

AP Environmental Science

Summer Assignment 2021-2022

Dear AP Environmental Science Classes,

Welcome to AP Environmental Science (AKA: APES)! **Students who enroll in APES should be ready and willing to devote sufficient time, focus & energy to class assignments, including daily text readings, taking extensive notes in and outside of class, preparing for frequent exams and quizzes, participating in experiments, writing reports, giving oral presentations, participating in class discussions, and doing other various class assignments.**

Students who are not able or willing to devote sufficient time, focus and energy to this course should consider taking the Environmental Systems course.

The major topics of the class we will be covering this year are as follows:

- The Living World – *Ecosystems and Biogeochemical Cycles*
- Populations – *Demographics, Dynamics and Growth*
- Energy Systems and Resources – *Atmosphere, Soil, Groundwater, and Geology*
- 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 their Impacts, Waste Disposal*
- Global Change – *Ozone, Global Warming, Loss of Biodiversity*

To be better prepared, we need to do some work over the summer. The purpose of this summer assignment is to get you thinking about the environment in which we live and help prepare you for your studies in environmental science for the upcoming school year.

There are various parts to the summer assignment; all of them to be submitted the first week of school. If you have any questions about the assignments, feel free to send me an email, Victoria.taylor@yesprep.org, or a message via chat on Teams. The summer assignments will count for a significant portion of your first quarter grade. All work turned in must be your OWN work.

Assignment Overview and Checklist (full directions on following pages):

- 1. "Home" Movie and Movie Questions** (Due third day of school)
- 2. Book Reflection Paper** (Due first day of school)
- 3. Prerequisite Knowledge and Skills** (to be tested on the first week of school- nothing to be turned in for this portion but you must review and brush up on your science and math skills!)

I am looking forward to this year and meeting all of you in August! Enjoy your summer and get outside!

Best,

Ms. V. Taylor (Victoria.taylor@yesprep.org)

Assignment #1: Watch “Home” and answer questions

Movie Link: <https://www.youtube.com/watch?v=iqxENMKaeCU&feature=c4-videos->

Watch the video and answer the assignment “HOME movie questions”. Movie can be played on your phone. Questions are listed at the end of this packet. Answer questions on a separate sheet of paper, preferably college ruled line paper, titled Home Movie Assignment. Put your first and last name at the top left-hand corner of the paper.

Assignment #2: Reading Assignment

Environmental science is a broad field of study. Not only is it a science in the traditional sense of biology and chemistry, but it’s influenced by society, government, economics, laws, and ethics. If you want to succeed in APES, you’ll need to constantly embrace this inter-disciplinary perspective. The listed book below demonstrates some of the variety of environmental topics.

Your assignment is to read the book over the summer. When you finish reading it, write a summary and reflection paper that is 2-3 pages in length, typed, double-spaced and 12 pt font in word. **You will submit this assignment in Schoology. This assignment is due at the beginning of your class period on the first day of school for the 2021-22 year. If you need assistance obtaining a copy of the book, please reach out to me via email or Teams.**

This report/reflection should include:

- a. title and author
- b. the authors purpose for writing the book/overall theme of the book
- c. a summary of the book
- d. events/themes/topics you learned about in the book and found interesting
- e. what surprised you the most and what you want to learn more about
- f. something you disagree with or otherwise need to research further to evaluate
- g. how the book impacted you (perhaps relate examples to your life)
- h. would you recommend this book

APES Summer Reading Assignment Book:

The World Without Us by Alan Weisman

Barnes and Noble

Amazon

Kindle

Assignment #3: Prerequisite Knowledge and Skills (tested on first week of school)

This specific assignment will not be graded; however you should be prepared to take a quiz on the following skills and concepts during the first week of school. **If you do not get at least an 80% on this prerequisite test, you will be required to meet for FOUR tutoring sessions throughout the semester (more info at the beginning of school). This include: Basic scientific knowledge, Math Skills, and Chemistry.** Information to help you study for the prerequisite test is on the next few pages.

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.

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

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

Gene pool	Extinction	Climate Change
Natural Selection	Plate Tectonics	Rocks vs. Minerals
Biodiversity	Weathering	Climate vs. Weather

You will also need to know the full name of each of these chemical abbreviations: CO₂, CO, C₆H₁₂O₆, CH₄, H₂, H₂O, N₂, NO_x, NO³⁻, NH₃, O₂, O₃, P, PO₄³⁻, S, SO₂, Cl, K, NaCl, Pb, Hg, U

Part B: Prerequisite Basic Mathematical Skills

Sometimes these calculations are fairly simple and you can complete the problems in your head. However, the APES exam requires that you SHOW ALL WORK for credit for the calculations on the free-response questions. This worksheet is designed to assess your skills for the type of calculations you will encounter on the exam.

Read through the following information and complete the following problems on a separate piece of paper. The problems are separated into sections that represent the various types of problems and operations you need to master. I encourage you to use dimensional analysis and to refrain from using a calculator to solve these problems because you will not always be using a calculator in class. **This will NOT BE GRADED; however, there will be a test on the material the first week of school.**

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? 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

<u>Rise</u>	<u>Y₂-Y₁</u>	slope	<u>change</u>	y=mx+b	<u>dX</u>
Run	X ₂ -X ₁		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 = 10³ =1,000

Million = 10⁶ =1,000,000 (people in the US)

Billion = 10⁹ =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>

Prefixes

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}

Scientific Notation

Practice by writing the following numbers in scientific notation:

- 1) One million
- 2) Forty eight thousand
- 3) 5878300
- 4) Six hundred
- 5) 0.015
- 6) 3950
- 7) 3 one thousandths

8) 0.2220

9) 1267

10) 0.0005

Convert the following to regular notation:

1) 2.45×10^4

2) 9.1×10^2

3) 7.5469×10^4

4) 1.970×10^5

5) 8×10^1

6) 8.556×10^1

7) 1.23456×10^7

8) 5.000×10^3

9) 9.444×10^2

10) 6.08×10^3

Use Scientific Notation (and only Scientific Notation) solve the following problems:

1) $(6.235 \times 10^{-8}) \times (6.7 \times 10^2) =$

2) $(2.456 \times 10^4) \div (1.436 \times 10^{13}) =$

3) $(2.34 \times 10^{-6}) \times (3.3 \times 10^4) =$

4) $(1.45 \times 10^6) \times (2.30 \times 10^{-3}) =$

5) $(9.81 \times 10^{12}) \times (4.02 \times 10^3) =$

Significant Figures

How many significant figures are in the following numbers? What rule(s) did you use to determine the number?

1) 30

2) 66000

3) 0.4

4) 968

- 5) 9050
- 6) 0.078
- 7) 0.007040
- 8) 1.7×10^6
- 9) 20006.0
- 10) 0.007

Percentages

- 1) If 35% of a natural area is to be developed, leaving 500 acres untouched, how many acres are to be developed?
- 2) If the concentration of mercury in a water supply changes from 65 ppm to 7 ppm in a ten-year period, what is the percentage change of the mercury concentration?
- 3) Fifteen million is what percentage of the U.S. population of 300 million?
- 4) What is 20% of a \$34.80 bill so you can give a good tip?
- 5) 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.

Sample Math Problems

Be sure you are able to complete the following types of problems.

- 1) What is one million times one thousand? Show your work in scientific notation. Give the answer in scientific notation and 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) 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?

- 5) 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 mp3s, how many days' worth of music would you have? (Keep track of units: kilobytes to terabytes and seconds to days)

APES: "Home" Movie Questions

1. Describe the conditions on early Earth.
2. How has Earth changed in the last 60 years since the use of oil has become more widespread?
3. What is most of the grain in the US used for?
4. What led to the dramatic decline in the biodiversity of agricultural crop species?
5. How many kilos of water does it take to produce 1 kilo of beef?
6. How have cars shaped the way housing is laid out in the US and other developed countries?
7. How much has the volume of international trade increased since 1950?
8. What are your thoughts on how the video portrays Dubai? Is it self-sustainable?
9. Rainforests are cut down to make farmland for which products/crops?
10. What makes the growth of Lagos different from how most other cities grow?
11. Where does the water from Greenland's melting ice sheet go?
12. Why are the glaciers of mountains so important for the people in the lowlands?
13. What hope does the video offer at the end?

This video project covers many topics that we will discuss in APES this year. Give **three specific examples** that are portrayed in the video **about each of the APES concepts** that are listed below:

All living things are linked

- 1.
- 2.
- 3.

Developed vs. Developing Countries

- 1.
- 2.
- 3.

Human Innovation and Technology

- 1.
- 2.
- 3.

The Carbon cycle

- 1.
- 2.
- 3.

Climatic Balance

- 1.
- 2.
- 3.

Shortage of Resources

- 1.
- 2.
- 3.

After watching the film, what topics are you most looking forward to learning about this year? What questions do you have?