

June, 2017

Dear AP Environmental Science Student,

I am glad that you are interested in the Advanced Placement Environmental Science class for the upcoming school year. AP Environmental Science is a full year course, designed for highly motivated students who have successfully completed both biology and chemistry. In addition, students should have completed physics or be enrolled in it, concurrently. Because AP Environmental Science is comparable to a college undergraduate course in environmental science, much is expected from the student in terms of time, energy and independent work. Students should be prepared to spend an average of eight hours per week outside of class in preparation, involving reading the text and outside sources and written assignments. Students are expected to complete individual lab reports, keep a lab notebook and to write abstracts on articles from scientific periodicals. These written assignments, along with tests and quizzes, will be used to determine each marking period grade.

As established by College Board, the AP Environmental Science curriculum is rigorous and demanding. There will be several lab experiments completed throughout the year. The textbook used is *Living in the Environment*, G. Tyler Miller, Jr., 16<sup>th</sup> edition, a book used extensively nationwide.

A summer assignment containing three parts based on important environmental current events, past environmental events as well as math review problems will be assigned at the end of the current school year. Students are responsible for this work, which is due on the **first day** of school in September. This assignment will be followed by lab work and a test shortly after the school year is underway.

In May of each year, the AP exams are administered. Since college credit may be earned by successful completion of the exam, we encourage students to participate. College credit is determined by the grade earned on the exam and the policy of the college concerning AP exams. If you have any questions or concerns, please contact me.

Thank you,

Mrs. Sarah Sherwin  
sarahsherwin@hvrds.org

## Part I: AP Environmental Science Summer Assignment

### Current Events

In environmental science, it's important to know about current issues in the news. One of our goals for this course is to educate you about environmental issues that are important to our community, our country, and our world. We will be reading and discussing a variety of current events throughout the school year as well. This is a great opportunity to start thinking about the environment and how it affects us.

Over the course of the summer, find two articles that relate to environmental science. Topics include, but are not limited to: pollution, climate change, environmental legislation, alternative energy sources, fossil fuels, human population growth, renewable resources, recycling/waste management, air quality, water quality, conservation/wildlife, food production/food safety, deforestation, GMOs (genetically modified organisms), etc.

On the **first day of class**, you should submit for each article:

- a copy of the article (2 points each)
- a summary of the article content (6 points each)
- a personal reaction (7 points each)

#### Article

All articles should be current and taken from a reliable source. The sources may be scientific publications, popular magazines, newspapers or the like. Try the NY Times (especially Tuesday), Washington Post, National Geographic, Discover Magazine, Natural History Magazine, Scientific American, Science, Nature, Sierra, Audubon, etc. The articles should be long enough for you to write a substantial summary and well-thought out response. All bibliographic information should be visible on the article itself or included with the summary. Try to find a variety of articles at the state, national, and global level that address multiple environmental issues.

#### Summary:

Write a brief summary of each article and point out the major environmental themes discussed. Your summary should be no less than 250 words.

#### Personal Reaction:

Your personal reaction should clearly state your opinions and/or reflection on the article. You can offer potential solutions, compare it to another environmental problem, ask questions about the article, or simply reflect on the article's content. Do not simply write, "This article was very interesting/good." It should be no less than 250 words. Some questions to drive your discussion:

- What are the key points made in the article?
- What are the points of view presented about this issue?
- Does the article teach you something new?
- Does it support or refute other information you've heard or read? How so/in what way?

## Part II: AP Environmental Science Math Prep

This year in APES you will hear the two words most dreaded by high school students...NO CALCULATORS! That's right, you cannot use a calculator on the AP Environmental Science exam. Since the regular tests you will take are meant to help prepare you for the APES exam, you will not be able to use calculators on regular tests all year either. The good news is that most calculations on the tests and exams are written to be fairly easy calculations and to come out in whole numbers or to only a few decimal places. The challenge is in setting up the problems correctly and knowing enough basic math to solve the problems. With practice, you will be a math expert by the time the exam rolls around. So bid your calculator a fond farewell, tuck it away so you won't be tempted, and start sharpening your math skills!

### Contents

Decimals

Averages

Percentages

Metric Units

- Later in the year, we will also practice scientific notation and dimensional analysis

### Reminders

1. Write out all your work, even if it's something really simple. This is required on the APES exam so it will be required on all your assignments, labs, quizzes, and tests as well.
2. Include units in each step. Your answers always need units and it's easier to keep track of them if you write them in every step.
3. Check your work. Go back through each step to make sure you didn't make any mistakes in your calculations. Also check to see if your answer makes sense. For example, a person probably will not eat 13 million pounds of meat in a year. If you get an answer that seems unlikely, it probably is. Go back and check your work.

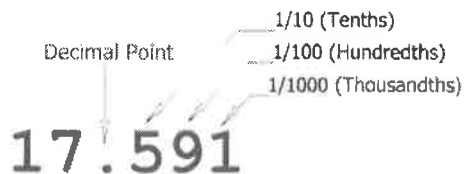
### Directions

Read each section below for review. Look over the examples and use them for help on the practice problems. When you get to the practice problems, write out all your work and be sure to include units on each step. Check your work.

