WORKSHEETS FOR BIOLOGY 105, UNIT 9, STEP 2
GLOBAL CLIMATE CHANGE INTERNET ASSIGNMENT

NAME: ______________________________ DATE: __________________

The introduction, instructions, and web links for this activity are on the Biology 105 website. You do NOT have to complete this assignment before you take your Unit 9 test. Please see your syllabus and/or the class website for the deadline to turn in this assignment. This assignment is worth a total of 12 points and has two parts:

Part 2: Regional Climate Change Impacts and Mitigation

When you have completed the entire Unit 9 Step 2 Internet Assignment (Part 1 and Part 2), turn in these worksheets and initial and date the Assignment Check-In list at the front desk in the Biology Learning Center. Your instructor will grade the worksheets, and return them after the deadline.

Did you work with another student in Bio 105 on this assignment? If so, whom:
__________________________________________ . Working with another person can be a great way to help both of you to learn better and to enjoy yourself more while you do so. However, there are rules for working together that you both must follow. These are available at http://dtc.pima.edu/blc/105/group_work.html and in the Student Code of Conduct. Submitting answers using your own words is one of the most important rules.

Part 1: Emissions, Global Warming, and Global Impacts

1. What are greenhouse gases (GHGs) and how do they influence the Earth’s climate?

2. Name the three most abundant greenhouse gases in the atmosphere. Give an example for each of how human activities are increasing the amounts of these GHGs in the atmosphere.

3. What do all three of your examples have in common (with respect to their sources)?
4. What country releases the greatest amount of carbon dioxide per capita (per person) into the atmosphere?

5. What happens to the amount of energy absorbed in the atmosphere vs. the amount that escapes out to space as GHG concentrations increase? What is the impact on the atmosphere?

6. Compare positive and negative feedbacks loops. Which type of feedback loop results in a warmer climate on Earth?

For each problem, indicate whether it is a POSITIVE FEEDBACK LOOP or a NEGATIVE FEEDBACK LOOP. Refer to your answer to Question 6 to help you.

7. Problem #1: If the temperature of the earth increases, then more water will evaporate from the oceans, and become water vapor in the air. Because water vapor is a greenhouse gas that holds heat, it could lead to even higher temperatures, which in turn lead to more evaporation. Is this a positive or negative feedback loop?
   Problem #1: __________________________

8. Problem #2: If temperature increases, more water will evaporate from the oceans, and there will be more water vapor in the air. The increase in water vapor will lead to more clouds. The increase in clouds will mean an increase in albedo, so that more solar radiation will be reflected away from the earth, leading to cooler temperatures. Is this a positive or negative feedback loop?
   Problem #2: ____________________________

9. Problem #3: If there is more carbon dioxide in the atmosphere, temperatures are likely to increase. It is possible that plants will respond to the increased carbon dioxide and increased temperatures with an increase in photosynthesis. Because carbon dioxide is needed for photosynthesis, this will reduce the amount of carbon dioxide in the atmosphere, leading to cooler temperatures. Is this a positive or negative feedback loop?
   Problem #3: ____________________________
10. What is the greatest amount of surface warming projected by 2100 A.D. on the figure Variations of the Earth’s Surface Temperature: year 1000 to year 2100? What is the least amount of warming? Your answer should be in °C.

11. How much did sea level rise during the 1900s?

12. What are the estimates of global sea level rise due to thermal expansion by 2090 A.D.? What are the estimates of global sea level rise due to melting glaciers?

13. Why are many scientists concerned that biological systems will be affected negatively by global climate warming?

14. Look again at the animation of modeled change in vegetation in Glacier National Park. Watch the animation all the way through. As the animation progresses from 1850-2100, notice the changes in vegetation. What would you say is the most consistent pattern to changes in vegetation across the landscape?

15. Look again at the animation of modeled change in vegetation in Glacier National Park. From the beginning (1850) use the stop button on your browser when the animation is at the year 1900. Take a minute to study the map and the legend. Click the refresh button on the web browser to start the animation over again. This time, watch it in its entirety. Pay particular attention to the vegetation types from the 21st century. What is the major change in vegetation between 1900 and 2000 in the lower elevations?
Part 2: Regional Impacts and Mitigating Global Climate Change

16. What is climate variability? Give an example of how the climate of the Southwest is variable.

17. How much warming is projected by 2090 for the Southwest? Which season will be most affected?

18. By how much is winter rainfall projected to change in the Southwest by 2090?

19. It is not at all clear how these projected changes in temperature and rainfall will affect the Southwest. List two possible outcomes that would be detrimental (bad) for the Southwest and its population and list two possible outcomes that would be beneficial for the Southwest and its population.

Detrimental outcomes:

Beneficial outcomes:

20. Why must efforts to address global climate change be international in scope?
21. What is the name of the international agreement on global climate change? Is the United States a part of this agreement?

22. Nations that have ratified the Kyoto Protocol have agreed to cut GHG emissions to certain targeted levels by what year?

23. Will the United States meet its targeted reduction by this date?

24. Do you think the Kyoto Protocol will be effective at stopping or reducing global climate change? Why or why not? Outline at least two lines of reasoning to support your answer.

25. Your life has been or will be noticeably affected by global climate change. Give at least one example of how you think you will be affected.

Turn in your worksheets for all of Unit 9 Step 2 and initial and date the Assignment Check-In list at the front desk in the Biology Learning Center. Your instructor will grade the worksheets and return them in a few days.