

# Advanced Placement Environmental Science, 2017-2018

Welcome to AP Environmental Science, commonly known as APES. APES is an advanced interdisciplinary science course that prepares students for the national AP Environmental Science exam, using a college text and requiring college level skills. A passing score on the AP exam may qualify the student to by-pass a semester of a first-year college environmental science course, so APES should not be considered "college prep." Rather, this is a **college class**, with college level expectations for **behavior, participation and effort**. All students working toward an undergraduate degree, no matter the major field of study, will need to take elective distribution courses in other fields (science). AP Environmental Science can fulfill part of this requirement, if you receive credit for a passing AP exam score. This can add up to a considerable monetary saving if you don't have to pay for these extra classes at university. Because this is a college level course, students will be required to do extensive reading and writing. For more information about APES and AP courses in general, go to [www.apcentral.collegeboard.com](http://www.apcentral.collegeboard.com)

The "problem" with environmental science is that it's an immense field of study. Not only does it combine various fields of natural science (biology, chemistry, geology, and physics), but history, sociology, politics, economics, laws, and ethics also complicate it. This interdisciplinary perspective is also what makes it such an important and powerful way to look at the world. Because we have so much ground to cover, I have some work for you to do over the summer to get you started thinking along these lines.

## Your Summer Assignment:

1. Scavenger Hunt (due Friday, August 18<sup>th</sup>)
2. Read a book and keep a reading log (due Monday, August 14)
3. Math Self Assessment (due Monday, August 14—if you can't do these problems, try to get help over the summer)
4. Chemistry Practice (due Monday August 14)

## Assignment #1: Scavenger Hunt

You will complete a "to-do" list see the following page for directions and rubric.

### Scavenger Hunt Due: Friday August 18, 2017.

Please feel free to send me a picture or update at [pleonard@pasco.k12.fl.us](mailto:pleonard@pasco.k12.fl.us)

## Assignment #1 Summer Scavenger Hunt Guidelines

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

### B. RULES

1. **FIND** as many of the items as you can (see list). All items can be found very locally, at some level, but might be better further afield.
2. **PROOF** of finding each item is an image (digital or film, still or motion), clearly showing (a) the item, (b) yourself, and (c) a date-identifying item].
3. 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).
4. Your **PRODUCT** will be a powerpoint slideshow **OR** a video. a. submitted on a CD, DVD or flash drive, or online. b. due on Friday of the first week of class, but early submissions are encouraged. c. It will be shown in class.
5. **HELPING** each other:
  - a. If your product is a **VIDEO**: you can work with **ONE** (1) partner (in pairs) to submit one video product for both of you. Both partners **MUST BE** represented with **EVERY** item.
  - b. If your product is a powerpoint: you can help each other, but your product is yours alone, with yourself in each image.
6. 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.

C. **PRODUCT:** Video **OR** Powerpoint slideshow including maps, with 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. If you're doing it on google, keynote or some odder program, download it and convert it to powerpoint or pdf.
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.
4. Checklist: highlight the boxes you got on the Scavenger Hunt List (this needn't be elaborate).

### D. CREDIT

1. Full credit is more or less the expectation. 2. "More items" is generally better than "fewer items." 3. "Best" is generally worth more than "Better", which is generally worth more than "good", but all will satisfy the item. 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 loss of all credit).

## E. 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 your phone handy, so you're always ready. When you see something, 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, try pleonard@paasco.k12.fl.us ; I check it irregularly during the summer.

## APES 2017-2018 Summer Scavenger Hunt List

Name:

#	Category	Best	Better	Good	Additional Information
1.	Lithosphere	Igneous rock outcrop (exposed bedrock)	Sedimentary or metamorphic rock outcrop (exposed bedrock)	Non-native rock, bigger than you.	Name of rock
2.	Hydrosphere	Ocean	Bay	Flowing or standing water in a watershed	Name of water body
3.	Atmosphere	Cumulus-type cloud	Stratus-type cloud	Cirrus-type cloud	Name of cloud type
4.	Biogeochemical cycles	Nitrogen Cycle	Carbon cycle	Water cycle	Where the element or compound has going to
5.	Energy Flow	Carnivore consuming herbivore or carnivore (not processed "food")	Herbivore consuming producer (not processed "food")	Photosynthesis happening	Names of participating species
3.	Biodiversity	Native endangered animal, in its habitat	Native threatened plant, in its habitat	Non-native endangered species	Name of species
7.	Biodiversity	Invasive animal species	Invasive plant species	Invasive human species	Name of species, and where species
3.	Population Growth	A human less than 1 year old	A human less than 2 years old	A human less than 5 years old	Name of the human, and a quote from human's minder
3.	Forest	Native tree you can't reach more than one quarter of the way around	Native tree you can't reach more than halfway around	Non-native tree you can't reach more than halfway around	Name of species
10.	Biodiversity Preserve	National park system unit	State park system unit	County or city park system unit	Name of park
11.	Food Crops	Food crop being grown on a farm	Food crop being transported	Food crop being processed or retailed	Name of food crop
12.	Meat	Animals being raised for food in a CAFO	Animals being raised for food on rangeland	Meat being retailed	Name of animal
13.	Fishing	Commercial fishing operation	Recreational fishing	Fish being retailed	Name of fish
14.	Water Resources	Water transport system	Water storage system	Water delivery and use	Where water came from and goes to
15.	Water Pollution	Point source of water pollution	Nonpoint source of water pollution	Polluted water or solid water pollutant	Type of water pollution

