AP Environmental Science (APES) Summer Work

Dr. McPherson

Advanced Placement Environmental Science is interdisciplinary; it embraces a wide variety of topics from different areas of study including geology, biology, ecology, anthropology, sociology, history, chemistry, geography, and more. It is important that you come to class in August with a basis from which to begin the year. Below you will find assignments to work on over the summer.

Complete the assignments below:

- Each assignment is **DUE ON the first day of the first full week of school. NO LATE ASSIGNMENTS WILL BE ACCEPTED!**
- I can be reached all summer at anniemcpherson@greensboroday.org
- Additionally, you will have quizzes **in August** on portions of the summer assignment.

1) **The Lorax –** watch the short video of the original Dr. Seuss story online *(see link)*. **Answer the questions that follow.** Be ready to discuss the concepts during the first week.

2) **Environmental Issue Current Events Story and Analysis-** Choose 1 interesting, shocking, creative, and/or innovative current events story, regarding an important environmental issue.
   - ***a.*** Your story may be in the form of a video clip, newspaper article, scientific journal study, or news broadcast **AND MUST** have been published within **the last 6 months**.
     - The sources may be scientific publications, popular magazines, newspapers or the like. Try the NY Times (especially Tuesdays), National Geographic, Discover Magazine, Natural History Magazine, Scientific American, Science, Nature, etc.
   - **b.** Type up a 1-1 ½ page analysis of the environmental issue being addressed, as well as an analysis of how the current event is similar to the story of The Lorax**. Use the following to help guide your analysis:**
     - Please see the Assignment AI Policy and tips for writing a paper for this class.
     - Summary of the current event.
     - Explain how the issue relates to the story of The Lorax.
     - Who are the key stakeholders involved in the issue? Is there a "Once-ler"? A "truffala tree"?
     - Utilized details from the Lorax and your article in your analysis.
     - Analysis should be *double spaced*, 12-point Times New Roman font, and on 1 inch margins.
   - **c.** Submit **BOTH** your chosen current events article and analysis to my email (see above). You will need to hyperlink your current events article at the end of your analysis. Make sure I can CLEARLY see where this hyperlink is and the link is clickable.
3) **Math Packet-** Complete the math problems, show your work.
4) Memorize the 10 different Acts and Laws and their descriptions (see link)

The Lorax – Video Questions **NAME _____**

Pre-read the questions below and answer while watching and/or after watching the Lorax video. **You can print the questions and write your answers or type on the document, then print.**

The Once-ler's Story: The Beginning

1. The Once-ler moved across the land in his wagon. He came upon a new region with an important natural resource. (A natural resource is a plant, animal, or mineral that can be used by people.)
    a. What was this natural resource the Once-ler found?

    b. Name an important natural resource in North Carolina.

Setting Up Shop and Doing Business

2. The Once-ler used the land's natural resource to start a business which made and sold a product.
    a. What was the product?
    b. How was it used by buyers?

3. The Lorax appeared at this point and asked the Once-ler some angry questions.

    a. What did the Lorax asked?

    b. What the Once-ler answered?

4. The Once-ler, like other humans in business, organized a system to manufacture and distribute his product. Listed below are several parts of a manufacturing process. Describe how each of the following was used in the story. You may refer back to the video.

    a. Raw materials? _____
    b. Product design? _____
    c. Labor (workers)? _____
    d. Assembly line? _____
    e. Energy? _____
    f. Shipping, transportation? _____
    g. Communication? _____

Using Technology

Businessmen, like the Once-ler, sometimes try to make more money by increasing the number of products they can sell. Often, new machines and systems are invented to do this. Other people use machines to work faster, more easily, and more accurately. For example, students use calculators. All of these machines are examples of "technology." Technology can be simple machines, like pencils, and complicated like cell phones and computers.

5. What technology did the Once-ler invent to increase the production of thneeds?_____

_____

_____

6. What are **3** other examples of technology presented in the story?

_____

_____

_____

Environmental Effects

7. The use of technology requires the use of natural resources. The use of natural resources often has an effect on the environment. How did the production of thneeds affect a key biotic natural resource, the truffula trees?

_____

_____

_____

8. Threatened and endangered species are those plants and animal populations facing extinction, often as a result of human activity. Name 3 threatened or endangered species in Florida. For each, describe why they face this condition.
   1) _____
   2) _____
   3) _____

9. Certain animals depended on truffula trees.
   a. Name the animals. _____
   b. Explain why these animals needed truffula trees.

