

The summer assignment comprehensive, designed to give you a jumping off point for this course. This is an advanced science course that combines the disciplines of biology, chemistry, geology and physics to investigate global environmental issues. We will discover how the Earth's systems function together and how humans have affected our planet. Because this is a college level course, you will be responsible for learning a large amount of material on your own. I will help you as we go, but it will be **your responsibility** to take notes, read the textbook, study and learn your vocabulary! We also work on the assumption that you have a general science background that includes biology, chemistry, physics and algebra. The purpose of this project is to help you prepare for the APES content by getting organized, reviewing some background information, and getting familiar with some of the basic concepts of environmental science. Utilizing your background knowledge is "key", to your success in this course.

General Guidelines:

- **Read the directions for each section carefully!**
- Each section should be clearly labeled.
- Each section of the project must be fully completed, neat and typed when specified.
- Each piece of the project should be bound together in some way.
- All research/information needs to be appropriately cited using APA format. A quick Google search will help you with formatting.
- All work is to be completed on your own. You may not work with other students to complete this assignment. Plagiarism will NOT be tolerated.
- The checklist, provided at the end of this packet, should be completed and attached to the front of your work.

THE ASSIGNMENT:**Section 1: Chemistry Review**

Chemistry is a big part of environmental science. It is highly recommended that you take chemistry before registering for this course. In order to review some of the basic chemistry concepts you will need complete the following on a clean sheet of paper. This may be typed or hand written.

1. For each of the following, write out the chemical name that goes with the symbol:

CO ₂	CO	C ₆ H ₁₂ O ₆	CH ₄	H ₂
N ₂	NO ₂	NO ₃	NH ₃	NH ₄
O ₂	O ₃	P	PO ₄ ³⁻	S
SO ₂	SO ₃	H ₂ SO ₄	NaCl	Pb
U	Rn	Hg	Cl	H ₂ O

2. Write at least a paragraph that explains the following:

- a. What is the pH scale? What does it measure?

- b. How do the numbers on the pH scale compare? Example – is a pH of 4 twice as strong as a pH of 2?
- c. What are the average pH ratings of the following common substances in the environment?
 - a. Blood
 - b. Rain
 - c. Freshwater (lake or river)
 - d. Ocean water

3. For the four items listed above, how /what can change/effect the pH?

Section 2: Math Review

The APES exam has a significant amount of math and **does not allow the use of calculators!**

Required Basic skills:

- Percentage
- Rates
- Scientific notation
- Dimensional Analysis
- Metric Prefixes

Complete each of the following problems including a detailed setup with **labeled units** and proper **scientific notation. NO CALCULATORS!** You must show all work to get credit.

** All problems should be expressed in scientific notation (do not write out large numbers with multiple zeros as place holders)*

1. What is ten million times three thousand?
2. What is thirty-four million plus two hundred fifty-six thousand times four hundred?
3. A population of deer had 200 individuals. If the population dropped 15% in one year, how many deer were lost? What is the total population of deer the next year?
4. One year we had 120 APES students and the next year we had 150 APES students. What percentage did the population of APES students grow by?
5. One year we had 2500 endangered sea turtles hatch. After one year there were only 1500. What percentage of turtles died?
6. Electricity costs 6 cents per kilowatt hour. In one month one home uses one megawatt of electricity. How much will the electric bill be? (be sure to look at the conversion chart for the conversion factor from kilo to mega)
7. Your car gets 12 miles to the gallon and your friend's car gets 20 miles to the gallon. You decide to go on a road trip to Virginia Tech, which is 300 miles away. If gas costs \$4 per gallon and you decide to split the gas money, how much money will you save by driving your friend's car?
8. A turtle was crawling at the rate of 38 cm per minute. How many kilometers would the turtle crawl in 2 hours?
9. A turtle was crawling at the rate of 43 cm per minute. How many kilometers would this turtle crawl in one day (24 hours) if it did not rest and continued to crawl at a continuous pace?

