SunSmart
UV Beads Activity Pack.

We care about protecting children and young people through education and supporting UV safe environments to ensure future SunSmart generations.

Protect yourself in **five ways** from skin cancer

SLIP SLOP SLAP SEEK SLIDE

Cancer Council WA | SunSmart®

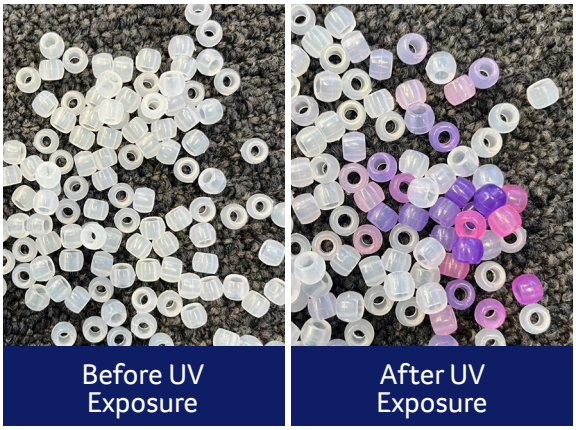
What are UV beads?

UV beads are made from white or clear plastic, with a photochromic dye, which means that the dye changes colour when it reacts with ultraviolet (UV) light. UV beads are a type of sensor that detects ultraviolet (UV) light produced by the sun or artificial sources for example UV torches. When UV beads are exposed to UV radiation, such as from sunlight, they react by changing colours. UV beads are also known as solar beads or UV sensitive beads and can be purchased online from educational stores.

How do UV beads work?

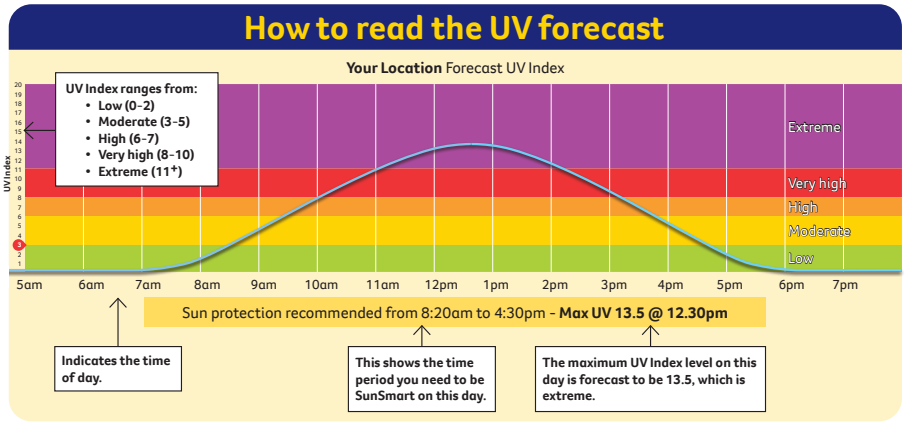
UV beads contain pigments that change colour when exposed to sunlight or other sources of UV radiation. The stronger the UV radiation present, the quicker the colour change and the deeper the colour. Once indoors and away from the sun's UV radiation, the beads change back to off-white.

UV beads are a great educational tool to teach science concepts around sun protection and UV radiation. The following activities have been organised into year levels; this is just a guide, but activities can be adapted for all year levels.



Information about ultraviolet (UV) radiation

- UV radiation is part of the natural energy produced by the sun.
- On the electromagnetic spectrum, UV has shorter wavelengths than visible light. The sun produces UVA (longer wavelength that can result in skin damage/skin cancer, aging, wrinkles), UVB (medium wavelength that can result in sunburn, skin cancer) and UVC (short wavelength that is absorbed by the Earth's atmosphere and doesn't reach Earth).
- The sun produces heat that we can feel (infrared) and light that we can see.
- The sun produces ultraviolet radiation that we cannot see or feel.
- UV radiation is a proven human carcinogen.
- A sunburn is a radiation burn from the sun.
- The UV Index is an open-ended numerical scale that measures the amount of UV radiation reaching the earth's surface.
- The UV Index shows a daily time period shows the strength of UV levels and daily UV peaks at solar noon on a clear sky day. Solar noon is the point at which the sun is directly overhead.
- UV radiation can bounce and reflect off surfaces, so it is important to use a combination of sun protection.
- When the UV Index is 3 or above, sun protection is required.
- UV and heat are not the same thing. We do not only need to use sun protection when it is hot. The UV Index can be 3 or above when it is cool and cloudy too.



