



WORLD HEALTH ORGANIZATION  
2003

# SUN PROTECTION

## A Primary Teaching Resource





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Designed by Con Stamatis, The Cancer Council Victoria

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# PREFACE

Children are more sensitive to ultraviolet (UV) radiation damage than adults, and sunburn during childhood increases the risk of skin cancer and eye damage (particularly cataracts) later in life, and suppresses the immune system.

During the first 18 years of life, when much of the lifetime UV radiation exposure is received, a significant proportion of time is spent at school or participating in school-based activities, such as camps or school sports. School children are also especially susceptible to fashion trends, suggesting that a suntan is healthy, and skills-based health education can help them to resist peer pressure.

It is important to target children's attitudes and behaviour at a young age, particularly at primary school, when children tend to be most receptive to the need for sun protection. Individuals who develop such life skills at a young age are more likely to adopt and sustain a healthy lifestyle during schooling and for the rest of their lives.

Experts worldwide participated in the International Workshop on Children's Sun Protection Education, organized by the World Health Organization (WHO), held in Orvieto, Italy, on 4 October 2001.

Based on the outcomes of this workshop, WHO has developed a comprehensive package of materials for children's sun protection education.

This includes:

- *Sun Protection and Schools: How to Make a Difference*, which describes the importance of sun protection in schools, and outlines necessary steps for establishing a school programme.

- *Sun Protection: A Primary Teaching Resource*, which is for primary school teachers and provides suggestions and ready-made teaching activities.
- *Evaluating School Programmes to Promote Sun Protection*, which is for schools, and educational and health authorities.

This teaching resource, prepared by Eva Rehfues, WHO, aims to provide primary school teachers with a starting point to incorporate sun protection into the curriculum and school activities. Realizing the general shortage of time and financial resources, the suggested materials and activities are intended to help teachers address sun protection without much extra time or preparation. The resource draws heavily on the experience of the SunSmart Campaign schools programme in Australia, and the SunWise school programme in the United States.

## ***How can Sun Protection: A Primary Teaching Resource be used?***

This resource offers ideas and materials to make it as easy as possible for teachers to integrate sun protection into their classroom activities. It describes a comprehensive approach to sun protection, provides background information on UV radiation and sun protection, and suggests a variety of teaching strategies and interdisciplinary approaches. It is intended to provide guidance, rather than be prescriptive.

Teaching materials and lesson plans from existing programmes were selected and grouped for two different age groups – early primary school (ages 6–9) and late primary school (ages 10–12) – although these age groupings will vary slightly from country to country.

Teachers can put the ready-made lesson plans directly into action. However, they may also refer to these as a list of ideas for the development of their own lesson plans.

Additional information, teaching resources, and activities can be obtained from the list of sun protection school programmes and interactive websites for children in the section titled "Further information".

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# A COMPREHENSIVE APPROACH TO SUN PROTECTION

Adopting an integrated approach to help students, teachers, staff, and the wider community to avoid health risks of ultraviolet (UV) radiation exposure can make a school programme on sun protection very effective. Important elements include sun protection education, a healthy school environment, and community and family involvement. Not all schools will have the resources to integrate sun protection into all of these components. It is more important to start with small, feasible changes than to wait until resources become available to address all components simultaneously.

## ***Skills-based health education***

Skills-based health education helps individuals to develop knowledge, attitudes, values, and life skills that are needed to make positive health-related decisions, and to put these into daily practice. Therefore, sun protection education must be culturally and geographically relevant. It can be made practical by developing the immediate connection with the structural and social environment children live in.

## ***A supportive environment***

While it is a personal decision to adopt sensible sun behaviour, positive choices can be supported through adequate structural and policy measures. The availability of shade structures at schools and day care centres is likely to reduce children's UV radiation dose significantly. A sun protection policy expresses a school's commitment to sun protection, and may address the use of clothing and sunscreen, the scheduling of outdoor activities, and the provision of shade on the school grounds.

## ***Community involvement***

Healthy sun-protective practices are more likely to take place if there is consistent information and support from the family, the school, and the community. While improving parents' behaviour can help promote sun protection for their children, the reverse may also be true: the messages children take home can encourage parents to adopt more sun-protective behaviours themselves. Sun-protective interventions can be a means of involving the broader community in school-based activities. Community members who have themselves experienced health problems relating to UV radiation exposure are often willing to provide first hand accounts to others. Sports days and school fairs are ideal opportunities for the school to showcase its sun protection strategies.



# TEACHING STRATEGIES

Use of a variety of educational methods can greatly enhance effective health education. Objectives and activities are most effective if they have a practical focus and are relevant to students' own experiences. The selected teaching modules presented under "Teaching activities" draw on a wide range of different educational methods to increase knowledge, build positive attitudes and values, dispel myths, increase skills, and provide support for a healthy lifestyle.

## Communication methods to convey knowledge

- Lecture
- Storytelling
- Panel discussion
- Programmed instruction
- Audiovisually-aided instruction
- Guest speaker
- Demonstration
- Peer teaching
- Non-directive teaching
- Individual instruction on independent student research project

## Methods to influence attitudes and skills

- Open discussion
- Inquiry and experimentation
- Field trip to community resource
- Behaviour modification
- Concept formation
- Construction of model
- Competition
- Role play
- Debate
- Design of sun-protective item, e.g. clothing, shade structure
- Game
- Simulation
- Modelling of behaviour
- Problem solving

## Organizational methods to bring about community-wide changes

- Organizing school or community groups for specific purpose
- Committee work

# INTERDISCIPLINARY APPROACHES

Sun protection education can be integrated into a range of curriculum areas. The most obvious of these is science, where, for example, the nature of UV radiation can be explored, and students can investigate the structure and function of the skin, the eye and the immune system, and the effects of UV radiation. However, sun protection can also be advanced in combination with a range of other subject areas, such as mathematics and the arts. Sun protection education may be combined with efforts addressing

other health issues as appropriate. For example, a primary school programme on safety could include topics such as road safety, hygiene, tobacco avoidance, healthy eating habits, and safe behaviour in the sun. Ideally, sun protection education would also be incorporated into the school's extracurricular activities, particularly outdoor events.

The tables below provide examples of links between individual teaching modules and curriculum areas.

Curriculum Area	Sun Protection Activity
<i>Science</i>	<ul style="list-style-type: none"> <li>• Sun scientists, Unit 1, page 14</li> <li>• Smarter than the average dog, Unit 1, page 14</li> <li>• Ozone and me, Unit 1, page 15</li> <li>• How is my skin damaged?, Unit 2, page 15</li> <li>• Personal sunburn danger zones, Unit 2, page 16</li> <li>• Hot spots, Unit 3, page 17</li> </ul> <p><b>Other ideas</b></p> <ul style="list-style-type: none"> <li>• Describe how different length shadows are formed by an object in the same position at different times of the day.</li> <li>• Discuss whether daily temperature fluctuations follow daily UV Index variations.</li> <li>• Compare the skin of different family members to identify signs of UV radiation exposure.</li> </ul>
<i>Mathematics</i>	<p><b>Other ideas</b></p> <ul style="list-style-type: none"> <li>• Shady characters, Unit 3, page 17</li> <li>• Show a range of times when it is most safe and least safe to be outdoors, using clock faces, with the times written under the clocks.</li> </ul>
<i>Language</i>	<p><b>Other ideas</b></p> <ul style="list-style-type: none"> <li>• How is my skin damaged?, Unit 2, page 15</li> <li>• Sell your own sunscreen, Unit 3, page 16</li> <li>• Write down five key messages for sun protection.</li> <li>• Design and market sun-protective items such as clothes, hats, and parasols.</li> </ul>
<i>Arts/Humanities</i>	<ul style="list-style-type: none"> <li>• Smarter than the average dog, Unit 1, page 14</li> <li>• Sell your own sunscreen, Unit 3, page 16</li> <li>• Hot spots, Unit 3, page 17</li> <li>• Shady characters, Unit 3, page 17</li> </ul> <p><b>Other ideas</b></p> <ul style="list-style-type: none"> <li>• Develop a poster or mural about an aspect of sun protection.</li> <li>• Fold your own sunhat (see Worksheets G and H).</li> <li>• Make a sun protection mascot using easily accessible materials.</li> </ul>
<i>Environmental Studies/Geography</i>	<ul style="list-style-type: none"> <li>• Ozone and me, Unit 1, page 15</li> <li>• Shady characters, Unit 3, page 17</li> </ul> <p><b>Other ideas</b></p> <ul style="list-style-type: none"> <li>• Plant a tree, and discuss what benefits trees have for the environment and human beings.</li> <li>• Identify situations and geographic locations where sun protection is particularly important.</li> </ul>

This is intended to help select relevant activities depending on the chosen curriculum area or available time slot. Other ideas are listed that can be further

developed according to the school's curriculum, the ages and capabilities of the students, and the teacher's objectives.

