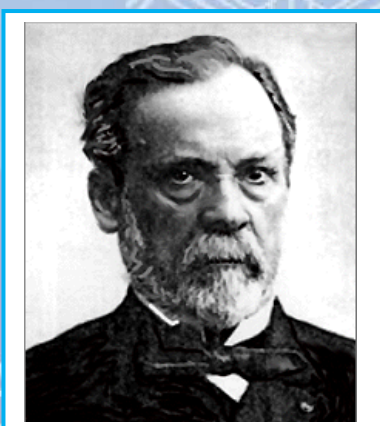
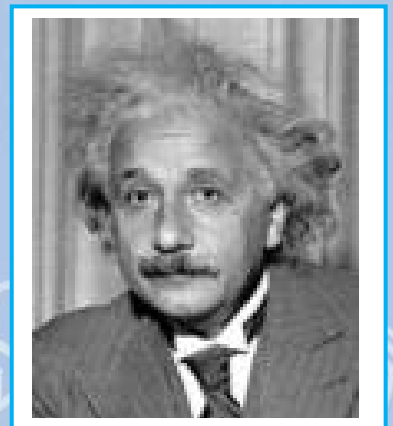




Sir Isaac Newton



Louis Pasteur



Albert Einstein

A
SCIENCE
Winter
Inquiry Land

Grade 6

Winter 2011-2012



Miami-Dade County Public Schools
Curriculum & Instruction

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WELCOME TO A SCIENCE WINTER INQUIRY LAND

Preparing for Science

Science is not something mysterious. Being "scientific" involves being curious, observing, asking how things happen, and learning how to find the answers. Curiosity is natural to children, but they need help understanding how to make sense of what they see.

Bruno V. Manno
Acting Assistant Secretary
Office of Educational Research and Improvement

Many people are frightened by science and see it as something that can only be understood by the mind of a genius. Increasing the number of people going into the fields of science and mathematics is the national goal. However, even if a student is not planning to pursue a career in one of those fields, they have to be prepared to live and work in a world that is becoming increasingly complex and technical.

What Is Science?

Science is not just a collection of facts. Facts are a part of science. However, science is much more. It includes:

- Observing what is happening,
- Predicting what might happen,
- Testing predictions under controlled conditions to see if they are correct,
- Trying to make sense of our observations, and
- Involving trial and error--trying, failing, and trying again.

Science does not provide all the answers. The world around us is always changing and we learn something new every day, so we have to be willing to make changes and adjustments to our knowledge when we discover something new.

The Winter Break Packet

The activities and reading passages in this packet were selected to allow students to experience the relevancy of science in a fun and engaging way. As they navigate through these activities, students should realize that science is not limited to the classroom but that it is all around in everyday lives and that it explains most of the phenomena encountered in life.

Included as part of this packet, is a link to the Miami-Dade County Public Schools Student Portal *Links to Learning* technology activities. Individualized student learning paths have been designed based on FCAT scores and are aligned to the District's Pacing Guides. These online activities are supplemental and, as such, are not to be assigned or graded. All online activities are provided as a resource to both parents and students to engage learning using technology. Please log on just as you do at your school <http://www.dadeschools.net/students.asp>.

Safety First

Read through each activity before you try it. Adult supervision is important, especially with any of the activities that involve heat, chemicals or sharp instruments.

Also, make sure that you understand any safety precautions that may be necessary for these—or any—science activities. In particular, you should:

- Taste nothing without adult supervision;
- Wear goggles whenever something could splash, burn, or shatter and endanger eyes;
- Follow warnings on manufacturers' labels and instructions for toys and science kits;
- Avoid toxic or other dangerous substances;
- Avoid accidents; and
- Know what to do if an accident occurs.

Enjoy!

Who Were They?

Sir Isaac Newton was a physicist, mathematician, astronomer, alchemist, and natural philosopher. He is best known for his explanation of Universal Gravitation and the three laws of motion. He was also able to prove that the reason of both the motion of objects on Earth and of celestial bodies is controlled by the same Neutral laws. These findings would make a revolutionary change in the development of science. His invention of the reflecting telescope was his great contribution in optics.

