

## 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, pass, and receive college credit.

### Materials Needed:

3 ring binder

Dividers

### 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 21<sup>st</sup> 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 jq6px. Then download class syllabus, if you didn't receive a paper copy. Read through the syllabus carefully and write down any questions or comments you have.
2. Using the syllabus, make a list of all the topics you will need to know before the AP exam. Also write down any additional lab or coursework expectation.
3. Email me at [laurawest@cusd.com](mailto:laurawest@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
4. Complete the checklist to turn in (found at the end of this packet).

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**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 <sub>2</sub>	CO	C <sub>6</sub> H <sub>12</sub> O <sub>6</sub>	CH <sub>4</sub>	H <sub>2</sub>
N <sub>2</sub>	NO <sub>2</sub>	NO <sub>3</sub>	NH <sub>3</sub>	NH <sub>4</sub>
O <sub>2</sub>	O <sub>3</sub>	P	PO <sub>4</sub> <sup>3-</sup>	S
SO <sub>2</sub>	SO <sub>3</sub>	H <sub>2</sub> SO <sub>4</sub>	NaCl	Pb
U	Rn	Hg	Cl	H <sub>2</sub> O

2. Write at least a paragraph (5-8 sentences) that explains the following:
- What is the pH scale? What does it measure?
  - 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!
  - What are the average pH ratings of the following common substances in the environment?
    - Blood
    - Rain
    - Freshwater (lake or river)
    - Ocean water

**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?  $15 \text{ million} / 300 \text{ million} = .05 = 5\%$
- What is 20% of this \$15 bill so that I can give a good tip?  $\$15 \times .20 = \$15 \times 20/100 = \$3$

**Rates**

- percent change =  $(\text{final} - \text{initial})/\text{initial}$
- 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**

$$\text{Thousand} = 10^3 = 1,000$$

$$\text{Million} = 10^6 = 1,000,000 \text{ (people in the US)}$$

$$\text{Billion} = 10^9 = 1,000,000,000 \text{ (people on Earth)}$$

$$\text{Trillion} = 10^{12} = 1,000,000,000,000 \text{ (National debt)}$$

- When using very large numbers, scientific method is often easiest to manipulate. For example, the US population is 300 million people or  $300 \times 10^6$  or  $3 \times 10^8$
  - 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.  $9 \times 10^6 / 3 \times 10^2 = (9/3) \times 10^{(6-2)} = 3 \times 10^4$

**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?*

$$\frac{24 \text{ mi}}{1 \text{ gal}} \times \frac{1.6093 \text{ km}}{1 \text{ mi}} \times \frac{3.7854 \text{ gal}}{1 \text{ L}} = \frac{150 \text{ km}}{1 \text{ L}}$$

Online dimensional analysis tutorials are available:

[http://www.chemprofessor.com/dimension\\_text.htm](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). If you need assistance with this, please refer to the sample problems on our website.

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1. What is ten million times three thousand?
2. What is thirty-four million plus two hundred fifty-six thousand times four hundred?
3. A population of deer had 200 individuals. If the population dropped 15% in one year, how many deer were lost? What is the total population of deer the next year?
4. One year we had 120 APES students and the next year we had 150 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 6 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 12 miles to the gallon and your friend's car gets 20 miles to the gallon. You decide to go on a road trip to Virginia Tech, which is 300 miles away. If gas costs \$4 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 38 cm per minute. How many kilometers would the turtle crawl in 2 hours?
9. A turtle was crawling at the rate of 43 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 8 meters by 6 meters? Use scientific notation in your answer.
11. You purchase a home that is 2500 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 250 kilocalorie slice of pizza?
13. A coal-fired electric power plant produces 12 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 200 births, 60 deaths, 10 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?)

**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 typed 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			
Agenda 21			
London Dumping Convention			

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Helsinki Convention			
CITES			
SMRCA			
RCRA			
Lacey Act			
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 new. 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!

Environmental Law	Ecosystems	Climate	Evolution	Preserving our biodiversity
Water pollution	Population growth	Cities and waste	Geology	Renewable Energy
Nonrenewable energy	Food/agriculture	Air pollution	Human Health	Forest or Rangeland

### 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

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- 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 annotations 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 have read and annotated the course syllabus.
- I have emailed Ms. West.
- My Binder is complete (under General Guidelines)

#### 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 and I am ready to explain it to someone else.
- I have cited all of the sources I used to find my information.

#### 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 completed three article current events.
- I have attached a paper copy of my article and annotations.

**This Assignment is due Friday, September 1<sup>st</sup> when you enter the classroom. If you turn in the assignment late, you will only earn a MAXIMUM of 50%.**

**If you turn in this assignment on our first classes, you can receive up to 25 bonus points on our first exam!**