

# AP Environmental Science Summer Assignment

Welcome to the 2016-2017 APES class! Environmental Science covers a very broad field of study that includes topics such as scientific processes, environmental laws, economics, and much, much more. This summer, you will be required to complete the following assignment over the summer to cover basic skills. Your exam date, Monday, May 1, 2017, is the very first AP exam! So when we get back in the fall we want to hit the ground running.

If you misplace this assignment, it can be found on the school's website, [www.westhillweb.com](http://www.westhillweb.com), or on Mrs. Grant's website, [www.sites.google.com/site/cgrantscience](http://www.sites.google.com/site/cgrantscience), under the AP Environmental Science tab.

If you have any questions, email will be checked weekly throughout the summer. Please feel free to email Mrs. Grant ([cgrant@stamfordct.gov](mailto:cgrant@stamfordct.gov)) or Mrs. Porter-Collins ([aportercollins@stamfordct.gov](mailto:aportercollins@stamfordct.gov)) with any questions.

## ***Assignment #1: Environmental Current Event***

On the first day of school, Monday, August 31<sup>st</sup>, you are to bring in a current event that occurs over the summer related to environmental science along with a one page summary and reflection.

## ***Assignment #2: Math and Analysis***

The math and analysis assignment is due the first day of school, Monday, August 31<sup>st</sup>

You will be tested on your math skills on Wednesday, September 2<sup>nd</sup> (date subject to change due to schedule rotation).



## **Math**

The following problems represent some of the basic math skills that are required to be successful in AP Environmental Science. On your exam you will NOT be allowed to use calculators and you should therefore attempt the following math problems as such. There will be a math quiz the first week of school.

### Scientific Notation

Put the following numbers into scientific notation.

1.  $0.00003 =$  \_\_\_\_\_

2.  $170,000 =$  \_\_\_\_\_

3.  $0.005 =$  \_\_\_\_\_

4.  $376 =$  \_\_\_\_\_

5.  $4160 =$  \_\_\_\_\_

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

6.  $3 \times 10^7 =$  \_\_\_\_\_

7.  $5.6 \times 10^3 =$  \_\_\_\_\_

8.  $8.2 \times 10^8 =$  \_\_\_\_\_

9.  $7 \times 10^1 =$  \_\_\_\_\_

10.  $2.1 \times 10^0 =$  \_\_\_\_\_

11.  $3.4 \times 10^{-2} =$  \_\_\_\_\_

12.  $5.1 \times 10^{-1} =$  \_\_\_\_\_

13.  $4.7 \times 10^{-4} =$  \_\_\_\_\_

14.  $6 \times 10^{-9} =$  \_\_\_\_\_

Solve the following

15.  $10^2 \times 10^5 =$  \_\_\_\_\_

16.  $10^1 \times 10^2 =$  \_\_\_\_\_

17.  $10^2 \times 10^{-5} =$  \_\_\_\_\_

18.  $10^{-1} \times 10^7 =$  \_\_\_\_\_

19.  $10^{-3} \times 10^{-3} =$  \_\_\_\_\_

20.  $10^{-4} \times 10^{-2} =$  \_\_\_\_\_

21.  $10^4 / 10^5 =$  \_\_\_\_\_

22.  $10^1 / 10^3 =$  \_\_\_\_\_

23.  $10^2 / 10^{-3} =$  \_\_\_\_\_

24.  $10^{-6} / 10^{-4} =$  \_\_\_\_\_

25.  $10^{-2} / 10^{-6} =$  \_\_\_\_\_

Solve the following using scientific notation

26.  $0.004 \times 0.006 =$

27.  $0.025 \times 0.004 =$

28.  $.00005 \times 0.000007 =$

29.  $26,000 \times 1,000 =$

30.  $237 \times 1,000,000 =$

31.  $320,000,000 \times 0.0005 =$

32.  $0.003 \times 4,000 =$

33.  $2,000 / 13,000 =$

34.  $25 / 0.0015 =$

35.  $200 / 1,000,000 =$

36.  $0.001 / .00001 =$

## Percentages

37. 10 is what percent of 1,000?
38. What is 25% of 2,500?
39. What is 30% of 3,000,000?
40. 25 is what percent of 4,000?
41. You dissolve 5 grams of salt into 95 grams of water. What is your percent salt solution?
42. A fluorescent bulb uses 24 watts and gives off the same amount of light as a 100 watt regular bulb. What is the percentage in energy savings by switching to a fluorescent bulb?
43. A light bulb uses 100 watts of power 0.95 watts are wasted as heat. What percentage of energy is used to light the bulb?
44. Your old microwave used 2 kilowatts an hour. Your new microwave uses 1.5 kilowatts an hour. What is your percent energy savings?