16.	Air Pollution	Nonmobile point source emitting pollution	Mobile source emitting pollution	Air pollution without identified source	Type of air pollution
17.	Renewable Energy	Renewable power generating plant (solar, wind, geothermal...)	Renewable residential or commercial generator	Renewably-powered appliance	Type of renewable energy
18.	Fossil Fuels	Fossil fuel production or processing (mine, well, refinery...)	Non-gasoline fossil fuel use or retail	gasoline retail	Name of fossil fuel
19.	Solid Waste	REDUCING waste generation (instead of reusing, recycling or discarding)	REUSE of potential waste (instead of recycling or discarding)	RECYCLEing potential waste (instead of discarding)	Potential waste that is being averted
20.	Urbanization	LEED platinum or gold building	LEED silver or certified building	Other "green" building	Name of or occupants of building, de features
21.	Transportation	Riding public mass transit	Public mass transit	Private mass transit	Destination and ride quality
22.	Transportation	Two cars, in same image, differing in mileage by more than 30 mpg	Two cars, in same image, differing in mileage by more than 20 mpg	Two cars, in same image, differing in mileage by more than 10 mpg	Makes, models and mileages of pictu
23.	Politics and Economics	University building, from which the environment is studied	Community college building, from which the environment is studied	Commercial or office building, from which the environment is worked with	Name of someone who works there, them about the environment.
24.	Politics and Economics	Worker in environment-related profession	Volunteer in environment- related work	Environmentally aware person	Name and environmental role of pers person.
25.	Aesthetics	A non-human thing in the environment that you find extraordinarily beautiful	A non-human thing in the environment that you find moderately beautiful	A non-human thing in the environment that you find not beautiful at all	What it is, and why it's beautiful or no

## Assignment #2: Read a book and keep a reading log

Reading Log due: Monday August 14, 2017

Please feel free to email this assignment to me [pleonard@pasco.k12.fl.us](mailto:pleonard@pasco.k12.fl.us) or uploaded to Canvas

There are countless great books about environmental issues. Your assignment is to choose one from the attached list to read over the summer and complete 5 reading entries. If you really want to read a book not on this list, you must talk to me or email me in advance to have it approved.

Below are the criteria for the reading log.

1. You must have at least five entries in your reading log. Divide the book into five or more sections and create a log entry for each section.
2. Each entry should consist of 3 sections:
  - a. As you read, take notes of the facts, information and situations you are reading about. Also, write down vocabulary and/or information that you don't understand.
  - b. Using your notes, summarize the main ideas of the section into a 5-sentence summary paragraph. Be sure to include some of the specifics from the text to support your ideas.
  - c. Write a paragraph (at least 5 sentences) that reflects your reactions to the reading. Feel free to include any questions you may develop as a result of the reading. You are encouraged to write any kind of response (positive, negative, or otherwise) to the work you are reading as long as it is justified and supported by information in the text or your own personal experiences.
3. Each entry must include the date the entry was completed.

### Book List for Assignment #2

#### Book Review Due: Monday August 14, 2017

Where to find one of these books if you don't want to buy it:

- Some of these books are available in my classroom library or in my personal library. Talk to me before school is out for the summer, and you may check them out from me.
- Check the public libraries. If they don't have the one you want, they can often get an interlibrary loan. They may even have electronic copies or audio books available for loan.

#### ***A Sand County Almanac*, by Aldo Leopold (1949)**

A collection of essays written in a style similar to Thoreau. A bit on the philosophical side, read this as a collection over time, not as a cover-to-cover read in a few sittings.

