Cypress Lake High School---AP Environmental Science

Ms. Chaves-Nieves

Welcome to the 2017-2018 AP Environmental Science class. I am very excited to work with each of you and get to know you over the coming year. APES is an incredibly large field of study. It is a science in the traditional sense but is also studies economics, government, laws, ethics, and societies' beliefs & opinions. It is absolutely necessary to maintain an interdisciplinary perspective in order to be successful in APES. To prepare for the course, I expect you to complete the following summer assignments. By doing this we can complete the requisite coursework prior to the AP test of Monday May 10, 2018.

Summer 2017 APES Assignment (go to CLHS website):

PREREQUISITE KNOWLEDGE AND SKILLS
You are expected to enter the course with a good understanding of basic scientific and mathematical concepts and skills as well as strong, reading, writing and speaking abilities. Although we will continue to develop these skills throughout the year, your success in the class is also dependent upon what you bring to it at the onset. Over the summer, review the scientific concepts and mathematical calculations below. We will be building upon and referencing them throughout the year. <u>You should be prepared to take an assessment on these skills and concepts during the first two weeks of school</u>.

Prerequisite Basic Scientific Concepts
You should be familiar with the following terms/concepts from Biology, Chemistry, and Earth Science:

Organic vs. Inorganic	Photosynthesis (reactants and products)
Natural vs. Synthetic	Cellular Respiration (reactants and products)
Kinetic vs. Potential Energy	Aerobic vs. Anaerobic
Radioactive decay	Adaptation
Half life	Mutation
Law of Conservation of Matter	Gene Trait
1st Law of Thermodynamics	Chromosome
2nd Law of Thermodynamics	Gene pool
Entropy	Natural Selection
Organism	Biodiversity
Species	Extinction
Population/Community	Plate Tectonics
Ecosystem	Weathering
Producers/Autotrophs	Climate Change
Consumers/Heterotrophs	Rocks vs. Minerals
Decomposers	Climate vs. Weather

The full name of each of these chemical abbreviations: CO_2, CO, $C_6H_{12}O_6$, CH_4, H_2, H_2O, N_2, NO_X, NO_3^-, NH_3, O_2, O_3, P, PO_4^{3-}, S, SO_2, Cl, K, $NaCl$, Pb, Hg, Rn, U

Prerequisite Basic Mathematical Skills (examples of concepts to review)
Percentage---Example: 17% = 17/100 = 0.17
- Remember that "percent" literally means divided by 100.
- Percentage is a measure of the part of the whole (or part divided by whole).
- 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	Y2-Y1	slope	change	y=mx+b	dX
Run	X2-X1		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 mile per hour. The word per means to divide, so miles per gallon is actually the number 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 method 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.
- 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. Ex: $9 \times 10^6 / 3 \times 10^2 = (9/3) \times 10^{(6-2)} = 3 \times 10^4$

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.chem.tamu.edu/class/fyp/mathrev/mr-da.html
     https://www.khanacademy.org/

Prefixes

Prefix	Fraction/Value	Power
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}

SAMPLE MATH PROBLEMS:

1) What is one million times one thousand? Show your work in scientific notation. Give the answer in
     A) scientific notation AND
     B) In words
2) A population of deer had 200 individuals. If the population grows by 15% in one year, how many deer will there be the next year?
3) One year I had 40 AP Environmental Science students and the next year I had 50 Environmental Science students, what percentage did the population of APES students grow by?
4) Electricity costs 6 cents per kilowatt hour. In one month one home uses one megawatt hour of electricity. How much will the electric bill be? (be sure to look at the prefixes chart on the previous page for the conversion of kilo to mega).
5) Your car gets 15 miles to the gallon and your friend's car gets 25 miles to the gallon. You decide to go on a road trip to St. Augustine Beach, which is 300 miles away. If gas costs $4 per gallon and you decide to split the gas money, how much money will you save in gas by driving your friend's car?
6) Virginia Beach is 10 miles wide and 30 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) An MP3 takes up about 16 kilobytes of memory per second of music. If you owned a one terabyte hard drive and filled it with only MP3's, how many days worth of music would you have? (keep track of units: kilobytes to terabytes and seconds to days).

Laws/Treaties:

Clean Air Act	Tobacco Control Act	Occupational Safety and Health Act
Clean Water Act	Hardrock Mining and Reclamation Act	Ocean Dumping Ban Act
Comprehensive Environmental Response, Compensation Liability Act	Kyoto Protocol	Oil Pollution Act
Consumer Product Safety Act	Law of the Sea Convention	Oil Spill Prevention and Liability Act
Convention on International Trade in Endangered Species	Marine Mammal Protection Act	Pollution Prevention Act
Emergency Planning & Community Right-To-Know Act	Marine Plastic Pollution Research and Control Act	Resource Conservation and Recovery Act
Endangered Species Act	Migratory Bird Hunting Stamp Act	Safe Drinking Water Act
Energy Policy Act	Montreal Protocol	Soil and Water Conservation Act
Federal Food, Drug, and Cosmetic Act	National Energy Act	Solid Waste Disposal Act
Federal Insecticide, Fungicide and Rodenticide Act	National Environmental Policy Act	Surface Mining Control and Reclamation Act
Federal Water Pollution Control Act	National Park Act	Toxic Substances Control Act
Fish and Wildlife Conservation Act	National Wildlife Refuge System Act	Wild and Scenic Rivers Act
Food Quality Protection Act	Nuclear Waste Policy Act	Wilderness Act