<b>Curriculum Area</b>	<b>Sun Protection Activity</b>
<i>Science</i>	<ul style="list-style-type: none"> <li>• Weather watch, Unit 1, page 20</li> <li>• My skin, Unit 2, page 20</li> <li>• My eye, Unit 2, page 21</li> <li>• Fads and fashions, Unit 3, page 23</li> <li>• Sun protection survey, Unit 3, page 24</li> </ul> <p><b>Other ideas</b></p> <ul style="list-style-type: none"> <li>• Describe the characteristics and structure of skin.</li> <li>• Identify types of UV radiation and their characteristics.</li> <li>• Investigate the impact of latitude on the level of UV radiation.</li> </ul>
<i>Mathematics</i>	<ul style="list-style-type: none"> <li>• Weather watch, Unit 1, page 20</li> <li>• Sun protection survey, Unit 3, page 24</li> </ul> <p><b>Other ideas</b></p> <ul style="list-style-type: none"> <li>• Tally answers to questions about attitudes to health and sun protection and graph the results.</li> <li>• Develop a measuring system to assess the amount of shade available in the school.</li> </ul>
<i>Language</i>	<ul style="list-style-type: none"> <li>• Going on holiday, Unit 1, page 19</li> <li>• Buddy talk, Unit 2, page 22</li> <li>• What if, Unit 3, page 23</li> <li>• Sun protection survey, Unit 3, page 24</li> </ul> <p><b>Other ideas</b></p> <ul style="list-style-type: none"> <li>• Prepare information about sun protection for an audience that speaks another language, e.g. a poster.</li> <li>• Find definitions for some key terms such as "UV radiation," "SPF," "sunsmart" etc.</li> </ul>
<i>Arts/Humanities</i>	<ul style="list-style-type: none"> <li>• Going on holiday, Unit 1, page 19</li> <li>• Buddy talk, Unit 2, page 22</li> <li>• Fads and fashions, Unit 3, page 23</li> </ul> <p><b>Other ideas</b></p> <ul style="list-style-type: none"> <li>• Make up and perform songs about sun protection.</li> <li>• Consider occupations and leisure activities that expose people to the sun and how these might be varied to improve safety.</li> </ul>
<i>Environmental Studies/Geography</i>	<ul style="list-style-type: none"> <li>• Weather watch, Unit 1, page 20</li> <li>• Understanding the UV Index, Unit 1, page 19</li> <li>• Going on holiday, Unit 1, page 19</li> </ul> <p><b>Other ideas</b></p> <ul style="list-style-type: none"> <li>• Design a building, e.g. school building, that is energy efficient and incorporates shade.</li> <li>• Conduct a debate about the need for further action in relation to ozone depletion.</li> <li>• Role play the deliberations of a committee whose objective is to decide the need for action on use of chemicals contributing to ozone depletion.</li> <li>• Conduct a debate about the need to prevent further clearing of trees/plant more trees in the school ground/community.</li> </ul>

# BACKGROUND INFORMATION

## Unit 1: The sun and UV radiation

### *The sun has beneficial and harmful effects*

The sun is essential for life on Earth. It supports life through photosynthesis in plants, and by providing warmth and light. In addition, sunlight is critical to human physical and psychological well-being.

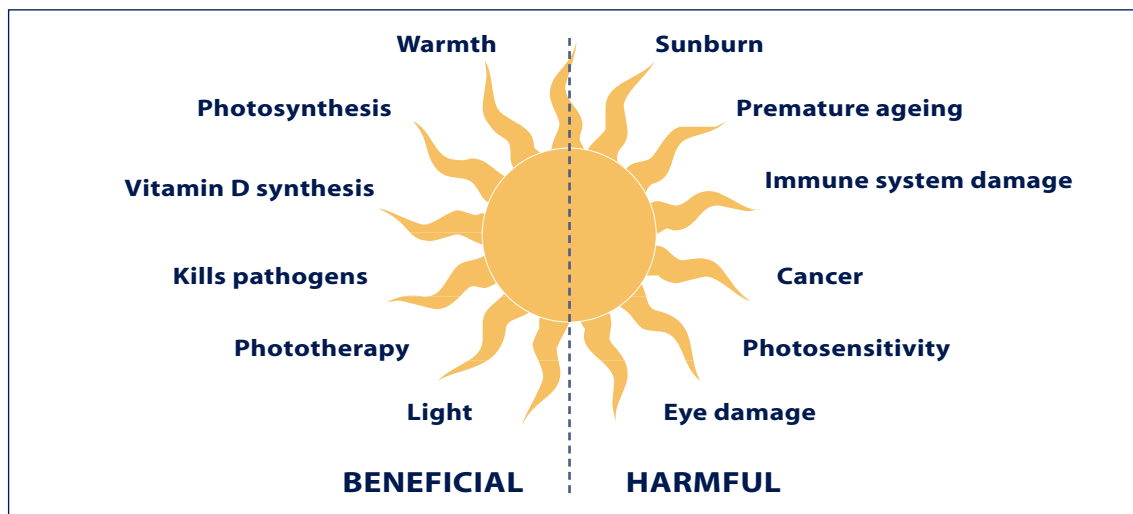
*Figure 1: Beneficial and harmful effects of sunlight*

### *The sun has rays that we cannot see or feel called UV radiation*

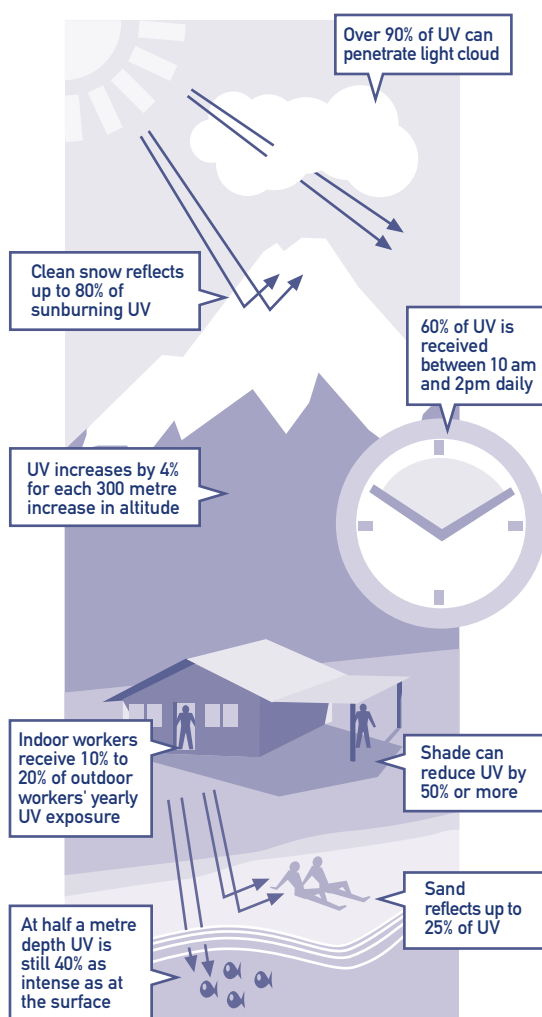
The sun emits light and warmth but also UV radiation. UV radiation cannot be seen or felt – UV radiation levels are independent of temperature and can still be high even when it is cloudy.

### *UV radiation levels vary depending on several factors*

- Time of day – the higher the sun in the sky, the higher the UV radiation level. The sun is at its highest at around noon.
- Time of year – UV radiation levels are generally highest during the summer months.
- Geographic location – the sun's rays are strongest at the equator, where the sun is most directly overhead. The closer the equator, the higher the UV radiation levels.
- Altitude – UV radiation levels increase with altitude because there is less atmosphere to absorb the damaging rays.
- Clouds – heavy cloud cover usually reduces UV radiation levels.
- Environment – UV rays are reflected off surfaces such as snow, water, sand, and concrete. This indirect UV radiation can significantly add to a person's overall exposure.



*Figure 1: Beneficial and harmful effects of sunlight. Adapted from National Safety Council, The Sun Safety Activity Guide.*



**Figure 2: Factors influencing UV radiation**

### **The UV Index, a measure of UV radiation levels**

The Global Solar UV Index describes the level of solar UV radiation at the Earth's surface. It has been designed to indicate the potential for adverse health effects and to encourage people to protect themselves. The values of the index range from zero upward – the higher the index value, the greater the potential for damage to the skin and eye, and the less time it takes for harm to occur. See next page.

In many countries, the UV Index is reported along with the weather forecast in newspapers, on TV, and on the radio. While the levels of UV radiation vary during the day, they reach a maximum around midday. The UV Index is usually presented as a forecast of the maximum amount of UV radiation expected to reach the Earth's surface at solar noon. In countries close to the equator, the UV Index can reach up to 20. Summertime values in northern latitudes rarely exceed 8.

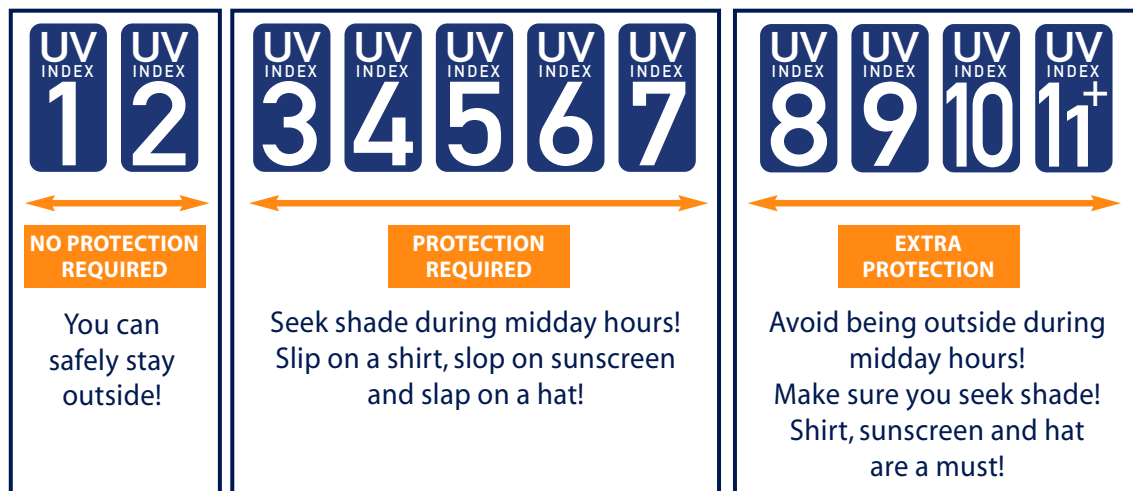
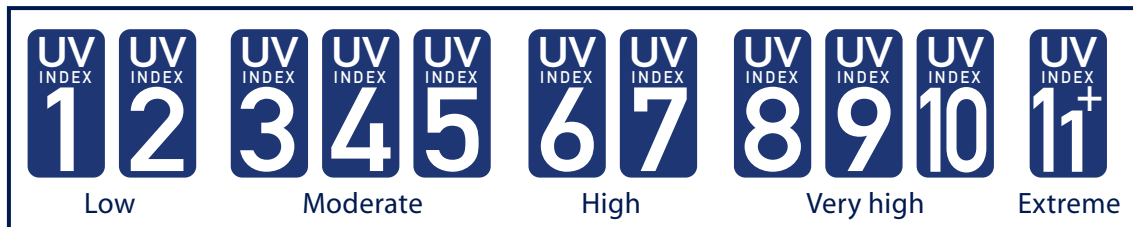


Figure 3: The UV Index can help raise awareness about UV radiation and alert people about the need to adopt protective measures, following WHO's recommended protection scheme. See colour version on back cover.