#### ***Silent Spring*, by Rachel Carson (1962)**

A classic book that helped launch the environmental movement in the 1960s. Written for the general public about scientific issues to make her case about the danger of DDT in our environment in an indisputable way.

#### ***The Diversity of Life*, by E.O. Wilson (1992)**

(Chapters 1-10 are optional, chapters 11-15 are required) E. O. Wilson, a Pulitzer Prize winning Harvard biology professor, coined the word "biodiversity," and in this book he describes how the species of the world became so diverse, the threats to this diversity, and why it matters.

#### ***The Omnivore's Dilemma*, by Michael Pollan (2007)**

A book about food: where it comes from, and how it's processed. Pollan investigates fast food, the organic movement, locally grown food, and hunting/gathering.

#### ***Ishmael* by Daniel Quinn (1992)**

The narrator answers an ad in a local newspaper from a teacher looking for serious pupils, only to find himself alone in an abandoned office with a full-grown gorilla. Ishmael is a creature of immense wisdom and he has a story to tell, one that no other human being has ever heard. Like all great teachers, Ishmael refuses to make the lesson easy; he demands the final illumination to come from within ourselves.

#### ***No Impact Man*, by Colin Beavan (2009)**

A man and his family try to live for one year without having any negative impact on the environment.

#### ***Collapse*, by Jared Diamond (2011)**

Reviews the causes of historical and pre-historical incidences of societal collapses such as Easter Island, Norse society in Greenland, the Maya, and the Anasazi

#### ***The Cartoon Guide to the Environment*, by Larry Gonick and Alice Outwater (1996)**

Covers the main topics of Environmental Science with a sense a humor using cartoons.

#### ***Plastic Purge*, by Michael SanClements (2014)**

A guide to understanding the role of plastics in our world, including how to comfortably avoid unnecessary plastic products

#### ***The Boy Who Harnessed the Wind*, by William Kamkwamba and Bryan Mealer (2010)**

William Kamkwamba was born in Malawi, a country where magic ruled and modern science was mystery. It was also a land withered by drought and hunger. But William had read about windmills, and he dreamed of building one that would bring to his small village a set of luxuries that only 2 percent of Malawians could enjoy: electricity and running water.

#### ***A Walk in the Woods*, by Bill Bryson (1998)**

Bill Bryson, a reluctant adventurer if ever there was one, undertakes a grueling hike along the world's longest continuous footpath—The Appalachian Trail. With his offbeat sensibility, his eye for the absurd, and his laugh-out-loud sense of humor, Bryson recounts his confrontations with nature at its most uncompromising over his five-month journey.

#### ***Into the Wild*, by Jon Krakauer (1996)**

Into the Wild is the true story of the mysterious life and death of Christopher Johnson McCandless, a talented young man from a good family who inexplicably turned his back on everything he seemed to have going for him. He graduated from Emory University in 1990, lost no time in giving away to charity the sizeable balance in his bank account, and then abruptly abandoned his past life and the personal identity all knew him by to basically disappear from the lives of family and friends

## Assignment #3: Math Self Assessment

### Math Assessment due: Monday August 14, 2017

Being able to do basic math is essential to this course. There is usually at least one section of one FRQ requiring math calculation. We will have to do math calculations in several assignments throughout the year, and we will not have time to review the basics. Go over this help sheet and complete the attached problem set. There will be weekly quizzes that include math problems. Get help and do lots of practice this summer if you don't feel like you are up to speed on all of these types of math problems.

#### Basic operations without a calculator

**Calculators are not allowed on the APES Exam**, so you will need to be comfortable doing addition, subtraction, multiplication, and division without an electronic crutch. Class activities sometimes require calculators, but you will not be able to use calculators on the weekly quizzes.

#### Scientific Notation

If you are used to having your calculator figure this out for you, you'll need to practice scientific notation.

Thousand =  $10^3 = 1,000$

Million =  $10^6 = 1,000,000$  (people in the US = 310 million)

Billion =  $10^9 = 1,000,000,000$  (people on Earth = 7 billion; age of the Earth = 4.6 billion years)

Trillion =  $10^{12} = 1,000,000,000,000$  (National debt = \$17 trillion)

- When using very large numbers, scientific method makes numbers easier to manipulate. For example, the US population is 300 million people or  $300 \times 10^6$  or  $3 \times 10^8$
- 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

#### 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.chemprofessor.com/dimension_text.htm)
- <http://www.chem.tamu.edu/class/fyp/mathrev/mr-da.html>

#### Metric Prefixes

m (milli) =  $1/1000 = 10^{-3}$

c (centi) =  $1/100 = 10^{-2}$

k (kilo) =  $1000 = 10^3$

M (mega) =  $1,000,000 = 10^6$

G (giga) =  $1,000,000,000 = 10^9$

T (tera) =  $1,000,000,000,000 = 10^{12}$

#### Percentages:

Be able to solve problems using fractions and percentages.

