

Spectacular Science Biographies

Grade Level or Special Area: 5th Grade

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Length of Unit: Two Weeks

I. ABSTRACT

A. We will be delving into the study of four great men in the science field. Students will explore the various discoveries that these great men made and ponder how they are an influence on scientific thought and reasoning still today. These lessons integrate science knowledge with inquiry science activities. Along with this, a rich strand of language arts and writing activities are woven into these lessons so that students will be challenged to use logical reasoning and application of the knowledge that is given to them in this unit.

II. OVERVIEW

A. Concept Objectives

1. The student will gain an understanding of the reasons for change and the results that change can have on society.
2. The student will see how logic and reasoning can be a springboard for the birth of new ideas.
3. The student will explore the inquiry method of science and make connections with the four men represented in this unit.
4. The student will make connections between ordinary people becoming extraordinary through tenacity and perseverance.

B. Content from the *Core Knowledge Sequence*

1. Science Biographies
 - a. Galileo
 - b. Percy Lavon Julian
 - c. Ernest Just
 - d. Carl Linnaeus

C. Skill Objectives

1. The student will use webs and Venn diagrams to compare and contrast theories and ideas.
2. The student will use creative writing and give presentations.
3. The student will use comprehension and summarize important details.
4. The student will make a hypothesis and conduct a scientific experiment.
5. The student will explore non-fiction reading material and the Internet to enhance comprehension.
6. The student will use a rubric to organize and plan a project.
7. The students will classify and sort animals and objects.
8. The student will take notes and conduct research.
9. The student will create illustrations to depict the life of different scientists.
10. The student will gather data and give explanations for an event.
11. The student will make connections between people and events.

III. BACKGROUND KNOWLEDGE

A. For Teachers

1. Hirsch, Jr. E.D. *What Your 5th Grader Needs To Know*. New York: Dell Publishing, 1991, ISBN 0-385-31026-9

2. McKissack, Patricia and Fredrick. African-American Scientists. Connecticut: The Millbrook Press, 1994, ISBN 1-56294-372-3
3. Anderson, M. Carl Linnaeus: Father of Classification. New Jersey: Enslow Publishers, 1997, ISBN 0-89490-7867

B. For Students

1. Students should complete the units on The Renaissance and the Reformation before this unit.
2. The students should have a grasp on the idea of inventions and discovery.
3. A prerequisite to this unit would be a mini study over classification.

IV. RESOURCES

- A. *African American Scientists*, by Patricia and Fredrick McKissack
- B. *Carl Linnaeus: Father of Classification*, by Margaret J. Anderson
- C. *Extraordinary Black Americans*, by Susan Altma
- D. *Rats, Bulls, and Flying Machines*, by Deborah Mazzotta Prum
- E. *Scientist Who Made History: Galileo*, by Mike Goldsmith
- F. *Starry Messenger*, by Peter Sis
- G. *What Your 5th Grader Needs To Know*, by E.D. Hirsch

V. LESSONS

Lesson One: Who is Galileo?

A. Daily Objectives

1. Concept Objective(s)
 - a. The student will see how logic and reasoning can be a springboard for the birth of new ideas.
 - b. The student will explore the inquiry method of science and make connections with the four men represented in this unit.
 - c. The student will make connections between ordinary people becoming extraordinary through tenacity and perseverance.
 - d. The student will gain an understanding of the reasons for change and the results that change can have on society.
2. Lesson Content
 - a. Science Biographies, Galileo
3. Skill Objective(s)
 - a. The student will compare two scientific theories and explain the conflict between church and science.
 - b. The student will summarize important details of Galileo's life through reading and answering comprehension questions.
 - c. The student will make a hypothesis and conduct a scientific experiment.

B. Materials

1. *Rats, Bulls, and Flying Machines*, by Deborah Mazzotta Prum
2. *Galileo*, by Jacqueline Mitton
3. Appendices A, B, and C
4. various balls of different weights and sizes
5. flour, water, Coke Flats, various objects of different sizes
6. bowl

C. Key Vocabulary

1. wrangling- arguing

2. Galileo and Copernicus- astronomers who believed that the universe was earth centered
3. heliocentric- theory that sun is at the center of the universe
4. geocentric- theory that earth is at the center of the universe
5. gravity- the pull of objects toward the center of the earth

