Name _____

Summer Assignment for AP Environmental Science. It is important to complete this work and review it before the start of the school year. **You will have a quiz** on the material within the first two or three days of the semester. Please contact us via email if you have questions: jkenyon@wcpss.net or mschug@wcpss.net

ARTICLES: Summer assignment Part A, Read the selected pages of the following, three, world-organization, summary reports on pressing environmental issues. Answer the questions below; it is likely you will need a **separate sheet of paper.**

i) Intergovernmental Science Policy Platform on Biodiversity and Ecosystem Services (IPBES), Summary for Policy-Makers. Read pp 9 to 15 (the "background"):

https://www.ipbes.net/sites/default/files/downloads/spm_unedited_advance_for_posting_htn.pdf

Answer the following…

1) Anthropogenic drivers are having direct impacts on what? (list)

2) Discuss what is meant by an "intact" ecosystem. Research and define the term "natural mosaic."

3) Using figure 3, describe the current status of corals, amphibians, and cycads.

4) (open ended response) This report ties ecosystem services and biodiversity to human survivability rather than just describing them as having value for ethical or biocentric reasons having nothing to do with humans. Do you think that is a good approach? Why or why not?

ii) Intergovernmental Panel on Climate Change, Summary for Policy-Makers. Read pp. 17 to 32, which is about how to mitigate and adapt to anthropogenic climate change aka global warming.

https://www.ipcc.ch/site/assets/uploads/2018/02/AR5_SYR_FINAL_SPM.pdf

Answer the following…

1) List the five reasons of concern for addressing climate change

2) compare and contrast adaptation to mitigation in the context of addressing climate change

3) What does CO2 equivalent mean? Define and describe an example.

4) (open ended response) What are ways you and your family can adapt to climate change?

5) What are ways you and your family can contribute to mitigating climate change?

iii) Click on the link listed below and use the article, 'Single Use Plastics, a roadmap' to answer the questions listed. The first several pages provide background information about the development, use and reporting on plastic. Please scroll through this and refer to pages 2-25 to answer related questions.

http://plastic-pollution.org/

Answer the following…

Since the 1950's growth in plastic production has outpaced most other material; this is most evident in single use plastics.

1) Define single use plastics and list 8-10 examples used in our daily lives. Use the information provided to answer the following:

a. Identify and describe two negative environmental impacts of single use plastic
b. identify and describe two negative social impacts of single use plastics
c. identify and describe two negative economic impacts of single use plastics

2) Briefly describe EPR and where it is currently being used

3) Do you think EPR is feasible in the US why or why not?

4) Try to be cognizant about your plastic consumption over a 24-48 hour period this summer. List 12-15 single use plastic (Styrofoam) items you used during that period.

a. Identify alternatives you could have or did use for 4 or 5 of these; *i.e. I brought a reusable bag to the store.*

b. Select one of the plastic items you used and disposed of. Search on-line and create a waste stream for this item. How was it produced, what are some of the materials/energies used to produce this item, is the item necessary or are there alternatives, where does it go after you disposed of it, then what happens?

c. Americans consume more plastic per capita than any other country, we are one of the biggest contributors to plastic pollution. In your opinion what needs to happen in order for Americans to reduce our plastic consumption? **OR** identify a successful 'story' from another country regarding their reduction in plastic consumption

MATH Summer assignment Part B, Being able to do basic math is essential to this course. We will have to do math calculations in several assignments throughout the year, and we will not have time to review the basics. Go over this help sheet and complete the following problem set. Get help and do lots of practice this summer if you don't feel like you are up to speed on all of these types of math problems, otherwise your quiz grades will suffer. *Calculators are not allowed* on the APES Exam, so you will need to be comfortable doing addition, subtraction, multiplication, and division without an electronic crutch. Class activities sometimes require calculators, but you will not be able to use calculators on quizzes or tests.

Scientific Notation

Thousand = 10^3 =1,000 Watts in a kilowatt

Million = 10^6 =1,000,000 (people in the US = 310 million or 3.10 X 108)

Billion = 10^9 =1,000,000,000 (people on Earth = 7.6 billion; age of the Earth = 4.6 billion years)

Trillion = 10^{12} =1,000,000,000,000 (National debt = $17 trillion)

- When using very large numbers, scientific method makes numbers easier 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. Example: $3.10 \times 10^6 + 2.0 \times 10^8 = 3.01 \times 10^6 + 200 \times 10^6 = 203.01 \times 10^6$ 2.03×10^8

- 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* Example: $4 \times 10^6 / 2 \times 10^4 = 2 \times 10^{6-4}$ or 2×10^2

Dimensional Analysis

You should be able to convert any unit into any other unit if given the conversion factor. Online tutorials are available:

http://www.chemprofessor.com/dimension_text.htm

http://www.chem.tamu.edu/class/fyp/mathrev/mr-da.html

http://chs.mesa.k12.co.us/Departments/science/documents/APESMasteringtheMathTEACHER.pdf

