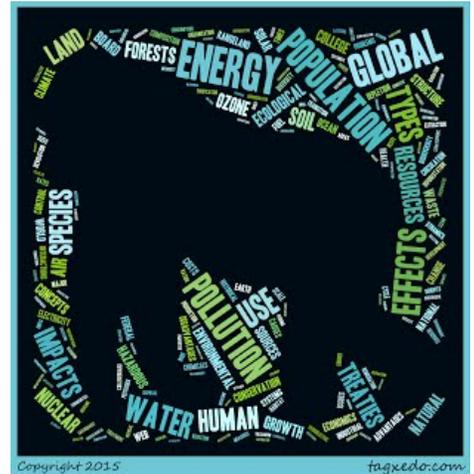


## APES 2018-19 Summer Assignment

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Dear Students,

Welcome to AP Environmental Science, also known as APES! To begin our study of local, regional and global environmental issues, I have prepared a challenging yet engaging summer assignment for you. When our school year begins we will continue to examine natural and human induced environmental problems. The summer assignment is due on the first day of school. Be prepared for a test on this material. A study guide will be posted on PowerSchool during the summer. Also, before school is out, stop by and sign up for WhatsApp group to communicate over the summer.



### 1. Math Review

- A. Complete the math review problem worksheet. All answers with work shown on a separate paper.
- B. Read CHSR document regarding ppm/ppb. Complete the problem set.

### 2. Ecological Footprint

An environmentally aware citizen, is aware of the issues around them and their own personal impact on the earth and its environments. You will be measuring your impact - or footprint - on the environment by following the directions below.

Create a new document. Title it Ecological Footprint.

#### A. Water usage calculator

Go to the link below. Calculate your water usage footprint. Take a screen shot of your results and paste onto your document.

<http://www.gracelinks.org/1408/water-footprint-calculator>

#### B. Carbon Footprint calculator

Go to the link below. Calculate your carbon footprint. Take a screen shot of your results and paste onto your document.

<http://www.nature.org/greenliving/carboncalculator/index.htm>

C. Ecological Footprint calculator. Take a screen shot of your results and paste onto your document.

<http://www.footprintnetwork.org/resources/footprint-calculator/>

Write an essay analyzing your results. Include a clear definition of what an ecological footprint is. Analyze your water use, carbon and ecological footprint results. Were your results above or below the national average. Were you surprised with your results?

What are steps you can take to make less of an impact on the environment? Be specific.

### **3. Environmental Law's Timeline**

Create a timeline of the following important events, people, and laws in environmental science. You can be creative on how you create your timeline. Keynote, booklet, actual time line format (several papers attached together), iMovie are all acceptable forms for submission.

For each item , describe each event, person or law in one or two sentences. Make sure everything is in your own words. Learn the information. This will be on your test. Include many diagrams on your timeline.

- \* 10,000 years ago: Agricultural revolution
- \* 275 years ago: Industrial revolution
- \* 1838: John Muir
  
- \* 1854: Walden by Henry David Thoreau
- \* 1862: Homestead Act
- \* 1872: Yellowstone National Park founded
- \* 1875: American Forestry Association founded
- \* 1890: Yosemite plus Sequoia National Park founded
- \* 1891: General Revision Act
- \* 1892: Sierra Club founded
- \* 1900: Lacey Act
- \* 1901-09: Golden Age of Conservation (Theodore Roosevelt)
- \* 1903: First national wildlife refuge established
- \* 1905: U.S. forest Service founded
- \* 1905: Gifford Pinchot
- \* 1905: Aldo Leopold
- \* 1905: Audubon Society founded
- \* 1906: Antiquities Act
- \* 1907-Congress became upset because Roosevelt was waving so much forest land so they banned further withdrawals.
- \* 1912: U.S. National Park service founded
- \* 1933: Civilian Conservation Corps founded
- \* 1930s: Dust Bowl
- \* 1933: Soil Conservation Service founded
- \* 1934: Taylor Grazing Act
- \* 1934: Migratory Bird Hunting Stamp Act
- \* 1940: Fish plus Wildlife Service founded
- \* 1962: Silent Spring published by Rachel Carson
- \* 1963: Wilderness Act
- \* 1968: Wild and Scenic Rivers Act
- \* 1969: Cuyahoga River in Cleveland, Ohio, caught fire





**Tips:**

\*Write out all your work, even if it's something really simple. This is required on the APES exam. It will be required on all your assignments, labs, quizzes, and tests as well.