More detailed information on the UV Index and links to organizations reporting the UV Index can be obtained from the website of Intersun, the Global UV Project, at <http://www.who.int/phe/uv>

### ***The ozone layer blocks out most harmful rays from the sun***

The Earth is mostly protected from UV radiation by the ozone layer. Ozone is a naturally occurring gas found in the Earth's atmosphere. The ozone layer acts like a shield that protects against the harmful effects of UV radiation on human beings. Man-made chemicals – such as the chlorofluorocarbons (CFCs) used in aerosol sprays, refrigerators, and air conditioners – rise into the atmosphere, where they are broken down. This releases chlorine, which depletes some of the protective ozone layer. With the thinning of the ozone layer, increased levels of UV radiation on Earth are expected, and have been measured in some countries.

Some possible outcomes of ozone depletion are:

- an increase in UV radiation-related adverse health effects such as sunburn and skin cancer;
- a possible drop in the production of plankton, which provides the basis for the ocean's food chains;
- lower production of important food crops around the world. Many plants are sensitive to high levels of UV radiation.

The good news about ozone depletion is that most countries have now entered into an agreement, the Montreal Protocol, to severely restrict the use of chemicals which destroy ozone. Actions taken as a result of the Montreal Protocol have decreased the levels of ozone-depleting substances in the atmosphere. This means that concentrations of chlorine in the stratosphere will decrease in years and decades to come. The bad news is that it will not be until the end of the 21st century that most ozone depletion will be reversed. Furthermore, atmospheric changes associated with the greenhouse effect may also have a negative impact on ozone levels.

For further information on ozone depletion and its effects on UV radiation levels, please go to the website of Intersun, the Global UV Project, at <http://www.who.int/phe/uv>

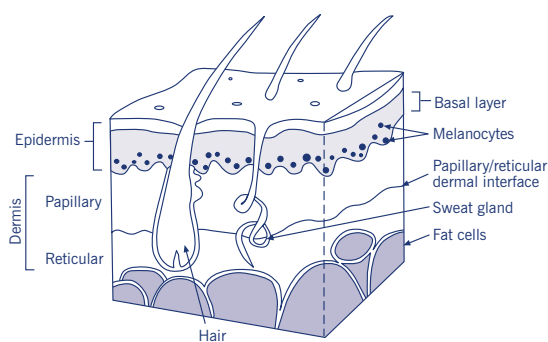
### **Unit 2: Health risks of UV radiation exposure**

#### ***Some UV radiation is necessary – too much is harmful***

Exposure to sunlight enables the body to produce vitamin D, which plays a crucial role in skeletal development, immune function, and blood cell formation. Ten to 15 minutes daily exposure of face, forearms, and hands to normal Northern European summer sun is sufficient to maintain vitamin D levels. Vitamin D deficiency may be a problem for some people, e.g. those with heavily pigmented skin who live in high-latitude areas where UV radiation levels are relatively low, or the housebound elderly.

While some sunlight is beneficial and its light and warmth enhances people's general feeling of well-being, prolonged exposure to UV radiation can cause serious health damage. We know that UV radiation is responsible for sunburn. Furthermore, sun exposure can cause skin cancer, skin ageing, and eye inflammation, and contributes to cataract development. There is also mounting evidence that exposure to UV radiation may weaken the immune system.

While all of these health effects are described in some detail as background information for teachers, it is advisable to avoid mentioning skin cancer to primary school children; instead, talk about skin damage.



**Figure 4: The human skin**

### Suntan

The skin produces the dark-coloured pigment melanin as a shield against damage from UV radiation. There is no such thing as a healthy tan – any colour change from our natural skin colour is a sign of damage and offers little protection against further damage.

### Sunburn

High doses of UV radiation kill most of the cells in the upper skin layer, and cells that are not killed are damaged. In its mildest form, sunburn consists of a reddening of the skin. The effects of a severe sunburn can last for several days, and may include blistering and peeling of the skin.

### Skin ageing

Chronic overexposure to the sun can change the texture and weaken the elasticity of the skin. Sun-induced skin damage causes premature wrinkling, sags and bags, and easy bruising. Up to 90% of the visible changes commonly attributed to ageing may be caused by sun exposure.

### Skin cancer

Frequent UV radiation exposure can cause skin cancer and accelerate cancer progression. Between two and three million non-melanoma skin cancers and approximately 132 000 malignant melanomas occur globally each year. Skin cancer incidence has been increasing in recent decades. Currently, one in five North Americans will develop some form of skin cancer in their lifetime.

The three most common types of skin cancer are basal cell carcinoma, squamous cell carcinoma, and melanoma. In contrast to malignant melanoma, non-melanoma skin cancers are not usually fatal. All forms of skin cancer are extremely rare among children, as cancer development may take several decades. However, frequent sun exposure and sunburn during childhood significantly increase the risk of developing skin cancer later in life.

#### Basal cell carcinoma

Usually appears as a red lump or scaly area. It grows slowly and rarely spreads to other parts of the body.



#### Squamous cell carcinoma

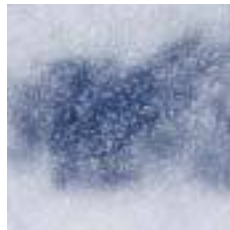
Appears as a thickened red scaly spot at body sites most often exposed to UV radiation, such as the ears, face, neck, and forearms. It tends to be slow growing but is more dangerous than basal cell carcinoma as it sometimes metastasizes and can be fatal.





### Malignant melanoma

Is the rarest but most dangerous type of skin cancer. It may arise as a new mole or as changes in colour, shape, size or sensation of an old spot, freckle or mole.



Melanoma tends to have an irregular outline and a patchy colouring. Itching is another common symptom but is also found in normal moles. If you have a mole, freckle or spot you are concerned about, go and see your doctor. If recognized and treated early, the chances of survival are good.

### Eye inflammation and cataract

Extreme UV radiation conditions such as strong ground reflection from sand, water or snow can lead to inflammations of the cornea and the conjunctiva. These are comparable to a sunburn of the very sensitive skin-like tissues of the eyeball and eyelids.

Snow blindness is an extreme form of corneal inflammation. Overexposure to the sun without eye protection may also lead to cataracts, a loss of transparency in the lens. Cataracts are the leading cause of blindness in the world.

### A weakened immune system

UV radiation may reduce the effectiveness of the immune system. Consequently, too much sun exposure could potentially enhance the risk of infection.

### Everyone is affected by UV radiation

Individuals produce different amounts of melanin, the coloured pigment in the skin, and as a result the skin's

sensitivity to UV radiation differs greatly. While people with pale or freckled skin, fair or red hair and blue eyes burn easily and do not tan much, people with dark hair and eyes rarely burn and may develop a tan more easily.

Naturally brown- and black-skinned people can tolerate much higher levels of sun exposure without getting sunburnt.

### Some individual risk factors for skin cancer

- fair skin
- blue, green or hazel eyes
- light-coloured hair
- tendency to burn rather than suntan
- history of severe sunburns
- many moles
- freckles
- family history of skin cancer

The incidence of skin cancers is much lower in dark-skinned people than in fair-skinned people, nevertheless, skin cancers occur and are often detected at a later, more dangerous stage.

The risk of other UV radiation-related health effects, such as eye damage and suppression of the immune system, is independent of skin type.

### Children are particularly at risk

- Children's skin is more sensitive to UV radiation damage.
- Sunburn in childhood increases the risk of melanoma and other skin cancers later in life.
- Children are more exposed to the sun as they spend a lot of time outdoors.

## Unit 3: Sun safety through sun protection

### *Sun damage is preventable through sensible behaviour*



People's behaviour in the sun is the main cause of the rise in skin cancer rates in recent decades. An increase in popular outdoor activities, and changes in clothing fashions and sunbathing habits, often result in excessive UV radiation exposure. Skin cancer and other UV radiation-related health effects are largely preventable if sun protection practices are followed early and consistently. The key message is to avoid sunburn and practise sun protection.

### *Changing attitudes*

Many people consider intensive sunbathing to be normal and perceive a suntan as a symbol of attractiveness and good health. Unfortunately, even children often adopt this attitude from a young age. Attitudinal barriers to sun protection must be addressed and changed before behaviours will change. Recognizing that people are born with different skin types and strengthening the message that everyone should be happy with their natural skin colour is an important step in promoting "sunsmart" attitudes. It is important to provide opportunities for this to be addressed in teaching about the need for sun protection.

