

AP Environmental Science 2011-2012 Summer Assignment

Mrs. Randall

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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 be exploring 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. The summer assignment will count toward 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 (5 points) – Please use or send the email address you would like me to use for an APES email class list-serv.

E-mail me with the following information by **August 1, 2011**:

- Brief introduction (likes/dislikes, extra-curriculars/after-school activities, helpful hints about you, AP course load, etc...)
- Why you are taking AP Environmental Science
- Why you think you will be successful on the AP Exam

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

-See list of terms below.

-Read and outline Chapters 1 and 2 in the text book. This reviews a lot of the material from your previous courses and covers some basics that we will need to get started in class.

3. Math Problems (14 points) – Due on first day of school.

- 1 point for setting up the problem, 1 point for the answer

(ALL WORK MUST BE SHOWN! THIS IS AN AP EXAM REQUIREMENT, SO GET USED TO IT!)

4. Current Events (20 points) – Due on the first day of school.

- Summaries and responses to 2 articles dealing with environmental issues

- 10 points each

- Be prepared to share one of your articles on the first day of school!

OPTIONAL, but RECOMMENDED Reading

1. Though this is not a requirement, you may wish to read *The Cartoon Guide to the Environment* by Larry Gonick and Alice Outwater (Collins Reference; 1996). This is a VERY easy read, short (204 pages in cartoons!), and some of the information is a little outdated, **but** it gives a quality, simplistic overview of the topics we are going to cover this year and would serve as a good introduction to environmental science.

2. In addition, I also highly recommend a subscription to **National Geographic**. It is \$15 for the year and you can order it online. The articles complement our curriculum VERY well!

Please feel free to contact me by email at any time at kimberly_randall@olentangy.k12.oh.us!!!

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 retake the quiz on your own time until you are able to achieve an 85% on it.

Prerequisite Basic Scientific Concepts:

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

Gene

Trait

Chromosome

Gene pool

Natural Selection

Biodiversity

Extinction

Plate Tectonics

Weathering

Climate Change

Rocks vs. Minerals

Climate vs. Weather

Mutation

Adaptation

The full name of each of these chemical abbreviations:

CO₂ CO C₆H₁₂O₆ CH₄ H₂

H₂O N₂ NO_x NO³⁻ NH₃ O₂

O₃ P PO₄³⁻ S SO₂ 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? $15 \text{ million} / 300 \text{ million} = .05 = 5\%$
- What is 20% of this \$15 bill so that I can give a good tip? $\$15 \times .20 = \$15 \times 20/100 = \$3$

Rates

$\frac{\text{rise}}{\text{run}}$	$\frac{Y_2 - Y_1}{X_2 - X_1}$	slope	$\frac{\text{change}}{\text{time}}$	$y = mx + b$	$\frac{dX}{dt}$
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- 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 300×10^6 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

$$\text{Ex. } 9 \times 10^6 / 3 \times 10^2 = (9/3) \times 10^{(6-2)} = 3 \times 10^4$$

Dimensional Analysis

You should be able to convert any unit into any other unit accurately if given the conversion factor.

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. 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 **two 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, with one inch margins.*** On the **first day of class**, for each article you should submit:

- a copy of the article (2 points each)
- a summary of the article content (4 points each)
- a personal reaction (4 points each)

Be prepared to share one of your articles with the class on the first day of school!

Article

All articles should be current (May-August 2011) 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 (i.e. not all articles should be about Columbus, Ohio) 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 between half a page to a page in length (no more, no less).**

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." **Your personal reaction should be between half a page to a page in length (no more, no less).** 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?