Use the equation to solve the following questions:  $\% \text{ Change} = \left( \frac{\text{New} - \text{Old}}{\text{Old}} \right) \times 100$

45. You start with 100 units and end with 150 units, what is the percentage increase?
46. You start with 100 units and end with 50 units, what is the percentage decrease?
47. You start with 25 units. How many units would you have after a 400% increase?
48. You start with 200 units. How many units would you have after a 75% decrease?
49. You use 1,000 kilowatts of power. You increase your usage by 40%. How many total kilowatts do you now use?
50. A light bulb uses 100 watts of power 0.95 watts are wasted as heat. What percentage of energy is used to light the bulb?
51. A fluorescent bulb uses 24 watts and gives off the same amount of light as a 100 watt regular bulb. What is the percentage in energy savings by switching to a fluorescent bulb?
52. A population starts the year with 1,000 residents. By the end of the year, 100 new babies were born. What is the percent increase for this population?
53. You dissolve 5 grams of salt into 95 grams of water. What is your percent salt solution?

*Dimensional Analysis*

How it works? Watch you units!!! No naked numbers.

<u>Starting Amount</u>	<u>Equal Amounts</u>	<u>Ending Amount</u>
5 meters	100 cm	= cm
	1 meter	

<u>Starting Amount</u>	<u>Equal Amounts</u>	<u>Ending Amount</u>
5 meters	100 cm	= 500 cm
	1 meter	

And you can write this way as well . . .

$$5 \text{ meters} \times \frac{100 \text{ cm}}{1 \text{ meter}} = 500 \text{ cm}$$

By now I'm sure you have figured out that you will need to know your metric system!

Symbol	Prefix	Multiplication Factor	
T	tera	$10^{12}$	1,000,000,000,000
G	giga	$10^9$	1,000,000,000
M	mega	$10^6$	1,000,000
k	kilo	$10^3$	1,000
h	hecto	$10^2$	100
da	deka	$10^1$	10
	<b>UNIT</b>	$10^0$	1
d	deci	$10^{-1}$	0.1
c	centi	$10^{-2}$	0.01
m	milli	$10^{-3}$	0.001
$\mu$	micro	$10^{-6}$	0.000,001
n	nano	$10^{-9}$	0.000,000,001
p	pico	$10^{-12}$	0.000,000,000,001

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

51. There are 2.2 pounds in 1 kilogram. How many pounds in 140 kilograms?
52. There are 2.53 centimeters in one inch. How many centimeters are in 32 inches?
53. There are 36 inches in one yard, how many centimeters are in two yards?
54. There are 100 centimeters in 1 meter. How many yards are in one meter?
55. Given 1000 watts in 1 kilowatt, how many watts are in 2.4 kilowatts?
56. 1 megawatt is  $10^6$  watts. How many kilowatts are there in one megawatt?
57. There are 1,000 grams in one kilogram, and 1,000 micrograms in one gram. How many micrograms are in 2,500 kilograms?
58. You have 24 light bulbs, each using 100 watts an hour. How many watts will be used in 120 hours?
59. 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?
60. A large, coal-fired electric power plant produces 12 million kilowatt-hours of electricity each day. Assume that an input of 10,000 BTUs of heat is required to produce an output of 1 kWh of electricity and one pound of coal yields 5,000 BTUs of heat. How many pounds of coal are consumed by the power plant each day?

## Analysis

### Graphing

You will be expected to know how to make a proper graph over the course of the year. Here are a few guidelines.