Activity 1: UV Reactive Detection Beads

The UV reactive detection beads activity is a great opportunity for students to observe the effects of UV radiation. The stronger the UV radiation present, the quicker the colour change of the beads and the deeper the colour. Once indoors and away from the sun's UV, the beads change back to off-white. There are 3 parts to this activity, part 1 explores the concept of UV radiation using the UV beads and part 2 is an experiment, testing how the UV beads respond in different conditions. Then in part 3 students create UV bead wrist band that they can take outdoors to see the effects of UV radiation.

Resources

- UV beads
- Variety of light sources (lamp, UV torch, etc.)
- Canisters, small containers, or empty cans
- Sunscreen with an SPF50 (variety sunscreen brands)
- Long pipe cleaners
- White and black cloth or card
- Broad-brimmed or bucket hat
- Water
- Plastic wrap

Part 1- Exploring

Instructions

1. Have the students move around the room, looking at the colour of their beads, placed under different sources of light. Note that fluorescent lighting will not change the beads' colour.
2. As the students move towards the window, they should notice that their beads will begin to change colour.
3. Take students outside if possible; it does not have to be a bright sunny day. Ensure that appropriate sun protective measures are taken for students and staff.
4. Class discussion: prompt students with the following questions to help them develop an explanation for the changes they are seeing in the UV beads.

Key questions

- What do you notice about the beads?
- What colour were they before? What colour are they now?
- Are the beads darker in direct sun light? What happens in the shade?

Part 2 – Experimenting

Instructions

1. Find an area in full sunlight.
2. Arrange the students into groups of 3-4 and distribute materials.
3. Have each group of students put three UV beads in each film canister/container/petri dish (lids are not required unless used to secure beads whilst moving outside. Remove lids once outside).

Process

Students will place different coverings on top of the canisters to determine the effect of the light restriction for this experiment. This activity can be done in small groups or completed as a whole class.

1. Discuss the experiment with students and hypothesise what they think will happen
2. Instruct students to test the following nine scenarios (if it is difficult to do all 9 tests at the one time, break the experiment into a couple of separate sessions). If you do not have a canister, tin cans or other small containers will also work. Place some UV beads into 9 canisters.
    - Canister 1. (control) Set it on a desk or the ground with nothing over it.
    - Canister 2. Lay a white piece of cloth over it.
    - Canister 3. Lay a black piece of cloth over it.
    - Canister 4. Put sunglasses over this canister.
    - Canister 5. Put a broad-brimmed hat over this canister.
    - Canister 6. Fill this canister with water. String the beads on a paper clip so that they will sink.
    - Canister 7. Cover this canister with plastic wrap.
    - Canister 8. Cover this canister with plastic wrap and then apply a coat of sunscreen SPF 30 to the plastic with a paintbrush or sponge.
    - Canister 9. Repeat the instructions for the previous canister using a SPF 50 sunscreen.
3. Observe each canister and discuss findings.

Key questions

- Which canister with UV beads had the darkest colour? Why do you think this happened?
- Which canister with UV beads colour did not change colour or was the lightest? Why do you think this happened?
- What does the canister with sunscreen tell us?

Part 3 - Creating

Instructions

1. To make a UV wrist band, provide each student with a pipe cleaner and UV bead. More UV beads can be used if possible.
2. Thread the UV beads onto the pipe cleaner.
3. Shape the pipe cleaner into a circle shape and twist the ends together to join.

Variation

The reactive UV beads can be transferred into an Art or Design and Technology project where students design and make a bracelet, other jewellery, or key ring show where there is UV. UV radiation cannot be seen or felt, and the piece of jewellery or key ring will be a reminder to use sun protection.

Activity 2: Sunglasses Experiment-UV Reactive Beads

UV reactive detection beads activity is an opportunity for students to observe the effects of UV radiation. The UV reactive detection beads indicate the presence of UV by changing colour. The stronger the ultraviolet (UV) radiation present, the quicker the colour change and the deeper the colour. Once indoors and away from the sun's UV, the beads change back to off-white. The sunglasses and UV reactive beads experiment tests to see if sunglasses can block out UV radiation.

