

Advanced Placement Environmental Science

Summer Assignment 2017-2018

Ms. Burch

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Dear AP Environmental Science Students,

Welcome to the 2017-2018 class of AP Environmental Science (APES). I am very excited to meet and work with each of you and get to know you over the coming year! Students who enroll in APES should be ready and willing to devote sufficient time, focus and energy to class assignments, including daily text readings, taking extensive notes in and outside of class, preparing for frequent exams and quizzes, participating in class activities and labs, writing reports, and participating in class discussions. Students who are not able to devote sufficient time, focus and energy to this course should consider taking the course at another time.

APES is an immense field of study with a wide range of topics covered. To help prepare, I expect you to complete a summer assignment so we can complete the requisite coursework prior to the AP test on May 10, 2018.

The summer assignment consists of 4 parts:

1. APES Informational Survey - <https://goo.gl/forms/ZqxuzLhBYUusy6EpS2>
2. Crash Course Biogeochemical Cycles Video Questions
3. Environmental Law Review
4. Math Review

You are responsible for completing this assignment for the second day of school, Friday, August 18, 2017. You may bring them to class on that day or email them to me as you finish. Pace yourself and make sure you are consistently working towards finishing these. I will check my email periodically throughout the summer. Please let me know if you have any questions or concerns.

Name:

Crash Course Biogeochemical Cycles Videos

On YouTube, look up the two Crash Course video titles listed below. Watch the videos and answer the following questions for each video.

Video 1: "The Hydrologic and Carbon Cycles: Always Recycle! - Crash Course Ecology #8"

1. What are biogeochemical cycles?
2. What is the hydrologic cycle?
3. What is Precipitation? Name a few types:
4. What is Evaporation?
5. What is sublimation?
6. What is Condensation? What does it form?
7. How are clouds responsible for moving water?
8. Where does most of evaporation take place on Earth?
9. What is runoff?
10. Where does runoff ultimately end up? (Most of it)
11. Why are oceans a big deal?
12. Why are oceans salty?
13. What are the 3 ways that the human body loses water?
14. What is evapotranspiration?
15. All living things require what to create their bodies?
16. What non-living things contain carbon?
17. How are plants involved in the Carbon Cycle? What two processes do they undergo that use carbon?
18. What are the 3 possible fates of carbon absorbed by plants?
19. What are fossil fuels?
20. How does carbon get into the ocean?

21. How is carbon used once it's in ocean water?
22. What are shells made of? What happens when they fall to the bottom of the ocean?
23. What happens to Limestone when it is dissolved in water?
24. What activities release carbon dioxide into the atmosphere?
25. What is happening with the excess carbon in the atmosphere? What is it causing?
26. What is permafrost? What happens as permafrost melts?
27. What is positive feedback loop? (Hint: What is happening with global warming?)

Video 2: "Nitrogen & Phosphorus Cycles: Always Recycle! Part 2 - Crash Course Ecology #9"

1. What percent of nitrogen and phosphorus are in an animal's body?
2. What do we need Nitrogen to make?
3. What do we need Phosphorus to make?
4. What percentage of the atmosphere is Nitrogen? What form is atmospheric Nitrogen in?
5. What is the chemical formula for Nitrate? _____ Nitrite? _____ Ammonium? _____
6. What is Nitrogen Fixation?
7. What are Nitrogen Fixing Bacteria? Where are they found?
8. What plants are in the Legumes Family? What does it mean that they form a symbiotic relationship?
9. What form of nitrogen is usable by plants? What enzyme makes it useful?
10. What does nitrifying bacteria do?
11. What other things can break nitrogen molecules apart?
12. What is denitrifying bacteria? Which enzyme does this?
13. What is special about the Phosphorus Cycle?
14. What is the Lithosphere? What special type of rock is rich in Phosphorus?
15. What is a lithotroph?

16. How do phosphates end up in the water? In the Soil?
17. A single phosphorus atom can get trapped in a biological cycle for how long? How does it get out of the biological cycle?
18. What are the main ingredients in fertilizers?
19. Why is too much of nitrogen and phosphorus bad for the environment?

Outside Research:

Diagram the carbon cycle, hydrologic cycle, phosphorus cycle, and nitrogen cycle below.

Environmental Law Review

Construct a table that organizes important information regarding environmental legislation for the laws/treaties listed below. Include the following information:

- Name of Law or Treaty
- Draft Year and Amendment Years
- Is it International (world) or National (just the U.S)
- Summarized Description: in your own words summarize and describe the function or job of the law or treaty (What does it do, what does it protect, etc.)
- What Environmental Issues are affected by this Legislation?
- Agency/Group Responsible for Regulation and Enforcement (United Nations, Department of Interior, EPA, etc.)

