AP Environmental Science - Summer Assignment

2017- 2018 Ms. Martinez

Dear AP Environmental Science Classes of 2017-18, Welcome to AP Environmental Science! Students who enroll in APES should be ready and willing to devote sufficient time, focus & energy to class assignments, including daily text readings, taking extensive notes in and outside of class, preparing for frequent exams and quizzes, participating in laboratory and field experiments, writing reports, giving oral presentations, participating in class discussions and doing other various class assignments. Students who are not able or willing to devote sufficient time, focus and energy to this course should consider taking this course at another time. In order to be better prepared, we need to do some work over the summer. Hopefully you will find most of your assignment both informative and enjoyable. The purpose of this assignment is to get you thinking about the environment in which we live and help prepare you for your studies in environmental science for the upcoming school year. You should plan on immersing yourself in the subject of environmental science for the next twelve months. Please complete the following assignment this summer **DUE the first day of school.**

Break Down:

For 4 and 5 you must have your hard copy or Ebook, "Living In The Environment" 18th ed. by Miller and Spoolman

1) The Lorax – Watch the 1972 version of The Lorax (using youtube) and fill out the questions worksheet.

2) APES Math Packet – complete the math packet and put all answers on the answer sheet. There will be a quiz on this in the first week.

3) US and World Maps – Fill in and label each map with the state or country. Also indicate 5 famous rivers or natural landmarks for each map.

4) Ch 1 Notes – Complete the Chapter Review and Critical Thinking questions for each section. Follow the notes template for the proper format.

5) Sustainability Poster – Using the information in Ch1 create a poster focusing on the 6 Principles of Sustainability. (Refer to the Rubric)

The Lorax – Video Questions **NAME _____**

Pre-read the questions below and answer while watching and/or after watching the Lorax video. **You can hand 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 California.

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 of 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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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
- Scientific Notation
- 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.

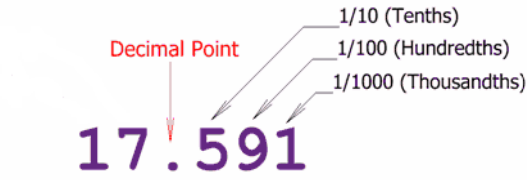
Directions

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.

$$\begin{array}{r} 123.0000 \\ 0.0079 \\ +43.5000 \\ \hline 166.5079 \end{array} \qquad \begin{array}{r} 27.583 \\ -\ 0.200 \\ \hline 27.383 \end{array}$$

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.

$3.77 \times 2.8 = ?$

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

Part IV: Dividing Decimals

Scenario One: If the divisor (the number after the / or before the $\overline{)\ \ }$) 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 under the $\overline{)\ \ }$).

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

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. 45.937 – 13.43 =
4. 199.007 – 124.553 =
5. 28.4 x 9.78 =
6. 324.45 x 98.4 =
7. 64.5 / 5 =
8. 114.54 / 34.5 =

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.

9. Find the average of the following numbers: 11, 12, 13, 14, 15, 23, and 29
10. 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 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

12000

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

12000 → 120.00 → 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 x .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

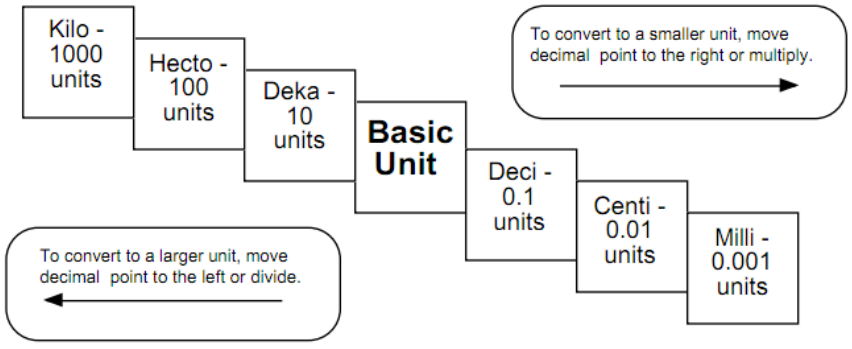
Step 2: $1600 / .08 = $160,000 / 8 = $20,000 *(Remember when the divisor has a decimal, move it to the end to make it a whole number and move the decimal in the dividend the same number of places. .08 becomes 8, 1600 becomes 160000.)*