Resources

- UV beads
- UV torch (optional to sunlight)
- A range of sunglasses lens (request donations from class families)
- Two small containers per group

Instructions

Experiment: To test if sunglasses can block out ultraviolet radiation.

1. Prior to the experiment, students make predictions, suggesting outcomes and reasons.
2. Place 6 beads into two small containers and cover each with a sunglass lens.
3. Place the containers outside in the sun and remove the lens from one container. Leave the other container with the lens covering the UV beads.
4. Leave for one minute and then compare the colour of the beads.
5. Students record observations and results and present findings including formal and informal representations.
6. Class discussion: Prompt students with key questions to help them develop an explanation for the changes they are seeing in the UV beads.
7. Students complete the following unfinished sentence. Using a sunglass lens…
8. Students share their findings. What did I learn?

Key questions

- What effect did the lens have on the colour change of the beads?
- What do you notice about the beads? (Changed colour)
- What colour were they before? What colour are they now?
- Are all the beads changing colour? If not, why not? If so, why do you think they are?

Activity 3: UV Beads and Sunscreen Experiment

The UV beads and sunscreen experiment explores how effective sunscreen is at protecting the skin from UV radiation. Often there are misconceptions that sunscreen 'blocks' UV, when in fact the active ingredients absorb and reflect UV, so they don't get to the skin at full intensity. This experiment effectively demonstrates that sunscreen should not be used in isolation and that using a combination the Slip, Slop, Slap, Seek and Slide is required when it comes to protecting the skin.

Resources

- UV beads
- Permanent marker pen
- Small plastic zip-lock bags
- SPF 50 sunscreen and spray-on sunscreen
- Make-up or moisturiser with SPF
- UV torch (optional)

Instructions

1. Divide the UV beads into four equal piles and put into a plastic zip lock bag.
2. Label one of the bags no sunscreen, SPF 50 sunscreen, spray sunscreen and make-up or moisturiser with SPF.
3. On the unlabeled side of the bag, smoothly and evenly spread a half-teaspoon of sunscreen directly onto the bag.
4. Wash your hands between each application so the experiment is fair. Let the sunscreen dry.
5. Go outside and lay the four bags, label down next to each other in direct sun light.
6. Watch them for two to three minutes.
7. Sort the bags in order of brightness of the colours. Turn the bags over to check the labels to see how effective the sunscreens were.

