SunSmart Myth Busters
SunSmart Scientists
Learning from and about the natural world

Curriculum Level 3 Unit Plan
Introduction

SunSmart Schools Aotearoa

The SunSmart Schools Accreditation Programme is run by the Cancer Society of New Zealand.

There are both risks and benefits from sun exposure. In New Zealand, the peak summer ultraviolet radiation (UV radiation) levels are 40% higher compared with corresponding latitudes in the northern hemisphere (eg. Southern Europe, mid USA). Excessive exposure to UV radiation from the sun can cause sunburn, skin damage and increase the risk of skin cancer.

Skin cancers are the most common cancers in New Zealand, and there is evidence they are increasing in incidence. From an early age, our children need to have the knowledge and behaviours that will protect them from harmful UV radiation. Students are in school when UV radiation levels are at their peak. Schools are uniquely placed to provide a sun-safe environment, educate students about sun protection behaviour and reduce the risk of skin cancer by becoming SunSmart. Energy from the sun includes heat, light and UV radiation. UV radiation cannot be seen or felt.

The Cancer Society encourages all New Zealanders to be SunSmart and “SLIP, SLOP, SLAP and WRAP”.

The Cancer Society SunSmart Schools Programme accredits schools that have developed and implemented a sun protection policy for Terms 1 and 4. The policy must meet minimum criteria that ensure students and teachers are in a sun-safe environment.

The programme includes:

- website information for teachers, students and parents on how to be SunSmart
- Cancer Society-approved guidelines on how to make your school a safe place for students and the school community
- highly engaging resources for students, parents, teachers and principals.

Being a SunSmart school shows that your school:

- is committed to protecting students, staff and parents from the risks of UV radiation
- is raising awareness about the importance of sun protection among parents and students
- promotes the school within the community as one that is committed to the health and safety of its students
- has a sun protection policy that follows the Cancer Society minimum criteria
- promotes and supports positive sun protection behaviours such as appropriate hat wearing
- is developing and maintaining a sun-safe environment.

The SunSmart Schools Programme is supported by the findings of the Community Preventive Services Taskforce. The Task Force recommends that primary and intermediate-school interventions are put in place to prevent skin cancer, based on strong evidence of their effectiveness in increasing sun-protective behaviours and decreasing ultraviolet exposure, sunburn incidence and formation of new moles.

SunSmart Schools teaching resources

These four cross-curricular SunSmart teaching resources address why we need to be SunSmart, how we can be SunSmart and how science and scientific knowledge can inform and underpin the SunSmart choices we make.

The units cover the New Zealand Curriculum Levels 1–4 and aim to:

a. enhance youth numeracy and literacy development and provide assessment tasks to assess the National Standards
b. embed key science concepts and experiences of the sun, energy and protection
c. support the principles of SunSmart and the New Zealand Curriculum (NZC)
d. use different examples/contexts to ensure appropriateness to different ethnic groups (particularly Māori, Pāsifika and Asian)
e. use Te Reo Māori concepts and language that will be woven into the resource
f. take an inquiry-based learning approach

The Cancer Society of New Zealand would like to acknowledge and thank The Trusts Community Foundation and Infinity Foundation Ltd for part-funding the development of these resources.

1 http://www.thecommunityguide.org/cancer/skin/education-policy/primaryandmiddleschools.html

Further information in relation to UV Index Boards, becoming a SunSmart School and a sample SunSmart School policy are at the back of this resource.
Level 3 Unit Overview

Overview planning tool

The overview diagram explains how the lessons for Level 3 have been organised to scaffold the teaching and learning experiences. The overview document can also be used as a planning document for teachers. By using the comment tool on your Adobe Acrobat tool bar, you can make notes on your students’ progress or next steps. You will find an example of how the overview can be used for planning purposes on the next page.

Science explorations

These units include a number of science explorations that can be adapted/differentiated to suit learning experiences and outcomes at any other level.

<table>
<thead>
<tr>
<th>Health</th>
<th>Science</th>
<th>Science Experience</th>
<th>Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="Heart.png" alt="Heart" /></td>
<td><img src="Sun.png" alt="Sun" /></td>
<td>![Lab Flask](Lab Flask.png)</td>
<td><img src="Code.png" alt="Code" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Literacy</th>
<th>Mathematics - Geometry &amp; Measurement</th>
<th>Mathematics - Number &amp; Algebra</th>
<th>Mathematics - Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="Book.png" alt="Book" /></td>
<td><img src="Triangle.png" alt="Triangle" /></td>
<td><img src="Penny.png" alt="Penny" /></td>
<td>![Pie Chart](Pie Chart.png)</td>
</tr>
</tbody>
</table>

| Energy from the sun includes heat, light and UV radiation. UV radiation cannot be seen or felt. |

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### Living World

- **Science: Sun narratives** – Learning how science knowledge and understanding can be communicated.
- **Science: Sun protection in different environments** – e.g., snow, water, mountains, desert
- **Science: UV radiation reflection** – Snow and water
- **Science: How do people in the sun protect themselves?**
- **Science: Sun protection for sports and recreation**
- **Science: Myth busters and sun protection**
- **Science: Sunlight on our skin? The good and bad. Vitamin D and burning.**

### Planet Earth and Beyond

- **Science: Sun protection in different environments** – e.g., snow, water, mountains, desert
- **Science: UV radiation reflection** – Snow and water
- **Science: How do people in the sun protect themselves?**

### Physical World

- **Science: Sun protection in different environments** – e.g., snow, water, mountains, desert
- **Science: UV radiation reflection** – Snow and water
- **Science: How do people in the sun protect themselves?**

### Material World

- **Science: Sun protection in different environments** – e.g., snow, water, mountains, desert
- **Science: UV radiation reflection** – Snow and water
- **Science: How do people in the sun protect themselves?**

### Lessons 1–5

- **Lesson 1**: Humans live, work and play in many different places and need to protect themselves from UV radiation.
- **Lesson 2**: Myth busters and sun protection
- **Lesson 3**: Sun protection in different environments, e.g., snow, water, mountains, desert
- **Lesson 4**: Sun radiation – what is it? UV MetService predictions Sports and recreation
- **Lesson 5**: Sun protection - our skin tells a story

### Lessons 6–8

- **Lesson 6**: What have we learnt about UV radiation? What have we learnt about our skin? How does UV radiation affect our skin? Eyes? How can we protect ourselves? Why do we need to expose our skin to sunlight?
- **Lesson 7**: UV radiation reflection Snow and water
- **Lesson 8**: How do people in the sun protect themselves?

### Lessons 9–11

- **Lesson 9**: We are investigating the effect of sunlight on living and non-living things.
- **Lesson 10**: We are investigating how UV beads and tonic water make UV light visible.
- **Lesson 11**: We are investigating how gnomons can help us identify optimum shade times.

### Lessons 12–13

- **Lesson 12**: We are investigating how gnomons can help us identify optimum shade times.
- **Lesson 13**: We are investigating the effectiveness of commercially prepared sunscreens.

### Lessons 14–15

- **Lesson 14**: We are investigating how gnomons can help us identify optimum shade times.
- **Lesson 15**: We are investigating the effectiveness of commercially prepared sunscreens.

**Key**

- A: Front loading through different sources of information
- B: Front loading through hands-on experiences
- C: Synthesis: Developing new understandings & knowledge through inquiry
**Curriculum Level 3 Unit Plan SunSmart Myth Busters**

**Purpose:** To engage students and their families in exploring and developing an understanding about healthy skin.

<table>
<thead>
<tr>
<th>Curriculum Areas Incorporated</th>
<th>Achievement Objectives Relevant to the activity, including possible links</th>
<th>Specific Learning Outcomes Students will be able to:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>English</strong></td>
<td><strong>Speaking, Writing and Presenting</strong></td>
<td>Students will be able to:</td>
</tr>
<tr>
<td></td>
<td><strong>Processes and strategies</strong></td>
<td>• construct texts integrating all the SunSmart knowledge gained through secondary sources and investigations</td>
</tr>
<tr>
<td></td>
<td><strong>Integrate sources of information, processes and strategies with developing confidence to identify, form and express ideas</strong></td>
<td>• use oral, written and visual language features to create a SunSmart message that is engaging for the school community.</td>
</tr>
<tr>
<td></td>
<td><strong>uses a developing understanding of the connections between oral, written and visual language when creating texts</strong></td>
<td>• use oral, written and visual language features to create a SunSmart message that is engaging for the school community.</td>
</tr>
<tr>
<td></td>
<td><strong>creates a range of texts by integrating sources of information and processing strategies with developing confidence</strong></td>
<td>• use oral, written and visual language features to create a SunSmart message that is engaging for the school community.</td>
</tr>
<tr>
<td></td>
<td><strong>is reflective about the production of own texts: monitors and self-evaluates progress, articulating learning with growing confidence.</strong></td>
<td>• use oral, written and visual language features to create a SunSmart message that is engaging for the school community.</td>
</tr>
</tbody>
</table>

**Mathematics and Statistics**

<table>
<thead>
<tr>
<th>Statistics</th>
<th><strong>Statistical Investigation</strong></th>
<th>Students will be able to:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Conduct investigations using the statistical inquiry cycle</strong></td>
<td>• gathering, sorting, and displaying multivariate category and whole-number data and simple time-series data to answer questions</td>
<td></td>
</tr>
<tr>
<td><strong>• identifying patterns and trends in context, within and between data sets.</strong></td>
<td>• gather, display and identify data patterns in the survey</td>
<td></td>
</tr>
<tr>
<td><strong>• Evaluate the effectiveness of different displays in representing the findings of a statistical investigation or probability activity undertaken by others.</strong></td>
<td>• interpret results of the survey data.</td>
<td></td>
</tr>
</tbody>
</table>

**Health and Physical Education**

<p>| Personal Health and Physical Development | Personal growth and development identify factors that affect personal, physical, social and emotional growth and develop skills to manage changes. | <strong>demonstrate an understanding of good skin health</strong> |
| Safety management | identify risks and their causes and describe safe practices to manage these. | <strong>identify that ultraviolet radiation (UVR) in sunlight causes our skin to burn and develop skin cancers</strong> |
| <strong>Community resources</strong> | Participate in communal events and describe how such events enhance the wellbeing of the community. | <strong>consider the ways in which the school community can control exposure to UV radiation</strong> |
| <strong>Listening, Reading and Viewing</strong> | Integrate sources of information, processes, and strategies with developing confidence to identify, form, and express ideas. | <strong>demonstrate an ability to gather, read, understand and effectively use SunSmart information for a specific purpose.</strong> |
| <strong>Processes and strategies</strong> | • selects and reads texts for enjoyment and personal fulfilment | • select and read texts for enjoyment and personal fulfilment |
|                               | • recognises and understands the connections between oral, written, and visual language | • recognises and understands the connections between oral, written, and visual language |
|                               | • integrates sources of information and prior knowledge with developing confidence to make sense of increasingly varied and complex texts | • integrates sources of information and prior knowledge with developing confidence to make sense of increasingly varied and complex texts |
|                               | • selects and uses a range of processing and comprehension strategies with growing understanding and confidence | • selects and uses a range of processing and comprehension strategies with growing understanding and confidence |
|                               | • thinks critically about texts with developing confidence | • thinks critically about texts with developing confidence |
|                               | • monitors, self-evaluates and describes progress with growing confidence | • monitors, self-evaluates and describes progress with growing confidence |</p>
<table>
<thead>
<tr>
<th>Curriculum Areas Incorporated</th>
<th>Achievement Objectives</th>
<th>Specific Learning Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Te Aho Arataki</td>
<td>Students should be able to:</td>
<td>Students will be able to:</td>
</tr>
<tr>
<td>Marau mo te Ako Te Reo Māori</td>
<td>3.1 Communicate, including comparing and contrasting, about habits, routines, and customs.</td>
<td>• ask and answer questions about their sunscreen survey results</td>
</tr>
<tr>
<td></td>
<td>3.2 Communicate about survey and results.</td>
<td>• request, accept or decline to participate in a sunscreen survey</td>
</tr>
<tr>
<td></td>
<td>3.3 Give and follow directions to survey participants.</td>
<td>• discuss, plan and record a checklist of what group members will do to prepare a sunscreen survey</td>
</tr>
<tr>
<td></td>
<td>3.4 Communicate, including comparing and contrasting the survey data.</td>
<td>• summarise in terms of the most popular ways to protect their skin from the sun</td>
</tr>
<tr>
<td></td>
<td>3.5 Communicate about immediate past survey activities.</td>
<td>• seek agreement from participants to take part in their survey.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nature of Science</th>
<th>Achievement Objectives</th>
<th>Level 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understanding in Science</td>
<td>• Appreciate that science is a way of explaining the world and that science knowledge changes over time.</td>
<td></td>
</tr>
<tr>
<td>Investigating in Science</td>
<td>• Build on prior experiences, working together to share and examine their own and others’ knowledge.</td>
<td></td>
</tr>
<tr>
<td>Communicating in Science</td>
<td>• Begin to use a range of scientific symbols, conventions and vocabulary.</td>
<td></td>
</tr>
<tr>
<td>Participating and Contributing</td>
<td>• Use their growing science knowledge when considering issues of concern to them.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Explore various aspects of an issue and make decisions about possible actions.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Living World</th>
<th>Achievement Objectives</th>
<th>Level 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life Processes</td>
<td>Recognise that there are life processes common to all living things and that these occur in different ways.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Material World</th>
<th>Achievement Objectives</th>
<th>Level 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Properties and Changes of Matter</td>
<td>Compare chemical and physical changes.</td>
<td></td>
</tr>
<tr>
<td>Chemistry and Society</td>
<td>Relate the observed, characteristic chemical and physical properties of a range of different materials to technological uses and natural processes.</td>
<td></td>
</tr>
</tbody>
</table>
### Vision
- Beliefs about what is important:
  - High expectations
  - Treaty of Waitangi
  - Cultural diversity
  - Inclusion
  - Learning to Learn
  - Community engagement
  - Coherence
  - Future focus.

