

AP ENVIRONMENTAL SCIENCE

FREE-RESPONSE QUESTIONS

OVERVIEW

One of the four questions will involve the **Analysis of a Data Set** - similar to the "dishwasher" or "fossil fuel plant" questions. (Calculators not allowed)

One of the questions will be a **Document-Based** question. You will have to read a document and answer questions based on that information as well as your general knowledge.

The last two questions are **Synthesis and Evaluation**. One of these questions will require you to set up an experiment to show some particular effect.

Each question is graded on a 10-point scale. The grading rubric is set up to contain slightly more than 10 points (e.g., 11-13). However, you can only earn a maximum of 10 points on any one question.

THINGS TO DO

1. Before answering any questions

- Read the question **twice**.
- Underline (highlight, outline, etc.) what the question is asking for; answer the question(s) asked and **only** those questions. Answer all parts of the question.
- Begin answering the question in the order it is written

2. Outline the answer to avoid confusion and disorganization. Pay close attention to the verbs used in the directions, such as **describe, explain, compare, give evidence for, graph, calculate, design an experiment**, etc., and be sure to follow those directions. Thinking ahead helps to avoid scratch outs, asterisks, skipping around and rambling.

If the question says to '**discuss**' or '**describe**'

1. Define the topic
2. Describe or elaborate on the topic
3. State an example of that topic

If the question says to '**compare and contrast**'

1. Clearly state what the items have in common
2. Clearly state how items are different

If the question asks a **mathematical** problem

1. Show every single step of all work
2. Set up problems so that labels cancel out (dimensional analysis)
3. Write answers with labels
4. If numbers are very large or very small, use scientific notation if at all possible
5. Make sure to include all appropriate units – avoid naked numbers! You won't receive full credit without units.

If the question asks for a **graph** to be made:

1. Set up the graph with the independent variable along the x-axis and the dependent variable along the y-axis.
2. Mark off axes in equal (proportional) increments and label with proper units
3. Plot points and attempt to sketch in the curve (line)
4. If more than one curve is plotted, write a label on each curve (this is better than a legend)
5. Label each axis
6. Give your graph an appropriate title (what is it showing?)

If the question asks for **lab design**, include the following:

1. Your **hypothesis** and/or predictions/expected results
2. The **independent variable** - what treatments will you apply
3. The **dependent variable** - what will you measure
4. The **variables to be controlled** (very important)
5. The **organism/materials/apparatus to be used**
6. Describe what you will **actually do**
7. Describe how you will actually **take and record data**
8. Describe how the data will be **graphed and analyzed**
9. State how you will draw a **conclusion** (compare results to hypothesis and predictions)

Note: Your experimental design **needs to be at least theoretically possible** and it is very important that your conclusions/predictions be consistent with the principles involved and with the way you set up the experiment.

3. Write the essay. Outlines and diagrams, no matter how elaborate and accurate, are not essays, and will not get you much credit, if any. You may use bullets sparingly within an essay. **Note:** If you are asked as a part of an essay on a laboratory to calculate a number, this does not require that you write an essay, but be sure to show how you got your answer. Show formulas used, and the values inserted into those formulas. Always include units – no naked numbers should be present. If asked to draw a diagram, be sure to label the components carefully and correctly.

4. Define and/or explain any terms you use. Say something about each of the important terms that you use. Rarely would the exam ask for a list of buzzwords.

5. Answer the question parts in the order called for and label them "a", "b", "c", etc. as they are labeled in the question. It is best not to skip around within the question. However, the four essays do not have to be answered in any particular order.

6. Write clearly and neatly. It is foolhardy to antagonize or confuse the reader with lousy penmanship. Readers thoroughly appreciate legible handwriting!

7. Use a ballpoint pen with blue or black ink. Bring an extra, just in case!

8. Go into detail that is on the subject and to the point. Be sure to include the obvious (for example, "light is necessary for photosynthesis"). Answer the question thoroughly.

9. If you cannot remember a word exactly, take a shot at it - get as close as you can. Even if you don't remember the name of the concept, describe the concept.

10. Remember that no detail is too small to be included as long as it is to the point. Be sure to include the obvious - most points are given for the basics anyway.

11. Carefully label your diagrams (otherwise they get no points). Place them in the text at the appropriate place, not attached at the end.

12. Widen your margins a little. This will make the essay easier for most folks to read.

13. Bring a watch to the exam so you can pace yourself. You have four essays to answer with about 22 minutes for each.

14. Understand that the exam is written to be hard. The national average for the essay section will be about 50% correct (i.e., 5/10). It is very likely that you will not know

everything. This is expected, but it is very likely that you do know something about each essay, so relax and do the best you can. Write thorough answers.