_____

10. Often, technological production creates "by-products." For example, a by-product of sawing wood is sawdust. Sometimes the by-products of technology are unwanted or dangerous (for example, poisonous chemicals) and are pollutants in the environment. Sometimes by-products are useful. (For example, wood chips can be used to make particle board.) Name two by-products that resulted from making thneeds.

    By-product #1? _____

    By-product #2? _____

11. Were the by-products that resulted from the making of thneeds harmful or helpful to the environment? Explain the effect on animals.

_____

_____

_____

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Using Math in AP Environmental Science

You will need to know how to do basic math calculations, so it is time to review your basic math skills. Below you will find four sections of basic math in order to prepare you for the more complicated math sections in future units. You will be tested on the math skills in this packet. Answer all questions on the answer sheet at the bottom of the packet.

Contents:

1. Percentages and Percent Change
2. Metric Units
3. Scientific Notation
4. Dimensional Analysis

Percentages:

Introduction:

Percents show fractions or decimals with a denominator of 100. Always move the decimal TWO places to the right in order 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 X .30 = 12,000
Step 3: Count the digits behind the decimal in the problem and add decimal to get the answer:

12,000 □ 120.00 □ 120

Part II: Finding the Percentage of a Number

To find the 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 Change and Increase or Decrease

To find percent change: $\frac{(NEW - OLD)}{OLD} \times 100$

Example: The iPhone has decreased from $650 to $515. What is the percent change in the price?
Step 1: 515- 650= -135
Step 2: -135 / 650 = -.208
Step 3: -.208 x 100 = -20.1%

To find 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 the Kindle?
Step 1: $139 x .1 = $25
Step 2: $139 - $25 = $114

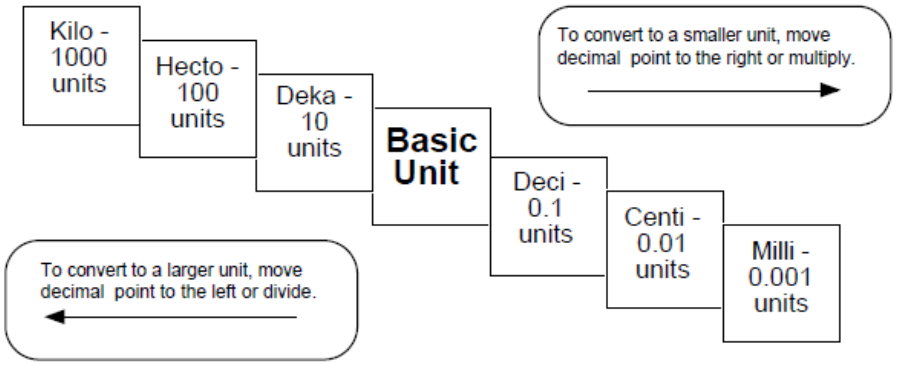
Percentage Practice:

Remember to show all your work, including units if given! All work and answers go on your Math Answer Sheet!

1. What is 45% of 900?
2. Thirteen percent of a 12,000 acre forest is being logged. How many acres will be logged in total?
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. 14,000 acres of a 40,000 acre forest burned in a forest fire. What percentage of the forest was damaged?
6. Home prices have dropped 5% in the past three years. An average home in Indianapolis three years ago was $130,000. What is the average home price now?
7. Approximately 30 million mobile devices were sold in 1998 in the United States. The number sold increased to 180 million devices in 2007. Calculate the percent increase of mobile device sales from 1998 to 2007.

Metric Units

Kilo-, centi-, and mili- are frequently used prefixes in the metric system. You need to be able to go from one to another easily and quickly. 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 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 centimeters= .00055 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 kilograms= 19,500,000 milligrams

Metric Conversion Practice:

Remember to show all your work, including units if given! All work and answers go on your Math Answer Sheet!

8. 1200 kilograms = ? milligrams
9. 14000 millimeters = ? meters
10. 6544 liters = ? milliliters
11. .078 kilometers = ? meters

Scientific Notation

Introduction:

Scientific notation is a shorthand way to express large or tiny numbers. 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:

1.23×10^{11}

Part 1: 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: 1.23×10^{11}

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

4.26×10^{-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: 4.26×10^{-8}

Scientific Notation Practice:

12. 145,000,000,000
13. 13 million
14. One billion
15. Twenty three thousand
16. 70 trillion
17. Three thousandth

Dimensional Analysis

Introduction:

Dimensional analysis is a way to convert a quantity given in one unit to an equal quantity of another unit by lining up all the known values and multiplying. The best way to start a factor-labeling problem is by using what you already know. In some cases you may use more steps than a classmate to find the same answer, but it doesn't matter. Use what you know, even if the problem goes all the way across the page!

