Exciting Experiments in Science and the African Americans Whose Work Influenced Them

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INTRODUCTION

Can anyone tell me who invented the first clothes dryer? Or who determined that vinegar, molasses, rubber, ink, and postage stamp glue could be made from sweet potatoes? If you stop the average individual on the street and ask them these questions they probably would not be able to answer you correctly. The scientists who discovered these great things have long been forgotten and their names don't easily roll off the tongues of young school age children.

Like in any other profession, scientists of every generation have been faced with the challenge of becoming masters in their careers. Some of these same scientists have found themselves being presented with an even larger problem: they were black. Several decades ago it was impossible for blacks in the field of science to receive the praise and acknowledgment they so well deserved. Fortunately, time brings upon change and the names and works of African American scientist and inventors have begun to pop up in classrooms across the nation. These same scientists have crossed color lines and stomped on racism to be the first and the best in their professions. The works of Benjamin Banneker (Mathematician, Astronomer, and Surveyor), George Washington Carver (Scientist and Inventor), Charles Drew (Physician and Surgeon), and Charles Henry Turner (Zoologist) are only samples of the tremendous efforts that African Americans have made to the field of science.

With these factors in mind, the students in my classroom will not only examine the lives and accomplishments of several African American scientists and inventors, they will be introduced to key scientific concepts and processes throughout the unit. This unit will be very important not only because it makes science seem more relevant to the lives of my students, but also is designed to incorporate the historical aspects of science through a hands-on teaching approach. The skills and concepts I hope to teach my students are knowledge and understanding of the scientific method and physical sciences (mixtures, physical and chemical changes), in addition to improving their scientific process skills, their ability to think critically and increasing their awareness of the historical correlation between individuals in history and science. Upon the completion of this unit my students will be able to demonstrate an understanding of the basic components in the physical science model for third grade.

There are several recurring themes that will be emphasized in my unit. The first will be the importance of the contributions and roles of African Americans not only in science but also in the improvement of the lives of many Americans. Second, students will observe how the ethics of one individual, whether they are considered to be good or bad,

could potentially affect others in some way. Third, the students will be introduced and taught the key and basic concepts of the scientific method when conducting scientific research. By learning to apply the scientific method to their work in the science classroom each student will be expected to learn the following scientific processing skills; observing, collecting, and recording data, inferring, predicting, and hypothesizing.

RATIONALE FOR UNIT

In the past I have often struggled to find the time and materials to structure a unit for my students to use during the month of February when teachers and students across the United States are paying their tributes to the world's most famous African Americans during Black History Month. Too often I also find that during this time of year we as educators seem to focus on the same individuals and their accomplishments. By doing this I believe that we begin to unconsciously teach our students that some of the contributions that were made by African Americans were not as important or relevant to our lives today. In the creation of this unit I hope to educate my students about the relevance of the accomplishments of African Americans from the past and present. I will use this three-week unit as an addition to the science and social studies lesson in my classroom during Black History Month.

Currently, my classroom is 100% African American and my school is 96.4% African American. For this reason I have decided to gear the content in this unit towards the study and recognition of African Americans in the field of science. Research has shown that students are able to grasp concepts with better understanding when the material is relevant to their lives or current situation. Through this unit I hope to provide my students with a broader perspective and understanding of science by studying the lives of African American scientists and inventors who have traditionally been underrepresented in the field of science.

"If you don't know your past, then you won't know your future." These words are played in the back of my mind every time I began to speak to my students about a historical event or critical part of history. I believe that history plays an important part in guiding not only the way we think, but also the way we presently see ourselves. When students are taught to understand the past and the present, I believe that the future will began to make more sense to them. Science and science education plays a pivotal role in that future and past. The future of science education and its importance in our country depends entirely on whether or not upcoming generations understand what resources they have, what was done to create them, and what they must do to keep them. It is my opinion that in order for students to truly value and appreciate science, they must be shown the importance of it and its relevance to their own personal lives.

