AP Environmental Science Preparation Assignment

As you are enjoying your summer, keep your skills honed by completing the included summer assignment! AP Environmental science combines many scientific disciplines including biology, chemistry, geology and physics. To make sure you are prepared for the course, you will need to show your ability to use your chemistry, mathematical, and literacy backgrounds. Because this is a college level course, you will be responsible for learning a large amount of material on your own. Summer work is a chance for you to review your skill sets and prepare for the course, so that ultimately you can take your AP test in the spring (Monday May 6, 2019), pass, and receive college credit.

Materials Needed:

3 ring binder

Dividers

Barron's AP

Environmental

Science, 7th edition

General Guidelines:

- **Read the directions for each section carefully!**
- Each section should be clearly labeled.
- Each section of the project must be fully completed, neat and typed when specified.
- Each piece of the project should be bound together in some way.
- All research/information needs to be appropriately cited using APA or MLA format. Easybib or Purdue OWL websites will help with formatting.
- All work is to be completed on your own. You may not work with other students to complete this assignment.
- The checklist, provided at the end of this packet, should be completed and attached to the front of your work.
- Hole punch all parts of assignments and put in your Binder.
- Make sure your Binder is Labeled with your First and Last Name
- Decorate your Binder if you choose and place the Binder Dividers inside.

Section 1: Electronic Setup

In this course, we will be using technology extensively to help you learn basic content and communicate as scientists in the 21st century. Complete each of the following tasks to ensure that you are ready to begin on the first day of class!

1. Sign up for google classroom. Click the + sign and type in code 9qixt6.

2. Watch the video introducing Environmental Science and take notes about the course.

3. Look over the course topics (next page), highlight what is already familiar to you/what you have studied before

4. Email me at lagurawest@cusd.com introducing yourself. Please let me know the following information:
   - Your name
   - Any special hobbies or interests you have
   - Why you have chosen to take APES
   - Other science courses you have taken
   - Your college and career goals
   - Any concerns you have for next year
   - What you are most excited about for next year

5. Complete the checklist to turn in (found at the end of this packet).

AP Environmental Science Preparation Assignment

This course covers the following topics:

I. **Earth Systems and Resources (10%–15%)**

A. Earth Science Concepts (Geologic time scale; plate tectonics, earthquakes, volcanism; seasons; solar intensity and latitude)

B. The Atmosphere (Composition; structure; weather and climate; atmospheric circulation and the Coriolis effect; atmosphere-ocean interactions; ENSO)

C. Global Water Resources and Use (Freshwater/saltwater; ocean circulation; agricultural, industrial, and domestic use; surface and groundwater issues; global problems; conservation)

D. Soil and Soil Dynamics (Rock cycle; formation; composition; physical and chemical properties; main soil types; erosion and other soil problems; soil conservation)

II. **The Living World (10%–15%)**

A. Ecosystem Structure (Biological populations and communities; ecological niches; interactions among species; keystone species; species diversity and edge effects; major terrestrial and aquatic biomes)

B. Energy Flow (Photosynthesis and cellular respiration; food webs and trophic levels; ecological pyramids)

C. Ecosystem Diversity (Biodiversity; natural selection; evolution; ecosystem services)

D. Natural Ecosystem Change (Climate shifts; species movement; ecological succession)

E. Natural Biogeochemical Cycles (Carbon, nitrogen, phosphorus, sulfur, water, conservation of matter)

III. **Population (10%–15%)**

A. Population Biology Concepts (Population ecology; carrying capacity; reproductive strategies; survivorship)

B. Human Population

IV. **Land and Water Use (10%–15%)**

A. Agriculture

B. Forestry (Tree plantations; old growth forests; forest fires; forest management; national forests)

C. Rangelands (Overgrazing; deforestation; desertification; rangeland management; federal rangelands)

D. Other Land Use

E. Mining (Mineral formation; extraction; global reserves; relevant laws and treaties)

F. Fishing (Fishing techniques; overfishing; aquaculture; relevant laws and treaties)

G. Global Economics (Globalization; World Bank; Tragedy of the Commons; relevant laws and treaties)

V. **Energy Resources and Consumption (10%–15%)**

A. Energy Concepts (Energy forms; power; units; conversions; Laws of Thermodynamics)

B. Energy Consumption

C. Fossil Fuel Resources and Use (Formation of coal, oil, and natural gas; extraction/purification methods; world reserves and global demand; synfuels; environmental advantages/disadvantages of sources)

D. Nuclear Energy (Nuclear fission process; nuclear fuel; electricity production; nuclear reactor types; environmental advantages/disadvantages; safety issues; radiation and human health; radioactive wastes; nuclear fusion)

E. Hydroelectric Power (Dams; flood control; salmon; silting; other impacts)

F. Energy Conservation (Energy efficiency; CAFE standards; hybrid electric vehicles; mass transit)

G. Renewable Energy (Solar energy; solar electricity; hydrogen fuel cells; biomass; wind energy; small-scale hydroelectric; ocean waves and tidal energy; geothermal; environmental advantages/disadvantages)

VI. **Pollution (25%–30%)**

A. Pollution Types

B. Impacts on the Environment and Human Health

C. Economic Impacts (Cost-benefit analysis; externalities; marginal costs; sustainability)
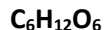
VII. **Global Change (10%–15%)**

A. Stratospheric Ozone (Formation of stratospheric ozone; ultraviolet radiation; causes of ozone depletion; effects of ozone depletion; strategies for reducing ozone depletion; relevant laws and treaties)

B. Global Warming (Greenhouse gases and the greenhouse effect; impacts and consequences of global warming; reducing climate change; relevant laws and treaties)

C. Loss of Biodiversity

AP Environmental Science Preparation Assignment
Section 2: Chemistry Review

Chemistry is a big part of environmental science. It is highly recommended that you take chemistry before registering for this course. In order to review some of the basic chemistry concepts you will need complete the following on a clean sheet of paper. This may be typed or hand written.

1. For each of the following, write out the chemical name that goes with the symbol:

CO_2 CO $C_6H_{12}O_6$ CH_4 H_2

N_2 NO_2 NO_3 NH_3 NH_4

O_2 O_3 P $PO_4{}^{3-}$ S

SO_2 SO_3 H_2SO_4 NaCl   Pb

U   Rn   Hg   Cl H_2O

2. Write at least a paragraph (5-8 sentences) that explains the following:
   a. What is the pH scale? What does it measure?
   b. How do the numbers on the pH scale compare? Example – is a pH of 4 twice as strong as a pH of 2? Hint-the pH scale is not linear!
   c. What are the average pH ratings of the following common substances in the environment?
      i. Blood
      ii. Rain
      iii. Freshwater (lake or river)
      iv. Ocean water

AP Environmental Science Preparation Assignment
Section 3: Math Review

The APES exam has a significant amount of math and **does not allow the use of calculators!** Complete each of the
following problems including a detailed set up with labeled units and proper scientific notation on a separate paper. **NO
CALCULATORS!** You must show all work to get credit.

*****In this class, it will be assumed that you are able to solve math problems using the following skills.*****

Percentage
$$17\% = 17/100 = .17$$
- Remember that "percent" literally means divided by 100.
- Percentage is a measure of the part of the whole. Or part divided by whole.
- 15 million is what percentage of the US population? 15 million / 300 million = .05 = 5%
- What is 20% of this $15 bill so that I can give a good tip? $15 x .20 = $15 x 20/100 = $3

Rates
- percent change = (final –initial)/initial
- All of the above are ways to look at rates. The second equation is the easiest way to calculate a rate,
especially from looking at a graph. Rates will often be written using the word "per" followed by a unit of time,
such as cases per year, grams per minute or mile per hour. The word per means to divide, so miles per gallon is
actually the number miles driven divided by one gallon.
- Rates are calculating how much an amount changes in a given amount of time.

Scientific Notation
$$Thousand = 10^3 = 1,000$$
$$Million = 10^6 = 1,000,000 \text{ (people in the US)}$$
$$Billion = 10^9 = 1,000,000,000 \text{ (people on Earth)}$$
$$Trillion = 10^{12} = 1,000,000,000,000 \text{ (National debt)}$$

- When using very large numbers, scientific method is often easiest to manipulate. For example, the US
population is 300 million people or 300×10^6 or 3×10^8
- When adding or subtracting, exponents must be the same. Add the numbers in front of the ten and
keep the exponent the same.
- When multiplying or dividing, multiply or divide the number in front of the ten and add the exponents
if multiplying or subtract the exponents if dividing
$$Ex. \quad 9 \times 10^6 / 3 \times 10^2 = (9/3) \times 10^{(6-2)} = 3 \times 10^4$$

Dimensional Analysis
You should be able to convert any unit into any other unit accurately if given the conversion factor.
Example: 24 miles/gallon = how many kilometers/liter?

24 mi	1.6093 km	3.7854 gal	=	150 km
1 gal	1 mi	1 L		1 L

Online dimensional analysis tutorials are available:
http://www.chemprofessor.com/dimension_text.htm
http://www.chem.tamu.edu/class/fyp/mathrev/mr-da.html

Prefixes

m (milli)	=1/1000	$=10^{-3}$
c (cent)	=1/100	$=10^{-2}$
k (kilo)	=1000	$=10^3$
M (mega)	=1,000,000	$=10^6$
G (giga)	=1,000,000,000	$=10^9$
T (tera)	=1,000,000,000,000	$=10^{12}$

o All problems should be expressed in scientific notation (do not write out large numbers with multiple
zeros as place holders).

AP Environmental Science Preparation Assignment

Show all work, box your answer:

1. What is 10^9 times 10^3?

2. What is twenty-four million plus two hundred fifty-six thousand?

3. A population of deer had 800 individuals.
   If the population decreased by 25% in one year, how many deer were lost?

   What is the total population of deer the next year?

4. One year we had 25 APES students and the next year we had 50 APES students. What percentage did the population of APES students grow by?

5. One year we had 2500 endangered sea turtles hatch. After one year there were only 1500. What percentage of turtles died?

