

# Ultra Violent Ultraviolet

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## Problem

Which sunscreen (Coppertone Sport, Banana Boat Sport, or Coppertone Kids) would best protect against ultraviolet light?

## Hypothesis

I predict that Coppertone Kids will best protect against both UVA and UVB ultraviolet light, because it contains the most zinc oxide. Since zinc oxide is an inorganic particle, it scatters ultraviolet light. Therefore, I think more zinc oxide would better protect against zinc oxide.

## Variables

**Independent:** Which sunscreens were tested.

**Dependent:** Amount of ultraviolet light each sunscreen allowed through.

**Controls:** The sunscreen all received the same amount of ultraviolet light.



## Data Analysis

To process the data, I took the data from each sunscreen and the baseline and graphed it; one line represented each sunscreen. I made four graphs in total: one for UVA with the baseline, one for UVA without the baseline, one for UVB with the baseline, and one for UVB without the baseline.



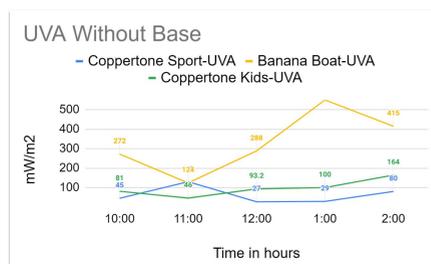
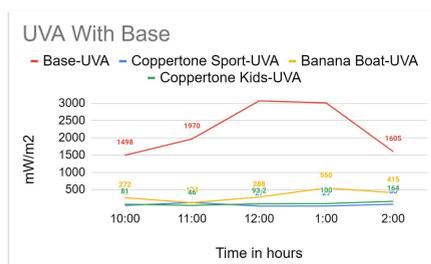
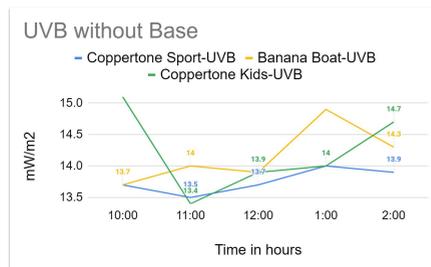
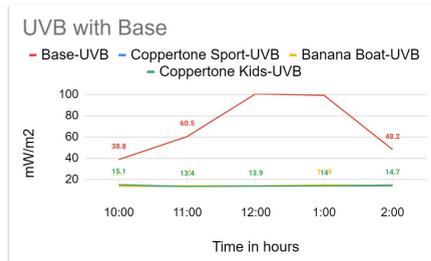
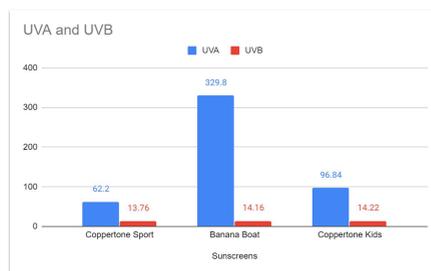
## Procedure

### Materials

- Vernier UVA and UVB Sensor
- Three overlays
- Sunscreen
  - Banana Boat (SPF 50)
  - Coppertone Sport (SPF 50)
  - Coppertone Kids (SPF 50)

### Procedure

1. This experiment is best done on sunny days
2. Prepare all needed materials
3. At 10:00 A.M., go outside. Use the Vernier UVA and UVB sensor to see how much UVA and UVB light there is. Write this down using mW/m<sup>2</sup>. Do this three times. After completing all three tests, find the average amount of mW/m<sup>2</sup> ((test1+test2+test3)/3=average)
4. Spread one tablespoon of Banana Boat sunscreen on the overlay. Repeat step three.
5. Spread one tablespoon of Coppertone Sport sunscreen on the overlay. Repeat step three.
6. Spread one tablespoon of Coppertone Kids sunscreen on the overlay. Repeat step three.
7. Repeat steps three through six at the following times: 11:00 A.M, 12:00 P.M, 1:00 P.M, and 2:00 P.M.



## Results

The sunscreen with the least amount of zinc oxide (Coppertone Sport) did the best at protecting against UVA rays. It let in 62.2 mW/m<sup>2</sup> of UVA. Coppertone Sport also did the best at protecting against UVB, letting in only 13.76 mW/m<sup>2</sup> of UVB. Banana Boat Sport did the worst against UVA, letting in a whopping 329 mW/m<sup>2</sup>. Banana Boat Sport also did second best against UVB, letting in only 14.16 mW/m<sup>2</sup>. Finally, Coppertone Kids-which had the most zinc oxide-did second best at protecting against both types of ultraviolet light. It let in 96.84 mW/m<sup>2</sup> of UVA and 14.22 mW/m<sup>2</sup> of UVB. My best explanation for this is that zinc oxide doesn't actually protect from ultraviolet light. I think that Coppertone Sport only did second best because it has something in it that counteracts the zinc oxide.

	10:00 A.M.	11:00 A.M.	12:00 P.M.	1:00 P.M.	2:00 P.M.
UVA	81	15.1	46	13.4	93.2
UVB	13.76	13.4	13.9	13.9	14.0
Coppertone Kids	96.84	14.22	14.22	14.22	14.22
Banana Boat Sport	329	14.16	14.16	14.16	14.16
Coppertone Sport	62.2	13.76	13.76	13.76	13.76
Control (no sunscreen)	1498	1970	3000	3000	1605

## Conclusion

In conclusion, the sunscreen with the least amount of zinc oxide (Coppertone Sport) did the best at protecting against ultraviolet rays. Banana Boat Sport, which had the second most amount of zinc oxide, did the worst at protecting against ultraviolet light. Coppertone Sport-which had the most zinc oxide-did second best at protecting against both types of ultraviolet light. My best explanation for this is that zinc oxide doesn't actually protect from ultraviolet light. I think that Coppertone Sport only did second best because it has something in it that counteracts the zinc oxide.

