AP Environmental Science Summer Assignment
2018-2019 School Year

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Name_____

Home (2009 Documentary)

Visit https://www.youtube.com/watch?v=jqxENMKaeCU to watch the 2009 Documentary *Home* on YouTube. Please complete the following questions. All answers should be thoroughly completed on your own notebook paper for numbers 1 through 14 and 21 through 25. You may answer the others on this paper and staple the completed assignment together.

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

This film covers many topics that we will discuss in AP Environmental Science (APES) this year. Give two specific examples that are portrayed in the film about each of the APES concepts listed below:

15. All living things are linked
    1.
    2.

16. Developed vs. Developing Countries
    1.
    2.

17. Human Innovation and Technology (next page)

1.
2.

18. The Carbon Cycle
    1.
    2.
19. Climactic Balance
    1.
    2.

20. Shortage of Resources
    1.
    2.

21. After watching the film, what topics are you most looking forward to learning about in APES? What questions do you have?

22. What did you think of the movie?

23. How does the movie end? Why do you think the filmmaker YannArthus-Bertrand finishes his film this way?

24. What conclusion(s) do you think the filmmaker YannArthus-Bertrand want us to reach?

25. If you had to give the film an alternate title, what would you name it?

APES SCAVENGER HUNT

To be completed before the beginning of class

Directions: Find the items in the following scavenger hunt list. Proof should be obtained digitally in photograph format and compiled into a Google slides slideshow. This compilation will be shown in class during the first week for a grade. I promise to present the same presentation to you on my own scavenger hunt!

To prove it was you who did the work, each of you MUST APPEAR IN EACH PHOTO: you, the item on the list, and a cutout of the waving ape on the next page. The ape is great to carry in your wallet or purse during your summer adventures!

Lastly, give each photo a caption, which identified the item on the list and gives an explanation or connection to an environmental science topic. You might have to do some online research and reading to connect your items to the field of environmental science.

1. An herbivore eating a producer
2. Growing crops
3. An organic food item in the grocery store
4. A genetically modified food item
5. 3 pieces of litter from a public place
6. A product made from recycled materials
7. A renewable energy source
8. A source of freshwater
9. A nonprofit or point source of pollution
10. Decomposition
11. Reuse of potential waste
12. Fossil fuel production, processing, or use
13. A human less than 5 years old
14. A worker in an environmentally related profession
15. Farm raised fish
16. A mineral that came from a mine
17. An electric or hybrid car in use (it may be parked but do not use a dealership parking lot)
18. An environmentally positive sight (something you think is helping the environment)
19. A source of air pollution that is NOT an automobile
20. An endangered species

Prerequisite Knowledge and Skills (tested on first week of school)
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 class, 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. This specific assignment will not be graded; however, you should be prepared to take a quiz on these skills and concepts during the first week of school.

This includes two parts: Basic scientific knowledge and Math Skills. Information to help you to study for this test is on the next few pages.

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

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

You also will need to know the full name of each of these chemical abbreviations: CO_2, CO, $C_6H_{12}O6$, CH_4, H_2, H_20, N_2, NO_x, NO^3, NH_3, O_2, O_3, P, $PO_4{}^3S$, SO_2, Cl, K, NaCl, Pb, Hg, U

Part B: Prerequisite Basic Mathematical Skills
You also should be prepared to perform mathematical calculation WITHOUT USING A CALCULATOR. You will not be allowed to use one on the APES Examination, so unless we are crunching data from a lab, we will not be using one in class, either. 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 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

$\frac{\text{Rise}}{\text{Run}}$	$\frac{Y_2-Y_1}{X_2-X_1}$	slope	$\frac{\text{change}}{\text{time}}$	y=mx+b	$\frac{dX}{dt}$

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 $300x10_6$ 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:

http://www.chemprofessor.com/dimension_text.htm
http://www.chemtamu.edu/class/fyp/mathrev/mr-da.html

Prefixes

m (milli)	=1/1000	$=10^{-3}$
c (centi)	=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. Forty eight thousand
2. Six hundred
3. 0.015
4. 3950
5. 3 one thousandths
6. 0.2220

Convert the following to regular notation:

1. 2.45×10^{4}
2. 9.1×10^{2}
3. 8×10^{1}
4. 8.556×10^{1}
5. 1.23456×10^{7}
6. 6.08×10^{3}

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

1. $(6.235 \times 10^{8}) \times (6.7 \times 10^{2}) =$
2. $(2.34 \times 10^{-6}) \times (3.3 \times 10^{4}) =$
3. $(1.45 \times 10^{6}) \times (2.30 \times 10^{-3}) =$
4. $(9.81 \times 10^{12}) \times (4.02 \times 10^{3}) =$

Dimensional Analysis

1. 8,640 mm -> cm
2. 175 lbs -> kg
3. 33.2kg/L -> kg/mL
4. 3.8 Km/sec -> miles/year
5. A 100 square mile area of National Park is how many acres? How many hectares?
6. A factory using four million BTUs of energy each month is using how many kilowatt-hours of energy?
7. Twelve hundred metric tons of solid waste is how many kilograms?
8. The total amount of freshwater on earth is estimated to be 3.73 x 108 km^3. What is the volume in cubic meters? In liters?
9. Traveling at 70 miles/hour, how many minutes will it take to drive 175 miles to San Antonio?

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. What is 20% of a $34.80 bill so you can give a good tip?
4. 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.

Energy Problems:

1. How much energy is required to raise the temperature of 1000 gallons of water by 25 degrees C?

2. By how many degrees Fahrenheit can the temperature of one metric ton of water be raised with the addition of 110 thousand BTUs of heat?

3. How much energy, in kj, does a 75 Watt light bulb use when it is turned on for 25 minutes?

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. 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 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?

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).