AP Environmental Science Summer Assignment

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. Please note that this assignment will be collected for a test grade on August 7th and September 7th, 2018. Any late or incomplete assignments will result in a score of ZERO. All materials should be typed. I hope that you have an enjoyable, exciting, and educational summer!

Contact information:
Jessica Carr
JCarr@Rahway.net

Due dates:

- **Sections I-IV** must be submitted onto google classroom by August 7, 2018
  - Use your Rahway email to sign into google classroom.
  - Use the + sign at the right top corner of the page.
  - Enter the AP environmental science class code to join our class. Classroom code: 3f4won

- **Section V** is due September 7, 2018. This section of the summer packet can be handwritten.

- Student who do not complete this section of the summer assignment will be removed from AP environmental science and placed into another appropriate science course.

**Integrity**
By your enrollment in this course, it appears that you are willing to challenge yourself. This is a college-level course. You are expected to complete your own work in your own words. **Plagiarism and cheating will not be tolerated and will receive a grade of ZERO.** Administrative discipline may also occur. **Simply because you worked with a partner does not mean you submit identical assignments.**
I. Experience the Natural World: Visit a natural outdoor area, go for a walk, and make some observations. Please attempt to go beyond your backyard. Here are some nearby places you could visit.

- Rutgers Gardens: [http://rutgersgardens.rutgers.edu/visitors.html](http://rutgersgardens.rutgers.edu/visitors.html)
- Watchung Reservation: [http://hikenj.net/parks/watchung-reservation/](http://hikenj.net/parks/watchung-reservation/)

On your walk, please do the following:

1. **Find a plant OR an animal IN YOUR TOWN that you have NEVER SEEN BEFORE "in the wild" and create a photo journal. This is a local assignment only. Pics you took while traveling will not receive credit.**

   a. **IF YOU CHOOSE A PLANT; YOU NEED AT LEAST 5 PHOTOS AT LEAST ONE WEEK APART:** Take at least one DIGITAL photo at least once every two weeks that has a DATE STAMP (date stamp need not appear on the photo itself, but when you upload it to your computer the file properties should list "Date Taken" (NOT only "Date Modified").

   b. **IF YOU CHOOSE AN ANIMAL:** You only need to have one good digital photo if you're going for an animal instead of a plant, but it's got to be a photo that's clear enough to be 100% sure of what you're looking at. Spend some time in your backyard or at a local park and look around. Mammals and birds will probably be hard to sneak up on to get a good photo, but if you're quick with the camera or if you set up a bird feeder and keep a close eye on it perhaps you'll have some luck. Don't forget about fish, reptiles, amphibians, and BUGS. Don't think you're going to get away with common stuff like deer, robins, squirrels, chipmunks, etc., either. If you think the animal will be too difficult - pick a plant!

   c. **For either, please describe the location. Include whether it was sunny or shady, wet or dry, the outside temperature the day you are taking the photo, what other types of plants or animals you see in the vicinity, time of day, etc. (1 paragraph)**

   d. **For either, do your best to identify the species. If you have any field guides at home, terrific! Start there. If not, try here: [http://www.backyardnature.net/i-ident.htm#b](http://www.backyardnature.net/i-ident.htm#b) If it's a plant and you're still not sure what you've got, take closeups of leaves, stem, and any flowers or fruit and/or bring a sample to the first day of class. Write down what you think it is and why.**

   e. **For either, give a brief biography of your plant or animal. You should give important details such as diet, native habitat, number of offspring, time of migration or reproduction, etc.**
II. Tragedy of the Commons:

Instructions: Go to http://bunnies.learnliberty.org/index.html and read the instructions. Play both versions of the “Bunny Game” and the “Moral of the Story” As you please both versions of the game, record your results in the tables below. When you are finished playing and reading, answer the analysis questions.

First Version: Keep track of how many bunnies you and your opponents capture in each round of the first version of the bunny game and record your results in Table 1.

Table 1

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<thead>
<tr>
<th></th>
<th># Bunnies Collected in Round 1</th>
<th># Bunnies Collected in Round 2</th>
<th># Bunnies Collected in Both Rounds*</th>
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<td>Total for All Players</td>
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* Note: The numbers in this column should equal the sum of the first two columns. It is possible that zero bunnies will be collected in some rounds of the game.

1. Did you capture any bunnies in the second round of play? Why or why not?

2. What types of incentives were present in each round of play? How did these incentives affect the game?

Second Version: Now keep track of how many bunnies you and your opponents capture in each round during the second version of the bunny game and record your results in Table 2.