### *Action steps for sun protection*

- **Limit time in the midday sun**  
The sun's UV rays are the strongest between 10 a.m. and 4 p.m. To the extent possible, limit exposure to the sun during these hours.
- **Watch for the UV Index**  
This important resource helps you plan your outdoor activities in ways that prevent overexposure to the sun's rays. While you should always take precautions against overexposure, take special care to adopt sun safety practices when the UV Index predicts exposure levels of very high or above.
- **Use shade wisely**  
Seek shade when UV rays are most intense, but keep in mind that shade structures such as trees, umbrellas or canopies do not offer complete sun protection. Remember the shadow rule: "Watch your shadow – No shadow, seek shade!"

- **Wear protective clothing**

A hat with a wide brim offers good sun protection for your eyes, ears, face, and the back of your neck. Sunglasses that provide 99% to 100% UVA and UVB protection (refer to Glossary) will greatly reduce eye damage from sun exposure. Tightly-woven, loose-fitting clothes will provide additional protection from the sun.

- **Use sunscreen**

Apply a broad-spectrum sunscreen of at least SPF 15 liberally and re-apply every two hours, or after swimming, playing or exercising outdoors.

- **Avoid sunlamps and tanning parlours**

Solariums, sunbeds, and sunlamps all use UV radiation and therefore damage the skin and unprotected eyes. They are best avoided entirely.

*Adapted from the SunWise School Program, United States Environmental Protection Agency*

**All “sunsafe” behaviours should be practised together**

It is best to try to avoid the midday sun or make use of shade, clothing, and hats. Apply sunscreen to those parts of the body that remain exposed, like the face and hands. Sunscreen should never be used to prolong the duration of sun exposure.

### **Facts about sunscreen**

Sunscreen as a means of sun protection has many limitations: it can easily wear off and most people do not apply sufficient amounts. Therefore, sunscreen should not be used as the primary means of sun protection but only in combination with other “sunsafe” measures and behaviours.

SPF stands for “sun protection factor”. This is a laboratory measure, which grades the ability of a sunscreen to block UVB radiation. It is not a number that can be directly translated into an estimate of protection or safe behaviour. Sunscreen should never be used to extend sun exposure.

### **Sun protection is relevant in all settings**

Sun protection is not only necessary on the beach or at the swimming pool but applies to all outdoor settings. In many situations people get sunburnt because they do not realize the need for protection. Children can be exposed to intense sunlight on the balcony at home, on weekend trips or a visit to the zoo, during breaks at kindergarten or school, and during outdoor sporting activities. Encouraging “sunsafe” behaviours as part of the school policy and practising them throughout the school day helps children develop these life skills.

# TEACHING ACTIVITIES

Sample activities are listed below as a starting point for sun protection in primary schools. Basic lesson plans are provided to enable teachers to take on sun protection without having to invest much additional time and resources.

However, these lesson plans can be freely modified to suit cultural and local needs. Teachers who want to be more creative and prefer to develop their own lesson plans may treat these as a resource for ideas.

The activities are grouped for two different age groups, i.e. early primary school (ages 6–9 years) and late primary school (ages 10–12 years).

They illustrate possible interactive approaches to teaching students about each of the following areas:

- The sun and UV radiation (Unit 1)
- Health risks of UV radiation exposure (Unit 2)
- Sun safety through sun protection (Unit 3)

Worksheets for these activities can be found in the Annex.

Activities are tied in with key objectives for the two age groups. Depending on the amount of time available for sun protection, three to five key objectives can be selected. These will help with the assessment and reporting of the children's achievements in relation to sun protection education.

## Early primary teaching activities

### Key objectives

Early primary school (age 6–9 years)
<p><b>KNOWLEDGE</b></p> <p><i>Students will learn that:</i></p> <ul style="list-style-type: none"><li>• The sun has beneficial and harmful effects for living things.</li><li>• Sun exposure causes sunburn and skin and eye damage.</li><li>• Staying indoors or in the shade at certain times of day/year can help to avoid skin and eye damage.</li><li>• Appropriate hats and clothing, sunscreen, and sunglasses can help to protect against damage caused by the sun.</li><li>• Colour change from our natural skin colour is a sign of damage.</li><li>• The Earth has a protective shield called the ozone layer, which blocks most of the harmful rays from the sun.</li></ul>
<p><b>ATTITUDES</b></p> <p><i>Students will demonstrate:</i></p> <ul style="list-style-type: none"><li>• A personal commitment to using sun protection strategies.</li></ul>
<p><b>SKILLS</b></p> <p><i>Students will be able to:</i></p> <ul style="list-style-type: none"><li>• Communicate knowledge about the risks associated with sun exposure and personal attitudes for minimizing sun exposure.</li><li>• Choose appropriate methods of sun protection for particular situations.</li><li>• Apply sunscreen correctly.</li><li>• Identify strategies used by the school to minimize sun exposure.</li><li>• Encourage others to minimize their sun exposure.</li></ul>

## Unit 1: The sun and UV radiation

### Sun scientists

#### Unit: The sun and UV radiation

##### Objectives

Students will:

- Learn that the sun has beneficial and harmful effects for living things.
- Learn that staying in the shade is a way of reducing UV-related health problems.

Disciplines: science, arts/humanities

Methods: lecture, open discussion, experimentation

Resources required: newspaper, fruit, e.g. banana, clay or dough, coloured paper

Become Sun Scientists for a week. Try some of these experiments. Make predictions about what the students think will happen. Do it and see. Were they right?

- Place some newspaper in direct sunlight and another piece in a dark cupboard.
- Place a piece of fruit in direct sunlight and another piece in the shade, both outdoors. A banana works well.
- Place a coil of clay or play dough in direct sunlight and another piece in the shade.
- Place some interesting shapes on a piece of coloured paper in direct sunlight and place a similar grouping in a dark cupboard.

Talk about the changes the sun has caused in each experiment you tried. Record your findings. Discuss how the sun's power cannot be seen but the changes it causes can. Talk about the power of the sun to change our skin by burning it.

## Smarter than the average dog

#### Unit: The sun and UV radiation

##### Objectives

Students will:

- Learn that staying indoors or in the shade at certain times of day/year can help to avoid skin and eye damage.
- Learn that appropriate hats and clothing, sunscreen, and sunglasses can help to protect against damage caused by the sun.

Disciplines: science, arts/humanities

Methods: lecture, storytelling, open discussion, design

Resources required: none

Talk to the students about the ways animals behave in the heat of the day. The website <http://www.foundation.sdsu.edu/sunwisestampede/> may provide useful background information. Where do dogs like to be on a hot day? What do they do? Why are birds busy in the morning and evening, but quiet in the middle of the day? Get them to make some generalizations about animals in summer. Ask whether people are always as smart as animals when it comes to the sun. Point out that temperature and UV radiation are not always linked: even on a cool day, UV radiation levels can be high.

Have the students make some posters about how "sunsmart" animals are when it comes to sun protection.

## Ozone and me

### Unit: The sun and UV radiation

#### Objectives

Students will:

- Learn that the Earth has a protective shield called the ozone layer, which blocks most of the harmful rays from the sun.

Disciplines: science, environmental studies

Methods: lecture, open discussion, problem solving

Resources required: Worksheet A

Draw the illustration on Worksheet A of the Earth's atmosphere on the board, copy it onto an overhead transparency, or photocopy and enlarge it.

Ask if the students have heard about the ozone layer around the Earth. Explain that the ozone layer protects the Earth from too much UV radiation. Talk about the hole scientists have found in the ozone layer over Antarctica. Ask the students what could happen if the ozone layer was destroyed.

Have small groups discuss and list the consequences of damage to the ozone layer. How might the climate change? What might happen to people? Plants? Animals? What predictions can they make about the number of people who could suffer from skin damage and other health effects in the future?

Get the groups to make a chart showing the possible consequences of damage to the ozone layer. Have groups label their charts with suggested ways of avoiding more ozone layer damage. Or have the students draw some of these consequences on the back of Worksheet A.

## Unit 2: Health risks of UV radiation exposure

### How is my skin damaged?

#### Unit: Health risks of UV radiation exposure

#### Objectives

Students will:

- Learn that sun exposure causes sunburn and skin and eye damage.
- Learn that colour change from our natural skin colour is a sign of damage.
- Demonstrate a personal commitment to using sun protection.

Disciplines: science, language

Methods: lecture, storytelling, problem solving

Resources required: tape recorder, tape

Make a list of all the ways our skin can be damaged, e.g. stung, cut, bruised, burnt. Talk about how the body can fix small hurts. Discuss what happens when skin is sunburnt and explain that this damage can lead to long-term changes in the skin such as freckles and other sorts of spots, wrinkles, and lines. Explain that skin 'remembers' every bit of sun it receives, and that skin damage may only show after a long time.

If any students have been sunburnt, ask them to write a story about how they felt. Give the stories titles like *Red, Mad and Sad* or *Sorry Tales of Sunburn*. You could record these stories onto a tape for free time listening.

If students have not been sunburnt, you could have them write about the way they protect themselves from the sun and why.

## Personal sunburn danger zones

### Unit: Health risks of UV radiation exposure

#### Objectives

Students will:

- Learn that sun exposure causes sunburn and skin and eye damage.
- Learn that colour change from our natural skin colour is a sign of damage.
- Learn that appropriate hats and clothing, sunscreen, and sunglasses can help to protect against damage caused by the sun.
- Be able to choose appropriate methods of sun protection for particular situations.

