Welcome to AP Environmental Science! The major topics of the class are as follows:

Energy Systems and Resources – atmosphere, soil, groundwater, and geology
The Living World – ecosystems and cycles
Populations – demographics, dynamics and growth
Land and Water Use – agriculture, forestry, mining, fishing and global economics
Energy Resources and Consumption – fossil fuels, nuclear energy, conservation and consumption
Pollution – types of pollution and its impact, waste disposal
Global Change – ozone, global warming, loss of biodiversity

This summer assignment will give you a brief overview of all of the topics we will go over this year by looking at some of the associated prerequisites and math calculations. Over the course of the year we will learn more about the science and social issues associated with each of the topics. There are two parts to the summer assignment which will be collected at the end of the first week of class and counted as a 100 point test grade. If you have any questions about the assignment, feel free to email me at raude@martin.k12.fl.us. All work turned in must be your own work. The assignment will be graded as follows:

Prerequisite Knowledge and Skills
AP Environmental Science is a college level course that combines content area from earth science, biology, chemistry, physics, math, and social studies. You are expected to enter the course with a good understanding of basic scientific and mathematical concepts and skills, as well as strong reading, writing, and speaking abilities. Although we will continue to develop these skills throughout the school year, your success in the class is also dependent upon what you bring to it at the onset. One goal of this summer assignment is to help you brush up on these skills and concepts. Over the summer, review the scientific concepts below as well as the mathematical calculations on the next page; we will be building upon and referencing them throughout the school year. You should be prepared to take a TEST on these skills and concepts on the last day of our first week of school.

Prerequisite Basic Scientific Concepts- The definitions of the following terms must be typed and you should write out the full name for each of the chemical abbreviations; you should be able to recognize examples of these terms/concepts from Biology and Chemistry:

- Organic
- Inorganic
- Kinetic energy
- Potential Energy
- Radioactive decay
- Half life
- Renewable resource
- Non Renewable resource
- Law of Conservation of Matter
- 1st Law of Thermodynamics
- 2nd Law of Thermodynamics
- Entropy
- Organism
- Species
- Population
- Community
- Ecosystem
- Producers/Autotrophs
- Consumers/Heterotrophs
- Decomposers
- Photosynthesis (write out the equation and the definition)
- Cellular Respiration (write out the equation and the definition)
- Aerobic
- Anaerobic
- Adaptation
- Natural selection
- Biodiversity
- Extinction
- Plate tectonics
- Weathering
- Climate Change
- Rock
- Mineral
- Climate
- Weather
- The full name of each of these chemical abbreviations:
  - CO₂, CO, C₆H₁₂O₆, CH₄, H₂O, N₂, NOₓ, NO₃⁻, NH₃, O₂, O₃,
  - P, S, SO₂, Cl, K, NaCl, Pb, Hg, Rn, U
Prerequisite Basic Mathematical Skills

Percentage
17% = 17/100 = .17
- Remember that “percent” literally means divided by 100.
- Percentage is a measure of the part of the whole. Or part divided by whole.
- 15 million is what percentage of the US population? 15 million / 300 million = .05 = 5%
- What is 20% of this $15 bill so that I can give a good tip? $15 x .20 = $15 x 20/100 = $3

Rates
Rates will often be written using the word “per” followed by a unit of time, such as cases per year, grams per minute or mile per hour. The word per means to divide, so miles per gallon is actually the number miles driven divided by one gallon. Rates are calculating how much an amount changes in a given amount of time.

