discuss how clothing helps protect their skin from the sun.*

# The Ozone and Me

## Directions

Label the following on the illustration of the Earth and its atmosphere:

Earth

Sun

Earth's four major systems:

- 1 Geosphere—the solid portions of Earth
- 2 Hydrosphere—the liquid water components of Earth

3 Atmosphere—the gases surrounding Earth

4 Biosphere—the zone of life on Earth

Two parts of the atmosphere:

- 1 Stratosphere
- 2 Troposphere

Ozone layer

Sources of ozone depleting substances (ODS)

Many popular household products like air conditioners used to use chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs). Both of these chemicals damage the Earth's protective ozone layer. Cars, trucks, power plants, and factories all emit air pollution that forms ground-level ozone or smog.







### Questions

- 1 What is the stratospheric ozone layer and what does it do?
- 2 What causes the hole in the stratospheric ozone layer (ozone layer depletion)?
- 3 What human-made objects use CFCs and HCFCs?
- 4 Why are we concerned about ozone layer depletion?
- 5 What is being done to reduce the effects of stratospheric ozone layer depletion?
- 6 What is “bad” ozone? What causes it?
- 7 What happens when we are exposed to UV rays?
- 8 Create an illustrated tri-fold brochure explaining either 1) what you learned about the importance of the ozone layer; or 2) the possible causes of ozone depletion.

This activity is adapted from *Sun Smart*, published by the Anti-Cancer Council of Victoria.



# The Ozone and Me

## Estimated Time

30 minutes

## Learning Objective

The objective of this activity is to teach students basic information about the ozone layer, the possible causes of its depletion, and how it is connected with their personal health and well-being. Students should understand that the Earth has four major systems that interact in multiple ways to affect the Earth's surface, materials, and processes. This interaction also affects humans and their existence on Earth. Assess whether the students understand the connection between the depletion of the ozone layer and the need to protect themselves from the harmful rays of the sun. Ask them if their behavior will change once they've completed the lesson and how.

## Directions

Instruct the students to label the following in the illustration of the Earth and its atmosphere:

Earth

Sun

Earth's four major systems:

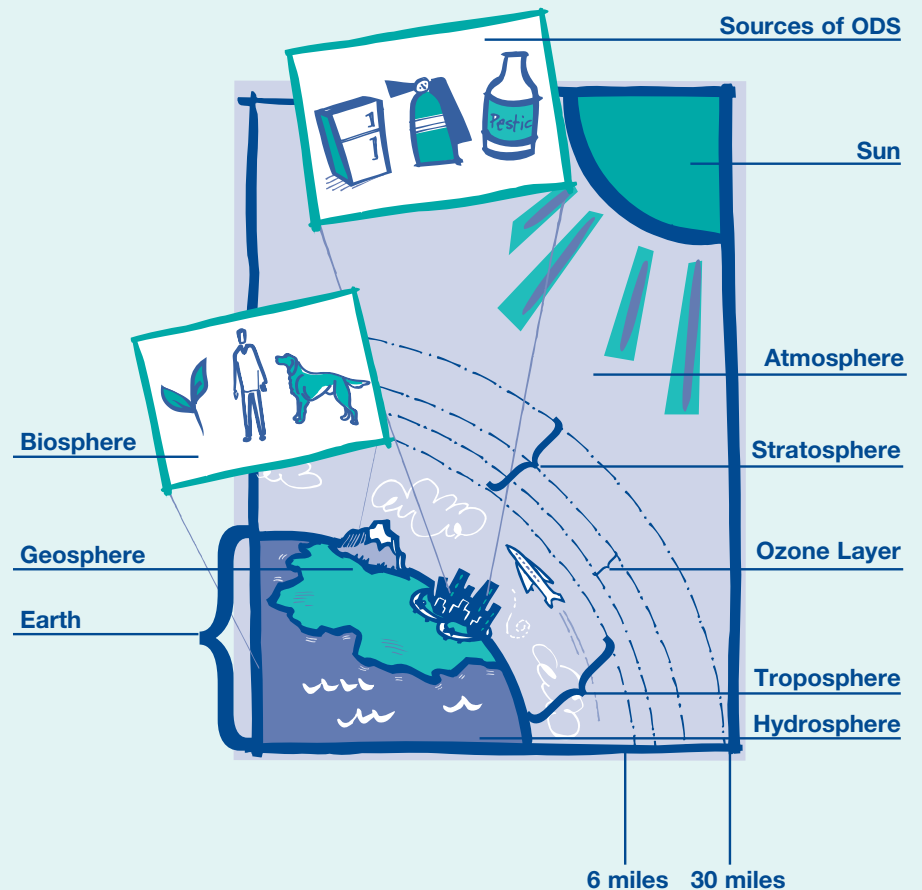
- 1 Geosphere—the solid portions of Earth
- 2 Hydrosphere—the liquid water components of Earth
- 3 Atmosphere—the gases surrounding Earth
- 4 Biosphere—the zone of life on Earth

Two parts of the atmosphere:

- 1 Stratosphere
- 2 Troposphere

Ozone layer

Sources of ozone depleting substances (ODS)





## Discussion

Discuss each of the Earth's systems and how they interact. Then move to a more specific discussion of the atmosphere and explain the presence of ozone in the atmosphere and discuss why ozone is good up high and bad nearby, its effects, and what measures are being taken because of ozone layer depletion.

For more information on ozone, see the *SunWisdom* section of the Tool Kit.

## Questions and Answers

- 1 What is the stratospheric ozone layer and what does it do? *A thin layer of naturally occurring gas in the stratosphere that protects life on Earth from the sun's harmful UV rays.*
- 2 What causes damage to the stratospheric ozone layer (ozone layer depletion)? *The use of chlorofluorocarbons (CFCs) and other chemical substances.*
- 3 What human-made objects use CFCs and HCFCs? *Air conditioners, refrigerators, fire extinguishers, aerosols, foams, and solvents.*
- 4 Why are we concerned about ozone layer depletion? *Ozone protects us from harmful UV rays. Without ozone, these rays can easily pass through the atmosphere and reach the Earth's surface. For each 1 percent drop in ozone levels (i.e., 1 percent increase in ozone layer depletion), scientists estimate about 1 percent more UVB will reach the Earth's surface.*
- 5 What is being done to reduce the effects of stratospheric ozone layer depletion? *Countries around the world have signed a treaty—The Montreal Protocol—promising to reduce and then eliminate use of ozone-depleting substances.*
- 6 What is “bad” ozone? What causes it? *Bad ozone is found in the troposphere and contributes to smog. High levels can make it difficult to breathe and cause eye irritation and headaches. Emissions from cars, some factories, gasoline vapors, and chemical solvents, in the presence of strong sunlight and hot weather, form bad ozone.*
- 7 What happens when we are exposed to UV rays? *Exposure to UV rays can cause sunburn, skin cancer, eye damage, immune system suppression, and premature aging of the skin.*
- 8 As a culminating activity, have students create an illustrated tri-fold brochure explaining either 1) what they learned about the importance of the ozone layer; or 2) the possible causes of ozone depletion. *Students should use what they have learned to create an illustrated brochure based on their understanding.*

For additional information, visit:  
[www.ucar.edu/learn/1.htm](http://www.ucar.edu/learn/1.htm)



# UV Frisbee® Science

## Directions

Observe the UV Frisbee as your teacher applies a variety of materials to the plastic covering it. Record your observations on the data chart below. Write down the color of the UV Frisbee after each material is applied to it. Use the data you have collected to answer the questions.

	Frisbee Color (before exposure)	Frisbee Color (after exposure)
material #1		
material #2		
material #3		



## Questions

- 1 Did the UV Frisbee change color when exposed to normal room light? Why or why not?
- 2 What happened to the color of the UV Frisbee in the sunlight? After five minutes?
- 3 What effects did the different sunscreens have on the UV Frisbee?
- 4 What did you note about the part of the UV Frisbee that was covered with cotton cloth?

This activity is adapted from the Project LEARN module *Ozone In Our Atmosphere*.



## UV Frisbee® Science

### Estimated Time

30–40 minutes

### Supplies

UV Frisbee

Sunscreen (a variety of protection levels including baby oil, SPF 30, and SPF 50)

2" x 2" swatches of cloth (a variety of materials including cotton, UV blocking fabric, and “tan-through” fabric)

Plastic wrap or hotel shower cap

Stop watch

Newspaper

Masking tape and marker

### Learning Objective

The objective of this activity is to demonstrate the effects of UV radiation and the effectiveness of different ways to block UV radiation. After completing this activity, students should be able to describe at least three ways they can protect themselves against harmful UV radiation. After the lesson, ask students whether their behavior will change and how. (See the *SunWisdom* section of the Tool Kit for a list of sun safety tips.)

### Directions

Use the UV Frisbee included in the SunWise Tool Kit to show students the effects of UV radiation and the effects of different materials on blocking out UV radiation. For more information about UV radiation, please review the *SunWisdom* section of the Tool Kit.

Students should watch you perform the experiment and record their observations on the data chart provided to them on the Student Page of this activity.

- Cover the UV Frisbee with a piece of clear plastic or hotel shower cap. Apply small circles of baby oil and sunscreen (each SPF level) to the plastic covering on the UV Frisbee. Use the masking tape and marker to identify each SPF level. Cover the UV Frisbee with the newspaper and take it outside. Uncover the UV Frisbee and begin timing. The unprotected area of the UV Frisbee will change color. The circle with SPF 0 baby oil will change color, but the circle with SPF 30 and above will not change color. Return to your classroom and remove the plastic with the sunscreen.
- Tape the different swatches of fabric to the UV Frisbee. Use the masking tape and marker to identify each fabric. Cover the UV Frisbee with the newspaper and take it outside. Uncover the UV Frisbee and begin timing. The unprotected area of the UV Frisbee will change color from



clear to purple. The area underneath the UV blocking fabric should not change color. Other fabrics will filter out a portion of UV depending on the thickness and tightness of the weave of the fabric. Return to your classroom and remove the fabric swatches.

- Supplemental activity: Perform a similar activity using sunglasses on the UV Frisbee.

### Questions and Answers

- 1** Did the UV Frisbee change color when exposed to normal room light? Why or why not? *The UV Frisbee will not usually change color because there is very little UV radiation in indoor lighting.*
- 2** What happened to the color of the Frisbee in the sunlight? After five minutes? *The Frisbee changed from clear to purple.*
- 3** What effects did the different sunscreens have on the UV Frisbee? *Generally, results do not differ much for sunscreens with SPF 30 or higher. SPF 30 sunscreen blocks approximately 97% of the sun's UVB rays while SPF 50 blocks approximately 98%. If the sunscreen is broad-spectrum, then the UVA protection is proportional to the UVB protection. So, when coupled with the broad-spectrum claim, a higher SPF value shows higher protection against UVA.*

- 4** What did you note about the part of the UV Frisbee that was covered with cotton cloth? *Answers will vary depending on the thickness and tightness of the weave of the cloth.*

**Insects can see UV rays, but humans can't.  
Flowers carry lovely UV-reflective patterns  
on their petals to attract insects.**





## Map a SunWise Town

### Directions

You are a civil engineer, and your job is to design a new SunWise town.

Your SunWise town will need to have everything other towns need, such as a fire station, shopping mall, post office, gas station, school, and parks.

Draw a map of a town. You'll want to provide plenty of shade for the town's residents to help them avoid overexposure to the sun's harmful UV rays. Pay attention to areas like the town square and public swimming pool. How can challenging areas like these be made sun safe? Don't forget the trees! Remember to consider where the sun will be in the sky at various times of the day and mark your map with north, south, east, and west.

Also, mark all the locations where your town's residents can help themselves be SunWise. This includes stores where they can buy sunscreen, hats, sunglasses, and other sun safety necessities. Create a legend for your map.

### Vocabulary Words

*Civil Engineer*—An engineer trained in the design and construction of public works.

*Legend*—The part of a map that explains the symbols used on the map.

### Questions

- 1 Where are the most SunWise areas in your town?
- 2 What are the best places to be a SunWise shopper?





## Map a SunWise Town

### Estimated Time

40–50 minutes

### Supplies

Colored pens and pencils

Ruler

Paper or poster board

### Learning Objective

This activity allows students to evaluate sun protection on a larger scale. It will help students visualize the connection between their environment and sun-safe behavior. Students will need to understand the movement of the sun across the sky over the course of the day and consider that movement when they create their town.

Ask students to think about where they spend time outdoors and if those places are SunWise. Assess student comprehension by having the class write a paragraph comparing areas in their neighborhoods to

the same areas in the towns they've mapped. How are they different? How could their towns be made more sun safe?

### Directions

Tell the class that they are civil engineers whose job is to design new SunWise towns. Their towns will need to have everything other towns need—a fire station, shopping mall, post office, gas station, school, and parks, for example.

The students will draw a map of their town. They should provide shade to help residents avoid overexposure to the sun's harmful UV rays. They will mark all the locations where residents can help themselves be SunWise. The students will then create legends for their maps.

### Questions and Answers

- 1 Where are the most SunWise areas in your town?  
*Answers will vary.*
- 2 What are the best places to be a SunWise shopper? *Answers will vary.*

### Physical Education Variation:

Have students walk around and map their school to determine areas where additional shade would be beneficial in terms of trees and shade structures (requires paper, pen, and surface to write on). This activity can also be coordinated with other content areas (e.g., science and social studies for environmental impact and improvements

to the community). It can also be structured as a student service learning project where students could coordinate a fundraising activity to purchase trees and/or erect a shade structure. Groups can also split up, with each member responsible for identifying at least two areas that would benefit from shade.



## Be a SunWise Traveler

### Directions

You are planning a trip. Use maps, a world globe, and websites to research your assignment and answer the questions below. Share your findings with your class.

### Vocabulary Word

*Mean* — The average value of a set of numbers. A mathematical value that is intermediate between other values.

### Activities and Questions

- 1 Using a world map or globe, identify where you live.
- 2 Using the world map or globe, identify where you would like to visit. Why would you like to visit this location? What time of year would you like your visit to occur?
- 3 Using the UV Index maps located on the EPA SunWise website, [www.epa.gov/uvindex](http://www.epa.gov/uvindex), identify what the UV Index mean (average) is where you live at this time of the year.
- 4 Using the UV Index maps located on the World Health Organization website, [www.who.int/uv/resources/link/indexlinks/en/](http://www.who.int/uv/resources/link/indexlinks/en/), identify what the UV Index mean (average) is where you would like to visit and at the time of year your visit would occur.
- 5 What do you notice about your local UV Index in comparison to the UV Index at the location and time you want to visit?
- 6 Are there similarities and differences? Why?
- 7 What SunWise action steps should you take when visiting your destination?





## Be a SunWise Traveler

### Estimated Time

45–60 minutes (students may work individually or in small groups)

### Supplies

Maps of the United States and the world  
Computers  
Action Steps for Sun Protection  
(see *SunWisdom* section)

### Learning Objective

This activity gives students the opportunity to learn about how people all over the world need to protect themselves from the sun's harmful UV rays. It will help students make connections and comparisons between their local environment and sun-safe behaviors they practice when visiting other parts of the world.

### Background/Talking Points

People often travel to, or vacation in, locations with extreme UV intensity, especially in comparison to the UV intensity at that time of year in the traveler's city or town. Additionally, travelers may not realize how intense the sun is at that time of year and may not adequately prepare for the UV radiation that they are exposed to, resulting

in severe sunburns. Studies have shown that as much as 88 percent of sunburns in children occur during sunny vacations. A serious potential problem surfaces when you combine this information with the fact that sunburn is a risk factor for skin cancer. By raising awareness of the dangers specifically associated with travel/vacations to UV intense destinations, our goal is for children and their caregivers to receive no sunburns during travel/vacations.

In addition:

- UV rays are reflected by snow, sand, water, and pavement. Fresh snow may reflect up to 80 percent of the incident UV radiation. This is important at higher altitudes and latitudes. Sand and water also reflect up to 25 percent and 5 percent of UV radiation, respectively, and can increase UV exposure at the beach.
- The closer you get to the equator, the more intense the UV rays. This occurs because the sun is more directly overhead, causing a shorter distance for the sun's rays to travel through the atmosphere, and there is naturally less ozone in the stratosphere in the tropics.
- The higher in altitude you go, the more intense the UV rays become because there is less atmosphere for the UV to travel through.



### Directions

Engage students by asking them if they have a place in mind that they would like to travel to someday. Or ask them if they have a friend or relative that lives far away from them (be cognizant of students that may have family in the military) that they might like to visit. Have students identify the place they would like to visit along with the time of year they would like to do this traveling. Students will identify the UV Index mean (average), both where they live and at the place they would like to visit, then make a connection or comparison of the two locations. They will then identify SunWise action steps they should take when visiting their choice of destinations. Instruct students to respond to the activities and questions individually or in pairs. Then, have them share their findings with the class.

### Student Activities and Questions

*Answers should reflect students' research on their location.*

- 1 Using a world map or globe, identify where you live.
- 2 Using the world map or globe, identify where you would like to visit. Why would you like to visit this location? What time of year would you like your visit to occur?
- 3 Using the UV Index maps located on the EPA SunWise website, [www.epa.gov/uvindex](http://www.epa.gov/uvindex), identify what the UV Index mean (average) is where you live at this time of the year.
- 4 Using the UV Index maps located on the World Health Organization website, [www.who.int/uv/resources/link/indexlinks/en/](http://www.who.int/uv/resources/link/indexlinks/en/), identify what the UV Index mean (average) is where you would like to visit and at the time of year your visit would occur.
- 5 What do you notice about your local UV Index in comparison to the UV Index at the location and time you want to visit?
- 6 Are there similarities and differences? Why?
- 7 What SunWise action steps should you take when visiting your destination?

### Resources to Learn More About Your Destination and SunWise Practices

[www.weather.com/activities/health/skin](http://www.weather.com/activities/health/skin)

[www.intellicast.com](http://www.intellicast.com)

[www.weatherbase.com](http://www.weatherbase.com)

[www.epa.gov/sunwise/kids/kids\\_actionsteps.html](http://www.epa.gov/sunwise/kids/kids_actionsteps.html)

For full page maps, please see the UV Index maps located at [www.epa.gov/uvindex](http://www.epa.gov/uvindex) and [www.who.int/uv/resources/link/indexlinks/en/](http://www.who.int/uv/resources/link/indexlinks/en/).