\*Don't forget to include units in each step. No unit = no credit

**Convert the following.**

1. 4 grams = \_\_\_\_\_ milligrams
2. 5 milliliters = \_\_\_\_\_ cubic centimeters
3. 3.1 kilometers = \_\_\_\_\_ meters
4. 26 meters = \_\_\_\_\_ cm
5. 2 kilograms = \_\_\_\_\_ grams
6. 3425 centimeters = \_\_\_\_\_ meters

Show your work for the below conversions.

7. 25 miles = \_\_\_\_\_ Km
8. 10 ounces = \_\_\_\_\_ grams
9. 49 ft = \_\_\_\_\_ meters
10. 1.67 yards = \_\_\_\_\_ mm

**Square Meter** = The square meter is the basic unit of *area* of the Metric System. Area is length by width, so, a square that is 1 meter on each side is 1 square meter. The Unit is meters  $\times$  meters, which is written  $m^2$  (square meters). You could have other shapes (such as a rectangle that is  $\frac{1}{2}$  a meter by 2 meters) that also make 1 square meter.

**The Hectare** = A hectare (ha) is an area equal to a square that is 100 meters on each side. So a hectare has  $100\text{ m} \times 100\text{ m} = 10,000\text{ m}^2$  (square meters). Hectares are commonly used to measure land.

**Square Kilometer** = A square kilometer is kilometer  $\times$  kilometer, which is written  $km^2$ . A kilometer is a thousand meters, so a square kilometer is also:  $1,000\text{ m} \times 1,000\text{ m} = 1,000,000\text{ m}^2$  (square meters). In other words a square kilometer is one-million square meters. Square kilometers are commonly used to measure large areas of land.

**Convert the following:**

1. 26  $m^3$  = \_\_\_\_\_  $hm^3$
2. 1400  $mm^3$  = \_\_\_\_\_  $m^3$
3. 15  $dm^3$  = \_\_\_\_\_  $cm^3$
4. 32,546  $m^3$  = \_\_\_\_\_  $km^3$
5. 1000  $hm^3$  = \_\_\_\_\_  $km^3$

## Converting Temperature:

From	To Fahrenheit	To Celcius	To Kelvin
Fahrenheit (F)	F	$(F-32)/1.8$	$(F-32)/1.8 + 273.15$
Celsius (C)	$(C*1.8) + 32$	C	$C + 273.15$
Kelvin (K)	$(K-273.15) *1.8 + 32$	$K-273.15$	K

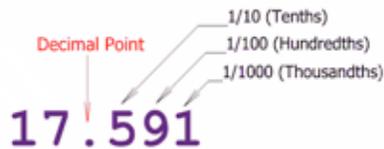
Convert the following. Show your work:

- $212^{\circ}\text{F} = \underline{\hspace{2cm}}^{\circ}\text{C}$   $\underline{\hspace{2cm}}$  K
- $37^{\circ}\text{C} = \underline{\hspace{2cm}}^{\circ}\text{F}$   $\underline{\hspace{2cm}}$  K
- $42\text{ K} = \underline{\hspace{2cm}}^{\circ}\text{C}$   $\underline{\hspace{2cm}}$   $^{\circ}\text{F}$

## Decimals

The basics

Decimals are used to show fractional numbers.



Adding or Subtracting Decimals. Remember- no calculators.

To add or subtract decimals, make sure you line up the decimals and then fill in any extra spots with zeros. Add or subtract just like usual. Be sure to put a decimal in the answer that is lined up with the ones in the problem.

$$\begin{array}{r} 123.0000 \\ 0.0079 \\ +43.5000 \\ \hline 166.5079 \end{array}$$

Multiplying  
Line up the numbers  
were no decimals.

$$\begin{array}{r} 27.583 \\ - 0.200 \\ \hline 27.383 \end{array}$$

Decimals  
just as you would if there  
DO NOT line up the

decimals. Write the decimals in the numbers but then ignore them while you are solving the multiplication problem just as you would if there were no decimals at all. After you have your answer, count up all the numbers behind the decimal point(s). Count the same number of places over in your answer and write in the decimal.

$$3.77 \times 2.8 = ?$$

$$\begin{array}{r} 3.77 \text{ (2 decimal places)} \\ \times 2.8 \text{ (1 decimal place)} \\ \hline 3016 \\ +754 \\ \hline 10.556 \text{ (3 decimal places)} \end{array}$$

### Dividing Decimals

If the divisor is not a whole number, move decimal point to right to make it a whole number and move decimal point in dividend the same number of places.