### Principles
- What we want for our young people:
  - Confident
  - Connected
  - Actively involved
  - Lifelong Learners.

### Values
- Expressed in thought and actions:
  - Excellence
  - Innovation, inquiry and curiosity
  - Diversity
  - Equity
  - Community and participation
  - Ecological sustainability
  - Integrity.

### Key Competencies
- Which of the key competencies (NZC pp. 12–13)?
  - Thinking
  - Using language, symbols and texts
  - Managing self
  - Relating to others
  - Participating and contributing.

### Pedagogical Approaches
- Aspects of effective pedagogy (NZC pp. 34–36) are highlighted in the activity:
  - Creating a supportive learning environment
  - Encouraging reflective thought and action
  - Enhancing the relevance of new learning
  - Facilitating shared learning
  - Making connections to prior learning
  - Providing sufficient opportunities to learn
  - E-learning
  - Engaging Māori and Pasifika students and their communities.

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### The New Zealand Curriculum Reading and Writing Standards for Years 1–8

**The Reading Standard** – By the end of year 6, students will read, respond to, and think critically about texts in order to meet the reading demands of the New Zealand Curriculum at Level 3. Students will locate, evaluate and integrate information and ideas within and across a small range of texts appropriate to this level as they generate and answer questions to meet specific learning purposes across the curriculum.

### The New Zealand Curriculum Mathematics Standard for Years 1–8

**The Mathematics Standard – Statistics**
- In contexts that require them to solve problems or model situations, students will be able to:
  - investigate summary and comparison questions by using the statistical inquiry cycle:
    - gather or access multivariate category and whole-number data
    - sort data into categories or intervals, display it in different ways, and identify patterns
    - interpret results in context, accepting that samples vary
  - order the likelihoods of outcomes for situations involving chance, considering experimental results and models of all possible outcomes.

### National Standards Assessment Tasks

### Planned Assessments
- Assessments should include both formative and summative, and any suggestions made in this unit need to be cognisant of student needs and abilities. Within the inquiry model, assessment should be ongoing, reflecting understanding at key points along the way.
- See Resource 22 for assessment of group work skills.

### Spotlight On
- Inquiry-based learning, e-learning
Links and Resources

If your firewall does not allow you to open a hyperlink, go to YouTube and type in the name of the resource. This should provide you with access to the resource.

TIKI Curriculum documents http://nicriculum.tiki.org.nz/


The WHO INTERSun programme http://www.who.int/uv/intersunprogramme/activities/en/

Cancer Council West Australia has eight interesting and interactive learning activities that can be delivered as stand-alone activities or presented as a term’s science work. The aim is to help students understand the science of light, with a focus on ultraviolet (UV) radiation http://www.cancerwa.asn.au/resources/2013-04-10-uv-radiation-learning-activities-book.pdf

Screen screen questions and answers http://www.cancernz.org.nz/assets/files/info/SunSmart/Sunscreen%20QA%27s_14Feb2012%28%29.pdf

Songs and waiata “Hei Konei e te Ariki” and “Hei Rourou mā Koutou” (in QA%27s_14Feb2012%283%29.pdf)

Tasks and activities

“Kei Raro i te Moana” (in QA%27s_14Feb2012%28%29.pdf)

http://www.who.int/uv/library/publications/primaryteach.pdf
http://www.foundation.sdsu.edu/sunsiwimestone/meetanimals.html
Dear 16 year old me http://www.youtube.com/watch?v=_4jgUcxMezM
The dark side of tanning http://www.youtube.com/watch?v=58dCTnIN40w
It’s a beautiful day for cancer http://www.youtube.com/watch?v=R95qJDC-z-o
Leathar face http://www.youtube.com/watch?v=UeUtBeZEdAa
Dangers of a deadly tan http://www.youtube.com/watch?v=ASO9FM6gDLs&feature=related
Leathar face http://www.youtube.com/watch?v=y95qkDC-z-o
Dear 16 year old me http://www.youtube.com/watch?v=ASO9FM6gDLs&feature=related

Note: The suggested websites are not all maintained by the Cancer Society of New Zealand. We only suggest sites we consider offer credible and reliable information, but we cannot guarantee that the information on such websites is correct, up to date or evidence based.
Introduction and hauora concept

Overview: We are using pictorial images to generate discussions around health and wellbeing and introduce the concept of hauora in skin health.

<table>
<thead>
<tr>
<th>Assessment Opportunities</th>
<th>Structure</th>
<th>Curriculum and Resource Links</th>
</tr>
</thead>
<tbody>
<tr>
<td>We are successful when we:</td>
<td>Prepare:</td>
<td>Refer to:</td>
</tr>
<tr>
<td>• can explain how the environment and people around us influence us</td>
<td>Clip 2: <a href="http://science.nationalgeographic.com/science/health-and-human-body/human-body/skin-article/">http://science.nationalgeographic.com/science/health-and-human-body/human-body/skin-article/</a></td>
<td>Pedagogical links:</td>
</tr>
<tr>
<td>• understand and can use some familiar health vocabulary in Māori</td>
<td>Connect:</td>
<td>• Creating a supportive learning environment</td>
</tr>
<tr>
<td>• can identify and explain our personal responsibility for our own actions and the responsibilities of others</td>
<td>• Assign students into groups of three or four. Allocate and define tasks of collector, recorder, reporter, timekeeper (use of these roles is encouraged throughout the unit).</td>
<td>• Encouraging reflective thought and action</td>
</tr>
<tr>
<td>• can identify and explain how health and wellbeing impact on the quality of our everyday lives</td>
<td>• Explain task, requirements and timeframe.</td>
<td>• Enhancing the relevance of new learning</td>
</tr>
<tr>
<td>• can identify the things that keep our skin healthy – physical (taha tinana), mental/emotional (taha hinengaro), social (taha whānau) and spiritual (taha wairua)</td>
<td>Activate:</td>
<td>• Facilitating shared learning</td>
</tr>
<tr>
<td>• understand that all four elements above need to be in balance for us to feel happy, healthy and safe.</td>
<td>• All watch video clip 1.</td>
<td>• Making connections to prior learning</td>
</tr>
<tr>
<td><strong>Te Reo</strong> – Learning intentions and success criteria rubrics for Te Reo <a href="http://hereoora.tki.org.nz/Unit-plans/Unit-1-Ko-au/Learning-intentions-and-success-criteria">http://hereoora.tki.org.nz/Unit-plans/Unit-1-Ko-au/Learning-intentions-and-success-criteria</a></td>
<td><strong>Structure</strong></td>
<td>• Providing sufficient opportunities to learn</td>
</tr>
<tr>
<td>Evidence: to assess Tumanatua Level 3.</td>
<td><strong>Demonstrate:</strong></td>
<td>• Engaging Māori and Pasifika students and their communities.</td>
</tr>
<tr>
<td>Evidence: Teach and assess social and interpersonal skills. Student, peer and teacher assessment ongoing.</td>
<td><strong>Consolidation:</strong></td>
<td><strong>Key competencies:</strong></td>
</tr>
<tr>
<td><strong>Te Reo:</strong> Ongoing opportunities to assess Te Reo <a href="http://hereoora.tki.org.nz/Unit-plans/Unit-1-Ko-au/Assessment-opportunities">http://hereoora.tki.org.nz/Unit-plans/Unit-1-Ko-au/Assessment-opportunities</a>.</td>
<td></td>
<td>• Thinking</td>
</tr>
</tbody>
</table>

Part One, Lessons 1–4

Our skin tells a story – love the skin you are in

Lesson 1-4

What is our skin telling us?

- Why do we have skin?
- What does the skin do for our body?
- How can we keep our skin healthy?
- What jobs do we have?

In groups, students look at the photos in Resource 1. Students go to the three-level guide (Resource 3a and complete individually. Use Resource 3b, Teacher’s Notes for background. Answers: 1 ✔ 2 ✔ 3 ✔ 4x 5 x 6 ✔ 7x 8 ✔ 9 ✔ 10 ✔ 11 ✔ 12 x 13 ✔ 14 x 15 ✔ 16 x 17 ✔ 18 ✔ 19 ✔ 20 x. Teacher collects their answers as they will be returned to the students later in the unit. Students will be asked to revisit their answers. Once they have more understanding and knowledge, students will be able to answer or change their responses. This will allow students to see if they are able to identify the difference between SunSmart myths and facts.

1. Tā moko is the ancient Māori practice of tattooing.

2. Patterns of the moko tell a story about the person, their family, where they come from and previously their rank. The area around the chin describes the hapō of the person and for men, the remainder of the face tells the history. Rangitāne o Wairarapa and Greater Wellington Regional Council

Curriculum Level 3 Unit Plan SunSmart Myth Busters
There is no right or wrong answer for this activity. We are exploring our own ideas and interpretations.

Decide which photos are examples of:
A. Physical (taha tinana)
B. Mental/emotional (taha hinengaro)
C. Social (taha whānau)
D. Spiritual (taha wairua)

Put the number of the photo in the box below:

A. Physical (taha tinana)

B. Mental/emotional (taha hinengaro)

C. Social (taha whānau)

D. Spiritual (taha wairua)

Newborn baby against mother’s skin

How did you decide where each photo belonged? Were there any photos that were hard to place? Why?
Lessons 1–4, Resource 2a

Hauora concept

Dr Mason Durie’s Te Whare Tapa Whā model compares hauora with the four walls of a whare, each wall representing a different dimension: taha wairua (the spiritual side); taha hinengaro (thoughts and feelings); taha tinana (the physical side); and taha whānau (family). All four dimensions are necessary for strength and symmetry. (Adapted from Mason Durie’s Whaiora: Māori Health Development. Auckland: Oxford University Press, 1994, page 70.)

Lessons 1–4, Resource 2b, Teacher’s Notes

Hauora concept

Information taken from Health and Physical Education Online:

Wellbeing
The concept of wellbeing encompasses the physical, mental and emotional, social and spiritual dimensions of health. This concept is recognised by the World Health Organization.

Hauora
Hauora is a Māori philosophy of health unique to New Zealand. It comprises taha tinana, taha hinengaro, taha whānau and taha wairua.

Taha tinana – physical wellbeing
The physical body, its growth, development and ability to move and ways of caring for it.

Taha hinengaro – mental and emotional wellbeing
Coherent thinking processes, acknowledging and expressing thoughts and feelings and responding constructively.

Taha whānau – social wellbeing
Family relationships, friendships and other interpersonal relationships; feelings of belonging, compassion and caring; and social support

Taha wairua – spiritual wellbeing
The values and beliefs that determine the way people live, the search for meaning and purpose in life and personal identity and self-awareness. (For some individuals and communities, spiritual wellbeing is linked to a particular religion; for others, it is not.)

Each of these four dimensions of hauora influences and supports the others.
### Determining your susceptibility to skin cancer – skin type

<table>
<thead>
<tr>
<th>SKIN TYPE (Fitzpatrick)</th>
<th>RESPONSE TO SUN EXPOSURE</th>
<th>EXAMPLES</th>
<th>SUSCEPTIBILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Always sunburn</td>
<td>Fair-skinned and freckled Blue-eyed Celts</td>
<td>Very high</td>
</tr>
<tr>
<td>2.</td>
<td>Always sunburn</td>
<td>Fair-skinned, blonde hair Blue-eyed Scandinavian</td>
<td>High</td>
</tr>
<tr>
<td>3.</td>
<td>Sometimes sunburn</td>
<td>Fair-skinned, brown hair Brown-eyed Unexposed skin is white</td>
<td>Average</td>
</tr>
<tr>
<td>4.</td>
<td>Seldom sunburn</td>
<td>Light brown skin, dark brown hair, brown-eyed Unexposed skin is light brown Mediterranean, Hispanic</td>
<td>Low</td>
</tr>
<tr>
<td>5.</td>
<td>Rarely sunburn</td>
<td>Brown-skinned darker Mediterranean, South-East Asian, Eastern Indian</td>
<td>Very low</td>
</tr>
<tr>
<td>6.</td>
<td>Never sunburn</td>
<td>African American</td>
<td>Minimal</td>
</tr>
</tbody>
</table>

Note: Any sign of skin colour change is a sign of sun damage. There is nothing healthy about a tan.

The Fitzpatrick scale is illustrative, not comprehensive in determining skin colour.

---

### Lessons 1–4, Resource 3b

**Fitzpatrick scale**

Any sign of skin colour darkening is a sign of sun damage. There is nothing healthy about a tan.