10. There are 125 blades of grass in a square cm of lawn. Assuming the grass stand is even, how many blades of grass would be found in a lawn measuring 8 meters by 6 meters? Use scientific notation in your answer.
11. You purchase a home that is 2500 square feet of living space. How many square meters of living space is this?
12. If a calorie is equivalent to 4.184 joules, how many joules are contained in a 250 kilocalorie slice of pizza?
13. A coal-fired electric power plant produces 12 million kilowatt-hours (kWh) of electricity each day. Assume that an input of 10,000 BTUs of heat is required to produce an output of one kilowatt-hour of electricity. Calculate the number of BTUs of heat needed to generate the electricity produced by the power plant each day.
14. (Using the information in 13) Calculate the pounds of coal consumed by the power plant each day assuming that one pound of coal yields 5,000 BTUs of heat.
15. If a city of 10,000 experiences 200 births, 60 deaths, 10 immigrants and 30 emigrants in the course of a year, what is its net annual percentage growth rate? (By what percentage did the population change?)

Section 3: 'Home' Video

Watch the video "Home" on youtube.com and answer the questions on a separate sheet of paper.

Home Video Questions

1. When did life originate on Earth?
2. When did Homo sapiens originate?
3. What was our planet like originally?
4. What was a cloud of a good knitted dust particles similar to so many similar clusters in the universe?
5. What was our Earth was like at its birth?
6. Why was it important for the Earth to be at the right distance from the sun-not too far, not too near?
7. How is the water cycle described?
8. How did the ocean get salty?
9. What is shared by every life-form on our planet?
10. What originated as stardust?
11. What provides the Earth's red, black, blue, and yellow?
12. Where did life first spark into being?
13. What fed off the Earth's heat?
14. What organism were the first that had the capacity to turn to the sun to capture its energy?
15. How did these organisms change the destiny of our planet?
16. What happened to the carbon that poisoned the atmosphere?
17. How much time can be read in the walls of Colorado's Grand Canyon?
18. How did the organisms grow their shells?
19. What happened to the shells of the microorganisms that died?
20. What did plant life finally do?
21. What is the Earth's water cycle?

22. Why water called one of the most unstable of all?
23. What happens when water freezes?
24. .What is the engine of life?
25. Why are water and air inseparable?
26. What are the green organisms that supply _____% of the oxygen?
27. Coral is the mutualistic relationship between what two organisms?
28. Where is and how big is the Great Barrier Reef?
29. The Great Barrier Reef has _____ species of fish, _____ species of mollusks and _____ species of coral.
30. It took more than _____ years for it to make trees.
31. In a chain of species, why are trees a pinnacle species?
32. Trees have inherited from _____ the power to capture light's energy.
33. Why are trees so important for the formation of soils?
34. Soils are the factory of _____ .
35. How is soil a world of incessant activity?

36. Why is it said that the Earth is a miracle?
37. What is meant by the phrase that "Every species has a role to play"?
38. Humans settled down after _____ nomadic years.
39. The _____ was, an invention that opened up new horizons and turned humans into navigators.
40. The majority of mankind lives _____ .
41. The first _____ grew up less than 6000 years ago.
42. One in _____ people still use only the strength of their bodies.
43. _____ billion human beings is more than the combined population of all the wealthy nations.
44. _____ are a family's only asset, as long as every extra pair of hands is a necessary contribution to its subsistence.
45. _____ feeds people, clothes them and provides for their daily needs. Everything comes from the Earth.
46. How did towns change humanity's nature as well as its destiny?
47. The physical energy and strength with which nature had not endowed them was found in _____
48. _____ was humans' first great revolution that was developed barely _____ years ago.
49. The uncertainty of _____ resulted in the first surpluses and gave birth to cities and civilizations.
50. Humans harnessed the energy of animal species and plant life, from which they at last extracted the .
51. _____ are the yeast of life.
52. The principal daily concern of all humans is to _____ .
53. _____ of humankind tills the soil over _____ of them by hand.
54. What is the pure energy-the energy of the sun-captured over millions of years by millions of plants more than a hundred million years ago.
55. In the last _____ years, the Earth's population has almost _____ , and over _____ people have moved to the cities.
56. Today, over _____ of the world's _____ inhabitants live in cities.
57. _____ resulted in the invention of _____ which in turn permitted the invention of skyscrapers.
58. A _____ of oil generates as much energy as _____ in 24 hours, but worldwide only percent of farmers have use of a tractor.
59. In the United States, only _____ farmers are left. (Equal to number of people in jails and prison in US)
60. They produce enough grain to feed _____ people. But most of that grain is used to feed _____ or _____ .