D. Procedures/Activities

1. Begin the lesson by reviewing the genre of biographies and ask students to share about different biographies that they have read about. Explain that we are beginning a mini unit on the biographies of 4 great scientists starting with a man named Galileo. (If you have already studied the Reformation, they should be able to recall basic facts about him.)
2. Hold up the book, Galileo, by Jacqueline Mitton and have students predict what this book will be about according to the pictures on the front. Then read the entire book aloud to students. This will take about 15-20 minutes. It is a children's version of the biography of Galileo. It goes over all of the highlights of his life. Discuss what the children learned.
3. Now have students get out their Rats, Bulls, and Flying Machine books and turn to pages 88-94. Read together and discuss as you go along. Then, pass out Appendix A and go over the questions and answers together. This paper goes over key things in the life of Galileo.
4. Now, recreate Galileo's experiment of dropping items of different weights. You can do this inside the classroom by standing on chairs or take the class outside. The idea here is to show children that Galileo didn't just believe what people told him, but he believed in experimenting and using inquiry to test ideas and offer proof. Explain to the students that he discovered that dropping items of different weights from the same starting point at the same time would cause them to touch the ground at the same time. Because Galileo believed in inquiry, we will take this experiment a step further. Pass out the paper title Making Craters.
5. (Appendix B) Students will work in small groups to complete this experiment and state their hypothesis and discovery.
6. Come together and discuss the experiment. Then pass out Appendix C and sing the song about Galileo together.

E. Assessment/Evaluation

1. Participation in the reading activities.
2. Appendices A and B will be collected and graded by a straight percentage points.
3. Students will also be expected to participate in the Galileo song. If anyone memorizes the song, extra credit will be given.

Lesson Two: Galileo, Rebel With A Cause

A. Daily Objectives

1. Concept Objectives
 - a. The student will gain an understanding of the reasons for change and the results that change can have on society.
 - b. The student will see how logic and reasoning can be a springboard for the birth of new ideas.
 - c. The student will make connections between ordinary people becoming extraordinary through tenacity and perseverance.
2. Lesson Content
 - a. Science Biographies, Galileo
3. Skill Objectives

- a. The student will compare and contrast scientific theories by using a Venn Diagram.
 - b. Students will summarize the main points in the life of Galileo by reading a non-fiction book and then creating a “Stair Step Book”.
- B. *Materials*
1. Appendix D
 2. *Rats, Bulls, and Flying Machines*, by Deborah Mazotta Prum
 3. *Starry Messenger*, by Peter Sis
 4. white construction paper, stapler, crayons and markers
- C. *Key Vocabulary*
1. astronomer- scientist who studies the heavens
 2. heretic- person who goes against the teaching of the church
 4. heliocentric- theory that sun is at the center of the universe
 5. geocentric- theory that earth is at the center of the universe
- D. *Procedures/ Activities*
1. Review what we learned about Galileo from yesterday’s lesson.
 2. Read the book, Starry Messenger to the class and discuss the importance of this book and the biographical implications that it holds.
 3. Work together to make a Venn diagram to compare and contrast the heliocentric and geocentric theories about the solar system and universe. After having this class discussion, students are ready to summarize Galileo’s Life.
 4. Pass out Appendix D which explains how to make a “Stair Step Book.” Students are to create a “Stair Step Book” summarizing the life of Galileo. They should use the book, Rats, Bulls, and Flying Machines for information.
- E. *Assessment/Evaluation*
1. The “Stair Step Book will be grading according to the rubric given to students. (Appendix D)

Lesson Three: Carl Linnaeus/The Father of Classification

- A. *Daily Objectives*
1. Concept Objectives
 - a. The student will explore the inquiry method of science and make connections with the four men represented in this unit.
 - b. The student will make connections between ordinary people becoming extraordinary through tenacity and perseverance.
 2. Lesson Content
 - a. Science Biographies, Carl Linnaeus
 3. Skill Objectives
 - a. The student will read non-fiction text and sort and summarize important details.
 - b. The student will use creative writing skills to present information in a graphic organizer.
 - c. The student will use a rubric to plan and present information.
 - d. The student will use the Internet to conduct research.
- B. *Materials*
1. *Carl Linnaeus: Father of Classification*, by Margaret J. Anderson
 2. Appendices E, F, and G
 3. Internet/ <http://www.hhmi.org/coolscience/critters/critter1.html>
 4. website: <http://www.ancienthistory.about.com/library/weekly/aa012702a.htm>
- C. *Key Vocabulary*
1. Carl Linnaeus- scientist who is considered the Father of Classification
 2. Classification – to put objects in different categories based on characteristics