OVERVIEW OF SCIENTISTS

In the making of this unit I have chosen to spotlight African American scientists. The individuals I have selected have left lasting impressions on our society with their many

valuable contributions to the field of science. These scientists/inventors that I have chosen have used their many talents to add to the improvement of the society we live in. Each of their lives, works, and endeavors can be used to study and apply the scientific concepts students and teachers in today's classrooms are used to learning. Below I have included the names and brief biographies for each scientist/inventor that is expected to be covered during the duration of the unit.

George Washington Carver/ Chemist, Inventor (1865-1943)

Born during the Civil War era George Washington Carver lived to become one of the most famous African American scientists, inventors, and educators. Although people still do not know his exact date of birth, they will tell you that when George Washington Carver was an infant he and his mother were kidnapped from the small farm were they were owned by Moses and Susan Carver. George was later returned to the Carver's and raised by them on their farm in Diamond Grove, Missouri until the age of twelve. It was at twelve that George left home and went to live in Neosho, Missouri so that he might attend an all-black school there. After attending the small school in Neosho for a short time George Washington Carver decided to leave because he realized that he knew just as much as the teacher did. Showing that this was true, George Washington Carver proved how intelligent he was by later graduating from Iowa State University and becoming the first African–American faculty member there. While teaching at Iowa State University Carver continued to excel as he was put in charge of the school's bacterial laboratory work in the Systematic Botany department.

George Washington Carver's career at Iowa State University was cut short when Booker T. Washington wrote him and asked if he would come to Tuskegee, Alabama as an instructor for the Tuskegee Normal and Industrial Institute. Carver accepted the position at Booker T. Washington's Tuskeegee Institute and began to use his research skills to find uses for peanuts and sweet potatoes. Through his hard work and research, Carver was able to find nearly 325 uses for the peanuts alone and another 108 applications for sweet potatoes. The products Carver was able to produce ranged from dyes and paints to rubber products. George Washington Carver's discoveries did more than pave the way for other African Americans. His works left a lasting impression on the entire world.

Percy Lavon Julian/ Chemist, Inventor (1899-1975)

Dr. Percy Julian was born in Montgomery, Alabama on April 11, 1899. He was the oldest son of James and Margaret Julian. Being the oldest of six children made Percy responsible for setting a high-quality example for his younger siblings. Percy Julian did more than set a good example for his younger siblings when he decided to enter DePauw University in Indiana with an eighth grade education as a sub-freshman. During the time Julian decided to enter college there was no public school education provided for blacks past the eighth grade. Therefore, he was given the title sub-freshman at DePauw and was

required to take additional classes so that he could catch up on everything he was not taught while completing his public school education.

In 1920, Julian graduated first in his class with a degree in chemistry. He immediately accepted a job as a chemistry instructor at Fisk University. Three years later, in 1923, Percy Julian was awarded an Austin fellowship in Chemistry and the opportunity to complete his Masters degree at Harvard University. After earning his Masters Degree in chemistry in 1926, Julian decided to pursue a Doctorate. It did not take him long to realize that his dreams of receiving a doctoral degree would not be easy in the United States due to the segregation and racism that encircled the country. His dream was put on hold because of the lack of a Doctoral program for blacks during that time. He was later given a Fellowship from the General Education Board and was allowed to travel to Vienna, Austria where he completed his Ph.D.

Percy Julian is most noted for his work in organic chemistry and the products he created by using the soybean. Using the soybean he was able to create sizing for paper and textiles as well as a fire-fighting foam that was used by many corporations to fight oil spill fires. Percy Julian synthesized hormones (progesterone and testosterone) from soybean oil as well.

Norbert Rillieux/ Inventor (1806-1894)

Norbert Rillieux, the inventor of a device that revolutionized sugar processing, was born March 17, 1806 in New Orleans, Louisiana. He was the son of an engineer by the name of Vincent Rillieux, who was also a sugar plantation owner. Rillieux's father recognized how brilliant he was as a young child and sent him to Paris to attend school. After completing his education, Rillieux taught engineering in Paris before returning to the United States.

