Midtown High School

AP Environmental Science 2025-2026: Summer Work

Welcome to AP Environmental Science!

The AP Environmental Science Curriculum centers around the 4 Big ideas and you will need to not only know these but also understand how they are interconnected. The goal of the course is to analyze environmental concepts and processes with the goal of proposing and justifying solution to environmental problems our society faces every day.

1. Energy Transfer:
    a. Energy conversions underlie all ecological processes. Energy cannot be created; it must come from somewhere. As energy flows through systems, at each step, more of it become unusable.
2. Interaction Between Earth Systems:
    a. The Earth is one interconnected system. Natural systems change over time and space. Biogeochemical systems vary in ability to recover from disturbances.
3. Interactions between Different Species and the Environment:
    a. Humans alter natural systems and have had an impact on the environment for millions of years. Technology and population growth have enabled humans to increase both the rate and scale of their impact on the environment.
4. Sustainability:
    a. Human survival depends on developing practices that will achieve sustainable systems. A suitable combination of conservation and development is required. The management of resources is essential. Understanding the role of cultural, special and economic factors is vital to the development of solutions.

These four big ideas are the framework for the 9 main units of the course:

1. The Living World: Ecosystems
2. The Living World: Biodiversity
3. Populations
4. Earth Systems and Resources
5. Land and Water Use
6. Energy Resources and Consumption
7. Atmospheric Pollution
8. Aquatic and Terrestrial Pollution
9. Global Change

Under no circumstances will Ai technology of any kind, Chat GPT, or plagiarism be able to be used on this assignment. This assignment will be run through a plagiarism check. Any instance of chat GPT or plagiarism will result in an automatic zero for this assignment and office referral.

Part 1: Welcome Letter Assignment

APES as a course involves a great deal of collaborative learning. It is important to me, as an instructor, that I get to know you as a person. It is also important that you now, as a young adult getting ready to enter college, work on email communication. I expect that you may struggle throughout the year, and I hope that you will keep an open line of communication with me as well as your other instructors. You will write a letter of introduction to the APES instructor→ Ms. Olliff. Please remember you're likely writing a letter that is making your first impression on a new teacher, so check for grammar/spelling and appropriate phrasing before sending.

When you are emailing an instructor, you need to ensure your email contains several things.

1. Subject Line:
    a. The subject line needs to include your name, which class you are in, and which period the class is followed by a brief description on what the email is in relation too.
        i. Example: Joe Smith 4th period AP Biology Questions about homework due date
2. Addressing the instructor properly madeline.olliff@apsk12.org
    a. You need to include a proper introduction
        i. Example: Dear Mr. Smith, Good Afternoon Mr. Smith, etc.
    b. You are emailing an instructor, not texting your best friend