Table 2

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<th></th>
<th># Bunnies Collected in Round 1</th>
<th># Bunnies Collected in Round 2</th>
<th># Bunnies Collected in Both Rounds</th>
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</thead>
<tbody>
<tr>
<td>You</td>
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<td>Opponent #1</td>
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<td>Opponent #2</td>
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<tr>
<td>Total for All Players</td>
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</table>

3. Did you capture any bunnies in the second round of play? Why or why not?

4. What is “Tragedy of the Commons”? Is the “Tragedy of the Commons” unavoidable?

5. 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 game
III. Current Events in Environmental Science (Part A and B):

The topics are as follows:

1. Human population growth
2. Non-native (invasive) species
3. Food production, food safety
4. Fossil fuels (coal, oil, natural gas)
5. Renewable resources (solar, wind, geothermal, hydroelectric, etc.)
6. Nuclear energy
7. Air quality
8. Water quality (surface or groundwater)
9. CO$_2$ and global warming
10. Recycling or another aspect of waste management (garbage)
11. Nature Conservancy, Sierra Club, World Wildlife Fund, or similar NGO (non governmental organization)
12. Overfishing, overhunting
13. Deforestation
14. Ozone depletion
15. Legislation or International Treaty dealing with an environmental issue.

A. Collect a copy of 1 article, published since January 1, 2016, relating to environmental issues found on the list of topics. (An issue involves an environmental concern, not just some interesting scientific finding.) The sources may be scientific publications, popular magazines, newspapers or the like. Try the NY Times (especially Tuesdays), National Geographic, Discover Magazine, Natural History Magazine, as well as the more scholarly Scientific American, Science, Nature, etc. You may find it more convenient to look online, but you still must indicate the source.

   a. For each, write at least 2 paragraphs, a paragraph or two summarizing the content, and a paragraph or two discussing your reaction. For example, does the article teach you something new? Does it support or refute other information you have heard or read? Are there other points of view on this issue?

   b. Attach a copy or provide a link of the article to your summary and reaction paragraphs.
B. Listen to or watch at least 1 hour of podcasts relevant to an environmental science issue on the list of topics. You may choose several from one series or mix and match. Below is a list of some of available podcasts; all of the podcasts in each series may not be about environmental science, so please choose episodes that are relevant. Also, there are many more podcasts than the ones on this list that apply - feel free to choose others. All of them are available free from the iTunes music store. If you need instructions for downloading and/or listening, please email Mrs. Carr.

List of podcasts

- TED talks are available for free online at http://www.ted.com/talks, through apps for your smartphone or tablet, and on Instant Netflix.
- 60-Second Science
- Nature Podcast
- Ecogeeks: Science Video Podcast
- Nature Stories Podcast
- NPR Climate Connections Podcast
- NPR: Environment Podcast
- NPR: Health and Science Podcast
- NPR: On Science Podcast
- Science Talk: The Podcast of Scientific American
- Science Times
- Podcast of Life
- Terra

a. For each podcast, write at least 2 paragraphs, a paragraph or two summarizing the content, and a paragraph or two discussing your reaction. For example, does the article teach you something new? Does it support or refute other information you have heard or read? Are there other points of view on this issue?

b. Attach a copy of the link or title of the podcasts you completed to your summary and reactions paragraphs.
IV. Textbook reading/questions:
Please read Chapter 1: Environmental Problems, Their Causes, and Sustainability from Living in the Environment: Principles, Connections, And Solution, Miller, G. Tyler and Scott Spoolman. Use chapter 1 to answer the following questions. Answers should be typed and in complete sentences, restating the question.

1. How does the story of the two ancient kings illustrate exponential growth?
2. What are potential problems of having the population size of Earth increase exponentially?
3. What is the difference between environmental science and environmentalism?
4. Define sustainability.
5. Explain the four components of sustainability.
6. What does it mean to live off of earth’s natural capital? Why is this important?

Section 1-2 – How Can Environmentally Sustainable Societies Grow Economically?

7. What is environmentally sustainable economic development?

Section 1-3 – How Are Our Ecological Footprints Affecting the Earth?