# A SunWise Legend

## Wise Heart Saves the Day<sup>1</sup>

Once upon a time, a very long time ago, there lived a young Indian boy who was both smart and kind and who longed to make the world a better place for his people. His name was Wise Heart, and he belonged to the Cahto Indian Tribe that lived in what is now northern California. The world in which Wise Heart lived was cold and barren, with few plants or trees. During the day, his world was gloomy and grim, lit by only a faint, dim light that seemed to come from very far away. At night, his world was always cloaked in deep darkness, a darkness that was broken only by the campfire and the torches that the elders alone were allowed to carry.

Wise Heart knew that the world had not always been such a dark and gloomy place. Sometimes as his tribe huddled around the campfire at night, the elders told stories—ancient stories—of a time when a bright light they called the Sun had warmed the world during the day, while its distant relatives, the Moon and Stars, had filled the night. Wise Heart had also seen the ancient tribal cave paintings that showed a world filled with the bright light of the Sun and with towering trees and plants. Whenever Wise Heart or the other children asked the elders how the world had lost its Sun, Moon, and Stars, the elders would become quiet and warn the children not to ask such questions.

One night, while Wise Heart slept, he dreamed of the beautiful, Sun-filled world that he had seen in the cave paintings. There were blue skies, trees laden with delicious fruit, and smaller plants with fragrant flowers. Then, in his dream, he heard the sound of a fiercely shrieking wind, and the Sun suddenly seemed to be torn from the sky, leaving only a dim glow in its wake. Wise Heart woke from his dream troubled and unable to fall back asleep.

When the dim light of day returned, Wise Heart cautiously approached the oldest and most respected of the elders, a stooped old man named Running Water. The boy recounted his dream and asked the old man if he knew what had happened to the Sun so many years before. At first Running Water scolded the boy and warned him not to wonder about such things. Finally, however, seeing the boy's determination to know the truth, Running Water relented. He told the boy that many years before, an Evil Spirit had become jealous of the brilliance and warmth of the Sun and had stolen it from the sky and hidden it in a deep canyon on the far side of the world. The Evil Spirit had also stolen the Moon and Stars and hidden them away as well so that the humans would not have enough light to be able to search for and free the Sun from its captor. From that day on, Running Water explained, the world had been dimly lit. Bound with thick ropes to a giant boulder, the Sun could make only a few of its rays reach above the edge of the deep canyon.

All that day Wise Heart thought about Running Water's words. He watched his people as they struggled to survive by eating the few fish in the stream and few small plants on the hillsides. By the time darkness fell, Wise Heart had made a decision. He would journey across the mountains, to the far side of the world. He would find the deep canyon where the Sun, Moon, and Stars were being held by the Evil Spirit, and somehow, he would free them. That, he decided, was how he would help make the world better for his people.

Early the next evening, Wise Heart secretly set out for the distant mountains, carrying only a skin of water, some dried fish, and a sharp knife. As he traveled, he asked the kind spirits of his people to help him, and they did. Guided by a fierce and powerful eagle and thousands of fireflies, Wise Heart found his way through the steep, dark mountain range. A sure-footed

mountain goat led him to the edge of the deep canyon in which the Evil Spirit was guarding the Sun, Moon, and Stars. Just at that moment, a traveling family of field mice offered to chew through the ropes that bound the Sun, Moon, and Stars while Wise Heart distracted the Evil Spirit. Accepting their offer of help, Wise Heart climbed cautiously over the rim of the canyon and slowly began to climb down the steep cliff toward the canyon floor below. Just as he reached the bottom, the silence was suddenly pierced by the same sound of shrieking wind that he had heard in his dream. The Evil Spirit, red-faced and shaking with rage, stepped between Wise Heart and the Sun, Moon, and Stars and demanded to know why the boy had intruded in his canyon. Before Wise Heart could answer, the Evil Spirit noticed the boy's water skin and demanded that he be given some water to quench his thirst and to cool his sun-scorched body. In reply, Wise Heart said, "Powerful spirit, I am happy to give you all my water, but first let me add some special herbs that will quench your thirst and cool your sun-scorched body better than plain water." The Evil Spirit agreed, and after Wise Heart had added the herbs, which were really sleeping herbs, he drank the water greedily. Soon after, the Evil Spirit fell asleep.

Immediately, as if on cue, the family of mice began gnawing through the thick ropes that held the Sun, Moon, and Stars captive. When they had almost completed their task, the Evil Spirit, feeling the heat of the Sun's rays as it slowly began to ascend into the sky, awoke from his slumber. With a piercing shriek, the Evil Spirit rushed to recapture the Sun. Just before he could do so Wise Heart cut through the remaining fragments of rope with his knife. With the ends of the rope held

tightly in his hands, Wise Heart and the mice sailed into the sky. A short time later, as the Sun passed over Wise Heart's village, they all jumped safely into the soft boughs of the tallest fir trees. From there, Wise Heart looked up to see the first and most beautiful sunrise that he would ever see.

Wise Heart returned to his tribe as a hero. The people hailed him as the Sun Guard and thanked him for returning light and warmth to the day and light to the night. Almost immediately, the trees and plants began to grow larger, and the people danced and celebrated in the warmth and brightness of the Sun. After several hours, however, the people began to complain. They said, "It's too hot! I'm thirsty!" Others complained of feeling tired and of their skin feeling red and sore. Wise Heart was amazed that his gift that had at first caused so much joy was now causing so much pain and discomfort. He thought for a moment and then quickly led his tribe to the river's edge. There he told his people to drink deeply and to coat their skin with mud from the riverbank. He told them, "The mud will soothe your skin and protect it from the powerful rays of the Sun," and they found that he was right. Now Wise Heart was truly a hero. His tribe could now enjoy the Sun and all the beauty it gave to the world, without being hurt by its powerful rays. Even today, Wise Heart is a hero, for though he did not know it, he had developed the first sunscreen with an SPF of 45!

The legend is available with illustrations at the Children's Melanoma Prevention Foundation website, [www.melanomaprevention.org](http://www.melanomaprevention.org).

<sup>1</sup> This story has been adapted from traditional tales by Jane Shanny and Mary Ellen Maguire-Eisen of the Children's Melanoma Prevention Foundation.



# A SunWise Legend

## Estimated Time

1 hour

## Supplies

Large paper

Markers and/or crayons

Book-making supplies/Paper for drawing

## Learning Objective

The students will learn that people from all over the world have different stories about the sun. Before the story is read, ask the students what they know about the power of the sun, both good and bad. Write their ideas on the board/paper. After reading the story assess what they have learned by asking them to write a story about the sun and why it is important to people around the world.

## Directions

Read to your class “Wise Heart Saves the Day,” a legend about the origin of the sun inspired by the Native American Cahto Tribe of California (on the Student Page of this activity). Discuss with them the location of California in relation to where you are located. While doing this, explain to them that people from all over the world have different ideas and beliefs about the sun. Discuss what they remember from the story. Ask them why the sun is so important that people from all over the world tell stories about it (e.g., it makes plants grow, provides light).

After discussing the legend and the sun with your students, ask them to write their own legend about the sun. Have them illustrate their short stories to make books. Once students have finished their books, have some share their legends with the class. To help your students get started, ask them to consider the following questions:

- 1 During what period of time does your sun myth take place?
- 2 Where does your sun myth take place?
- 3 In your sun myth, who is the main character(s)?
- 4 What powers does your main character(s) have?
- 5 What effect or change has your character(s) made?







## Keep an Eye on Sun Safety

### Directions

UV radiation can cause damage to the eyes of both animals and humans. One example of eye damage is a cataract. A cataract is the clouding of the eye's lens, which makes it difficult to see. Sea lions and seals that live in a zoo may develop cataracts because of not enough shade in their enclosure or because of looking up at the sun during feeding and training with the zookeeper. In addition, the reflection from the water causes extra UV exposure for both the animals and the visitors at the zoo.

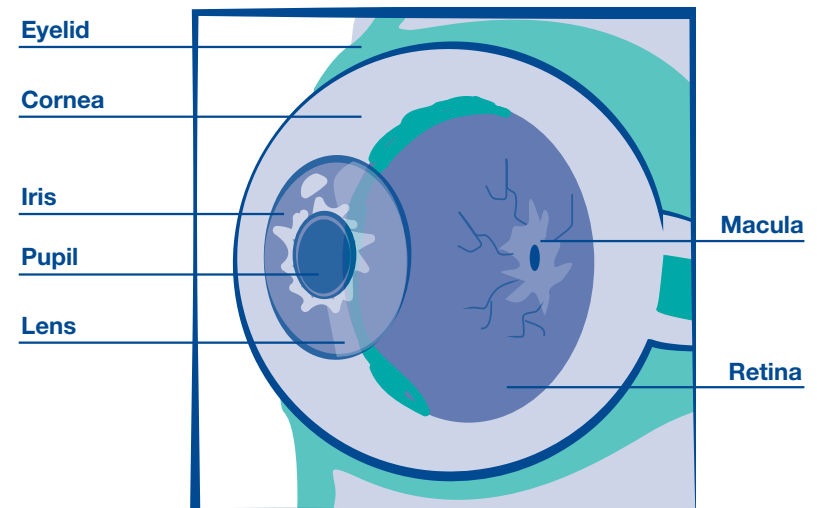
Design an outdoor zoo exhibit for seals and sea lions that helps protect their eyes and the zoo visitors' eyes from too much sun exposure. How should visitors dress for a sun-safe day at the zoo?

Many animals have natural adaptations that protect them from the sun. Find examples of these animal adaptations by visiting the SunWise website [www.epa.gov/sunwise](http://www.epa.gov/sunwise) or the website of your local zoo. In your exhibit design, include signs that point visitors in the direction of these animals.

### Vocabulary Words

*Cataract*—A clouding of the eye's lens that can blur vision

*Lens*—A transparent structure in the eye that helps focus light





# Keep an Eye on Sun Safety

## Estimated Time

30–45 minutes

## Supplies

Paper

Pens or Pencils

## Learning Objective

The aim of this activity is for students to learn the importance of protecting their eyes from overexposure to the sun's harmful UV rays. By understanding animal adaptations for sun protection and designing a sun-safe enclosure for zoo animals, students will draw connections to the ways they can protect themselves from overexposure to the sun. Assess if they have learned how to protect their eyes from UV radiation by facilitating a classroom evaluation of each group's exhibit design.

## Directions

Assign groups to collaborate on the design of a sun-safe outdoor exhibit for seals and sea lions. Before the students begin, have a brief discussion on the damaging effects that UV radiation has on the eyes of both animals and humans (for additional background information on cataracts and UV-induced eye damage, refer to the "Prevent Eye Damage" fact sheet on the SunWise website). Use the following questions to guide a discussion:

- 1 Does the exhibit design provide enough shade for the animals?
- 2 Do the visitors have a shaded area where they can watch the animals?
- 3 How should visitors dress for a sun-safe day at the zoo?
- 4 Where can zoo visitors find other sun-safe animals?

Describe to the students how seals and sea lions in zoos can be prone to cataracts due to the following: 1) lack of shade in the enclosure; 2) reflection of UV rays from the water and from the light surfaces of the tank/enclosure; 3) looking up toward the sun during feeding and training with the zookeepers; and 4) living longer in captivity than in the wild (in addition to overexposure to UV radiation, cataracts can also develop from old age).

Ask students to brainstorm animals that have natural adaptations to protect themselves from the sun. The students may research animal adaptations on the SunWise website or on your local zoo's website, or you can guide them to examples of adaptations using the "Search for SunWise Animals" resource on the SunWise website. Explain to the students that humans can "adapt" too with simple sun safety habits. For eye protection, these habits include the following: avoiding overexposure to the sun; wearing a wide-brimmed hat and sunglasses with 99-100% UVA/UVB protection; seeking shade when the sun's UV rays are most intense between 10 a.m. and 4 p.m.; checking the UV Index; and using extra caution around reflective surfaces such as water, snow, and sand.



When the students have finished their exhibits, lead them in a discussion to evaluate each design. Relate the issue of eye protection to the students' environments. Ask the students where they might get the most UV exposure in their daily lives. Remind the students that sun safety is important for all outdoor activities, including recess at school, swimming, boating, biking, soccer, baseball, etc. Ask the students to think of ways they can better protect their eyes from too much sun exposure.

### Additional Resources

Search for SunWise Animals, available on the SunWise website

*([www.epa.gov/sunwise/doc/animals\\_zoo.pdf](http://www.epa.gov/sunwise/doc/animals_zoo.pdf))*

SunWise Animal Quiz, available on the SunWise website

*([www.epa.gov/sunwise/doc/Animal\\_WhoAmI.pdf](http://www.epa.gov/sunwise/doc/Animal_WhoAmI.pdf))*

Prevent Eye Damage, available on the SunWise website

*([www.epa.gov/sunwise/doc/eyedamage.pdf](http://www.epa.gov/sunwise/doc/eyedamage.pdf))*

### Activity Enrichment

- Connect this activity with the UV-sensitive Frisbee activity. Have the students bring their sunglasses to class and test their effectiveness using the Frisbee. Place the sunglasses on the inner surface of the Frisbee and then carry it outside. Once the Frisbee has changed color, carry it back indoors and remove the sunglasses. If there is a white area in the shape of the sunglasses, then the sunglasses are effective at blocking UV radiation.
- Have students brainstorm activities and occupations that may lead to a person's eyes being exposed to excessive UV radiation. Answers may include sports (baseball, skiing, swimming, surfing, etc.) and outdoor jobs (fishing, construction, landscaping, farming, etc.). Ask the students how they could protect their eyes during each activity.
- In addition to overexposure to UV radiation, risk of cataracts also increases with age. Ask the students if they know of anyone who has cataracts or other eye damage. Offer the students the opportunity to interview that person and report back to the class. Remind the students to ask their interviewee about previous sun exposure and sun protection habits.
- Have the students experience what it is like to have cataracts by taking an old pair of glasses and applying a light coat of non-toxic snow spray. Students can take turns wearing the glasses.
- Connect this activity with a visit to your local zoo or aquarium. Plan a sun-safe animal tour using the "Wild for Sun Protection" resource on the SunWise website.





## Sunny Crossword

### Supplemental

#### Directions

Answer the questions and fill in the crossword puzzle with the answers.

#### Across

- 1 The right type of these will block almost 100 percent of the UV radiation that can cause damage to your eyes.
- 4 Small, brownish spots on the skin that can increase in number with exposure to sunlight.
- 6 EPA school program that promotes sun safety.
- 8 A \_\_\_\_-brimmed hat will protect your face, neck, and ears.
- 9 The most serious form of skin cancer.
- 10 \_\_\_\_\_ are most at risk for overexposure to UV radiation because their young skin is thinner and more easily damaged.
- 12 UV is an acronym for \_\_\_\_\_.
- 13 If your \_\_\_\_\_ is shorter than you are when you're outside, it's time to seek shade.
- 15 Everyone is affected by UV radiation. Skin color doesn't exclude anyone from its effects, but if you have \_\_\_\_ skin you are at higher risk for skin cancer.

**Sunny Crossword** continued**Down**

- 1** Use this with at least SPF 30, and apply properly to protect against skin damage.
- 2** The time the sun is at its highest, which means its rays have less distance to travel through the atmosphere and the intensity is greatest.
- 3** Initials for sun protection factor.
- 5** Abbreviation for chlorofluorocarbon, one of the chemicals that destroys the fragile ozone layer.
- 7** The sun's rays are stronger at high altitudes and closer to the \_\_\_\_\_.
- 8** Overexposure to the sun can cause skin cancer, eye damage, and \_\_\_\_\_.
- 10** Eye damage that occurs when there is a loss of transparency in the lens, which clouds your vision.
- 11** It is UV \_\_\_\_\_, not the warmth or the brightness of the sun, that causes damage to our skin.
- 12** This type of radiation is not absorbed by the ozone layer and can cause a lot of damage to our bodies.
- 13** You can find protection from the sun's UV rays under the \_\_\_\_\_ of trees and umbrellas.
- 14** A gas found in two layers of the atmosphere with the same chemical structure; it is bad at ground level and good high above the Earth.







# Sunny Crossword

## Supplemental

### Estimated Time

10–15 minutes

### Learning Objective

This activity promotes the idea of protection from overexposure to the sun. Students will learn about the adverse health effects of UV radiation and how to avoid them.

### Clues and Answers

#### Across

- 1** The right type of these will block almost 100 percent of the UV radiation that can cause damage to your eyes. (*Sunglasses*)
- 4** Small, brownish spots on the skin that can increase in number with exposure to sunlight. (*Freckles*)
- 6** EPA school program that promotes sun safety. (*SunWise*)
- 8** A \_\_\_\_-brimmed hat will protect your face, neck, and ears. (*Wide*)
- 9** The most serious form of skin cancer. (*Melanoma*)
- 10** \_\_\_\_\_ are most at risk for overexposure to UV radiation because their young skin is thinner and more easily damaged. (*Children*)
- 12** UV is an acronym for \_\_\_\_\_. (*Ultraviolet*)
- 13** If your \_\_\_\_\_ is shorter than you are when you're outside, it's time to seek shade. (*Shadow*)
- 15** Everyone is affected by UV radiation. Skin color doesn't exclude anyone from its effects, but if you have \_\_\_\_ skin you are at higher risk for skin cancer. (*Fair*)

**Sunny Crossword** continued**Down**

- 1** Use this with at least SPF 30, and apply properly to protect against skin damage. (*Sunscreen*)
- 2** The time the sun is at its highest, which means its rays have less distance to travel through the atmosphere and the intensity is greatest. (*Noon*)
- 3** Initials for sun protection factor. (*SPF*)
- 5** Abbreviation for chlorofluorocarbon, one of the chemicals that destroys the fragile ozone layer. (*CFC*)
- 7** The sun's rays are stronger at high altitudes and closer to the \_\_\_\_\_. (*Equator*)
- 8** Overexposure to the sun can cause skin cancer, eye damage, and \_\_\_\_\_. (*Wrinkles*)
- 10** Eye damage that occurs when there is a loss of transparency in the lens, which clouds your vision. (*Cataracts*)
- 11** It is UV \_\_\_\_\_, not the warmth or the brightness of the sun, that causes damage to our skin. (*Radiation*)
- 12** This type of radiation is not absorbed by the ozone layer and can cause a lot of damage to our bodies. (*UVA*)
- 13** You can find protection from the sun's UV rays under the \_\_\_\_\_ of trees and umbrellas. (*Shade*)
- 14** A gas found in two layers of the atmosphere with the same chemical structure; it is bad at ground level and good high above the Earth. (*Ozone*)



## Sunny Crossword





## WordWise

### Supplemental

#### Directions

Be WordWise! Look up each of the following words in the dictionary and write the definitions. Then create a sentence for each word. Make sure the reader can understand what the word means in the sentence. For example, if the word is “sunscreen,” a sentence like, “I bought sunscreen at the store” does not help the reader understand what sunscreen is. However, a sentence like, “I applied sunscreen on my skin before I went outside to play so that I wouldn’t get a sunburn” helps the reader know that sunscreen is some kind of protection from the sun that you put on your skin.