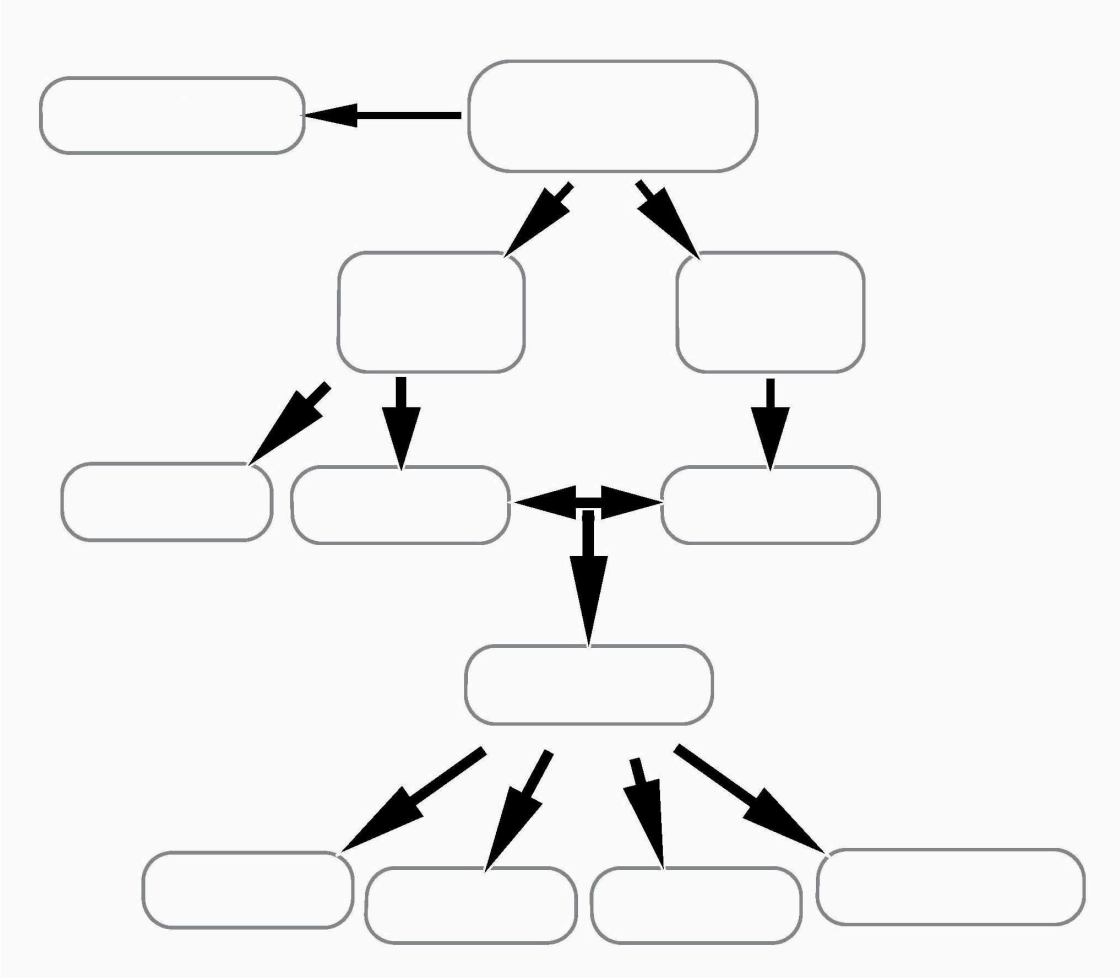
In your letter you will need to include:

1. Introduce yourself
    a. What is your name?
    b. Do you have a nickname you go by?
    c. What grade are you in?
2. Courses:
    a. What science classes have you taken so far?
    b. How many AP classes have you taken before this year?
    c. What subject area(s) are you most interested in continuing in college?
    d. Is there anything that you've especially liked or disliked about your earlier biology/science classes?
3. Yourself
    a. What do you like to do (hobbies, sports, music, interests, etc.)?
    b. Tell me about your family (siblings, pets, who do you live with? how would you describe them?)
    c. Do you have a job or plan on getting a job next year/ What kind?
4. Learning
    a. What are your personal strengths when it comes to learning new material?
    b. What causes you to struggle in a course? How do you address that challenge?
    c. How would you describe yourself as a learner?
    d. How would you describe yourself as a team or group member?
    e. A lot of times students say that they will learn best with interactive activities, what does interactive mean to you?
5. APES
    a. Why are you taking this course? What do you hope to accomplish/gain from this course?
    b. What are you looking forward to most in AP Biology?
    c. Do you have any concerns coming into APES this year?

Part #2: Introduction to Environmental Science

Watch the Bozeman Science YouTube video linked below ONLY to 7:30 to get a better sense of what to expect through this course. Complete the questions as you watch.
https://youtu.be/LE9KTG9PFho

1. AP Environmental science is the study of the _____ between the _____ and the _____.
2. Listen to Mr. Anderson describe the various parts of the concept map, and pause after he reveals a new word, and filling in that word.