Scientific Notation

Thousand = $10^3$ = 1,000
Million = $10^6$ = 1,000,000 (people in the US)
Billion = $10^9$ = 1,000,000,000 (people on Earth)
Trillion = $10^{12}$ = 1,000,000,000,000 (National debt)
- When using very large numbers, scientific method is often easiest to manipulate. For example, the United States population is about 310 million people or 3.1 x 10^8
- When adding or subtracting, exponents must be the same. Add the numbers in front of the ten and keep the exponent the same.
- When multiplying or dividing, multiply or divide the number in front of the ten and add the exponents if multiplying or subtract the exponents if dividing. Ex. 9 x 10^6 /3 x 10^2 = (9/3) x 10^{(6-2)} = 3 x 10^4

Dimensional Analysis

You should be able to convert any unit into any other unit accurately if given the conversion factor. Online tutorials are available:
http://www.chemprofessor.com/dimension_text.htm
http://www.chem.tamu.edu/class/fyp/mathrev/mr-da.html

Prefixes

m (milli) =1/1000 =10^-3
\( c \) (cent) =1/100 =10^-2
k (kilo) =1000 =10^3
M (mega) =1,000,000 =10^6
G (giga) =1,000,000,000 =10^9
T (tera) =1,000,000,000,000 =10^{12}

Math Problems

Answer the questions. Use a separate sheet of paper and show all work.

1) What is one billion times three billion? Show your work in scientific notation. Give the answer in scientific notation and in words.
2) A population of deer had 300 individuals. If the population grows by 30% in one year, how many deer will there be the next year?
3) One year I had 62 AP Environmental Science students and the next year I had 43 Environmental Science students, what percentage did the population of APES students grow by?
4) Electricity costs 9 cents per kilowatt hour. In one month one home uses one megawatt hour of electricity. How much will the electric bill be? (be sure to look at the prefixes chart on the previous page for the conversion of kilo to mega)
5) Your car gets 28 miles to the gallon and your friend’s car gets 38 miles to the gallon. You decide to go on a road trip to Virginia Tech, which is 300 miles away. If gas costs $4.50 per gallon and you decide to split the gas money, how much money will you save in gas by driving your friend’s car?

The prerequisite terms and five simple math questions count as part one of the summer assignment.
Part two is as follows:
PART TWO OF APES SUMMER ASSIGNMENT

APES Summer (Summer Scavenger Hunt): This is the official, most important summer assignment. It is spelled out in detail on other sheets. An example of a summer video has been provided, without any guarantees of accuracy, promises of quality or assumptions of liability. http://www.youtube.com/watch?v=yLDgeaw1S20&feature=plcp.

1. Explore, enjoy, honor, consider and document your environment
2. Take the Ape out sightseeing.

RULES

FIND all of the items on the attached list. All items can be found very locally, at some level, but might be better further away. PROOF of finding each item is an image (digital or film, still or motion), clearly showing (a) the item, (b) yourself, and (c) the item. Required DOCUMENTATION for each image is (a) the item identification, (b) the item location, (c) the date the item was "collected", and (d) "additional information" (see list).

Your PRODUCT will be a powerpoint slideshow OR a video submitted on a CD, DVD or flash drive, or online due on Friday of the first week of class, but early submissions are encouraged, it will be shown in class.

HELP each other:
If your product is a video: you can work with one partner (in pairs) to submit one video product for both of you. Both partners must be represented with every item.
If your product is a slideshow: you can help each other, but your product is yours alone, with yourself in each image.

You are NOT ALLOWED to trespass, obstruct traffic, violate any laws, jeopardize your safety or compromise your integrity in any way in pursuit of any item.

PRODUCT: Video OR Slideshow including maps, with the checklist
1. VIDEO: Each item would be a clip, including the item, the icon, you, and the requisite documentation (which could be audio, of course). Videos can be submitted with a partner.
2. POWERPOINT SLIDESHOW: Each item is a slide, including the item, the icon, you and the requisite documentation. Slideshows must be submitted individually
3. Maps: image locations marked on a map or maps; ideally the map or maps would be an additional slide or slides, or video clip or clips.