*Sun*

*Solar*

*Epidermis*

*Ultraviolet Radiation*

*Suntan*

*Intensity*

*Atmosphere*

*Ozone*

*Ozone Layer*

*Pigment*

*Melanoma*



## WordWise

### Supplemental

#### Estimated Time

45–50 minutes

#### Supplies

Dictionary

#### Directions

The students should define each of the words and then use them in a sentence that somehow expresses the meaning of the word.

*Sun*—A star of medium brightness, around which the Earth revolves. The sun provides the Earth with its light and heat from 93 million miles away.

*Solar*—Of or relating to the sun; caused or produced by the action of the sun's light.

*Epidermis*—The outer layer of the skin of a vertebrate animal.

*Ultraviolet Radiation*—Radiation with a wavelength too small to be visible to the naked eye.

*Suntan*—Browning of the skin's pigment, caused by damage from exposure to the sun's UV rays.

*Intensity*—Strength, power, or energy.

*Atmosphere*—The whole mass of air and other gases surrounding the Earth.

*Ozone*—A gas that forms in the atmosphere when three atoms of oxygen are combined. It can be good or bad depending on its location.

*Ozone Layer*—A layer in the stratosphere, which is located 6–30 miles above the Earth's surface. It protects people from the damaging effects of the sun's rays by absorbing some UV radiation.

*Pigment*—Coloring material in the skin cells of plants and animals.

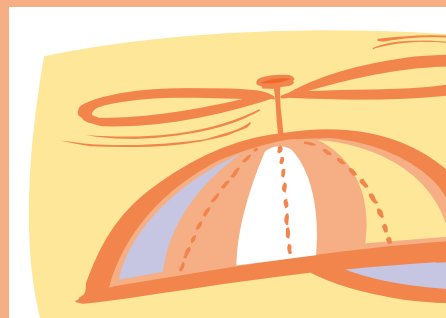
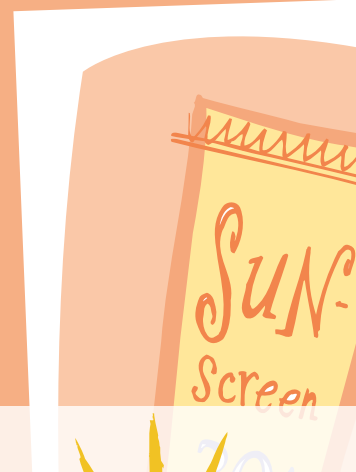
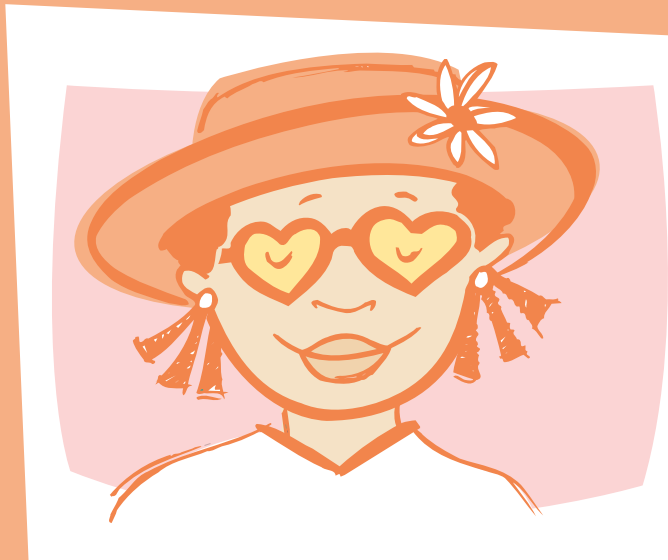
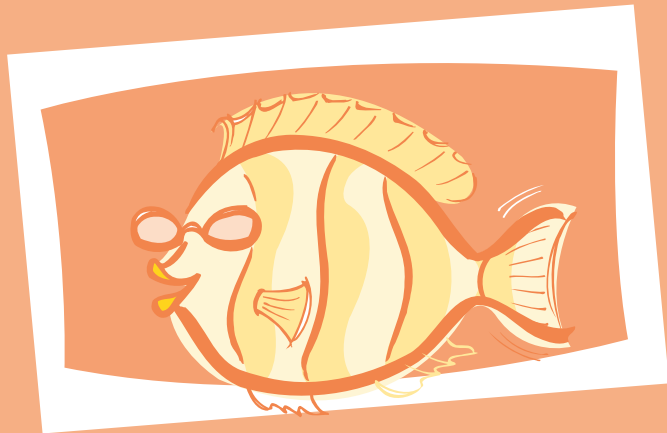
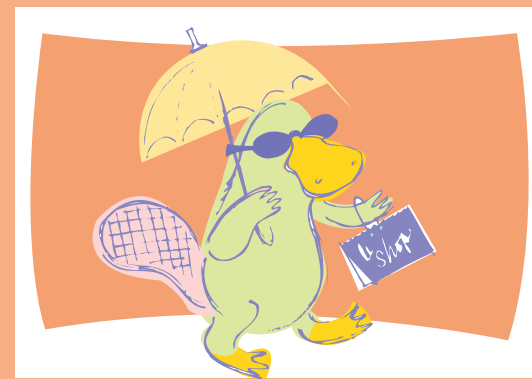
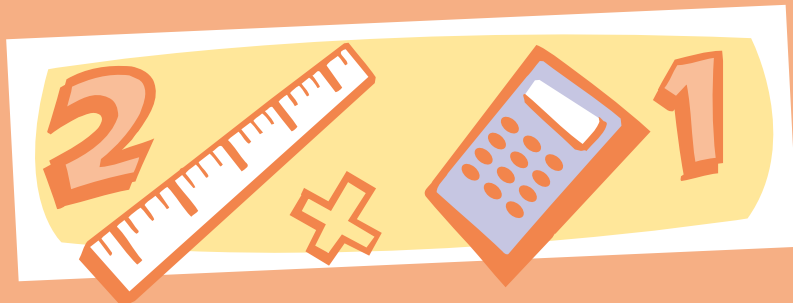
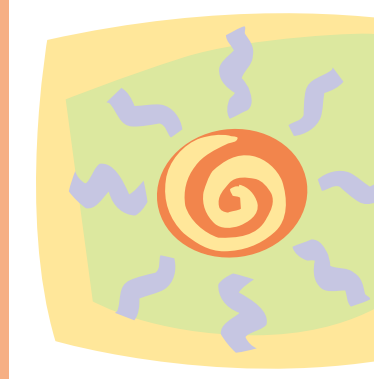
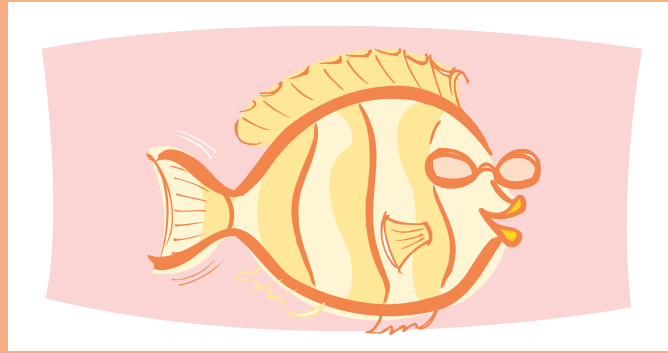
*Melanoma*—A usually malignant tumor containing dark pigment; a type of skin cancer.

#### Additional Activities

Using the words they defined, have students create

- A short story for a younger audience
- A four–eight frame comic strip

# uv meter



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Daily reporting of ultraviolet (UV) intensity data by school children will enable students to understand the scientific concepts related to ozone layer depletion and UV radiation. It will help them modify their outdoor behaviors to limit exposure and future incidences of adverse health effects.

This section includes instructions for operating your hand-held UV meter as well as three activities beyond entering your data on the SunWise Internet Site. These activities are aligned with the national educational standards as identified on the educational standards matrix cards for grades 3–5 and 6–8. Good luck with your UV monitoring efforts!

### **UV Meter Activities**

- 1** What Works? Effectively Blocking UV Rays
- 2** Chart and Graph UV Intensity
- 3** Reflecting UV Radiation

## Hand-held UV Meter: Device Operating Instructions

*The activities in this section require the use of an ultraviolet (UV) meter. If you choose to purchase a hand-held UV meter, several vendors can be found on the Internet. We urge you to check the open market for price, quality, and delivery terms before purchasing any items. EPA cannot endorse the products and services of these vendors.*

*Some hand-held UV meters measure the intensity of the sun's UV rays based upon the UV Index (UVI) scale of 0 to 11+ (low to extreme).*

### UV Index Values

UV Index values depict intensity levels on a 0 to 11+ scale in the following way:

Index Number	Intensity Level
≤ 2	Low
3 to 5	Moderate
6 to 7	High
8 to 10	Very High
11+	Extreme

While you should always take precautions against overexposure, you should take special care to adopt safeguards such as SPF 30+ sunscreen, hats, sunglasses, protective clothing, etc., as the UV Index value gets higher.

Registered SunWise schools and partners can enter daily UV forecast and intensity data by logging on to the SunWise website at [www.epa.gov/sunwise/enterdata.html](http://www.epa.gov/sunwise/enterdata.html). Detailed instructions for entering the data can be found on the site.



### Precautions

- Use your meter to monitor only the sun's natural radiation. It should never be used to measure UV from artificial sources such as tanning beds.
- Staying in the shade does not provide complete protection from UV radiation due to the scattering effect of UV radiation.
- High temperature and humidity may lead to incorrect results. Do not leave the device in conditions of high humidity or temperature for long periods.
- The meter may fail to operate correctly if the sensor window is not kept clean. Remove dirt with a piece of soft cloth moistened in alcohol (ethanol, isopropanol). Use cleaning fluids sparingly.
- Upon leaving the factory, the meter is carefully calibrated. Improper handling (water immersion, strong shocks) may alter the meter's parameters. Handle with care.

Your UV meter should not replace your common sense or current method of avoiding skin and eye damage from the sun.

### About the UV Index

The UV Index, developed by the National Weather Service and EPA, provides a forecast of the expected risk of overexposure to the sun and indicates the degree of caution you should take when working, playing, or exercising outdoors. The UV Index predicts UV intensity on a 0 to 11+ scale, where  $\leq 2$  indicates a low risk of overexposure, and 11+ means an extreme risk. Calculated on a next-day basis for every ZIP Code across the United States, the UV Index takes into account clouds and other local conditions that affect the amount of UV radiation reaching the ground in different parts of the country.

For more detailed information on UV radiation and the UV Index, read the fact sheets that can be found in the *SunWisdom* section of this Tool Kit or log onto the SunWise website, [www.epa.gov/sunwise](http://www.epa.gov/sunwise).



uv meter



## What Works? Effectively Blocking UV Rays

### Directions

Take the UV meter outside. Check and record the unfiltered UV level. Next, cover the meter with a plastic bag, and apply sunscreen on the outside of the bag over the sensor area. Check and record the UV level and sunscreen SPF number. Try this for a variety of sunscreens with different SPF numbers. Use a clean bag for each sunscreen application.

Next, try the same experiment with sunglasses. Cover the UV meter sensor area with different pairs of sunglasses. Record your results. Lastly, try it with different types and colors of cloth.

### Vocabulary Words

*Sensor*—The area on the UV meter that senses the UV level.

*SPF*—Sun Protection Factor; a number indicating how protective a sunscreen is against UVB rays.

### Questions

- 1 What SPF number seems to be the most protective against the sun's harmful UV rays? How much of a difference did it make?
- 2 Which pair of sunglasses filtered out the most UV rays? Were they UV sunglasses?
- 3 What kind of cloth filtered out the most UV rays? Was there any difference in similar types of cloth but with different colors?
- 4 From what you have learned from this experiment, what precautions should you take when going outside in order to protect yourself from the sun's harmful UV rays?



## What Works? Effectively Blocking UV Rays

**Estimated Time**  
40–50 minutes

**Supplies**  
UV meter  
Plastic bags  
Pairs of UV and non-UV sunglasses  
Variety of sunscreens with different SPF numbers  
Variety of fabric pieces

**Learning Objective**  
This activity will show students that different sunscreens, coverings, and sunglasses can have a real effect on UV levels. This will emphasize to students the need to wear sunscreen, while at the same time helping them distinguish the effectiveness of different types. Assess student comprehension by asking them to predict what levels of protection different materials would offer, other than the ones you’ve tried in the experiment.

**Directions**  
Take the UV meter outside. Have one student check and record the unfiltered UV level. Next, have the class take turns covering the UV meter with plastic bags and applying different sunscreens on the outside of the plastic bag over the sensor area. Make sure the students apply an even amount, no thicker than you would apply on your body. Have the students check and record the UV reading

and sunscreen SPF number with each sunscreen. Try this for a variety of sunscreens with different SPF numbers. Use a clean bag for each sunscreen application.

Next, try the same experiment with sunglasses. Have the class cover the UV meter sensor area with different pairs of sunglasses, and record the results. Finally, try covering the sensor with different types and colors of cloth and record the results.

### Questions and Answers

- 1** What SPF number seems to be the most protective against the sun’s harmful UV rays? How much of a difference did it make? *Since SPF 15 filters out 93 percent of UVB radiation, and SPF 30 filters out 97 percent, there should be little noticeable difference with SPF numbers higher than 15; there should be a difference between 4 and 15.*
- 2** Which pair of sunglasses filtered out the most UV rays? Were they UV sunglasses? *Answers may vary. Yes, if the UV reading was low.*
- 3** What kind of cloth filtered out the most UV rays? Was there any difference in similar types of cloth but with different colors? *Your answers will vary. Generally, tighter weave provides greater protection.*
- 4** Given what you have learned from this experiment, what precautions should you take when going outside in order to protect yourself from the sun’s harmful UV rays? *Answers will vary, but students might say wearing sunscreen of SPF 30 or higher, UV blocking sunglasses, and tightly-woven clothing.*



uv meter



## Chart and Graph UV Intensity

### Directions

Working with a partner or group, take turns going outside to record the UV intensity with the UV meter and the weather conditions (sunny, cloudy, rainy, etc.) at approximately the same time each day.

Record your findings in a logbook or chart.

After all the data is recorded, graph and analyze your data.

### Questions

- 1 What difference does the weather make in the UV intensity each day?

- 2 On which days are the sun's UV rays the most dangerous? The least? Why?





uv meter



# Chart and Graph UV Intensity

### Estimated Time

This activity should take a few minutes each day for recording data. The graphing and discussion should take 40-50 minutes once the data is collected. The entire activity could last one to two weeks, depending on how the class is divided.

### Supplies

- UV Meter
- Logbook or chart for data

### Learning Objective

This activity will emphasize that harmful UV rays are present in any type of weather, not just when sunny. Students should always be SunWise, even on a cloudy day. Assess student comprehension of this message by asking the class to make a list of the clothing they wore each day of the experiment. Ask them how they would change that behavior now, knowing that there were UV rays present even on the cloudy days.

### Directions

Divide the students into pairs or groups. Each pair will take turns going outside to record the UV intensity with the UV meter and the weather conditions (sunny, cloudy, rainy, etc.) at approximately the same time each day. Students may also use the SunWise website, [www.epa.gov/sunwise/windex.html](http://www.epa.gov/sunwise/windex.html), to retrieve current UV readings and past UV data.

Students should record their findings in the logbook or chart that you provide.

After all the data is recorded, instruct the students to graph and analyze the data.

### Questions and Answers

- 1 What difference does the weather make in the UV intensity of each day? *The sun's UV rays are less affected by the weather than many students would think.*
- 2 On which days are the sun's UV rays the most dangerous? The least? Why? *UV rays on cloudy days, as well as sunny days, can cause damage to unprotected skin and eyes. UVB rays fluctuate with time of day and season. UVA rays are consistent throughout the day and year and can pass through clouds.*



uv meter



## Reflecting UV Radiation

### Directions

In this activity, you will work with your teacher to determine the changes in UV intensity by comparing UV readings between direct sunlight and a variety of reflective surfaces.

Using the chart below, record the correct values taken from the UV meter as the meter is placed in a variety of scenarios.

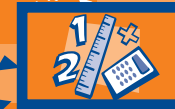
### Questions

- In which scenario was the UV intensity the greatest? What was the UV reading?
- In which scenario was the UV intensity the least? What was the UV reading?
- Which surface was most UV-reflective? Which was least UV-reflective? Why?
- What are some similarities between your behavior in the sun and the scenarios in which you placed the UV meter? What are some differences?
- List some additional scenarios you participate in—sitting inside a sun-filled room or car, for example. What do you think the UV intensity would be if the meter were placed in the same scenario?

Scenarios	UV Meter Reading
In direct sunlight	
In shade	
Reflecting off sand	
Reflecting off water	
Reflecting off aluminum foil	



uv meter



## Reflecting UV Radiation

### Estimated Time

30 minutes

### Supplies

UV meter

Plastic bag (to protect the UV meter)

A large bowl, bucket, or dishpan

1 lb. of sand

1 gallon of water

Aluminum foil (enough to line the bowl)

### Learning Objective

The goal of this activity is to demonstrate changes in UV intensity by comparing UV readings from direct sunlight and a variety of reflective surfaces. Assess the prior knowledge of the students by asking them to predict readings caused by the different surfaces and why they selected those values. After the activity, discuss their results. Compare their predictions with their actual results.

### Directions

Take students outside on a sunny day. Choose a location that offers students proper shade coverage, but allows you to place the experiment materials in direct sunlight. Take a UV reading using the UV meter. Have students record the UV reading in the appropriate space on the chart provided, or one that they have constructed to collect data. Use the UV meter in the scenarios listed, and instruct the students to record the readings in the appropriate spaces on their chart. Remember, the UV meter is not waterproof. Don't forget to protect it with the plastic bag.

### UV Meter Scenarios

Take a reading with the UV meter facing down toward the sand.

Take a reading with the UV meter facing up on the sand simulating sunbathing.

Take a reading with the UV meter pointing toward the bowl of water placed in the sun.

Take a reading with the UV meter pointing toward the aluminum foil placed in the sun.

