Welcome to AP Environmental Science! The major topics of the class are as follows:

Energy Systems and Resources – atmosphere, soil, groundwater, and geology
The Living World – ecosystems and cycles
Populations – demographics, dynamics and growth
Land and Water Use – agriculture, forestry, mining, fishing and global economics
Energy Resources and Consumption – fossil fuels, nuclear energy, conservation and consumption
Pollution – types of pollution and its impact, waste disposal
Global Change – ozone, global warming, loss of biodiversity

Listed below are three assignments that should be completed over the summer. Pay attention to the due dates, as they are different for each assignment. You may contact us by email kesterson.christopher@mail.fcboe.org or killingsworth.staci@mail.fcboe.org with any questions. We may be in and out of town so allow a few days to respond.

I. Prerequisite Basic Mathematical Skills

Percentage

-17% = 17/100 = .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 (300million)?
  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

$\frac{\text{Rise}}{\text{Run}}$ $\frac{Y_2-Y_1}{X_2-X_1}$ slope $\frac{\text{change}}{\text{time}}$ $\frac{\text{new-old}}{\text{old}} \times 100$

- 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.
-The last formula is used to find percent change or rate of percent change (increase or decrease).

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Scientific Notation

Thousand = 10^3 =1,000
Million = 10^6 =1,000,000
Billion = 10^9 =1,000,000,000
Trillion = 10^{12} =1,000,000,000,000
- When using very large numbers, scientific notation is often easiest to manipulate. For example, the US population is 300 million people or $300x10^6$ or $3x10^8$
- 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. $9x10^6 / 3x10^2 = (9/3) \times 10^{(6-2)} = 3 \times 10^4$

Dimensional Analysis

You should be able to convert any unit into any other unit accurately if given the conversion factor.
Online tutorials are available. Here are a few. You must know how to set up a problem using dimensional analysis. Please read through this tutorial.
http://www.chem.tamu.edu/class/fyp/mathrev/mr-da.html

Prefixes

m (milli)	=1/1000	$=10^{-3}$
c (cent)	=1/100	$=10^{-2}$
da(deka)	=1/10	$=10^1$
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	$=10^{12}$

The following math problems represent math skills you should be familiar with to be successful in AP Environmental Science. **Please work the problems on another sheet of paper, showing all your work and units. These calculations must be turned in on the first day of school. There will be no credit given if you do not show your setup and units throughout.**

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Part One: Decimals & Percentages

For questions 1-5, convert to decimals.

1. $\frac{10}{1000}$ 2. $\frac{50}{1000}$ 3. $\frac{800}{10000}$ 4. $\frac{0.9}{1000}$ 5. $\frac{100}{10000}$

For questions 6-10, convert the answers from questions 1-5 into percents

6. 7. 8. 9. 10.

Part Two: Doubling Times

To calculate how long it takes a population to double, use the equation:

DT (doubling time) = 70 / r where r is the growth rate of the population (in a percent…do not convert to a decimal). Example: The doubling time of a population with a 2% growth rate is 70/2% = 35 years.

For problems 11-15 the growth rates are given in a percent for the populations. Calculate how long it will take the population to double.

11. 2% 12. 4% 13. 8%

14. 10% 15. 0.5%

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Part Three: Energy Conversions

Energy will be tested on the AP exam. It is important that you know how to convert between kilowatts and megawatts. For this, use

1 MW (megawatt) = 1,000 kW (kilowatts)

A watt is a measure of how much power (energy) an item produces. Your electricity bill comes in kilowatts.

For problems 16-20 megawatts are given and you should convert them into kilowatts.

16. 2MW

17. 40MW

18. 10MW

19. 35MW

20. 4.5MW

Part Four: Scientific Notation

Put the following numbers into scientific notation.

21. 0.003

22. 1,530,000

23. 0.00005

Write the following numbers in standard notation (convert from scientific)

24. 1 X 10^6

25 3.5 X 10^2

26. 5.7 X 10^9

Part Five: Dimensional Analysis

Set up and solve the following equations using all units and showing all work. Conversion factors are included. Use scientific notation when appropriate.

27. There are 2.2 pounds in 1 kilogram. How many pounds in 120 kilograms?

28. There are 36 inches in one yard, how many centimeters are in one yard?

29. There are 1,000 grams in one kilogram, and 1,000 micrograms in one gram. How many micrograms are in 2,500 kilograms?

30. You have 24 light bulbs, each using 100 watts an hour. How many watts will be used in 120 hours?

31. 1,000 homes are in a city. Each home uses 200 kilowatt hours a month. How many kilowatt hours does the entire city use in a month?

32. 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 Virginia Tech, 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?

II. Laboratory Materials

Each student should bring 2 ***colorless*** 2-liter plastic bottles with labels removed completely. Do not lose the bottle caps. Each student should also bring a fist-sized insoluble rock. You may want to soak it in water to make sure it is insoluble. You may bring these items the first three days of school.

III. Shopping

Each student should order the paperback version of "The Princeton Review: AP Environmental Science Prep" 2021 Edition. ***You may have to pre-order on Amazon. Bring this to school with you as soon as you receive it. <u>You must provide a receipt the first day of school as proof of purchase.</u> We will give you a deadline to bring the book to school as the date approaches.***

https://www.amazon.com/Princeton-Review-Environmental-Science-Prep/dp/0525569545

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We are looking forward to seeing you in the fall. Have a wonderful summer.

Chris Kesterson and Staci Killingsworth

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