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

11. Thirteen percent of a 12,000 acre forest is being logged. How many acres will be logged?
12. A water heater tank holds 280 gallons. Two percent of the water is lost as steam. How many gallons remain to be used?
13. What percentage is 25 of 162.5?
14. 35 is what percentage of 2800?
15. 14,000 acres of a 40,000 acre forest burned in a forest fire. What percentage of the forest was damaged?
16. You have driven the first 150 miles of a 2000 mile trip. What percentage of the trip have you traveled?
17. 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?
18. 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?
19. 235 acres, or 15%, of a forest is being logged. How large is the forest?
20. 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 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

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

21. 1200 kilograms = ? milligrams
22. 14000 millimeters = ? meters
23. 670 hectometers = ? centimeters
24. 6544 liters = ? milliliters
25. .078 kilometers = ? meters
26. 17 grams = ? kilograms

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.

Part I: 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 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. 4.26×10^{-8}

Part II: Adding and Subtracting Numbers in Scientific Notation

To <u>add</u> or <u>subtract</u> 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.

$$3.72 \times 10^{5} \rightarrow .372 \times 10^{6}$$

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.

$$1.722 \times 10^{6}$$

Part III: 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: $1.35 \times 10^6 \quad X \quad 3.72 \times 10^5 = ?$

Step 1: Multiply the coefficients.

$$\begin{array}{r} 1.35 \\ \times\ 3.72 \\ \hline 270 \\ 9450 \\ \underline{40500} \\ 50220 \end{array} \rightarrow 5.022$$

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.

$$5.635 / 3.45 = 2.3$$

Step 2: Subtract the exponents.

$$3 - 6 = -3$$

Step 3: Write your final answer.

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

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

Write the following numbers in scientific notation:

27. 145,000,000,000

28. 13 million

29. .000348

30. 135 trillion

Complete the following calculations:

31. $3 \times 10^3 + 4 \times 10^3$
32. $4.67 \times 10^4 + 323 \times 10^3$
33. $9.85 \times 10^4 - 6.35 \times 10^4$
34. $1.278 \times 10^{-13} - 1.021 \times 10^{-10}$
35. three hundred thousand plus forty-seven thousand
36. 13 million minus 11 thousand
37. $1.32 \times 10^8 \text{ X } 2.34 \times 10^4$
38. three million times eighteen thousand
39. one thousandth of seven thousand
40. $3.45 \times 10^9 / 2.6 \times 10^3$
41. $1.98 \times 10^{-4} / 1.72 \times 10^{-6}$
42. twelve thousand divided by four thousand

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. It is sometimes called factor-labeling. 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 a dimensional analysis problem, 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. Likewise, 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.

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

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.

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

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

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

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 cancelled 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.

$$9.46 \times 10^7 \text{ seconds} / \ 1 = 9.46 \times 10^7 \text{ seconds}$$

Step 6: Review your answer to see if it makes sense. 9.46 x 10^7 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 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.

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

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

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

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

$$50 \times 5280 \text{ feet} \times 1 \times 1 = 264000 \text{ feet}$$
$$1 \times 1 \times 60 \times 60 \text{ seconds} = 3600 \text{ seconds}$$
$$264000 \text{ feet} / 3600 \text{ seconds} = 73.33 \text{ feet/second}$$

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

Conversions:

1 square mile = 640 acres
1 hectare (Ha) = 2.47 acres
1 kw-hr = 3,413 BTUs
1 barrel of oil = 159 liters
1 metric ton = 1000 kg

43. 134 miles = ? inches
44. 8.9×10^5 tons = ? ounces
45. 1.35 kilometers per second = ? miles per hour
46. A city that uses ten billion BTUs of energy each month is using how many kilowatt-hours of energy?
47. A 340 million square mile forest is how many hectares?
48. If one barrel of crude oil provides six million BTUs of energy, how many BTUs of energy will one liter of crude oil provide?
49. Fifty eight thousand kilograms of solid waste is equivalent to how many metric tons?

APES Math Prep Answer Sheet Name: _____

Remember to show all your work, include units on each step and circle your final answer. Please do not use a calculator. You will not be able to use a calculator on the APES Exam you will take next May.

