# AP Environmental Science(APES) Summer Assignment

Welcome to APES at Lake Central High School!!

AP Environmental Science is a lab based course that is designed to examine ecological, biological, chemical, physical and environmental concepts and interactions. A student of this course should be familiar with local, regional and global concerns within their own environment. The objective of this summer assignment is to get you thinking environmentally and to refresh some math skills. This class is for the student that is willing to do work and challenge themselves in the process.

Please note that these assignments will be collected for a grade at the end of the ***first week*** of school. Please assemble all materials in a binder with dividers. All materials should be typed (except the math). Once school has started you will be required to use Canvas and be a part of the class. If you have questions or need any guidance, please email me at **julieshupryt@lcscmail.com**. I hope that you have an enjoyable, exciting, and educational summer! I look forward to meeting you and for some of you, seeing you again in August! We are going to have a fun and memorable time together in APES! -

*Mrs. Shupryt*

Below are the tasks you should complete this summer. All final materials should be ***typed, and assembled in order in a binder with dividers or emailed in a Google doc*** to be handed in at the end of the ***first week of school. There will be a QUIZ over the math portion.*** If you are emailing in a Google doc please send it to **julieshupryt@lcscmail.com.**

## 1. Environmental Surveys / Ecological Awareness

a. Got to: http://www.gracelinks.org/824/water-program and complete the water footprint calculator. Record how much water you use as a family and as an individual. Print your results. Submit your results to the teacher in your binder.

b. Go to: http://www.nature.org/greenliving/carboncalculator/index.htm and find your individual carbon footprint.
Print your results. Submit your results to the teacher in your binder.

c. Go to: http://www.myfootprint.org/ and find your ecological footprint. (For # 2 - use the U.S. Measurement System). This site does cost $1. If you would like to save money, go to http://footprint.wwf.org.uk/ or http://footprintnetwork.org/en/index.php/GFN/page/calculators/ and find your ecological footprint. You might have to convert your information to the metric system. Print your results. Submit your results to the teacher in your binder.

## 2. Tragedy of the Commons

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. When 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.

## 3. Brush Up Your Math Skills

Math Assignment - Please complete the following problems, showing all work. ***This assignment does not have to be typed. MUST SHOW ALL WORK! NO WORK = NO CREDIT.***

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

b. If a calorie is equivalent to 4.184 joules, how many joules are contained in that 250 kilocalorie slice of pizza?

c. A coal-fired electric power plant produces 12 million kilowatt-hours (kWh) of electricity each day. Assume that an input of 10,000 BTU's of heat is required to produce an output of one kilowatt-hour of electricity.

d. Calculate the number of BTU's of heat needed to generate the electricity produced by the power plant each day.

e. Calculate the pounds of coal consumed by the power plant each day, assuming one pound of coal yields 5,000 BTU's of heat.

f. 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?

g. What is 45% of 900?

h. Thirteen percent of a 12,000 acre forest is being logged. How many acres will be logged?

i. Home prices have dropped 5% in the past three years. An average home in Schererville three years ago was $200,000. What's the average home price now?

j. A teenager consumes 20% of her calories each day in the form of protein. If she is getting 700 calories a day from protein, how many calories is she consuming per day?

k. A natural gas power plant is 60% efficient. If one cubic meter of natural gas provides 1000 BTU of electricity. How many BTUs of waste heat were produced?

l. If 35% of a natural area is to be developed, leaving 500 acres untouched, how many acres are to be developed?

m. Calculate the percentage growth rate for a country with a population of 6 million: in a year in which it had 100,000 births,70,000 deaths, 30,000 immigrants, and 50,000 emigrants.

n. If the concentration of mercury in a water supply changes from 65 ppm to 7 ppm in a ten-year period, what is the percentage change of the mercury concentration?

o. Determine the number of seconds in one decade.

p. If there are 5280 ft. in a mile, and 3.45 miles in a league, and 0.00018 leagues per meter, how many meters would you travel if you covered 100,000 feet?

q. If there are 270,512 drams in one cubic meter and 1.55*10-5 hogsheads in a dram, how many cubic meters of water are there in 10 hogsheads?

r. Convert 9 $m^3$ to $mm^3$.

s. Convert 456 $in^2$ to $ft^2$.

t. Convert 835 $g/cm^3$ to $kg/m^3$.

u. The half life of Zn-71 is 2.4 minutes. If one had 300.0 g of parent material at the beginning, how many grams would be left after 9.6 minutes has elapsed? How many half lives has it been through?

v. Pd-100 has a half life of 3.6 days. If it has had 4 half lives, how old is the sample? What is the percent of parent and daughter material left? If it started with 3200 atoms, how much of the parent is left?

w. The half life of iodine-131 is 8.040 days. What percentage of an iodine-131 sample will remain after 40.20 days?

x. 1300 kilograms = ? milligrams
17000 millimeters = ? meters
680 hectometers = ? centimeters
6544 liters = ? milliliters
.078 kilometers = ? meters
17 grams = ? kilograms

y. Write the following numbers in scientific notation:
145,000,000,000
13 million
435 billion
.000348

135 trillion
24 thousand

z. Complete the following calculations.