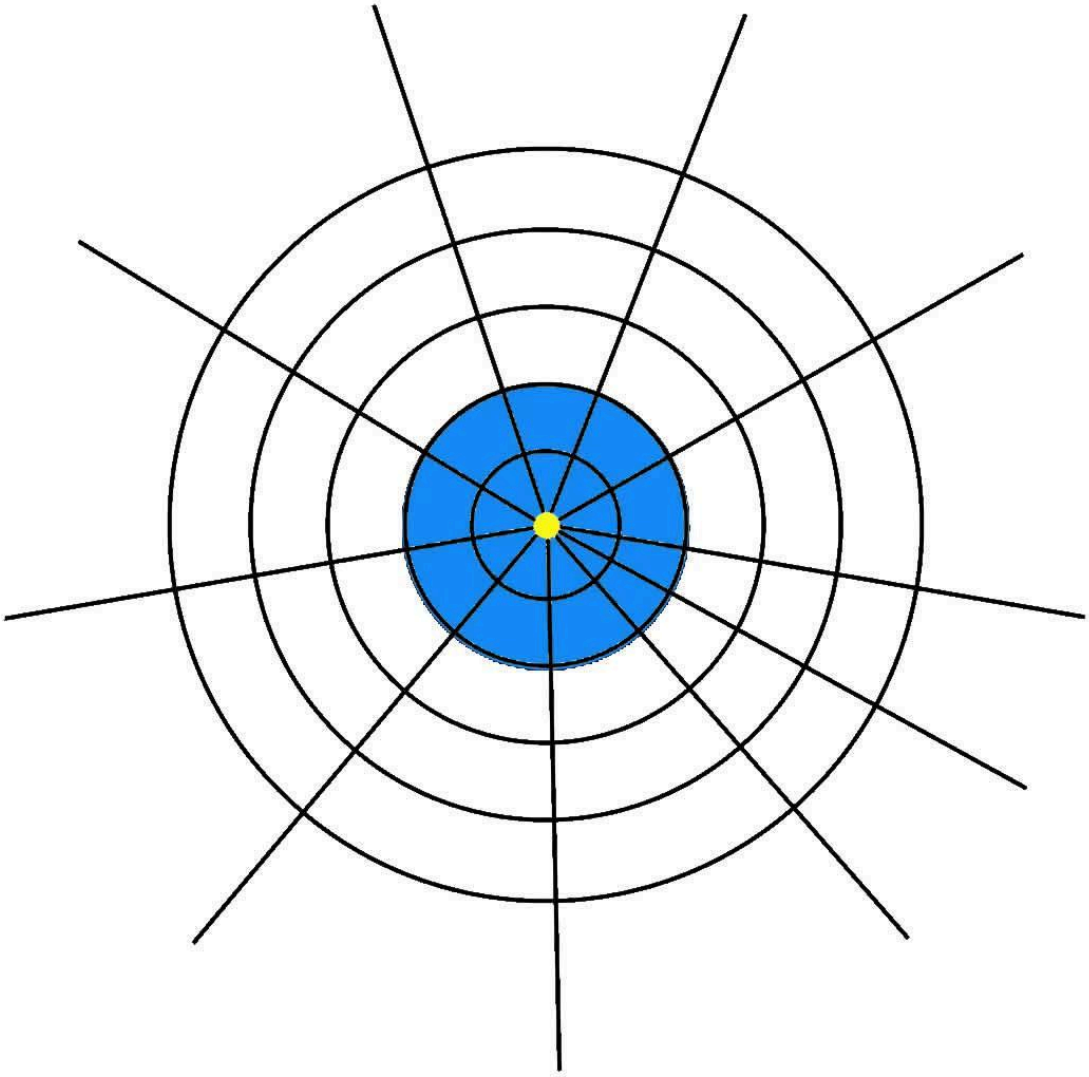


3. **Describe** what happened on Easter Island.

4. **Explain** the difference between Environmental Science vs Environmentalism.

