**AP Environmental Summer Assignment 2017**

Welcome to APES! I am very happy that you have decided to take this course and embark on what I hope will be an exciting, beneficial and relevant educational journey. APES combines content area from biology, chemistry, earth science, physics, math and social studies. Your summer assignment is to perform several tasks to help you prepare for a successful year and get you thinking about our world and how humans affect it. You are expected to enter the course with a good understanding of basic science and math concepts, so one goal of this assignment is to help you brush up on these, as we will be building upon and referencing these throughout the year. You are also required to get outside and explore and contemplate our beautiful world. Please print out these 7 assignment pages. If you have questions, please feel free to email me at [rogersla@fultonschools.org](mailto:rogersla@fultonschools.org). I will be checking my email (somewhat) regularly. Please don’t leave this all until the few days before school begins - don’t be the “pro” in procrastinator! Have a fun summer and I look forward to an exciting year of APES!

Cheers! Mrs. Rogers

This summer assignment consists of the following parts which are presented on these 7 pages:

1. **Introductory email**: Email me, Mrs. Laurie Rogers, at [rogersla@fultonschools.org](mailto:rogersla@fultonschools.org) by Wed. 8/02/17 and tell me your name, something you love about nature, why you are taking APES, and a specific goal you have for the class.
2. **Prerequisite Basic Scientific Concepts review**: Work is due first day of class. You are responsible for knowing this. We will have a concepts assessment on Friday of the first week.
3. **Math Review Problems**: Work is due first day of class. Basic math skills (**without** the use of a calculator – oh no!) are a requirement for APES. Sharpen up your math skills and complete the math questions without using a calculator, as you will not be allowed to use a calculator for the exam, and thus during the class! **Show all work**. An AP Environmental Science Math Review is also posted for your reference if you have forgotten how to do some calculations. Be prepared for a math assessment on Friday of the first week. Answers will be posted in Room 132.
4. **“Get outside yourself”ie!** (Thank you REI). Explore the great outdoors photo assignment! Due 2nd day back.

**Part 2. Prerequisite Basic Scientific Concepts:**

You should be familiar with the following terms/concepts from biology, chemistry and earth science. Create a set of flash cards or a definitions list that you will turn in. There will be an assessment on this on Friday of the first week.

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| Matter | Radioactive decay | Photosynthesis |
| Elements | Fission vs Fusion | Cellular respiration |
| Compounds | Half-life | Aerobic vs anaerobic |
| Atoms | Law of Conservation of Matter | Adaptation |
| Protons, neutrons, electrons | 1st Law of Thermodynamics | Mutation |
| Atomic number vs Mass number | 2nd Law of Thermodynamics | Biodiversity |
| Isotopes | Eukaryotic vs prokaryotic | Extinction |
| Ion | Gene | Atmosphere/lithosphere/hydrosphere |
| pH | Trait | Plate tectonics |
| Organic vs Inorganic compounds | Chromosome | Weathering |
| Hydrocarbons | Species | Climate vs weather |
| Physical vs chemical change | Population | watershed |
| Concentration | Community | Climate change |
| Natural vs Synthetic | Ecosystem | Rocks vs minerals |
| Kinetic vs Potential energy | Producers/autotrophs | Biomes |
| Biogeochemical cycles | Consumers/heterotrophs | deforestation |
| Environmental science | Decomposers | Pollution |
| Keystone species | Invasive species | Sustainability |

You should also know the names of the following chemical compounds and elements:

CO2, CO, C6H12O6, CH4, H2, H2O, N2, NOx, NH3, NO3-, O2, O3, P, PO43-, S, SO2, Cl, K, NaCl, Pb, Hg, Rn, U, CFC

**Part 3. Math Review (no calculators!):**

Work the following 50 practice problems on a separate sheet, and remember to show all your work, including units, and **DO NOT USE YOUR CALCULATOR**!! Resist temptation, you can do it! If you need to refresh your memory on how to do these problems, please refer to the handout “AP Environmental Science Math Review” or “APES Math review (Area and Volume conversions)” posted on this website. Topics: Decimals, Averages, Percentages, Scientific Notation, Metric, Temperature conversions, Dimensional Analysis, Graphing & Graph Analysis