### Decimals

#### Part I: The basics

Decimals are used to show fractional numbers. The first number behind the decimal is the tenths place, the next is the hundredths place, the next is the thousandths place. Anything beyond that should be changed into scientific notation (which is addressed in another section.)



#### Part II: Adding or Subtracting Decimals

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.

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

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

#### Part III: Multiplying Decimals

Line up the numbers just as you would if there were no decimals. 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.

$$3.77 \times 2.8 = ?$$

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

#### Part IV: Dividing Decimals

*Scenario One:* If the divisor (the number after the / or before the  $\sqrt{\quad}$ ), does not have a decimal, set up the problems just like a regular division problem. Solve the problem just like a regular division problem. When you have your answer, put a decimal in the same place as the decimal in the dividend (the number before the / or un  $\sqrt{\quad}$ ).

$$\begin{array}{r} 424.9 \\ 38 \overline{) 16146.2} \\ \underline{152} \\ 94 \\ \underline{76} \\ 186 \\ \underline{152} \\ 342 \\ \underline{342} \\ 0 \end{array}$$

*Scenario Two:* If the divisor does have a decimal, make it a whole number before you start. Move the decimal to the end of the number, then move the decimal in the dividend the same number of places.

$$3.8 \overline{) 1614.62}$$

Then solve the problem just like a regular division problem. Put the decimal above the decimal in the dividend. (See Scenario One problem).

Practice: Remember to show all your work, include units if given, and NO CALCULATORS! **All work and answers go on your answer sheet.**

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.  $64.5 / 5 =$
11.  $114.54 / 34.5 =$
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! All work and answers go on your answer sheet.

13. Find the average of the following numbers: 11, 12, 13, 14, 15, 23, and 29
14. Find the average of the following numbers: 124, 456, 788, and 343
15. Find the average of the following numbers: 4.56, .0078, 23.45, and .9872

### Percentages

#### Introduction:

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:  $.85 = 85\%$ .       $.008 = .8\%$

#### Part I: 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

$\times .30$

12000

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

$12000 \rightarrow 120.00 \rightarrow 120$

#### Part II: 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)

#### Part III: Finding Percentage Increase or Decrease

To find a percentage increase or decrease, first find the percent change, then add or subtract the change to the original number.

Example: Kindles have dropped in price 18% from \$139. What is the new price of a Kindle?

Step 1:  $\$139 \times .18 = \$25$

Step 2:  $\$139 - \$25 = \$114$

#### Part IV: 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:  $\$1600 / .08 = \$160,000 / 8 = \$20,000$  (Remember when the divisor has a decimal, move it to the end to make it a whole number and move the decimal in the dividend the same number of places. .08 becomes 8, 1600 becomes 160000.)

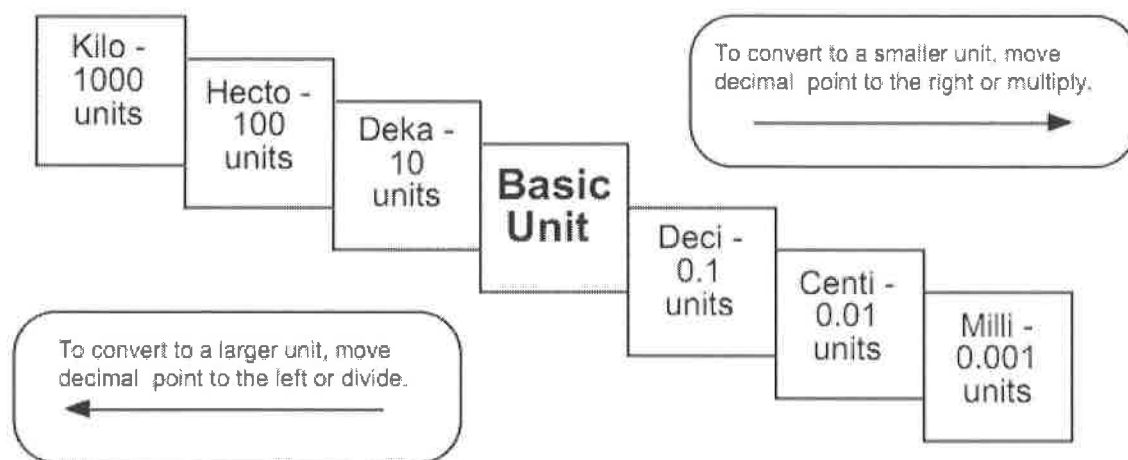
Practice: Remember to show all your work, include units if given, and NO CALCULATORS! All work and answers go on your answer sheet.

16. What is 45% of 900?
17. Thirteen percent of a 12,000 acre forest is being logged. How many acres will be logged?
18. A water heater tank holds 280 gallons. Two percent of the water is lost as steam. How many gallons remain to be used?
19. What percentage is 25 of 162.5?
20. 35 is what percentage of 2800?
21. 14,000 acres of a 40,000 acre forest burned in a forest fire. What percentage of the forest was damaged?

22. You have driven the first 150 miles of a 2000 mile trip. What percentage of the trip have you traveled?
23. 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?
24. The Greenland Ice Sheet contains 2,850,000 cubic kilometers of ice. It is melting at a rate of .006% per year. How many cubic kilometers are lost each year?
25. 235 acres, or 15%, of a forest is being logged. How large is the forest?
26. A teenager consumes 20% of her calories each day in the form of protein. If she is getting 700 calories a day from protein, how many calories is she consuming per day?
27. In a small oak tree, the biomass of insects makes up 3000 kilograms. This is 4% of the total biomass of the tree. What is the total biomass of the tree?

### Metric Units

Kilo-, centi-, and milli- are the most frequently used prefixes of the metric system. You need to be able to go from one to another without a calculator. You can remember the order of the prefixes by using the following sentence: *King Henry Died By Drinking Chocolate Milk*. Since the multiples and divisions of the base units are all factors of ten, you just need to move the decimal to convert from one to another.



**Example: 55 centimeters = ? kilometers**

*Step 1: Figure out how many places to move the decimal. King Henry Died By Drinking... – that's six places. (Count the one you are going to, but not the one you are on.)*

*Step 2: Move the decimal five places to the left since you are going from smaller to larger.*

$$55 \text{ centimeters} = .00055 \text{ kilometers}$$

**Example: 19.5 kilograms = ? milligrams**

*Step 1: Figure out how many places to move the decimal. ... Henry Died By Drinking Chocolate Milk – that's six places. (Remember to count the one you are going to, but not the one you are on.)*

*Step 2: Move the decimal six places to the right since you are going from larger to smaller. In this case you need to add zeros.*

$$19.5 \text{ kilograms} = 19,500,000 \text{ milligrams}$$

Practice: Remember to show all your work, include units if given, and NO CALCULATORS! All work and answers go on your answer sheet.

28. 1200 kilograms = ? milligrams
29. 14000 millimeters = ? meters
30. 670 hectometers = ? centimeters
31. 6544 liters = ? milliliters
32. .078 kilometers = ? meters
33. 17 grams = ? kilograms

# Data for plotting graphs

Answer any associated questions on the back of your graph(s). Graph paper can be printed from Schoology (under Files/Links), or use a program like Excel, Open Office or Create-A-Graph.

**Graphing Practice Problem:** Ethylene is a plant hormone that causes fruit to mature. The data above concerns the amount of time it takes for fruit to mature from the time of the first application of ethylene by spraying a field of trees.

Amount of ethylene in ml/m <sup>2</sup>	Wine sap Apples: Days to Maturity	Golden Apples: Days to Maturity	Gala Apples: Days to Maturity
10	14	14	15
15	12	12	13
20	11	9	10
25	10	7	9
30	8	7	8
35	8	7	7

- A. Make a line graph of the data.
- B. What is the dependent variable?
- C. What is the independent variable?

**Part II: APES Math Prep Answer Sheet**

Name: \_\_\_\_\_

Remember to show all your work, **include units** on each step and *circle your final answer*. **NO CALCULATORS!!!!****DECIMALS**

1.      <b>Answer:</b> _____	2.      <b>Answer:</b> _____
3.      <b>Answer:</b> _____	4.      <b>Answer:</b> _____
5.      <b>Answer:</b> _____	6.      <b>Answer:</b> _____
7.      <b>Answer:</b> _____	8.      <b>Answer:</b> _____
9.      <b>Answer:</b> _____	10.      <b>Answer:</b> _____
11.      <b>Answer:</b> _____	12.      <b>Answer:</b> _____



## AVERAGES

13.

14.

15.

Answer: \_\_\_\_\_

Answer: \_\_\_\_\_

Answer: \_\_\_\_\_

## PERCENTAGES

16.

17.

Answer: \_\_\_\_\_

Answer: \_\_\_\_\_

18.

19.

Answer: \_\_\_\_\_

Answer: \_\_\_\_\_

20.

21.

Answer: \_\_\_\_\_

Answer: \_\_\_\_\_

22.

23.

Answer: \_\_\_\_\_

Answer: \_\_\_\_\_

<b>24.</b>           Answer: _____	<b>25.</b>           Answer: _____
<b>26.</b>           Answer: _____	<b>27.</b>           Answer: _____

### METRIC SYSTEM

<b>28.</b>       Answer: _____	<b>29.</b>       Answer: _____	<b>30.</b>       Answer: _____
<b>31.</b>       Answer: _____	<b>32.</b>       Answer: _____	<b>33.</b>       Answer: _____

**Part III of Summer Assignment:**

**Name:** \_\_\_\_\_

Environmentally literate students should have recognition of major environmental events. For the following events, please find the date(s) of the event, place, and provide a description of the event.

<u>Event</u>	<u>Date (s)</u>	<u>Place</u>	<u>Description</u>
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1- Love Canal

2- Earth Day

3- Bhopal

4- Aswan Dam

5- Chernobyl

6- Exxon Valdez

7- DeepWater Horizon Oil Spill

8-Three Mile Island

9- Flint, MI Water Supply