5. **Analyze** why the t-shirts from the 1980s that said 'Save Our Planet' is a silly slogan.

6. Fill in the following Planetary Boundaries chart and color in those boundaries that we have already passed the capacity of Earth for.



   a. What does the yellow dot in the center represent?

   b. What does the blue circle represent?

7. **Analyze** Why do some of the Planetary Boundaries from #6 have no red filled in?

8. **Describe** what needs to drive sustainability.

9. **List** the 7 science practices:
    a.

    b.

    c.

    d.

    e.

    f.

    g.

10. **Describe** what happened to the Deepwater Horizon.

Part 3: Current Events:

Our world and relationship to it is ever changing, especially in light of all the media surround global climate change. Analyzing news articles and thinking critically about what we see perpetuated on social media is an extremely important skills in this class as well as going forward in your life especially at university.

You will need to find five current event/news articles related to APES content. You can use the AP Environmental Science CED available for download online to help ensure that the content relates to the course. One of the three articles need to relate specifically to state or federal legislation. By current article, I mean with in the past 5 years, so the farthest back you can go is 2020. You will need to complete a Science Text New Analysis Worksheet for each article. A copy is provided below along with the grading rubric.

Article #1

Title of Article/ Date Published/ News Source:	
Claim #1:	**Describe how the evidence backs up the claim:**
Claim #2:	**Describe how the evidence backs up the claim:**
Claim #3:	**Describe how the evidence backs up the claim:**

Discuss the Author's perspective: The point of view and/or attitude toward the topic (inform, persuade, entertain):
Discuss the Author's Assumptions: The points that are assumed to be true. Can be facts, analysis, or values:
Discuss the credibility of this source: Where is the text from? Is it an established source of information? Does it use sensational headlines (click-bait)?
List two unanswered questions after reading this article OR list two follow-up questions to the research discussed in the article:

Article #2

Title of Article/ Date Published/ News Source:	
Claim #1:	**Describe how the evidence backs up the claim:**
Claim #2:	**Describe how the evidence backs up the claim:**
Claim #3:	**Describe how the evidence backs up the claim:**
Discuss the Author's perspective: The point of view and/or attitude toward the topic (inform, persuade, entertain):	

Discuss the Author's Assumptions: The points that are assumed to be true. Can be facts, analysis, or values:
Discuss the credibility of this source: Where is the text from? Is it an established source of information? Does it use sensational headlines (click-bait)?
List two unanswered questions after reading this article OR list two follow-up questions to the research discussed in the article:

Article #3

Title of Article/ Date Published/ News Source:	
Claim #1:	**Describe how the evidence backs up the claim:**
Claim #2:	**Describe how the evidence backs up the claim:**
Claim #3:	**Describe how the evidence backs up the claim:**
Discuss the Author's perspective: The point of view and/or attitude toward the topic (inform, persuade, entertain):	

Discuss the Author's Assumptions: The points that are assumed to be true. Can be facts, analysis, or values:
Discuss the credibility of this source: Where is the text from? Is it an established source of information? Does it use sensational headlines (click-bait)?
List two unanswered questions after reading this article OR list two follow-up questions to the research discussed in the article:

	3	2	1
Claims	Claims are accurate, different, complete, and in the student's own words.	Some claims are not accurate, different, complete or in own words.	Many claims are not accurate, different, complete or in own words.
How the Evidence Backs Up the Claim	Provides and discusses a piece of strong evidence to back up each claim.	Evidence and discussion are appropriate to back up the claims, but somewhat weak for one or more claims.	Weak evidence and discussion to back up the claim.
Author's Assumptions, Prespective, Credibility of Source, Follow-up Question	All 4 boxes (assumptions, perspective, credibility, follow-up) provide accurate and strong discussion.	Some of the discussion in the 4 boxes is strong.	Weak discussion in some or all of the 4 boxes.