CREDIT
1. Full credit is the expectation.
2. "More items" is better than "fewer items."
3. "Best" is worth more than "Better", which is generally worth more than "good."
   Note – this is out of 100 points therefore 25 “best” items is equal to a 100%, 25 “better” items is worth an 88%, and 25 “good” items is worth 63%.
4. Clarity and quality of imagery is important
5. Accuracy and thoroughness of documentation are important.
6. Creativity and entertainment value are way better than no creativity or entertainment value; they can compensate for minor deficiencies, but not for major deficiencies.
7. Evidence of trespassing, obstruction of traffic, violation of laws, jeopardizing safety or compromising integrity will cost credit. Photoshopping or other image manipulation to gain advantage constitutes an absolute abandonment of integrity and be given a zero.

SUGGESTIONS
1. Have fun with it; it's not supposed to be "work."
2. Build it gradually throughout the summer. Saving it all for the last day would make it "work."
3. Keep the Ape in your wallet or with your phone, so you're always ready. When you see something, whip out the Ape, take a picture or clip, and collect the info.
4. If you have no imaging device, you can borrow one from a friend, or work with a friend, or let me know and you can borrow one from me.
5. If questions arise, send an email to raude@martin.k12.fl.us; I may check during the summer.
<table>
<thead>
<tr>
<th>#</th>
<th>Category</th>
<th>Best (4 points)</th>
<th>Better (3.5 points)</th>
<th>Good (2.5 points)</th>
<th>Additional Information (+1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lithosphere</td>
<td>Igneous rock outcrop (exposed bedrock)</td>
<td>Sedimentary or metamorphic rock outcrop (exposed bedrock)</td>
<td>Non-native rock, bigger than you.</td>
<td>Name of rock</td>
</tr>
<tr>
<td>2</td>
<td>Hydrosphere</td>
<td>Ocean</td>
<td>Bay</td>
<td>Flowing or standing water in a watershed</td>
<td>Name of water body</td>
</tr>
<tr>
<td>3</td>
<td>Atmosphere</td>
<td>Cumulus-type cloud</td>
<td>Stratus-type cloud</td>
<td>Cirrus-type cloud</td>
<td>Name of cloud type</td>
</tr>
<tr>
<td>4</td>
<td>Biogeochemical cycles</td>
<td>Nitrogen Cycle</td>
<td>Carbon cycle</td>
<td>Water cycle</td>
<td>Where the element or compound has come from and is going to</td>
</tr>
<tr>
<td>5</td>
<td>Energy Flow</td>
<td>Carnivore consuming herbivore or carnivore (not processed &quot;food&quot;)</td>
<td>Herbivore consuming producer (not processed &quot;food&quot;)</td>
<td>Photosynthesis happening</td>
<td>Names of participating species</td>
</tr>
<tr>
<td>6</td>
<td>Biodiversity</td>
<td>Native endangered animal, in its habitat</td>
<td>Native endangered plant, in its habitat</td>
<td>Non-native endangered species</td>
<td>Name of species</td>
</tr>
<tr>
<td>7</td>
<td>Biodiversity</td>
<td>Invasive animal species</td>
<td>Invasive plant species</td>
<td>Invasive human species</td>
<td>Name of species, and where species came from</td>
</tr>
<tr>
<td>8</td>
<td>Population Growth</td>
<td>A human greater than 25 years old</td>
<td>A human between 17-25</td>
<td>A human less than 17</td>
<td>Name of the human, and a quote from the human</td>
</tr>
<tr>
<td>9</td>
<td>Forest</td>
<td>Native tree you can’t reach more than one quarter of the way around</td>
<td>Native tree you can’t reach more than halfway around</td>
<td>Non-native tree you can’t reach more than halfway around</td>
<td>Name of species</td>
</tr>
<tr>
<td>10</td>
<td>Biodiversity Preserve</td>
<td>National park system unit</td>
<td>State park system unit</td>
<td>County or city park system unit</td>
<td>Name of park</td>
</tr>
<tr>
<td>11</td>
