Climate Change & the Greenhouse Effect

SNC1W | Student laboratory assignment | 1 of 4

Prepare for your investigation

Name: _____ Date: _____ Class: _____

Research question

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

Learning goal: use the virtual model to gather evidence, explain climate change & the greenhouse effect 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.

• Set the model to the reference state. Record baseline results.

• Change only CO_2 concentration to 420, 560, and 840 ppm. Record a trial for each, keeping all other inputs constant.

• Restore the baseline. Change albedo to 0.25 and 0.35, recording both trials.

• At fixed CO_2, compare a 20-year response with a 100-year response.

• Investigate one mitigation scenario using the controls. Compare your results to a matched no-action scenario.

• Complete the formal lab report using evidence from your trial table and graph.

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 ppb	Albedo	Solar %	Years

Data table 1 — continued (2)

Trial / item	Forcing W/m²	Equil. ΔT °C	Transient 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. Procedure — Describe the steps used to collect at least four comparable trials. (K/U, A)

6. Data analysis — Use your recorded trials to describe the relationship between CO_2 concentration and temperature anomaly. (K/U, A)

7. Albedo investigation — Explain how increasing or decreasing planetary albedo changes absorbed solar energy. (K/U, A)

8. Energy balance — Explain incoming solar radiation, outgoing infrared radiation and greenhouse forcing. (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