Greenhouse Effect & Climate Change

SNC2D | Student laboratory assignment | 1 of 4

Prepare for your investigation

Name: _____ Date: _____ Class: _____

Research question

How can observations from this virtual investigation explain greenhouse effect & climate change?

Learning goal: use the virtual model to gather evidence, explain greenhouse effect & climate change and communicate a supported conclusion.

Materials: WorksheetGalaxy virtual laboratory, this assignment, calculator or spreadsheet if needed. Virtual observations only; do not recreate hazardous procedures or perform physical fitness tests without teacher approval.

1. Define two relevant scientific terms from the Background Information tab. (K/U)

2. Write a prediction or hypothesis with a scientific reason. (K/U, T/I)

3. Identify the variable or feature compared, the measured outcome and constants or consistent observation criteria. (T/I)

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Perform the virtual laboratory

Open the corresponding virtual lab and read Background Information. Follow the investigation instructions below. Record authentic simulated results; do not invent data.

- Read the background and write a testable hypothesis about CO_2 and equilibrium temperature.
- In the Experiment tab, choose Reset to baseline and record a baseline trial.
- Keep methane, albedo and solar intensity constant. Record CO_2 trials at 280, 420, 560, and 840 ppm .
- Return CO_2 to 420 ppm and vary albedo (for example 0.25, 0.30, 0.35), recording each trial.
- Compare only trials that differ in one input. Use the Data & Graphs tab to graph the CO_2 series.
- Explain why a model can be useful without predicting every detail of the real climate system.
- Complete the Lab Report, export your draft if needed, and print/save as PDF.

Record each completed observation using the simulator’s record control when available. Use Data & Graphs to review results. Export CSV if available; attach additional rows or screenshots when needed.

Record the exact settings and any changes to the method.

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Observations & results

Enter the actual results. Keep trial IDs consistent between continued tables. Attach the full exported data or extra sheets when the procedure requires more rows. Include units as displayed.

Data table 1

Trial / item	CO_2 ppm	CH_4 index	Albedo	Solar %	Absorbed W/m²

Data table 1 — continued (2)

Trial / item	Temp °C	ΔT °C

Qualitative observations / sample calculation (show units where applicable)

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Analysis, conclusion & assessment

4. Present a labelled graph of a measured relationship, or an annotated diagram / comparison chart for qualitative investigations. Attach it separately. Explain the pattern using recorded evidence. (C, T/I)

5. Identify the independent, dependent, and controlled variables in your CO_2 investigation. (K/U, A)

6. Explain how changing planetary albedo affects absorbed solar energy and temperature. (K/U, A)

7. Describe the difference between incoming sunlight and outgoing infrared radiation. (K/U, A)

8. Explain why a logarithmic CO_2 forcing relationship does not imply that adding CO_2 has no effect. (K/U, A)

Conclusion and evaluation: answer the research question, revisit the prediction using evidence, identify a model limitation and propose an improvement. (T/I, A)

Submit this assignment plus your completed Lab Report (printed or saved as PDF from the lab) and any supporting data/figures.

K/U: accurate concepts /10	T/I: method, data, reasoning /12	C: clear tables, units, report /8	A: explanation, conclusion, transfer /10

Total: /40