<td>Food Crops</td>
<td>Food crop being grown on a farm</td>
<td>Food crop being transported</td>
<td>Food crop being processed or retailed</td>
<td>Name of food crop</td>
</tr>
<tr>
<td>12</td>
<td>Meat</td>
<td>Animals being raised for food in a CAFO</td>
<td>Animals being raised for food on rangeland</td>
<td>Meat being retailed</td>
<td>Name of animal</td>
</tr>
<tr>
<td>13</td>
<td>Fishing</td>
<td>Commercial fishing operation</td>
<td>Recreational fishing</td>
<td>Fish being retailed</td>
<td>Name of fish</td>
</tr>
<tr>
<td>14</td>
<td>Water Resources</td>
<td>Water transport system</td>
<td>Water storage system</td>
<td>Water delivery and use</td>
<td>Where water came from and goes to</td>
</tr>
<tr>
<td>15</td>
<td>Water Pollution</td>
<td>Point source of water pollution</td>
<td>Nonpoint source of water pollution</td>
<td>Polluted water or solid water pollutant</td>
<td>Type of water pollution</td>
</tr>
<tr>
<td>16</td>
<td>Air Pollution</td>
<td>Nonmobile point source emitting pollution</td>
<td>Mobile source emitting pollution</td>
<td>Air pollution without identified source</td>
<td>Type of air pollution</td>
</tr>
<tr>
<td>17</td>
<td>Renewable Energy</td>
<td>Renewable power generating plant (solar, wind, geothermal...)</td>
<td>Renewable residential or commercial generator</td>
<td>Renewably-powered appliance</td>
<td>Type of renewable energy</td>
</tr>
<tr>
<td>18</td>
<td>Fossil Fuels</td>
<td>Fossil fuel production or processing (mine, well, refinery...)</td>
<td>Non-gasoline fossil fuel use or retail</td>
<td>gasoline retail</td>
<td>Name of fossil fuel</td>
</tr>
<tr>
<td>19</td>
<td>Solid Waste</td>
<td>REDUCING waste generation (instead of reusing, recycling or discarding)</td>
<td>REUSE of potential waste (instead of recycling or discarding)</td>
<td>RECYCLEing potential waste (instead of discarding)</td>
<td>Potential waste that is being averted</td>
</tr>
<tr>
<td>20</td>
<td>Urbanization</td>
<td>LEED platinum or gold building</td>
<td>LEED silver or certified building</td>
<td>Other &quot;green&quot; building</td>
<td>Name of or occupants of building, description of 'green' features</td>
</tr>
<tr>
<td>21</td>
<td>Transportation</td>
<td>Riding public mass transit</td>
<td>Public mass transit</td>
<td>Private mass transit</td>
<td>Destination and ride quality</td>
</tr>
<tr>
<td>22</td>
<td>Transportation</td>
<td>Two cars, in same image, differing in mileage by more than 30 mpg</td>
<td>Two cars, in same image, differing in mileage by more than 20 mpg</td>
<td>Two cars, in same image, differing in mileage by more than 10 mpg</td>
<td>Makes, models and mileages of pictured cars</td>
</tr>
<tr>
<td>23</td>
<td>Politics and Economics</td>
<td>University building, from which the environment is studied</td>
<td>Community college building, from which the environment is studied</td>
<td>Commercial or office building, from which the environment is worked with</td>
<td>Name of someone who works there, and a quote from them about the environment</td>
</tr>
<tr>
<td>24</td>
<td>Politics and Economics</td>
<td>Worker in environment-related profession</td>
<td>Volunteer in environment-related work</td>
<td>Environmentally aware person</td>
<td>Name and environmental role of person, and quote from person.</td>
</tr>
<tr>
<td>25</td>
<td>Beauty</td>
<td>A non-human thing in the environment that you find extraordinarily beautiful</td>
<td>A non-human thing in the environment that you find moderately beautiful</td>
<td>A non-human thing in the environment that you find not beautiful at all</td>
<td>What it is, and why it's beautiful or not</td>
</tr>
</tbody>
</table>
THIS APE MUST BE SHOWN IN EVERY PICTURE!