

### Final

I. Fill in the blank (10 points). Complete the following statements.

1. In the upper ocean, the region in which temperature changes rapidly is called the \_\_\_\_\_.
2. Plants and phytoplankton are called primary producers because they \_\_\_\_\_.
3. The theory that plants will grow faster with higher greenhouse gas concentrations is called \_\_\_\_\_.
4. The total combined weight of organic material is called \_\_\_\_\_.
5. Global sea level rise could result from \_\_\_\_\_.

II. Short answer (15 points each—75 points total). Answer these questions with a brief and carefully constructed paragraph. You may find it helpful to draw a diagram.

1. What are the major processes that can remove CO<sub>2</sub> from the atmosphere? How rapidly or slowly do they act?

2. If you drove your car to school today, you released CO<sub>2</sub> out of your tailpipe. What are the major carbon reservoirs where the CO<sub>2</sub> could end up on the short term?

3. What effects does the surface-wind pattern have on the circulation of the oceans?

4. Explain why lack of diversity in food crops might present problems for the world food supply.

5. Why is global warming a threat to biodiversity?

## III. Essay I (30 points).

General Electric Motorcars (a division of DaimlerChrysler) recently sent out a brochure with photos of the “GEM”, a golf-cart like Neighborhood Electric Vehicle. The accompanying letter begins,

*Dear Residents of California*

*Recently, advanced technology vehicles have been receiving a lot of press. President Bush’s call for increased fuel cell research and development, California transit operators requesting bids for station car projects and a surge of “electric vehicles” in the news.*

*I’m writing to tell you about an amazing Low Speed Neighborhood Electric Vehicle—the GEM—that is an ideal supplement to your transportation needs .... The idea behind the creation of the GEM was to produce a vehicle that fits a need not met with conventional vehicles currently available on the market. Why use a gas vehicle for a task that doesn’t require you to go very far or very fast? Why use an ordinary golf car when for virtually the same price, you could own a street legal, stylish and versatile Electric Vehicle?*

The letter includes some information about financing and lists these features of the GEM:

- *Plugs into any 110 outlet, fully recharged in 6-8 hours*
- *Travels approximately 30-35 miles per charge at 25 mph*
- *Costs about a penny per mile to drive ...*
- *Environmentally responsible*

And the letter concludes,

*Californias have always been on the cutting edge with new technology and have always been a recognized leader when it comes to environmental issues. Now, for a limited time with [our current special offer] there has never been a better time to own a GEM and at the same time, do your part to clean the air.*

.....

Write an essay discussing the following issues: Why would DaimlerChrysler choose to market an electric car in California? What are the environmental advantages of a GEM? What are the environmental drawbacks of a GEM?

IV. Essay II (30 points).

Although the Bush administration has taken a clear stance opposing the Kyoto Protocol, the Senate still has the option of debating and possibly ratifying the treaty. Write a letter to California Senators Feinstein and Boxer outlining what action you would like them to take on global warming and the Kyoto Protocol.

There is no correct answer, and you should consider that although the California senators are both Democrats, they expect to receive letters from individuals holding a wide range of political views.

To give yourself credibility, make sure that you write a well-informed letter demonstrating that you are familiar with the scientific and political issues underlying your recommendation.