

Unit 5 Atmosphere and Climate Change

Unit 5 Free Response Exam A-DAY 12/11 B-DAY 12/12

***(This Unit's exam will consist of 2 **timed** FRQ's only, multiple choice questions will be included in the final)

Chapter 17: DUE A-DAY 11/20 B-DAY 11/26

1. About how thick is Earth's Atmosphere?
2. Name one characteristic of each of the four atmospheric layers.
3. Where is the "ozone layer" located?
4. How and why is stratospheric ozone beneficial for people?
5. How is tropospheric ozone harmful to people?
6. How does solar energy influence weather and climate?
7. How do Hadley, Ferrel, and polar cells help to determine long-term climatic patterns and the location of biomes?
8. Describe a thermal inversion.
9. Name three natural sources of outdoor air pollution.
10. Name three sources of outdoor air pollution caused by human activity.
11. What is the difference between a primary and a secondary pollutant? Give an example of each.
12. What is smog?
13. How is smog formation influenced by the weather?
14. How is smog formation influenced by topography?
15. How does photochemical smog differ from industrial smog?
16. How do chlorofluorocarbons (CFCs) deplete stratospheric ozone?
17. Why is this depletion considered a long-term international problem?
18. What was done to address this problem?
19. Why are the effects of acidic deposition often felt in areas far from where the primary pollutants are produced?
20. List three impacts of acidic deposition.
21. Name five common sources of indoor pollution. For each, describe one way to reduce one's exposure to this source.

FRQ 1: A-DAY DUE: 11/29 B-DAY DUE 11/30

Read the article below from the *Freemont Free Press* and answer the questions that follow.

10

Fremont City Council Considers Nitrogen Ban to Fight Smog!

At Tuesday's council meeting, Susan Lanza, a local environmental scientist, spoke about the role that nitrogen compounds play in the photochemical smog episodes that have recently plagued Fremont. Noting how successful the ban on the sale of phosphate detergents had been in improving conditions in Lake Fremont, Councilman Peter Budd proposed a ban on the use of all nitrogen-containing

fertilizers in Fremont to solve the local photochemical-smog problem.

Councilwoman Nita Smith made a statement that "although nitrogen-based fertilizers can cause other environmental problems, the ban on nitrogen fertilizers won't solve the smog problem in Fremont." After a heated discussion, the council tabled the motion on the ban.

- (a) Support Councilwoman Smith's statement that nitrogen-based fertilizers cause other environmental problems by describing one such problem.
- (b) Identify a nitrogen-containing primary pollutant that contributes to the formation of photochemical smog. Describe how that primary pollutant forms and explain why Councilman Budd was wrong.
- (c) Identify one secondary pollutant that is a component of photochemical smog and describe the following:
 - (i) How the secondary pollutant forms
 - (ii) ONE human health effect of the pollutant
 - (iii) ONE environmental effect of the pollutant
- (d) Earth's natural nitrogen cycle occurs in several steps. Describe one chemical transformation that occurs in the natural nitrogen cycle and discuss the importance of that transformation to an ecosystem.

Chapter 18: A-DAY DUE: 12/3 B-DAY DUE: 12/4

1. What happens to solar radiation after it reaches Earth?
2. How do greenhouse gases warm the lower atmosphere?
3. Why is carbon dioxide considered the main greenhouse gas?
4. How could an increase in water vapor create either a positive or negative feedback effect?
5. What is El Nino- Southern Oscillation? When and where do they happen?
6. What environmental problems are associated with El Nino?
7. What is La Nina and when does it happen?
8. How do scientists study the ancient atmosphere?
9. List five major trends in climate that scientists have documented so far.
10. Now list five future trends or impacts that they are predicting.
11. Describe how rising sea levels, caused by global warming, can create problems for people.
12. How may climate change affect marine ecosystems?
13. How might a warmer climate affect agriculture?
14. How is it affecting distributions of plants and animals?
15. How might it affect human health?
16. What are the largest two sources of greenhouse gas emissions in the United States?
17. In what ways can we reduce these emissions?
18. What roles have international treaties played in addressing climate change? Give two specific examples
19. Describe one market-based approach for reducing greenhouse emissions.
20. Explain one reason it may work well and one reason it may not work well.
21. Describe several ways in which we can reduce greenhouse gas emissions from transportation.

FRQ 2 A-DAY DUE: 12/5 B-DAY DUE: 12/6

Read the article below from the *Fremont Daily Gazette* and answer the questions that follow.

10 FREMONT DAILY GAZETTE

El Niño Linked to Disease Epidemics

Scientists have long realized the strong linkage between the ocean and atmosphere and the effect of this linkage on global climate patterns. Only recently however, have scientists established a possible link between climate change and health-related epidemics. Every few years a dramatic climate shift known as the El Niño-Southern Oscillation (ENSO) disrupts the normal interaction between ocean and atmosphere and alters the normal pattern of water temperatures and winds. ENSOs occur every 3 to 7 years and typically last from several months to over a year. During an El Niño, normal climatic patterns are severely disrupted and the longer the phenomenon lasts, the more disruptive it can be. When an ENSO lasts 12 months or longer it can also disrupt populations of oceanic and other aquatic organisms and set off a series of environmental problems throughout the world. Recently scientists studying ENSOs established a link between the climate-related changes during an El Niño event and the spread of such diseases as cholera and yellow fever.

The linkage apparently is the result of changing surface temperatures during the event, producing conditions suitable for the rapid spread of various vector-transmitted diseases in affected areas. The same changing conditions are also linked to several other environmental problems.

Recently, scientists at the Max Planck Institute in Germany reported that, based on a computer simulated model, human-induced global warming affects ENSOs. The model predicts more frequent El Niño events with increases in greenhouse gases, and if this model is correct, then we can expect further increases in disease epidemics in various parts of the world.

- (a) Describe what an El Niño is and clearly indicate where it occurs.
- (b) Describe the connection between the climate change associated with an El Niño and the transmission of diseases. Explain whether the article is correct in its reporting of the various disease epidemics that occur in response to an El Niño.
- (c) People in what part of the world would be most likely to be affected by this link between El Niño and disease?
- (d) Clearly describe two other important environmental problems associated with ENSOs.