61. Agriculture accounts for _____% of humanity's water consumption.
62. _____, another gift of the petrochemical revolution, exterminated _____.
63. Toxic pesticides seeped into the _____.
64. _____ of the varieties developed by farmers over _____ of years have been wiped out.
65. How can a growing worldwide demand for meat be satisfied without recourse to _____ farms?
66. The result is that it takes _____ of water to produce one kilogram of potatoes, _____ for one kilo of rice and _____ for one kilo of beef.
67. We know that the end _____ is imminent, but we refuse to believe it.
68. The automobile shapes _____ where every _____, a safe distance from the asphyxiated _____, and where neat rows of houses huddle round _____.
69. If LA's model were followed by all, the planet wouldn't have _____ vehicles, as it does today, but _____.
70. Everywhere, machines dig, bore and rip from the Earth the pieces of stars buried in its depths since its creation _____: .
71. As a privilege of power, _____% of this mineral wealth is consumed by _____% of the world's population.
72. Before the end of this century excessive _____ will have exhausted nearly all the planet's _____.
73. Since _____, the volume of international trade has increased _____ times over.
74. _____ percent of trade goes by sea. _____ million containers are transported every year headed for the world's major hubs of consumption.
75. _____ is one of the biggest construction sites in the world, a country where the impossible becomes possible.
76. The ocean covers _____ of the planet.
77. The _____ remain a secret. They contain _____ of species whose existence remains a mystery to us.
78. Since _____, fishing catches have increased _____, from _____ to _____ million metric tons a year.
79. _____ of fishing grounds are exhausted, depleted or in danger of being so. Most large fish have been fished out of existence since they have no time to _____.
80. _____ humans live in the world's desert lands, more than the combined population of _____.
81. What is fossil water?
82. Across the planet, one major river in _____ no longer flows into the sea for several months of the year.
83. Lake Powell took _____ to reach high-peak mark. Its level is now _____ of that.
84. Water shortages could affect nearly _____ people before _____.
85. These wetlands are crucial to all life on Earth. They represent _____ percent of the planet. What are wetlands?
86. Trees provide a habitat for _____ of the planet's biodiversity-that is to say, of all life on Earth. Every year, Why is this biodiversity important?
87. What are mangrove forests and why are they important?
88. Every year, _____ hectares of tropical forests disappear in smoke and as lumber.
89. What happens when the rain forest burn?
90. How long did it take Borneo's vast primary forest to totally disappear?
91. Over _____ people-almost a _____ of the world's population-still depend on charcoal for cooking and heating.
92. On the hills of Haiti, only _____ percent of the forests are left.
93. What is the story of the Rapa Nui, the inhabitants of the Easter Island?