Louis Pasteur was a French chemist and microbiologists and one of the most famous and influential contributors in medical science. He is remembered for his remarkable breakthroughs in the causes and preventions of diseases supported by his experiments on the germ theory of disease. He also created the first vaccine for rabies and anthrax. Pasteur also invented the method of “pasteurization”, where harmful microbes are stopped from causing sickness in food.

Albert Einstein is the greatest scientist of the twentieth century and the most notable physicist of all time. He was born in Germany but eventually migrated to America to take a teaching position at Princeton University. It is told that he had a learning disability in his childhood. He could not talk till he was three and could not read till he was eight. Despite such problems, in 1921 he became the noble prize winner for his contributions to Physics. His *Theory of Relativity* is considered a revolutionary development of Physics.

Mission: Geology

How Do Chemicals Weather Rocks?

Adapted from: <http://userpages.bright.net/~double/erode.htm>

Dear Scientist,

Congratulations! You have been selected as a result of your enthusiasm for learning. The mission that you have decided to accept explores a part of the wondrous world in which you live – Planet Earth. You will now assume the role of *geologist*. This important scientist studies the structure of the Earth, especially the rocks and minerals. Important scientific terms that you use are: weathering, the wearing down of rocks

There has been a considerable amount of chemical pollution in the air resulting in the formation of the destructive *acid rain*. This evil villain is affecting the rocks of the Earth. Is the *acid rain* as evil as people say? Your mission is to conduct an experiment to determine how much damage will occur to the rocks near your home if *acid rain* continues to fall.

The experiment:

1. Place an equal number of limestone or marble chips in each of two jars.
2. Cover the stones in one jar with water and those in the other with vinegar; then screw lids on the jars. Be sure to use the same amount in each jar.
3. Hypothesize what will occur in both jars.
4. Allow the jars to stand overnight.
5. You may notice some bubbles forming in the jar with the vinegar. What does this mean?
6. The next day, pour out the liquid from each jar into separate bowls.
7. Label the bowls "water" and "vinegar".
8. Allow the water in the bowls to evaporate.
9. Compare the amount of solid material remaining in the two bowls.
10. Repeat the experiment with rocks from your yard.
11. Complete the *Experimental Design* write-up and conclusion on the following page.
12. Decide if you consider acid rain to be evil. Defend your decision.



Experimental Diagram

Title:	
Type of Experiment <i>(controlled experiment, observation)</i>	
Problem Statement <i>(Can be written as a question)</i>	
Hypothesis:	
Test (Independent) Variable:	
Outcome (Dependent) Variable:	
Experimental Tests:	
Number of Trials per Test: <i>(repetition)</i>	
Control Test:	
Variables Held Constant:	

Writing Your Conclusion

Directions: Write your conclusion within three paragraphs. Answer questions 1-3 in the introduction paragraph, question 4 in the body paragraph, and questions 5-7 in the conclusion paragraph.

1. What was investigated? (Describe the problem statement)
2. Was the hypothesis supported by the data?
3. What were the major findings?
4. How did your findings compare with other researchers?
5. What possible explanations can you offer for your findings?
6. What recommendations do you have for further study and for improving the experiment?
7. What are some possible applications of the experiment?

Benchmark(s):

SC.6.E.6.1 – Describe and give examples of ways in which Earth’s surface is built up and torn down by physical and chemical weathering, erosion, and deposition.

