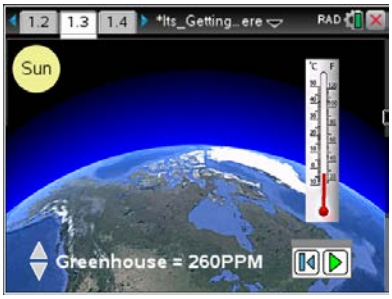
Science Objectives

- Students will manipulate greenhouse gases to gather data on global temperature.
- Students will learn that greenhouse gas released by humans could further warm the Earth.
- Students will evaluate the effects of rising greenhouse gases on the physical environment of the Earth.



TI-Nspire™ Technology Skills:

- Download a TI-Nspire document
- Open a document
- Move between pages
- Use a minimized slider
- Graph a linear regression

Tech Tips:

Make sure that participants understand how to graph a line on a data and statistics page.

Lesson Materials:

Student Activity

- Its_Getting_Hot_in_Here_Student.doc
- Its_Getting_Hot_in_Here_Student.pdf

TI-Nspire document

- Its_Getting_Hot_in_Here.tns

Vocabulary

- photons
- infrared radiation
- greenhouse effect

About the Lesson

Within this lesson, students are given an image of the greenhouse effect which can be manipulated to adjust the amount of greenhouse gases that would change the corresponding temperature.

- As a result, students will:
  - Be able to measure the relationship between the level of greenhouse gases and global temperature.
  - Observe how manipulating the level of greenhouse gases has a direct effect on the amount of infrared radiation which is trapped in the atmosphere.
  - Explore how changing the level of greenhouse gases has an effect on the amount of infrared energy that escapes into space.

TI-Nspire™ Navigator™

- Send out the .tns file.
- Monitor student progress using Screen Shots.
- Use Live Presenter to spotlight student answers.
- Enter items as appropriate for use of TI-Navigator.

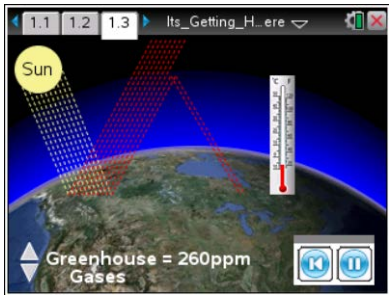
Activity Materials

- *Its_Getting_Hot_in_Here.tns* document
- TI-Nspire™ Technology

Discussion Points and Possible Answers

1. Have students read the background information stated on their activity sheet and on page 1.2 of the tns file.

Move to page 1.3.



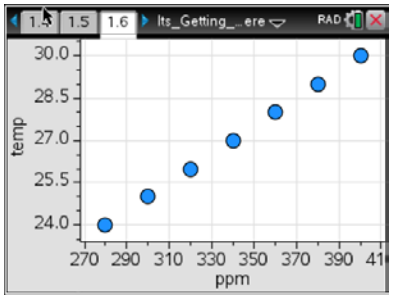
2. Have students explore this page by adjusting the level of greenhouse gases. Be sure the student clicks the play button first before attempting to make any adjustments. Once the play button has been clicked, as the student makes an adjustment, the data will then be stored on the spreadsheet on page 1.4.

Move to page 1.4.

Here students will see a table, which has collected all of the data points from the simulation. As students adjusted the level of greenhouse gases, the temperature changed and is indicated on this page.

Move to pages 1.5 – 1.6.

On page 1.5, students are to read the information related to the graph on page 1.6.



3. On page 1.6, students will see the data points from the simulation plotted showing the relationship between global temperature and level of greenhouse gases.
   Students will need to then graph a line showing the relationship between the level of greenhouse gases and the overall temperature. They should press **MENU > Analyze > Regression > Show Linear (mx+b)**.

TI-Nspire Navigator Opportunities

Complete a Class Capture to make sure that all students are able to compute the linear regression. If not, make a student the Live Presenter, and have them walk the other students through the process.

Move to pages 1.7 – 1.15.

Have the students answer questions 1-9 on the handheld, the activity sheet, or both.

Q1. Use your graph on page 1.6 with the linear regression equation in slope-intercept form. For every 20 ppm increase in greenhouse gases, how much does the temperature increase?

Answer: 1 degree Celsius

Q2. Using your graph, is there evidence to support a relationship between the concentration of greenhouse gases and global temperature?

Answer: A. Yes

Q3. In this simulation, which variable is the outcome (dependent) variable?

Answer: B. temperature

Q4. The sun releases energy in the form of _____, which heats up our planet.

Answer: C. photons

Q5. As you decrease the total amount of greenhouse gases in the atmosphere, the temperature increases.

Answer: False

Q6. When running the simulation you are able to manipulate the level of greenhouse gases and observe a temperature change. As you increase the amount of greenhouse gases, what happens to the total amount of energy released by the sun?

Answer: B. The amount of energy stays the same.

Q7. As you increase the concentration of greenhouse gases, what happens to the amount of infrared energy that escapes into space?

Answer: C. The amount of energy that escapes into space decreases.

Q8. How would life on our planet be different if we did not have the greenhouse effect?

Sample Answers: very cold nights, no temperature regulation, the planet would freeze

Q9. In what ways will the Earth change if the average global temperature rises?

Sample Answers: melting ice caps, rising global oceans, changes in weather patterns, loss of fresh water sources

Wrap Up

When students are finished with the activity, retrieve the .tns file using TI-Nspire Navigator. Save grades to Portfolio. Discuss activity questions using Slide Show.

Assessment

- Formative assessment will consist of questions embedded in the .tns file. The questions will be graded when the .tns file is retrieved. The Slide Show will be utilized to give students immediate feedback on their assessment.