DECIMALS

1. **Answer: _____**	**2.** **Answer: _____**
3. **Answer: _____**	**4.** **Answer: _____**
5. **Answer: _____**	**6.** **Answer: _____**
7. **Answer: _____**	**8.** **Answer: _____**

AVERAGES

9. **Answer: _____**	**10.** **Answer: _____**

PERCENTAGES

11. Answer: _____	**12.** Answer: _____
13. Answer: _____	**14.** Answer: _____
15. Answer: _____	**16.** Answer: _____
17. Answer: _____	**18.** Answer: _____
19. Answer: _____	**20.** Answer: _____

METRIC SYSTEM

21. Answer: _____	**22.** Answer: _____	**23.** Answer: _____
24. Answer: _____	**25.** Answer: _____	**26.** Answer: _____

SCIENTIFIC NOTATION

27. Answer: _____	**28.** Answer: _____
29. Answer: _____	**30.** Answer: _____
31. Answer: _____	**32.** Answer: _____
33. Answer: _____	**34.** Answer: _____
35. Answer: _____	**36.** Answer: _____

37. Answer: _____	**38.** Answer: _____
39. Answer: _____	**40.** Answer: _____
41. Answer: _____	**42.** Answer: _____

DIMENSIONAL ANALYSIS

43. Answer: _____
44. Answer: _____

45.

Answer: _____

46.

Answer: _____

47.

Answer: _____

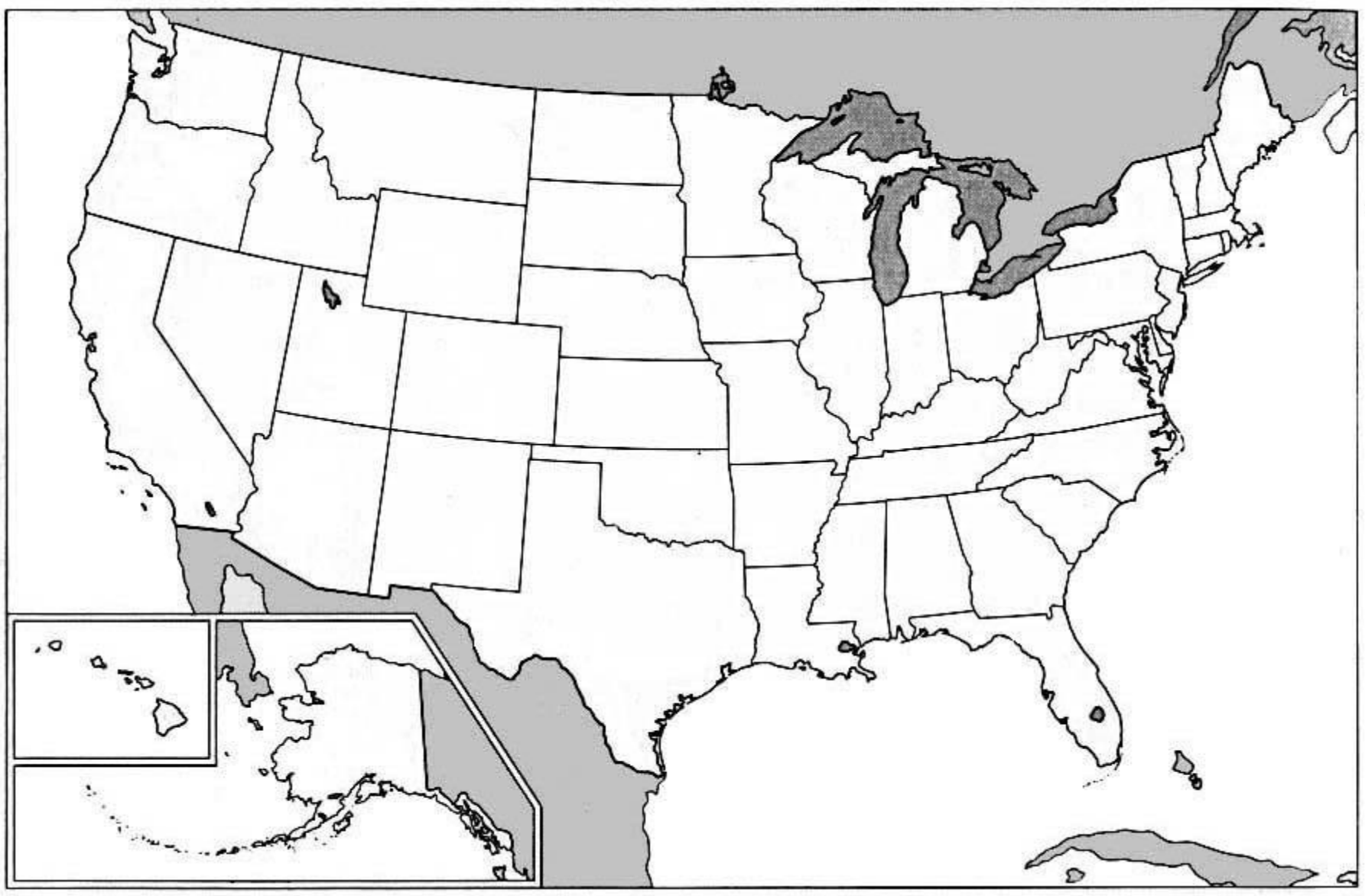
48.