> While in Paris, Rillieux learned that the boiling point of liquids is reduced as the pressure is reduced (like a vacuum). Rillieux applied this to the processing of sugar, heating the cane sugar in a vacuum, and re-using the steam in the processing procedure. This resulted in a highly efficient mechanical process that replaced the old, laborious, dangerous, and costly method of processing sugar by hand that was called the "Jamaica train." (enchantedlearning.com)

The device and process that Norbert Rillieux completed revolutionized sugar processing. In 1864 his invention was patented and was most noted for its ability to make the processing of sugar more efficient, faster, and safer.

Sandra Murray/ Cell Biologist, Educator (1947-)

Sandra Murray was born October 7, 1947 in Chicago, Illinois. She was the only daughter of Charles and Muggy Wise Murray who owned and ran a moving business. As a child,

Sandra Murray was very curious and at every given moment she expressed that curiosity through boundless questioning of the adults around her. Her curiosity as a child came as no surprise to Murray's father who liked to make toys out of old junk.

Sandra Murray's love for science and her never-ending capabilities in high school won her the opportunity to attend weekend classes in biomedical research at the University of Chicago. This experience sparked two life-changing moments in Murray's life. While attending her biomedical research classes at the University of Chicago, Murray began to confirm her love for science and her ideas of becoming a successful scientist one day. In spite of this, Murray's invigorating experience also prompted a discouraging comment from her high school counselor. The high school guidance counselor tried to discourage Murray from pursing a career in science by explaining to her that the field of science was not for someone who was black and female. This comment only made Sandra Murray more determined to excel and keep trying to accomplish her dream.

After graduating from high school at the age of 18, Murray enrolled at the University of Illinois to start work on her bachelor's degree. While attending classes during the day, Murray had to work at night to help support herself and to pay her expenses for school. Soon after graduating in 1970 with her bachelor's degree in biology she enrolled in the graduate biology program at Texas Southern University in Houston, Texas. While attending Texas Southern University, Murray was offered a teaching assistantship. She received her masters in 1973 and then enrolled in the University of Iowa for her doctoral studies. Murray received her PH.D in 1980. "The University of California at Riverside offered her a post doctoral research position with William Fletcher, and she was able to pursue further research on hormones, especially the effects of adrenocortropin and gap junction-mediated cell-cell communication on the glands that produce hormones" (Notable Black American Scientist 188).

Sandra Murray is most recognized for her work in hormone research and the communication between cells. Due to her success and outstanding reputation, Murray has received invitations to conduct research all over the world and with some of the top laboratories in the United States.

IMPLEMENTATION

I believe that the best way to teach children and to help them develop a concrete understanding of any material is through hands-on and minds-on experiences. I will use this three-week unit as an addition to the science and social studies lesson in my classroom during Black History Month. The lessons that I have created will serve as an addition and review for skills and concepts that are being covered in the social studies and science curriculum that are being used in my classroom. Each lesson in this unit will focus heavily on one or more of the following third grade TEKS for social studies and science:

Science

3.9 The student knows that living organisms have basic needs.
3.3 The student uses critical thinking and scientific problem solving to make informal decisions.
3.8 The student knows that living organisms need food, water, light, air, a way to dispose of waste, and an environment in which to live.
3.7 The student knows that matter has physical properties.

Social Studies

3.1. History. The student understands how individuals, events, and ideas have influenced the history of various communities.
3.9 Citizenship. The student understands characteristics of good citizenship as exemplified by historic figures and ordinary people.
3.15 Science, technology, and society. The student understands how individuals have created or invented new technology and affected life in communities around the world, past, and present.

This unit will also cover the following Texas Assessment of Knowledge and Skills (TAKS) objectives:

Objective 1: The student will demonstrate an understanding of the nature of science.
Objective 2: The student will demonstrate an understanding of the life sciences.
Objective 3: The student will demonstrate an understanding of the physical sciences.

By covering these key TAKS objectives I will be able to aide in the success of my third grade students passing the 5th grade elementary science test.