8. Describe 2 examples of resources that are directly available for use and 2 examples of resources that are not directly available for use.
9. Explain the difference between a renewable resource and a perpetual resource and give an example of each.
10. Explain how clear cutting tree in the rainforest is an example of environmental degradation.
11. Define the 3 types of property.
12. Explain how overfishing of yellowfin tuna is an example of tragedy of the commons. What are some solutions to this problem?
13. What are some ways to extend supplies of nonrenewable resources? Give some examples of how you practice these methods in your daily life.
14. When you compare China and the United States, why do you think China’s per capita ecological footprint is so much less than the United States?
15. Describe the 3 major cultural changes that have occurred in the history of humans. How does this relate the idea of sustainability?

Section 1-4 – What Is Pollution and What Can We Do about It?

16. What is the difference between point and nonpoint source pollution? Give an example of each.
17. What are the 3 effects of pollution?
18. What are the 3 problems associated with output pollution control?
19. What is the suggested alternative method to reducing pollution? Explain that method.

Section 1-5 – Why Do We Have Environmental Problems?

20. Identify the 5 major causes of environmental problems.
21. As you look at figure 1-13, which two factors do you think are most harmful? Why?
22. Describe one harmful and one beneficial effect of affluence. How does this make you feel being an American?
23. Compare and contrast the 3 environmental worldviews. Which do you agree most with and why?
24. Explain how Chattanooga, Tennessee used social capital to reform the city.
25. Describe the 4 scientific principles of sustainability. How could these 4 principles lead to a sustainability revolution?
V. Math skills:
The APES Examination will require you to do mathematical calculations. Occasionally these calculations may be somewhat esoteric, and you may find it possible to do them in your head; nonetheless, it is mandatory to show all work for all calculations on the free-response section of the APES exam. This worksheet is designed help to prepare you for the type of calculations you may encounter on this year’s APES exam. Expect a math skills test the first full day of school. Calculators will not be allowed to be used during the test.

For each problem show every step of your work, and indicate the cancellation of all units…No Calculators!!

Scientific Notation—All APES students should be able to work comfortably with numbers in scientific notation.

Place the following numbers into scientific notation. No Calculators!!

1) one billion  4) twenty three thousand

2) 70 trillion  5) three hundred

3) 0.00025  6) 7,310,000

Perform the following calculations in scientific notation. No Calculators!!

7) five hundred billion times thirty five thousand

8) six thousand divided by 300 billion

9) $3.4 \times 10^2$

$1.7 \times 10^5$
10) $1.0 \times 10^5$
   
   $2.0 \times 10^3$

11) $(3.5 \times 10^{-2})(2.0 \times 10^{-5})$

12) $(1.11 \times 10^{-5})(6.0 \times 10^9)$

**Metric Conversions**—All APES students should be comfortable converting between common metric prefixes. Below are common prefixes, and the number of base units each represents. For example, 1 teraWatt = $10^9$ Watts; 1 millimeter = $10^{-3}$ meters

\[ n = \text{nano} = 10^{-9} \quad u = \text{micro} = 10^{-6} \quad m = \text{milli} = 10^{-3} \]

\[ k = \text{kilo} = 10^3 \quad M = \text{mega} = 10^6 \quad T = \text{Tera} = 10^9 \quad G = \text{Giga} = 10^{12} \]

13) 2.8 mm = ____________ m

14) 1.3 nm = ____________ m

15) 300 mg = ____________ g

16) 12 g = ____________ ng

17) 250 mL = ____________ L

18) 400 GW = ____________ W

19) $5 \times 10^4$ kg = ____________ Mg
**Unit conversions**—All APES students should be able to convert from one system of units to another

*Use the information below to complete the following. Show all of your work including the canceling of all units. No Calculators!!*

1 mi<sup>2</sup> = 640 acres  
1 L = 0.264 gallons  
BTU = 8.6 x 10<sup>5</sup> calories

1 acre = 0.405 hectares  
1 kilowatt-hour = 3.4 x 10<sup>4</sup>  
1 metric ton = 1 x 10<sup>3</sup> kg

1 barrel oil = 42 gallons

20) A 100 square mile area of national forest is how many acres? how many hectares?

21) A city that uses ten billion BTUs of energy each month is using how many kilowatt-hours of energy?

22) Fifty eight thousand kilograms of solid waste is equivalent to how many metric tons?

**Percentages**—All APES students should be able to work comfortably with percentages.

\[
\text{%Change} = \frac{\text{Final} - \text{Initial}}{\text{Initial}} \times 100
\]

23) 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.

24) If the concentration of mercury in a water supply changes from 65 parts per million (ppm) to 7 ppm in a ten-year period, what is the percentage change of the mercury concentration? How much per year?
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*See packet

Score: