Lesson Title	Calculating Your "Carbon Footprint!"
Length of Lesson	One (50 minute) class period
Created By	Bo Cherry
Subject	General Science
Grade Level	7th grade
State Standards	7th: 1 c (Inquiry); 4 a,b (Earth and Space Science)
DOK Level	DOK 2
DOK Application	Separate, Compare, Relate, Make Observations
National Standards	5-8: A (Inquiry); D (Earth and Space Science)
Graduate Research Element	An understanding of the carbon cycle is an important part of geology and of environmental sciences.

Student Learning Goal:
MS 7th Grade:
(Inquiry) 1 (c) Collect and display data using simple tools and resources to compare information; (Earth and Space Science) 4 (a) Justify the importance of Earth materials (e.g. rocks, minerals, atmospheric gases, water) to humans.

National Science Education Standards of Content 5-8:
(Inquiry - A) Abilities necessary to do scientific inquiry; Use appropriate tools and techniques to gather, analyze, and interpret data; Use mathematics in all aspects of scientific inquiry; (Earth and Space Science - D) Structure of the Earth System

Materials Needed (supplies, hand-outs, resources)
Computer, Projecter, Powerpoint (INSPIRE_PP_Cherry_07.30.11), Handouts (INSPIRE_HO_Cherry_07.30.11), Calculators (optional)

Lesson Performance Task/Assessment:
In this lesson, students will have an opportunity to calculate their hypothetical carbon footprint. This lesson will begin by splitting the class into groups of 2-4, depending on the class size (the smaller the group, the better). There should be 10 groups total. Each group will be given a different handout which discusses a different, hypothetical family. Students must read about the family's daily life and calculate a carbon footprint for that family. Each handout guides the students through the calculation, but the instructor should also check each group's progress as the lesson goes on. After the calculations are complete, each group will be asked to present their findings on the board. The teacher will make a chart prior to this which will look similar to the chart in the handout file

(INSPIRE_HO_Cherry_07.30.11). A discussion with a powerpoint will follow the exercise. This discussion will include the fundamentals of how greenhouse effect works, and how carbon dioxide is one of the more prevalent greenhouse gases because of the various sources of emission. The instructor should also show that CO2 is not the only greenhouse gas. Discussion should always reference the exercise in some way, so also asking how the students could minimize their own carbon footprint.

Lesson Relevance to Performance Task and Students:
This lesson is a great way to introduce students to a carbon footprint, and use this hypothetical calculation as a segue into greenhouse gases and the greenhouse effect. Students will begin to develop an idea of how various earth systems operate in that the solar energy is the driver of the system and much of the radiation is reflected or absorbed then re-emitted. Students will understand how humans can contribute to the concentration of greenhouse gases in our atmosphere. Students will also understand why the greenhouse effect is important to life on Earth, but also how it can be a contributor to global climate change. The initial exercise will also incorporate mathematics in the science classroom.

Anticipatory Set/Capture Interest:
In order to capture the students' interest, the class will be divided into small groups at the beginning of the lesson. Working in small teams, students will calculate the hypothetical carbon footprint of their new “family.” This will have the students discussing each situation that they are assigned and each group will report their findings to the class.

Guided Practice:
The second half of this lesson is guided by the instructor through the powerpoint presentation. Not much text accompanies the powerpoint, so much of the information will be discussed and the concepts will be outlined.

Independent Practice:
Students will have an opportunity at the beginning of the class to work in small groups or individually to calculate their hypothetical carbon footprint. Students will also be expected to take detailed notes on the powerpoint lecture throughout the second half of the class period.

Remediation and/or Enrichment:
Remediation- Individual IEP
Enrichment - Have students research their family's actual carbon footprint. Using the worksheet as a guide for their calculations, students can find out and average kilowatts used per year, as well as an average driven per year.

Check(s) for Understanding:
The instructor should lead discussion and use formative feedback from those discussions in order to check for understanding. By asking questions about the concepts behind the greenhouse effect, the instructor can decide the level of understanding amongst the students.

Closure:
Question 1: What are some solutions for decreasing our carbon foot-print? Are these solutions expensive or do they end up saving money?

Question 2: How can the gas, CO2, be measured in tons if it is a gas?

Possible Alternate Subject Integrations:
Chemistry, Physical Science, Mathematics

Teacher Notes:
The handout provided with this lesson is found at:
http://www.windows2universe.org/teacher_resources/co2_spew_w2u.pdf