Disciplines: science

Methods: lecture, open discussion, problem solving

Resources required: Worksheet B

Talk about how different parts of our bodies can be sunburnt more quickly than other parts. Ask the students to suggest some of these.

Give the students a copy of Worksheet B and go through the sunburn ranking. Do any of these match the students' suggestions? Discuss how they can take special care to protect the different parts of their bodies from exposure to the sun. Ask what types of covering they could use to protect each part, such as a hat, sunscreen, long shirt, sunglasses, etc. You could also discuss what methods of sun protection might be most appropriate in different situations, e.g. when swimming, playing sport or riding a bicycle. Have them complete the worksheet.

## Unit 3: Sun safety through sun protection

### Sell your own sunscreen

#### Unit: Sun safety through sun protection

#### Objectives

Students will:

- Learn that appropriate hats and clothing, sunscreen, and sunglasses can help to protect against damage caused by the sun.
- Be able to apply sunscreen correctly.

Disciplines: language, arts/humanities

Methods: design, game, role play

Resources required: Worksheet C

Have the students design their own sunscreen using Worksheet C. Get the students to cut out their sunscreen bottle designs. Ask them to try to sell their sunscreen to the class with a "sales pitch". Why is their sunscreen the best? Tape their sales pitches for a later listening activity.

Make a sunscreen bottle-shaped book by writing the "sales pitch" on the back of each one and joining them together. Or simply make a mobile out of the sunscreen bottles by mounting them on cardboard before writing on the back. Fast workers can listen to the tape you made of the sunscreen sales pitches and try to identify who is speaking.

Have students work in groups to put together instructions for correct application of the sunscreen. Conduct a role play where students follow the instructions given by different groups. Discuss whether the instructions are clear and whether they include all the necessary information.

## Hot spots

### Unit: Sun safety through sun protection

#### Objectives

Students will:

- Learn that everyone is at risk from exposure to the sun.
- Learn that staying indoors or in the shade at certain times of day/year can help to avoid skin and eye damage.
- Learn that appropriate hats and clothing, sunscreen, and sunglasses can help to protect against damage caused by the sun.
- Be able to choose appropriate methods of sun protection for particular situations.

Disciplines: science, arts/humanities

Methods: lecture, open discussion, library research

Resources required: world map

Display a map of the world, highlighting the hot climate areas (those between the two tropics) with coloured tapes or paper strips. Get the students to name some of the “hot spot” countries and list these. Is their own country in this group of countries? Are their favourite holiday destinations in this group of countries? Talk about some customs that people in hot climates follow, e.g. many Spanish-speaking countries have a siesta in the heat of the day; in many countries people wear complete cover to protect themselves from the sun.

Have the students work in pairs to carry out library research on life in one of these countries. Ask them to find out:

- What kinds of homes do these people live in?
- What kinds of clothes do they wear?
- How do they protect themselves from the sun?

Get the students to make brief notes about their reading. Encourage them to draw illustrations to match their notes. Each pair can present their findings

to the class. Build up a display of the students’ work. Are there similarities and differences they can notice?

Point out that temperature and UV radiation are not always linked: even on a cool day UV radiation levels can be high. Emphasize that even outside the “hot spot” zones, people are still at risk from exposure to the sun. Discuss whether there are some customs we could adopt from elsewhere to help protect us from the sun.

## Shady characters

### Unit: Sun safety through sun protection

#### Objectives

Students will:

- Learn that staying indoors or in the shade at certain times of day/year can help to avoid skin and eye damage.
- Learn that appropriate hats and clothing, sunscreen, and sunglasses can help to protect against damage caused by the sun.
- Be able to identify strategies used by the school to minimize sun exposure.

Disciplines: mathematics, arts/humanities, environmental studies

Methods: lecture, open discussion, design, field trip, research

Resources required: tree seedling, umbrellas, magazines, e.g. horticultural magazines

Discuss why using shade is an important way to protect the skin from sun damage. Ask the students to name different kinds of shade providers, such as an umbrella, hat, tree, pergola, clothing, sunglasses, shade cloth, a roof.

Try some of these activities:

- Go for a walk around the school just before break or lunchtime and map the shady areas.



- Talk about what games the students like to play in these places.
- Plant a shade tree where shade is needed.
- Take your umbrellas for a walk around the neighbourhood.
- Make a collage out of magazine pictures of shady gardens, houses with verandas and pergolas, etc.
- Label the pictures with the student's explanations of how these things help to keep them and others safe from the sun.

## Late primary teaching activities

### Key objectives

Late primary school (age 10–12 years)
<p><b>KNOWLEDGE</b>  <i>Students will learn that:</i></p> <ul style="list-style-type: none"> <li>• The sun has beneficial and harmful effects for living things.</li> <li>• The sun has rays that we cannot see called UV radiation.</li> <li>• UV radiation is at its maximum at certain times of the day and year.</li> <li>• UV radiation levels are independent of temperature.</li> <li>• UV radiation from the sun can have harmful effects on people, including sunburn, skin damage, eye damage, and skin ageing.</li> <li>• All sources of UV radiation, including tanning beds, can cause damage.</li> <li>• Minimizing outdoor activities at peak UV radiation times is one way to avoid exposure.</li> <li>• Staying in the shade is a way of reducing UV exposure.</li> <li>• Wearing protective clothing, sunscreen, and sunglasses helps to minimize UV exposure.</li> <li>• Suntan and sunburn are signs of skin damage.</li> <li>• Young people can resist the pressure to get a suntan.</li> <li>• Young people can make sensible decisions about using sun protection.</li> <li>• Sunscreen does not completely block UV radiation.</li> <li>• The Earth has a protective shield called the ozone layer, which blocks most of the harmful rays from the sun.</li> </ul>
<p><b>ATTITUDES</b>  <i>Students will demonstrate:</i></p> <ul style="list-style-type: none"> <li>• A personal commitment to using sun protection strategies.</li> <li>• Support for others who choose to use sun protection strategies.</li> <li>• Responsibility for personal health.</li> </ul>
<p><b>SKILLS</b>  <i>Students will be able to:</i></p> <ul style="list-style-type: none"> <li>• Communicate knowledge about the risks associated with sun exposure and personal attitudes for minimizing sun exposure.</li> <li>• Identify times/locations/situations when sun protection is most necessary.</li> <li>• Choose appropriate methods of sun protection for particular situations.</li> <li>• Apply sunscreen correctly.</li> <li>• Identify signs of UV-related damage.</li> <li>• Identify strategies used by the school to minimize sun exposure.</li> <li>• Encourage others to minimize sun exposure.</li> <li>• State the benefits of minimizing UV radiation exposure.</li> <li>• Support others who choose to minimize UV radiation exposure.</li> </ul>

## Unit 1: The sun and UV radiation

### Understanding the UV Index

#### Unit: The sun and UV radiation

##### Objectives

*Students will:*

- Learn that UV radiation is at its maximum at certain times of day and year.
- Learn that wearing protective clothing, sunscreen, and sunglasses helps to minimize UV exposure.
- Be able to identify times/locations/situations when sun protection is most necessary.

*Disciplines: environmental studies, mathematics*

*Methods: lecture, open discussion*

*Resources required: world map*

Ask students whether they have heard of the UV Index. Where have they come across the information? Can they describe what the UV Index is?

Explain that the UV Index is a way of describing the level of solar UV radiation at the Earth's surface. The values of the index range from zero upward – the higher the index value, the greater the potential for damage to the skin and eyes, and the less time it takes for harm to occur.

Discuss some of the factors that influence UV radiation levels at specific locations, e.g. altitude, cloud cover, surrounding surfaces, and in particular latitude.

Using a world map, ask students to predict which cities or countries would have the highest/lowest UV radiation levels. You could provide them with a list of cities listed on the Internet (e.g. from <http://www.who.int/phe/uv>) and ask them to locate them on the map and rank them according to UV

radiation levels. You may even ask them to do the same exercise for two different times of the year, e.g. mid-winter and mid-summer.

Ask them to verify their thoughts with selected UV Index readings for different cities around the world that are available from the Internet. What is the reason for these differences? How does the UV Index differ at different times of year and times of day?

### Going on holiday

#### Unit: The sun and UV radiation

##### Objectives

*Students will:*

- Be able to identify times/locations/situations when sun protection is most necessary.
- Be able to choose appropriate methods of sun protection for particular situations.
- Be able to communicate knowledge about the risks associated with sun exposure and personal attitudes for minimizing sun exposure.
- Be able to encourage others to minimize sun exposure.

*Disciplines: environmental studies, language, arts/humanities*

*Methods: lecture, open discussion*

*Resources required: world map*

Have each student choose their preferred holiday location. Ask them to find the UV Index readings for these countries on the Internet.

In what ways might students need to change their behaviour compared to their home environment? What other factors might they need to consider in choosing sun protection methods, other than the UV Index, e.g. temperature, time of day, and

surrounding surfaces such as water or snow? Are they aware of any local cultural practices for sun protection?

Ask students to develop a travel brochure for their chosen city or country, and include sun protection tips. Students should ensure that they consider factors like time of year in developing their advice.

### Weather watch

#### Unit: The sun and UV radiation

##### Objectives

*Students will:*

- Learn that UV radiation is at its maximum at certain times of day and year.
- Learn that UV radiation levels are independent of temperature.
- Be able to identify times when sun protection is most necessary.

*Disciplines: science, mathematics, environmental studies*

*Methods: lecture, enquiry/research*

*Resources required: Worksheet D*

Some television news programmes and many Internet sites broadcast the UV Index level each day in spring and summer as part of their evening weather report. Have the students monitor temperature and UV Index readings for a week and record their results on Worksheet D. If getting the students to do this at home is difficult, arrange for a week's weather report to be recorded on a videotape and watch them together as a class activity. Alternatively, use the weather reports published in daily newspapers.

