**Sunscreen - Design An Experiment**

***Objective:***

The student will work with a partner or on their own to design an experiment on the effectiveness of sunscreens using the attached **Steps of the Scientific Method/ Experimental Design**. The student will perform the experiment in class and complete a **Lab Report** (using the attached format). The lab report will be completed as homework.

**Possible Research Questions**:

* Do sunscreens with higher SPF values provide greater protection?
* Do different brands of sunscreen provide greater protection?
* Is duration of exposure for different brands a factor? etc.

Materials, such as different sunscreens and UV Beads will be provided by me. Students may work with a partner although both students will submit **separately** a completed lab report. Students should share sunscreen supplies and may bring additional materials such as sunscreen brands or sun testing paper.

Submit:

1. **Coversheet with Name and Title of Experiment. Also include partner’s name if applicable.**
2. **Completed Lab Report in proper format (50 points\*).**

**\*Lab grade = 50% of your grade! (Based on you ability to successfully implement the experiment in class.)**

**Steps of the Scientific Method / Experimental Design**

1. **Problem/Observation/Research.** The problem is the scientific question to be solved. It is best expressed as an “open-ended” question, which is a question that is answered with a statement, not just a yes or a no. For example, “How does light affect the reproduction of bread mold on white bread?”
2. **Hypothesis.** An educated guess, written in an “If … then” statement.
3. **Controlled Experiment includes:**
   1. **An Experimental Group** is the group on which the experiment is being done. This group is being given some sort of treatment that is being tested. In the experimental group, you will have the following:
      1. **Independent Variable** is the variable you purposely manipulate (change).
      2. **Dependent Variable** is the variable that is being observed, which changes in response to the independent variable.
   2. **A Control Group** is the group that does NOT have the experiment done on them. This group does NOT receive the treatment.
4. **Procedures.**  Instructions or steps needed to carry out the experiment.
5. **Data Table.** As you conduct your experiment, you will be collecting data. This may be informing of a data chart, drawings, diagrams, or written observations.
6. **Analysis.**  Review of the data included in the data table, including any patterns or trends, if present.
7. **Conclusion**. Based on data conclude if hypothesis and predictions were accurate and whether you can Reject or Accept hypothesis. At this point, you can reform the hypothesis and predictions and retest.

**Lab Report**

*Please type, Times New Roman font, size 12. This report should be written in the third person. Do not include the words “We” or “I”. Follow the exact format below for the final report: Headings centered and bolded, single space with double space between sections.*

**Experiment Title (2 points)**

**Purpose of Experiment (5 points)**

Write a summary of the experiment. Include the scientific question to be solved.

**Introduction (5 points)**

The introduction sets the scene and background information for your report. Research should be completed for this section. This research leads to your hypothesis, which should also be included.

**Materials and Procedure (5 points)**

Describe in detail the materials you will need to conduct your experiment.

**Procedure (8 points)**

Describe in detail the method you used to collect data, make observations, design apparatus, etc. Your report should be detailed enough so that someone would be able to repeat the experiment from the information in your paper. Include detailed drawings or diagrams of equipment as needed. Note any safety hazards or precautions. Also, state the independent variable, control, and constants, in this section.

**Observations (5 points)**

What observations did you make? Discuss the charts or tables you completed.

**Data or Results (10 points)**

Include a data table and scale for results. Graphs would be included here.

**Analysis and Conclusion (10 points)**

Briefly summarize your results. Was your hypothesis supported or rejected? How is this related to a real-life example? Include a discussion of errors (if ones were made). What would you do differently if you repeated this project?