The Science Academy STEM Magnet

2021-2022 AP Environmental Science Summer Assignment

Welcome to AP Environmental Science (APES). I am so excited for next year, and I hope you are too. The purpose of this summer assignment is to introduce you to Environmental Science. First, it will help you become aware of the environment and many of the ongoing concerns related to it. In addition, it will hopefully inspire you so that you come ready to learn about all of the great topics we'll cover next year. If you have any questions about this work over the summer, please feel free to email me at flavia.dimonaco@lausd.net

Have a wonderful summer!
Mrs. DiMonaco

Assignments 1, 2, and 3 are due on the first day
Assignments 4 and 5: due on the second day of school

ASSIGNMENT #1: 10 points
CURRENT EVENTS: ENVIRONMENTAL ARTICLES SUMMARIES & REFLECTIONS

Find **two articles** that have been published recently 2015-18.

- Each article should be about a different environmental issue.
- Examples: chemical contamination, climate change, pollution, deforestation, overpopulation, endangered species, invasive species, pesticides, habitat destruction.
- Include a hard copy of each article (either printed out, photocopied, or cut out) OR include the hyperlink to the URL if you found it online.
- Sources can include scientific publications, journals, newspapers like the *LA Times, National*
- *Geographic, The Wall Street Journal*.
- Online newspapers or journals or .gov, .edu. or .org sites are okay too.
- Include a Works Cited at the end of your reflections (MLA or APA is fine).

For each article please address the following criteria in at least 1/2 page single-spaced per article.
1. Summarize the content of the article **in your own words**.
a. Focus on the following questions:
i. What is the problem? When did it begin?
ii. Do we know who the responsible parties are? If so, who is it?
iii. How severe is the environmental impact?

2. Reflect on or write your personal reaction to the article.
a. Focus on the following questions.
i. What are your thoughts on the issue?
ii. How does it compare to information you have heard or read before? Does it support/refute what you know or thought you knew?
iii. What other information would be helpful for you to better understand the environmental impacts?

ASSIGNMENT #2: 10 points
BE AWARE OF AND ENJOY NATURE

Visit a natural area, go for a walk, sit in your backyard, go to a park or the beach or anywhere outside and make some observations!
-Record the date, time, duration, and location of your outing.
-Record observations on the following things:

- Flora (plants)
- Fauna (animals, fungi, etc.)
- Geology (rocks, soil, etc.)
- Weather (today)/Climate (throughout the seasons)

You don't need to know specific species names for all of the plants and animals and types of rocks and soil that you see, but *describe them*. What color are they? How big are they? What are they doing? How are they interacting with each other, with other types of organisms?

This part of the assignment can just be a running list of things you see, can use bullet points, and doesn't need to be in complete sentences.

You can also include drawings of what you see if you are so inclined.

Write a paragraph (complete sentences) reflecting on the following questions:

- What did you encounter?
- What questions did you wonder as you observed everything?
- How much and what kinds of human impacts did you notice in that area?

How did you enjoy the activity?

ASSIGNMENT #3: 5 points
Environmental History

AP Environmental Science is an interdisciplinary course that focuses on processes in the environment and man's impact. Read the famous except from **Rachel Carson** below and answer the analysis questions:

The his tory of life on earth has been a his tory of interaction betwe en I iving thin gs and tlleir surround ings To a large extent, the physical fo rm and the habits of tile earth's vegetation and its animal life have been molded by the environment. Considering the whole span of earth! time, I.Ile o pposite effect, in hich life actuall modifies its surround ings, has been rela ti el slight. Onl y within t.h.e moment of time represente d by the present cenmry has one species-man-a cqui red significant power to alter the namre of his orld.