Example:

Name	Draft Year & Amendment Year(s)	International or US?	Summarized Description	Environmental Issue(s) Affected	Regulation or Enforcement Agency
Clean Air Act	1963, 1977, 1990	US	To monitor and control air pollutants such as sulfur dioxide, nitrogen oxides, carbon monoxide, particulate matter, ozone, lead, carbon dioxide, volatile organic compounds, mercury. Meant to protect public welfare and health and regulate emissions of dangerous air pollutants.	Air pollution, human health	EPA

Table Hints:

- You may find it easier to do this in landscape orientation.
- You can use online SCHOLARLY resources to find the information. Since these are governmental in nature, .gov sites are best! For example: <https://www.epa.gov/laws-regulations>

*****You will have a QUIZ on this material the second week of school, so be prepared! *****

Clean Air Act	Clean Water Act	Comprehensive Environmental Response, Compensation Liability Act (CERCLA)
Convention on the International Trade in Endangered Species (CITES)	Corporate Average Fuel Economy (CAFE standards)	Emergency Planning & Community Right-To-Know Act (EPCRA)
Endangered Species Act (ESA)	Energy Independence & Security Act	Energy Policy Act
Federal Food, Drug, and Cosmetic Act (FFDCA, FDCA, or FD&C)	Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)	Federal Water Pollution Control Act
Fish and Wildlife Act	Food Quality Protection Act	General Mining Act of 1872
Hardrock Mining & Reclamation Act	Healthy Forests Initiative (HFI)	Kyoto Protocol
Lacey Act (1900)	Law of the Sea Convention (UNCLOS)	Madrid Protocol- aka Antarctic Treaty
Marine Mammal Protection Act (MMPA)	Marine Protection, Research, and Sanctuaries Act (MPRSA)	Montreal Protocol aka Convention of Ozone Depletion
National Energy Act	National Environmental Policy Act (NEPA)	National Wildlife Refuge System Act
Noise Control Act	Nuclear Waste Policy Act (NWPA)	Occupational Safety & Health Act (OSHA)
Ocean Dumping Ban Act	Oil Pollution Act (OPA)	Oil Spill Prevention & Liability Act
Paris Agreement	Pollution Prevention Act (PPA)	Refuse Act
Resource Conservation & Recovery Act (RCRA)	Safe Drinking Water Act	Soil & Water Conservation Act
Solid Waste Disposal Act	Superfund Amendments and Reauthorization Act (SARA)	Surface Mining Control & Reclamation Act (SMCRA)
Taylor Grazing Act	Toxic Substances Control Act (TSCA)	Wilderness Act

AP Environmental Science Math Review

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!

Content

Decimals	Percentages	Metric Units	
Averages	Scientific Notation	Dimensional Analysis	Graphing

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.

Math Resources

If you're having difficulty with any of the concepts, check out Khan Academy online at www.khanacademy.org. They have great review videos for a variety of topics. You can search on the Khan Academy site for particular topics, such as Dividing Decimals, Finding Percentages, or Dimensional Analysis.

Directions

Complete the practice problems on the following pages. Remember to write out all of your work and include units in each step if units are given in the problem. Check over your work.

Name: _____

APES Math Review Problems**Decimals – Show all of your work!**

1. $1.678 + 2.456 =$	2. $45.937 - 13.43 =$	3. $90.3 - 32.679 =$
4. $28.4 \times 9.78 =$	5. $64.5 \div 5 =$	6. $114.54 \div 34.5 =$

Averages – Show all of your work!

7. Find the average of the following numbers: 10, 11, 12, 13, 14, 15, 23	8. Find the average of the following numbers: 124, 456, 788, 343	9. Find the average of the following numbers: 4.56, 0.0078, 23.45, 0.9872
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Percentages – Show all of your work!

10. What is 45% of 900?	11. What percentage is 25 of 162.5?	12. 35 is what percentage of 2800?
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<p>13. Thirteen percent of a 12,000 acre forest is being logged. How many acres will be logged?</p>	<p>14. 14,000 acres of a 40,000 acre forest burned in a forest fire. What percentage of the forest was damaged?</p>	<p>15. 235 acres, or 15%, of a forest is being logged. How large is the forest?</p>
<p>16. A teenager consumes 20% of her calories each day in the form of protein. If she is getting 700 calories a day from protein, how many calories is she consuming per day?</p>	<p>17. A water heater tank holds 280 gallons. Two percent of the water is lost as steam. How many gallons remain to be used?</p>	<p>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?</p>

Metric System– Show all of your work!

<p>19. How many kilograms does 17 grams equal?</p>	<p>20. 670 hectometers = x centimeters</p>	<p>21. 6544 liters is equal to how many milliliters?</p>
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Scientific Notation – Show all of your work!

<p>22. Write 145,000,000,000 in scientific notation.</p>	<p>23. Write 24 thousand in scientific notation.</p>	<p>24. Write 0.000348 in scientific notation.</p>
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25. $(3.45 \times 10^9) \div (2.6 \times 10^3) =$

26. $7.89 \times 10^{-6} + 2.35 \times 10^{-8}$

27. $(3.78 \times 10^3)(2.9 \times 10^2)$

Dimensional Analysis – Show all of your work!