3. tedious- very detailed and monotonous
4. taxonomy- the science of classification

D. *Procedures/Activities*

1. Tell students that we are continuing in our journey of science biographies today with a new scientist and his name is Carl Linnaeus. Read aloud the first chapter in the biography titled: Carl Linnaeus: Father of Classification, by Margaret J. Anderson. This will give children an idea of where Carl Linnaeus came from. Now pass out the timeline of the life of Carl Linnaeus. (Appendix E) Students should be encouraged to read the rest of this book on their own if it peaks their interest.
2. Arrangements should have been made in advance to go to the computer lab for research. (If this is not possible, make copies of pages from various pages about this man.) Have students start at the following website:
<http://www.ancienthistory.about.com/library/weekly/aa012702a.htm>
(As this gives basic information and is a good starting point) Have students bring the time line to the computer lab for reference. Their assignment is to find five or more facts about Linnaeus and write them down. They are to be prepared to present their findings to the class. If students finish writing down five facts early, they can play the classification game at the website: <http://www.hhmi.org/coolscience/critters/critter1.html>
3. Back in the classroom, students are to share the facts that they found about Carl Linnaeus in their cooperative learning groups. They are to gather what they think is the most interesting information about this man and put it together in the form of a “People Book.” (See Appendix F) They are to be prepared to share their “People Books” with the class tomorrow.
4. After students have had time to work on their “People Books” gather everyone together for a quick review and pass out the Carl Linnaeus song. (Appendix G) Sing this song together as you review this man’s accomplishments.

E. *Assessment/Evaluation*

1. Students will give oral presentations over their “People Books” in cooperative learning groups. The given rubric will be used to assess this assignment.

Lessons Four and Five: Applying Classification the Linnaeus Way

A. *Daily Objectives*

1. Concept Objectives
 - a. The student will gain an understanding of the reasons for change and the results that change can have on society.
 - b. The student will see how logic and reasoning can be a springboard for the birth of new ideas.
 - c. The student will explore the inquiry method of science and make connections with the four men represented in this unit.
 - d. The student will make connections between ordinary people becoming extraordinary through tenacity and perseverance.
2. Lesson Content
 - a. Science Biographies, Carl Linnaeus
3. Skill Objectives
 - a. The student will use creative writing to classify animals into appropriate groups.
 - b. The children will use graphic organizers and webs to present information.

B. *Materials*

1. Appendices G, H, I, J,K, and L)
2. Carl Linnaeus: Father of Classification, by Margaret J. Anderson

3. animal cards or various animal books with classification information on them
 4. chart paper, markers and crayons
 5. lab coat
 6. a piece of candy for each student(any kind will work, but something a little bit unusual will work best here)
 7. science journal (or a piece of paper will work)
- C. *Key Vocabulary*
1. taxonomy- the science of classification
 2. classification groups- Kingdom, Phylum, Class, Order, Family, Genus, Species
 3. Dichotomous key- a web where items are placed in two categories according to characteristics or traits
 4. dominant trait- prevailing characteristic that shows up in an animal
 5. recessive trait- a hidden trait in an animal that is less likely to be seen
- D. *Procedures/Activities*
1. Review major facts about Carl Linnaeus together and discuss group findings from yesterday's research. Then sing the Carl Linnaeus song once again. (Appendix G)
 2. Go over the 7 major categories that Linnaeus used to classify living things. Explain how this process takes a broad fact and gets more detailed as it goes. Give the kids this acronym to help them remember the classification groups:
Kids Playing Catch On Freeway, Get Smashed! (Appendix H)
Kingdom
Phylum
Class
Order
Family
Genus
Species
 3. Pass out animal cards or animal books with classification information on them.
 4. Children are going to work in cooperative learning groups and select two animals that they want to research. They are going to pretend that they are scientist and that they have discovered a new animal. (This animal will be a cross between the two animals that they have selected to learn about.)
 5. Students will complete Appendix I in their cooperative learning group. They will be instructed to use dominate traits of animals to decide which animal classifications will be written down for the "newly discovered animal". Then, they will put this information on large chart paper along with an illustration of the "newly discovered animal" and present this to the class. Each group will select one student to be the "head scientist". This student will wear a lab coat and present this information to the class with the help of his group. (Sometimes, students will start to talk in an accent while wearing the lab coat. They really get into this.)
 6. **Day Two of this Lesson:** We will begin this day by reviewing facts about Carl Linnaeus and his role in classification. I will explain how tedious his work was and how he needed to carefully think about characteristic and categories. Then, I will tell the students that we are going to participate in an activity that would make Carl Linnaeus proud. I will pass out Appendix J for the children. I will set this activity up by saying that scientists have discovered a brand new type of treat and they get to name it. Their task is to observe it carefully, taste it and break it down into classification categories. (See Appendix K for an example) Students will share their findings with the class. Then, we will look at classification even