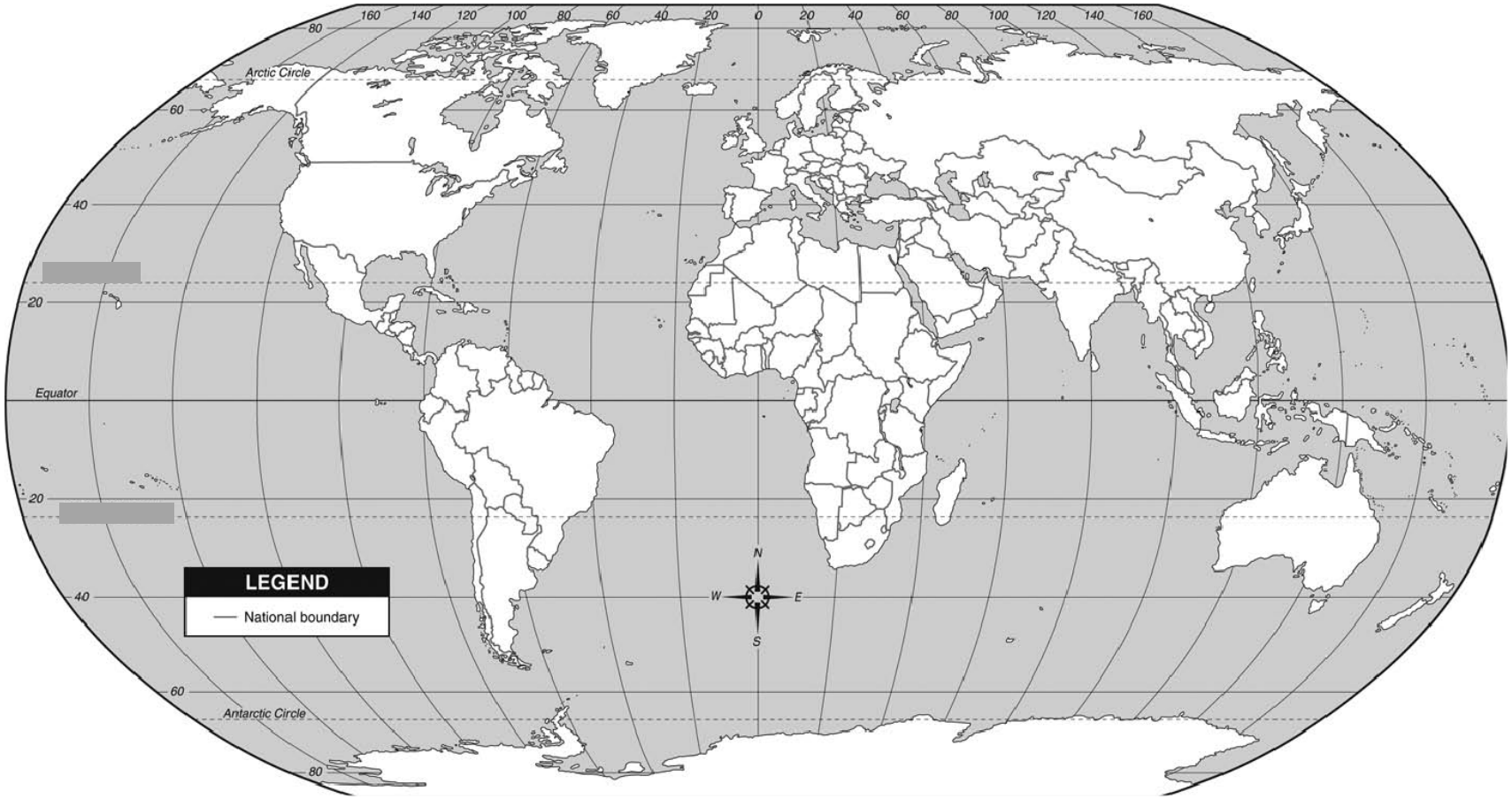
Answer: _____

49.