Metric Prefixes

m (milli) =1/1000 =10^{-3}	M (mega) =1,000,000 =10^6
c (centi) =1/100 =10^{-2}	G (giga) =1,000,000,000 =10^9
k (kilo) =1000 =10^3	T (tera) =1,000,000,000,000 =10^{12}

Directions: Please complete the following to the best of your ability. No calculators allowed! Please round to the nearest 10th as appropriate. **YOU MUST SHOW ALL WORK TO GET FULL CREDIT!!!**

1. Convert the following numbers into scientific notation.

16, 502 = _____

0.0067 = _____

0.015 = _____

600 = _____

3950 = _____

0.222 = _____

2. Convert from scientific notation to regular notation.

6.96×10^{3} = _____

3.46×10^{-5} = _____

2.54×10^{4} = _____

9.1×10^{-2} = _____

5.0×10^{-3} = _____

9.444×10^{2} = _____

3. Complete the following problems. You must show all work!

A. 45 x 61 =

B. 350 x 1.5 =

C. 550 ÷ 2 =

D. 426 ÷ 4 =

E. 3465 ÷ 2.2 =

4. Use scientific notation (and only scientific notation) to solve the following problems:

A. $3.0 \times 10^{5} \times 3.3 \times 10^{4}$ =

B. $9.0 \times 10^{8} \div 4.5 \times 10^{3}$ =

C. $3.4 \times 10^{-2} / 1.7 \times 10^{-5}$

D. $1.0 \times 10^{5} / 2.0 \times 10^{3}$

E. $(3.5 \times 10^{-2})(2.0 \times 10^{-5})$

F. $(1.11 \times 10^{-5})(6.0 \times 10^{9})$

II. Percent Change: Use the following equation to assist in solving the next two problems.
Percent change = past—present X 100

1. Calculate the percent increase in world grain production per person between 1950 and 2000 using the following data.

Year	Per capita world grain production (kg)
1950	200

1970 223

1990 240

2000 250

2. The total fertility rate (TFR) of a country is the average number of births per woman in that country. In Madagascar the TFR went from 6.0 in 1995 down to 5.0 in 2005. What is the percent change in the TFR in Madagascar from 1995 to 2005?

3. If 35% of a natural area is to be developed, leaving 500 acres untouched, how many acres are to be developed?

III. Dimensional Analysis:
You should be able to convert any unit into any other unit if given the conversion factor. Online tutorials are available:
http://www.chemprofessor.com/dimension_text.htm

http://www.chem.tamu.edu/class/fyp/mathrev/mr-da.html

http://chs.mesa.k12.co.us/Departments/science/documents/APESMasteringtheMathTEACHER.pdf

Dimensional analysis (also called the factor-label method) is a mathematical system using conversion factors to move from one unit of measurement to a different unit of measurement. For example, you can use dimensional analysis to calculate how many seconds are in a day.

(http://www2.franciscan.edu/academic/mathsci/mathscienceintegation/MathScienceIntegation-617.htm)

A good video to go over dimensional analysis can be found here:

http://www.youtube.com/watch?v=fEUaQdaOBKo

The key with dimensional analysis is that each of the conversion factors is equal to one. Using these factors will allow you to move from one unit of measurement to another.

Examples of conversion factors:

60 sec = 1 min 1 inch = 2.54cm 1 km = 0.62 mi

1 square mile = 640 acres 1 hectare (Ha) = 2.5 acres

1 kWh = 3,400 BTUs 1 barrel of oil = 160 liters

1 metric ton = 1000 kg 1 cubic meter = 1000 liters

1 gram water = 1 ml water

Note the importance of UNITS! When solving these problems in APES, units are vital! The units help you determine which way to use the conversion factors. Also, if you do not show the units in your set-up and answer you do not get credit for your work.

Solve the following problems using dimensional analysis. **Please show the set up and work for the problem.** Units must be shown throughout the problem!

1. How many millimeters are in 8 inches? Please round your answer to the nearest 10th.

Use the following information to solve questions 2 to 5.

The biomass of the forest increases at an annual rate of 2.7×10^5 kg/ha. The forest biomass is 50 percent carbon by mass.
Each year the district uses 3.0×10^5 gallons of fuel oil for heating and hot water.
10 kg of CO_2 is produced when 1 gallon of fuel oil is burned.
1.0 kg of CO_2 contains 0.27 kg of carbon.
The cost of putting 1 ha of the forest in conservancy is $12,000.

2. Calculate the mass of carbon, in kg, that is accumulated and stored in 1.0 ha of forest in one year.

3. Calculate the mass of carbon, in kg, that is emitted by the school as a result of its fuel-oil consumption in one year.

4. Calculate the number of hectares (ha) of forest the school district needs to conserve in order to offset the carbon released in one year by the school burning its fuel oil.

5. Calculate the amount of money the school district must raise for the conservation project.

6. Sixty kilometers per hour = how many miles per hour

7. A city that uses 34 billion BTUs of energy each month is using how many kilowatt-hours (kWh) of energy? (remember, scientific notation is the tool to use)

8. A 2.5 million square mile forest is how many hectares?

9. If one barrel of crude oil provides 1.6 million BTUs of energy, how many BTUs of energy will one liter of crude oil provide?