In dimensional analysis problems, start with your given value and unit and then work toward your desired unit by writing equal values side by side. Remember you want to cancel each of the intermediate units. To cancel a unit on the top part of the problem, you have to get the unit on the bottom. Likes to cancel a unit that appears on the bottom part of the problem, you have to write it in on the top. Once you have the problem written out, multiply across the top and bottom and then divide the top by the bottom.

Example: 3 years = ? seconds

Step 1: Start with the value and unit you are given. There may or may not be a number on the bottom.

$$\left[\frac{3 \text{ years}}{}\right]$$

Step 2: Start writing in all the values you know, making sure you can cancel top and bottom. Since you have years on top right now, you need to put years on the bottom in the next segment. Keep going, canceling units as you go, until you end up with the unit you want (in this case seconds) on the top.

$$\left[\frac{3 \text{ years}}{}\right]\left[\frac{365 \text{ days}}{1 \text{ year}}\right]\left[\frac{24 \text{ hours}}{1 \text{ day}}\right]\left[\frac{60 \text{ minutes}}{1 \text{ hour}}\right]\left[\frac{60 \text{ seconds}}{1 \text{ minute}}\right]$$

Step 3: Multiply all the values across the bottom. Write in scientific notation if it's a large number. Write units on your answer.

$3 \times 365 \times 24 \times 60 \times 60 = 9.46 \times 10^7$ seconds

Step 4: Multiply all the values across the bottom. Write in scientific notation if it's a large number. Write units on your answer if there are any. In this case everything was canceled so there are no units.

$1 \times 1 \times 1 \times 1 = 1$

Step 5: Divide the top number by the bottom number. Remember to include units.

9.46×10^7 seconds / $1 = 9.46 \times 10^7$ seconds

Step 6: Review your answer to see if it makes sense. 9.46×10^7 seconds is a really big number. Does it make sense for there to be a lot of seconds in three years? YES! If you had gotten a really tiny number, then you would need to go back and check for mistakes.

In lots of APES problems, you will need to convert both the top and bottom unit. Don't panic! Just convert the top one first and then the bottom.

Example: 50 miles per hour = ? feet per second

Step 1: Start with the value and units you are given. In this case there is a unit on top and on bottom.

$$\left[\frac{50 \text{ miles}}{1 \text{ hour}}\right]$$

Step 2: Convert miles to feet first.

$$\left[\frac{50 \text{ miles}}{1 \text{ hour}}\right] \left[\frac{5280 \text{ feet}}{1 \text{ mile}}\right]$$

Step 3: Continue the problem by converting hours to seconds.

$$\left[\frac{50 \text{ miles}}{1 \text{ hour}}\right] \left[\frac{5280 \text{ feet}}{1 \text{ mile}}\right] \left[\frac{1 \text{ hour}}{60 \text{ minutes}}\right] \left[\frac{1 \text{ minute}}{60 \text{ seconds}}\right]$$

Step 4: Multiple across the top and the bottom. Divide the top by the bottom. Be sure to include units on each step. Use scientific notation for large or small numbers.

50 x 5280 feet x 1 x 1 = 264000 feet
1 x 1 x 60 x 60 seconds = 3600 seconds
264000 feet / 3600 seconds = 73.33 feet/second

Dimensional Analysis Practice:

Remember to show all your work, including units if given! All work and answers go on your Math Answer Sheet!

Non-metric conversions:

1 hectacre (Ha) = 1000 square meters
1 barrel of oil = 159 liters

18. 1200 cm per hour = ? km per week
19. The U.S. consumes approximately 20 million barrels of oil per day. How many liters of oil does the U.S. consume in one year?
20. A 340 million square meter of forest is how many hectacres?
21. Termites live in the tropical rainforest breaking down dead and decaying plant material. As they break down the plant material they release methane, a greenhouse gas. Annually 1,000 termites release approximately 500 grams of methane. Given a density of 3.5 x 106 termites per hectacre, what is the annual amount of methane released, in kilograms, by the termites inhabiting a 3,000 hectare of tropical rainforest?

Name _____ Date_____

APES Math Answer Sheet

Directions: Write out your math calculations below. Remember to show all work, include units on each step and clearly identify your final answer by putting a box around it!

PERCENTAGES

1.	2.
3.	4.
5.	6.
7.	

METRIC SYSTEM

8.	9.
10.	11.

SCIENTIFIC NOTATION PRACTICE:

12.	13.
14.	15.
16.	17.

DIMENSIONAL ANALYSIS PRACTICE:

18.
19.
20.
21.