During the past quarter century I.his power has not only increased to one of disturbing magn irude but it has changed in character The mos t alarm ing of all man's assau ll.s upon the environment is the contamination of air, earth, ri vers, and sea ·with dangerous and even le thal materials. This pollut io n is for the most [!)art irrecove rable; the chain of e ii it initia tes not only in 1h . world that must support life but in living tiss ues is for the most part irre ersilble . I n this now universal oontamination of the en ironment, chemica ls are the sinis ter and little-recognized partners of radiation in changing tile very nature of the world- the very nature of its life. Strontium 90, released tllrough nudear explos io ns into the air, comes to tile ea rth in rain or drifts down as fallout, lodges in soil, enters into the grass or com or wheat gro wn th re, and in time takes up its abode in the bones of a human being, there to remain until his death Similarly, chemicals sprayed on croplands or forests or gardens l.ie long in the soil, entering into Ii ing organis ms, passing from one to anothe r in a chain of [!)oiso ning and death . Or I.hey pass myster io usly by unde rgrollild streams until the y emerge and, through the alchemy of air and sunli ght, combine into new forms that kill vegetalion, sicken came, and work unknown harm on those Who drink from once pure wells As Al bert Schwe itzer has sa id, "Man can hardly even recognize the devils of his own creation."

It took hundreds of milli.o ns of ears to produce the l.life tha.t now inhabi.ts the eartll,---eons of time in wh ic h tllat de eloping and evol ing and di ersifying lif'e .reached a state of adjllstment and balance with its s11rroundings. The environment rigorous! shaping and directing the life **it** su pported, contained elemen ts that were hosti.le as well as supporting. Certain rocks ga e out dangerous radia tion, e en within the lighl of the sun, from whic h all life draws its en rgy, th re were short- ave radiations witJt po,ver to injure. Gi en time- tim e not in years bur in millennia-- life adjusts, and a balance has been reached. For time is the essential ingredient; but in the mod m world there is no time.

The rap idity of change and tile speed ith which new situatio ns are created follow the impetuous and heedless pane of rnan ral.lle r than I.Ile de libe rate pace ofn ature. Rad iation is no longe r merely I.Ile !ba ckgro und rad iat ion of roc ks, the bombardmen t of cosmic rays, the ultravio let of the s1Jn that have exis ted before there \ws an life on earth; radiation is now the unnatural creation of man's lamperin o witll the atom The chemicals to which life is asked to make its adjustmen t are no lo nger mere! the calci um and sil.ica and copper and all the .rest of the mineral washed out of the rocks and carried in riv ers to the sea; they are the synthetic creations of man's inventi e mind, bre ed in his laboratories, and having no counterparts in nature.

To adjust to these chemicals would require time on the scale that is nature's; it would require not merely the years of a man's life but the life of generations. And even this, were it by some miracle possible, would be futile, for the new chemicals come from our laboratories in an endless stream; almost five hundred annually find their way into actual use in the United States alone. The figure is staggering and its implications are not easily grasped—500 new chemicals to which the bodies of men and animals are required somehow to adapt each year, chemicals totally outside the limits of biologic experience.

Among them are many that are used in man's war against nature. Since the mid-1940's over 200 basic chemicals have been created for use in killing insects, weeds, rodents, and other organisms described in the modern vernacular as "pests"; and they are sold under several thousand different brand names.

These sprays, dusts, and aerosols are now applied almost universally to farms, gardens, forests, and homes—nonselective chemicals that have the power to kill every insect, the "good" and the "bad," to still the song of birds and the leaping of fish in the streams, to coat the leaves with a deadly film, and to linger on in the soil—all this though the intended target may be only a few weeds or insects. Can anyone believe it is possible to lay down such a barrage of poisons on the surface of the earth without making it unfit for all life? They should not be called "insecticides," but "biocides."

The whole process of spraying seems caught up in an endless spiral. Since DDT was released for civilian use, a process of escalation has been going on in which ever more toxic materials must be found. This has happened because insects, in a triumphant vindication of Darwin's principle of the survival of the fittest, have evolved super races immune to the particular insecticide used, hence a deadlier one has always to be developed—and then a deadlier one than that....

The "control of nature" is a phrase conceived in arrogance, born of the Neanderthal age of biology and philosophy, when it was supposed that nature exists for the convenience of man. The concepts and practices of applied entomology for the most part date from that Stone Age of science. It is our alarming misfortune that so primitive a science has armed itself with the most modern and terrible weapons, and that in turning them against the insects it has also turned them against the earth.

[1] Rachel Carson, "Silent Spring," in Diane Ravitch, ed., *The American Reader: Words that Moved a Nation* (New York: HarperCollins, 1990), 323-325.