<table>
<thead>
<tr>
<th>Skin types</th>
<th>Characteristics</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1</td>
<td>High risk of sun sensitivity, always burns, never tans.</td>
<td>Red hair with freckles, some New Zealanders.</td>
</tr>
<tr>
<td>Type 2</td>
<td>Very sun sensitive, burns easily, tans minimally.</td>
<td>Fair skinned, fair haired, Northern European, many New Zealanders.</td>
</tr>
<tr>
<td>Type 3</td>
<td>Sun-sensitive skin, sometimes burns, slowly tans to light brown.</td>
<td>Central European, many New Zealanders.</td>
</tr>
<tr>
<td>Type 4</td>
<td>Skin burns minimally, always tans to moderate brown.</td>
<td>Mediterranean European some South Americans, some New Zealanders.</td>
</tr>
<tr>
<td>Type 5</td>
<td>Skin rarely burns, tans well, darkly pigmented skin.</td>
<td>Some South Americans, some Africans, some Indians, some New Zealanders.</td>
</tr>
<tr>
<td>Type 6</td>
<td>Darkest pigmented skin.</td>
<td>Some South Americans some Africans, some Indians, some New Zealanders.</td>
</tr>
</tbody>
</table>

Note: Albino – extremely high risk of negative sun reaction.

It is important to distinguish between natural (constitutive) skin colour and additional acquired from UV radiation exposure (facilitative), which is associated with skin damage. There is evidence that Māori are represented in all categories. There is a growing literature on ‘people of colour’ and ‘ethnic skin’ but not much about Pacific peoples, in particular. The British Journal of Dermatology recently had a whole special supplement: Ethnic Skin: a New Era for Studying Human Cutaneous Diversity, October 2013, Volume 169, Issue Supplement s3, Pages iii–v, 1–97.
Fitzpatrick skin type and resource
I have found that my skin profile is the following:

<table>
<thead>
<tr>
<th>Fitzpatrick skin type</th>
<th>What I look like, e.g. skin and eye colour</th>
<th>Where my ancestors are likely to have come from</th>
<th>My skin's response to sun exposure</th>
<th>How quickly my skin burns in the sun</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 2, 3, 4, 5, 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Animals have lots of different ways to protect themselves from the sun.
2. Humans are animals, too.
3. Hauora is a Māori word that means health and wellbeing.
4. There are four parts to our health and wellbeing and, like a whare, they need to be strong and equal so that there is a balance. These four parts are taha wairua (the spiritual side), taha hinengaro (thoughts and feelings), taha kia ora (the physical side) and taha whānau (family).
5. According to Fitzpatrick, humans have three main types of skin colour.
6. Our skin colour can show us what part of the world some of our ancestors came from and where we live now.
7. Humans with dark-coloured skin burn the fastest in the sun.
8. You cannot get sunburn on a cool cloudy day.
9. Humans can protect themselves from the sun by SLIPPING into the shade and a collared long-sleeved shirt, SLAPPING on a hat, SLOPPING on sunscreen and WRAPPING on some sunglasses.
10. Sunlight is made of all different sorts of energy and light.
11. The sun sends down ultraviolet radiation (UVR) to the earth.
12. We can see ultraviolet radiation (UVR).
13. The ultraviolet radiation (UVR) is what causes our skin to burn.
14. There is more ultraviolet radiation (UVR) at night because the moon reflects the rays.
15. There is more ultraviolet radiation (UVR) in summer because the earth is closer to the sun in summertime in New Zealand.
16. Skiing in the snow can expose you to high levels of ultraviolet radiation (UVR) because you are at altitude.
17. Ultraviolet radiation (UVR) is reflected off snow and water so it is important to wear sunglasses when in the snow or near water.
18. Countries in the world that are near the equator get more ultraviolet radiation (UVR) than countries like the UK and Canada.
19. The ozone layer is a filter (like a cloud) between the sun’s rays and the earth’s surface.
20. The hole in the ozone layer was caused by people using too many spray underarm deodorants instead of roll-on deodorants.
5. Write the level two (interpretative) statements last. What can the learners infer from the text by thinking about what the text implies or suggests but doesn’t say directly? These statements need to be a mixture of what can and cannot be inferred from the text. Students need to justify their choices by referring to the text.

How do I use the three-level guide?
- Make sure students understand the purpose of the task, i.e. to reach an understanding of the text at three levels.
- Stress that this is not a simple ‘true/false’ activity and that level three in particular will not have ‘right or wrong’ answers.
- Model the process with a practice guide or with a first question at each level.
- Allow plenty of time to complete all stages of the task.
- You may wish to follow this process for students in the classroom:
  - Stage one: students work individually
  - Stage two: students work in groups – preferably multi-level/mixed ability
  - Stage three: present or record and discuss similarities and differences between group responses, especially at applied level.

Three-level guides were developed by H. Herber around 1970. They are used to help students think through oral, written or visual texts after they have been given some background knowledge of a topic. They can be used across all curriculum areas.

A three-level guide comprises a series of statements (not questions) that prompt comprehension. The purpose of the guide must be clear and must be explained to students. The statements should be designed so that they promote a coherent understanding about some aspect(s) of the topic or text (as opposed to a random set of statements about the text).

The three levels

- Level one ➔ Literal ➔ What’s “on the lines”? ➔ Factual level of understanding
  AIM: to enable learners to accurately identify key and relevant information/ideas explicitly stated in the text.

- Level two ➔ Interpretative ➔ What’s “beyond the lines”? ➔ Interpretative level of understanding
  AIM: to enable learners to reflect on and interpret the information, to pick up the inferences in the text and to draw conclusions from the text.

- Level three ➔ Applied ➔ What’s “between the lines”? ➔ Applied level of understanding
  AIM: to enable learners to apply the content of the text to broader situations or generalisations beyond the text, but related to or generated from the text.

What are the benefits of three-level guides?
Three-level guides:
- show students what information they need to focus on
- encourage students to become close and critical readers and thinkers
- require students to clarify, support, justify and evaluate their thinking
- support less-successful learners by offering models of how to think through the content as they are reading
- provide opportunities for language development through focused small-group discussion.

How do I write a three-level guide?
1. Choose an important content area.
   Three-level guides can take time to construct, so it is important to base them on something that is significant and important for students to process in depth.
2. Work out what main ideas or understandings you want the students to get out of the text.
3. Write the level three (applied) statements first.
   This leads you to work out the main ideas and concepts you want learners to think about. Level Three statements should promote discussion and not be able to be answered with a simple “yes” or “no” response. Students should be able to justify their conclusions or responses by referring to the text but should be thinking beyond the text.
4. Write the level one (literal) statements.
   Identify the key and relevant information that will lead learners towards the understandings at the applied level. Mix these statements with some information that is not explicitly stated/found in the text.
Lesson 5
Knowledge attack – UV radiation and UVI

Overview:

We are finding out about our skin and how to best protect it from ultraviolet radiation.

Assessment Opportunities

Learning Outcomes

We are successful when we can:

- explain what UV radiation and UVI are
- use the information sheets to identify facts about our skin and the sun
- read and interpret information on UV radiation levels
- use the information on skin and UV radiation and UVI as a basis for decisions about sun protection.

Structure

Prepare:

- Resource 5a and 5b and Resource 6 in A3 size, one copy for each group of three students.
- Data projector
- Enough sets of crayons or coloured pencils for students to have a set if they are working in groups of three. (Each group must have green, yellow, orange, red and purple colours.)

Connect:

We have identified that our skin tells a story about who our ancestors are likely to have been, the amount of sun protection we need, our age and our lifestyle. Now we are going to look more closely at skin and how we can protect it from harmful ultraviolet radiation contained in sunlight.

Activate:

1. Students are placed in pairs and given a copy of Resource 5a and 5b.
   - Students complete Resource 5a by matching the images with the correct fact in Resource 5b. Answers: A1, B4, C7, D9, E2, F5, G10, H3, I6, J8.
   - Students are placed into groups of three. Each group receives an A3 copy of Resource 5a and 5b in A3 size, one copy for each group of three students. (Each group must have green, yellow, orange, red and purple colours.)
   - Students need to have access to the internet and can go to the websites below to help them find out more information.

2. Once students have completed the infographics (Resource 6), the A3 sheets from each group are displayed on the classroom wall. Students do a ‘walk by’ of the displayed infographic sheets as if they were in an art gallery.
   - Teacher and students discuss which infographics worked well – the visual images that successfully explain the facts.

Note to teachers: Dr Richard McKenzie, Emeritus Researcher on Atmospheric Radiation from NIWA, suggests, “Fair-skinned New Zealanders receive much higher UV radiation levels than our ancestral home in the northern hemisphere (e.g. United Kingdom (UK)) due to New Zealand being much closer to the equator than the UK. Our peak summer UV radiation levels are also 40% greater than at corresponding latitudes in the northern hemisphere (e.g. Southern Europe, mid USA). Further, because of our mild temperatures, it’s comfortable to stay in the sun for too long.”

Lesson 5

Structure

3. UVI – teacher revisits:
   - the Cancer Society SunSmart messages of Slip, Slop, Slap and Wrap
   - UV radiation in sunlight are the rays that burn our skin
   - even though we cannot see or feel UV radiation, we can measure it
   - the ultraviolet index (UVI) measures the level of UV radiation in the environment.
   - In New Zealand, the National Institute of Water and Atmospheric Research (NIWA) measures UVI. They also forecast the amount of ultraviolet radiation (UVR) for the next day.

4. Teacher shows students the website on the data show, including today’s and yesterday’s UV index and the UVI forecast.

5. Teacher outlines that UV radiation is affected by:
   - season
   - time of day
   - geographical location
   - altitude
   - cloud cover
   - characteristics of the immediate physical environment, albedo effects, not just snow and water.

6. Teacher takes students to http://lrrpublic.clinet.nsw.edu.au/lrrSecure/Sites/Web/sunsmart/brainiac/uv.htm. Talks about the graph, (x-axis is the time of the day and y-axis is the UVI level and what the different colours mean). Teacher clicks on ‘check this’. Teacher clicks on ‘winter’ to show the UVI for winter. In winter, when is the UVI at its highest level? When is it at its lowest level?
   - Teacher then clicks on ‘summer’. When is the UVI at its highest level? When is it at its lowest level? What is different about this graph when compared to the winter graph? Why is the UVI rate higher in summer than in winter?
   - Teacher returns to http://lrrpublic.clinet.nsw.edu.au/lrrSecure/Sites/Web/sunsmart/brainiac/protect_pop2.htm and students complete the clote test individually and then discuss their answers.

   - Teacher goes back to http://lrrpublic.clinet.nsw.edu.au/lrrSecure/Sites/Web/sunsmart/brainiac/uv.htm and clicks on ‘test yourself’. Students complete the UV index and exposure test in pairs. Teacher clicks on ‘check’ to go over the answers.

   - UV index graphs
   - Teacher returns to http://www.cancernz.org.nz/reducing-your-cancer-risk/sunsmart/the-ultraviolet-index/example-of-daily-uvr-levels-over-a-summers-day/
   - When the UVI is 3 or above, sun protection is needed.

   - What does the graph (on next page) tell us about when we will need sun protection in New Zealand?
Lesson 5

Consolidation:
Teacher (or if possible, students) go to the following sites and answer the following questions:
1. Click on [http://www.niwa.co.nz/our-services/online-services/uv-and-ozone/today’s-uv-index](http://www.niwa.co.nz/our-services/online-services/uv-and-ozone/today’s-uv-index). Which city has the highest UVI?
2. Click on [www.niwa.co.nz/our-services/online-services/uv-and-ozone/forecasts](http://www.niwa.co.nz/our-services/online-services/uv-and-ozone/forecasts). Note the x-axis is based on a 24-hour clock. Imagine you are planning the programme for a camp in Gisborne for year 7 students from your school. You want the students to play an outdoor game of touch rugby. What time of the day would you schedule it so that students would be less likely to burn?
3. Imagine you are also planning the programme for a camp in Christchurch for year 8 students from your school. You want the students to play an outdoor game of touch rugby. What time of the day would you schedule it so that students would be less likely to burn? Is this time different or the same as it would be for the school camp in Gisborne?
4. How could you use the NIWA site to ensure that you and your family and friends do not get badly burnt when you are playing sport or having a picnic or swimming?

Table 1: Mean UVI Levels throughout the Year at Five New Zealand Centres

<table>
<thead>
<tr>
<th></th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auckland</td>
<td>10</td>
<td>8</td>
<td>7</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>6</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>Wellington</td>
<td>9</td>
<td>8</td>
<td>6</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td>7</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Christchurch</td>
<td>8</td>
<td>7</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>7</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Central Otago</td>
<td>8</td>
<td>7</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Invercargill</td>
<td>7</td>
<td>6</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

Note: Mean UVI includes clouds

Table 2: Peak UVI Levels (Solar Noon) Throughout the Year at Five New Zealand Centres

<table>
<thead>
<tr>
<th></th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auckland</td>
<td>13</td>
<td>11</td>
<td>7</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>6</td>
<td>8</td>
<td>11</td>
<td>13</td>
</tr>
<tr>
<td>Wellington</td>
<td>14</td>
<td>13</td>
<td>9</td>
<td>6</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>5</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td>Christchurch</td>
<td>12</td>
<td>10</td>
<td>8</td>
<td>5</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>7</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>Central Otago</td>
<td>10</td>
<td>8</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>7</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>Invercargill</td>
<td>8</td>
<td>7</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>9</td>
<td>10</td>
</tr>
</tbody>
</table>

Note: Peak UVI is when cloudless

Structure

Teacher then clicks on ‘Mean and Peak UVI levels (taken at solar noon) throughout the year at five New Zealand centres’ on the page, which will take them to the tables below.