Answer: _____

Practice U.S. Map




160 140 120 100 80 60 40 20 0 20 40 60 80 100 120 140 160
80
Arctic Circle
60
40
20
Equator
20
40
60
Antarctic Circle
80
LEGEND
National boundary
N
W
E
S

Notes Format Template

Your chapter notes must be formatted as shown below:

Name

Date

Chapter Title and Sections

Section number

1. This would be the first question. Make sure to **bold** any vocab words you are describing and *italicize the question you are answering*. (in parenthesis put the page number you found the answer in the book for easy reference later)
2. I would suggest indenting (pressing enter to a new line) and putting a page number after each sentence in the question for easy reference.

Section Number

3. Below is a filled out example from chapter 18-1 of your book!

Ch 18 exert Pg. 502

Section 18-1

2. What is the key concept for this section? Define density, as it relates to the atmosphere, and atmospheric pressure and explain why both are two important atmospheric variables. Define troposphere, stratosphere, and ozone layer. What are the major differences between the troposphere and stratosphere?

Ms. Martinez

7/1/2018

Chapter Review: 18-1 to 18-3

Section 18-1

2. *The key concept for this section is* 'the two innermost layer of the atmosphere are the troposphere, which supports life, and the stratosphere, which contains the protective ozone.' (pg. 475)

Density is the number of molecules per unit of air volume *and relates to the atmosphere by* increasing in density in the lower layers of the atmosphere and decreasing in density going

towards the outer layers. This creates higher atmospheric pressure in the lower atmosphere and less atmospheric pressure in the upper atmosphere. *Both are important atmospheric variables because* they play major roles in the weather. (pg. 475)

The **troposphere** is the layer closest to the earth that contains 75-80% of the earth's air mass. The troposphere is also thicker at the equator then at the poles. It contains 78% nitrogen, 21% oxygen, and trace elements of water vapor, argon, carbon dioxide, dust, soot particles, methane, ozone, and nitrous oxide. Rising and falling air currents, winds, and concentrations of CO2 and other greenhouse gases in the troposphere play a major role in the planet's short-term weather and long-term climate. (pg. 475)

The **stratosphere** is the atmosphere's second layer which extends 17 to about 48 kilometers above the earth's surface. The composition of the troposphere and stratosphere are about the same with the stratosphere having much less water vapor and much more ozone. (pg. 475)

The **ozone layer** is a concentration of ozone in the stratosphere around 17-26 kilometers above sea level and is created by UV light interacting with O2 to form O3 (ozone). The ozone layer acts as a "global sunscreen" and keeps about 95% of the sun's harmful UV radiation for reacting the earth's surface. This allows life to exist on earth and protects us from sunburn, skin and eye cancer, cataracts, and damaging our immune system. (pg. 475-476)

The major differences between the troposphere and stratosphere is a slightly different composition with the stratosphere having less water vapor and more ozone. They also are at different levels of the atmosphere with the troposphere at 0-17 kilometers and the stratosphere is at 17-26 kilometers above sea level. (pg. 475)

Sections 18-2

3.

4.

Section 18-3

5.

Principles of Sustainability Poster

Objective: to define and identify the three scientific principles of sustainability and the three social science principles of sustainability.

On a poster you must create *a picture* and *describe* each of the principles of sustainability.

(Figure 1-2) Scientific Principles of Sustainability

- Solar Energy
- Chemical Cycling
- Biodiversity

(Figure 1-5) Social Science Principles of Sustainability

- Economics
- Politics
- Ethics

At the bottom of your poster answer and **explain** the following questions:

1. Is it possible for humans to maintain all principles of sustainability?
2. Are some principles easier to maintain than others?
3. How does environmental science connect the natural world with the modern human world?

RUBRIC

	10pts	5pts	0pts
Descriptions	Complete with All descriptions are in complete sentences and include a process or example	Mostly completed with descriptions in complete sentences.	Not present
Pictures	Completed with neat and colored pictures for each principle	Incomplete and without neatness	Not Present
Reflection Questions	Completed in complete sentences	Incomplete	Not Present
Creativity, Esthetic, and Neatness	Poster shows color, creativity, and is esthetically pleasing	Little creative thought or color but still neat	Is untidy and was clearly made the night before