AP Environmental Science 2009-2010
Summer Assignment

Welcome to AP Environmental Science! The major topics of the class are as follows:

Energy Systems and Resources – atmosphere, soil, groundwater, and geology
The Living World – ecosystems and cycles
Populations – demographics, dynamics and growth
Land and Water Use – agriculture, forestry, mining, fishing and global economics
Energy Resources and Consumption – fossil fuels, nuclear energy, conservation and consumption
Pollution – types of pollution and its impact, waste disposal
Global Change – ozone, global warming, loss of biodiversity

This summer assignment will give you a brief overview of all of the topics we will go over this year by looking at some of the associated prerequisites and math calculations. Over the course of the year we will learn more about the science and social issues associated with each of the topics. There are four parts to the summer assignment, one of which is due at the end of July and one of which will be collected on the first day of class. If you have any questions about the assignment, feel free to email me at Erin.Greer@vbschools.com. If you work with someone else, be sure that your answers are in your own words and not copied from a partner. The summer assignment will count for a significant portion of your first nine weeks grade. All work turned in must be your own work. The assignment will be graded as follows:

1. E-mail Me (15 points)

E-mail me with the following information by Wednesday **July 29th**:

- Brief introduction
- Why you are taking AP Environmental Science
- Why you think you will be successful on the AP Exam

* Feel free to e-mail me at any time with questions on the summer assignment. I will be out of town periodically so allow a few days for a response.

2. Prerequisite Knowledge and Skills – Quiz the first week of class

3. Math Problems (30 points) – Due by Wednesday **July 29th**

- Drop it off in the office or mail it to THS; Be sure that both your name and my name are visible
- 2 points for setting up the problem, 2 points for the answer, 2 points for neatness

4. Current Events (45 points) – Due on the first day of class

- Summaries and responses to 3 articles dealing with environmental issues; 15 pts. each

Summer Study Sessions

I will be available at the following times to discuss summer assignment questions and go over problems. You will receive a 15 point classwork grade for each session that you attend, though attendance is not mandatory. Both sessions will meet in Room 232.

Monday, July 27th 10:00 - 12:00
Thursday, August 27th 10:00 - 12:00

Prerequisite Knowledge and Skills

AP Environmental Science is a college level course that combines content area from earth science, biology, chemistry, physics, math, and social studies. You are expected to enter the course with a good understanding of basic scientific and mathematical concepts and skills, as well as strong reading, writing, and speaking abilities. Although we will continue to develop these skills throughout the school year, your success in the class is also dependent upon what you bring to it at the onset. One goal of this summer assignment is to help you brush up on these skills and concepts. Over the summer, review the scientific concepts below as well as the mathematical calculations on the next page; we will be building upon and referencing them throughout the school year. You should be prepared to take a quiz on these skills and concepts during the first week of school. If you do not receive at least an 85% on the quiz, you will need to stay after for tutoring until you are able to achieve an 85% on it.

<u>Prerequisite Basic Scientific Concepts:</u>

You should be familiar with the following terms/concepts from Biology, Chemistry, and Earth Science:

Organic vs. Inorganic
Natural vs. Synthetic
Kinetic vs. Potential Energy
Radioactive decay
Half life
Law of Conservation of Matter
1st Law of Thermodynamics
2nd Law of Thermodynamics
Entropy
Organism
Species
Population
Community
Ecosystem
Producers/Autotrophs
Consumers/Heterotrophs
Decomposers
Photosynthesis (reactants and products)
Cellular Respiration (reactants and products)
Aerobic vs. Anaerobic
Adaptation
Mutation

Gene
Trait
Chromosome
Gene pool
Natural Selection
Biodiversity
Extinction
Plate Tectonics
Weathering
Climate Change
Rocks vs. Minerals
Climate vs. Weather

The full name of each of these chemical abbreviations:

CO_2, CO, $C_6H_{12}O_6$, CH_4, H_2,
H_2O, N_2, NO_x, NO^{3-}, NH_3, O_2,
O_3, P, PO_4^{3-}, S, SO_2, Cl, K,
NaCl, Pb, Hg, Rn, U

Prerequisite Basic Mathematical 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

$\frac{\text{Rise}}{\text{Run}}$	$\frac{Y_2-Y_1}{X_2-X_1}$	slope	$\frac{\text{change}}{\text{time}}$	y=mx+b	$\frac{dX}{dt}$

- 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 $300x10^6$ or $3x10^8$
- 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. $9x10^6 / 3x10^2 = (9/3) \times 10^{(6-2)} = 3 \times 10^4$

Dimensional Analysis

You should be able to convert any unit into any other unit accurately if given the conversion factor. Online 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	$=10^{12}$	

Math Problems

Answer the questions. Use a separate sheet of paper if necessary. Show all work

1) What is one million times one thousand? Show your work in scientific notation. Give the answer in scientific notation and in words.

2) A population of deer had 200 individuals. If the population grows by 15% in one year, how many deer will there be the next year?

3) One year I had 40 AP Environmental Science students and the next year I had 50 Environmental Science students, what percentage did the population of APES students grow by?

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

5) Your car gets 15 miles to the gallon and your friend's car gets 25 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 in gas by driving your friend's car?

6) Virginia Beach is 10 miles wide and 30 miles long. If one inch of rain falls on Virginia Beach, how many cubic feet of rain fell on Virginia Beach. (Hint: convert all units to feet first).

7) An MP3 takes up about 16 kilobytes of memory per second of music. If you owned a one terabyte hard drive and filled it with only mp3s, how many days worth of music would you have? (keep track of units: kilobytes to terabytes and seconds to days)

Current Events

In environmental science, it's important to know about current issues in the news. One of our goals for this course is to educate you about environmental issues that are important to our community, our country, and our world. We will be reading and discussing a variety of current events throughout the school year as well. This is a great opportunity to start thinking about the environment and how it affects us.

Over the course of the summer, find three articles that relate to environmental science. Topics include, but are not limited to:

pollution, climate change, environmental legislation, alternative energy sources, fossil fuels, human population growth, renewable resources, recycling/waste management, air quality, water quality, conservation/wildlife, food production/food safety, deforestation, GMOs (genetically modified organisms), etc.

This portion of the summer assignment must be typed in 12 pt. Times New Roman or a similar font. It must be double spaced.
On the **first day of class,** you should submit for each article:

- a copy of the article (2 points each)
- a summary of the article content (6 points each)
- a personal reaction (7 points each)

Article
All articles should be current (May-Sept. 2009) and taken from a reliable source. The sources may be scientific publications, popular magazines, newspapers or the like. Try the NY Times (especially Tuesdays), Washington Post, National Geographic, Discover Magazine, Natural History Magazine, Scientific American, Science, Nature, etc. The articles should be long enough for you to write a substantial summary and well-thought out response. All bibliographic information should be visible on the article itself or included with the summary. Try to find a variety of articles at the state, national, and global level (ie. not all articles should be about the Chesapeake Bay) that address multiple environmental issues.

Summary:
Write a brief summary of each article and point out the major environmental themes discussed. Your summary should be no less than 250 words.

Personal Reaction:
Your personal reaction should clearly state your opinions and/or reflection on the article. You can offer potential solutions, compare it to another environmental problem, ask questions about the article, or simply reflect on the article's content. Do not simply write, "This article was very interesting/good." It should be no less than 250 words. Some questions to drive your discussion:

- What are the key points made in the article?
- What are the points of view presented about this issue?
- Does the article teach you something new?
- Does it support or refute other information you've heard or read? How so/in what way?