Table 1: Mean UVI Levels throughout the Year at Five New Zealand Centres
Table 2: Peak UVI Levels (Solar Noon) Throughout the Year at Five New Zealand Centres

Teacher will also have to show students where the main centres are located in New Zealand by going to [http://www.metservice.com/national/home](http://www.metservice.com/national/home)

What do the graphs below tell us about:
- (Table 1) the cities that most often have an average (mean) UVI of 3 or above?
  - Are there any surprises for you?
  - (Table 2) the cities that most often have the high UVI scores (3 or above) throughout the year?
  - Are the same cities those you noted in Table 1? Why is this?
Lesson 5, Resource 5a
Love the skin you’re in

Look at the image in Column A, which describes a fact about your skin. Go to Resource 5b which lists 10 facts about our skin. Match each of the 10 facts about your skin with the image in Resource 5a. Write the fact in Column B of Resource 5a.

<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>The skin is the largest organ in the body</td>
</tr>
<tr>
<td>b.</td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td></td>
</tr>
<tr>
<td>d.</td>
<td></td>
</tr>
<tr>
<td>e.</td>
<td></td>
</tr>
</tbody>
</table>

Lesson 5, Resource 5a
Love the skin you’re in

<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>f.</td>
<td></td>
</tr>
<tr>
<td>g.</td>
<td></td>
</tr>
<tr>
<td>h.</td>
<td></td>
</tr>
<tr>
<td>i.</td>
<td></td>
</tr>
<tr>
<td>j.</td>
<td></td>
</tr>
</tbody>
</table>
### Lesson 5, Resource 5b
**Love the skin you’re in**

**10 facts about your skin**

1. The skin is the largest organ in the body.
2. UVA rays penetrate the dermis. UVB rays penetrate the epidermis.
3. In winter, you can get sunburnt at high altitudes.
4. The thinnest part of your skin is found on your eyelid.
5. Skin colour is the result of a protein called melanin.
6. You need to SLIP, SLOP, SLAP and WRAP to protect your skin.
7. The thickest part of your skin is found on your foot.
8. There are a lot of different skin colours, but everybody has to protect the skin they’re in.
9. Your skin has three layers.
10. You can get sunburnt even on cloudy days.

---

### Lesson 5, Resource 6
**12 incredible facts about UV radiation**


<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>UV radiation is cumulative over your life span. Your skin remembers all skin damage, sunburn and tanning.</td>
<td>The risk of sunburn is greater when you are at a high altitude, e.g. up a mountain or in the snow.</td>
</tr>
<tr>
<td></td>
<td>Ultraviolet radiation from the sun cannot be seen or felt but it causes sunburn and skin cancer.</td>
</tr>
<tr>
<td></td>
<td>A person surrounded by snow receives UV radiation from the sky as well as UV radiation reflected off the snow.</td>
</tr>
<tr>
<td></td>
<td>Snow, water and concrete all reflect UV radiation.</td>
</tr>
<tr>
<td></td>
<td>Reflection from fresh snow can double the amount of UV radiation you are exposed to when outside.</td>
</tr>
<tr>
<td></td>
<td>UV radiation can go through clouds.</td>
</tr>
<tr>
<td></td>
<td>UV radiation can cause damage to your eyes.</td>
</tr>
<tr>
<td></td>
<td>When in the snow, protect your eyes by wearing sunglasses or goggles that filter UV radiation, are close fitting and wrap around.</td>
</tr>
<tr>
<td></td>
<td>To avoid sunburn in the snow or when you are near water, wear:</td>
</tr>
<tr>
<td></td>
<td>• a hat that covers your head and ears</td>
</tr>
<tr>
<td></td>
<td>• long sleeves and trousers</td>
</tr>
<tr>
<td></td>
<td>• SPF 30 sunscreen on your face</td>
</tr>
<tr>
<td></td>
<td>• SPF 30 lip balm</td>
</tr>
<tr>
<td></td>
<td>• sunglasses/goggles.</td>
</tr>
<tr>
<td></td>
<td>Stay indoors or in the shade around lunchtime.</td>
</tr>
<tr>
<td></td>
<td>The ultraviolet index measures the level of UV radiation in the environment.</td>
</tr>
<tr>
<td></td>
<td>The ultraviolet index is highest between September and April (especially between 10am and 4pm) in New Zealand, so sun protection will be needed during this time.</td>
</tr>
<tr>
<td></td>
<td>When going to the beach or a pool, wear a dark-coloured rash shirt for better UV radiation protection.</td>
</tr>
</tbody>
</table>
Part Two, Lessons 6–8
Science investigations

### Thinking like SunSmart scientists

The sun is our biggest source of energy. Energy makes things happen. Energy changes things. Energy from the sun includes heat, light and UV radiation. UV radiation cannot be seen or felt.

**Overview:**

- Scientists investigate and use observation to ask questions about, understand, think about and explain how the sun’s energy can make things happen.
- Scientists share their understanding and knowledge with other people in order to check or improve their explanations of the sun and its effects.
- We can use our understanding to protect ourselves from the harmful effects of the sun, while still enjoying the benefits.

### Assessment Opportunities

**Lessons 6–8**

<table>
<thead>
<tr>
<th>We are successful when we can:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• explain how science can help us to find out about and understand the centre of our solar system</td>
</tr>
<tr>
<td>• share what we already know about the sun and where/how we gained that knowledge</td>
</tr>
<tr>
<td>• view and analyse secondary sources</td>
</tr>
<tr>
<td>• carry out a plan of action to test our ideas</td>
</tr>
<tr>
<td>• prepare equipment to use in investigations</td>
</tr>
<tr>
<td>• understand that our senses help us collect data</td>
</tr>
<tr>
<td>• use the data we collect to make explanations</td>
</tr>
<tr>
<td>• use tools and measurements to describe change</td>
</tr>
<tr>
<td>• explain the relationship between exposure to the sun and changes in size, colour and temperature</td>
</tr>
<tr>
<td>• use our data to think about what is happening and why.</td>
</tr>
</tbody>
</table>

### Structure

**Lessons 6–8**

- Students will have amassed quite a body of information about the sun. Some of this will be from media messages, previous school studies, personal interest and personal experience. The focus of these lessons is to help students to surface their present understandings and knowledge and to identify how they know what they know.
- Directing students in an explicit way will draw their attention to how, as humans, we draw upon multiple sources to make sense of the natural world. This series of lessons will add to their present understanding/knowledge of the sun by asking students to engage with and analyse a number of texts and the information/ideas present. They will need direction to think about these texts not just as sources of facts/information but to consider what knowledge/understandings were required in order to construct them. Students should be encouraged to think about how successful the examples are.
- Asking the students to identify what they know as a result of personal experiences/noticings re the sun will help to reinforce that scientific understanding. Knowledge starts with observations.
- The empirical nature of science

This means that science is based on and derived from observations of the world around us from which interpretations are made. Scientists depend on empirical evidence to produce scientific knowledge. Any scientific explanation must be consistent with empirical evidence, and new evidence brings the revision of scientific knowledge.


Building student knowledge about how scientists gain knowledge with regard to the sun and by participating in guided and student-designed investigations will enable them to have confidence to make decisions about how they manage their exposure to the sun’s energy.

**Just how powerful is our sun?**

- What we already know about the sun.
- How science can help us to find out about and understand the centre of our solar system.

**Lesson 6**

**Prepare:**

Preview the following sources:

- Our solar system [http://solarsystem.nasa.gov/planets/](http://solarsystem.nasa.gov/planets/)

This interactive chart from NASA allows students to see how the sun is central. Clicking on each planet, orbital pathways, etc. gives a brief synopsis of the information embedded in this chart. It may be useful to allow students time to navigate this chart at another time.

- The surface of the sun as you have never seen it [https://www.youtube.com/watch?v=bM7bc5D4K8o&feature=youtube_gdata](https://www.youtube.com/watch?v=bM7bc5D4K8o&feature=youtube_gdata)

This clip is able to build curiosity through awe and wonder using NASA footage. The clip provides reinforcement of what has been previously explored but adds...
Lessons 6–8

Structure

depth through introducing powerful, dynamic images and vocabulary. The clip could be used to help students write their own voice-over. The scope for science-specific words in combination with figurative language promotes the understanding that scientists are affected by and respond to phenomena in personal ways – awe and wonder is a driver of the need to know as much as the gathering of data. Scientists do not only describe phenomena in objective, clinical terms.

Narration/voice-over on clip:

“The sun has shed light on our home for more than 4 billion years. It will continue to do so for another 4. It is massive almost beyond comprehension. Constant yet ever changing. Born from a swirling cloud of dust and gas, it is a giant fusion engine that drives the solar system. It seethes and boils like a living thing. Loops of plasma rise up, so large they would dwarf earth. Explosions flash on its surface. And yet the sun also gives us warmth. And beauty. And life.”

Connect and activate:

Students view both video clips https://www.youtube.com/watch?v=bM7bc5D4K8o&feature=youtube_gdata and http://solarsystem.nasa.gov/planets/

• Organise students in groups of four. Supply each student with paper strips to record/draw what they know about the sun (Resource 7a). Stop after a few minutes and ask them to share what they have recorded. In the groups, students organise what they know as a result of secondary sources into one set and what they know from personal experience/observation into the other set. They use Resource 7b and 7c to complete the exercise. Teacher explains that their personal observations are those gathered through the five senses and could be about their observations about reflection, light/shade, heat, effect on plant growth, effect on their skin, animals avoiding sunlight, evaporation, etc.

Demonstrate:

• Once each group has completed the activity, they place Resource 7b on the wall at one end of the classroom (as pre-organised by the teacher) and Resource 7c: on the other wall. Students move around and look at the statements from each group, detailing their response.

• Ask if there are any observations/experiences that they have in common with other groups. If so, what does that suggest? (The sun’s effects may be consistent or there may be a pattern to our understanding.)

• Can they see any connection between what they know through secondary sources and their own observations or experiences (e.g. the pattern of shadow lengths over the course of a day; insects avoiding the sun)?

• Ask if anybody mentioned the sun as the centre of our solar system. Note what is known and ask if anybody can add to that.

• Introduce the NASA Our Solar System interactive chart using data show/interactive white board http://solarsystem.nasa.gov/planets/. What information is presented? How was this information collected? How reliable is it? Allow students time to discuss in their groups whether this interactive chart is useful in terms of adding new ideas and facts about the sun. Each group can report back on and justify their decision.

Consolidate:

Talk about how energy changes things or makes things work. The sun is a major source of energy. This means we need to think about how that energy changes both living and non-living things. SunSmart people are aware that this energy defines our individual skin story. The type of skin we have is linked to our heritage (skin type), and what we do to our skin (avoiding over-exposure that leads to sun damage, both on the surface and deeper, leading to premature ageing, skin lesions, carcinomas. Link back to previous lessons (e.g. Fitzpatrick skin types, Resource 3).

Lessons 6–8, Resource 7a

10 things I know about the sun

Write down 10 things you know about the sun.

1. ................................................................................................................................................................................................................

2. ................................................................................................................................................................................................................

3. ................................................................................................................................................................................................................

4. ................................................................................................................................................................................................................

5. ................................................................................................................................................................................................................

6. ................................................................................................................................................................................................................

7. ................................................................................................................................................................................................................

8. ................................................................................................................................................................................................................

9. ................................................................................................................................................................................................................

10. ..............................................................................................................................................................................................................

Instructions:

1. Write down 10 things you know about the sun.

2. Cut each of the 10 statements about the sun into strips.

3. With your group, decide if the statement is either from a secondary source or from personal experience or observation.

4. Once you have made the decision, glue each statement on the appropriate sheet (Resource 7b if it is from a secondary source or Resource 7c if it is from personal experience or observation).
Lessons 6–8, Resource 7b
Things we know about the sun from secondary sources

Lessons 6–8, Resource 7c
Things we know about the sun from our experiences
**Lessons 6-8**

### Structure

**Prepare**

**Lessons 7-8**

Teacher to view clips and apps before use in class:

- [https://www.youtube.com/watch?v=bM7bc5D4k8o&feature=youtube_gdata](https://www.youtube.com/watch?v=bM7bc5D4k8o&feature=youtube_gdata)
- [https://voicethread.com/](https://voicethread.com/)

The sun is a mass of incandescent gas. They might be giants [http://www.youtube.com/watch?v=3jdWlSF195Y](http://www.youtube.com/watch?v=3jdWlSF195Y) or try [http://www.youtube.com/watch?v=mE069GDM_k](http://www.youtube.com/watch?v=mE069GDM_k)

**Sun Safe Play Everyday**

- [http://www.youtube.com/watch?v=Zc2wE5dVx3Y](http://www.youtube.com/watch?v=Zc2wE5dVx3Y)
- Sun Safety – Who’s at risk of skin cancer? [http://www.youtube.com/watch?v=MK_NM5V7BAS](http://www.youtube.com/watch?v=MK_NM5V7BAS)

**Connect:**

Introduce the clip Surface of the Sun As You’ve Never Seen It and provide students with transcript of the voice over (Resource 8).

