POSNACK

S C H O O L

AP Environmental Science Summer Assignment 2017-2018

Please Note: Assignment is due on the first day of school.

Task 1: Read the essay "Tragedy of the Commons" by Garrett Hardin. Here is a link:

http://www.garretthardinsociety.org/articles/art_tragedy_of_the_commons.html

W hen you have completed the reading, please respond to the following in **complete sentences:**

a.   What is Garrett Hardin's central idea in this essay?

b.   Do you personally agree with Hardin's central idea?

c.   Is the "Tragedy of the Commons" unavoidable?

d.   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 <u>all</u> work and units.

a.   How many square centimeters are there in a square meter?

b.   How many square inches are there in a square meter?

c.   You may someday purchase a house that has 2500 square feet of living space. How many square meters of living space is this?

d.   If a calorie is equivalent to 4.184 joules, how many joules are contained in that 200 kilocalorie slice of pizza?

e.   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 – or you could go to a food store and browse. (hint: do not use the tomato you picked out of the garden that morning) For the item you select:

a.   Record date, item, and its country of origin

b.   Use internet resources or other sources to estimate the distance from where the item was grown to your home. Do the best estimate you can – obviously it is difficult/impossible to tell where in Mexico that cantaloupe came from…

c.   List the most likely modes of transportation (hint: there are probably more than one of them) used to move that item from the field where it was growing to your kitchen.

d.   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
Because we will be discussing environmental issues throughout the world, a working knowledge of world geography is essential. All AP Environmental Science students must know the names and locations of the following on a map of the world: all continents, all oceans, major seas and lakes (Caribbean Sea, Gulf of Mexico, Mediterranean Sea, Arabian Sea, Black Sea, all 5 Great Lakes, Caspian Sea, Aral Sea), major rivers and river systems (Amazon, Nile, Mississippi (also Missouri and Ohio Rivers), Yangtze, Ganges, Yellow), major mountain chains (Rockies, Andes, Appalachians, Alps, Urals, Himalayas), and ***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
Make flashcards of the attached vocabulary and become familiar with and be able to use the attached Prerequisite Basic Mathematical Skills.

Task #6

Go to http://www.greenfacts.org/en/ecosystems/
There are 10 questions on this web site and answers to these questions. The answers for each question are presented in 3 different levels of depth which allows readers to explore as deeply or as superficially as they like. You should read the first "Summary" level answers for all 10 questions and be prepared for a quiz on the first level answers the second day of school. You are encouraged to read the second "Details" level if your background in ecology/ecosystems is weak.

Task #7

The AP Environmental Science exam will have some mathematical calculations in the multiple choice section, and one of the free response questions always involves mathematical calculations. No calculators are allowed during the exam. Therefore, a thorough knowledge of scientific notation, metric and English systems of measurement, and basic computational skills to be performed without a calculator is necessary. Review the information below and complete the problems to be turned in the first day of class. Also, expect a quiz on the metric system, percentages, units (conversion factors will be supplied to you if needed on the quiz) and scientific notation during the first week of school to be done without a calculator.

Task #8

Online video resources.
a. Bozeman AP Environmental Science at http://www.bozemanscience.com/ap-environmental-science/ **- watch the FIRST 2 videos** and take notes. Also make a list of the videos available in the notes, it is optional to watch additional videos.

b. Watch the video "Emerging Science: Ecological Economics" at http://video.vpt.org/video/1409029473/ - watch the video and take notes.

c. Watch the TED Talk "Pavan Sukhdev: Put a value on nature" at http://www.ted.com/talks/pavan_sukhdev_what_s_the_price_of_nature.html - watch the video and take notes.

d. Crash Course Ecology at https://www.khanacademy.org/partner-content/crash-course1/partner-topic-crash-course-bio-ecology#cc-ecology —make a list of the videos available in the notes, it is optional to watch the ones you are most interested in.

<h1 style="color:red; text-align:center">Prerequisite Basic Mathematical Skills</h1>

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 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
Rise Y_2-Y_1 slope change y=mx+b dX
Run X_2-X_1 time 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 miles per hour. The word 'per' means to divide, so miles per gallon is actually the number of 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 notation 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
- Online tutorial: http://www.chem.tamu.edu/class/fyp/mathrev/mr-scnot.html
Ex. $9x10_6$ / $3x10_2$ = (9/3) x $10_{(6-2)}$ = 3 x 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}

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
On each flash card, write a definition and sentence/example for each the following vocabulary terms in the context of environmental science.

environment
environmental science
ecology
ecosystem
environmentalism
sustainability
natural capital
natural resources
nutrient cycling
per capita
resource
conservation
sustainable yield
environmental degradation
tragedy of the commons
pollution
point source
nonpoint source
output pollution control
input pollution control
poverty
environmental ethics
inductive reasoning

deductive reasoning
paradigm shift
pH
organic compounds
acidity
inorganic compounds
nuclear fission
law of conservation of matter
first law of thermodynamics
second law of thermodynamics
positive feedback loop
negative feedback loop
tipping point
synergy
ecology
species
population
community
genetic diversity
habitat
ecosystem

biosphere
geospher
e biome
natural greenhouse
effect abiotic
biotic
range of
tolerance limiting
factor trophic
level
formula for
photosynthesis formula
for respiration anaerobic
respiration detritivore
omnivore
decompose
r food web
food chain
biomass
ecological efficiency
net primary
productivity
transpiration
aquifer

Math Problems to be turned in the first day of class.

Answer the questions. Use a separate sheet of paper to show all work.

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

2) A population of deer had 325 individuals. If the population grows by 16% in one year, how many deer will there be the next year?

3) One year I had 124 AP Environmental Science students and the next year I had 87 Environmental Science students. What percentage did the population of APES students decrease by (round to the nearest tenth)?

4) Electricity costs 7 cents per kilowatt hour. In one month one home uses 1.8 megawatt hours of electricity. How much will the electric bill be?

5) Your car gets 21 miles to the gallon and your friend's car gets 28 miles to the gallon. You decide to go on a road trip to the University of Virginia, which is 175 miles away. If gas costs $4 per gallon and you decide to split the gas money, how much money will each of you save in gas by driving your friend's car?

6) Virginia Beach is about 20 miles wide and 28 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) The concentration of mercury in a water supply changes from 10ppm (parts per million) to 56ppm over a ten-year period. What is the percentage change of the mercury concentration?

8) Consider a wind turbine that is rated at 1.5 MW (megawatts) per hour. This means that with sufficiently high winds, it will produce 1.5 MW or 1,500 kW (kilowatts) of power. If this wind turbine runs at its rated power of 100% of the time for a full year, how much energy would it produce in a year? Give your answer in kWh/year (kilowatt hours per year).

9) Show your work for the following multiplication and division problems. You can use a calculator to check your work, but I want to see that you understand how to solve these problems by hand. Just like on the AP exam, no credit is given if you don't show your work.
a. 75.3 x 16.9
b. 1964 x .0718
c. $5.80 \times 10{-3}$ x 2.17
d. 2362 / 71.9
e. .08 / .0094
f. 4.60×104/ .0530