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Exploring Global Warming Using TI calculator, Agent Sheets and GIS

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Global Warming

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Goal

■Science

◆Students will interpret data to understand global warming and the green house effect.
(Atmospheric Science, Ecology)

■Mathematics

◆How to enter information into the calculator and graph data to interpret and communicate mathematically.

■Technology

◆To use modeling tools to gather, interpret, and simulate real world issues.

Performance Objectives

■Students will manipulate the Agent Sheets model in order to see the direct correlation between CO₂, temperature, polar ice caps and the rising seas (sea level)

■Students will hypothesize and develop conclusions

■Students will answer questions based on the data graphed on the TI calculator

■Students will learn how to enter data to calculate and plot a graph

■Students will review how to label a graph

■Students will produce a graph and find correlation between the temperature and CO₂

NYS Standards

■Science

◆S-3 Earth and Space Science concepts

◆S-4 Scientific Connections and Applications

◆S-5 Scientific Thinking

◆S-6 Scientific Tools and Technologies

■Mathematics

◆S-1 Mathematical reasoning

◆S-4 Modeling/Multiple representations

◆S-5 Measurement

■Technology

◆Information technology is used to retrieve, process, and communicate information and as a tool to enhance learning.

TI - Graphing Calculator

Smart View

TI Calculator and Smart View

TI Graph

Graph Questionnaire

- What is represented on the y-axis? (The title of the y-axis and include the units)
- What is represented on the x-axis? (The title of the x-axis and include the units)
- Where on the globe was the data taken from?
- What trends or conclusions can you draw from the graph? (increasing/decreasing? What does it mean?)

Excel-Data Analysis

Temp. and CO₂ Data and Graph Analysis

- During what time was the observed temperature increase the greatest?
- What time period shows the greatest increase in Co₂ concentrations?
- Examine the date carefully. Does the data support the conclusion that increasing greenhouse emissions are responsible for the 0.5 degree Centigrade increase in observed temperature during the past 110 years? Explain your reasoning.
- What are some other natural phenomena that possible could explain increases in temperature.

Agent Sheets – The Model

- The model was generated from trends noticed in the data
- Agents were created representing CO₂, global temperature, and polar-ice caps

The Worksheet

Changes...

Increased Temperature

Increase of Melted

Polar-Ice Caps

Differentiated Instruction

Beyond the expectations

Recognize

- Students varying background knowledge
- Readiness
- Language
- Preferences in learning
- Interests
- How to react responsively

Differentiated instruction is a process to approach teaching and learning for students of differing abilities in the same class.

http://www.cast.org/publications/ncac/ncac_diffinstruc.html

Increasing Complexity

The Differentiated Classroom

■ Agent Sheets

◆ Create new agents

★ Methane, Sulfuric oxide, Nitrous oxide, water vapor, carbon monoxide, etc

★ Design a new model representing opposing theories

■ GIS – Geographic Information Systems

◆ Comparing metadata about the different agents affecting the global temperature