Tell students: ‘This clip uses NASA footage. There is a common misunderstanding that scientists can only use facts to describe things that they notice, investigate and want to explain about the natural world. However, the work of science is carried out by human beings, and all human beings respond to events and things that fill us all with awe and wonder.’

Ask them to think about how the three elements of visuals, voice and music work together to convey just how amazing and powerful our sun is.

Read through the transcript before viewing. In groups, students can identify poetic language and content-specific language. Do these two approaches work well together?

Remind students to think about how different techniques are used to add a level of engagement with the content. View Surface of the Sun As You’ve Never Seen It [https://www.youtube.com/watch?v=bM7bc5D4k8o&feature=youtube_gdata](https://www.youtube.com/watch?v=bM7bc5D4k8o&feature=youtube_gdata)

On Resource 8, record words they would use and what wonderings they have about the sun as a result of this clip.

Was the clip successful in creating interest and adding ideas and facts?

Talk about how the sun is always there, every day, so we forget to even think about it. Ask how the scientists who study the sun are able to make us think about the sun.

**Extension:**

Suggest that students revisit the solar system chart again, as part of their reading. Direct them to think about how different entities in the solar system are affected by their proximity to the sun. Pose the question: If the sun determines these aspects/characteristics of Mercury, asteroid belt, etc., then should this information be factored into our decision-making around our exposure to the sun’s energy?

Using a compilation of sun images, students can make presentations that reflect poetic and content-specific language. Use Voicethread [https://voicethread.com/](https://voicethread.com/) or Fotobabble [http://www.fotobabble.com/](http://www.fotobabble.com/) or a storyboard app.

**Activate:**

This next part of the lesson builds on the use of other media clips to present different information. Each clip has a different audience. Students will analyse and critique whether these clips are successful.

### Lessons 6-8

**Structure**

These clips will front load some information about the sun and also allow students to think about the information and whether the techniques used are successful. If our aim is to build scientific literacy, students need opportunities to practise this kind of approach and to share the thinking that is generated as a result. Scientific understanding/knowledge is cumulative and also tentative. Ideas are tested and sometimes revisited as new information comes to hand.

**View clip** The sun is a mass of incandescent gas [http://www.youtube.com/watch?v=3jdWlSF195Y](http://www.youtube.com/watch?v=3jdWlSF195Y) or try [http://www.youtube.com/watch?v=mE069GDM_k](http://www.youtube.com/watch?v=mE069GDM_k)

- **Students work in groups of four.** As the clip plays, students record as many facts as they can, in the form of words or pictures. Students read their list and tick the facts that they already know. Group members share what they have managed to record. Listen again following the same method. Are they able to add more? Why/why not? What helps/hinders the process? Ask what age group this clip is aimed at. Have the producers been successful? In what ways? What strategies have they used? What extra information about the sun do all the clips share with us?

- Ask students, in terms of adding to student understanding/knowledge, is this clip successful?

- Students revisit the facts gathered by the group. Point out this is a very old track and that some of the facts may no longer be valid. Refer back to NASA chart and how this is a more recent compilation of understandings re the sun. What could the students do to check out the information in the song?

- Remind students that, over time and as technology advances, some of our ideas about the sun and the solar system end up being revised. This is the tentative (not set in stone) nature of science. Most of the information is still considered to be current. Does this clip build a sense of how powerful the sun is?

**Students view clips** [http://www.youtube.com/watch?v=Zc2wE5dVx3Y](http://www.youtube.com/watch?v=Zc2wE5dVx3Y) and [http://www.youtube.com/](http://www.youtube.com/) watch?v=MK_NM5V7BAS

Use similar analysis as above. Focus on what information is conveyed, who the message is aimed at and whether it is successful. After viewing, one person from each group reports back to class.

**Consolidate:**

We have been considering the knowledge we have about the sun, either as a result of secondary sources or our own experiences. The clips allow us to think about some of the types of message about the sun that are in circulation. These ideas emerged in much the same way that our own ideas about the sun have been formed – noticing the effects and then carrying out investigations to prove or disprove our thinking.

**Learning from our experiences:**

Discuss with students how science investigations develop as a result of our noticing effects and wanting to determine causes. Investigation in science requires organised noticing. The purpose of all the investigations is to help you to make SunSmart choices that are based on your science understandings and knowledge about how powerful our sun is.
The sun has shed light on our home for more than 4 billion years. It will continue to do so for another 4. It is massive almost beyond comprehension. Constant yet ever changing. Born from a swirling cloud of dust and gas, it is a giant fusion engine that drives the solar system. It seethes and boils like a living thing. Loops of plasma rise up, so large they would dwarf Earth. Explosions flash on its surface. And yet the sun also gives us warmth. And beauty. And life.

Facts I know about the sun

- The sun has shed light on our home for more than 4 billion years.
- It will continue to do so for another 4.
- It is massive almost beyond comprehension.
- Constant yet ever changing.
- Born from a swirling cloud of dust and gas, it is a giant fusion engine that drives the solar system.
- It seethes and boils like a living thing.
- Loops of plasma rise up, so large they would dwarf Earth.
- Explosions flash on its surface.
- And yet the sun also gives us warmth. And beauty. And life.

Overview: We are investigating the effect of sunlight on living and non-living things.

Structure

Lessons 9–11

These investigations allow students to consider the sun’s effect – its ability to change both living and non-living things. Students should be encouraged to think about how these experiences inform their ability to make SunSmart choices.

A: What is the effect of different amounts of energy from the sun on green plants?
B: What is the effect of energy from the sun on different-coloured containers?

Part A

We are investigating the effect of heat and light from the sun on living and non-living things.

We are learning to:

- predict what will happen when green plants get different amounts of sunlight
- record data using photos and qualitative and quantitative descriptions.

Prepare:
Six indoor plants of the same type and size (e.g. lemon balm).

Connect:
Ask students why sunlight is important for plants. Divide class into six groups. In groups discuss “Do all plants need the same amount of sunlight?” and give reasons and an example. Group to record responses. Only responses that include a reason and an example are valid. We are going to test the effect of different amounts of sunlight on six plants – two in a shaded part of class (out of direct sunlight), two covered by a box (or in a cupboard) and two in full sunlight.

Activate:
Can you predict what might happen to each plant? Why?

Demonstrate:
- Give each group time to look carefully at their specimen. Ask them to look at the leaves. What do they look like? Are they the same size? How are they joined to the stem? What colour are they? Use the opportunity to identify plant parts. What is under the soil? (Roots, etc). (Complete Resource 9a.)
- Take photos of each plant. Insert photo on chart in Resource 9a. Measure the biggest leaf and the smallest leaf on each plant. Measure the height of the plant. Record.
- Remind students that scientists use numbers to describe things accurately (measurement is a quantitative description).
- Students to describe leaf colour. Record on Resource 9a.
- Place two plants in each location. Ensure that each specimen is labelled (1, 2, 3, 4, 5 or 6) so that the group can identify their plant. Students should organise who will take photos and record observations.
- Group to take photos of each plant every 2–3 days for 2 weeks and make a wall display of the picture diary. Record student plant progressions under photos.
- At the end of 2 weeks, each group has time to observe their plant and think about the data collected. Allow groups to share their findings with other groups. This reporting-back time can be organised by regrouping so new groups have members from each of the original groups. Students to use their data to support their reporting back. Students to design information and graphics to describe their results.
Lessons 9–11

Structure

Part B
We are investigating the effect of energy from the sun on different coloured containers.

We are learning to:
• use words and numbers to describe change
• use a watch/timer
• record results
• decide if data shows that the sunlight changes the water.

Prepare:
Each group needs: four empty soft drink cans; four rubber bands; four sheets of paper (one white, one black plus two from a selection of colours, cut to size so that the can is able to be wrapped in paper and secured by a rubber band); thermometer; jug of water; towels for spills; recording sheet for each student (Resource 9b).

Activate:
Remind students: We are learning how energy from the sun can change things. Today we are going to do an investigation to test how quickly water heats up in different-coloured containers. To keep this fair, we are going to keep the size of the container, the amount of water, and the starting temperature of the water the same. We will put them outside in the same place. Only the colour of the can will be different.

Demonstrate:
• Teacher demonstrates wrapping a can with black paper and securing the paper with rubber bands.
• Instruct students to wrap their cans.
• Distribute student recording chart (Resource 9b). Students to colour in their can.
• Distribute jugs of water to groups. Take starting temperature.
• Students record on thermometer graphic.
• Each can is to be filled to the top.
• Carry cans outside to place in sunlight.
• Set timer and leave outside for 1⅓ hours.
• Once the cans are set up and you have returned to class, ask the students in their groups to discuss which colour can they think will be most effective at heating up the water, and why.
• Record each group’s suggestion
• At the end of 1⅓ hours, check the temperature of the water inside the different-coloured cans.
• What has happened? Allow students time to share their results in their group.
• Collate findings of all groups. What do these results show?
• Does colour make a difference? How is this information useful when we are thinking about protecting our skin from the sun.

Restate: The sun is powerful. The sun’s energy can change things. It can damage our skin so we need to be SunSmart when we are in the sun.

Lessons 9–11, Resource 9a

STARTING DATE:
Scientists collect data at the beginning of their experiment. They can use words, pictures, drawings, numbers, videos and photos.

POSITION: In the sun/no sunlight/shade
Lessons 9–11, Resource 9a
Record sheet

Lessons 9–11, Resource 9b
Observation chart

In the sun/no sunlight/shade
DAY : DATE

Insert Photo

Measurement of biggest leaf: ....................................
Colour of biggest leaf: ...............................................
Measurement of smallest leaf: ..................................
Colour of smallest leaf: ..............................................
Height of plant: ..........................................................

Insert Photo

Measurement of biggest leaf: ....................................
Colour of biggest leaf: ...............................................
Measurement of smallest leaf: ..................................
Colour of smallest leaf: ..............................................
Height of plant: ..........................................................

Insert Photo

Measurement of biggest leaf: ....................................
Colour of biggest leaf: ...............................................
Measurement of smallest leaf: ..................................
Colour of smallest leaf: ..............................................
Height of plant: ..........................................................

Insert Photo

Measurement of biggest leaf: ....................................
Colour of biggest leaf: ...............................................
Measurement of smallest leaf: ..................................
Colour of smallest leaf: ..............................................
Height of plant: ..........................................................

Start temperature ........................................................
Finish temperature ........................................................
Lesson 12
UV beads – making UV visible

Overview: We are investigating using UV beads to reveal the presence and intensity of UV light.

Structure
Lesson 12
Prepare:
- Resource 10 recording sheet (one per student)
- Coloured pencils
- Camera/video/iPad/tablet.

We are learning to:
- understand that the light spectrum has parts not visible to the naked eye
- familiarise ourselves with how UV beads can detect the presence of UV light.

Connect:
Sometimes we think that, because something cannot be seen or felt, it is not able to have an effect, but think how, even though we cannot see air, we can see its effects, for example, how it moves trees and how it carries smoke from a chimney straight up on a calm day but off on an angle in the wind. Just like air, we cannot see UV radiation, but there are substances that can reveal its presence. We need to remind ourselves that it is present during all hours of sunlight and that, over time, its harmful effects on our skin will be obvious.

Activate:
Work in groups of four.
1. Hold up a box. Inside this box, there are some small ziplock bags containing UV beads. These beads contain a chemical that reacts to the presence of UV light by turning from white to another colour. This investigation will help us to detect the presence of UV radiation in three different locations – exposed to sunlight next to the window, exposed to full sunlight outdoors and exposed to sunlight in a shady spot outdoors. You are to gather your data by showing what colour changes happen in each location over a time interval of 15 minutes. You can record this on the data sheet – you will need coloured pencils. You will also take photographs at intervals to track changes.
2. In your group, discuss what result you expect in each location.
3. In your group, discuss the order of locations.
4. At the end of the investigation, each group will account for three bags, each containing 10 beads. These beads and bags will be required again for another investigation.
5. Take 5 minutes to discuss locations and roles. Share tasks.

Consolidate:
In your group, discuss what you have found out. What are the implications of your results? What was interesting or surprising? How does this new information add to your SunSmarts?

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UV bead detectives

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Lesson 13
Tonic water detective

Overview: We are investigating how we can make UV light visible.

Assessment Opportunities

Lesson 13
We are successful when we can:
• demonstrate how scientists can use chemicals to reveal the presence of something that is not visible to the naked eye
• use our science experiences to inform our SunSmart choices
• explain that light from the sun is made up of a mixture of many different colours of light, even though to the eye the light looks almost white
• carry out an action and test our ideas
• use the results of the experience to explain the presence of UV radiation in sunlight.

Structure

Lesson 13
Teacher note: The most dramatic results will occur around noon when the sun is directly overhead and in summer.