1) Who is the one species responsible for altering the environment? (1 point)

2) What are some of the sources of the “rain of chemicals” discussed in this article? (1 point)

3) How many humans are on the earth today? (1 point)

4) What do you think are some ways humans can help save the environment? (2 points)

ASSIGNMENT #4: 15 points
Math Review

AP Environmental Science has a Math component. AP Environmental Science includes quantitative problem solving as well as conceptual knowledge of environmental issues such as ecology, energy sources, and pollution.

Here is some basic Math information:

A. **Conversions**

There are some basic conversions you should know.

Ex 1 meter (m) = 100 centimeters (cm)

Ex 1 megawatt (Mw) = 1000 kilowatt (kw)

Ex 1 kilowatt (kw) = 1000 watts (w)

Ex 1 kilogram (kg) = 1000 grams (g)

Ex 1 meter (m) = 1000 millimeters (mm)

B. **Dimensional Analysis**

This is a valuable tool used to convert units and perform environmental problems. The college board expects you to use dimensional analysis when solving math problems that are part of free response questions.

Ex – How man seconds in 25 years?

25 years (start with given) x 365 days/year x 24 hours/1 day x 60 minutes/1 hour x 60 seconds/1 minute =

Answer = 31536000 or 3.1 x 107 seconds

*** If you cancel out like units, the answer should be left - Ex - seconds on top

C. **Calculating Percentage Change**
Use this formula:

$$\frac{\text{FINAL-INITIAL}}{\text{INITIAL}} \times 100$$

Problem: In the year 1900 there were 10 gallons of water used per person per day. By the year 2000, there were 12 gallons of water used per day per person. What is the percent increase?

The APES Examination will require you to do mathematical calculations. It is mandatory to show all work on the free response section of the APES exam. The worksheet is designed to prepare you for some of the calculations you may see.

Scientific Notation – Being able to work comfortably with scientific notation, will help you tackle many APES problems.

1. Twenty-three thousand: _____
2. 10 million: _____
3. Five hundred billion times 35 thousand: _____
4. 3 billion divided by 6 million: _____

Unit Conversions (Use The Dimensional Analysis Format)

5. A city that uses ten billion BTUs of energy each month is using how many kilowatt-hours of energy? [1kwh = 3400 BTUs]. Use the dimensional analysis format.

6. Convert 6 m^3 to cm^3 .

7. Convert 10 MW to KW

8. 180 mm to m

Density

9. What is the volume of a tank that can hold 10,000 Kg of methanol whose density is 0.500 g/cm^3?

Percentages

10. In 1990 the total MSW (municipal solid waste) was 150 million tons. By 2012, the total was 250 million tons. What was the percent increase?

Sample FRQ (Free Response Question) – Math based

2. Iron ores are rocks from which metallic iron can be extracted for steel production. This process involves several steps. Iron ore is first mined and then turned into pig iron in a blast furnace, and some rock waste such as silicon dioxide is separated out. In the final step, the pig iron is refined into steel using a process that includes reacting the molten pig iron with oxygen to remove impurities.

   (a) Use the data below to respond to the following. For each calculation, show all your work.

Global Iron and Steel Data
1.6 billion tons of iron ore are used yearly to make pig iron.
1.2 billion tons of pig iron are produced each year.
Iron ore reserves are estimated to be 800 billion tons.
95% of iron ore that is mined is used in steel production.

   (i) **Calculate** the weight (in tons) of rock waste produced globally each year when iron ore is converted to pig iron.

   (ii) **Calculate** the weight (in tons) of pig iron that could be produced if all of the estimated global iron ore reserves were used for pig iron production.

   (iii) **Calculate** the weight (in tons) of the current global iron ore reserves that would be used to make steel if the current trends continue.

   Both iron ore and coal are mined for use in the manufacture of steel. It is estimated that for every ton of steel recycled, 1.25 fewer tons of iron ore and 0.7 fewer tons of coal must be mined. About 80 million tons of steel are recycled each year in North America.

   (b) **Calculate** the weight (in tons) of coal that is conserved each year in North America by recycling steel.

Complete Calculations:

ASSIGNMENT #5: 10 points
Course Overview

Directions: Go to the Bozeman Science website and to the AP Environmental Science course. Watch the first video, 001 Environmental Science (9:08 minutes).

Link: http://www.bozemanscience.com/ap-environmental-science/

Write down an essay addressing the following prompt: Why is it important for high school students to take this course?