**Back to Basics:**

1. 1.678 + 2.456 =
2. 344.598 + 276.9 =
3. 45.937 – 13.43 =
4. 90.3 – 32.679 =
5. 324.45 x 98.4 =
6. 1256.93 x 12.38 =
7. 64.5 / 5 =
8. 114.54 / 34.5 =
9. Find the average of the following numbers: 11, 12, 13, 14, 15, 23, and 29
10. Find the average of the following numbers: 124, 456, 788, and 343
11. Find the average of the following numbers: 4.56, .0078, 23.45, and .9872

**Percentages**

1. Thirteen percent of a 12,000 acre forest is being logged. How many acres will be logged?
2. A water heater tank holds 280 gallons. Two percent of the water is lost as steam. How many gallons remain to be used?
3. 14,000 acres of a 40,000 acre forest burned in a forest fire. What percentage of the forest was damaged?
4. You have driven the first 150 miles of a 2000 mile trip. What percentage of the trip have you traveled?
5. Home prices have dropped 5% in the past three years. An average home in Indianapolis three years ago was $130,000. What’s the average home price now?
6. The Greenland Ice Sheet contains 2,850,000 cubic kilometers of ice. It is melting at a rate of .006% per year. How many cubic kilometers are lost each year?
7. 235 acres, or 15%, of a forest is being logged. How large is the forest?
8. Calculate the percentage growth for a county with a population of 6 million in a year in which it had 100,000 births, 70,000 deaths, 30,000 immigrants and 40,000 emigrants.
9. A coal fired power plant is 35% efficient. If one ton of coal contains 20 million Btu of energy, then how many Btu of waste heat are produced per ton of coal?
10. If the concentration of iron in a water supply changes from 45ppm to 8 ppm in a ten-year period, what is the annual percent change of the iron concentration?
11. If 25% of a natural area is to be developed, leaving 750 acres untouched, how many acres are to be developed?

**Metric Conversions**

***Common Metric prefixes:***

*µ (Micro) = 1/1,000,000 = 10 -6 m (milli) = 1/1000 = 10 -3 c (centi) = 1/100= 10 -2  k (kilo) = 1000 = 103*

*M (mega) = 1,000,000 = 106 G (giga) = 1,000,000,000 = 109 T(tera) = 1,000,000,000,000 = 1012*

*ppm = parts per million ppb = parts per billion*

1. 1200 kilograms = ? milligrams
2. 2.3 Gbyte = ? Mbyte
3. 6544 liters = ? milliliters
4. .078 kilometers = ? meters
5. 17 milligrams = ? kilograms

**Temperature Conversions**: Formulas:°C = 5/9 (°F – 32) and °F = (°C x 9/5) + 32

1. a) 85°F = \_\_ °C b) 15 °C =\_\_\_ °F c) -35 °C = \_\_\_ °F

**Scientific Notation**

*Write the following numbers in scientific notation:*

1. 145,000,000,000
2. .000348
3. 135 trillion
4. 1 millionth

*Complete the following calculations:*

1. (3 x 103)+ (4 x 103)
2. (7.89 x 10-6 )+ (2.35 x 10-8)
3. (9.85 x 104) – (6.35 x 104)
4. (2.9 x 1011) – (3.7 x 1013)
5. (1.32 x 108) X (2.34 x 104)
6. 3.78 x 103 ) X (2.9 x 102)
7. three million times eighteen thousand
8. one thousandth of seven thousand
9. (3.45 x 109) / (2.6 x 103)
10. (1.98 x 10-4)/ (1.72 x 10-6)

**Dimensional Analysis (remember this??☺)**

*Handy Conversion factors:*

*1 square mile = 640 acres 1 hectare (Ha) = 2.47 acres 1 kw-hr = 3,413 BTUs*

*1 barrel of oil = 159 liters 1 metric ton = 1000 kg 1 inch = 2.54 cm 1 mile= 1.6 km or 5280 feet*

*1 pound = 16 oz or 454 grams 1 kg = ton = 2000 lbs 1 liter = 1.057 quart 1 mL = 1 cm3*