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.

want to know:	$\frac{\text{sec}}{\text{day}}$				
know:	$\frac{60 \text{ sec}}{1 \text{ min}}$	$\frac{1 \text{ min}}{60 \text{ sec}}$	$\frac{60 \text{ min}}{1 \text{ hr}}$	$\frac{1 \text{ hr}}{60 \text{ min}}$	$\frac{1 \text{ day}}{24 \text{ hr}}$ $\frac{24 \text{ hr}}{1 \text{ day}}$
solve:	$\frac{60 \text{ sec}}{1 \text{ min}}$	$\frac{60 \text{ min}}{1 \text{ hr}}$	$\frac{24 \text{ hr}}{1 \text{ day}}$	=	$\frac{86400 \text{ sec}}{1 \text{ day}}$

28. 1.35 kilometers per second is equal to how many miles per hour?

29. 134 miles is equal to how many inches?

30. If one barrel of crude oil provides six million BTUs of energy, how many BTUs of energy will one liter of crude oil provide? (1 barrel of oil = 159 liters)

31. A city that uses ten billion BTUs of energy each month is using how many kilowatt-hours of energy? (1 kw-hr = 3,413 BTUs)

32. Fifty eight thousand kilograms of solid waste is equivalent to how many metric tons? (1 metric ton = 1000 kg)

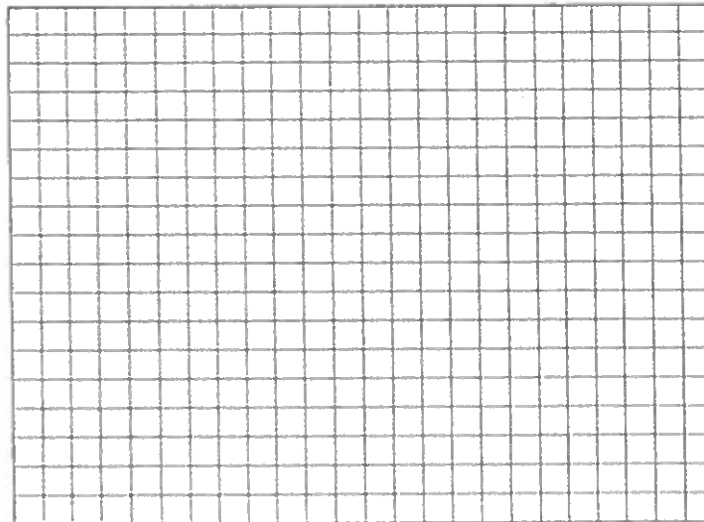
33. A 340 million square mile forest is how many hectares? (1 square mile = 640 acres and 1 hectare (Ha) = 2.47 acres)

Graphing Problem 2:

Ethylene is a plant hormone that causes fruit to mature. The data below shows the amount of time it takes for fruit to mature from the time of the first application of ethylene by spraying a field of trees.

Amount of ethylene in ml/m ²	Wine sap Apples: Days to Maturity	Golden Apples: Days to Maturity	Gala Apples: Days to Maturity
10	14	14	15
15	12	12	13
20	11	9	10
25	10	7	9
30	8	7	8
35	8	7	7

- A. Make a line graph of the data.



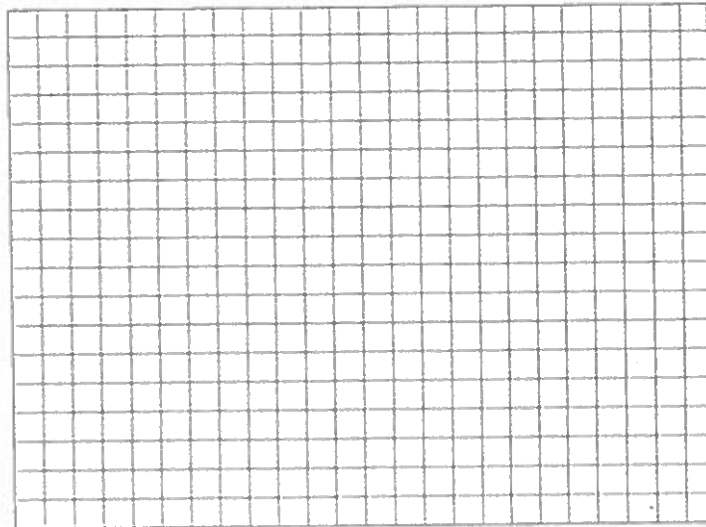
- B. What is the dependent variable?
- C. What is the independent variable?
- D. What is the optimum level of ethylene to use if a farmer needs to get their fruit to market as soon as possible?

Graphing

A clam farmer has been keeping records concerning the water temperature and the number of clams developing from fertilized eggs. The data is recorded below.

Water Temperature in °C	Number of developing clams
15	75
20	90
25	120
30	140
35	75
40	40
45	15
50	0

A. Make a line graph of the data.



B. What is the dependent variable?

C. What is the independent variable?

D. What is the optimum (best) temperature for clam development?