After your students have completed this experiment, return to your classroom to discuss the findings.



uv meter



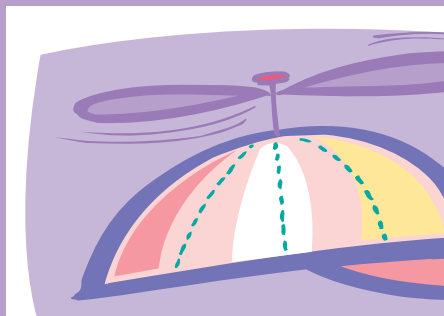
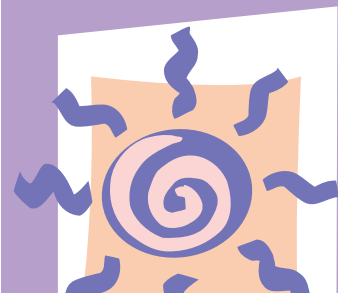
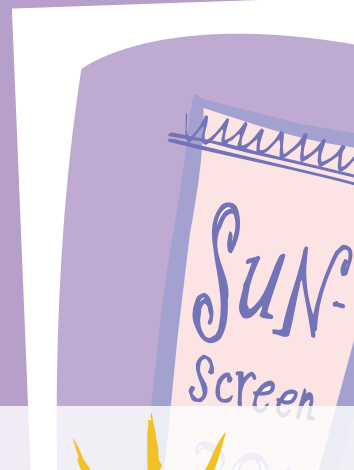
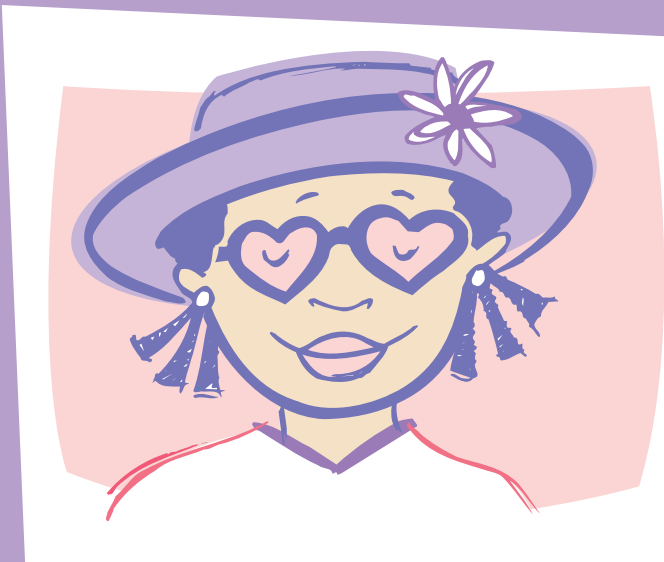
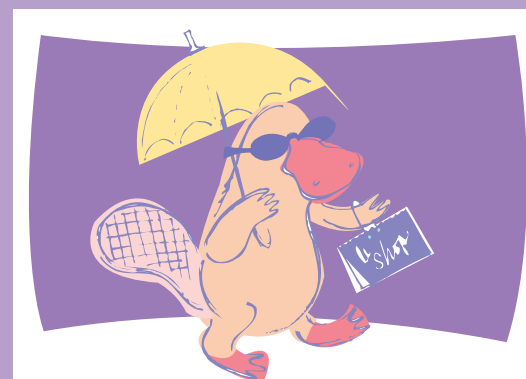
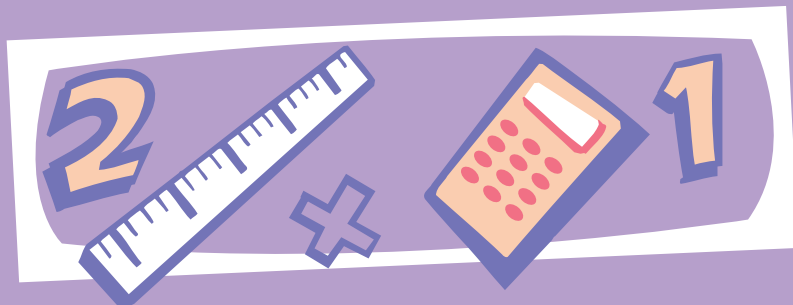
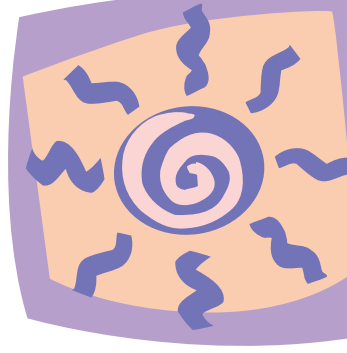
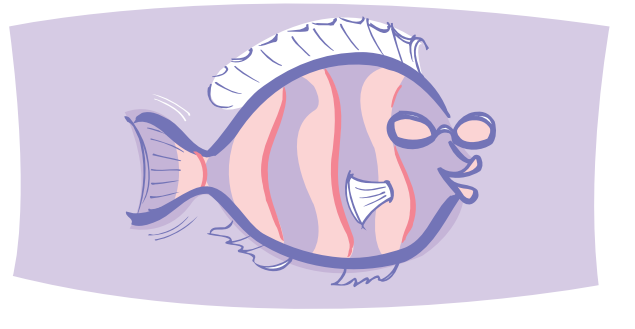
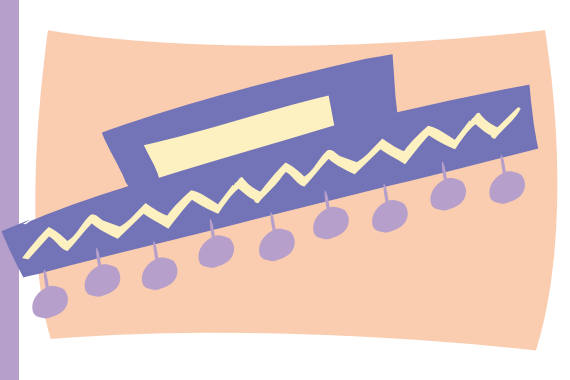
### Questions and Answers

- 1** In which scenario was the UV intensity the greatest? What was the UV reading? *Answers will vary.*
- 2** In which scenario was the UV intensity the least? What was the UV reading? *Answers will vary.*
- 3** Which surface was most reflective? Which was least reflective? Why? *Answers will vary.*
- 4** What are some similarities between your behavior in the sun and the scenarios you placed the UV meter in? What are some differences? *The scenarios were designed to mimic our behavior in the sun. Differences would include the use of sunscreen, sunglasses, or protective clothing; the use of these items would add protection from the UV rays.*
- 5** List some additional scenarios you participate in; sitting inside a sun-filled room or car, for example. What do you think the UV intensity would be if the meter was placed in the same scenario? *Try it out. The answers will vary depending on whether the windows are treated to block UV rays. Car windshields generally protect against UVA and UVB, while the side windows are not as protective.*





# policy information



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## Becoming a SunWise School

The school day makes up a major part of a child's everyday life. The time children spend outside of the classroom, including recess, lunch, physical education classes, field trips, and after-school activities, can result in a significant amount of sun exposure, especially if it occurs during the hours of peak sun intensity from 10 a.m. to 4 p.m. Children need to be physically active, but must learn to protect themselves from overexposure to ultraviolet (UV) radiation. Given that sun damage is cumulative, schools need to recognize that everyday exposure counts. Overexposure to the sun can cause serious health problems such as skin cancer, cataracts, and immune system suppression. Schools can play a major role in preventing these adverse health effects by:

- Instilling SunWise behaviors in students and staff through education.
- Providing a school environment that is SunWise, including both physical and policy enhancements.

Becoming a SunWise School may require changes to the school's physical environment and policies and practices. Some changes may take longer than others to implement. Some changes may involve costs, but many can be implemented with little or no cost to the school. The key is to recognize sun safety as an important health issue, and to make changes that are feasible and realistic for your school. Skin cancer and the other harmful health effects from overexposure are largely preventable, and by making these changes, positive steps are taken toward a healthier future.

The federal government has classified UV radiation as a human carcinogen, along with other cancer-causing agents such as asbestos, radon, and tobacco smoke.

## Why Being SunWise is Important for Children

### School Age Focus

Skin cancer experts and researchers used to warn the public that children need to use sun protection to prevent skin cancer *later* in life. Now the experts and researchers are warning the public that children need to use sun protection to prevent skin cancer *at an early age* and *later* in life. Two recent studies find that melanoma and the two major types of nonmelanoma skin cancer—basal cell and squamous cell carcinoma—are rising dramatically in young Americans. First, the incidence of pediatric melanoma in US cancer registries increased 46 percent from 1973 to 2001 among children (age < 20 years) and young adults (age 20 to 24 years). Second, a population-based study using very complete and extensive data from Minnesota demonstrated an increase in the incidence of nonmelanoma skin cancer among young women and men, with a particularly strong increase in basal cell carcinoma in young women. The authors of both studies concluded by calling for a strong focus and emphasis on skin cancer prevention in young populations, including young adults.

### Melanoma: A Teen Survival Story

As mentioned, it is important for people of all ages, young and old, to be sun safe. Kim Clark, a high school soccer star from Arizona and a volunteer for The SHADE Foundation, knows how important it is to be SunWise. Here is her story:

*How old were you when you were diagnosed with melanoma?*

Kim: I was 13. But I had my first mole removed when I was 9 years old. Then at 13, I was told it was Stage IV melanoma. Again, now at 14, I have had a couple more moles removed.

*What was it like when the doctor told you that it was melanoma?*

Kim: I was very shocked. I didn't know what melanoma meant. When you read on the Internet or in books, people don't get melanoma at the age of 13. It affected my family drastically, but we became stronger. I went through the church and talked with many of my friends and family. They all gave me a lot of support. We realized that it does happen to young kids and we need to really think about how we are protecting ourselves. I made a saying with my dad that we're going to score the goal and we're going to win the game to fight cancer.

*How difficult was it to go through treatment?*

Kim: I had to get 4 radiation shots for the surgery so they could find where the cancer was feeding from. The radiation shots hurt really bad. They took lymph nodes out of my underarm and a few sentinel nodes. They cut down to the muscle in my back and there is now a 5-inch scar. The results came back that they got it all, so I was lucky not to have to get chemo.

*You've been playing soccer for a long time, so you've spent a lot of time outside. Was sun protection anything you ever thought about before?*

Kim: I put sunscreen on, but I never really thought about if I was putting it on the right way or if I was putting on enough. I wasn't really aware of what could happen. I'd put it on because my parents told me to, but then I never reapplied it while spending hours in the sun. I never really burned and I have never used a sun-tanning booth.

*How have your sun protection behaviors changed?*

Kim: I've learned how to put on sunscreen the right way. An hour before I go out into the sun, I glaze it over my body and let it soak in. Then when I get to my destination, I put it on again and rub it in. I do it every hour while I'm outside. There are some special shirts that have sun protection in them that I wear under my soccer jersey and then I put sunscreen on. My parents also bought portable shade structures to use on the soccer fields so we can sit in the shade on the sidelines.

*How easy is it to follow sun protection practices now?*

Kim: I find it pretty easy. Easy enough that I should have done it before. Most of my friends have realized that, "Hey, we know someone who has gone through this." They have pulled together and wear sun protection. All of my friends do it.

*What is your opinion on the look of being tan?*

Kim: I think it looks ugly and it's kind of stupid to be doing that. I think that pale is pretty. All of my friends say that they're going to be pale with me. Some kids at school comment on how pale I am, but I just tell them that I know the consequences.

*Why is it important for you to become a spokesperson for sun protection?*

Kim: I want to help spread sun protection awareness to everybody. I want to let people know that it can happen to young people too.

# Becoming a SunWise School

## Step One

### Define Goals

Examples of some goals that you might set for your school are:

- Increase sun safety awareness in your school and surrounding communities.
- Adopt practical sun protection measures.
- Help students acquire SunWise behaviors through education about the dangers of overexposure to ultraviolet (UV) rays and measures they can take to protect themselves.
- Encourage students and staff to use broad-spectrum SPF 30+ sunscreen and wear protective clothing, appropriate hats, and sunglasses when outdoors.
- Provide a physical environment that is sun safe, i.e., with shade coverings or trees.
- Communicate with parents and community members about your school's SunWise practices.

## Step Two

### Evaluate Your School

The “*Evaluate Your School*” tool is located on page 5 of this policy section. This tool can be very helpful in assessing the current state of your school's sun protection practices and what you can do to make your school more SunWise. Please take a couple of minutes to take this “quiz” and add up the total number of points to obtain your score. Refer to the score key for helpful hints for what steps to take to implement SunWise practices in your school. Then advance to Step Three.

## Step Three

### Write an Official SunWise School Sun Safety Policy

Formalizing your school's Sun Safety Policy in writing will assist in putting your goals into action. It will also help you communicate your school's policy to staff, students, and the surrounding community.

Please note, the term “policy” throughout this document may be defined somewhat loosely. School policy can often imply official

regulations. Here, we are referring to practices and procedures that are developed and adhered to within each school to benefit the health and safety of its students.

The SunWise policy section contains many helpful ideas for practical and feasible practices that your school can adopt. We realize that some may be easier to implement than others. In addition, some may require permission and/or input from school principals, the superintendent, other staff, and community members. We offer a number of suggestions to facilitate the process of involving school leaders and getting them on board with these practices, including:

- Make an appointment with the school principal to discuss sun protection practices you would like to implement in your school.
- Be prepared with background information on the importance of sun protection in general, development of sun-safe health habits, and having a sun-safe school environment.

### Step Three continued

- Have support from parent-teacher organizations, other parent groups, and/or other staff members.
- Include an action plan with ideas of what practices you would like to implement, how they can be implemented, how funds can be made available, and what contacts you will likely need.

### Suggested Focus Areas for Your SunWise School Sun Safety Policy

By completing and reviewing the *Evaluate Your School* tool, you are now ready to develop a school sun safety policy. Please refer to the Checklist (page 7) of this policy section. Use this Checklist as a goal-setting tool and check off which practices you will work on implementing in your school. Options include:

#### Environment

- Increase the number of shelters and trees to provide adequate shade on the school grounds.
- Schedule outdoor activities before 10 a.m. and after 4 p.m., especially during the months when UV radiation is most intense.
- Hold outdoor activities in shady areas whenever possible.

### School Practices

- Incorporate the SunWise curriculum into the health or regular classroom curriculum. (See *Integrating Sun Protection into Lesson Plans*, page 16).
- Work with parents to provide SPF 30+, broad-spectrum, water-resistant sunscreen for student use.
- Make sunscreen available to students.
- Find out if any students have sun sensitivities or sunscreen allergies and allow for necessary precautions.
- Allow children to wear sunglasses that block 100 percent of UVA and UVB, and hats, which will help protect the face, neck, eyes, and ears, whenever the children are outside.
- Ensure that sun safety policies are reflected in the planning of all outdoor events, including field trips.
- Provide resources and education to staff on sun protection and the SunWise curriculum.
- Sign up to receive the daily UV Index and occasional UV Alerts (visit [www.epa.gov/sunwise/uvindex.html](http://www.epa.gov/sunwise/uvindex.html) and click on Enviro Flash), and let children and staff know what the UV intensity

is expected to be. For more information on the UV Index, please see the *SunWisdom* section.

### Behavior

- Encourage staff and parents to act as role models for students by practicing sun-safe behaviors.
- Encourage the daily application of sunscreen before school and prior to outdoor activity.
- Encourage students to use available shaded areas for outdoor activities.

Look to your community to help enhance your program ideas. Local medical professionals, business people, media, and others can provide skills, information, and materials to support your SunWise School Sun Safety Policy. Also, remember to include parents in your efforts. They can help raise awareness and support in the community for future funding of environmental changes, such as planting trees or building shade structures.

### Step Four

#### Communicate with Parents and Community Members

SunWise safety messages must be reinforced beyond the classroom in order to change policies and behaviors. Making sure that the SunWise

### Step Four continued

message is reinforced in both home and community environments is a vital component in the creation of sun-safe behaviors in students. This can be achieved through active communication with parents, guardians, area news services, and other community members.

- Communicate your rationale for the policy changes and the goals that you expect to achieve.
- Use language that is inclusive and understandable to your audience (parents, staff, students, and the community at large).
- Regularly reinforce sun safety behaviors in a positive way through newsletters, parent-teacher meetings, and student/teacher activities.
- Refer to templates located in this policy section for communication outlets, including permission slips, a parent handbook, and example blurbs and articles for newsletters and nurse's notes.

The following are some other suggestions for getting students, staff, parents, and your community involved with your school's sun safety policy:

- Distribute your school's SunWise policy, as well as relevant fact sheets from the *SunWisdom* section of this Tool Kit, to staff, parents, and the local community.
- Forge partnerships with other teachers and administrators, parent organizations, local nonprofit and civic organizations, recreational programs, businesses, and the media, in particular weathercasters. Use partnerships to build support for the program and sun safety policies.
- Involve the media to the fullest extent. Distribute press releases about SunWise activities that your school is sponsoring to local media outlets.
- Encourage students, staff, parents, and other community members to sign up for EnviroFlash UV Index emails.
- Present a sun safety information session at a staff, school council, and/or PTA meeting.
- Network with your local businesses and encourage them to provide incentives, such as hats, sunglasses, and sunscreen, to reinforce the habits and messages of sun protection.
- Get your local community involved and excited by organizing a SunWise block party, field day, or assembly. Invite all of your students, staff, parents, and community members. Keeping your SunWise School Sun Safety Policy fresh in the minds of your community will ensure enduring SunWise behaviors and better health for all.
- Team up with organizations listed in the Resources section of this Tool Kit to help promote sun safety awareness and practices.
- Participate in and sponsor commemorative programs where donations can lead to planting trees or constructing shade structures on your school grounds.

The following pages contain examples of correspondence you might use to inform parents about your SunWise School Sun Safety Policy and alert the media to your SunWise activities. In addition, you will find a sample SunWise School Sun Safety Policy. Use these examples as starting points for your own outreach activities.

## Evaluate Your School

Use this evaluation tool by answering the following questions to determine your school's current sun protection practices. Add up the total number of points from all of the questions below and refer to the key for suggestions on how to make your school more SunWise.

Assess the use of school grounds in relation to availability and use of shade:

How many trees or shade structures are on your school grounds?

- 2 Many      1 Few      0 None

Are shaded areas available to students during lunch, recess, physical education, and sports?

- 2 Yes      1 Somewhat      0 No

Approximately what proportion of outdoor space is sheltered by structures and/or trees?

- 2 66–100%      1 33–66%      0 0–33%

Can the amount of shade be realistically increased in areas of high student use?