Further learning

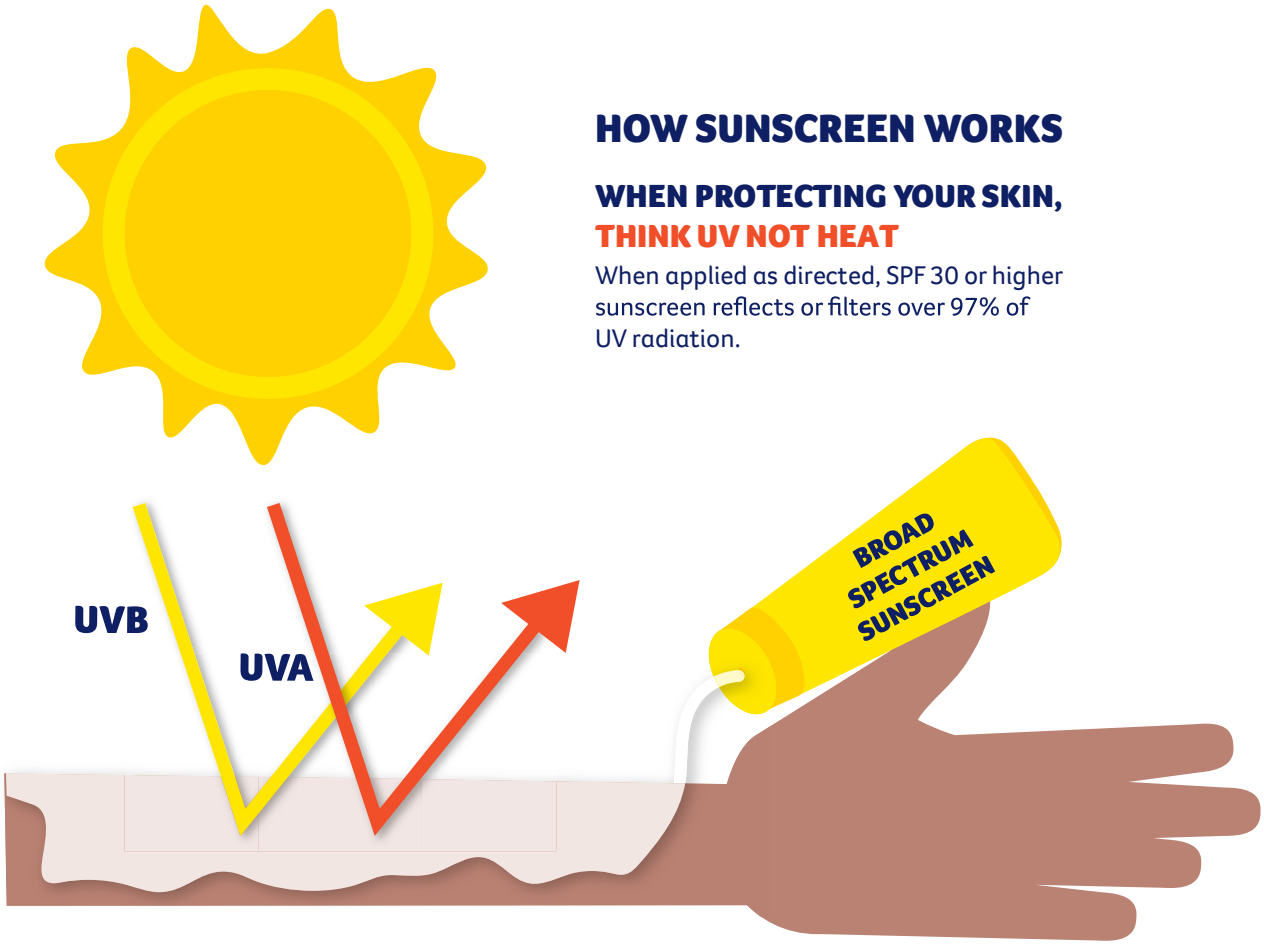
- Watch Tips for applying sunscreen YouTube video
- Place different fabrics of clothing over half of the UV beads in the zip lock bags to test the effective of fabrics and using clothing to protect the skin. Is clothing more effective than sunscreen when protecting the skin from UV radiation?
- Complete this experiment again but using a UV torch instead of natural sun light.

Key questions

- What do you know about UV radiation?
- Why do you think the beads change colour? What does this mean?
- What are some ways we can protect our skin?
- Why is it important to protect our skin?
- Are all the beads changing colour? If not, why not? If so, why do you think they are?

Notes

- The UV beads are very sensitive and will always change colour a little regardless of how well a sunscreen works. The bag with no sunscreen will always present full intensity and the brightest colours compared the other bags.
- The bags with sunscreen will have some beads around the edges showing brighter colour beads than those in the middle. This is a great teaching point for students to discuss the importance of applying sunscreen properly, using the right amount of sunscreen and not missing parts of the skin.
- The SPF make-up or moisturiser can have a lower SPF and will let more UV through to the beads.



Activity 4: SunSmart Accessories

This art and design lesson involves students to research, plan, develop and create a SunSmart accessory (hat, jewellery or arm band) that acts as a reminder to use sun protection. All accessories created by students must include UV reactive detection beads. UV reactive detection beads indicate the presence of UV by changing colour. The stronger the ultraviolet radiation present, the quicker the colour change and the deeper the colour. Once indoors and away from the sun's UV, the beads change back to off-white. This activity is designed to consolidate student's understanding about the difference between UV and heat. It provides students with the knowledge and information to make informed decisions and healthy lifestyle choices around skin protection.

Resources

- Activity sheet 1: design a UV detection accessory
- Range of recycled and art and craft materials
- UV beads

Instructions

1. Experiment with the UV reactive detection beads. Have the students move around the room, looking at the colour of their beads, placed under different sources of light (such as lamps, a grow-light for plants). Note that fluorescent lighting will not change the beads' colour.
2. As the students move towards the window, they should notice that their beads will begin to change colour. Take students outside if possible; it does not need to be a bright sunny day.
3. Class discussion: prompt students with key questions to help develop an explanation for the changes they are seeing in the UV beads.
4. Distribute 'design a UV detection accessory' activity sheet and research different types of accessories.
5. Using the design template, students plan and draw two designs. Be sure to label the designs with as much detail as possible and list the materials needed. The designs must include the UV detection beads and can be anything that can be worn, such as a hat, jewellery or arm band.
6. Students select which design they will be creating and make their accessory.
7. Complete the remainder of the questions on the activity sheet for reflection.

