Soaking up the Sun: An Investigation of Sunscreens and Ultraviolet Intensity Geology/Earth Science Mr. Traeger

Name:

Date: ____

Period: ____

Purpose

The purpose of this lab investigation is to determine how different SPF value sunscreens perform. Other factors such as time of day, time of year, sun angle, and atmospheric conditions will be considered to determine whether or not it is necessary to wear sunscreen. Students will gain an intimate understanding of the UV Index and risks to their health.

Materials

- Vernier Lab Experiment 21 •
- Sun trackers
- Sun photometers UV Sensing Beads •
- Calculator •
- String •

- Meter stick
- Writing device

Part 1: Investigating Sunscreen Effectiveness

1. Follow the instructions on the Vernier Experiment 21 handout. READ THEM CAREFULLY for best results! 2. Take UV data and record it in the chart below. I will take UVA data and report it to the class.

Brand and SPF Value	Active Ingredients in Sunscreen	UVA Intensity (mW/m²) (Traeger)			UVB Intensity (mW/m²)		
		Trial 1	Trial 2	Avg.	Trial 1	Trial 2	Avg.
SPF 0 (Control)	None						
Banana Boat Dark Tanning Oil SPF 4							
Banana Boat Sunscreen SPF 8							
Banana Boat Sunblock SPF 15							
Banana Boat Ultra Sunblock SPF 30							
Target Ultra Sunblock SPF 30							
Your sunscreen: Brand and SPF							

3. Graph your data below in a double line graph. Put Brand/SPF # on x-axis and Average Intensity on the y-axis.



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- 4. Study your graph. Is there any logical relationship between the intensity of light and SPF number? In other words, does SPF 30 have double the protection of SPF 15? Does SPF 8 have double the protection of SPF 4? See if you can find any mathematical relationship between SPF number and actual protection.
- 5. What is SPF? Based on this lab, what SPF would you choose for your skin type and level of outdoor activity?
- 6. Study the active ingredients in each sunscreen. Describe how ingredients might determine effectiveness of each sunscreen.
- 7. Compare the Banana Boat SPF 30 to the Target SPF 30. Which one provides better protection? Why?
- 8. What is the difference between UVA and UVB radiation? Does each sunscreen protect your skin equally well in terms of UVA and UVB protection? Why or why not.
- 9. If you have a pair of eyeglasses, sunglasses, or clothing, test them for UV protection. Report findings below.
- 10. How good are the UV beads at detecting UV radiation? What are their limitations?

Part 2: Other Factors Affecting UV Radiation Intensity

1. Take the following background data using the sun trackers and weather station data at the same time you take UV readings. I will show you how to use the sun trackers.

Date	Time	Sun Altitude	Sun Azimuth	Elevation	Temperature (°C)	Humidity (%)	Barometric Pressure (in. Hg)	Radiation (W/m ²)	UV Index	Atmosphere Transmission of Sunlight %
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2. How might the date and time of day affect solar radiation received?

- 3. How might the sun altitude (height above horizon) and azimuth (direction on horizon) affect solar radiation?
- 4. How might the elevation above sea level affect solar radiation?
- 5. Do you think temperature, humidity, or barometric pressure has an effect on UV radiation received? Why or why not?
- 6. What is the ultraviolet index? What factors does it depend on?
- 7. What time of year do you need to be most concerned about wearing sunscreen? Least concerned?