Name _____ Period _____ Due Date _____

Investigating Climate Change at the Micro- and Macroscopic Level

Inquiry /5

Application /10

Objectives

- Discover some causes and effects of increasing global temperature. (D1.1)
- Determine the environmental factors that affect the motion and size of glaciers.(D2.5, D3.8)
- Explain how greenhouse gases influence the temperature of the Earth. (D3.6)

PART A: Glaciers

1. Open up the PhET Glaciers simulation (http://phet.colorado.edu/en/simulation/glaciers) and play with the sim for five minutes. What do you find? Discuss your ideas with your partner.

Inquiry 0 / -0.5

2. Observe what happens to the glacier as you adjust different parameters in the simulation. Record your observations in the table.

Inquiry /2

Action	Glacier Movement	Maximum Thickness
Decrease the average annual snowfall	☐ Advances ☐ Retreats ☐ None	☐ Increases ☐ Decreases ☐ No Change
Increase the average annual snowfall	☐ Advances ☐ Retreats ☐ None	☐ Increases ☐ Decreases ☐ No Change
Decrease the average temperature	☐ Advances ☐ Retreats ☐ None	☐ Increases ☐ Decreases ☐ No Change
Increase the average temperature	☐ Advances ☐ Retreats ☐ None	☐ Increases ☐ Decreases ☐ No Change

3. What claims can you make about the relationship between the amount of snowfall and the movement and thickness of glaciers? Provide quantitative evidence for your claims. (using measurements is best here!)

App. /2

4. What claims can you make about the relationship between the average temperature and the movement and thickness of glaciers? Provide qualitative evidence for your claims. (using measurements is best here)

App.
/2

PART B: The Greenhouse Effect

1. Open up the PhET Greenhouse Effect simulation (http://phet.colorado.edu/en/simulation/greenhouse) and play with the sim for five minutes. What do you find? Discuss your ideas with a classmate if this helps.

Inquiry
0 / -0.5

Greenhouse Effect Tab

1. Adjust the concentration of greenhouse gases in the atmosphere and observe what happens. Record your observations in the table below.

Greenhouse Gas Concentration	What happens to sunlight?	What happens to infrared photons?	What happens to the temperature?
Today			
Ice Age			
None			

Inquiry
/2

Photon Absorption Tab

2. Explore how the different molecules interact with visible and infrared light. Do you find any patterns?

App. /2

3. Which gases are considered *greenhouse gases*? Provide evidence to support your answer.

App. /2

4. Build an atmosphere with different compositions. Use the table below to record your observations.

Composition of Atmosphere	What happens to infrared photons?	What happens to visible photons?
Lots of greenhouse gases		
No greenhouse gases		

Inquiry /1

PART C: Reflection

Use your observations on the *microscopic* level (very small level) in **The Greenhouse Effect simulation** to explain your *macroscopic* (very big level) observations in the **Glaciers simulation**. What connections can you make?

App. /2