Divide as usual. Put decimal point directly above decimal point in the dividend.

$$\begin{array}{r} 424.9 \\ 38 \overline{) 1614.62} \\ \underline{152} \\ 94 \\ \underline{76} \\ 186 \\ \underline{152} \\ 342 \\ \underline{342} \\ 0 \end{array}$$

### Dividing Divisors with Decimals

Multiply the divisor by a power of 10 to make it a whole number.

Multiply the dividend by the same power of 10. Place the decimal point in the quotient.

Divide the dividend by the whole-number divisor to find the quotient.

$$38 \overline{) 1614.62}$$

Remember to show all your work, include units if given, and NO CALCULATORS!

1.  $1.678 + 2.456 =$
2.  $344.598 + 276.9 =$
3.  $1229.078 + .0567 =$
4.  $45.937 - 13.43 =$
5.  $199.007 - 124.553 =$
6.  $90.3 - 32.679 =$
7.  $28.4 \times 9.78 =$
8.  $324.45 \times 98.4 =$
9.  $1256.93 \times 12.38 =$
10.  $64.5 \div 5 =$
11.  $114.54 \div 34.5 =$

12.  $3300.584 / 34.67 =$

### Averages

To find an average, add all the quantities given and divide the total by the number of quantities.

Example: Find the average of 10, 20, 35, 45, and 105.

Step 1: Add all the quantities.  $10 + 20 + 35 + 45 + 105 = 215$

Step 2: Divide the total by the number of given quantities.  $215 / 5 = 43$

Practice: Remember to show all your work, include units if given, and NO CALCULATORS!

1. Find the average of the following numbers: 11, 12, 13, 14, 15, 23, and 29

2. Find the average of the following numbers: 124, 456, 788, and 343

3. Find the average of the following numbers: 4.56, .0078, 23.45, and .9872

### Percentages

Percents show fractions or decimals with a denominator of 100. Always move the decimal TWO places to the right to go from a decimal to a percentage or TWO places to the left to go from a percent to a decimal.

Examples:  $.85 = 85\%$ .       $.008 = .8\%$

#### Finding the Percent of a Given Number

To find the percent of a given number, change the percent to a decimal and MULTIPLY.

Example: 30% of 400

Step 1:  $30\% = .30$

Step 2: 400

$$\begin{array}{r} \underline{\phantom{0} \times .30} \\ 12000 \end{array}$$

Step 3: Count the digits behind the decimal in the problem and add decimal to the answer.

120.00

#### Finding the Percentage of a Number

To find what percentage one number is of another, divide the first number by the second, then convert the decimal answer to a percentage.

Example: What percentage is 12 of 25?

Step 1:  $12/25 = .48$

Step 2:  $.48 = 48\%$  (12 is 48% of 25)

## Finding a Total Value

To find a total value, given a percentage of the value, DIVIDE the given number by the given percentage.

Example: If taxes on a new car are 8% and the taxes add up to \$1600, how much is the new car?

Step 1:  $8\% = .08$

Step 2:  $\$1600 / .08 = \$160,000 / 8 = \$20,000$

Calculate the following. Show your work. NO CALCULATORS.

1. What is 45% of 900?
2. Thirteen percent of a 12,000 acre forest is being logged. How many acres will be logged?
3. A water heater tank holds 280 gallons. Two percent of the water is lost as steam. How many gallons remain to be used?
4. What percentage is 25 of 162.5?
5. 35 is what percentage of 2800?
6. 4,000 acres of a 40,000 acre forest burned in a forest fire. What percentage of the forest was damaged?
7. You have driven the first 150 miles of a 2000 mile trip. What percentage of the trip have you traveled?
8. Home prices have dropped 5% in the past three years. An average home in Indianapolis three years ago was \$130,000. What's the average home price now?

## Scientific Notation

Introduction: Scientific notation is a shorthand way to express large or tiny numbers. Since you will need to do calculations throughout the year WITHOUT A CALCULATOR, we will consider anything over 1000 to be a large number. Writing these numbers in scientific notation will help you do your calculations much quicker and easier and will help prevent mistakes in conversions from one unit to another. Like the metric system, scientific notation is based on factors of 10. A large number written in scientific notation looks like this:

$$1.23 \times 10^{11}$$

The number before the x (1.23) is called the coefficient. The coefficient must be greater than 1 and less than 10. The number after the x is the base number and is always 10. The number in superscript (11) is the exponent.