I will teach this unit in several different ways. There will be weeklong lessons throughout the entirety of the unit that focus on specific individuals, their lives, and their contributions to science. Taking into consideration that every child who enters my third grade classroom is on a different level academically when it comes to science and scientific thinking, I have decided to single out specific science processing skills in my unit. This will insure that the end result will allow my students to be able to understand and apply the scientific method to their own work.

My unit will enhance my classroom instruction in science and social studies. Upon the completion of the unit each student in my classroom will be able to: (1) use critical thinking and scientific problem solving to make informal decisions in science; (2) understand how African Americans have created or invented new technology and affected life in communities around the world, past and present; and (3) demonstrate an understanding of the basic components in the physical sciences model for third grade.

UNIT BACKGROUND

The structure and overall focus of each lesson will play an important part in whether or not my students have grasped the concepts I am teaching. What is more important to me is that they understand and absorb, not memorize the concepts and material being taught. The lessons in this unit will allow my students to receive a glimpse of the contributions that African Americans have made to the field of science.

Before the start of each lesson I will have the students create their own observation journals by designing their own cover page out of plain white paper and crayons. Once they have finished with their cover pages they will place them in a folder with several sheets of notebook paper. This journal will be used to take notes on experiments and other classroom activities. Week one of the unit will begin with the study of George Washington Carver's life and accomplishments. When talking about the life of George Washington Carver I will emphasize learning the parts of plant seeds, whether they are considered to be living organisms, and the attributes of chemical and physical changes.

Lesson one of week one will begin with the drawing of a KWL chart on the board and me asking my students if they have ever heard of a man by the name of George Washington Carver. I have included an example of how the chart should look below.

K (What I Know)	W (What I Want to know)	L (What I Learned)
1._____ 2._____ 3._____	1._____ 2._____ 3._____	1._____ 2._____ 3._____

In this chart the students will be asked to write three things they already know about George Washington Carver under the **K**. They will then proceed to write at least three things they would like to know or learn about Carver under the letter **W**. The last portion of this chart will be completed at the end of the lesson. Once their KWL charts have been completed I will proceed to explain to the class that George Washington Carver was an inventor and creator of many useful things, but he is most recognized for his creation of peanut butter. Before we begin our lab experiment I will read to them the biography of George Washington Carver. Once I have read the book I will initiate a brief 5 to 10 minute discussion about Carver and his accomplishments.

In lesson one my students will be introduced to the peanut first as a seed. They will observe and examine the inside of a peanut or bean as part of lab one, which ironically is entitled *Parts of a Seed*. While participating in the lab each student will follow the following procedures. First, the students will place the peanut seeds in a petri dish and

then soak them in water. Then, each group of students will be given one bean to place on a napkin. Next, the skin or outside portion of the beans will be removed and the students will use their fingers to split the bean open. Finally, the students will be asked to use their hand lens to observe and then discuss what they have seen. As the students are making their observations they will record and draw their findings in their science journals.

Lesson two will begin with a review of the activities that were conducted the day before and a reader's theater activity. From the reading of this play and a small group discussion, my students will be expected to read and understand the life and accomplishments of George Washington Carver. Before the start of the activity each student will be assigned a part to read. If there are fewer students than parts, some students will be asked to read more than one part. I have included a small excerpt from the reader's theater play we will read below. This play was written by Ginny Hall and is published in her book *Readers' Theater Grade 2*.

********** Characters**********

Narrator	Reader 7 (W)	Reader 14 (T)
Reader 1 (G)	Reader 8 (A)	Reader 15 (O)
Reader 2 (E)	Reader 9 (S)	Reader 16 (N)
Reader 3 (O)	Reader 10 (H)	Reader 17 (C)
Reader 4 (R)	Reader 11 (I)	Reader 18 (A)
Reader 5 (G)	Reader 12 (N)	Reader 19 (R)
Reader 6 (E)	Reader 13 (G)	Reader 20 (V)

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Narrator: George Washington Carver had a dream. He wanted to help poor farmers. He learned all he could about soil and crops. He taught farmers what to plant. He taught farmers that planting peanuts and sweet potatoes would enrich the soil. He taught people how to help themselves. He made his dream come true!