Prepare:
• Two clear, plastic cups per group
• Use permanent marker to label one cup T and the other W. Provide a cup labelled T and a cup labelled W to each group.
• 1 litre of tonic water.
• 1 litre of tap water.
• Black paper, polythene, felt or cloth (approximately 21 cm x 30 cm).

Connect:
We have learnt that we cannot see or feel UV radiation. Today, we are going to use the quinine in tonic water to show that there is UV radiation in the sunlight. Tonic water is mostly made up of water, but it also contains a very small amount of a substance called quinine. The quinine is able to absorb UV radiation and then reflect this back so that we can see that part of the light spectrum that is usually invisible to our naked eye.

Activate and demonstrate:
Students follow the instructions in Resource 11a.

Front load about the presence of quinine in tonic water. Although tonic water is mostly water, the small amount of quinine in it means we can use tonic water as a UV detective.

Consolidate:
The following is a guide for teacher questioning. Looking at the top 5 cm of the liquids, what do you see? (The upper centimetres of the tonic water cup should “glow” blue.)

1. Did both liquids appear the same? (No, the tap water should show no change.)
2. What effect does the black paper, polythene, felt or cloth have on your observation? (The black cloth increases the contrast, which makes the glow of blue easier to see.)
3. What is contained in the sunlight that causes the observed results? (Ultraviolet radiation.)
4. Give an explanation for the observed difference between the tonic water and the tap water. (There must be a difference between the tonic water and the tap water. Teacher can explain the presence of the quinine during post-lab discussion.)
5. Have you observed similar occurrences in other materials? (Answers will vary. Some students might be aware of the fluorescence of minerals under UV light.)
6. How might the position of the sun affect your results? (The higher the sun is in the sky, the shorter the path length through the atmosphere (ozone layer), allowing more ultraviolet to get through.) You may want to consider doing this activity at different times of the day so that students can compare the differences.

Finish with:
This investigation helps to remind us that rays of ultraviolet light are always present in sunlight and that, although the energy may be invisible, the effects of ultraviolet radiation from the sun is always shaping the story that our skin tells.
**Lesson 13, Resource 11b**

**Tonic water detective reveals UV radiation**

<table>
<thead>
<tr>
<th>TONIC</th>
<th>WATER</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image.png" alt="Tonic &amp; Water" /></td>
<td><img src="image.png" alt="Tonic &amp; Water" /></td>
</tr>
</tbody>
</table>

**Observations and thoughts**

**Lesson 14**

**Are you a human gnomon?**

**Investigating how gnomons can help us identify optimum shade times.**

<table>
<thead>
<tr>
<th><strong>Structure</strong></th>
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<tbody>
<tr>
<td><strong>Lesson 14</strong></td>
</tr>
<tr>
<td>We are investigating optimum shade time by using a human gnomon.</td>
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<tr>
<td><strong>We are learning to:</strong></td>
</tr>
<tr>
<td>• understand how the energy from the sun can be blocked by solid objects that cast a shadow (shadows can lessen the effect of heat and light)</td>
</tr>
<tr>
<td>• use a human gnomon to observe the projected shadow over a day</td>
</tr>
<tr>
<td>• make a photographic record of the shadows</td>
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<tr>
<td>• record our observations on a table/chart</td>
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<tr>
<td>• share our data with our groups and identify how this data is useful.</td>
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<tr>
<td><strong>Prepare:</strong></td>
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<tr>
<td>Students organised in groups.</td>
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<tr>
<td>Materials needed for each group: ruler, tape, chalk, worksheet to record observations (Resource 13).</td>
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<tr>
<td>Equipment needed for teacher: timer or watch.</td>
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<tr>
<td><strong>Connect:</strong></td>
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<tr>
<td>Ask students about any shadow exploration they have made. What did they notice about the shadows made at different times of the day? Show students the shadow images in Resource 12. Discuss how people notice things/phenomena in the natural world and start to think about what is happening. We notice effects. Thinking about effects make us wonder about causes. We look for ways to explain things.</td>
</tr>
<tr>
<td>Tell students that they will use a group member as a human gnomon. A gnomon is the part of a sundial that projects a shadow. They will use experience to trace the passage of the sun in a more organised way.</td>
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<tr>
<td><strong>Activate:</strong></td>
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<tr>
<td><strong>Day 1:</strong></td>
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<tr>
<td>The tracing of the human gnomon will need to be done at regular intervals, e.g. every 2 hours, on the hour, starting at 9am.</td>
</tr>
<tr>
<td>1. Locate a sunny spot on the asphalt/concrete in the playground that is free from any other shadows.</td>
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<tr>
<td>2. Each group nominates a gnomon to stand in a designated spot with their back to the sun (to discourage looking directly at the sun).</td>
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<tr>
<td>3. Draw around the gnomon’s feet in order to mark the position that will be returned to. Take a photo of the shadow cast. Draw around the shadow. Recording the sun’s position and length of shadow on the chart (Resource 13). Repeat this at set intervals throughout the day.</td>
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<tr>
<td>4. In groups, students predict and justify where they think their gnomon’s shadow will fall at the end of school.</td>
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<tr>
<td>5. Have students outline the predicted shadow with a different-coloured chalk. Take a photo and record the prediction on the charts.</td>
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<tr>
<td>6. At 2.00pm make the last recording for the day.</td>
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<tr>
<td><strong>Day 2:</strong></td>
</tr>
<tr>
<td>1. Students to check if their predictions were correct.</td>
</tr>
<tr>
<td>2. Do all the groups have similar findings?</td>
</tr>
<tr>
<td>3. How do these findings support SunSmart messages re best times to stay indoors?</td>
</tr>
</tbody>
</table>

*Note: The shorter your shadow, the higher the UV index.*
Lesson 14, Resource 12
Shadow images

Lesson 14, Resource 13
Gnomon recording sheet

Group members _______________________

<table>
<thead>
<tr>
<th>TIME</th>
<th>SHADOW LENGTH (Remember to measure from zero)</th>
<th>POSITION OF SUN (Remember – do not look directly at the sun).</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td>![Sun Icon]</td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td>![Sun Icon]</td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td>![Sun Icon]</td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td>![Sun Icon]</td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td>![Sun Icon]</td>
</tr>
</tbody>
</table>

Time of longest shadow? ___________________ Time of shortest shadow? ___________________
Lesson 15
Protective potions sunscreen investigation

Overview: We are investigating the effectiveness of commercially prepared sunscreen.

Assessment Opportunities
Lesson 15
We are successful when we can:
• carry out an action and test our ideas
• use data we collect to make explanations and decisions
• use data to explain which sunscreen is the most effective.

Structure
Lesson 15
Prepare:
• Four bottles of sunscreen (varying brands and SPF ratings, e.g. 15, 30, 80).
  Teacher will not let the students know what the SPF rating is for each of the sunscreens until after the experiments have been completed.
• A teaspoon (5 ml) of sunscreen for each group of students. Each group will have four samples of four different sunscreens labelled 1, 2, 3 and 4.
  • Sunscreen testing results.
  • Five ziplock plastic bags.
  • Five sets of UV beads.
  • Camera.

Activate:
• Students read the information and complete the tasks on Resource 14a.
• Each group of students receives a sample of each of the four commercial sunscreens labelled 1, 2, 3, 4.
• In total, they will have four commercial samples.
  • Students photograph UV beads before placing in the bag. Place UV beads in each of the five plastic ziplock bags.
  • Students smear sunscreen from sample 1 on the first plastic bag and number this 1. Likewise, sample 2 on the second plastic bag and number this 2, etc. until they have four plastic bags containing UV beads and smeared in one of the samples plus one bag with no sunscreen.
  • What do students predict will happen?
  • Students place the five plastic bags in direct sunlight from 10am in the morning until 2.30pm.
  • Students open the bags at 2.30pm. Students photograph UV beads after removing them from the plastic bag. Students observe and record the colour of the UV beads on Resource 14b and answer the questions.
  • Were there any surprises?

Lesson 15, Resource 14a
Sunscreen background

Sunscreens protect our skin by absorbing or reflecting ultraviolet radiation. Some do both.

Physical filters
Physical filters form a layer on the skin that ultraviolet radiation cannot pass through, e.g. zinc oxide. They reflect ultraviolet radiation away from your skin.

Chemical sunscreens
Chemical sunscreens form a layer that absorbs ultraviolet radiation. This must be put on 20 minutes before going outside.

No sunscreen protects against all ultraviolet radiation, so make sure that you protect yourself with what you wear. Apply sunscreen generously at least 20 minutes before sun exposure. Reapply sunscreen frequently and every 2 hours especially after swimming, towelling, exercising and perspiring. Swimming and sweating can remove sunscreen.

Task 1
Find out what you already know about sunscreen.
Click on ‘Test Yourself’ and find out how much you already know about sunscreens.

Task 2
Click on ‘Check This Out’. Are any of these sunscreens suitable? Click on the labels to find out.
In this experiment, we are using UV beads to indicate whether sunscreen has stopped UV rays going through a plastic bag. UV beads contain pigments that react with ultraviolet light from the sun, even on a cloudy day. We are using the UV beads to detect the UV-blocking effectiveness of four different sunscreens. We are working in groups of no more than four students.

**Procedure:**
- Each group will receive a sample of each of the four commercial sunscreens, labelled 1, 2, 3, 4.
- In total, you will have five commercial samples.
- You will have five sets of UV beads. Take a photo of the UV beads before placing them in the plastic bags.
- Smear sunscreen from sample 1 on the first plastic bag and number this 1. Likewise, sample 2 on the second plastic bag and number this 2, etc. until you have four plastic bags containing UV beads and smeared in one of the four samples plus one bag with no sunscreen.
- What do you predict will happen?
- Place the five plastic bags in the direct sunlight from 10am in the morning until 2.30pm.
- Open the bags at 2.30pm, take a photo of the beads from each sample, observe and record the colour of the UV beads below.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Colour of UV beads before placing in the plastic bag</th>
<th>Colour of UV beads after removing from the plastic bag</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. No sunscreen</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Questions:**
1. In which samples did the beads change colour?
2. In which sample did the beads change colour the most?
3. In which sample did the beads change colour the least?
4. What does this tell us about the ability of the sunscreens to block UV radiation?
5. Which is the most effective sunscreen?

**Overview:**
- What have we learnt about UV radiation?
- What have we learnt about our skin?
- How does UV radiation affect our skin?
- How can we protect ourselves from UV radiation?

**Essential question:**
How do others in our community protect their skin from ultraviolet radiation?

**Assessment Opportunities**

**Lessons 16–20**

**Structure**

**Lessons 16–20**

**Connect:**
- At what time of year and day is UV radiation strongest in New Zealand?
- At what time of the year and day is UV radiation strongest where we live (i.e. UVI 3 or more)?
- What do we about how UV radiation affects our skin?
- What can we do to protect our skin from UV radiation?

**Complete Resource 15b, 15c, 15d.**

**Read Resource 15d together.**

**Revisit Resource 4a.** Are there any changes you would like to make to your answers?

**Procedure:**
Work through Resource 16 and have students complete the survey using Resource 17. Students have five copies of the survey. Each of the five people they interview are given a copy of the survey. The extra sheet is used by the students to tally their results.

**Consolidation:**
Presentation to peers and whānau (see Resource 21).
Read the sample bio poem below and how it was made. Then use the template provided on the next page to develop your own bio poem about vitamin D.

**Amalie "Emmy"**

German mathematician and teacher; Loving, innovative, inspiring, intelligent, pacifist; Contemporary of Felix Klein, David Hilbert, and Albert Einstein; Keenly interested in languages, teaching math, non-commutative algebra, axiomatic theory, and abstract algebra with special attention to rings, fields, and groups; Who wrote *Ideal Theorie in Ringbereichen* and over 40 other papers; Whose contributions include Noether’s Theorem, Noether’s rings, work on theory of invariant used by Einstein, finding relationships between algebra, geometry, and logic, inspiring students to make their own contributions; Who is remembered as the Mother of Abstract Algebra and for the "Noether’s Boys," her followers; Who wanted to overcome gender issues, and political tensions and battles to become a woman professor under her own name; Who lived in Germany from 1882 to 1933 and fled to the U. S. from 1933 until her death in 1935. During the Nazi rule because she was a Jewish, liberal woman.

**Noether**

The student above developed the poem by completing the following template.

