It's Getting Hot in Here

MIDDLE GRADES SCIENCE NSPIRED

Science Objectives

- Students will manipulate greenhouse gases to gather data on average 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.

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.

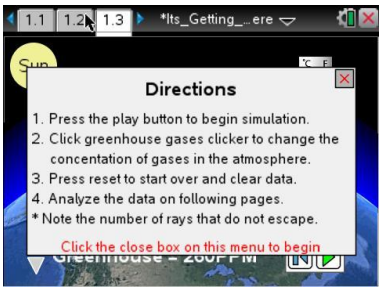
- As a result, students will:
  - Be able to measure the relationship between the level of greenhouse gases and average global temperature.
  - Observe how manipulating the level of greenhouse gases has a direct effect on the amount of infrared radiation which is trapped in the atmosphere.

TI-Nspire™ Navigator™

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

Activity Materials

- Compatible TI Technologies: TI- Nspire™ CX Handhelds, TI-Nspire™ Apps for iPad®, TI-Nspire™ Software



Tech Tips:

- This activity includes screen captures taken from the TI-Nspire CX handheld. It is also appropriate for use with the TI-Nspire family of products including TI-Nspire software and TI-Nspire App. Slight variations to these directions may be required if using other technologies besides the handheld.
- Watch for additional Tech Tips throughout the activity for the specific technology you are using.
- Access free tutorials at http://education.ti.com/calculators/pd/US/Online-Learning/Tutorials

Lesson Files:

Student Activity

- Its_Getting_Hot_in_Here_Student.doc
- Its_Getting_Hot_in_Here_Student.pdf

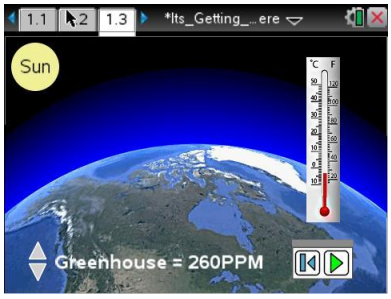
TI-Nspire document

- Its_Getting_Hot_in_Here.tns

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 selects the Play button first before attempting to make any adjustments. Once the play button has been selected, as the student makes an adjustment, the data will then be stored on the spreadsheet on page 1.4.

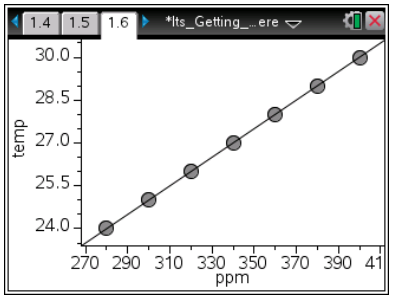
Tech Tip: To access the Directions again, select menu or **Document Tools ( ) > Its Getting Hot in Here > Directions.**

Tech Tip: To access the Directions again, select > **Directions.**

Move to page 1.4.

Here students will see a spreadsheet, 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.



Students are to read the information describing the graph on page 1.6

3. They will see the data points from the simulation plotted and the linear regression showing the relationship between average global temperature and level of greenhouse gases. Have students graph a line showing the relationship between the level of greenhouse gases and the overall temperature.

Tech Tip: To graph a line, select **Menu** or > **Analyze > Regression > Show Linear (a+bx).** You may need to back-out to the main Tools Menu to see the desired menu option.

TI-Nspire Navigator Opportunities

Complete a Class Capture to make sure that all students are following along with the linear regression. If not, make a student 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 device, the activity sheet, or both.

Q1. Using your graph on page 1.6, you should see a linear regression now (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: B. 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 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.