- 2 Yes      1 Somewhat      0 No

Are there currently any future plans for adding new trees/structures or new construction or renovations that would provide more shade?

- 2 Yes  
1 Possibly, if can secure funding  
0 Not at this time

Assess current school policies for aspects that encourage or discourage SunWise practices:

Are the students allowed to apply sunscreen in school?

- 2 Yes  
1 Only on field trips/field days  
0 No

Are teachers and nurses allowed to apply/help apply sunscreen to students?

- 2 Yes  
1 Teachers monitor while students apply it themselves  
0 No, they are not allowed

Are students allowed to wear hats on school grounds?

- 2 Yes, but not in the building  
1 Only allowed on field days/field trips  
0 No

At what time of day are outdoor activities scheduled?

- 2 All activities are before 10 a.m. and after 4 p.m.  
1 Try to avoid 10 a.m. to 4 p.m.  
0 Most activities are between 10 a.m. and 4 p.m.



Are sun safety facts and reminders often communicated with parents through the use of newsletters, nurse's notes, education pamphlets, etc.?

- 2 Yes, written forms of communication often include sun safety information
- 1 A summer reminder is usually distributed
- 0 No

Are parents or guardians included in sun safety decisions made by the school?

- 2 Yes
- 1 Somewhat
- 0 No

Look at current student and staff behaviors through a SunWise lens:

How many students come to school wearing sunscreen?

- 2 Most
- 1 Some
- 0 None

What are the sun safety behaviors of school staff and administration? Do they act as role models in the reinforcement of school policies?

- 2 Most wear sunscreen and protective clothing, seek shade
- 1 Some try to practice a few sun safety behaviors
- 0 None

Do students and staff make use of available shade during outdoor activities?

- 2 Yes, shade is mostly utilized
- 1 Somewhat
- 0 No

### 0-9 Points

Your school still has some work to do to make it SunWise. The SunWise Program will greatly help in the efforts to integrate sun safety into your school's daily practices. The first step is realizing that this is an important issue that affects your students' and staff's health. The next step is to raise the awareness of your school community. By using this Tool Kit to integrate a sun safety curriculum into classroom lessons and to establish sun-safe practices, your school will become SunWise. Please review the Checklist (see page 7) for many important steps that can be taken in your school.

### 10-19 Points

Your school has already taken some important steps toward becoming SunWise. However, by using this Tool Kit, you can improve your school's efforts even further. It may be helpful to take a closer look at your school grounds to assess where it may be possible to increase the amount of shade. Consider adding other practices noted on the Checklist (see page 7). Other ideas are to increase the amount of communication already sent to parents regarding the importance of sun safety through outlets such as newsletters, and to develop protocols for sunscreen and protective clothing, hats, and sunglasses use.

### 20-28 Points

Your school is doing a really good job at being SunWise. By using this Tool Kit, you can help improve the efforts even further. Besides supplying a creative curriculum, it also suggests further opportunities that your school can take to expand current practices. In addition to suggestions from above, it might be beneficial to work on fundraisers to increase the amount of available shade on the school grounds, or to try to adjust outdoor activities to occur outside the 10 a.m. to 4 p.m. time period.

## *Developing a School Sun Safety Policy Checklist*

Please review the following menu of sun protection practices. Check off (✓) the selections that are most feasible to implement in your school (select all that apply).

### **Environment**

- Increase the number of shelters and trees on the school grounds.
- Adjust schedule of outdoor activities.
- Hold outdoor activities in shady areas whenever possible.

### **School Practices**

Incorporate the SunWise Program into the health or regular classroom curriculum (see *Integrating Sun Protection into Lesson Plans*, pages 16-18).

- Work with parents to provide sunscreen for student use.
- Make sunscreen available to students at school.
- Allow children to wear sunglasses and hats whenever they are outside.
- Ensure that sun safety policies are reflected in the planning of all outdoor events, including field trips (see *Sample Language template*, pages 11-12).
- Provide resources and education to staff on sun protection and the SunWise Program.

- Sign up for EnviroFlash UV emails and report the daily UV Index to the student body and staff.

### **Behavior**

- Encourage staff and parents to act as role models for students by practicing sun-safe behaviors.
- Encourage the daily application of sunscreen before school and prior to outdoor activity.
- Encourage students to use available shaded areas for outdoor activities.

### **Communication**

- Communicate your rationale for the policy changes and the goals that you expect to achieve with the school community.
- Regularly reinforce sun safety behaviors and facts through newsletters, a parent handbook, parent-teacher meetings, and student/teacher activities (see *Sample Language template*, pages 11-12).
- Work with parent-teacher organizations to coordinate fundraisers for sun protection initiatives and to organize educational opportunities in the community (see *Donation Letter template*, page 13).

## Sample Letter to Parents

### Dear Parent/Guardian/Caregiver:

At [School Name], we are committed to providing your child with a healthy environment. Overexposure to the sun can cause serious health problems such as skin cancer, premature aging of the skin, and other skin disorders; cataracts and other eye damage; and immune system suppression. We know children need to be physically active, but they must learn to protect themselves from overexposure to ultraviolet (UV) radiation. The amount of time children spend outside the classroom, including recess, lunch, physical education classes, field trips, and after-school activities, can result in a significant amount of sun exposure. Our school has developed sun safety practices to provide each student the support needed to be sun safe. Sun damage to the skin is cumulative. Because of these factors, we ask that you support us as we strive to make [School Name] a sun-safe school.

Please help us reinforce the sun safety messages that children will be learning in school by encouraging them to use and practice the following actions:

### Do Not Burn

Overexposure to the sun is the most preventable risk factor for skin cancer.

### Avoid Sun Tanning and Tanning Beds

UV rays from tanning beds and the sun cause skin cancer and wrinkling. If you want to look like you've been in the sun, consider using a sunless self-tanning product, but continue to use sunscreen with it.

### Generously Apply Sunscreen

Generously apply sunscreen to all exposed skin using a Sun Protection Factor (SPF) of at least 30 that provides broad-spectrum protection from both ultraviolet A (UVA) and ultraviolet B (UVB) rays. Reapply every two hours, even on cloudy days, and after swimming or sweating.

### Wear Protective Clothing

Wear protective clothing, such as a long-sleeved shirt, pants, a wide-brimmed hat, and sunglasses, when possible.

### Seek Shade

Seek shade when appropriate, remembering that the sun's UV rays are strongest between 10 a.m. and 4 p.m.

### Use Extra Caution Near Water, Snow, and Sand

Water, snow, and sand reflect the damaging rays of the sun, which can increase your chance of sunburn.

### Check the UV Index

The UV Index provides important information to help you plan your outdoor activities in ways that prevent overexposure to the sun's rays. Developed by the National Weather Service and EPA, the UV Index is issued daily nationwide. To receive daily UV forecasts via email sign up for EnviroFlash at [www.epa.gov/sunwise/uvindex.html](http://www.epa.gov/sunwise/uvindex.html).

### Get Vitamin D Safely

Get Vitamin D safely through a diet that includes vitamin supplements and foods fortified with Vitamin D. Don't seek the sun.

Skin cancer and the other harmful health effects from overexposure are largely preventable, and by making these changes, positive steps are taken toward a healthier future.

Enclosed with this letter is a copy of [School Name]'s new sun safety policy. Please contact [contact name and phone number] if you have any questions or concerns, or if you would like further information on sun protection.

Sincerely,

[School Contact or Official]

## Sample Press Release

**[Date]**  
**[Contact Name and Telephone Number]**  
**[Your City, State]**  
**[School Name]**

### Kicks Off SunWise Program

- [School Name] announced this week that it will initiate a new policy of sun protection practices to become a SunWise School. Overexposure to the sun's harmful ultraviolet (UV) rays can result not only in a painful sunburn, but can also lead to serious health problems, including skin cancer and eye damage.
- [School Name] believes that it is important to get involved because the school environment provides the opportunity to reach a significant number of youth at a time when health habits are still being formed.

- [Optional: If events are planned, include:] Locally, an event will be held in recognition of [School Name]'s partnership with the U.S. Environmental Protection Agency to become a SunWise School. There will be a [details of event—what, where, when, contact information]. All community members are welcome to attend.
- The SunWise Program consists of a variety of efforts that the school will undertake to encourage children and their families to be sun safe. SunWise aims to create a healthier environment by minimizing overexposure to UV radiation.

### Facts about Sun-Related Illnesses

- Overexposure to the sun may lead to skin cancer, cataracts, immune system suppression, and premature aging of the skin.

- More than 3.5 million cases of skin cancer are diagnosed each year, making it the most common of all cancers in the United States.
- Locally, [add recent local state statistics, visit [statecancerprofiles.cancer.gov](http://statecancerprofiles.cancer.gov)]

### Action Steps for Sun Protection Do Not Burn

Overexposure to the sun is the most preventable risk factor for skin cancer.

### Avoid Sun Tanning and Tanning Beds

UV rays from tanning beds and the sun cause skin cancer and wrinkling. If you want to look like you've been in the sun, consider using a sunless self-tanning product, but continue to use sunscreen with it.

### **Generously Apply Sunscreen**

Generously apply sunscreen to all exposed skin using a Sun Protection Factor (SPF) of at least 30 that provides broad-spectrum protection from both ultraviolet A (UVA) and ultraviolet B (UVB) rays. Reapply every two hours, even on cloudy days, and after swimming or sweating.

### **Wear Protective Clothing**

Wear protective clothing, such as a long-sleeved shirt, pants, a wide-brimmed hat, and sunglasses, when possible.

### **Seek Shade**

Seek shade when appropriate, remembering that the sun's UV rays are strongest between 10 a.m. and 4 p.m.

### **Use Extra Caution**

#### **Near Water, Snow, and Sand**

Water, snow, and sand reflect the damaging rays of the sun, which can increase your chance of sunburn.

### **Check the UV Index**

The UV Index provides important information to help you plan your outdoor activities in ways that prevent overexposure to the sun's rays. Developed by the National Weather Service and EPA, the UV Index is issued daily nationwide.

### **Get Vitamin D Safely**

Get Vitamin D safely through a diet that includes vitamin supplements and foods fortified with Vitamin D. Don't seek the sun.

For more information on these SunWise events or [School Name]'s SunWise Program, please contact [Contact Name and telephone number/email] and visit [www.epa.gov/sunwise](http://www.epa.gov/sunwise).

## Sample Language

### Newsletters & Parent Communication

#### For Newsletters and Nurse's Notes

Including sun protection awareness information and action steps in school newsletters is a productive way of communicating these important messages to parents. It is suggested to use a combination of types of messages including some awareness and action messages. Focus on specific action steps that parents can take to help make their child sun safe, as well as on providing the information to explain why it is so important.

#### Awareness Information

- Sunburns during childhood are harmful and painful. It can take less than 10 minutes for a child's skin to burn. Childhood sunburns increase the risk for skin cancer later in life.
- Childhood burns can begin to increase the risk for skin cancer occurrence as early as the late teen years and early to mid-twenties.
- A significant amount of lifetime sun exposure occurs before age 18. Protecting skin and eyes during the

first 18 years of life can reduce the risk of some types of skin cancer by up to 78 percent. Melanoma is a cancer that can affect younger people and can start as early as adolescence.

- Children learn healthy habits best at a young age. With sun damage accumulating over a person's lifetime, teaching the importance of sun safety habits at a young age is a priority.
- Your child is at the age when important health habits are still being formed. Now is the time to help your child learn necessary sun protection behaviors to protect his/her skin from the damage that can appear later in life. Prevention efforts are needed across settings targeting schools, families, and communities.

#### Action Steps

- On appropriate days, please apply sunscreen to your child prior to sending him/her to school. We strongly encourage that your child bring and wear a sun-protective hat for all outdoor activities. To find out what the UV intensity is

predicted to be, sign up for Enviro-Flash daily UV Index emails by visiting [www.epa.gov/sunwise/uwindex.html](http://www.epa.gov/sunwise/uwindex.html).

- We encourage children to enjoy physical activity and fresh air year-round. However, proper precautions should be taken to ensure that your child's outdoor time is a safe time. It is very important for all children to protect themselves from overexposure to the sun.
  - ▮ Limit sun exposure, especially during the sun's peak hours of 10 a.m. to 4 p.m.
  - ▮ Use a sunscreen with an SPF of at least 30 every day.
  - ▮ Reapply sunscreen every 2 hours during outdoor activity.
  - ▮ Apply sunscreen at least 20 minutes prior to going outdoors.
  - ▮ Wear a hat with a wide brim to protect the face, neck, and ears.
  - ▮ Wear protective clothing, such as long pants and a long-sleeved shirt, and UV-protective sunglasses, to help protect skin and eyes.

- ▶ Encourage play in the shade.
- ▶ Check the UV Index.
- ▶ Be aware that water, sand, snow, and concrete can all reflect the sun’s UV rays.
- ▶ Avoid and discourage tanning salon use.

**Example Article**

Most children enjoy spending time outdoors, whether it is before or after school, during recess or gym class, or on weekends. We encourage children to enjoy physical activity and fresh air year-round. However, proper precautions should be taken to ensure that when outdoors, your child is safe from the sun. Just like children need mittens and warm hats to be safe from the cold, they need sunscreen and hats to be safe from the harmful rays of the sun.

Skin cancer is the most common form of cancer in the United States, but it is also the most preventable. Children can learn good health habits while they are young to help them be sun safe. Excessive and unprotected sun exposure increases the risk of skin damage later in life.

[*School Name*] believes that this is an important health issue; therefore we are taking some necessary steps to incorporate sun safety into our school day. If you have any suggestions or comments regarding these sun protection practices, please contact [*Contact Name and telephone number*] or your own health care provider.

**For Permission Slip**

In order to ensure that sun safety policies are reflected in the planning of all outdoor events, including field trips, consider adding language about sun protection to the permission slip. An example of wording on a permission slip follows:

“During this field trip/field day, your child will be outdoors for a substantial period of time. Please send your child to school with sunscreen and a hat. Your child’s teacher will give him/her time to put on the sunscreen. Also, please apply sunscreen to your child before sending him/her to school.”

**For Parent Handbook**

Most school handbooks currently contain a section on appropriate clothing suggestions for winter

weather, such as coats, boots, and gloves. The suggested language below expands the clothing section to include suggestions for warm weather and sun protection.

Example: “We request that parents provide appropriate clothing and hats for their children, with attention to weather conditions—cold or warm, sunny or rainy. It is also strongly encouraged that parents apply sunscreen to their child prior to sending him/her to school on days where the weather warrants it.”

**For Sample Policy: Curriculum Addition**

The inclusion of a sun safety program such as SunWise in health or regular classroom education is one key part of the new policy. Providing students with the necessary knowledge and skills, while creating an environment that reinforces these practices, will be most effective.

Example: “Incorporate the SunWise Program into the health or regular classroom curriculum. Included is a chart designed to assist staff in determining how this integration can be accomplished.”

## *Donation Letter—Sample*

John Smith  
Town Tree Farm  
111 Main Street  
Town, State 00000

Dear Sir/Madam:

I am the *[insert title/position]* at *[School Name]*. The purpose of this letter is to inform you that we are committed to providing our children with a healthy and safe environment. Overexposure to the sun can cause serious health problems such as skin cancer, premature aging of the skin, and other skin disorders; cataracts and other eye damage; and immune system suppression.

We know children need to be physically active, but they must learn to protect themselves from overexposure to ultraviolet (UV) radiation. Our school has developed sun safety practices to provide each student the support needed to be sun safe. Sun damage to the skin is cumulative. At *[School Name]*, we recognize that everyday sun exposure matters.

Because of these factors, we're asking businesses like yours, who believe in the health and safety of the children in our communities, for donations to help our school increase the shade on our school property. Our school needs to improve sun protection for our children. The plan is to plant trees and construct shade structures to optimize the shade usage for our children and staff. These trees and shade structures will contribute to the beautification of our school environment, but more importantly, they will provide much needed shade and reduce the possible risk of skin cancer for our children.

I will give you a call in the near future to see if a donation would be possible. In the meantime, if you have any questions, please contact me at *[insert phone number]* or *[insert email address]*.

Thank you in advance for your consideration and support.

Sincerely,

*[Name]*

*[Title/Position]*



## Sample SunWise School Policy

To assist you with the development of your SunWise School Policy, refer to the Checklist (see page 7) to select the practices that your school has chosen to implement. Adapt this template with your new school policy for inclusion in the school handbook:

At [*School Name*], we are dedicated to the health and well being of our community. Because of this, we have developed this SunWise policy to ensure that all students and staff attending our school are protected from overexposure to the harmful ultraviolet (UV) rays of the sun. This policy documents our SunWise protection practices in the areas of environment, school policies, and behavior. These practices will be applied to all outdoor school events, including recreational activities and field trips.

### Objectives

The goals of our SunWise policy are:

- Increase sun safety awareness in our school and in our surrounding communities.
- Adopt practical, realistic sun protection measures.
- Help our students acquire SunWise behaviors by educating them about the dangers of overexposure to UV rays and measures they can take to protect themselves.
- Develop strategies that encourage students and staff to make responsible decisions about sun safety.
- Encourage students and staff to use broad-spectrum sunscreen and wear protective clothing, appropriate hats, and sunglasses when outdoors.
- Open a line of communication with parents and community members about our school's SunWise policy.

### Environment

In the creation of a sun-safe environment for staff and students, [*School Name*] will:

- Increase the number of shelters and trees to provide adequate shade on the school grounds.
- Try to schedule outdoor activities before 10 a.m. and after 4 p.m., especially during the months when UV radiation is most intense.
- Hold outdoor activities in shady areas whenever possible.

### Policy

It is our policy that [School Name] will:

- Subscribe to EPA's daily EnviroFlash UV emails and disseminate UV Index values when appropriate.
- Include parents and guardians in creation of all SunWise school policies.
- Work with parents to provide SPF 30+, broad-spectrum, water-resistant sunscreen for student use.
- Make sunscreen available to students and staff.
- Ensure that sun safety policies are reflected in the planning of all outdoor events, including field trips.

### Behavior

Our school believes in encouraging sun-safe behaviors in our students and staff. [School Name] will:

- Encourage staff and parents to act as role models for students by practicing sun-safe behaviors.
- Encourage the daily application of sunscreen before school and prior to outdoor activity.
- Allow children to wear sunglasses that block 100 percent of UVA and UVB, and hats, which will help protect the face, neck, eyes, and ears, whenever they are outside.
- Encourage students to use available shaded areas for outdoor activities.