15. The AP Exam may include what are called synthesis and conceptual questions. These questions may ask you to indicate the relationship between two or more concepts. If you do not know the relationship between the concepts, at least tell what you do know about them individually.

THINGS NOT TO DO

1. Do not waste time on background information or a long introduction unless the questions call for historical development or historical significance. Answer the question.
2. Don't ramble. Get top the point; don't shoot the bull. Say what you know and go on to the next question. You can always come back later and add information if you remember something.
3. Don't use felt tip pens -they leak through the paper and make both sides hard to read. Do not obliterate information you want to delete. One or two lines drawn through the word(s) should be sufficient. Don't write more than a very few words in the margin. Don't write sloppily. It is easier for the grader to miss an important word when he/she cannot read your handwriting.
4. Don't panic or get angry because you are unfamiliar with the question. You probably have read or heard something about the subject - be calm and think.
5. Don't worry about spelling every word perfectly or using exact grammar. These are not a part of the standards the graders use. It is important for you to know, however, that very poor spelling and grammar will hurt your chances.
6. There is no need to say the same thing twice. While introductory paragraphs may be important in English class, saying, "Process A is controlled by x, y, and z" and then writing a paragraph each on A, X, y, and z is a waste of valuable time. This also goes for restating the question. **Don't restate the question, just answer it.**
7. If given a choice of two or three topics to write about, understand that only the first one(s) you write about will count. You must make a choice and stick with it. If you decide that your first choice was a bad one, then cross out that part of the answer so the reader knows clearly which part you wish to be considered for credit. If the question says to choose 3 out of 5 topics, choose the 3 you are the most confident of, in other words, "the "best" answers you can provide. If the question asks specifically about RNA, don't discuss DNA duplication.

8. Don't leave questions blank. Remember that each point you earn on an essay question is the equivalent of two correct multiple-choice questions, and there is no penalty for a wrong guess, bad spelling or bad grammar. Make an effort on every question!

9. Avoid using vague terminology. Examples are the following terms/phrases that need some specific descriptive information: pollution, factory, contamination, runoff, kills stuff, smokestacks, bad, toxic, harmful, bad for the environment, negatively influences, energy source, waste, chemicals, pesticides, good/bad, better/worse. You must do more than “term drop” – show that you actually understand the specifics.

10. Do not include opinion, points of view or flippant answers.

11. Don't Quit!

FINAL THOUGHTS

Get to the point

Be concise. Be precise.

Don't waste time adding any additional information. Credit is only given for information requested.

Give examples whenever you can, but still be concise.

Don't list items in an outline form. Use normal sentence structure to give a list of items.

Always use complete sentences and good penmanship. If they can't read it, they can't grade it. For questions involving calculations, calculators are not allowed. You can get credit for setting up a problem correctly and showing all work including correct units. You receive no credit for the correct answer only.

FRQ topics already used

Energy (6x)

Human Population (2x)

Water (4x) – “pollution”, diversion

Food Webs

Air (2x)

El Nino

Land Use

Toxicity/LD50

Renewable/Non-renewable resources	Soils/Agriculture
Pesticides	Introduced Species
Recycling	Wetlands, Estuaries
Biodiversity (2x)	Radioactive Isotopes
Biomagnification/Mercury Pollution/Seafood	Mining/Restoration
Diseases	Meat Production/Consumption
ANWR (Oil, Tundra, Development)	Fisheries
Global Warming/CO2 cycle/Temperature	Brownfields
Solar/Photovoltaic Cells	Tragedy of the Commons

FRQ topics not used (at all or not in a way that “stands out”)

Biogeochemical cycles	Succession
Biomes/Aquatic Life Zones/Ecosystems	Stratospheric Ozone Depletion
Geology	Forestry
Fire Ecology	Oceans/Ocean Pollution
Coral Reefs	Weather/Climate
Genetically Modified Food	Photochemical Smog
Sustainable Development	Public Lands
Demographic Transition	Hydrogen Energy
Consumption/Resource Use/Affluenza/I=PAT/Ecological Footprint/Conservation	
Air Quality Monitoring/specific air pollutants/sources/impacts/prevention/reduction	
Population Dynamics/growth patterns/r strategists/k strategists/predation/density dependent variables/density independent variables/biotic potential	

Possible Calculation Based FRQ Topics

Municipal Solid Waste: amounts generated, placed in landfills, recycled, incinerated; waste-to-energy plants (e.g., methane production)

Agriculture/Arable Land: amounts of fertilizers used, water used, carrying capacity, feeding more people, overpopulation

Ecological Pyramids: trophic structure, energy transfer

Biodiversity: listed endangered and threatened species

Water: use, requirements, population size, sewage treatment