Big Idea 6: Earth Structures

Content Cluster: Earth and Space Science

Earth's Greenhouse Effect

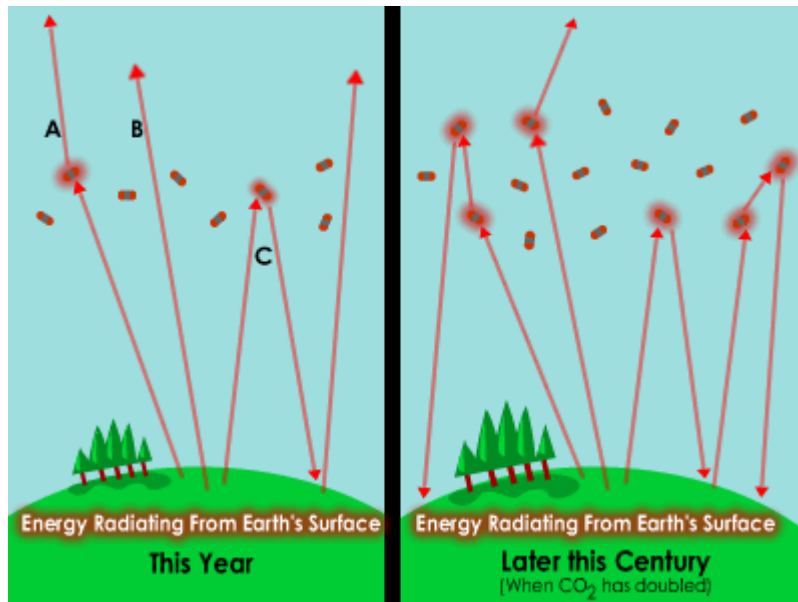
Adapted from: Windows to the Universe

http://www.windows.ucar.edu/tour/link=/earth/climate/earth_greenhouse.html

Directions: Try to answer the following pre-reading questions, then read the article and determine the accuracy of the responses. Complete the questions at the end of the selection as a knowledge-check of the Greenhouse Effect.

Pre-Reading Questions:

1. Recall current issues related to global warming and climate change.
2. Hypothesize what will happen if the world's climates kept getting hotter, especially over winter break.



The Earth's surface, warmed by the Sun, radiates heat into the atmosphere. Some heat is absorbed by greenhouse gases like carbon dioxide and then radiated to space (A). Some heat makes its way to space directly (B). Some heat is absorbed by greenhouse gases and then radiated back towards the Earth's surface (C). With more carbon dioxide in the atmosphere later this Century, more heat will be stopped by greenhouse gases, warming the planet.

Click on image (ctrl + shift) for full size (41 Kb) Lisa Gardiner / Windows to the Universe

Energy from the Sun that makes its way to the Earth's surface can have trouble finding its way back out to space. This is because of a natural process called the greenhouse effect. Without the greenhouse effect, Earth's temperature would be below freezing. However, Earth's greenhouse effect is getting stronger as we add more greenhouse gases to the atmosphere. And that is warming the climate of our planet.

Heat is radiated into the atmosphere from the Earth's surface, which is warmed by sunlight. As the heat makes its way back to space, much of it is absorbed by greenhouse gases in the atmosphere. Greenhouse gases are more complex than most other gas molecules in the atmosphere, with a structure

that can absorb heat. They radiate the heat back to the Earth's surface, to another greenhouse gas molecule, or out to space.

Sometimes during this Century, the amount of the greenhouse gas carbon dioxide in the atmosphere is expected to double. Other greenhouse gases like methane and nitrous oxide are increasing as well. The quantity of greenhouse gases is increasing as fossil fuels are burned, releasing the gases and other air pollutants into the atmosphere. Fossil fuels such as coal, oil and natural gas were formed in the Earth over millions of years. Greenhouse gases also make their way to the atmosphere from other sources. Farm animals, for example, release methane gas as they digest food. As cement is made from limestone, it releases carbon dioxide.

With more greenhouse gases in the air, heat passing through on its way out of the atmosphere is more likely to be stopped. The added greenhouse gases absorb the heat. They then radiate this heat. Some of the heat will head away from the Earth, some of it will be absorbed by another greenhouse gas molecule, and some of it will wind up back at the planet's surface again. With more greenhouse gases, heat will stick around, warming the planet.

Resource:

Greenhouse Effect Video:

http://www.windows2universe.org/earth/climate/greenhouse_gases_scott_denning_movie.html

Language Arts and Social Sciences connections

Questions:

1. Determine the author's purpose for writing the article.
2. Explain radiation.
3. What part does the atmosphere play in keeping the Earth's surface temperature warm?
4. Whose responsibility is it to regulate the amount of carbon dioxide (CO₂) released in the atmosphere?
5. Develop a logical argument for reducing the use of fossil fuels, such as gasoline and coal bar-b-que.
6. How does the energy from the sun affect the temperature of the air, water, and land?
7. The article discusses climate change. How is climate different from weather?
8. Write or produce a 30-60 second commercial, ad jingle, or print advertisement to increase public's awareness of the connection between increasing CO₂ emissions and climate change.