**BIO POEM – TEMPLATE**

| Line 1 | Mathematician’s first name |
| Line 2 | Description |
| Line 3 | Four characteristics of this person |
| Line 4 | Contemporary of ____________ (minimum 2 other people) |
| Line 5 | Keenly interested in ____________ (minimum 3 areas) |
| Line 6 | Who wrote ____________ (titles of books or other writings) |
| Line 7 | Who is remembered as/for ____________ |
| Line 8 | Whose contributions include ____________ |
| Line 9 | Who wanted or wanted to change ____________ |
| Line 10 | Who lived in ____________ (geographical and time reference) |
| Line 11 | During ____________ (historical reference) |
| Line 12 | Last name |

Now write your own bio poem. You will need to read the information on the following sites in order to complete the bio poem. [http://www.cancernz.org.nz/assets/files/info/SunSmart/VitaminD_Q&A_14Mar2012(1).pdf](http://www.cancernz.org.nz/assets/files/info/SunSmart/VitaminD_Q&A_14Mar2012(1).pdf)

**Bio poem on vitamin D**

Now write your own bio poem. You will need to read the information on the following sites in order to complete the bio poem. [http://www.cancernz.org.nz/assets/files/info/SunSmart/VitaminD_Q&A_14Mar2012(1).pdf](http://www.cancernz.org.nz/assets/files/info/SunSmart/VitaminD_Q&A_14Mar2012(1).pdf)

| Line 1 | Vitamin D is |
| Line 2 | Description |
| Line 3 | Three functions of vitamin D are |
| Line 4 | We get Vitamin D from ____________ (minimum two sources) |
| Line 5 | Made when the sun ____________ (explain how it is produced) |
| Line 6 | Sensible sun exposure is ____________ (two reasons) |
| Line 7 | We need vitamin D for ____________ |
Lessons 16-20, Resource 15b
Top 10 ways the sun can damage your health

In groups of three, identify 10 ways that too much sun can damage your health. Use all the knowledge and observations you have made to complete the statements below by putting in the missing word.

1. The sun’s UV radiation can ______________ your skin.
2. The sun’s UV radiation can _____________ your eyesight.
3. The sun’s UV radiation can ______________ skin cells.
4. The sun’s UV radiation can cause ___________, which destroys the top layer of your skin.
5. The sun’s UV radiation ages our ______________.
6. When exposed to the sun’s UV radiation, skin produces more of the brown melanin, which _________ the skin and gives us limited protection.
7. Over-exposure to the sun’s UV radiation causes at least 90% of all skin __________ cases in NZ.
8. The sun heats ______________ objects.
9. The sun melts _______________.
10. Too much sun can ______________ living and non-living things.

Lessons 16-20, Resource 15c
SunSmart science

Link the SunSmart action in Column A with the scientific knowledge we now have in Column B.

<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Stay in the shade around lunchtime.</td>
<td>A. Snow, pool water, concrete and the surf all reflect UV radiation.</td>
</tr>
<tr>
<td>2. Wear a broad-brimmed, bucket hat or a cap with flaps.</td>
<td>B. UV radiation can affect our eyes.</td>
</tr>
<tr>
<td>3. Wear a long-sleeved shirt.</td>
<td>C. The UV radiation index (UVI) is highest between September to April (especially between 10am and 4pm) in New Zealand.</td>
</tr>
<tr>
<td>4. Wear broad-spectrum sunscreen of at least SPF 30 or above.</td>
<td>D. New Zealand and Australia (southern hemisphere) have less ozone overhead than in the northern hemisphere, which is one of the reasons why more UV radiation reaches us.</td>
</tr>
<tr>
<td>5. Wear lip balm with a sunscreen in it or zinc on lips and nose.</td>
<td>E. Humans with light skin burn faster in the sun and need to cover up most of their skin.</td>
</tr>
<tr>
<td>7. When going to the beach or a pool, wear a dark-coloured rash shirt for better UV radiation protection.</td>
<td>G. The skin on our face and eyelids is very delicate and thinner than it is on other parts of our body.</td>
</tr>
</tbody>
</table>
Lessons 16-20, Resource 15d

Slip, Slop, Slap, Wrap
Ways we can protect ourselves from the sun.

SLIP into some sun-protective clothing – a shirt with a collar and sleeves – and into some shade

SLOP on some sunscreen – broad-spectrum of at least SPF 30

SLAP on a broad-brimmed or bucket hat or a cap with flaps

WRAP on a pair of sunglasses – make sure they meet the Australian/New Zealand standard

Lessons 16-20, Resource 16, Teacher’s Notes
Preparing for and conducting a survey

Let’s find out what SunSmart actions the people in our community use by carrying out a survey. Before we use our survey, let’s practise our interviewing techniques.

Teacher models good and not-so-good interviewing techniques through role play and asks students to identify features such as not looking at the person, muffled voices, speaking too quickly. Create a checklist of interview technique reminders.

- In groups of 4, students interview each other and record their findings on the survey sheet (Resource 17). One student to conduct interview, one to record, and one to observe. Rotate roles.
- After the four interviews, ask each group to consider: “What did we do well? What did we not do well? What could we improve on next time and how?”
- Students work in their group to identify five different people they could ask for their survey so that they get different ages, genders and ethnicities using the structure shown below.

<table>
<thead>
<tr>
<th>People to survey</th>
<th>Male/Female</th>
<th>Who in our group is responsible</th>
<th>Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>5–10 years old</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethnicity:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11–20 years old</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethnicity:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21–30 years old</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethnicity:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31–50 years old</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethnicity:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>51 years or over</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethnicity:</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Lessons 16–20, Resource 17

#### SunSmart survey

**Name __________________________**

<table>
<thead>
<tr>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
</table>

**Age group**

- 5–10
- 11–20
- 21–30
- 31–50
- 51+

**Ethnicity**

- Pākehā
- Other
- NZ Māori
- Samoan
- Cook Is. Māori
- Tongan
- Niuean
- Tokelauan
- Fijian
- SE Asian
- Chinese
- Indian
- Other

**SunSmart Action**

- Never
- Sometimes
- Always

- Stay in the shade between 10am and 4pm Sept–April
- Wear a broad-brimmed, or bucket hat, or cap with flaps
- Wear a long-sleeved shirt
- Wear broad-spectrum sunscreen of at least SPF 30
- Wear lip balm with a sunscreen in it or zinc on my lips and nose
- Wear wrap-around sunglasses
- Wear a rash shirt when near or in the water

### Lessons 16–20, Resource 18, Teacher’s Notes

#### Analysing results

Students collate their results (for the five people they surveyed) by tallying up the totals on their spare survey sheet. Teacher asks each group:

- Have you noticed if there are any similarities or differences between what the males and females have reported?
- Have you noticed if there are any similarities or differences between the age groups and what they have reported?
- Have you noticed if there are any similarities or differences between the ethnicities and what they have reported?

Teacher then uses the survey sheet to collate the totals from each group so that they have total figures for the class.

- Have you noticed if there are any similarities or differences between what the males and females have reported? I wonder why that is?
- Have you noticed if there are any similarities or differences between the age groups and what they have reported? I wonder why that is?
- Have you noticed if there are any similarities or differences between the ethnicities and what they have reported? I wonder why that is?

Teacher then discusses with students the best ways to present the data that is of most interest. See examples of a pie chart or bar graph below. Students write what the data results tell them.

Teachers could go to the links below for tasks at Levels 3–4 that focus on interpreting given data and graphing it.

Action plan for presentation to peers and whānau

We have found out a lot of things about ultraviolet radiation and how we can protect our skin. The key messages we have that will help us to protect ourselves from UV radiation are:

• Slip on a collared shirt with sleeves and into the shade
  • Slop on broad-spectrum SPF 30 sunscreen
  • Slap on a broad-brimmed hat
  • Wrap on wrap-around sunglasses

We have found out what SunSmart actions the people in our community use most often and those they use the least. We need to share the findings from our survey with the community. We also need to encourage the community to take ALL the SunSmart actions.

Encourage students to add to the list and also provide SunSmart actions used in their culture.

Students then work with their group to decide how they will present:

a) the findings from the survey
b) their message to encourage the school community to use all SunSmart actions.

They could present their message as a short film or cartoon (see http://www.youtube.com/watch?v=8nX7Ik_xo04). See Resource 10 for a presentation plan and Resource 21 for a group reflection sheet.
Lessons 16-20, Resource 21

Group reflection

Consider the way you worked as a group throughout the unit. For each of the areas below, put a circle around the number that best indicates how you think your group worked.

1 = always, 2 = often, 3 = usually, 4 = sometimes, 5 = never

1. Taking turns

   1  2  3  4  5

2. Listening to each other

   1  2  3  4  5

3. Sharing the responsibilities

   1  2  3  4  5

4. Solving problems

   1  2  3  4  5

5. Producing work we are proud of

   1  2  3  4  5

Resource 22

Group work – what works

1. For the teacher – a checklist of instructional environment and management components
2. For the students – group rules and agreement
3. For each student – feedback on group work (form)
4. What group work strategies are effective in your school?
5. Strategies for effective group work
6. Essential group dynamics
7. Social skills score cards – Levels 1–4
1. Instructional environment and management components

Teachers:

1. **A positive attitude**
   Belief that students are capable of learning. Have high expectations and make students accountable for meeting these expectations.

2. **Ensure your instructions and criteria for success are clear**

3. **Teach and assess the social and interpersonal skills**
   These include:
   - **Level 1**
     Building trust, listening, taking turns, looking at people when they talk, forming groups quickly and efficiently, taking responsibility for their own and the group’s behaviour, accepting and valuing differences, resolving conflict constructively.
   - **Level 2**
     Active listening, asking questions, clarifying, constructive criticism, helping and accepting others, paraphrasing, summarising.
   - **Level 3**
     Interviewing, coaching, teaching, negotiating, brainstorming, building on each other’s ideas.
   - **Level 4**
     Creative group problem-solving, conflict resolution, planning and organising, decision making, individually negotiating curriculum and research.

4. **Use a variety of team formations**
   Teacher-selected groups can be the primary groupings, but you can vary this by using randomly selected and student-selected groups. Students who do not work in student-selected groups may lose this privilege and be placed in teacher-selected groups or work individually on projects.

5. **Ensure students understand their positive interdependence within the group (outcome and means interdependence)**
   Students realise that they ‘sink or swim’ together.

6. **Encourage considerable promotive (face-to-face) interaction between students**

7. **Individual accountability and personal responsibility are paramount**
   Each student is held responsible by group members for contributing their fair share to the group’s success. The teacher is no longer the fountain of all knowledge, but is a resource guide.

8. **Ensure there is group processing at the end of every session**
   Groups reflect on how well they are functioning by:
   - describing what actions were helpful and unhelpful
   - making decisions about what actions to continue or change.
   Group processing also promotes a sense of self-efficacy.

9. **Stress the importance of attendance**
   Each student needs to feel that there is ownership and a responsibility to turn up. They will be answerable to their group when their absence negatively impacts on the group’s ability to complete a task.

10. **Consistency – arrange your room so that group work can take place frequently**
    Use co-operative learning regularly as “you have to sweat in practice before you can perform in concert”. The skill needs to be practised until it becomes an automatic habit pattern.

11. **Reward often**
    Use both extrinsic and intrinsic rewards.

12. **Provide frequent specific feedback on the task**

13. **Monitor the progress of the groups**
    Keep a book that details the points and bonus points students have gained for effort and social skills as well as the task-specific skills.

14. **Everyone has a role to play**
    Groups need a chairperson, recorder, timekeeper, clarifier and summariser.

15. **Be patient**
    New skills take a while to master. Students need a lot of practice before it becomes automatic.
2. Group rules and agreement

You will need to discuss and then write up a list of agreed rules that will govern your group. Each member of your group will need to sign the agreement below.

**Points to consider:**

1. A positive attitude
2. Be generous with praise for each other
3. Listen while others talk, take turns, look at people when you talk, form the group quickly, take responsibility for your own and the group’s behaviour, resolve conflict constructively
4. Remember, you ‘sink or swim’ together
5. Each group member is responsible to the group for contributing their fair share
6. Each group member is responsible for the outcome – they need to show up to class
7. Be patient with those who find it difficult to understand the first time

**Group members:**

**List of rules for our group:**

**My role in this group is:**

Signed: ____________________________

Date: ____________________________

---

3. Feedback on group work

Besides each of the statements write the number that best describes your judgement.

- **1 = always, 2 = often, 3 = usually, 4 = sometimes, 5 = never**

<table>
<thead>
<tr>
<th>Individual</th>
<th>Grade 1–5</th>
<th>Group</th>
<th>Grade 1–5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I had a positive attitude when working with the group</td>
<td>The group had a positive attitude</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. I was generous with praise for others in my group</td>
<td>My group was generous with praise for each other</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. I listened while others talked</td>
<td>My group listened while others talked</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. I took my turn to contribute and talk</td>
<td>We took turns to contribute and talk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. I looked at people when I talked to them</td>
<td>We looked at people when we talked to them</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. I joined my group quickly</td>
<td>We joined our group quickly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. I took responsibility for my own behaviour</td>
<td>We took responsibility for our own behaviour</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. I took responsibility for the behaviour of my group members</td>
<td>We took responsibility for the behaviour of our group members</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. I worked together with the others to ensure that we swam rather than sank</td>
<td>We worked together to ensure that we swam rather than sank</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. I contributed my fair share to the group</td>
<td>We all contributed our fair share to the group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. I showed up regularly to class</td>
<td>We showed up regularly to class</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. I was patient with those who found it difficult to understand the first time</td>
<td>We were patient with those who found it difficult to understand the first time</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4. What group work strategies are effective in your school?