1. 134 miles = ? inches
2. 8.9 x 105  ounces = ? tons
3. 1.35 kilometers per second = ? miles per hour
4. A city that uses ten billion BTUs of energy each month is using how many kilowatt-hours of energy?
5. A 340 million square mile forest is how many hectares?
6. The total amount of freshwater on earth is estimated to be 3.7 x 108 km3. What is the volume in L?
7. Your car gets 15 miles per gallon, and your friend’s car gets 25 mpg. If you go on a 200 mile road trip in your friend’s car, and gas costs $2.50 per gallon, how much money will you save in gas by using your friend’s car instead of your car?
8. If one barrel of crude oil provides six million BTUs of energy, how many BTUs will one liter of crude oil provide?
9. Fifty eight thousand kilograms of solid waste is equivalent to how many metric tons?
10. Sapelo Island, off the coast of Georgia, is 16500 acres in size. If one inch of rain falls on the island, how many cubic feet of rain fell on the island?
11. Your house is 1000.0 sq ft, and you have a natural gas furnace. 60,000. BTUs of heat per square foot are required to heat your house for one winter season. A) How many BTUs of energy will be needed? B) If one cubic foot of natural gas supplies 1,000. BTUs of heat, how many cubic feet of natural gas will be needed for this one winter season?
12. Suppose my car gets 32 miles to the gallon of gas and I drive approximately 15,000 miles per year. How many gallons of gas do I use in a year? If one gallon of gasoline emits 20 pounds of CO2, when burned in the internal combustion engine of my car, how much CO2 does my car emit each year?

# Graphing Practice

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| **pH of water** | **Number of tadpoles** |
| **8.0** | **45** |
| **7.5** | **69** |
| **7.0** | **78** |
| **6.5** | **88** |
| **6.0** | **43** |
| **5.5** | **23** |

1. Make a line graph of the data, on graph paper.
2. What is the dependent variable?
3. What is the independent variable?
4. What is the average number of tadpoles per sample?
5. What is the optimum water pH for tadpole development?
6. Between what two pH readings is there the greatest change in tadpole number?
7. How many tadpoles would we expect to find in water with a pH reading of 5.0?

**Graph Analysis Practice**

*Answer each question regarding the graphs which follow below.*

1. Identify the graph that matches each of the following stories:

a. I had just left home when I realized I had forgotten my books so I went back to pick them up.

b. Things went fine until I had a flat tire.

c. I started out calmly, but sped up when I realized I was going to be late.

2. The graph #2 represents the typical day of a teenager. Answer these questions:

a. What percent of the day is spent watching TV?

b. How many hours are spent sleeping?

c. What activity takes up the least amount of time?

d. What activity takes up a quarter of the day?

e. What two activities take up 50% of the day?

f. What two activities take up 25% of the day?

3. Answer these questions about graph #3:

a. How many sets of data are represented?

b. On approximately what calendar date does the graph begin?

c. In what month does the graph reach its highest point?

4. Answer these questions about graph #4:

a. How many total miles did the car travel?

b. What was the average speed of the car for the trip?

c. Describe the motion of the car between hours 5 and 12?

d. What direction is represented by line CD?

e. How many miles were traveled in the first two hours of the trip?

f. Which line represents the fastest speed?

5. Answer these questions about graph #5:

a. What is the dependent variable on this graph?

b. Does the price per bushel always increase with demand?

c. What is the demand when the price is 5$ per bushel?

6. Answer these questions about graph #6:

a. What is the total freshman enrollment of the college?

b. What percent of the students are majoring in physics?

c. How many students are majoring in economics?

d. How many more students major in poly sci than in psych?