Key questions

- What do you notice about the beads?
- What colour were they before? What colour are they now?
- Are the beads darker in direct sunlight? What happens in the shade?
- Why is it important to be UV aware?
- How do we know that UV radiation is there?
- What is the difference between heat and UV?
- What are some strategies we can use to protect ourselves from UV?

Activity 5: Protecting Life: The Martian Challenge

Students explore how UV radiation from the sun can affect living things, comparing conditions on Earth and Mars, and then discuss ways in which organisms may protect themselves from UV radiation. This activity has been adapted from NASA's Protecting life: The Martian Challenge. Part one of the activity involves students designing and creating a Martian using craft materials and UV beads. The UV beads are 'radiation detectors' and students experiment and make observations in the shade and full sun.

Resources

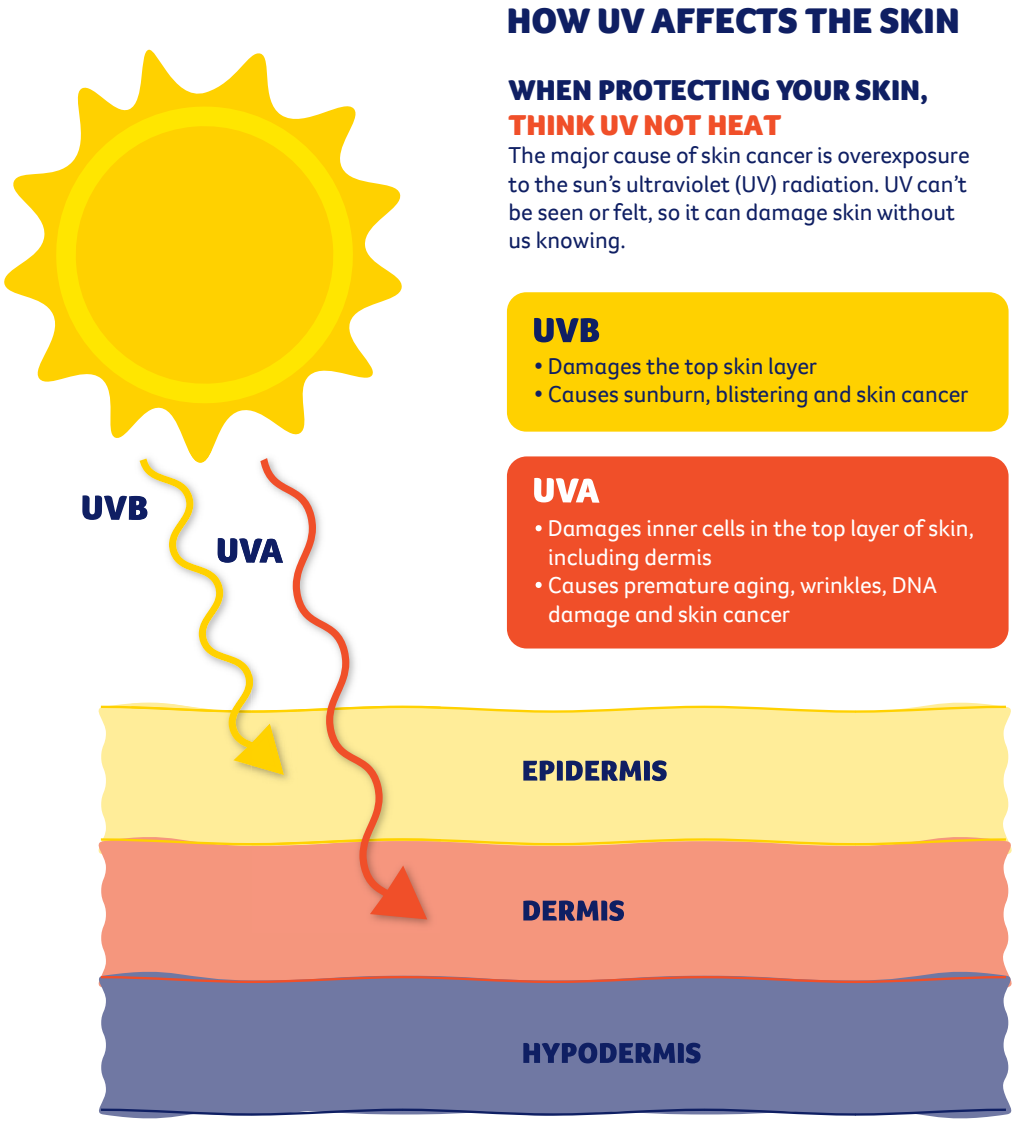
- Activity sheet 2: The Martian challenge
- 3 UV beads and 2 *non*-UV beads
- 2 pipe cleaners
- Various craft items for constructing a creature, such as Styrofoam balls, felt, foil, additional pipe cleaners, small milk cartons, empty small water bottles, coloured card stock, pompoms, and coloured wool.
- Select outdoor area that has shady and sunny spot.
- Prepare indoor area: ensure area is large enough to enable students to create their Mars creatures