$(3 \times 10^3) + (4 \times 10^3)$
$(4.67 \times 10^4) + (323 \times 10^3)$
$(1.278 \times 10^{13}) - (1.021 \times 10^{10})$
$(2.9 \times 10^{11}) - (3.7 \times 10^{13})$
$(1.32 \times 10^8) \times (2.9 \times 10^2)$
$(3.78 \times 10^3) \times (2.34 \times 10^4)$
$(3.45 \times 10^9) / (2.6 \times 10^3)$
$(1.98 \times 10^{-4}) / (1.72 \times 10^{-6})$

aa. Graphing Problem: The thickness of the annual rings indicate what type of environmental situation was occurring at the time of its development. A thin ring, usually indicates a rough period of development, lack of water, forest fires, or a major insect infestation. On the other hand, a thick ring indicates just the opposite.

| Age of the tree in years | Average thickness of the annual rings in cm. Forest A | Average thickness of the annual rings in cm. Forest B |
|---|---|---|
| 10 | 2.0 | 2.2 |
| 20 | 2.2 | 2.5 |
| 30 | 3.5 | 3.6 |
| 35 | 3.0 | 3.8 |
| 50 | 4.5 | 4.0 |
| 60 | 4.3 | 4.5 |

1. Would this be a line or a bar graph? Why? Draw the graph.
2. What is the dependent variable?
3. What is the independent variable?
4. What was the average thickness of the annual rings of 40 year old trees in Forest A?
5. Based on this data, what can you conclude about Forest A and Forest B?

bb. Ethylene is a plant hormone that causes fruit to mature. The data below concerns the amount of time it takes for fruit to mature from the time of the first application of ethylene by spraying a field of trees.

| Amount of ethylene in $ml/m^2$ | Wine sap Apples: Days to Maturity | Golden Apples: Days to Maturity | Gala Apples: Days to Maturity |
|---|---|---|---|
| 10 | 14 | 14 | 15 |
| 15 | 12 | 12 | 13 |
| 20 | 11 | 9 | 10 |
| 25 | 10 | 7 | 9 |
| 30 | 8 | 7 | 8 |
| 35 | 8 | 7 | 7 |

1. Would this be a line or a bar graph? Why? Draw the graph.
2. What is the dependent variable?
3. What is the independent variable?
4. What conclusion could you discern about ethylene and its effect on trees from the data?

## 4. Think Global: Watch THREE Environmental Documentaries

Documentaries must be a minimum of 45 minutes in length. *Documentaries should look at Environmental ISSUES, not just nature.* Please complete the following for ***EACH*** documentary.

a. Provide the name of the documentary and year in which it was released.
b. Describe any questions you may have as a result of your viewing (3 Questions Minimum)
c. Describe your opinion of the documentary – positive/negative/neutral. Reference items in the documentary to support your thoughts. (Minimum 1 paragraph)
d. Relate what you have learned to your personal life – how does it affect/impact you? What information affected you the most? Will it impact how you live your life? (Minimum 1 paragraph)
e. Choose one documentary and design a unique movie poster and slogan for it. Your movie poster should be colorful, neat, and include a slogan that identifies the take home message of the film. Then justify and defend your poster /slogan (Minimum 1 paragraph)

*****Suggested Documentaries - many can be found on NetFlix, Amazon Instant Video, at your local library, or some even stream on the web, for example: http://www.youtube.com, below is a list to help you get started:

* National Geographic: Human Footprint
* National Geographic: Six Degrees Could Change the World
* Flow: For the Love of Water
* Trashed
* King Corn
* Who Killed the Electric Car / Revenge of the Electric Car
* Manufactured Landscapes
* Vanishing of the Bees
* Blue Gold: World Water Wars
* World in Balance: The Population Paradox
* Plastic Planet
* Planet in Peril
* An Inconvenient Truth
* Empty Oceans, Empty Nets (PBS)
* Harvest of Fear (Frontline)
* Hawaii: Message in the Waves
* Cane Toads: An Unnatural History
*The Human Experiment
*180° South
* Tapped
* Food, Inc.
* Dirt
* Gasland
* Fuel
* Fresh
* Bag It
* Baraka
*Cowspiracy
* The Cove
*Fresh
* True Cost