Benchmark(s):

SC.6.E.7.1 Differentiate among radiation, conduction, and convection, the three mechanisms by which heat is transferred through Earth's system.

SC.6.E.7.5 Explain how energy provided by the sun influences global patterns of atmospheric movement and the temperature differences between air, water and land.

SC.6.E.7.6 Differentiate between weather and climate.

SC.6.E.7.9 Describe how the composition and structure of the atmosphere protects life and insulates the planet.

Big Idea 7: Earth Systems and Patterns.

Content Cluster: Earth and Space Sciences

Scenarios – How Much Do You Spew?

http://www.windows.ucar.edu/teacher_resources/co2_spew_w2u.pdf

What do you know about greenhouse gases and global warming? Carbon dioxide (CO₂) is a greenhouse gas that traps infrared (heat) energy. Burning fossil fuels for energy releases more CO₂ into the atmosphere, causing the Earth to warm.

Your Top-Secret Mission:

- Calculate carbon emissions based on information about a family's energy consumption
 - Identify sources of carbon dioxide emissions
 - Consider ways to decrease carbon dioxide emissions in daily life and possibly help save the planet.
1. You have been provided with scenario cards of three different family situations and their energy use.
 2. Mission Assignment:
 - a. Calculate the yearly carbon dioxide (CO₂) emissions for each family compare and contrast the families' lifestyles and use of energy.
 - b. Complete the table recording the emissions for each family.
 3. Reflection Questions
 - a. Why there are such large differences in the amount of emissions.
 - b. The Kyoto Protocol recommended that emissions be reduced to at or below 1990 levels. That means less than 11,000 pounds of CO₂ per person per year. Look at the table and consider how many of the families are meeting that goal.
 - c. Which activities emitted the most CO₂ and how would you modify the scenarios to reduce CO₂ emissions.
 - d. Brainstorm ways in which emissions might be lowered from global agreements to individual actions

Data Table: Emissions for Each Family

	Jetsetter Family	Demos Family	Des Moines Family
Driving			
Flying			
Mass Transit			
Taxi/Limo			
Electricity			
Heating Oil			
Natural Gas			
Propane			
TOTAL			
Per person			

Scenarios

Dudley and Dahlia Demo

The Demo's Sante Fe, New Mexico home is constructed of hay and pink adobe. It has very large, south-facing windows to let in sunshine during winter. A shade prevents too much sun from getting in on hot summer days. Vegetarians, the Demo's eat vegetables grown in their greenhouse. Their lights, the computer, and a few, small household appliances are powered by a wind generator and photovoltaic cells, which are installed on the roof next to their solar hot water panels. The Demos own no car. They bicycle into town for dinner and a movie once a month; making the most of the \$40 check they receive from the energy company. They decided not to have children due to the global population problem. Dahlia does not work. She inherited just enough from her father, a California brussel sprouts grower, to build the house and maintain her happy, simple, lifestyle with Dudley, who hand crafts mandolins for students in the Santa Fe Music Academy.

For the Demo family in one year...

Miles driven	0
Miles flown	0
Miles traveled by mass transit	0
Miles traveled by taxi or limo	0
Kilowatt hours of electricity (kWh)	They make 2400 kWh more than they use each year.
Gallons of heating oil	0
Therms of natural gas	0
Gallons of bottled gas or propane	0

Jason and Jane Jetsetter and Family

Jason and Jane are co-CEO's of Nirvana Airlines with corporate headquarters in Houston, TX, which is very hot in the summer months. They work very hard, make many important business trips, and earn high salaries. They enjoy free air travel on Nirvana Airlines for business and pleasure, enabling the whole family to spend their hard-earned vacation time visiting distant places such as Thailand, Costa Rica, and Botswana in the past year. They have two college age children, Jack and Jill, who are often homesick for Mom and Dad, requiring them to drive home every weekend (200 miles round trip from each college). Everyone in the family drives an SUV. "It is much safer to drive SUVs," says Jane confidently, "especially when we drive the treacherous snow-packed roads around our vacation house in Colorado where we ski during winter and spring breaks."

For the Jetsetter family in one year...