Reader 1 (G): G is for "George Washington Carver." He was a man with a dream. He loved plants. He wanted to help farmers grow better crops. (Readers Theater 91)

Once we have completed the reader's theater activity I will talk to my students about chemical and physical changes. We will define and discuss what chemical and physical changes are and how they look. I will then point out that scientists classify things such as these into two categories. I will introduce this activity by having the class think about the many different kinds of materials that exist, both man-made and natural. I will ask the question, "Do materials stay the same forever or do they eventually change?" Each

student will then identify different ways they have seen materials change either quickly or over a period of time.

After this the students will engage in a discussion of chemical and physical changes. On the chalkboard I will list and discuss the four types of changes that fall under physical changes and the five types of changes that fall under chemical changes or indicators of change. This lesson will teach my students that physical changes involve changes in (1) shape, (2) size, (3) temperature, or (4) phase or state of material. Chemical changes involve changes in (1) odor of a substance, (2) production of gas, (3) change in taste of the substance, (4) formation of a precipitate from a liquid, or (5) change in color.

During this step students will be instructed to take notes in their journals over what they have learned so far about physical and chemical changes and what more they would like to learn. Each student will then be given a student data sheet and six different material set-ups, one at a time, with the exception of the ice-cubes. They will then observe the materials closely using as many of their senses as they can. Once everyone has understood the process for conducting the experiment each group will be given their first setup of materials. There are six setups in all. The setups are as follows:

Setup 1
Each group of students will be given an ice cube and paper towels. The ice cubes will be placed on the paper towels so that the students might observe them. All observations for set up one will be recorded at the end of the experiment.

Setup 2
Each group will be given a whole potato chip and a paper towel (Lay's work best). One student in the group will then place his/her hand down firmly on the chip.

Setup 3
Each group will receive a plastic cup containing about 59 ml (2 oz) of white vinegar, a plastic cup containing 5 ml (1t) of baking soda, and paper towels. The students will observe the vinegar after adding the baking soda to it.

Setup 4
Each group will be given a lump of modeling clay. One student will use the palm of his/her hand to press down firmly on the clay.

Setup 5
Each group will be given a plastic cup containing about 89 ml (3oz) of whole milk, a plastic cup containing about 30 mL (1 oz) of white vinegar, and a plastic spoon. The students will add the vinegar to the milk and then mix it with the spoon.

Setup 6
Each group will receive a plastic cup filled with water and steel wool. One student will remove the steel wool from the cup and place it on a napkin for observation.

Once all student and group observations have been made I will go over the results with the entire class. Although some results may vary, most of the groups will have observed the following outcomes during their experiment:

Setup 1: Ice cube
Students should have viewed changes in phase, shape, size, and temperature. All of these changes are physical changes.

Setup 2: Potato chip
Students should have observed changes in size and shape.
Both of these changes are considered to be physical changes.

Setup 3: Vinegar
Students should have observed changes in taste, odor, and the production of gas (carbon dioxide), which indicates a chemical reaction and the creation of a new material. All of these changes are classified under chemical changes.

Setup 4: Clay
Students should have observed changes in shape. These changes are classified as physical changes.

Setup 5: Milk
Students should have observed changes in taste and odor. These are both considered chemical changes.

Setup 6: Steel Wool
Students should have observed a change in color from the rusting of the steel wool. This change is classified as a chemical change.

In lesson three students will discuss one of George Washington Carver's most noted inventions: peanut butter. Each student will be asked to develop and record a prediction on how Carver was able to create peanut butter. As a science experiment we will then create peanut butter in the classroom and observe the physical changes in making peanuts into peanut butter. After the completion of the experiment they should be able to identify the physical changes that took place.

Lessons four and five of week one will be used for reviewing and assessment. During lesson four I will have the students observe the changes in water from a solid to a liquid. We will discuss how this applies to the things that we have covered on physical and chemical changes. I will show my students the correlation between the changes that occur when water is placed in different temperatures and the phase the water is in. Lesson five will consist of a review and re-cap of the week's lessons. Each student will complete their K-W-L charts with information they have learned about George Washington Carver. To check the understanding of the students I will develop a short

handout that requires the students to know four basic things. The students must able to: (1) Identify George Washington Carver, (2) Name three types of changes that can occur when there are physical changes present, (3) Describe or tell what types of changes occur during a chemical change, and (4) Describe the parts of a plant seed.

