AP Environmental Science Summer Assignment 2021-2022

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Dear AP Students and Parents:

Welcome to AP Environmental Science! This is a year-long College Board approved course offered to juniors and seniors who wish to learn about the environment and environmental problems around them. The concepts covered in this course coincide with college level environmental science and prepare students for the College Board AP Environmental Science Exam in May. As an AP student, you are expected to read and understand concepts on your own, show initiative, work independently and submit quality work at all times. You are also expected to take the AP Environmental Science exam.

Prerequisites:

- Junior or senior standing.
- Completion of Geology (P) OR Chemistry (P) with a C or better in both semesters.

About Environmental Science:

Environmental Science is an interdisciplinary laboratory science that covers a wide variety of topics included in the study of environmental science. The following themes provide a foundation for the structure of the AP Environmental Science course:

1. Science is a process
2. Energy conversions underlie all ecological processes
3. The Earth itself is one interconnected system
4. Humans alter natural systems
5. Environmental problems have a cultural and social context
6. Human survival depends on developing practices that will achieve sustainable systems

Here's what you need to do:

_____Toxicity of Pesticides Lab, use the Experimental Design Cheat Sheet to help you.

These assignments will be due on the first day of class for the Fall 2021 school year.

Toxicity of Pesticides Lab

Materials: 1 "six pack" of plants from a local nursery
1 bottle of spray herbicide -OR- a spray bottle of half vinegar/half water

Procedure:

1. Take the six plants and cut the plastic so that they are apart from one another.
2. On one of the plastic containers, with a permanent marker, write "control" and set that one aside.
3. On another plant container write "normal dose", on another one write "$\frac{1}{2}$ normal dose", on a third write "$\frac{1}{4}$ normal dose", on the fourth write "2 times normal dosage", and on the last one write "4 times normal dosage".
4. Decide what "normal" is. (Ex: when reading the bottle's instructions and it says to "completely cover the plant with foam" – this could be considered the normal dose; just be sure to count the number of sprays it takes to completely cover the plant with the pesticide.)
5. Go outside and spray the "normal" plant with the amount to "completely cover the plant with foam" (count the # of sprays it took). Then spray the rest of the plants with the $\frac{1}{2}$ normal, $\frac{1}{4}$ normal, 2 times normal, and 4 times normal amounts.
6. Water all of the plants (including the control) and put them in the window until the plants have all died.
7. Take pictures of your plants every two days until all the plants have died. Include these pictures in your lab write up.
8. Next, discuss why the manufacturer of the herbicide would like us to "completely cover the plant with foam" and the environmental effect the runoff pesticide will have.

Conclusion:

1. Was the normal dosage effective in killing the plant?
2. Did lower amounts of pesticide still have the desired effect of killing the plants?
3. What are the environmental effects of this pesticide? Does using more than needed have an environmental footprint?
4. What is the most effective dose of this pesticide?
5. Are there any human health risks of being exposed to this pesticide?
6. What are some alternative ways we could have killed these plants without the use of pesticide?

Experimental Design
cheat sheet

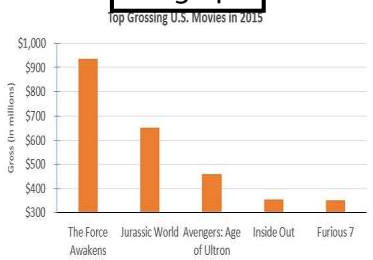
Graphs

How to set up the graph

X-AXIS (horizontal) --> Independent variable
Y-AXIS (vertical) --> Dependent variable

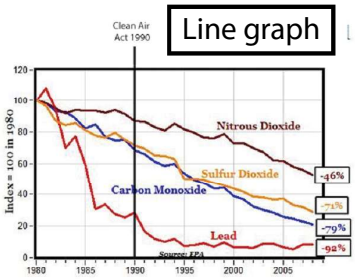
*Always include axis labels with units of measure (ex: Concentrations of SO_2 in **ppm**)
*Space tick marks out evenly
*Write numbers at tick marks
*Axis numbers should be a number line and not your exact data points (ex: 2, 4, 6, 8, 10; not 1.2, 4.9, 6.1, 9.3)

Bar graph



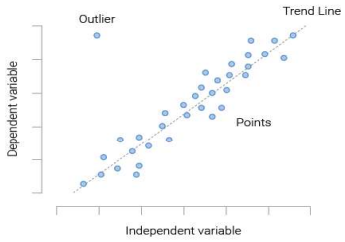
*Bars don't touch (social distancing)
*Bars of the same set are same color
*Use when comparing different groups
*Use different colors only for multiple sets of data on same graph & include key/legend.

Line graph



*Represents continuous data that relates to itself.
*Connect data points for each data set with a line.
*different data sets need to be different color

Scatter plot



*Probably won't see on exam nor need to create.
*Shows possible correlation/relationship between 2 variables.
*Can have a "trend line" showing the average of the data.
*Do not connect the dots
*Closer the points to one another, closer the relationship

Analyzing Results

* Back up your statements specifically with data from the graph and make full connections for the reader to show full understanding of the topics.

Variables

Independent & Dependent

INDEPENDENT VARIABLE
What you are observing to see if it has an effect on the outcome of the experiment or what we are altering.

→

DEPENDENT VARIABLE
The outcome of the test or experiment. It is what we are measuring (the result) and is DEPENDENT upon the independent change.

Controls/Constants

CONTROLS
What you keep steady or controlled to keep from altering or influencing your experiment.

CONSTANTS
Things you keep the same between all of the tests or don't allow to change. Constants can also be controls.

Control Group(s)

CONTROL GROUP
Completely different from experiment controls & constants.
This is a test or group that you keep under normal conditions so that it can be compared to the test groups. This is done to see if the change (independent variable) made a measurable difference.

Bad experiment

*Changes multiple variables at once making it so you cannot tell what variable produced a change.
*Lacks experimental controls that lead to outside influences on your tests.
* Test groups of few individuals