#### APES Math Problems

Answer the questions. Use a separate sheet of paper if necessary. **Show all work neatly.**

1. What is one million times one thousand? Show your work in scientific notation. Give the answer in scientific notation and in words.
2. A population of deer had 200 individuals. If the population grows by 15% in one year, how many deer will there be the next year?
3. Last year I had 14 AP Environmental Science students and next year I will have 32 AP Environmental Science students, what percentage did the population of APES students grow by?

4. Electricity costs 6 cents per kilowatt hour. In one month one home uses one megawatt hour of electricity. How much will the electric bill be? Use dimensional analysis to solve.
  
5. Your car gets 15 miles to the gallon and your friend's car gets 25 miles to the gallon. You decide to go on a road trip to Chicago, 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 in gas by driving your friend's car? Use dimensional analysis to solve.
  
6. Virginia Beach is 15 kilometers wide and 50 kilometers long. If 2 cm of rain falls on Virginia Beach, how many cubic meters of rain fell on Virginia Beach? (Hint: convert all units to meters first).
  
7. An MP3 takes up about 16 kilobytes of memory per second of music. If you owned a one terabyte hard drive and filled it with only mp3s, how many days worth of music would you have? Use dimensional analysis to solve.

#### **Assignment #4: Chemistry Review**

#### **Chemistry Review due Monday, August 14, 2017**

Chemistry is a big part of environmental science (there was a lot more chemistry on the 2016 exam than they expected, according to student conversations). 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 to 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 <sub>2</sub>	CO	C <sub>6</sub> H <sub>12</sub> O <sub>6</sub>	CH <sub>4</sub>	H <sub>2</sub>
N <sub>2</sub>	NO <sub>2</sub>	NO <sub>3</sub>	NH <sub>3</sub>	NH <sub>4</sub>
O <sub>2</sub>	O <sub>3</sub>	P	PO <sub>4</sub> <sup>3-</sup>	S
SO <sub>2</sub>	SO <sub>3</sub>	H <sub>2</sub> SO <sub>4</sub>	NaCl	Pb
U	Rn	Hg	Cl	H <sub>2</sub> 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? Hint- the pH scale is not linear!
  - c. What are the average pH ratings of the following common substances in the environment?
    - i. Blood
    - ii. Rain
    - iii. Freshwater (lake or river)
    - iv. Ocean water

## **Go APES!**

### **Optional activities, no due date**

Here are some ways you can “GO APES” this summer. None are required; all are fun.

- Instead of driving, ride a bike or take a walk
- Get wet in a downpour (not in a thunderstorm)
- Follow a stream to its headwaters
- Follow a stream to its mouth
- Speaking of water, where does yours come from?
- Watch an ant colony
- Study the waves at the beach
- Solve the local deer overpopulation problem
- Visit the Pasco County recycling facility; make some contributions
- Watch the Discovery Channel
- Figure out why dew forms on the grass at night, but not every night
- Compare star counts in New Port Richey, Port Richey, etc vs. your vacation spot (lay on your back and count stars on a clear night)
- Celebrate “meatless Mondays” by following a vegetarian diet one day a week
- Be a “vegan before 6:00 p.m.” No animal products until after 6:00 every day
- Play around with Google Earth
- Grow your favorite vegetable
- Look at a big tree and determine where all that mass came from
- Go fishing
- Follow the path of your favorite gem or precious metal from mine to your ring finger
- Pretend that you have no electricity for an evening
- Where does your electricity come from, and why does it matter?
- Camp out, even if it’s in your back yard
- Pick berries
- Use sunscreen regularly
- Change your light bulbs from incandescent to compact fluorescent bulbs
- Relate the heating of your car’s interior on a sunny day to the greenhouse effect
- Watch some birds or bats
- Compare the color and ‘blinking’ patterns of different fireflies/lighting bugs
- Visit a farm, or at least the farmer’s market
- Have a septic tank? How does it work?
- Read the Wall Street Journal
- Tired of the phrase “going green?” Come up with another term.
- Buying organic food? Not buying organic food? Does it matter?
- At the pool? Figure out how many gallons of water it takes to fill it up.