SUMMARY:

**Goals**
- Expectation clearly expressed (verbally and on OHT/board)

**Rules**
- Individual roles within team

**Objectives**
- Clear time allocation

**Understanding**
- Student behaviour (the shy; the outcast; the saboteur)

**Planning**
- Where in the unit will this fit?

**When?**
- Time of day/week/term?

**Organisation**
- Environment/resources – well before the lesson

**Resources**
- An obvious one

**Knowledge**
- Development of group work skills

**Evaluate**
- Student feedback/strategies for group work reflection – i.e. score cards, discussion, self-evaluation (student and teacher)

5. Strategies for effective group work

1. **Group size**
   - Maximum 5 (3 or 4 is ideal).

2. **State objectives and set goals**
   - For example, give each group an egg, four straws, six sheets of paper and Sellotape. Design a contraption using these materials to stop an egg breaking when it is dropped from a height of 5 metres.

3. **Identify strategies for working together (group dynamics)**
   - This may be done at the start of the year or lesson to set the scene for appropriate group work (see 6. Essential group dynamics).

4. **Resources**
   - Ensure you have enough resources for each group.

5. **Identify roles**
   - Design some role-play cards that clearly describe the job of each member of the group, e.g. initiator – must get the group started in discussion.
   - Assign roles to each member of the group.

   **Roles can include:**
   - **Initiator**: must get the group started in discussion
   - **Reader**: reads problems to the group and comes up with the first idea
   - **Reporter**: writes down group ideas
   - **Evaluator**: writes down how well the group worked together
   - **Improver**: writes down things the group could do to improve and works closely with the evaluator.

6. **Evaluation**
   - After participating in a group activity, evaluate how well the group worked together. Teacher can share their observations.
6. Essential group dynamics

Below is a list of essential elements important to establishing a co-operative group. These will be important when working together in groups or as a class.

1. **Good leaders and followers**
   These people can make decisions, keep things moving, and can work with others in the group to achieve goals. They should never totally dominate but look to include others’ opinions because these can be valuable. Good followers should offer opinions and support the leader’s approach to completing a task. It should not be up to the leader alone to complete tasks.

2. **Give everyone a chance**
   Statements like “What do you think ...?” can help include others in group discussions. Always look for those who aren’t involved and help them feel accepted into your group, especially if they are people you do not generally talk to in class.

3. **Be involved yourself**
   What you think is often what you never say because you feel others will “shame you out”. If we support other’s opinions and challenge opinions carefully, people don’t get hurt.

4. **Good groups and individuals co-operate**
   Identify your challenges and set goals either in debate or discussion and sort out a plan of attack. A group’s decision may not always be what you agree with. Good team members are people who can accept team decisions. (Think of some of the rules your parents set may not agree with these.) Distribute the tasks so time is maximised and everyone feels involved.

Some groups argue, some debate and others discuss. Arguing can slow things and harm others. Debating and discussion provides many opinions and solutions to challenges.

The most important component of all these is **CO-OPERATION**.

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### Resource 22

**Group work – what works**

#### 7. Social skills score card

**Level 1**

**Student’s name:**

**Date:**

<table>
<thead>
<tr>
<th>Student</th>
<th>Peer</th>
<th>Teacher</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Social skills</th>
<th>Level 2</th>
</tr>
</thead>
<tbody>
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<td><strong>Student</strong></td>
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</tr>
<tr>
<td><strong>Peer</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Teacher</strong></td>
<td></td>
</tr>
</tbody>
</table>

### Social skills score card

**Level 2**

**Student’s Name:**

**Date:**

<table>
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<tr>
<th>Active listening</th>
<th>Asking questions</th>
<th>Clarifying</th>
<th>Constructive criticism</th>
<th>Helping others</th>
<th>Paraphrasing</th>
<th>Accepting others differences</th>
<th>Summarising</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peer</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teacher</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
Resource 22
Group work – what works

Social skills score sard
Level 3

Student’s name:
Date:

Social skills score sard
Level 4

Student’s name:
Date:

How to monitor the UV Index Board

The UV Index (UVI) Board is a great tool students can use to monitor UV radiation levels for your area.

How to use:

1. Go to http://www.niwa.co.nz/UV-forecasts
2. Click on the nearest town/city to your school
3. Once you have clicked on the town, information will be displayed that will show:
   - the date today
   - the maximum (clearsky) UVI forecast for the day
   - the location
4. Measure across from the top of the bell-shaped curve to the UVI number on the left side of the graph. This number is the maximum UVI for the day.
5. Move the arrow on your board to display the maximum UVI for the day

For more information on sun protection in schools, visit the SunSmart Schools website http://www.sunsmartschools.co.nz/
Tips and Ideas

| Update the UV Index Board every morning to display the correct daily maximum UV forecast. | Include the daily UV Index in other school activities, e.g. at school, assembly, on school radio, on PC’s, in school newsletters, etc. |
| Think about the best place to display the sign. As many students as possible need to see the sign. It’s also useful to place it somewhere that parents and visitors can see it. This will help reinforce what is being taught at school. | Students could think up other visual ways of displaying the UV Index level. Each level could have a different brightness of sun, or pictures of trees, hats, etc. could be put up on a board to show what type of protection is needed when the day has a higher level of UV radiation. |
| Mapping the UV Index for the year according to month is a great idea to get the students to monitor and to see the pattern that the UV Index can take. This could be used for further discussion. | Seeing the UV Index each day, even when it is cloudy, helps students to understand why they need to protect themselves not just from bright sun but also from UV radiation between September and April. |
| Update the board every day throughout the school year, not just in the summer months. This will help students to understand the reasons why wearing hats and other SunSmart behaviours are required during Terms 1 and 4 (as New Zealand has a very high UV Index during these terms). |

For more information on sun protection in schools, visit the SunSmart Schools website [http://www.sunsmartschools.co.nz/](http://www.sunsmartschools.co.nz/)

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**Steps to becoming a SunSmart school**

First, have a commitment to improving sun safety in your school community.

Complete the online SunSmart Schools Accreditation Application to see how well your school is doing at meeting the Cancer Society’s minimum criteria for accreditation. You will need your school’s MoE number: [http://database.sunsmartschools.co.nz](http://database.sunsmartschools.co.nz)

Review your school sun protection policy. A sample policy is provided here: [http://www.sunsmartschools.co.nz/schools/accreditation/become-a-sunsmart-school](http://www.sunsmartschools.co.nz/schools/accreditation/become-a-sunsmart-school)

Submit your sun protection policy online OR download the printable application form [http://www.sunsmartschools.co.nz/schools/accreditation/become-a-sunsmart-school](http://www.sunsmartschools.co.nz/schools/accreditation/become-a-sunsmart-school)

Attach your current sun protection policy. Send the application form and your policy to your local division of the Cancer Society by email or post.

After you have applied for accreditation your local Cancer Society health promoter will contact you. They will advise you if there are areas to be included/amended in your policy to meet the minimum criteria for accreditation. Once you have made any necessary changes, your policy can be resubmitted online. Once you have become accredited, you will receive a SunSmart Schools Accreditation Certificate, a sign for your school building or gate and a media release for your local newspaper.

**Minimum criteria for SunSmart schools accreditation**

- The sun protection policy is implemented during Terms 1 and 4, when ultraviolet radiation levels are most intense.
- All staff, students and parents/caregivers are to be informed of the sun protection policy and its intended practices.
- All students wear broad-brimmed (minimum 7.5cm brim), legionnaire or bucket hats (minimum 6cm brim, deep crown) when outside.
- See: [http://www.sunsmartschools.co.nz/schools/hats](http://www.sunsmartschools.co.nz/schools/hats).
- Students not wearing a hat are required to play in allocated shade areas.
- The use of broad-spectrum sunscreen of at least SPF 30 is encouraged.
- The use of sun-protective clothing is encouraged (e.g. shirt with sleeves and a collar).
- Staff are encouraged to act as role models by practising SunSmart behaviours.
- SunSmart education programmes are included in the curriculum at all levels every year.
- The sun protection policy is reflected in the planning of all outdoor events (e.g. camps, excursions, sporting events).
- Outdoor activities are rescheduled, whenever possible, to minimise time outdoors between 10am and 4pm.
- The school has sufficient shade or is working towards increasing the number of trees and permanent shade structures to provide adequate shade in the school grounds.
- You can find some helpful tips and documents here: [http://www.sunsmartschools.co.nz/schools/shade](http://www.sunsmartschools.co.nz/schools/shade)

The board of trustees and principal review the sun protection policy regularly, including making suggestions or improvements at least once every 3 years.
SunSmart policy
A comprehensive sun protection policy for schools covers the following four areas:
• Behaviour – reducing exposure to ultraviolet radiation e.g. through use of sunhats, clothing, broad-spectrum sunscreen of at least SPF 30.
• Environment – promoting the provision and use of shade and rescheduling activities.
• Curriculum – educating about sun protection and skin cancer prevention.
• Policy review – undertaking review at least 3 yearly.

A SunSmart policy needs to:
• be developed in consultation with the whole school community of board of trustees, staff, students, parents and caregivers
• outline the way in which the school will protect students and staff from the harmful effects of ultraviolet radiation
• meet the minimum criteria for SunSmart Schools accreditation with regard to behaviour, curriculum, environment and policy review.

To help you develop a comprehensive sun protection policy, a sample policy is available for download here: http://www.sunsmartschools.co.nz/schools/accreditation/become-a-sunsmart-school

Evaluation of your sun protection policy
The Cancer Society’s role is to encourage and assist schools to become sun safe, not to judge or compare progress with other schools.
Your school’s application form and sun protection policy will help the Cancer Society assess your school’s existing sun protection strategies to assist schools to become accredited.
Not every strategy in the application form needs to be included in your policy. The assessment will be based on the minimum criteria for SunSmart Schools accreditation.

Working towards meeting the criteria for SunSmart Schools accreditation
Some schools’ existing sun protection policy may already meet the criteria for SunSmart accreditation. Other schools may need to review their existing sun protection policy to meet the minimum criteria (or develop a new policy if they do not already have one). It is important that the whole school community is involved in the development of the policy so there is a commitment to it. For some schools, it may take a period of time to develop a policy that covers all areas of the essential criteria. There is no time limit by which a school has to become accredited.

Contact your local Cancer Society centre to help you with your application and to develop a policy that meets the minimum criteria for SunSmart Schools accreditation.

Why we need this policy
New Zealand has among the highest melanoma rates in the world. Excessive exposure to ultraviolet radiation (UVR) from the sun causes sunburn, skin damage and increases the risk of skin cancer. Getting sunburnt in childhood and adolescence will increase the risk of melanoma and other skin cancers in later life.

This sun protection policy will apply during Terms 1 and 4, (especially between 10am and 4pm). However, from the beginning of September UVR levels are increasing. Therefore, sun protection should be used in September when children are outdoors for extended periods (e.g. sports days).

During the winter months sun protection is not usually needed except at high altitudes in highly reflective environments, for example, in snow, or skiing.

This policy is adopted from (DATE) so that children attending (SCHOOL NAME) are protected from excessive exposure to UVR from the sun.

Being SunSmart
• Require children to wear broad-brimmed (minimum 7.5cm), legionnaire or bucket hats (minimum 6cm brim and a deep crown) when they are outside (for example, during interval, lunch, sports, excursions and activities).
• Provide hats for children to borrow.
• Encourage students to wear clothing that protects their skin from the sun even when out of uniform (for example with sleeves and collars, and rash tops when swimming outside).
• Implement a “No Hat, Play in the Shade” policy. Require children without hats or with bare shoulders to play in the shade or indoors.
• Work with the school community to promote students’ use of SPF 30+ broad-spectrum sunscreen.¹
• Make sunscreen available to students at school outdoor activities, particularly at sports days and similar events.
• Encourage all staff to role model SunSmart behaviour, for example use appropriate hats within the school grounds and during outdoor school activities.
• Regularly publicise and reinforce the SunSmart Policy (for example through newsletters, school website, parent meetings, and student and teacher activities).
• Talk to parents about the school’s SunSmart Policy at enrolment and encourage parents to practise SunSmart behaviour, i.e. in school newsletters and enrolment packs.
A Curriculum that includes SunSmart education

- Include SunSmart education and activities as part of the school's curriculum at all levels each year. For curriculum resources visit the SunSmart Schools website www.sunsmartschools.co.nz

Building a SunSmart environment

- Work towards developing and improving existing shade in areas where students gather. Shade can be both built (shade verandas) and natural (trees).
- Include a sun exposure assessment in the Risk Analysis and Management system for any Education Outside The Classroom (EOTC) plan for outdoor activity.
- Hold outdoor activities in areas with plenty of shade whenever possible. ²
- Consider the possibility of rescheduling suitable outdoor events/activities to early morning / late afternoon.
- Allow children access to indoor shade such as indoor sports and recreational facilities/gymnasia during lunch breaks.

Supporting and evaluating SunSmart behaviour

- Ensure on-going assessment of SunSmart behaviour, shade and curriculum emphasis.
- The Board of Trustees and Principal will review the school's SunSmart policy at least every three years.

1. Sunscreen should not be the only or primary form of sun protection.
2. The highest clear-sky UVR levels occur around the middle of the day. The Cancer Society recommends planning trips to venues with adequate shade or providing your own shade (umbrellas or tents).

Policy prepared by: ________________________ (Name or title e.g. BoT) on______________________

Policy approved by: ________________________ (Name or title e.g. BoT) on______________________

Policy will be reviewed on______________________