### Evaluation

[School Name] will, in collaboration with parents, guardians, and community members, review the effectiveness of this SunWise policy each year. We will:

- Review the SunWise behaviors of students and staff.
- Assess the amount and quality of shade provided on school grounds.
- Assess the use of shade by students and staff.

References from:

*Fun for Everyone*, Anti-Cancer Council of Victoria, SunSmart, 1994.

*The Sun Safety Activity Guide*, National Safety Council.

Special thanks to Karen Emmons, Ph.D. and Jodie Zwirn, MPH, Dana Farber Cancer Institute, and Alan Geller, RN, MPH, Harvard University, for their contributions to the updated *Policy Information* section.

## Integrating Sun Protection into Lesson Plans

*Instructions: Sun protection can be integrated throughout all aspects of the regular classroom curriculum in each grade. Use this tool as a guide to find appropriate sun protection lessons for the classroom. Determine the skills to be used and the amount of time allotted before selecting an activity.*

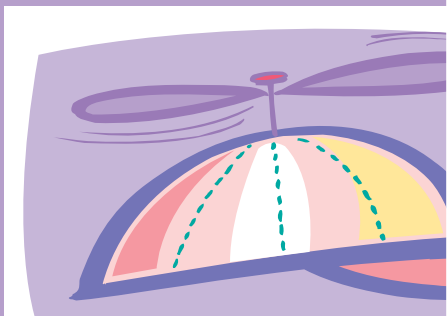
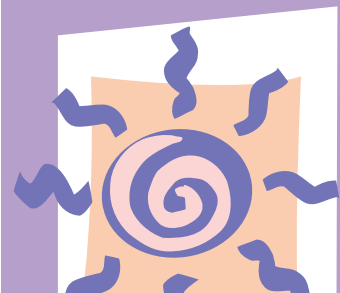
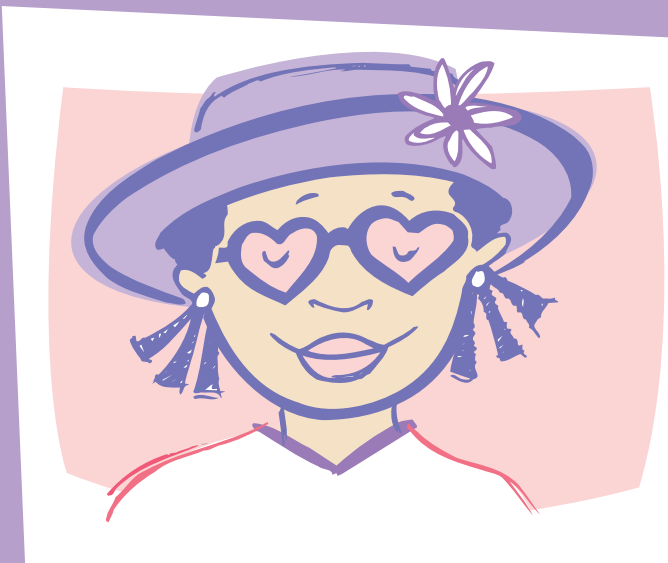
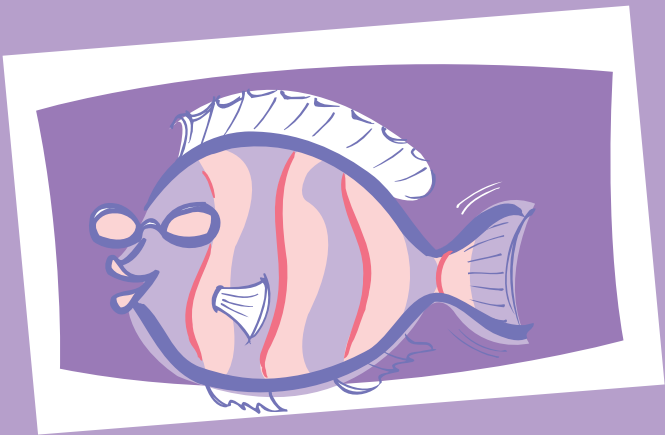
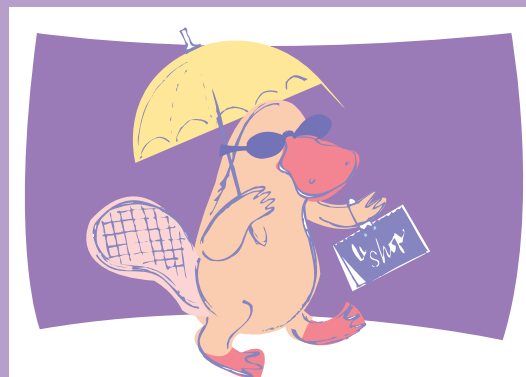
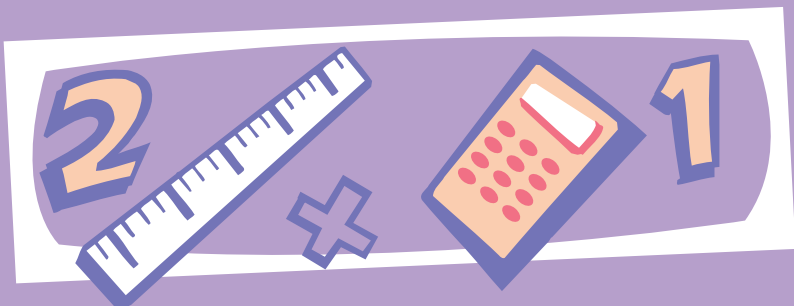
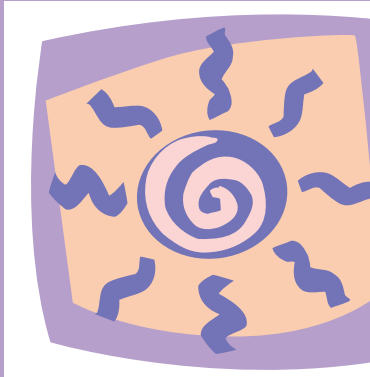
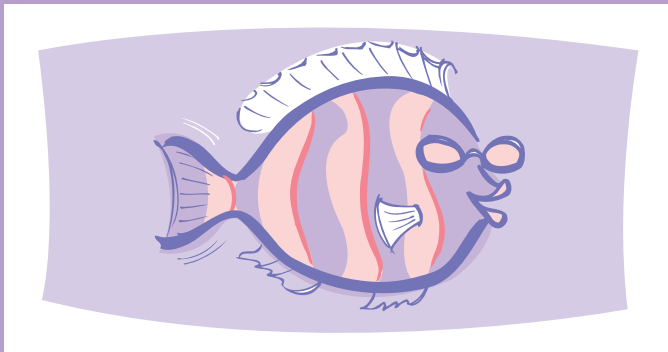
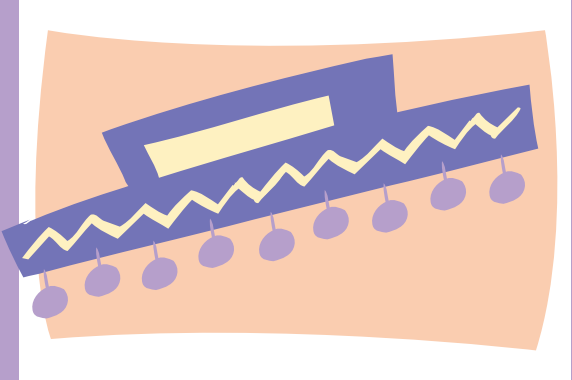
Grades K–2 Activities	Subjects	Approximate Time (Minutes)	Focus/Skill	Pages
A SunWise Legend	English/LA, Social Studies	15–20	Story, sun	1–3
Hot Potato with the Sun	Health, P.E.	varies	Reinforcement	5
A SunWise Beach Party	Math	15	Addition, drawing	7–8
Buy SunWise	Math, English/LA	30–60	Counting, money	9–10
Speedy Sun Relay Race	P.E., Health	30	Running, game	11–12
Sunny Says	P.E., Health	20	Game	13
Watch Your Shadow	Science, English/LA	2 intervals of 15 minutes each	Shadows, demonstration	15–16
The Sun Shines Around the World	Social Studies, English/LA, Science	20–45	Geography, research, customs	17–18
Keep an Eye on Sun Safety	Science, English/LA	15–20	Creative thinking, presentation	19
<b>SUPPLEMENTAL</b>				
Wacky Paper Sunglasses	Art, Science	20	Crafts, cutting, demonstration	20–21
SunWise Word Search	English/LA	varies	Reinforcement	22–23

*Grades 3–5 and 6–8 continue on the following pages.*

Grades 3–5 Activities	Subjects	Approximate Time (Minutes)	Focus/Skill	Pages
Sun Scoop	English/LA, Health, Science	30–60	Investigating, reporting	1–2
SunWise Word Scramble	English/LA	15–20	Reinforcement	3–4
SunWise Virtual Vacation	English/LA, Social Studies	45	Internet, research, writing	5–7
The Sun Shines Around the World	English/LA, Science, Social Studies	20–45	Geography, research, customs	9–10
Sun Myths from the Internet	English/LA, Social Studies	30–45	Internet, research, writing	11–12
SunWise Fashion Show	Health	60	Presentation	13–14
UV Frisbee Fun	English/LA, Health, P.E.	30	Demonstration, game	15–16
Personal Skin Assessment	Health, P.E., Social Studies	30	Self-assessment	17–18
Sun Safety Survey	Math	20	Percentages, graphs	19–20
SunWise Word Problems	Math	40–50	Word problems	21–22
Measure Your Shadow	Math, Health, Science	3 intervals of 15 minutes each	Shadows, demonstration, graphs	23–25
Speedy Sun Relay Race	P.E., Health	30	Game	27–28
Sun Science	Science, English/LA	30	Demonstration	29–30
The Ozone and Me	Science, English/LA	30	Reading, ozone, atmosphere, Earth	31–34
UV Frisbee Science	Science	30–40	Demonstration, charting	35–37
Map a SunWise Town	Social Studies, Science	40–50	Maps, measure, draw, writing	39–40
Be a SunWise Traveler	Math, Social Studies, English/LA, Science	45–60	Computations, maps, reading	41–43
A SunWise Legend	English/LA, Social Studies	60	Creative writing, mythology	45–47
Keep an Eye on Sun Safety	English/LA, Science	30–45	Creative thinking, presentation	49–51
<b>SUPPLEMENTAL</b>				
Sunny Crossword	English/LA	10–15	Reinforcement	53–58
WordWise	English/LA	45–50	Writing	59–60
<b>UV METER ACTIVITIES</b>				
What Works? Effectively Blocking UV Rays	Science	40–50	Demonstration, observation	UV 3–4
Chart and Graph UV Intensity	Science, Math	40–50	Charting, measure, predicting	UV 5–6
Reflecting UV Radiation	Science, Math	30	Demonstration, predicting	UV 7–9

Grades 6–8 Activities	Subjects	Approximate Time (Minutes)	Focus/Skill	Pages
A Sunny Performance	English/LA, Health	50–60	Presentation, creative thinking	1–2
SunWise Show	English/LA, Health	2–3 classes	Creative writing, presentation, crafts	3–4
Sun Scoop	English/LA, Health, Science	30–60	Investigating, reporting, writing	5–6
SunWise Virtual Vacation	English/LA, Health, Social Studies	45	Internet, research, writing	7–10
Sun Mythology	English/LA, Social Studies	30–45	Creative writing, mythology	11–12
Sunsational Scientists in History	English/LA, Social Studies	30–45	Research, astronomy, writing	13–15
The Sun Shines Around the World	English/LA, Science, Social Studies	20–45	Geography, research, customs	17–18
Why Does Winter Make Some People SAD?	English/LA, Health	30–45	Comprehension, health effects	19–22
Sun-safe Beach Party	English/LA, Health, P.E.	30–45	Situational	23–24
UV Frisbee Fun	English/LA, Health, P.E.	30	Demonstration, game	25–26
Personal Skin Assessment	English/LA, Health, P.E., Social Studies	30	Self-assessment	27–28
Bargain Shopper	Math	45	Budget, research	29–30
Skin Cancer in Your State	English/LA, Math	40–50	Percentages, ratios, graphs	31–35
SunWise Surveyor	English/LA, Health, Math, Science	1–2 classes	Maps, dimensions	37–39
You Are the Architect	English/LA, Health, Math, Science, Art	more than 1 class period	Drawing, creative thinking	41–42
Detecting UV Light Using Tonic Water	English/LA, Science	40–50	Demonstration, writing	43–44
Gumdrop Science	Science	40–50	Demonstration, ozone, atmosphere, Earth	45–48
UV Frisbee Science	Science	30	Demonstration, charting	49–51
Be a SunWise Traveler	English/LA, Health, Math, Social Studies	45–60	Computations, maps, reading	53–55
A SunWise Legend	English/LA, Social Studies	60	Creative thinking, mythology	57–59
Keep an Eye on Sun Safety	English/LA, Health, Science	30–45	Creative thinking, presentation	61–63
Wild for Sun Protection	Science, English/LA	30–60 per activity	Research, presentation	65–68
UV ABCs	Science, Health, English/LA	2–3 classes	Research, presentation	69–71
<b>SUPPLEMENTAL</b>				
SunWise Flier	English/LA	30–45	Computer graphics	72–74
SunWise Word Problems	Math	40–50	Word problems	75–76
<b>UV METER ACTIVITIES</b>				
What Works? Effectively Blocking UV Rays	Science	40–50	Demonstration, observation	UV 3–4
Chart and Graph UV Intensity	Science, Math	40–50	Charting, measure, predicting	UV 5–6
Reflecting UV Radiation	Science, Math	30	Demonstration, predicting	UV 7–9

# SunWisdom



**SunWise**<sup>®</sup>   
a program that **radiates** good ideas  
A Partnership Program of the U.S. Environmental Protection Agency  
[www.epa.gov/sunwise](http://www.epa.gov/sunwise)



## Action Steps for Sun Protection

*While some exposure to sunlight can be enjoyable, too much can be dangerous. Overexposure to ultraviolet (UV) radiation in sunlight can result in a painful sunburn. It can also lead to more serious health effects, including skin cancer, premature aging of the skin, and other skin problems; cataracts and other eye damage; and immune system suppression. Children particularly need sun protection education, since unprotected exposure to the sun during youth puts them at an increased lifetime risk for skin cancer.*

### **Be SunWise**

Most people are not aware that skin cancer, while largely preventable, is the most common form of cancer in the United States, with more than 3.5 million cases diagnosed each year. By following a number of simple steps, you can still enjoy your time in the sun while protecting yourself from overexposure. In cooperation with a number of leading public health organizations, the U.S. Environmental Protection Agency (EPA) is providing these action steps to help you and your family be “SunWise.” Other than staying

indoors, no single step can fully protect you from overexposure to UV radiation, so use as many of the following actions as possible.

### **Do Not Burn**

Overexposure to the sun is the most preventable risk factor for skin cancer.

### **Avoid Sun Tanning and Tanning Beds**

UV rays from tanning beds and the sun cause skin cancer and wrinkling. If you want to look like you’ve been in the sun, consider using a sunless self-tanning product, but continue to use sunscreen with it.

### **Generously Apply Sunscreen**

Generously apply sunscreen to all exposed skin using a Sun Protection Factor (SPF) of at least 30 that provides broad-spectrum protection from both ultraviolet A (UVA) and ultraviolet B (UVB) rays. Reapply every two hours, even on cloudy days, and after swimming or sweating.

### **Wear Protective Clothing**

Wear protective clothing, such as a long-sleeved shirt, pants, a wide-brimmed hat, and sunglasses, when possible.

### **Seek Shade**

Seek shade when appropriate, remembering that the sun’s UV rays are strongest between 10 a.m. and 4 p.m.

### **Use Extra Caution Near Water, Snow, and Sand**

Water, snow, and sand reflect the damaging rays of the sun, which can increase your chance of sunburn.

### **Check the UV Index**

The UV Index provides important information to help you plan your outdoor activities in ways that prevent overexposure to the sun’s rays. Developed by the National Weather Service and EPA, the UV Index is issued daily nationwide.

### **Get Vitamin D Safely**

Get Vitamin D safely through a diet that includes vitamin supplements and foods fortified with Vitamin D. Don’t seek the sun.

Early detection of melanoma can save your life. Carefully examine all of your skin once a month. A new or changing spot should be evaluated.



## Use as Directed: Getting the Most Out of Sunscreen

The U.S. Food and Drug Administration (FDA) is the federal agency responsible for regulating sunscreens. Effective June 18, 2012, FDA issued final regulations that established a standard test for over-the-counter (sold without a prescription) sunscreen products that determine which products are allowed to be labeled as “Broad Spectrum.” FDA extended the compliance dates for testing and labeling until December 17, 2012 for most over-the-counter sunscreen products.

Prior FDA rules on sunscreens dealt almost exclusively with protection against sunburn, which is primarily caused by ultraviolet B (UVB) radiation from the sun, and did not address ultraviolet A (UVA) radiation, which contributes to skin cancer and early skin aging. After reviewing the latest science, FDA determined that sufficient data are available to establish a “broad spectrum” test for determining a sunscreen product’s

UVA protection. Passing the broad spectrum test shows that the product provides UVA protection that is proportional to its UVB protection.

Sunscreen products that pass the broad spectrum test are allowed to be labeled as “Broad Spectrum.” These “Broad Spectrum” sunscreens protect against both UVA and UVB rays. Scientific data demonstrated that products that are “Broad Spectrum SPF 15 [or higher]” have been shown to reduce the risk of skin cancer and early skin aging when used with other sun protection measures, in addition to helping prevent sunburn. Other sun protection measures include limiting time in the sun and wearing protective clothing.

EPA follows the recommendation of the National Council on Skin Cancer Prevention in recommending the use of SPF 30 or higher sunscreen. The SPF value indicates the level of sunburn protection provided by the

sunscreen product. All sunscreens must be tested according to an SPF test procedure. The test measures the amount of ultraviolet (UV) radiation exposure it takes to cause sunburn when a person is using a sunscreen in comparison to how much UV exposure it takes to cause sunburn when they do not use a sunscreen. The product is then labeled with the appropriate SPF value indicating the amount of sunburn protection provided by the product. Higher SPF values (up to 50) provide greater sunburn protection. Because SPF values are determined from a test that measures protection against sunburn caused by ultraviolet B (UVB) radiation, SPF values only indicate a sunscreen’s UVB protection. However, sunscreens that pass the new broad spectrum test will have demonstrated that they also provide ultraviolet A (UVA) protection that is proportional to their UVB protection. To pass the broad spectrum test, sunscreens with higher SPF values

will provide higher levels of UVA protection as well. Therefore, under the new label requirements, a higher SPF value for sunscreens labeled “Broad Spectrum SPF [value]” will indicate a higher level of protection from both UVA and UVB radiation.

