

POSNACK

S C H O O L

Summer Assignment 2021 - 2022 · AP Environmental Science

Welcome to AP Environmental Science! 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. This is a college level course. You will be responsible for learning part of the material on your own. It is your responsibility to take notes, study, read the chapters and case studies. The purpose of this assignment is to help you prepare for the AP Environmental Science content by reviewing some background information and getting familiar with some of the basic concepts of APES. All work must be turned in on the first day of school. I hope you will have a relaxing summer and am looking forward to an exciting new school year.

Task 1: [Click Here](#) to Read the essay “Tragedy of the Commons” by Garrett Hardin.

When you have completed the reading, please respond to the following in complete sentences:

1. What is Garrett Hardin's central idea in this essay?
2. Do you personally agree with Hardin's central idea?
3. Is the “Tragedy of the Commons” unavoidable?
4. Identify one “commons” in your own life (at school, home, work) and explain how it is (or is not) being managed wisely to avoid the situation described in the essay.

Task 2: Math Assignment.

Please complete the following problems, showing all work and units.

1. How many square centimeters are there in a square meter?
2. How many square inches are there in a square meter?
3. You may someday purchase a house that has 2500 square feet of living space. How many square meters of living space is this?
4. If a calorie is equivalent to 4.184 joules, how many joules are contained in that 200kilocalorie slice of pizza?
5. If a city of 10,000 experiences 100 births, 30 deaths, 10 immigrants, and 20 emigrants in the course of a year, what is its net annual percentage growth rate?

Task 3: Fruits and Vegetables on the Move!

At some point over the summer, look around your house and identify a piece of fruit or vegetable that has travelled to be a part of your diet. Usually there is a sticker on the item telling you its country of origin . For the item you select:

1. Record date, item, and its country of origin
2. Use internet resources or other sources to estimate the distance from where the item was grown to your home.

3. List the most likely modes of transportation (can be more than one) used to move that item from the field where it was growing to your kitchen.
4. Respond to the following in a paragraph or two: What are the environmental impacts of shipping fresh produce over long distances? What are the health benefits/health costs of having a wide variety of fresh produce available at all times? Is it “worth it?”

Task 4: World Map

All AP Environmental Science students must know the names and locations of the following on a map of the world:

1. Continents
2. Oceans
3. Major seas and lakes (Caribbean Sea, Gulf of Mexico, Mediterranean Sea, Arabian Sea, Black Sea, all 5 Great Lakes, Caspian Sea, Aral Sea)
4. Major rivers and river systems (Amazon, Nile, Mississippi (also Missouri and Ohio Rivers), Yangtze, Ganges, Yellow)
5. Major mountain chains (Rockies, Andes, Appalachians, Alps, Urals, Himalayas)
6. Approximate locations of some major world cities (New York, Los Angeles, Mexico City, London, Tokyo, Shanghai). Students should also be able to draw the equator on a map of the world within 10 degrees of latitude. *A map quiz will be given during the first week of school.*

Task 5: Video Introduction

Bookmark the following website: <http://www.bozemanscience.com/ap-environmental-science>

It is a useful resource to refer to throughout the year. Watch the video “001 – Environmental Science” and answer the following questions:

- What is “Environmental Science”?
- What is the outline of the course?
- What is the difference between Environmental Science and Environmentalism?
- What are Planetary Boundaries, a term coined by Johan Rockstrom?
- What are the affecters affecting Earth, that can then affect society and in which categories are we exceeding the planetary boundaries currently?
- What does sustainability mean and how is it related to the concept of Planetary Boundaries?
- What is the role of the economy in this model?
- What is the structure of the AP exam?

Task 6: Current Events

In environmental science, it is important to know about current issues in the news. 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 1 recent article related to environmental science. The article should be current (during the past 2 years) and taken from a reliable source. The sources may be scientific publications, popular magazines or newspapers. Try the NY times, Washington Post, National Geographic, Discover Magazine, Natural History Magazine, Treehugger.com. It can be a paper or online article, but make sure it is properly cited. The article should relate to a 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 the following components and clearly identify each component with headings

- Title of the Article
- Writer
- Summary: brief summary that tells me what the article is about (key ideas)
- Analysis:
 - Points of view – does the article have more than one side/pov? If so what are they?
 - 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?
 - Controversy: Is there any controversy surrounding this article? If so briefly explain it.
- Your perspective: State your perspective on this news article based on your personal knowledge of the topic and your reading of the article.
- Effect on you: How does this topic relate to you or affect you?
- Attach the article – either a physical copy of the article or a working link must be included.
- Citation

Task 7: Vocabulary and Basic Mathematical Skills (attached)

Make flashcards or a quizlet of the attached vocabulary and become familiar with and be able to use the attached Prerequisite Basic Mathematical Skills.

Prerequisite Basic Mathematical Skills Review

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.
- Ex. 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

- Rise $Y_2 - Y_1$ / Run $X_2 - X_1$
- Slope change $y = mx + b$
- Rates will often be written using the word ‘per’ followed by a unit of time, such as cases per year, grams per minute or miles per hour.
- The word ‘per’ means to divide, so miles per gallon is the number of miles driven divided by one gallon. Rates are calculating how much an amount changes in each 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 = $10^{12} = 1,000,000,000,000$
- When using very large numbers, scientific notation 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
- Online tutorial: <http://www.chem.tamu.edu/class/fyp/mathrev/mr-scn0t.html>

Dimensional Analysis

- You should be able to convert any unit into any other unit accurately if given the conversion factor.
- Online tutorials are available:
 - <https://www.khanacademy.org/math/algebra/x2f8bb11595b61c86:working-units/x2f8bb11595b61c86:rate-conversion/v/dimensional-analysis-units-algebraically>
 - <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) = $1,000,000,000,000 = 10^{12}$

Long Division and Multiplication

- You should be able to do these calculations by hand, including values with decimals and scientific notation. Many students struggle in this area because calculators are not allowed on the AP exam.
- Online tutorials are available:
 - <http://www.mathsisfun.com/dividing-decimals.html>
 - <http://www.tutors4you.com/tutorialondecimals.htm>

Vocabulary Terms

environment	inductive reasoning	Biosphere
environmental science	deductive reasoning	Geosphere
ecology	paradigm shift	Biome
ecosystem	pH	natural greenhouse effect
environmentalism	organic compounds	abiotic
sustainability	acidity	biotic
natural capital	inorganic compounds	range of tolerance
natural resources	nuclear fission	limiting factor
nutrient cycling	law of conservation of matter	trophic level
per capita	first law of thermodynamics	formula for photosynthesis
resource conservation	second law of thermodynamics	formula for respiration
sustainable yield	positive feedback loop	anaerobic respiration
environmental degradation	negative feedback loop	detritivore
tragedy of the commons	tipping point	omnivore
pollution	synergy ecology	decomposer
point source	species	food web
nonpoint source	population	food chain
output pollution control	community	biomass
input pollution control	genetic diversity	ecological efficiency
poverty	habitat	net primary productivity
environmental ethics	ecosystem	transpiration
		aquifer