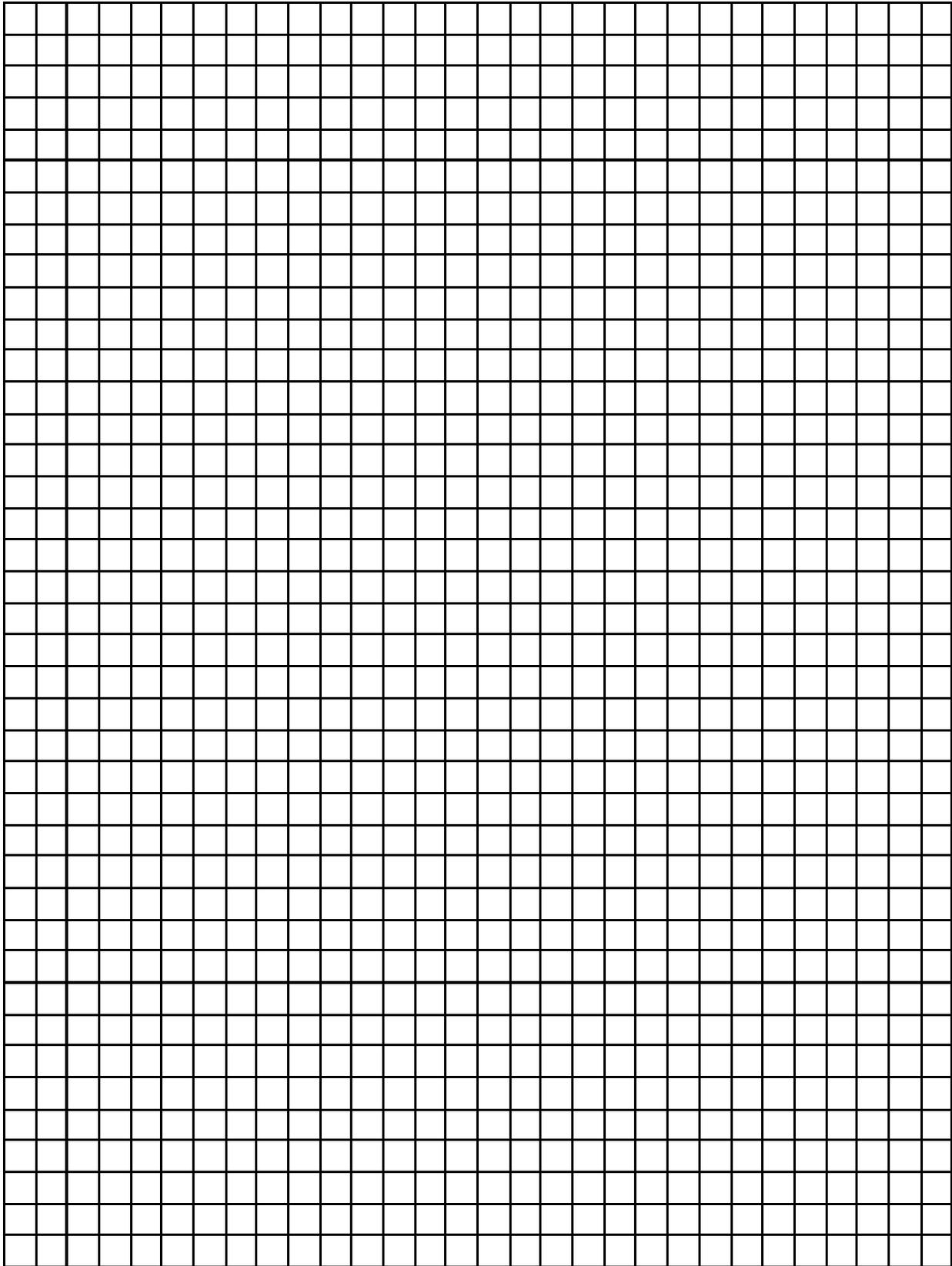
- Always use a ruler
- Tick marks should be evenly spaced.  
i.e., if 1 box = 10, than 2 boxes = 20, etc . . .
- When making and scaling your axes, try and fill up as much of the graphing area as possible.
- If making a scatter plot/line graph, always connect your data points
- Label your x and y axis with appropriate titles and units  
Example: X axis = Time (Hour), Y Axis = Energy Use (kWh)
- Title your graph in proper y vs. x format  
Example: Energy Use (kWh) vs. Time (Hour)
- Make sure to include a legend if differentiating between different data sets (using different colors or symbols).

61. Graph the data on the graph paper provided and answer the following questions.

The thickness of the annual rings indicates what type of environmental situation was occurring at the time of its development. A thin ring usually indicates a rough period of development (lack of water, forest fires, or a major insect infestation). On the other hand, a thick ring indicates the opposite.

<b>Age of the tree in years</b>	<b>Forest A Average thickness of annual rings in cm</b>	<b>Forest B Average thickness of annual rings in cm</b>
10	2.0	2.2
20	2.2	2.5
30	3.5	3.6
35	3.0	3.8
50	4.5	4.0
60	4.3	4.5

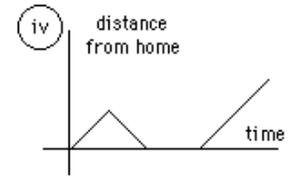
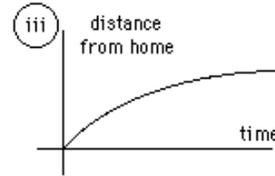
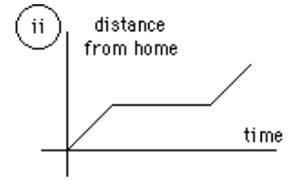
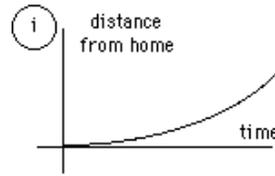
- What is the dependent variable?
- What is the independent variable?
- What was the average thickness of the annual rings of 40 year old trees in Forest A?
- Based on this data, what can you conclude about Forest A and Forest B?



Analysis

62. Identify the graph that matches each of the following stories:

- I had just left home when I realized I had forgotten my books so I went back to pick them up.
- Things went fine until I had a flat tire.
- I started out calmly, but sped up when I realized I was going to be late.



63. The graph at the right represents the typical day of a teenager. Answer these questions:

- What percent of the day is spent watching TV?
- How many hours are spent sleeping?
- What activity takes up the least amount of time?
- What activity takes up a quarter of the day?
- What two activities take up 50% of the day?
- What two activities take up 25% of the day?



64. Answer these questions about the graph on the right:

- How many total miles did the car travel?
- What was the average speed of the car for the trip?
- Describe the motion of the car between hours 5 and 12?
- What direction is represented by line CD?
- How many miles were traveled in the first two hours of the trip?
- Which line represents the fastest speed?
- What could explain the reason this leg was faster than the others?