Miles driven	15,000 miles per vehicle. Each of the four cars gets 15 mpg.
Miles flown	40,000 miles of business travel for each parent. 45,000 miles of vacation travel for each of the four people
Miles traveled by mass transit	0
Miles traveled by taxi or limo	500
Kilowatt hours of electricity (kWh)	40,000 kWh for the Houston home and 8000 kWh for the Vail home
Gallons of heating oil	0 (Both homes have electric furnaces.)
Therms of natural gas	0
Gallons of bottled gas or propane	0

Laurence and Peoria Des Moines

Laurence (who goes by Larry) and Peoria and their children Lansing (age 6) and Toledo (age 4) live in a suburb of Chicago, IL. Larry drives a minivan and Peoria drives an SUV to get to work and to bring Lansing and Toledo to daycare and school. They don't take buses or the subway because they don't think these modes of transportation are fast enough. The whole family recently flew to Florida to visit Disneyworld, which Lansing really liked. Toledo was scared by the giant mice that followed him around. Their home is the same size as most homes in their town, about 2400 square feet, and their home energy use is about the same as everyone else in town too, in fact, it is the American average. Like most homes in the Midwest US, a chilly place in the winter, their home is heated with natural gas. Their area also gets hot in the summer and a string of recent heat waves inspired them to install a central air conditioner.

For the DesMoines family in one year...

Miles driven	15,000 miles driven in a minivan and 15,000 driven in an SUV Both vehicles get 15 mpg
Miles flown	The four Des Moines fly 2000 miles round trip to Florida
Miles traveled by mass transit	0
Miles traveled by taxi or limo	100 miles to and from the airports in Chicago and Florida
Kilowatt hours of electricity (kWh)	14,000 kWh per year
Gallons of heating oil	0
Therms of natural gas	1182 therms to heat the home in the chilly Midwest winters
Gallons of bottled gas or propane	0

Extension

1. Complete the activity worksheet for your family. You will need to collect data such as car mileage, plane flights, electric and gas bills in order to do the calculations.
2. Brainstorm ways that you and your family could cut emissions.
3. What would family members be willing to do or give up in order to make reductions in greenhouse gas levels?
4. Are these changes easy or difficult to implement?
5. Is there a cost to initiate them or is there a cost savings?

Benchmark(s):

SC.6.N.1.5 – Recognize that science involves creativity, not just in designing experiments, but also in creating explanations that fit.

Big Idea 1: The Practice of Science

Content Cluster: Nature of Science

ANTI-DISCRIMINATION POLICY

Federal and State Laws

The School Board of Miami-Dade County, Florida adheres to a policy of nondiscrimination in employment and educational programs/activities and strives affirmatively to provide equal opportunity for all as required by law:

Title VI of the Civil Rights Act of 1964 - prohibits discrimination on the basis of race, color, religion, or national origin.

Title VII of the Civil Rights Act of 1964, as amended - prohibits discrimination in employment on the basis of race, color, religion, gender, or national origin.

Title IX of the Educational Amendments of 1972 - prohibits discrimination on the basis of gender.

Age Discrimination in Employment Act of 1967 (ADEA), as amended - prohibits discrimination on the basis of age with respect to individuals who are at least 40.

The Equal Pay Act of 1963, as amended - prohibits gender discrimination in payment of wages to women and men performing substantially equal work in the same establishment.

Section 504 of the Rehabilitation Act of 1973 - prohibits discrimination against the disabled.

Americans with Disabilities Act of 1990 (ADA) - prohibits discrimination against individuals with disabilities in employment, public service, public accommodations and telecommunications.

The Family and Medical Leave Act of 1993 (FMLA) - requires covered employers to provide up to 12 weeks of unpaid, job-protected leave to "eligible" employees for certain family and medical reasons.

The Pregnancy Discrimination Act of 1978 - prohibits discrimination in employment on the basis of pregnancy, childbirth, or related medical conditions.

Florida Educational Equity Act (FEEA) - prohibits discrimination on the basis of race, gender, national origin, marital status, or handicap against a student or employee.

Florida Civil Rights Act of 1992 - secures for all individuals within the state freedom from discrimination because of race, color, religion, sex, national origin, age, handicap, or marital status.

Veterans are provided re-employment rights in accordance with P.L. 93-508 (Federal Law) and Section 295.07 (Florida Statutes), which stipulates categorical preferences for employment.

Revised 9/2008