FDA advises the public to be aware that no sunscreens are “waterproof” because all sunscreens eventually wash off. Sunscreens can only be labeled as “water resistant” if they are tested according to the required SPF test procedure. Sunscreens labeled “water resistant” will also be required to state whether the sunscreen remains effective for 40 minutes or 80 minutes when swimming or sweating, and all sunscreens will be required to provide directions on when to reapply.

In summary, the final rule includes the following requirements:

- **Broad Spectrum designation.** Sunscreens that pass FDA’s broad spectrum test procedure, which measures a product’s ultraviolet A (UVA) protection relative to its ultraviolet B (UVB) protection, may be labeled as “Broad Spectrum SPF [value]” on the front label. For Broad Spectrum sunscreens, SPF values also

indicate the amount or magnitude of overall protection. Broad Spectrum SPF products with SPF values higher than 15 provide greater protection and may claim additional uses, as described in the next bullet.

- **Use claims.** Only Broad Spectrum sunscreens with an SPF value of 15 or higher can claim to reduce the risk of skin cancer and early skin aging if used as directed with other sun protection measures. Non-Broad Spectrum sunscreens and Broad Spectrum sunscreens with an SPF value between 2 and 14 can only claim to help prevent sunburn.
- **“Waterproof,” “sweatproof” or “sunblock” claims.** Manufacturers cannot label sunscreens as “waterproof” or “sweatproof,” or identify their products as “sunblocks,” because these claims overstate their effectiveness. Sunscreens also cannot claim to provide sun protection for more than 2 hours without reapplication or to provide protection immediately after application (for example— “instant protection”) without submitting data to support these claims and obtaining FDA approval.

- **Water resistance claims.** Water resistance claims on the front label must indicate whether the sunscreen remains effective for 40 minutes or 80 minutes while swimming or sweating, based on standard testing. Sunscreens that are not water resistant must include a direction instructing consumers to use a water resistant sunscreen if swimming or sweating.
- **Drug Facts.** All sunscreens must include standard “Drug Facts” information on the back and/or side of the container.

### Additional Resources

[www.fda.gov/downloads/forconsumers/consumerupdates/ucm258718.pdf](http://www.fda.gov/downloads/forconsumers/consumerupdates/ucm258718.pdf)

[www.fda.gov/forconsumers/consumerupdates/ucm258468.htm#Q1\\_Why\\_is\\_FDA](http://www.fda.gov/forconsumers/consumerupdates/ucm258468.htm#Q1_Why_is_FDA)

If used as directed with other sun protection measures, this product reduces the risk of skin cancer and early skin aging, as well as helps prevent sunburn. Only products labeled with both “Broad Spectrum” AND SPF 15 or higher have been shown to provide all these benefits.



<b>Drug Facts</b>	
<b>Active Ingredients</b> Avobenzone 3% Homosalate 10% Octyl methoxycinnamate 7.5%	<b>Purpose</b> Sunscreen
<b>Uses</b> <ul style="list-style-type: none"> <li>• helps prevent sunburn</li> <li>• if used as directed with other sun protection measures (see <b>Directions</b>), decreases the risk of skin cancer and early skin aging caused by the sun</li> </ul>	
<b>Warnings</b> <b>For external use only</b> <b>Do not use</b> on damaged or broken skin <b>When using this product</b> keep out of eyes. Rinse with water to remove. <b>Stop use and ask a doctor</b> if rash occurs <b>Keep out of reach of children.</b> If product is swallowed, get medical help or contact a Poison Control Center right away.	
<b>Directions</b> <ul style="list-style-type: none"> <li>• apply liberally 15 minutes before sun exposure</li> <li>• reapply:               <ul style="list-style-type: none"> <li>• after 40 minutes of swimming or sweating</li> <li>• immediately after towel drying</li> <li>• at least every 2 hours</li> </ul> </li> <li>• <b>Sun Protection Measures.</b> Spending time in the sun increases your risk of skin cancer and early skin aging. To decrease this risk, regularly use a sunscreen with a broad spectrum SPF of 15 or higher and other sun protection measures including:               <ul style="list-style-type: none"> <li>• limit time in the sun, especially from 10 a.m. – 2 p.m.</li> <li>• wear long-sleeve shirts, pants, hats, and sunglasses</li> </ul> </li> <li>• children under 6 months: Ask a doctor</li> </ul>	
<b>Inactive ingredients</b> aloe extract, barium sulfate, benzyl alcohol, carbomer, dimethicone, disodium EDTA, jojoba oil, methylparaben, octadecene/MA copolymer, polyglyceryl-3 distearate, phenethyl alcohol, propylparaben, sorbitan isostearate, sorbitol, stearic acid, tocopherol (vitamin E), triethanolamine, water	
<b>Other information</b> <ul style="list-style-type: none"> <li>• protect this product from excessive heat and direct sun</li> </ul>	
<b>Questions or comments?</b> Call toll free 1-800-XXX-XXXX	

These products have not been shown to protect against skin cancer and early skin aging. They have been shown only to help prevent sunburn.



<b>Drug Facts</b>	
<b>Active Ingredients</b> Avobenzone 3% Homosalate 10% Octyl methoxycinnamate 7.5%	<b>Purpose</b> Sunscreen
<b>Uses</b> • helps prevent sunburn	
<b>Warnings</b> <b>Skin Cancer/Skin Aging Alert:</b> Spending time in the sun increases your risk of skin cancer and early skin aging. This product has been shown only to prevent sunburn, <b>not</b> skin cancer or early skin aging. <b>For external use only</b> <b>Do not use</b> on damaged or broken skin <b>When using this product</b> keep out of eyes. Rinse with water to remove. <b>Stop use and ask a doctor</b> if rash occurs <b>Keep out of reach of children.</b> If product is swallowed, get medical help or contact a Poison Control Center right away.	
<b>Directions</b> • apply liberally 15 minutes before sun exposure • reapply: • after 40 minutes of swimming or sweating • immediately after towel drying • at least every 2 hours • children under 6 months: Ask a doctor	
<b>Inactive ingredients</b> aloe extract, barium sulfate, benzyl alcohol, carbomer, dimethicone, disodium EDTA, jojoba oil, methylparaben, octadecene/MA copolymer, polyglyceryl-3 distearate, phenethyl alcohol, propylparaben, sorbitan isostearate, sorbitol, stearic acid, tocopherol (vitamin E), triethanolamine, water	
<b>Other information</b> • protect this product from excessive heat and direct sun	
<b>Questions or comments?</b> Call toll free 1-800-XXX-XXXX	

# Health Effects of Sun Overexposure

*Since the appearance of an “ozone hole” over the Antarctic in the 1980s, Americans have become aware of the health threats posed by depletion of stratospheric ozone, which protects the Earth from the sun’s harmful ultraviolet (UV) rays. This fact sheet provides a quick overview of the major health problems linked to overexposure to UV radiation:*

- Skin cancer (melanoma and nonmelanoma)
- Premature aging of the skin and other skin problems
- Cataracts and other eye damage
- Immune system suppression

Understanding these risks and taking a few sensible precautions will help you enjoy the sun while lowering your chances of sun-related health problems later in life.

## **Skin Cancer**

One in five Americans will develop skin cancer in their lifetime. Medical research is helping us understand the causes and effects of skin cancer. Many health and education groups

are working to reduce the incidence of this disease, of which more than 3.5 million cases are diagnosed each year.

## **Melanoma**

Melanoma, the most serious form of skin cancer, is characterized by the uncontrolled growth of pigment-producing cells. One American dies of melanoma every hour. By 2015, it is estimated that one in 50 Americans will develop melanoma in their lifetime. Many dermatologists believe there may be a link between childhood sunburns and melanoma later in life. The rate of new melanoma cases in this country has nearly doubled in the past two decades, and the rise is expected to continue.

## **Nonmelanoma Skin Cancers**

Nonmelanoma skin cancers are generally less deadly than melanomas. Nevertheless, left untreated, they can spread, causing disfigurement and more serious health problems. More than 2 million Americans are diagnosed with nonmelanoma skin cancer each

year. There are two primary types of nonmelanoma skin cancers.

*Basal Cell Carcinomas* are the most common type of skin cancer tumors. They usually appear as small, fleshy bumps or nodules on the head and neck, but can occur on other skin areas. Basal cell carcinoma grows slowly, and rarely spreads to other parts of the body. It can, however, penetrate to the bone and cause considerable damage.

*Squamous Cell Carcinomas* are tumors that may appear as nodules or as red, scaly patches. This cancer can develop into large masses, and unlike basal cell carcinoma, it can spread to other parts of the body.

These two cancers have a cure rate as high as 95 percent if detected and treated early. The key is to watch for signs and seek medical treatment.

### Other Skin Damage

Other UV-related skin problems include actinic keratoses and premature aging of the skin. Actinic keratoses are skin growths that occur on body areas exposed to the sun. The face, hands, forearms, and the “V” of the neck are especially susceptible to this type of lesion.

Although premalignant, actinic keratoses are a risk factor for squamous cell carcinoma. Look for raised, reddish, rough-textured growths and seek prompt medical attention if you discover them. Chronic overexposure to the sun also causes premature aging, which over time can make the skin become wrinkled, thick, and leathery. Since it occurs gradually, often manifesting itself many years after the majority of a person’s sun exposure, premature aging is often regarded as an unavoidable, normal part of growing older. With proper protection from UV radiation, however, most premature aging of the skin can be avoided.

### Cataracts and Other Eye Damage

Cataracts are a form of eye damage in which a loss of transparency in the lens of the eye clouds vision. If left untreated, cataracts can lead to blindness. Research has shown that UV radiation increases the likelihood of certain cataracts. Although curable with modern eye surgery, cataracts diminish the eyesight of millions of Americans and cost billions of dollars in medical care each year. Other kinds of eye damage include pterygium (tissue growth that can block vision), skin cancer around the eyes, and degeneration of the macula (the part of the retina where visual perception is most acute). All of these problems can be lessened with proper eye protection.

### Immune Suppression

Scientists have found that overexposure to UV radiation may suppress proper functioning of the body’s immune system and the skin’s natural defenses. All people, regardless of skin color, may be vulnerable to effects, including impaired response to immunization and an increased sensitivity to sunlight that may result from interactions with certain medications.

### EPA’s SunWise Program

In response to the serious public health threat posed by overexposure to UV radiation, EPA is working with schools and communities across the nation through the SunWise Program. SunWise aims to teach children and their caregivers how to protect themselves from overexposure to the sun.

# Ozone: Good Up High, Bad Nearby

## What is Ozone Anyway?

Ozone ( $O_3$ ) is made naturally in the atmosphere when three oxygen atoms join together to form a colorless gas. Ozone can have good or bad effects, depending on where it's located in the atmosphere. One way to remember this is, "good up high, bad nearby."

## Good Up High

### The "Good" Ozone Layer: Earth's Sunscreen

The earth is wrapped in layers of air called the atmosphere. "Good" ozone is in the earth's upper atmosphere, 10 to 30 miles above the surface. Life couldn't exist without this protective ozone, which is also called the "ozone layer."

The sun gives off light, heat, and other types of radiation. Too much UV (ultraviolet) radiation can cause skin cancer, cataracts, and harm plants and animals. Ozone high in the atmosphere absorbs, or takes in, some of the sun's harmful UV rays before they reach the ground. Just as sunscreen helps protect your skin from getting burned, ozone up high works like Earth's sunscreen.

## The Ozone Hole is Not a Hole

Although we say "hole in the ozone layer" or "ozone hole," there's no actual hole. Instead, the protective layer contains less good ozone than it used to. This thinning is found all over the earth, but the biggest losses are over the North and South Poles. That's because ozone destruction is worse when it's very cold.

To see current levels of ozone over the South Pole, go to:  
[ozonewatch.gsfc.nasa.gov](http://ozonewatch.gsfc.nasa.gov).

The trouble with ozone destruction starts when certain chemicals used in air conditioners, fire extinguishers, insulating foams, and solvents are let out during use. These chemicals eventually reach the upper atmosphere and are broken down by the sun's radiation, releasing chlorine and bromine atoms. These atoms take away one of the oxygen atoms from ozone and use them to make other substances. Chlorine and bromine atoms are catalysts, meaning they can speed up a chemical reaction without changing, and can repeat the destructive cycle again with another ozone molecule. So one chlorine or

bromine atom can destroy thousands and thousands of ozone molecules, causing ozone to disappear much faster than nature can replace it.

People often confuse the ozone hole with global warming, but they are two different problems.

## Is Anyone Doing Anything About the Ozone Hole (That's Not a Hole)?

The Montreal Protocol is an international treaty that protects the ozone layer by phasing out the manufacture and use of ozone-depleting chemicals. It was enacted in 1989, and all of the countries in the world have signed it. Many ozone-depleting chemicals are now illegal to use, or are only used in small quantities. If all countries meet the terms of the Montreal Protocol, scientists expect the ozone layer to heal by around 2050.

Because of the Montreal Protocol, levels of most ozone-depleting chemicals in the atmosphere have slowly gone down. As a result, the size of the ozone "hole" has remained pretty much the same in recent years.

Today, any products in the U.S. containing CFCs and other ozone-depleting chemicals must have warning labels. The U.S. also prohibits the release of refrigerants used in car and home air conditioners into the air, because they still use ozone-depleting chemicals.

#### **Why Can't We Just Make More Ozone?**

Ozone molecules are constantly being made and destroyed by the sun's ultraviolet light in natural processes. Normally, the amount made and the amount destroyed is about the same, so nothing changes. Think of the amount of ozone as the water level in a bathtub with the faucet running and the drain open. If you turn on the water just right, you can make the amount of water leaving the bathtub equal to the amount coming in, so that the water level never changes. But right now, the drain has gotten faster, and the amount of ozone destroyed is more than the ozone being made.

A big reason we can't make more ozone to send into the upper atmosphere is because it would take a LOT of energy. In fact, to make the amount of ozone normally found in

the upper atmosphere, you'd need about double the electricity that we use in the U.S. every year. In the atmosphere, this huge amount of energy comes from the sun. We also don't have a way to transport the ozone to the right places in the atmosphere.

Since we can't make more ozone, the solution is to slow the flow down the drain back to its normal rate. And the only way to do *that* is to stop using ozone-depleting chemicals.

#### **Bad Nearby**

##### **What Causes "Bad" Ozone?**

"Bad" ozone is found at ground level. In cities, it's made when emissions from vehicles, power plants, chemical plants, and other sources react with heat and sunlight. The hotter the day and the stronger the sun, the more ozone is formed. That's why ozone is usually worst on windless, hot summer afternoons. High levels of ozone are mainly a concern for people from April 1–September 30.

You're most likely to find high levels of "bad" ozone in urban areas. You might hear it called "smog." However, other areas can also have high ozone

levels when winds blow pollution hundreds of miles from their original sources.

#### **How Does "Bad" Ozone Affect Me?**

Even at low levels, breathing ozone can cause chest pains, coughing, nausea, throat irritation, and congestion. It can also worsen heart and lung diseases, like emphysema, bronchitis, and asthma. The more ozone pollution a person breathes, the more permanent damage it can do to her lungs.

Healthy people can also find it harder to breathe when exposed to ozone pollution. Because it usually forms in hot weather, anyone who spends time outdoors in the summer may be affected, particularly children, older people, outdoor workers, and people exercising. Millions of Americans live in areas where ozone levels are higher than the national health standards, and should pay attention to ozone levels when the weather is hot and sunny.



### Ways to Protect Your Health on Bad Ozone Days:

- Use the Air Quality Index (AQI). The AQI uses colors and numbers to tell you how much pollution is in the air: [www.airnow.gov](http://www.airnow.gov).
- Use the EPA's Activity Guidelines at your school and sports practices to keep your kids healthy: [www.epa.gov/airnow/school\\_flag/school-chart-2013.pdf](http://www.epa.gov/airnow/school_flag/school-chart-2013.pdf).
- Do outdoor activities early in the morning and after 6 p.m.
- Pay attention to any breathing or lung problems you might have.

### How Are We Dealing With Ozone Pollution?

The Clean Air Act Amendments of 1990 require the US Environmental Protection Agency, the States, and cities to carry out programs that reduce emissions of ozone-forming chemicals from sources like cars, industry, power plants, and consumer products. Power plants are reducing emissions, companies are developing cleaner cars and fuels, many gas stations are using special nozzles at the pumps to recapture gasoline vapors, and vehicle inspection programs are being improved to reduce emissions.

### What Can I Do?

We can control some things, and some things we can't. Here are some things you can do. And remember, lots of small steps add up to big differences!

#### To Limit "Bad," Nearby Ozone

- Keep your car tuned-up and running well.
- Carpool, use mass transit, walk, bicycle, and plan trips efficiently to reduce driving, especially on hot summer days.
- Be careful not to spill gas when filling up your car or gas-powered lawn equipment. During the summer, fill your gas tank during cooler evening hours.
- Make sure your car's tires are properly inflated and your wheels are aligned.
- Participate in your local utility's energy conservation programs.
- Seal containers of household cleaners, workshop solvents, and garden chemicals to prevent chemicals from evaporating into the air. Dispose of them properly.

### To Protect "Good" Ozone Up High

- Have your car, home air conditioning, and refrigerator checked for leaks.
- Make sure that the technicians working on your air conditioners and refrigerator are certified to recover the refrigerant, as required by law.
- Find out from your local government the best way to get rid of old refrigerators and air conditioners.

### How Can I Protect Myself from UV Rays?

- Use the UV (ultraviolet) Index: The UV Index tells you how strong the sun's rays will be for the day: [www2.epa.gov/sunwise/uv-index](http://www2.epa.gov/sunwise/uv-index).
- Don't Get Burned: Sunburns, especially for children, significantly increase the risk of getting skin cancer over your lifetime.
- Avoid Sun Tanning and Tanning Beds: The UV radiation causes skin cancer and wrinkling.

**Use Enough Sunscreen:** At least 15 minutes before going outside, put on about one ounce of sunscreen over all exposed skin. Sunscreen should have a Sun Protection Factor (SPF) of at least 30 and provide protection from both ultraviolet A (UVA) and ultraviolet B (UVB) rays. Reapply every two hours, even on cloudy days, and after swimming or sweating.

