

AP Environmental Science
Summer Assignment 2016 - 2017

Welcome future APES students! This is an advanced science course that combines the disciplines of biology, chemistry, geology and physics to investigate global environmental issues. We will discover how the Earth's systems function together and how humans have affected our planet. We will also examine our personal consumption habits and learn ways to be responsible global citizens in the face of serious environmental issues.

Because this is a college level course, you will be responsible for learning a large amount of material on your own. I will help you as we go, but it will be your responsibility to take notes, study and learn your vocabulary! We also work on the assumption that you have a general science background that includes biology, chemistry and algebra. The purpose of this assignment is to help you prepare for the APES content by getting organized, reviewing some background information, and getting familiar with some of the basic concepts of environmental science and your own consumption habits.

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.
- All research/information needs to be appropriately cited using APA format. A quick google search will help you with formatting.
- All work is to be completed on your own. You may not work with other students to complete this assignment.

Part I: Electronic Setup (Due August 1st)

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. Enroll onto the class Edmodo site. Group code:sjs74u. Under class organization, you will find the class syllabus. Download a copy of this document and read through carefully.
2. Write a letter introducing yourself. Please let me know the following information:
 - Your name, address, phone number
 - Any special hobbies or interests you have?
 - What other science classes have you taken?
 - Why you have chosen to take APES?
 - What would you like to get out of this course?
 - Any concerns you have for next year?

This assignment should be turned submitted on Edmodo in the assignment folder labeled "Student Introductions." This assignment is due by August 1st.

3. Once you are in the course, spend a little time going over the course description and material provided.

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Part II. Chapter 1 (Due August 10th)

1. Read and outline chapter 1 in our textbook. Look at the Chapter Review section and try to incorporate the main parts of these questions. You do not have to write out these answers separate from your outline.

Part III. Current Events (Due August 12th)

In environmental science, it is important to know about current issues in the new. One of my goals is to familiarize you with environmental issues that are important to our community, country and world. We will be reading and discussing a variety of current events throughout the school year as well. 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 (especially Tuesday), Washington Post, National Geographic, Discover Magazine, Natural History Magazine, Treehugger.com, etc. I do not care if you use a newspaper, journal, etc. or an online copy of your article as long as it is properly cited and printed out.

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. Each article should be on its own paper. Analyses should be approximately 1 typed page in length.

- 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 – either a physical copy of the article or a working web address must be included.

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Turn in a paper copy! No electronic copy needed.

Part IV. Chemistry Review (Due August 15th)

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 should be typed.

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

CO ₂	CO	C ₆ H 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 ₂ SO ₄	NaCl	Pb
U	Rn	Hg	Cl	H ₂ O

2. Write at least a paragraph 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

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Part V. Math Review (Due August 22nd)

The APES exam has a significant amount of math and **does not allow the use of calculators!** Most students find that with a little practice, the math is not difficult, but as many of us have not had practice with setting up and solving problems without a calculator in a long time, in the beginning it can be daunting.

****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

- Thousand = $10^3 = 1,000$
- Million = $10^6 = 1,000,000$ (people in the US)
- Billion = $10^9 = 1,000,000,000$ (people on Earth)
- Trillion = $10^{12} = 1,000,000,000,000$ (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. $9 \times 10^6 / 3 \times 10^2 = (9/3) \times 10^{(6-2)} = 3 \times 10^4$

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.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}

Complete each of the following problems including a detailed set up with labeled units and proper scientific notation. **NO CALCULATORS!** You must show all work to get credit.

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- 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.
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?)

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Part VI. Environmental Legislation (Due August 29th)

Create a chart similar to the one on the next page and fill in the missing information pertaining to important legislation. **Make sure this is typed so that you can add as many details as needed!** You can change the formatting to fit your preferences (example – make it landscape if that’s easier for you). 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			
Helsinki Convention			
CITES			
SMRCA			
RCRA			
Lacey Act			
Clean Water Act			
Safe Drinking Water Act			
Clean Air Act			
Antiquities Act			
Endangered Species Act			
CERCLA			

If you turn in an assignment late, you will only earn a MAXIMUM of 50% (as this is the policy for all late work in APES).