94. In _____ years, the gap between rich and poor has grown wider than ever. Today, _____ of the world's wealth is in the hands of the richest _____ percent of the population.
95. One human being in _____ now lives in a precarious, unhealthy, overpopulated environment, without access to daily necessities, such as water, sanitation or electricity. Hunger is spreading once more. It affects nearly _____ people.
96. It's all about carbon. Under the effect of global warming, the ice cap has lost _____% of its thickness in years. Its surface area in the summer shrinks year by year. It could disappear before _____.
97. By _____, a _____ of the Earth's species could be threatened with extinction.
98. Around the North Pole, the ice cap has lost _____% of its surface area in _____ years.
99. Greenland's ice contains _____% of the freshwater of the whole planet. When it melts, sea levels will rise by nearly _____ meters.
100. Sea levels are rising. Water expanding as it gets warmer caused, in the 20th century alone, a rise of centimeters.
101. Coral reefs, for example, are extremely sensitive to the slightest change in water temperature. _____ percent have disappeared.
102. _____ of the _____ biggest cities stand on a coastline or river estuary. As the seas rise, salt will invade the water table, depriving inhabitants of drinking water.
103. What will happen when the glaciers in the Himalayas recede?
104. Droughts are occurring all over the planet. In Australia, _____ of farmland is already affected.
105. The permafrost is the ground that is constantly frozen. What will happen when it melts?
106. The world spends _____ times more on military expenditures than on aid to developing countries.
107. _____ people a day die because of dirty drinking water
108. _____ people have no access to safe drinking water
109. Nearly _____ people are going hungry
110. Over _____% of grain traded around the world is used for animal feed or bio fuels
111. _____% of arable land has suffered long-term damage
112. Every year, _____ hectares of forest disappear
113. One mammal in _____, one bird in _____, one amphibian in _____ are threatened with extinction
114. Species are dying out at a rhythm _____ times faster than the natural rate
115. _____ of fishing grounds are exhausted, depleted or in dangerous decline
116. The average temperature of the last _____ years have been the highest ever recorded
117. The ice cap is _____% thinner than _____ years ago
118. There may be at least _____ climate refugees by 2050
119. In Bangladesh, a man thought the unthinkable and founded a bank that lends only to the poor. In barely years, it has changed the lives of _____ people around the world.
120. Gabon is one of the world's leading producers of wood. What is selective logging?
121. I have seen houses producing their own energy. _____ people live in the world's first ever eco-friendly district in _____.
122. _____% of the energy we consume comes from fossil energy sources. Every week, _____ new coal-fired generating plants are built in _____ alone.
123. _____, _____, _____ and _____ are the biggest investors in renewable energy. They have already created over _____ jobs.
124. In _____ hour, the sun gives the Earth the same amount of energy as that consumed by all humanity in year. As long as the Earth exists, the sun's energy will be inexhaustible.

Section 4: Case Study

Choose a topic-based case study from the following website:

www.mhhe.com/Enviro-Sci/CaseStudyLibrary/.

1. Find two additional articles on the same topic.
2. On separate pages, cite the article using APA format. Then, briefly summarize each of the articles in a 150-200 word paragraph. *(If the APA format is new to you, please Google the correct procedure for citing your particular source of information.)*
3. Write a 2-3 page paper on your topic that answers the following questions: What is the science behind the story? What situation(s) or crisis has occurred? What are the impacts to the environment? How is the problem being dealt with? What are the aftereffects of the problem/situation/crisis? What changes in regulations/legislation have been made as a result of the problem/situation/crisis? *(1 inch margins, #12 font, double spaced, APA format)*

Checklist:

Please place this completed checklist at the front of your assignment before you turn it in.

Name _____

Section 1: Score _____/30 *(Instructor will assign the scores)*

- I have identified all of the chemical compounds and I am ready for a quiz.
- I have written at least one paragraph about pH and I am ready to explain it to someone else.
- I have researched the pH of the items listed and the effects on their pH
- I have cited all of the sources I used to find my information.

Section 2: Score _____/50

- I have read through the math review material and understand how to solve these types of problems.
- I have completed all of the review problems and am ready to take a math quiz.

Section 3: Score _____/50

- I watched the entire video 'Homes.
- I have answered all questions relating to the video.

Section 4: Score _____/70

- I have chosen a topic-based case study from the website provided
- I have found two additional articles related to my chosen topic
- I have written a thoughtful, 2-3 page paper on my topic, using the guiding questions.
- I have cited my three articles using APA format.

This Assignment is due the first day of class when you enter the classroom. If you turn in the assignment late, you will only earn a MAXIMUM of 50%.