6. Electricity costs 4 cents per kilowatt hour. In one month one home uses one megawatt of electricity. How much will the electric bill be? (be sure to look at the conversion chart for the conversion factor from kilo to mega)

7. Your car gets 15 miles to the gallon and your friend's car gets 30 miles to the gallon. You decide to go on a road trip to Virginia Tech, which is 500 miles away. If gas costs $5 per gallon and you decide to split the gas money, how much money will you save by driving your friend's car?

8. A turtle was crawling at the rate of 24 cm per minute. How many kilometers would the turtle crawl in 2 hours?

9. A turtle was crawling at the rate of 50 cm per minute. How many kilometers would this turtle crawl in one day (24 hours) if it did not rest and continued to crawl at a continuous pace?

10. There are 125 blades of grass in a square cm of lawn. Assuming the grass stand is even, how many blades of grass would be found in a lawn measuring 4 meters by 3 meters? Use scientific notation in your answer.

11. You purchase a home that is 5500 square feet of living space. How many square meters of living space is this?

12. If a calorie is equivalent to 4.184 joules, how many joules are contained in a 500 kilocalorie slice of pizza?

13. A coal-fired electric power plant produces 24 million kilowatt-hours (kWh) of electricity each day. Assume that an input of 10,000 BTUs of heat is required to produce an output of one kilowatt-hour of electricity. Calculate the number of BTUs of heat needed to generate the electricity produced by the power plant each day.

14. (Using the information in 13) Calculate the pounds of coal consumed by the power plant each day assuming that one pound of coal yields 5,000 BTUs of heat.

15. If a city of 10,000 experiences 500 births, 80 deaths, 20 immigrants and 30 emigrants in the course of a year, what is its net annual percentage growth rate? (By what percentage did the population change?)

AP Environmental Science Preparation Assignment
Section 4: Environmental Legislation

Create a chart similar to the one on this and the next page and fill in the missing information for each piece of legislation. This can be types or handwritten. We will study MANY different environmental policies throughout the year. This is just to get you started.

Legislation Name	Is this a US or World Treaty, Law or Act?	Date Enacted (Year)	Description of the Legislation (Give the purpose, important founding organizations or people, any major points that you find)
Kyoto Protocol			
Montreal Protocol			
Paris Agreement 2016			
Agenda 21			
London Dumping Convention			
Helsinki Convention			
CITES			
SMRCA			
RCRA			
Lacey Act			
Stockholm Convention			
Clean Water Act			
Safe Drinking Water Act			
Clean Air Act			
Antiquities Act			
Endangered Species Act			
CERCLA			

Section 5: Current Events

In environmental science, it is important to know about current issues in the news. There are Free Response Questions on the exam, which will require you to be able to read and understand scientific articles. Over the course of the summer, find 3 recent articles related to environmental science.

All articles should be current (during the past 2 years) and taken from a reliable source. The sources may be scientific publications, popular magazines, newspapers etc. Try the NY times, Washington Post, National Geographic, Discover Magazine, Natural History Magazine, Treehugger.com, etc. Make sure print out the article, and you should be able to cite it.

Each article should relate to a different topic chosen from the following list. As the year progresses you will be able to cover all of the topics!

I.   Earth

II.   Living Systems

III.   Populations

IV.   Land and Water Use

V.   Energy

VI.   Pollution

VII.   Global Change

Article Analysis Directions:

Include all of the following components and clearly identify each component with headings. Each analysis should be either typed or very neatly written in blue or black ink. Each article should be on its own paper.

- Title of the Article
- Summary: **brief** summary that tells me what the article is about.
- Analysis:
    a. Points of view – does the article have more than one side/pov? If so what are they?
    b. Bias – Is this article biased in any way? In your opinion, does the author give a positive, negative, or neutral view of the environmental science topic?
    c. Controversy: Is there any controversy surrounding this article? If so briefly explain it.
    d. Your perspective: State your perspective on this news article based on your personal knowledge of the topic and your reading of the article.
    e. Effect on you: How does this topic relate to you or your affect you?
- Attach the article.
- Include your article <u>annotations</u> either on the printed copy or on a separate page.

AP Environmental Science Preparation Assignment

Checklist:

Please place this completed checklist at the front of your assignment before you turn it in.

Name _____

Section 1: Score_____/20

        I have signed up for google classroom
        I watched the intro video and written notes
        I have emailed Ms. West.
        I have a Barron's review book, a binder, and dividers

Section 2: Score_____/20

        I have identified all of the chemical compounds and I am ready for a quiz.
        I have written at least one paragraph about pH.

Section 3: Score_____/20

        I have read through the math review material and understand how to solve these types of problems.
        I have completed all of the review problems and am ready to take a math quiz.

Section 4: Score_____/20

        I have researched and recorded information for all of the legislation listed.
        I have cited all of the sources I used to find my information.
        I have studied the legislation and am ready for a quiz.

Section 5: Score_____/20

        I have summarized my articles
        I have attached a paper copy of my article and annotations.

This Assignment is due Friday, August 24th when you enter the classroom, you will be able to use it to help you on your first quiz that day.