During week two of my unit I will introduce the students in my class to Norbert Rillieux. Lesson one of week two will begin just as the first lesson in week one began. Each student will be asked to create a K-W-L chart that shows what he or she already knows about Norbert Rillieux, what he or she want to know about him, and what he or she has learned about him. After the students have completed their K-W-L charts I will proceed to read a short biography on Norbert Rillieux.

The first experiment we will work on is entitled *What is Sugar Cane?* I will cut the sugar cane into small 1-inch pieces. Each group of two students will be given two pieces of sugar cane on a plate. I will ask the students to observe the piece of sugar cane on the plate and draw what they see in their journals. Once they have made a visual observation, each student will then be asked to write what they think the sugar cane will taste like and how they came to that conclusion. After all of the students have made their visual observations they will be allowed to taste the sugar cane and record their observations on the taste of it.

Lesson two during week two will be conducted over a two day period. After reviewing the biography of Norbert Rillieux, I will give my students several important facts about Rillieux, his invention, and his life. They will then be asked to take that information and create a pictorial biography of his life and accomplishments. Each student will be expected to present his/her own product to the class once they are done. Once all of the students have presented we will complete an experiment on solubility (dissolving). "Dissolving is a physical change in which the molecules, atoms, or ions of a substance (called the solute) dissociate from that substance and mix with the molecules of the dissolving liquid (called the solvent)." (Kern 20) In this experiment the students will be given two cups each containing ¼ cup of water. They will then measure one teaspoon of salt and one teaspoon of flour. They will place the salt in one cup of water and flour in the other. The students will then observe what happens to the salt and flour in each of the cups. They will record their observations and then stir the mixtures in both cups with a spoon. The question they will be expected to answer is which substance completely dissolved in the water.

Lesson three of week two will also be conducted over a two day period. During this lesson the creativity of my students will be tested. I will place them in groups of three to four students. By this time will we have discussed Norbert Rillieux and his invention for refining sugar in great detail. In their groups the students will be expected to design an invention that could be used to help people solve a problem or complete a task more efficiently; student inventions have no limitations. They may choose to create an invention to address or to improve any common task or problem at home, school, or work.

During week three of my unit we will discuss both Percy Julian and Sandra Murray. Lesson one will begin with the introduction of Percy Julian, his life, and scientific inventions. Our first experiment will be entitled *How Do You Clean An Oil Spill?* This experiment involves the class trying to determine the best way to clean up oil that has been poured into a pan filled with water. The students will be given an 8-inch piece of yarn or string. They will then be asked to use their string to move all of the oil in the pan to one central location on the side of the pan. At the completion of this experiment I will talk to the students about Percy Julian and his experiments with soybeans. The students will discuss how Julian created a foam made from soy beans to clean up oil fires.

Below I have included the experiments, procedures, and materials that will be necessary to complete week one of this unit. I have also taken the liberty to include the information that is needed to complete lesson one of week two as well.

LESSON PLANS

Week One, Lesson One: Parts of a Seed

Materials
Raw peanut seeds
hand lens
petri dish (1 for every 2 to 3 students)
3 oz of water
paper towels

Procedures
1. The students will place the peanut seeds in a petri dish and then soak them in water.
2. Each group of students will then be given one seed to place on a napkin.
3. The skin or outside portion of the seeds will be removed and the students will use their fingers to split the bean open.
4. Students will be asked to use their hand lens to observe what they see. As the students are making their observations they will record and draw their findings in their science journals. *(For best results pre-soak or plant a few seeds 2-4 days prior to completing this experiment. This will give students the opportunity to view the different stages of the life cycle of a seed.)*

As an extension to this lesson teachers can allow students to place seeds in a petri dish and allow them to observe the stages of a seed's life cycle first hand. For better results use seeds from a garden store because they have not been treated yet.