**Wear Protective Clothing,** such as a long-sleeved shirt, pants, a wide-brimmed hat, and sunglasses, when possible.

**Seek Shade** when you can. Remember, the sun's rays are strongest from 10 a.m. to 4 p.m.

**Use Extra Caution Near Water and Sand:** They reflect the sun's rays, which can increase your chance of sunburn.

**Get Vitamin D Safely:** Choose foods fortified with Vitamin D or take vitamin supplements. Don't seek the sun.

### **The Shadow Rule**

Look for your shadow to estimate your UV exposure:

- If your shadow is taller than you are (in the early morning and late afternoon), you're probably getting less UV exposure.
- If your shadow is shorter than you are (around midday), you are getting higher levels of UV radiation. Seek shade and protect your skin and eyes.

# UV Radiation

The sun radiates energy over a broad spectrum of wavelengths. Ultraviolet (UV) radiation, which has a shorter wavelength than either visible blue or violet light and is not visible to the human eye, is responsible for sunburns and other adverse health effects (Diagram A). Fortunately for life on Earth, our atmosphere's stratospheric ozone layer shields us from most UV radiation. What gets through the ozone layer, however, can cause the following problems, particularly for people who spend time outdoors without sun protection:

- Skin cancer
- Premature aging of the skin
- Suppression of the immune system
- Cataracts and other eye damage

Because of these serious health effects, you should limit your exposure to UV radiation and protect yourself when outdoors.

## Types of UV Radiation

Scientists classify UV radiation into three types or bands—UVA, UVB, and UVC.

**UVA:** Not absorbed by the ozone layer.

**UVB:** Mostly absorbed by the ozone layer, but some does reach the Earth's surface.

**UVC:** Completely absorbed by the ozone layer and oxygen in the atmosphere.

UVA and UVB that reach the Earth's surface contribute to the serious health effects listed above.

## UV Levels Depend on a Number of Factors

The level of UV radiation that reaches the Earth's surface can vary, depending on many factors. Each of the following factors can increase your risk of UV radiation overexposure and its consequent health effects.

## Stratospheric Ozone

The ozone layer absorbs most of the sun's UV rays, but the amount of absorption varies depending on the time of year and other natural phenomena. This absorption has also decreased as the ozone layer has thinned, due to the release of ozone-depleting substances that have been widely used in industry.

## Time of Day

The sun is at its highest in the sky around noon. At this time, the sun's rays have the least distance to travel through the atmosphere and UVB levels are at their highest. In the early morning and late afternoon, the sun's rays pass through the atmosphere at an angle and their intensity is greatly reduced.

## Time of Year

The sun's angle varies with the seasons, causing the intensity of UVB rays to change. UVB intensity tends to be highest during the summer months. The intensity of UVA rays is relatively constant throughout the year.

### Latitude

The sun's rays are strongest at the equator, where the sun is most directly overhead and UV rays must travel the least distance through the atmosphere (Diagram B).

Ozone also is naturally thinner in the tropics compared to the mid and high latitudes, so there is less ozone to absorb the UV radiation as it passes through the atmosphere. At higher latitudes the sun is lower in the sky, so UV rays must travel a greater distance through ozone-rich portions of the atmosphere and, in turn, expose those latitudes to less UV radiation.

### Altitude

UV intensity increases with altitude because there is less atmosphere to absorb the damaging rays. Thus, when you go to higher altitudes, your risk of overexposure increases.

### Weather Conditions

Cloud cover reduces UVB levels, but not completely. Depending on the type and thickness of the cloud cover, it is possible to burn—and increase your risk for long-term skin and eye damage—on a cloudy day.

### Reflection

Some surfaces, such as snow, sand, concrete, or water, can reflect much of the UV radiation that reaches them. Because of this reflection, UV intensity can be deceptively high even in shaded areas.

Diagram A

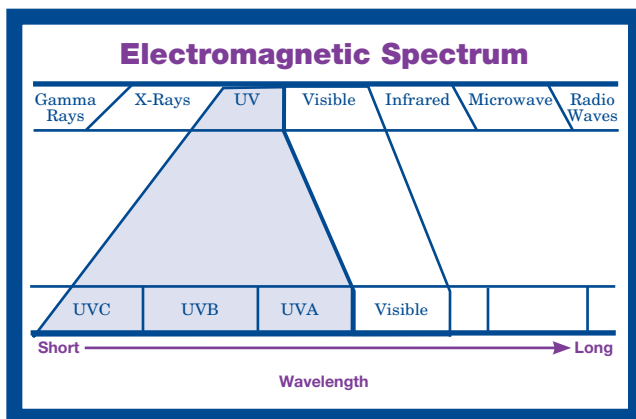
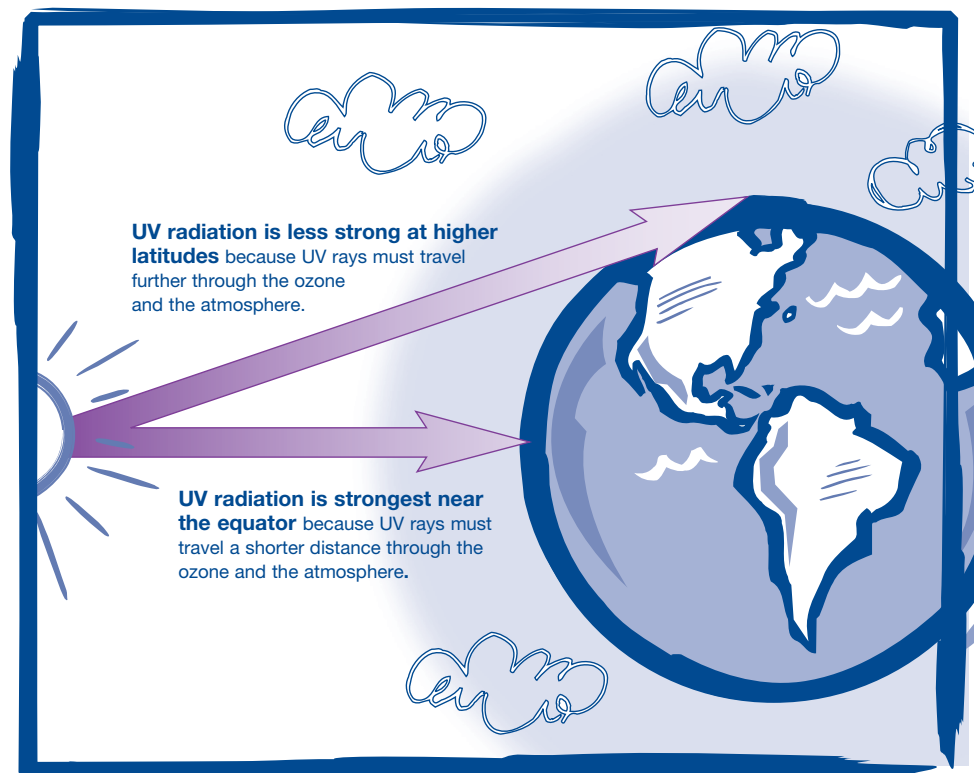


Diagram B



## What Is the UV Index?

Some exposure to sunlight can be enjoyable; however, too much could be dangerous. Overexposure to the sun’s ultraviolet (UV) radiation can cause immediate effects, such as sunburn, and long-term problems, such as skin cancer and cataracts. The UV Index, which was developed by the National Weather Service and EPA, provides important information to help you plan your outdoor activities to prevent overexposure to the sun’s rays.

The UV Index provides a daily forecast of the expected risk of overexposure to the sun. The Index predicts UV intensity levels on a scale of 0 to 11+, where  $\leq 2$  indicates a low risk of overexposure and 11+ signifies an extreme risk. Calculated on a next-day basis for every ZIP Code across the United States, the UV Index takes into account clouds and other local conditions that affect the amount of UV radiation reaching the ground in different parts of the country.

UV Index Number	Exposure Level
2 or less	Low
3 to 5	Moderate
6 to 7	High
8 to 10	Very High
11+	Extreme

### SunWise Action Steps

By taking a few simple precautions daily, you can greatly reduce your risk of sun-related illnesses. To be SunWise, consider taking the following action steps daily:

- Do Not Burn
- Avoid Sun Tanning and Tanning Beds
- Generously Apply Sunscreen

- Wear Protective Clothing, Including a Hat, Sunglasses, and Full-Length Clothing
- Seek Shade
- Use Extra Caution Near Water, Snow, and Sand
- Check the UV Index
- Get Vitamin D Safely

Early detection of melanoma can save your life. Carefully examine all of your skin once a month. A new or changing spot should be evaluated.

### What is the UV Alert?

EPA issues a UV Alert when the level of solar UV radiation reaching your local area is predicted to be unusually intense for the time of year. The UV Alert is a warning, and it offers simple steps you can take to protect yourself and your family. The UV Alert consists of the SunWise action steps and is posted by ZIP Code and City, State at [www.epa.gov/sunwise/uvindex.html](http://www.epa.gov/sunwise/uvindex.html).

**What does the UV Alert mean?**

The UV Alert is based on the UV Index, which EPA provides with the support of the National Weather Service. EPA only issues a UV Alert when the UV Index is predicted to be 6 or higher and unusually intense for the time of year. In some parts of the United States, the UV Index rarely or never reaches this level, so your local area may never receive a UV Alert.

UV Alert days are not the only days you need to protect yourself. EPA recommends that you take the SunWise action steps every day, regardless of the season. Because

children typically spend more time outdoors than adults, it is especially important that children take these steps. Even if you have darker skin, EPA recommends that you act SunWise to reduce your risk of skin cancer, cataracts, and other UV-related health problems.

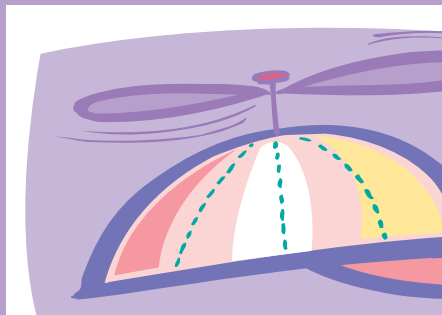
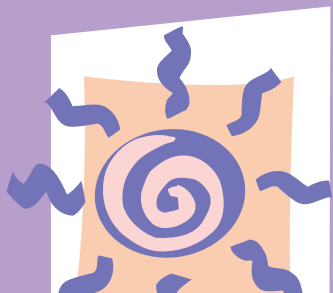
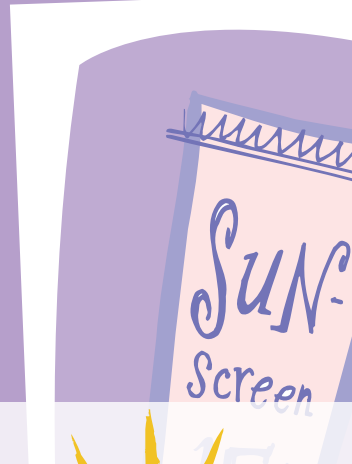
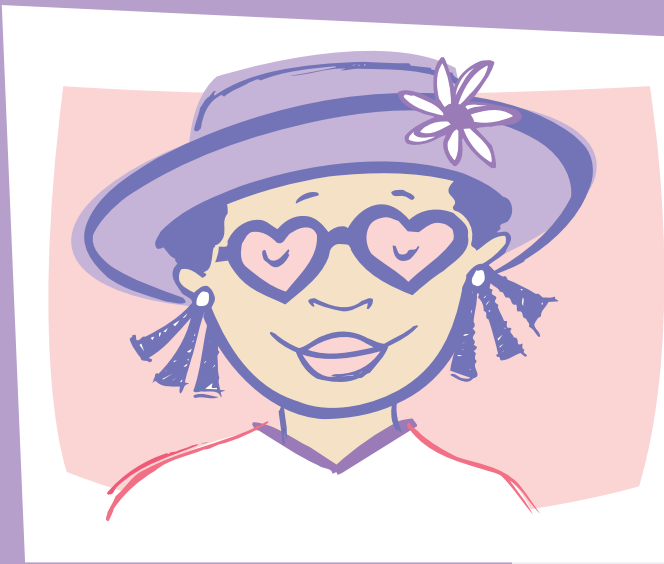
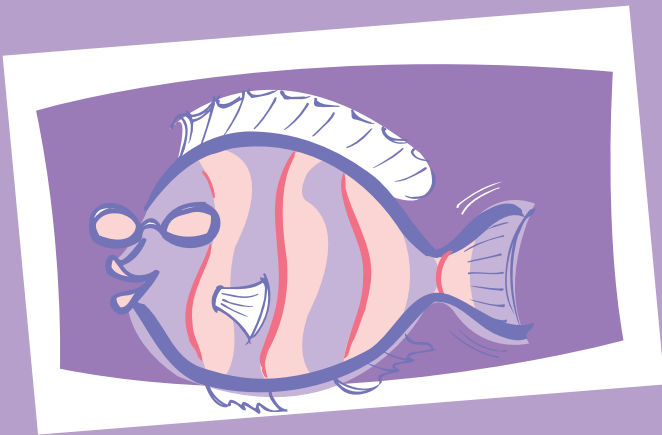
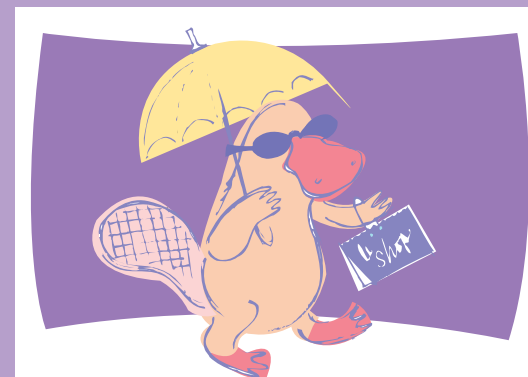
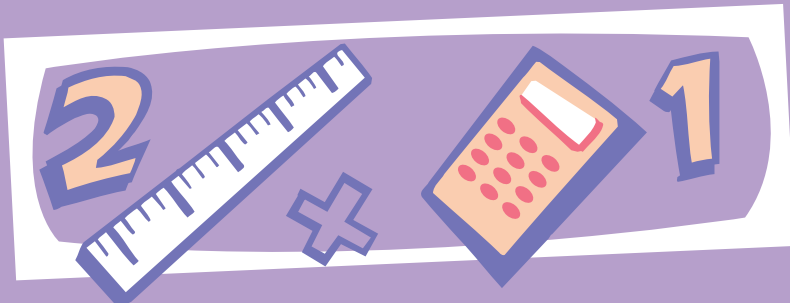
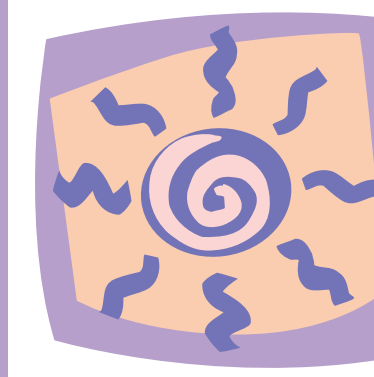
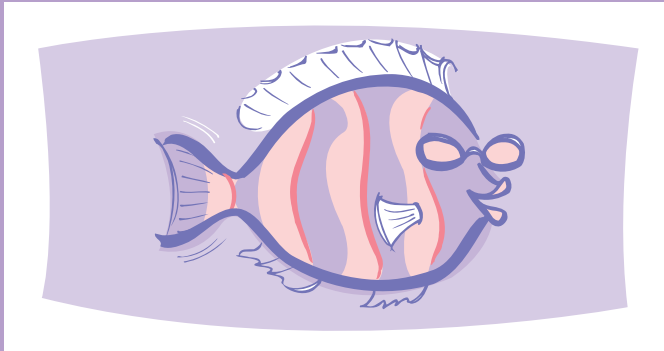
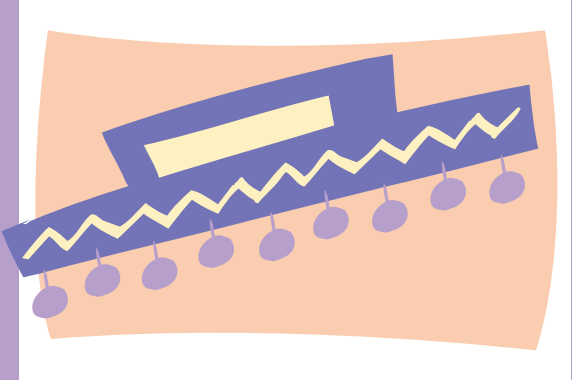
**Where can I find the UV Index and UV Alert forecasts for my area?**

You can find the UV Index and UV Alert forecasts for your area in your local newspaper, on television, and by visiting EPA's SunWise website at [www.epa.gov/sunwise](http://www.epa.gov/sunwise). Enter your ZIP Code. The resulting UV forecast will indicate if there is a UV Alert.

The SunWise website will direct you to EPA's EnviroFlash website, where you can sign up to receive the daily UV Index and occasional UV Alerts directly by email.

The National Weather Service is currently offering a national UV Alert map as an experimental product. The map indicates which parts of the country have a UV Alert forecast for the coming day. Follow the link from the SunWise website to the map.

# materials



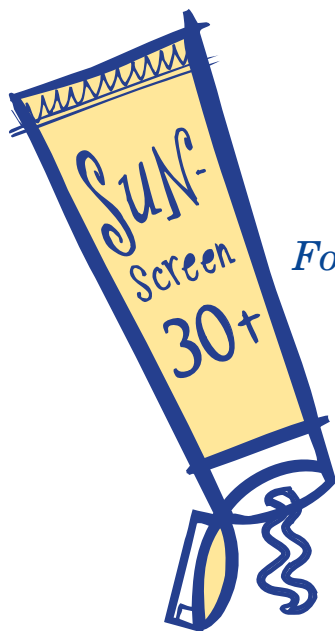
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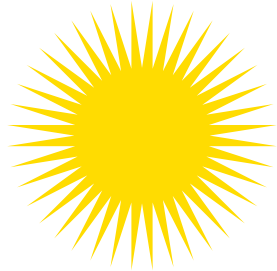
## UV INDEX CHART



UV Index Number	Exposure Level
2 or Less	Low
3 to 5	Moderate
6 to 7	High
8 to 10	Very High
11 +	Extreme

# Action Steps for Sun Protection

Do Not Burn



Avoid Sun Tanning and Tanning Beds

Generously Apply Sunscreen



Wear Protective Clothing



Seek Shade



Use Extra Caution Near Water, Snow, and Sand

Check the UV Index

UV Index Number	Exposure Level
2 or Less	Low
3 to 5	Moderate
6 to 7	High
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Get Vitamin D Safely

Early detection of melanoma can save your life