Have students plot UV Index and temperature readings for each day on a graph. Do high UV Index readings always coincide with high temperatures?

Discuss the fact that UV Index levels may still be high on cloudy or apparently cool days. You might like to play back the videotape to compare the daily temperatures with the UV radiation levels. What can the students discover?

### Unit 2: Health risks of UV radiation exposure

#### My skin

#### Unit: Health risks of UV radiation exposure

##### Objectives

*Students will:*

- Learn that UV radiation from the sun can have harmful effects on people, including sunburn, skin damage, eye damage, and skin ageing.
- Learn that suntan and sunburn are signs of skin damage.
- Learn that some people sunburn more easily than others.
- Demonstrate responsibility for personal health.

*Disciplines: science*

*Methods: non-directive teaching, open discussion, research*

*Resources required: Worksheet E*

Ask the students whether any of them have ever had sunburn. What happened to their skin? Did their skin burn easily, some, or not at all?

Explain to the students that some people sunburn very easily when out in the sun without sun protection. Other people take much longer to burn,

but still need to protect themselves from overexposure to the sun because the sun can still cause damage to the skin.

Explain the following risk factors for burning easily: red, blonde, or light brown hair; blue, hazel or green eyes; fair skin; many freckles.

- Ask the students to tell you some things they know about the skin. List the ideas on the board.
- Distribute Worksheet E with a diagram of the skin. Discuss the layers, the functions, and different skin types.
- Have the students look at their skin. Ask them the following questions: What do they notice on their skin? Do they have freckles? Is it rough, smooth, the same all over? Does their neighbour's skin look like their own skin?

### My eye

#### Unit: Health risks of UV radiation exposure

##### Objectives

*Students will:*

- Learn that UV radiation from the sun can have harmful effects on people, including sunburn, skin damage, eye damage, and skin ageing.
- Learn that wearing protective clothing, sunscreen, and sunglasses helps to minimize UV radiation exposure.
- Demonstrate responsibility for personal health.
- Be able to identify times/locations/situations when sun protection is most necessary.

*Disciplines: science*

*Methods: non-directive teaching, open discussion, research*

*Resources required: Worksheet F, different types of sunglasses*

Ask the students whether their grandparents see as clearly as they do. Have they ever heard about cataracts? Did their grandmother or grandfather have to undergo an operation to restore their eyesight?

Explain to them that UV radiation does not only affect the skin but can also have harmful effects on the eye. Cloudiness or cataracts appear to different degrees in most people as they age, but frequent sun exposure worsens this development. Cataracts can be surgically removed and an artificial lens or other means of optical correction can restore vision.

- Distribute Worksheet F with a diagram of the eye. If your school has a model of the eye you might like to use this. You might even ask students to construct their own simple models, based on a diagram. Discuss the functions of the various key structures of the eye, particularly the cornea, pupil, lens, and retina. Ask students how UV radiation might be able to enter the eye. Mention that the eye is the only organ that allows the penetration of visible light deep into the human body.
- Ask students which parts of the eye might be affected by UV radiation.
- Ask the students to consider the possible effects of UV radiation on specific structures of the eye, e.g. eyelid – skin damage; lens – cloudiness (cataracts); cornea – cloudiness (solar keratopathy). Use the diagram or model. What effects might these have on a person's vision?
- Ask the students to think about natural protection of the eye from UV radiation. What can they observe about the eye's structure and position? What happens if they look into bright light? Warn students not to deliberately look

into any bright light, in particular towards the sun, as this could cause eye damage.

Explain that the eye is shielded by the brow ridge, the eyebrows, and the eyelashes. Constriction of the pupil, closure of the eyelids, and the squinting reflex are activated by bright light to minimize the penetration of the sun's rays into the eye. However, these natural defences are of limited use under extreme conditions such as strong ground reflection from snow, water, and sand.

- Given the eyes' position and structure, discuss what kinds of characteristics a pair of sunglasses would need to provide the best possible protection against UV radiation.
- Characteristics to be discussed might include wraparound style/side protection against UV radiation entering the eye around the lens, and lenses that minimize transmission of UVA and UVB radiation (refer to Glossary).
- Have the students design a pair of sunglasses - make a model that will provide the best protection. They might choose to do this for a special purpose, e.g. their favourite sport. Alternatively, they could develop an advertisement for sunglasses.

### Buddy talk

#### Unit: Health risks of UV radiation exposure

##### Objectives

*Students will:*

- Learn that UV radiation from the sun can have harmful effects on people, including sunburn, skin damage, eye damage, and skin ageing.
- Learn that wearing protective clothing, sunscreen, and sunglasses helps to minimize UV radiation exposure.
- Learn that suntan and sunburn are signs of skin damage.
- Be able to communicate knowledge about the risks associated with sun exposure and personal attitudes for minimizing sun exposure.
- Be able to state the benefits of minimizing sun exposure.

*Disciplines: language, arts/humanities*

*Methods: research, design, peer teaching*

*Resources required: Worksheet G, Worksheet H*

Get the students to prepare a short talk which they can present to students in younger classes about why the sun is dangerous for people's skin. They could prepare pictures to illustrate their talk. Arrange for your class to present their talks in pairs to small groups of three or four younger students. The older students could make up "sunsmart" kits for their younger buddies. See Worksheets G and H for instructions on making a Chinese hat and a legionnaire hat.

### Unit 3: Sun safety through sun protection

#### Fads and fashions

##### Unit: Sun safety through sun protection

###### Objectives

Students will:

- Learn that wearing protective clothing, sunscreen, and sunglasses helps to minimize UV radiation exposure.
- Learn that young people can resist the pressure to get a suntan.
- Learn that young people can make sensible decisions about using sun protection.
- Demonstrate responsibility for personal health.

Disciplines: science, arts/humanities

Methods: lecture, open discussion

Resources required: Worksheet 1, swimwear articles or swimwear catalogue

Discuss the power of fashion to influence people's ideas about what they should wear. Talk about some of the reasons why we wear fewer and lighter clothes these days. In groups, have the students list the good and bad points of following fashion in general.

Using the illustrations on Worksheet 1, talk about how people's ideas on swimwear have changed and are still changing. Ask them to suggest why this is so.

Show them some pictures of the new kids' swimwear (lycra neck to knee style) from a catalogue or show actual examples.

Discuss:

- How are these like the old-fashioned styles?
- Why do you think swimwear designers have gone back to an old-fashioned style?
- Do you think people's need for sun safety has influenced the designers?

- How would this swimwear help protect you from the sun?

Using Worksheet 1, get the students to list the good and bad points of each type of swimwear and to identify which are the "sunsmart" designs.

#### What if

##### Unit: Sun safety through sun protection

###### Objectives

Students will:

- Demonstrate a personal commitment to using sun protection strategies.
- Demonstrate support for others who choose to use sun protection strategies.
- Demonstrate responsibility for personal health.
- Be able to encourage others to minimize sun exposure.
- Be able to support others who choose to minimize UV radiation exposure.

Disciplines: language

Methods: role plays, open discussion

Resources required: none

In small groups, role play some of these situations. Talk about different ways of handling the problems.

- **What if** your friends laugh at you because you're wearing a "sunsmart" hat and they aren't?
- **What if** your family is taking a friend to the beach and he or she arrives at your house without a shirt, a hat or sunglasses?
- **What if** you have forgotten to put on sunscreen before you go to the park to play and you only remember when you arrive there?

## Sun protection survey

### Unit: Sun safety through sun protection

#### Objectives

*Students will:*

- *Be able to identify strategies used by the school to minimize sun exposure.*
- *Be able to encourage others to minimize UV radiation exposure.*
- *Be able to state the benefits of minimizing UV radiation exposure.*

*Disciplines: science, mathematics, language*

*Methods: inquiry/research*

*Resources required: Worksheet J*

Tell the students that they are going to find out how “sunsmart” the students at your school are by carrying out a survey. Use Worksheet J, or develop your own survey questions.

Divide the class into Survey Teams of three or four students. Give each team a copy of the survey so that they can go to survey other classes. Tell them to note the person’s age and gender on the survey. It is a good idea to have a practice run on your own class first so that everyone knows how to tally. Arrange with other classes for your Survey Teams to visit them.

Analyze the survey responses and make a graph to show what people said. Make statements about the survey findings in terms suitable for the students’ age, e.g. in fractions or percentages. Write a report for your school newsletter to let parents know about the students’ findings. Read the report at assembly.

Use the results of the survey to identify particular kinds of sun-protective behaviours in the school community that could be improved upon. Ask students to develop appropriate messages that could be promoted in various ways, e.g. through posters, newsletter items, at school assemblies, etc.

# FURTHER INFORMATION

*Sun Protection and Schools: How to Make a Difference* and *Evaluating School Programmes to Promote Sun Protection* complement this document, and all three taken together form a comprehensive package to facilitate the incorporation of sun protection into the primary school curriculum and health agenda. These documents can be downloaded from the website of WHO's Intersun Programme:

**Intersun, The Global UV Project**

Protection of the Human Environment  
World Health Organization  
1211 Geneva 27  
Switzerland  
<http://www.who.int/phe/uv>

**School programmes on sun protection**

The following websites provide information about school programmes and teaching resources.