Week One, Lesson Two: Presto Chango

Process Skills
Observing, comparing, classifying, inferring, and recording data

Materials
1 ice cube
1 small lump of modeling clay
Paper towels
1 plastic spoon
1 whole potato chip
Bucket or sink for disposal
1 small clear plastic cup containing about 59 mL (2oz) of white vinegar
Steel wool in water
1 small plastic cup containing 5 mL (1t) of baking soda
1 small plastic cup containing about 30 mL (1oz) of white vinegar
1 small plastic cup containing about 89 mL (3oz) of whole milk

Student Data Sheet

Name: _____ Date: _____

Material	Changes Observed	Type of Changes ?
Ice Cube		
Potato Chip		
Vinegar		
Clay		
Milk		
Steel Wool		

Week One, Lesson Three: Peanut Butter

Process Skills
Observing, hypothesizing, inferring, and recording data

Materials
1 bag of roasted un-salted peanuts
1 package of crackers (enough for each student to receive 1)
1 blender
1 wooden spoon
½ cup of oil
2 tablespoon of salt
Butter (you may substitute melted butter or margarine for the oil)

Procedure
1. Take peanuts out of the shell and hull.
2. Pour one cup of peanuts inside of the blender.
3. Add 2-3 tablespoons of oil and ¼ tablespoon of salt to the peanuts in the blender (add as much oil as needed).
4. Grind the peanuts in the blender until the mixture becomes creamy.
5. Take the peanut butter out with a spoon and place it on a cracker for each student.

Upon the completion of this experiment each student will answer the following questions in their observation journals:
1. Is a raw peanut the seed of a peanut plant?
2. Which part of the peanut is the shell and which part is the hull?

Week One, Lesson Four: Solid, Liquid, Gas

Process Skills
Observing, inferring, and recording data

Materials:
Glass jar (without the lid)
Ice cubes
Pie tin
Hot water
Hand lens

Procedures
1. The pie tins will be placed in the freezer until they are ice cold. Then they will be taken out and ice cubes will be placed on the inside of them.
2. The jars will be filled with hot tap water.
3. The pie tins will be placed over the tops of the jars. Each group of students will then

be required to observe the pie tin and the jar as they sit.
4. Students will be required to observe and record what happens inside the jar. The sides of the jar should become cloudy and wet. After a short time it will appear to be raining in the jar.

Week Two, Lesson One: What is Sugar Cane?

Process Skills
Observing, comparing, inferring, and recording data

Materials
Hand lens
Observation journal
1 piece of sugar cane
Knife (for teacher use only)
1 napkin per student
1 small paper plate per 2 students

Procedures
1. Cut the sugar cane into small 1 inch pieces.
2. Each group of two students will be given two pieces of sugar cane on a plate.
3. Ask the students to observe the piece of sugar cane on the plate and draw what they see in their journals.
4. Once they have made a visual observation, each student will then be asked to write what they think the sugarcane will taste like and how they came to that conclusion.
5. After all of the students have made their visual observations they will be allowed to taste the sugarcane and record their observations on the taste of it.

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Internet Resources

Brown, Mitchell C. *The Faces of Science: African Americans In the Sciences*. 1995. Princeton University. <http://www.princeton.edu/~mcbrown/display/faces>.
Mitchell Brown provides a compilation of biographies of famous African American scientists. The book gives detailed information about the

accomplishments of these scientists and in some cases, pictures of the scientists and their inventions.

Norbert Rillieux: American Inventor. 2001. Enchanted Learning. <http://www.enchantedlearning.com/inventors/page/r/rillieux.shtml>. This is a teacher-friendly website that provides teachers with reproducible handouts and lessons. Most of the lessons can be downloaded for free from this website.

Percy Julian. The Black Inventor Online Museum. <www.blackinventor.com>. This online museum provides biographical information about the world's most notable African American scientists and inventors. Persons who log onto this website are able to access complete biographical information on a limited number of African American inventors for free. This is a good website to use for research purposes.