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| --- | --- | --- |
| [[Problem 1](https://d1zqayhc1yz6oo.cloudfront.net/19713ef65a8d08658a0e269f5b658550.png)](https://d1zqayhc1yz6oo.cloudfront.net/19713ef65a8d08658a0e269f5b658550.png) | [[Problem 2](https://d1zqayhc1yz6oo.cloudfront.net/c136a304d61ef924d3c3fa05de5fbe7a.png)](https://d1zqayhc1yz6oo.cloudfront.net/c136a304d61ef924d3c3fa05de5fbe7a.png) | [[Problem 3](https://d1zqayhc1yz6oo.cloudfront.net/18d3ab0a2d933aff14c69af5d72a07f3.png)](https://d1zqayhc1yz6oo.cloudfront.net/18d3ab0a2d933aff14c69af5d72a07f3.png) |
| Graph # 1  Use this graph to answer problem 1 above. | Graph #2  Use this graph to answer problem 2 above. | Graph #3  Use this graph to answer problem 3 above. |
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| [[Problem 4](https://d1zqayhc1yz6oo.cloudfront.net/ece01aa2f44e891dbeda0c547212b16e.png)](https://d1zqayhc1yz6oo.cloudfront.net/ece01aa2f44e891dbeda0c547212b16e.png) | [[Problem 5](https://d1zqayhc1yz6oo.cloudfront.net/a783ad873362e781964bddb02e2da844.png)](https://d1zqayhc1yz6oo.cloudfront.net/a783ad873362e781964bddb02e2da844.png) | [[Problem 6](https://d1zqayhc1yz6oo.cloudfront.net/d576136dfa180578342ca5775482b12a.png)](https://d1zqayhc1yz6oo.cloudfront.net/d576136dfa180578342ca5775482b12a.png) |
| Graph #4  Use this graph to answer problem 4 above. | Graph #5  Use this graph to answer problem 5 above. | Graph #6  Use this graph to answer problem 6 above. |

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**Part 4. Get outside “yourself-ie! (This is due the 2nd day back)**

Get out and enjoy the glorious summer weather and explore our beautiful natural world!

1. Please visit **at least one park** (local, state or national), take a picture of yourself at the park, and write 4 paragraphs reflecting on your visit, describing and providing information about the park, its history, the flora and fauna, what you observed, visible signs of the impact of humans on the park, and your overall impressions. (You may need to do some research).

2) Additionally, throughout the summer, you are to take a few creative photos to document your environmental experiences! To confirm your presence, **submit 8 photos** with either yourself in it, or, if that’s not feasible, a picture that includes **our friend Mr. Apes** (see below). Cut out the ape picture and keep it in your wallet so you are always ready to snap a photo. Each picture must represent ONE of the categories below (no duplicates!). Images must be interesting, clear, high quality, well-composed, unenhanced and original! Your product will be a digital presentation of your images (PowerPoint or other form of your choice).

For each photo, provide:

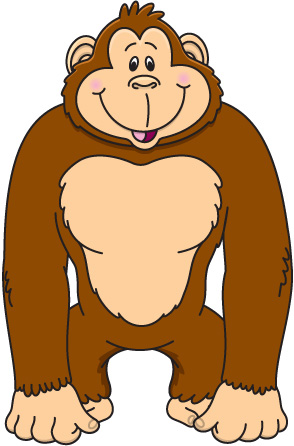
* Date
* Location
* Category (see below)
* Identification and description of item(s) in photo (you may need to do some research)
* Details about the category your photo represents (you may need to do some research)
* What you found interesting about this scene

Be creative and have fun.

**Suggested Photo Categories:**

|  |  |
| --- | --- |
| Lithosphere (name of rock outcrop/geological form) | Food production (agriculture, livestock, etc.) |
| Hydrosphere (name and type of water body) | Energy sources: Renewable or Non-renewable |
| Atmosphere (name of cloud type, etc.) | A different biome (if you happen to be traveling) |
| Endangered or invasive species | Waste disposal |
| Ecosystem (identify specific trees, plants, wildflower ) | Recycle or reuse (an innovative idea seen outdoors) |
| Wildlife | Beauty of nature (flora or fauna, & why it’s beautiful to you) |
| Human populations, demographics, poverty | Biogeochemical cycles |
| Forestry, Mining, Fishery | Signs of Climate Change |
| Biodiversity | Affluenza or scarcity |

Print and cut out the picture of Mr. Apes below (if you wish to include him in your photos)

[](http://www.google.com/url?sa=i&rct=j&q=&esrc=s&source=images&cd=&cad=rja&uact=8&ved=0ahUKEwjr5Y7w2vHMAhWFTCYKHTDwBvsQjRwIBw&url=http://www.clipartpanda.com/categories/ape-clipart&psig=AFQjCNH1LLPrjPe8gGiW6p2VWo9pTPwUug&ust=1464144875140302)