**Australia**

**SunSmart Campaign**

The Cancer Council Victoria  
1 Rathdowne Street  
Carlton Vic 3053  
<http://www.sunsmart.com.au/>

**Cancer Foundation of Western Australia Inc.**

46 Ventnor Ave  
West Perth WA 6005  
<http://www.cancerwa.asn.au>

**Canada**

**Children's UV Index Sun Awareness Program**

Meteorological Service of Canada  
4905 Dufferin Street  
Downsview  
Ontario M3H 5T4  
<http://www.msc-smc.ec.gc.ca/uvindex/>

**France**

**Vivre avec le soleil**

Sécurité Solaire  
15 rue Manin  
F-75019 Paris  
<http://www.infosoleil.com/vivreaveclesoleil.php>

**Germany**

**Deutsche Krebshilfe e.V.**

Thomas-Mann-Str. 40  
53111 Bonn  
Postfach 1467  
53004 Bonn  
<http://www.krebshilfe.de>

**Israel**

**Israeli Cancer Association**

Revivim Street 7  
P.O. Box 437  
53104 Givatayim  
<http://cancer.org.il/>

**Northern Ireland**

**Care in the Sun**

Green Park Healthcare Trust  
Health Promotion Department  
Musgrave Park Hospital  
Stockman's Lane  
Belfast BT9 7JB  
<http://www.careinthesun.org/>

**United Kingdom**

**Sunsafe**

Department of Health  
Richmond House  
79 Whitehall  
London SW1A 2NS  
<http://www.doh.gov.uk/sunsafe>



## United States

### **SunGuard Man Online**

Coalition for Skin Cancer Prevention in Maryland  
1211 Cathedral Street  
Baltimore  
Maryland 21201  
<http://www.sunguardman.org>

### **The SunSafe Project**

Norris Cotton Cancer Center, HB 7925  
One Medical Center Drive  
Lebanon, NH 03756  
<http://www.dartmouth.edu/dms/sunSAFE/>

### **SunWise School Program**

United States Environmental Protection Agency  
1200 Pennsylvania Avenue, NW  
Mail Code 6205J  
Washington, DC 20460  
<http://www.epa.gov/sunwise/>

### **Sunwise Stampede**

American Zoo and Aquarium Association  
8403 Colesville Road  
Suite 710  
Silver Spring  
MD 20910-3314  
<http://www.foundation.sdsu.edu/sunwisestampede>

## Interactive websites

The following interactive websites are specifically designed for children and students and contain illustrated activities and games that reinforce important concepts and allow students to undertake further research.

### **Kids' Corner, Environmental Health Center, United States**

Is designed to help children learn about environmental safety and health issues and includes sun safety games, word puzzles, and other activities.  
<http://www.nsc.org/ehc/kidscorn.htm>

### **Sunsense, National Radiological Protection Board, United Kingdom**

Describes the essentials of sun protection and features Sally going to the beach in the interactive Protect Yourself game.  
<http://www.nrpb.org/understand/sunsense/sunsense.htm>

### **SunSmart, The Cancer Council Victoria, Australia**

Provides information on the skin, skin cancer, the sun, and being "sunsmart" for students aged 5 to 12 years. Playing the game "Save Sid!" students can test their memory and "sunsmart" knowledge.  
[http://www.sunsmart.com.au/s/schools/prim\\_index.htm](http://www.sunsmart.com.au/s/schools/prim_index.htm)

### **SunWise, Environmental Protection Agency, United States**

Offers activities such as the "Who Wants to Be SunWise" trivia game to help students learn more about the harmful effects of the sun and about simple action steps for protection.  
<http://www.epa.gov/sunwise/kids.html>

### **SunWise Stampede, United States**

Offers fun activities that teach children how animals protect themselves from the sun's harmful rays, and how children can do the same. Children can play web games, go on a search for sunwise animals at the zoo, or work on activity sheets.  
<http://www.foundation.sdsu.edu/sunwisestampede/>

### **Veggie-Mon, University of Texas, United States**

Contains information on UV radiation-induced skin damage, sun safety, and scientific research on ozone depletion. Interactive activities, games, and quizzes help students make informed, healthy lifestyle choices.  
[http://www.veggie-mon.org/students/under\\_sun/under\\_sun.htm](http://www.veggie-mon.org/students/under_sun/under_sun.htm)

# GLOSSARY

**basal cell carcinoma (BCC)**

The most common type of skin cancer, which originates from basal cells in the skin. Usually appears as a red lump or scaly area. Rarely spreads to other organs (metastasizes).

**carcinogen**

An agent that induces cancer. May be physical, e.g. UV radiation; chemical, e.g. tobacco tar; or biological, e.g. human papilloma virus.

**cataract**

Partial or complete clouding of the eye lens which impairs vision and may cause blindness. Vision can be restored by surgical removal and replacement with artificial lens.

**chlorofluorocarbon (CFC)**

A compound containing carbon, chlorine, fluorine, and sometimes hydrogen. Used as a refrigerant, solvent, or aerosol propellant, or in the manufacture of plastic foams.

**conjunctiva**

The mucous membrane that lines the inner surface of the eyelids and covers the front part of the eyeball.

**cornea**

The transparent part of the eyeball that covers the iris and pupil. Admits light to the interior of the eye.

**erythema**

Redness of the skin. A sign of sunburn.

**immune system**

The system that protects the body from foreign substances, cells, and tissues that can cause disease. Produces chemicals and cells that attack

the invaders and thus help the body to fight disease.

**malignant melanoma (melanoma)**

Malignant cancer of melanocytes. Usually has an irregular outline and patchy colouring. Rarest but most dangerous type of skin cancer that often spreads to other organs (metastasizes).

**melanin**

A group of black, dark-brown, or reddish pigments present in the skin. Produced by specialized cells called melanocytes.

**melanocyte**

A cell in the upper skin layer that produces the pigment melanin.

**metastasis**

The process where cells break away from a tumour and spread around the body.

**ozone**

A form of oxygen that has three atoms in the molecules. Found in high concentrations in the ozone layer.

**ozone layer**

The atmospheric layer at heights of approximately 32 to 48 km. High ozone concentrations block most solar UV radiation from entry into the lower atmosphere.

**photosensitivity**

A skin condition that makes a person particularly sensitive to UV radiation. Exposure leads to an allergic reaction such as a rash or severe sunburn. Often associated with the use of certain medications.

**photosynthesis**

The synthesis of chemical compounds by plants with the aid of energy from the sun.

**phototherapy**

The therapeutic use of light and/or UV radiation to treat diseases such as rickets, psoriasis, eczema, and jaundice.

**skin cancer**

A tumour arising in the skin that is caused by uncontrolled cell division. Classified as melanoma and non-melanoma skin cancers (basal and squamous cell carcinoma).

**snow blindness**

Inflammation of the cornea leading to temporary blindness. Caused by exposure of the eyes to UV radiation reflected from snow or ice.

**squamous cell carcinoma (SCC)**

A scaly or plate-like malignant tumour of the skin that sometimes spreads (metastasizes) to other organs. The second most common form of skin cancer.

**sun protection factor (SPF)**

A laboratory measure that grades how much UVB a sunscreen can block. The numbers range from 2 upwards.

**ultraviolet (UV) radiation**

Part of the solar emissions that include light, heat, and UV radiation. UV region covers the wavelength range 100–400 nm and is divided into three bands: UVA, UVB, and UVC. All three bands are classified as a probable human carcinogen.

**UVA radiation**

Long-wavelength UVA covers the range 315–400 nm. Not significantly filtered by the atmosphere. Approximately 90% of UV radiation reaching the Earth's surface.

**UVB radiation**

Medium-wavelength UVB covers the range 280–315 nm. Approximately 10% of UV radiation reaching the Earth's surface.

**UVC radiation**

Short-wavelength UVC covers the range 100–280 nm. All solar UVC radiation is absorbed by the ozone layer.

**UV Index (UVI)**

Describes the level of solar UV radiation at the Earth's surface. Educational tool to alert people about the need to adopt protective measures.

**vitamin D**

A vitamin that is essential for normal bone and tooth structure. Found in cod liver oil, egg yolk and milk. Bodily synthesis activated by UV radiation.

# ANNEX: WORKSHEETS

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# WORKSHEET A

My name is:

Unit 1: The sun and UV radiation

Activity: Ozone and me

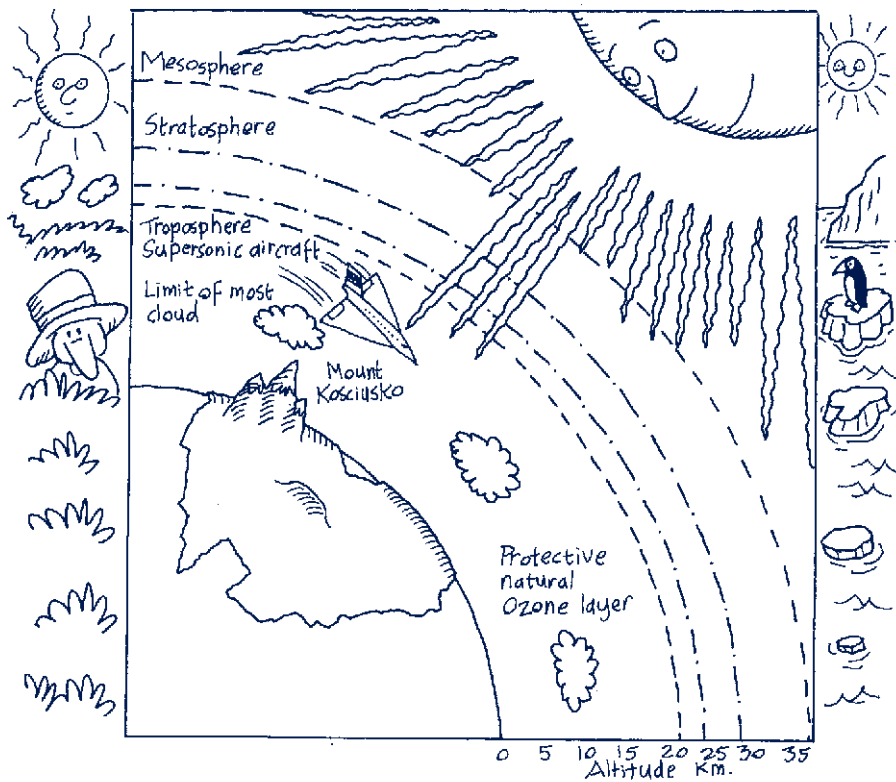
Level: Early primary

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## Ozone—the Earth's sunscreen

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What could happen to people, plants or animals if the ozone layer is damaged?

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Source: SunSmart Fun for Everyone, The Cancer Council Victoria, Australia

# WORKSHEET B

My name is:

Unit 2: Health risks of UV radiation exposure

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Activity: Personal sunburn danger zones

Level: Early primary

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## Personal sunburn danger zones

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Body part	Sunburn ranking 5 = high risk 1 = low risk	How can you stay safe?
face	5	.....
arms	5	.....
shoulders	4	.....
neck	4	.....
legs	? __	.....
nose	? __	.....
back	? __	.....
chest	? __	.....
head	2	.....
stomach	? __	.....
back of knees	1	.....
feet	? __	.....
hands	? __	.....

Parts of my body I need to take special care to protect are:

1. .... 2. .... 3. ....

Source: SunSmart Fun for Everyone, The Cancer Council Victoria, Australia

# WORKSHEET C

My name is:

.....

Unit 1: Sun safety through sun protection

Activity: Sell your own sunscreen

Level: Early primary

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## Design your own sunscreen bottle

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Source: SunSmart Fun for Everyone, The Cancer Council Victoria, Australia

# WORKSHEET D

My name is:

.....

Unit 1: The sun and UV radiation

Activity: Weather watch

Level: Late primary

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## Weather watch

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Record the UV radiation readings for a week by watching a television weather report or checking the newspaper.



DAY	WEATHER	UV RADIATION LEVEL
Day one	.....	.....
Day two	.....	.....
Day three	.....	.....
Day four	.....	.....
Day five	.....	.....
Day six	.....	.....
Day seven	.....	.....

What I found out: .....

.....

.....

.....

.....

Source: SunSmart Fun for Everyone, The Cancer Council Victoria, Australia



# WORKSHEET E

**My name is:**

Unit 1: Health risks of UV radiation exposure

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Activity: My skin

Level: Late primary

## The skin



Identify the following:

- Epidermis
- Dermis
- Melanocytes
- Melanin
- Basal cells
- Squamous cells

- What are the two layers of the skin?
- Which layer is on top closest to the surface of the skin?
- What is the deepest layer of the skin called?

Source: Project S.A.F.E.T.Y.(Sun Awareness of Educating Today's Youth), The Texas Cancer Council and The University of Texas M.D. Anderson Cancer Centre, Houston, Texas

# WORKSHEET F

**My name is:**

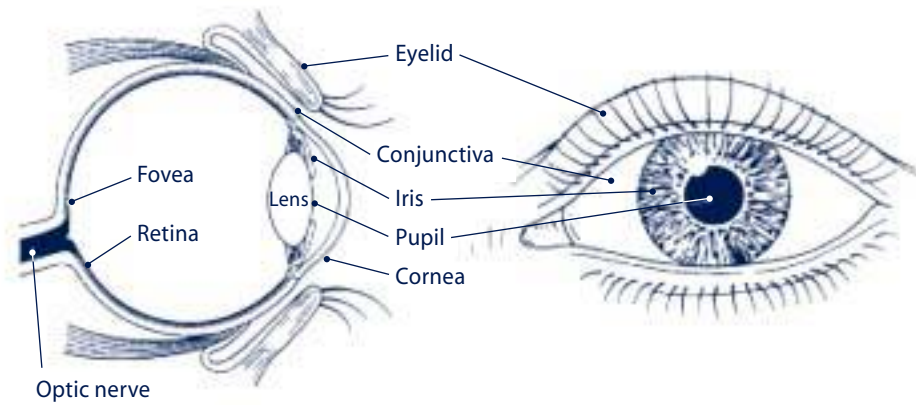
Unit 1: Health risks of UV radiation exposure

.....

Activity: My eye

Level: Late primary

## The eye



Source: Advice on Protection Against Ultraviolet Radiation, National Radiological Project Board, United Kingdom

Unit 1: Health risks of UV radiation exposure

Activity: Buddy talk

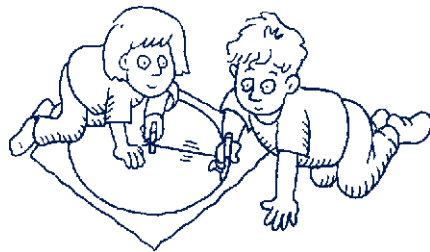
Level: Late primary

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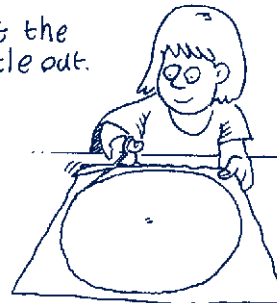
## Chinese hat

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① Trace, or draw a circle from something in your room.



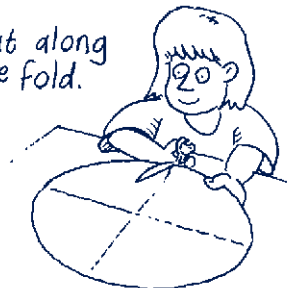
② Cut the circle out.



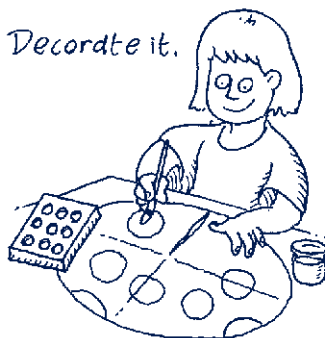
③ Fold it in four.



④ Cut along one fold.



⑤ Decorate it.



⑥ Overlap the cut edges to form a cone.



⑦ Staple, or glue in place.



⑧ Attach a chin strap if desired.

Source: SunSmart Fun for Everyone, The Cancer Council Victoria, Australia

# WORKSHEET H

My name is: .....

Unit 1: Health risks of UV radiation exposure

Activity: Buddy talk

Level: Late primary

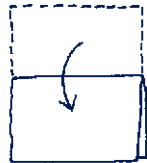
## Legionnaire hat



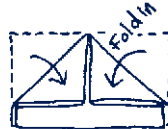
① One sheet of Herald-Sun.



② Fold in half.



③ Fold each corner into centre.



④ Fold up one side from the bottom.



⑤ Turn over and fold up other side.

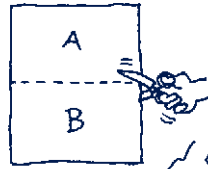
⑥ Fold corners over ends and staple from inside as shown.



⑦ Open out to form a hat.



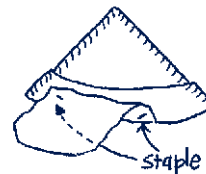
⑧ For the back flap and peak take a second half sheet of newspaper, fold it in half and cut into two pieces A+B. (tear)



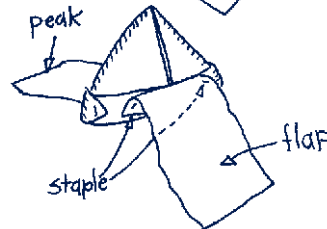
⑨ Fold sheet A in half. Turn in corners and staple as shown.



⑩ Attach this to the front of the hat to make a peak (see above)



⑪ Attach sheet B to back of hat to make the flap.



Source: SunSmart Fun for Everyone, The Cancer Council Victoria, Australia

# WORKSHEET I

My name is: .....

Unit 1: Sun safety through sun protection

Activity: Fads and fashions

Level: Late primary

## Fads and fashions

Ideas about swimwear have changed a lot and go on changing. Write what you think is good and bad about each of these designs. Label the ones that you think are SunSmart.



1999 .....



1880 .....



1965 .....



1945 .....



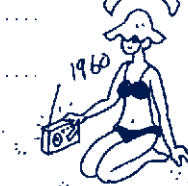
1975 .....

1980 .....

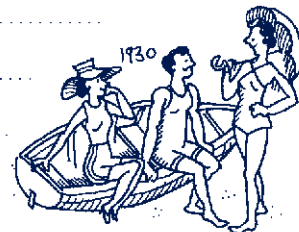
1900 .....



1960 .....



1930 .....



Write the dates in order on the back.

Source: SunSmart Fun for Everyone, The Cancer Council Victoria, Australia

# WORKSHEET J

My name is:

.....

Unit 1: Sun safety through sun protection

Activity: Sun protection survey

Level: Late primary

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## Sun protection survey

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Age of person answering questions

0-5	5-10	10-15	15+

Males	Females



QUESTIONS	ANSWERS	
	YES	NO
<b>Question 1:</b> Do you often wear a hat outside?		
<b>Question 2:</b> Did you bring a hat to school today?		
<b>Question 3:</b> Did you wear your hat outside today at recess?		
at lunchtime?		
<b>Question 4:</b> Did you play in the shade today?		
<b>Question 5:</b> Did you wear sunscreen today?		

Source: SunSmart Fun for Everyone, The Cancer Council Victoria, Australia