## Writing Numbers in Scientific Notation

To write a large number in scientific notation, put a decimal after the first digit. Count the number of digits after the decimal you just wrote in. This will be the exponent. Drop any zeros so that the coefficient contains as few digits as possible.

Example: 123,000,000,000

Step 1: Place a decimal after the first digit. 1.23000000000

Step 2: Count the digits after the decimal...there are 11.

Step 3: Drop the zeros and write in the exponent.  $1.23 \times 10^{11}$

Writing small numbers in scientific notation is similar. The only difference is the decimal is moved to the left and the exponent is a negative. A tiny number written in scientific notation looks like this:

$$4.26 \times 10^{-8}$$

To write a tiny number in scientific notation, move the decimal after the first digit that is not a zero. Count the number of digits before the decimal you just wrote in. This will be the exponent as a negative. Drop any zeros before or after the decimal.

*Example:* .0000000426

*Step 1:* 00000004.26

*Step 2:* Count the digits before the decimal...there are 8.

*Step 3:* Drop the zeros and write in the exponent as a negative.  $4.26 \times 10^{-8}$

### Adding and Subtracting Numbers in Scientific Notation

To add or subtract two numbers with exponents, the exponents must be the same. You can do this by moving the decimal one way or another to get the exponents the same. Once the exponents are the same, add (if it's an addition problem) or subtract (if it's a subtraction problem) the coefficients just as you would any regular addition problem (review the previous section about decimals if you need to). The exponent will stay the same. Make sure your answer has only one digit before the decimal – you may need to change the exponent of the answer.

*Example:*  $1.35 \times 10^6 + 3.72 \times 10^5 = ?$

*Step 1:* Make sure both exponents are the same. It's usually easier to go with the larger exponent so you don't have to change the exponent in your answer, so let's make both exponents 6 for this problem.

$$3.72 \times 10^5 \quad .372 \times 10^6$$

*Step 2:* Add the coefficients just as you would regular decimals. Remember to line up the decimals.

$$\begin{array}{r} 1.35 \\ + .372 \\ \hline 1.722 \end{array}$$

*Step 3:* Write your answer including the exponent, which is the same as what you started with.

$$1.722 \times 10^6$$

### Multiplying and Dividing Numbers in Scientific Notation

To multiply exponents, multiply the coefficients just as you would regular decimals. Then add the exponents to each other. The exponents DO NOT have to be the same.

*Example:*  $1.35 \times 10^6 \times 3.72 \times 10^5 = ?$

*Step 1:* Multiply the coefficients.

$$1.35$$

$$\begin{array}{r}
 \times 3.72 \\
 270 \\
 9450 \\
 \hline
 40500 \\
 50220 \quad 5.022
 \end{array}$$

Step 2: Add the exponents.

$$5 + 6 = 11$$

Step 3: Write your final answer.

$$5.022 \times 10^{11}$$

To divide exponents, divide the coefficients just as you would regular decimals, then subtract the exponents. In some cases, you may end up with a negative exponent.

Example:  $5.635 \times 10^3 / 2.45 \times 10^6 = ?$

Step 1: Divide the coefficients.

$$5.635 / 2.45 = 2.3$$

Step 2: Subtract the exponents.

$$3 - 6 = -3$$

Step 3: Write your final answer.

$$2.3 \times 10^{-3}$$

Write the following numbers in scientific notation:

1. 145,000,000,000
2. 13 million
3. 435 billion

Complete the following calculations:

4.  $3 \times 10^3 + 4 \times 10^3$
5.  $4.67 \times 10^4 + 323 \times 10^3$
6.  $7.89 \times 10^{-6} + 2.35 \times 10^{-8}$
7.  $9.85 \times 10^4 - 6.35 \times 10^4$

As a student enrolled in this class, I affirm the principle of academic integrity and commit to upholding integrity by completing all academic assignments myself. I will not participate, either directly or indirectly, in cheating or plagiarism; and I will actively discourage cheating or plagiarism by others throughout this course.

***I have read through the summer assignment and understand the depth and time commitment to complete this assignment over the summer. I understand I must complete the summer assignment due on the first day of AP Environmental class. I will rigorously prepare for the first exam given on the first day of class and know that if I do not score 70% or better, I may be removed from AP Environmental Science.***

\_\_\_\_\_  
Student Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Printed name

Compile all worksheets and place in order in an appropriate binder or folder. Assignments should be ready before you come to class. You will not have time to assemble and organize your assignment in class. 15 point penalty will be given to assignments that are not ready. Those who have failed to complete entire summer assignment will be removed from this course.