Instructions

- Introduce students to the activity and discuss some characteristics of Mars that might be helpful to life. Discuss the challenges that living things on Mars would face and UV radiation.
- Students design their own Martian creature using the materials provided. Encourage them to share their ideas as they build.
- Following their designs, students construct their Martian, a Mars creature. Explain that their creatures will include radiation detectors (UV beads) that are made from a special pigment that is very sensitive and turns colours when exposed to the ultraviolet rays.
- **Predict**: When the Martians are finished, ask students to complete the predict section of the activity sheet.
- **Observe**: Ask the students to cover their Martian's radiation detectors with their hands, and then take it outside. Don't forget to be SunSmart before you head outside.
- Shaded observations: Have students stand in the shade and uncover their creature. What do you observe happening to the Mars creature's radiation detectors? The beads become lightly coloured, indicating that, even in the shade outside, there is some UV radiation reaching the detectors and our skin.
- Ask students to cover their Martian with their hands again so that no light reaches it. Keep the creature covered for about two minutes while the beads change back to white. Use this opportunity to discuss their observations. What do you think will happen when we take our creatures out into the full sunlight?
- Full sun observations: Let the children now take their Martian into the full sun. What happens to the beads? The beads become deeply coloured, reacting to the intensity of the UV radiation to which they are being exposed.
- Return indoors, continue the discussion and complete the observe section of the activity sheet. Ask some key questions to guide the discussion. What happened to your Martian's radiation detectors? Was your prediction correct?
- **Reflect**: Class discussion, what did this experiment tell you about UV radiation and you?

Key questions

- What is UV radiation? How does is affect us?
- Why is the sun important? What are some harmful effects of the sun?
- What do you observe happening to the Mars creature's radiation detectors?
- What do you think will happen when we take our creatures out into the full sunlight?
- What happened to your Martian's radiation detectors? Did they change in the shade? In the Sun?
- Where did they change the most? Why do you think this is?
- What caused your creature's radiation detectors to change colours?
- What happened to the radiation detectors after coming back inside, and what caused it?
- What did this experiment tell you about UV radiation and you?
- How do we protect ourselves from UV radiation?



Activity Sheet 1: Design a UV Detection Accessory

Design a UV detection accessory that can worn to remind people to use sun protection from harmful UV. Your SunSmart accessory design must include a UV detection bead and easy to wear.

Develop and label two accessory designs. Select your best design to make.

List the resources required

After you have made your UV detection accessory, what are some of the challenges you encountered?

What did you do to overcome the challenges?

Does your UV detection accessory work? Why/why not?

Activity Sheet 2: The Martian Challenge

Predict: When you have finished making your Martian, what do you observe.
What colour are your Martian's UV radiation detectors (the UV beads)?

Are your Martian's radiation detectors picking up any signs of radiation in this building? ☐ Yes ☐ No

Do you think your Martian's radiation detectors will turn colours if it goes out into the Sun? Why or why not?

Will its radiation detectors change colours if it goes outside into the shade? Why or why not?

Observe: Cover your Martian's radiation detectors with your hands, and then take it outside.
Shaded observations: Stand in the shade and uncover your creature. What did you observe?

Full sun observations: Re-set the UV beads by covering them for 2 mins. Take your Martian into the full sun.
What did you observe?

Where did the radiation detectors change colour the most? Why did this happen?
What caused your creature's radiation detectors to change colours?

Activity Sheet 2: The Martian Challenge

What happened to the radiation detectors after coming back inside, and what caused it?

Reflect: What did this experiment tell you about UV radiation and YOU?