



AP Environmental Science Summer Work Instructions

Hello APES students! Glad you are here, and welcome to the start of our coverage of environmental science. Given APES is a college level course, and the goal is preparation for the AP exam in May, the bar is high for me, you and your peers. The volume of material, combined with the number of minutes we have in class together, make it impossible for us to cover all of the topics thoroughly, thus the need to cover material quickly during the year, and get a head start with this summer assignment. Much of your success in the class is built on your ability to work independently, so our summer work is to do just that, and complete the assignments listed below.

You have 3 assignments to complete, which are due by **midnight on Sunday, August 29**, the day before classes start. Answers are to be handwritten, written on notebook paper or on hard copy print outs, and shared with me (cbright@ves.org) via Google Docs (not OnCampus). Typed answers will not be accepted. Use whatever scan app is easiest for you. If you're looking for an app, ScanPro is easy to use.

Assignment #1 – Biology Review.

Assignment #2 – Math Review.

Assignment #3 – Chemistry Review.

Plan ahead. Depending on your background and mastery of the subjects covered in the assignments, time for completion for each assignment is 1 – 2 hours. After a brief review of the material, we will have a quiz on this material around 1 week into the semester.

Thanks, have a great summer, and let me know if you have any questions.

Mr. Bright

Scientific Process Skills

1. Provide an example of quantitative data.
2. Provide an example of qualitative data.
3. Design a simple experiment and identify the independent variable, dependent variable(s), control variables, as well as control group and experimental groups.
4. When graphing data, which variable is graphed on the X axis? The Y axis?

Ecology

5. List the levels of Ecological organization from most specific to broadest.
6. Provide 3 examples of abiotic factors and 3 examples of biotic factors.
7. What is the difference between habitat and niche?
8. Define symbiosis.
 - a. Describe the 3 types of symbiosis.
 - b. Provide examples of each.
9. Define and give examples of predation and competition.
10. Construct a food chain. Label: producer, consumer, primary consumer, secondary consumer, 1st trophic level, 2nd trophic level, 3rd trophic level.
11. Describe the rule of 10.
12. What is biomass?
13. The law of conservation of energy states that _____.
14. Describe the steps in Primary Land Succession; and Secondary Land Succession.
15. What is the primary energy source for ALL living things?
16. Draw an exponential growth curve and a logistic growth curve.
17. What happens to a population as it reaches carrying capacity?
18. What is the effect of birth rate, death rate, emigration, and immigration on a population?
19. What is the widespread effect of CFCs in the atmosphere? Explain how this occurs.
20. What is the widespread effect of CO₂ in the atmosphere? Explain how this occurs.
21. What law is responsible for limiting the production of CFCs? What law is responsible for limiting CO₂?

Cell Energy

22. What is photosynthesis? Equation? Occurs where?
23. Why is photosynthesis important to all living things?
24. What is cellular respiration? Equation? Occurs where?
25. Why is cellular respiration important to all living things?

Measurement/Lab Skills/Atomic Structure/Matter

1. What piece of equipment is used to measure mass? In what unit is this mass reported?
2. What piece of equipment is used to ACCURATELY measure volume? In what unit is this volume reported?
3. What is the value of percent error determined using data—what is the formula?

Nomenclature

Compound Name	Chemical Formula	Compound Name	Chemical Formula
butane		Ozone	
nitric acid		Sulfate	
methane		Nitrite	
chlorofluorocarbon		Nitrate	
sulfuric acid		Ammonia	
carbon tetrafluoride			

Acids & Bases

4. Identify two properties of an acid and two properties of a base.
5. Acids have a pH range from _____, with _____ being the strongest. Bases have a pH range from _____, with _____ being the strongest.
6. What is a neutralization reaction?
7. How many times stronger is a pH of 3 than a pH of 4?

APES Math Review Concepts

1. **PERCENTAGE:** Percentage is a measure of the part of the whole.

Example 1: 15 million is what percent of the United States population of approximately 300 million?
 $15 \text{ million} / 300 \text{ million} = 0.05 \times 100 = 5\%$

Example 2: What is 20% of a \$15 restaurant bill?

$$20\% = 20/100 = 0.20$$

$$0.20 \times \$15 = \$3.$$

2. **RATES:** Change in amount in a given time; rise/run; change/time; $\Delta Y/\Delta X$

Rates will often be expressed using the word, “per” followed by a unit of time, for example, grams per minute, liters per year. For AP Environmental science you will often have to calculate PERCENT CHANGE of a population or amount of a pollutant.

KNOW THIS EQUATION: $| (\text{Original} - \text{New}) / \text{Original} | \times 100 = \text{rate of change}$

3. SCIENTIFIC NOTATION

$$\text{Thousand} = 10^3 = 1,000$$

$$\text{Million} = 10^6 = 1,000,000 \text{ (relative to US population)}$$

$$\text{Billion} = 10^9 = 1,000,000,000 \text{ (relative to people on Earth)}$$

$$\text{Trillion} = 10^{12} = 1,000,000,000,000 \text{ (national debt)}$$

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.

- $9 \times 10^4 + 3 \times 10^2 = 900 \times 10^2 + 3 \times 10^2 = 903 \times 10^2$ or 9.03×10^4

When multiplying or dividing, multiply or divide by the number in front of the ten and add the exponents if multiplying or subtract the exponents if dividing

- $9 \times 10^6 \times 3 \times 10^2 = (9 \times 3) \times 10^{(6+2)} = 27 \times 10^8$ or 2.7×10^9
- $9 \times 10^6 / 3 \times 10^2 = (9/3) \times 10^{(6-2)} = 3 \times 10^4$

4. **DIMENSIONAL ANALYSIS:** You are expected to be able to convert between units of measure accurately. Checkout these Online tutorials assistance is available: <http://joneslhs.weebly.com/>

5. PREFIXES

$$\text{m (milli)} = 1 / 1000 = 10^{-3}$$

$$\text{c (centi)} = 1 / 100 = 10^{-2}$$

$$\text{k (kilo)} = 1000 = 10^3$$

$$\text{M (mega)} = 1,000,000 = 10^6$$

$$\text{G (giga)} = 1,000,000,000 = 10^9$$

$$\text{T (tera)} = 1,000,000,000,000 = 10^{12}$$

MATH PROBLEMS: Show all work, answer the questions.

1. What is one million times one thousand? Use scientific notation in your work and answer.
2. A deer population of 200 individuals grows by 15% in one year. How many deer will there be the next year (year 2)?
3. Last year, I had 16 APES students and this year I will have 21 APES students. By what percentage will the population of APES students increase?
4. Electricity costs \$0.06 per kilowatt hour. In one month, one home uses one megawatt hour of electricity. How much will the electric bill be?
5. Your car gets 15 miles per gallon and your friend's car averages 25 mpg. You decide to head off to Hilton Head on vacation, 281 miles away. If gas costs \$3.75/gallon and you decide to split the gas costs, how much money will you save by driving your friend's car?
6. A beach is 10 miles wide and 30 miles long. If one inch of rain falls on this beach, how many cubic feet of rain fell in this area? Hint: convert units to feet first. Show your work.
7. A hectare is a unit of square measure, and 1 hectare = 2.47 acres. Assume the VES campus is 160 acres, hence the name 'Old 160.' Convert this value to hectares. Show your work.

Chemical Equations

Research and write the chemical equations for the following processes:

Photosynthesis:

Cellular Respiration:

Burning Coal:

Burning Natural Gas:

Nitrogen Fixation (by bacteria):

Formation of Sulfuric Acid Rain:

Ocean Acidification: