



Ultraviolet Light—What is it? Where is it?

Everyone spends time outside, under our nearest star, the Sun. As a result, we are all exposed to the invisible light given off by the Sun called ultraviolet (UV) light. There is a clear link between UV light and the synthesis of vitamin D in our bodies, so most people need sun exposure to produce enough vitamin D for good health. However, too much sun is unhealthy and causes problems with our skin and eyes. Think of that last sunburn you had! Ouch! Painful!

Too much sun is bad, too little is not good either as we need Vitamin D to thrive. Experimenting with these little UV detectors, aka, UV beads, is a great (and relatively inexpensive) way to explore how much UV exposure we are getting and what kinds of filtering materials help to keep us safe outdoors. The beads measure the ultraviolet coming from the Sun. So, the darker the bead becomes, the more ultraviolet light is hitting the bead surface. They serve as a great reminder to put on sunscreen, don a hat, put on your favorite sunglasses and wear a long-sleeved shirt!

A few universal connections here include health, family, and survival. Please feel free to add to the list of universal connections!

How long? 10-15 minutes to visit all the stations. 15 minutes to set up.

How large a group? 5 people per station; with larger groups you can demonstrate.

Learning objectives?

- the Sun gives off different kinds of energy: heat, visible light and invisible light in the form of ultraviolet rays
- the Earth's atmosphere protects us from most of the harmful UV rays
- there are several ways that we can protect ourselves from the Sun's harmful rays

What are tangible connections you can make to your site?

- 1.
- 2.
- 3.

What are intangible connections you can make?

- 1.
- 2.
- 3.

What do I need to prepare? Locate materials listed below and set up 5 stations.

What do I need?

UV beads (<https://www.teachersource.com/category/ultraviolet>) and covering such as a hat, bandana or metal cup to prevent the UV from hitting the detectors (a closed fist or a pocket also work to keep the beads out of the sun!)

- cup or water bottle filled with water
- sunscreens at various SPF ratings (15 and 50+ are good to use)
- zip-lock baggies and a pen to label the SPF ratings

- sunglasses (feel free to ask visitors to check their own regular glasses as well—this seems to be a big hit with those out there wearing glasses)
- a sunny location
- a shady location
- pipe cleaners

Exploring with UV beads

1. Get the 5 stations going—find a sunny spot, a shady spot, get out your sunglasses, and a cup with water. Squeeze a little of each of the sunscreens into the corner of a zip-lock baggie, label with the SPF rating, and drop in a bead (this keeps sunscreen from getting all over).
2. Now you are ready to explore! Have a bead in your pocket and take it out, making sure to keep it in your closed fist. Ask visitors to predict what will happen to the bead when you let sunlight fall on it. After they give their predictions open your hand and place the bead in full sun. Ask visitors to explain what they are seeing.
3. Depending on the size of your group you can ask for a volunteer to try out the UV detectors at the five stations. But it is much more fun to give each visitor a couple of beads (preferably all the same color) and let them try out detecting UV at the various stations. If you have extra colleagues on hand, it is good to have an adult at each of the station.
4. Questions to ask as your visitors work through the stations:
 - Where do you think the bead will turn the darkest?
 - What happens in the water?
 - Do sunglasses protect eyes from UV? What about regular glasses?
 - What do you think happens to UV on a cloudy day?
 - Is the shade really free of UV?
 - Can you think of any adaptations that animals or plants we find here locally have made to survive and thrive in the sun?
 - Are there other conditions or filters that can block the UV?
5. Distribute beads and pipe cleaners to visitors so that they can attach their UV detectors to their jackets or packs to continue detecting UV. Another good spot for the beads is on a hiking boot shoelace!
6. Extend this activity with a selection of filtering agents—plastic wrap, paper, aluminum foil, cloth of various thickness, wax paper. You can get creative here depending on what you have on hand and let visitors find what works well for sun protection.



UV beads come in a variety of colors. Multiple colors are very cool, but using a single color makes it easier to compare color change as the beads are tested out in various settings. This is a good opportunity to introduce the notion of changing one variable at a time when conducting experiments.