Part #4 Dimensional Analysis:

One of the six science practices that is a part of this course is Mathematical Routines. This also includes what is called dimensional analysis. Students must be able to apply appropriate mathematical relationships to solve a problem with work shown. In fact, you will have at least three dimensional analysis problems on the FRQ portion of the AP exam, where in order to receive full credit you will need to show your work appropriately as well as get the correct answer. Here we will practice some dimensional analysis style problems to get your comfortable with proper set up especially.

1. Watch this introductory video on dimensional analysis and complete the problems in the video: https://youtu.be/Eh0SQhMUhAU
    a. Practice Problem #1: How many minutes will it take to earn $25o if your hourly wage is $7.50? Show work below

    b. Practice Problem #2: There are 6.02×10^{23} molecules of water in 18 grams of water. Each molecule contains 2 hydrogen and 1 oxygen atom. How many atoms are there in 45 grams of water? Show work below.

2. Watch the level 2 video on dimensional analysis and complete the problems in the video below: https://youtu.be/bu12pfoH9Ng

a. A cyclist averages 20.6 mph, how fast is this in cm/sec? There are 0.62 miles in 1 kilometer.

b. A NaCl solution is 3.5 m (moles of NaCl per L solution) What is the concentration of this solution in g/mL?

3. Watch the level 3 video on dimensional analysis and complete the problems in the video below: https://www.youtube.com/watch?v=NDpXzOMkxak&list=PLT3eSyRJ7aXJnDJiRgRk7opTVNfblPZSk&index=3
   a. How many gold atoms are there in a gold bar 1 mm^3 in size? The density of gold in 19.3 g/cm^3 and 6.02 x 10^{23} gold atoms have a mass of 197 grams.

   b. The acceleration due to gravity is 9.8 m/s^2 what is the acceleration in km/hr^2 ?

Practice Problems: Now that you know a little more about dimensional analysis, it is time to practice on your own. Make sure to show your work for each problem and make sure to always include units, no naked numbers ever!

1. You are a caterer specializing in children's birthday parties. You have 12 birthdays to cater next week. You must bake 2 cakes for each party. Each cake will have 6 candles on it. How many birthday candles do you need for the 12 parties?

2. A manager for a factory farm is ordering corn. Each animal eats 2.3 kg of corn per day. Considering all the inputs associated with growing corn in an industrialized manner (fertilizers, pesticides, machinery, etc.) it takes 2 liters of oil to produce 10 grams of corn. How much oil is used to grow the corn for a one week supply of corn for the 3000 animals the manager must feed?

3. My bathroom mirror is lit by eight 75 watt bulbs. Each bulb consumes 75 watt-hours (Wh) per hour that it is on. The lights are on for approximately 2 hours each day. How many kilowatt-hours (kWh) of energy are consumed by the bathroom lights in 1 year?

4. Approximately 220 million tires are discarded in the U.S. each year. These tires present a disposal problem because they take up space, harbor pests, and have been known to catch fire. One tire can generate about 250,000 BTUs (1 BTU = 3×10^{-4} kWh) when it is burned. The average American home consumes about 10,000 kWh of electricity per year. How many tires would be needed to meet the annual electricity demand of ten homes for one year if the production of electricity from tires is 50% efficient?

5. After determining your ecological footprint, you discovered that your energy consumption is very high. Your family uses 6,896,551 Btu's (British Thermal Unit) of electrical power per month. and how much was your electric bill? 1 Btu = 0.00029 kWh; 1 kWh costs $0.16

6. If the Recommended Daily Allowance (RDA) for vitamin C is 60 mg per day and there are 70 mg of vitamin C per 100 g of orange, how many 3.0 oz. oranges would you have to eat each week to meet this requirement?

7. Ruth Palladium (RuPd) bought 10 acres of land and built a house on 2.0 acres. RuPd wanted to raise sheep on the remaining 8.0 acres. If it takes 1/8 (0.125) hectare to raise one sheep, how many sheep can be raised on the 8 acres.