deeper. I will read aloud pages 60-69 from the book Carl Linnaeus: Father of Classification. This chapter shows the painstaking process of classification. I will define the word dichotomous key and explain that this method of classification was used by Carl Linnaeus on many occasions.

7. I will walk through making a dichotomous key with the class by having each student take off one shoe and put it in a pile at the front of the room. I will talk through the process of making a dichotomous key and classifying items in this way and keep notes in web form on the board. (See Appendix L for my example) Students will also be expected to copy this web down in their science journals. Students will really find this fascinating and they have to listen because they will not get their shoe back until the key is complete.

E. Assessment/Evaluation

1. Appendices will be graded on percentage points.
2. Participation points will be given for working together in cooperative groups and giving the presentation.
3. Participation points will also be given for making the dichotomous key with shoes.

Lessons Six and Seven: Ernest Just

A. Daily Objectives

1. Concept Objectives
 - a. The student will gain an understanding of the reasons for change and the results that change can have on society.
 - b. The student will see how logic and reasoning can be a springboard for the birth of new ideas.
 - c. The student will make connections between ordinary people becoming extraordinary through tenacity and perseverance.
2. Lesson Content
 - a. Science Biographies, Ernest Just
3. Skill Objectives
 - a. The student will take notes and conduct research.
 - b. The student will create illustrations that depict the importance of the scientist's life.
 - c. The student will summarize information from non-fiction reading material.

B. Materials

1. Appendices M, N, and O
2. construction paper, scissors, markers, and crayons
3. African American Scientists, by Patricia and Fredrick McKissack
4. computer lab with Internet or various library books on Ernest Just

C. Key Vocabulary

1. Ernest Just- an African-American biologist who was a leading man in his field
2. biology- a science that studies living things
3. Synthesize- to manufacture or create something
4. Spingarn Medal- award given to African Americans for making society a better place

D. Procedures/Activities

1. Introduce the new scientist for study, Ernest Just. Begin today's lesson by reading pages 69-72 out the book, African American Scientists, by Patricia and Fredrick McKissack. Be sure to show the students the picture. Then pass out Appendix M which is a song about Ernest Just's life. Sing this together a couple times until the students get the hang of it. Now pass out Appendix N which

contains questions about this great scientist. They are to work in pairs to find the answers to these questions. Going to the computer lab and doing a Google Search is my suggestion, but if the Internet is not available, this activity can be done by gathering various books together from the library that contain information about Ernest Just. Students will be expected to take notes as well which they will need to continue with their research tomorrow.

2. **Day Two of this lesson:** Now that students have a basic idea of the accomplishments of this great scientist, they are ready to summarize their findings. Pass out Appendix O which gives directions for making a “quadrama”. Go over these directions orally so that children understand the procedure. They are permitted to use the Internet or any books or research material to come up with four things that they think are the most important details of the life of Ernest Just and put their findings in the form of a “quadrama”. At the end of this activity, students should share their “quadrama” facts along with their illustrations orally. End this lesson by singing together the Ernest Just song once again. (Appendix M)

E. Assessment/Evaluation

1. Students will be expected to participate in singing the song. (Appendix M)
2. Appendix N will be graded by a straight percentage.
3. The “quadrama” (Appendix O) will be graded according to the rubric.

Lessons Eight and Nine: The Life of Percy Lavon Julian

A. Daily Objectives

1. Concept Objectives
 - a. The student will gain an understanding of the reasons for change and the results that change can have on society.
 - b. The student will see how logic and reasoning can be a springboard for the birth of new ideas.
 - c. The student will explore the inquiry method of science and make connections with the four men represented in this unit.
 - d. The student will make connections between ordinary people becoming extraordinary through tenacity and perseverance.
2. Lesson Content
 - a. Science Biographies, Percy Lavon Julian
3. Skill Objectives
 - a. The students will compare and contrast three scientist by the use of a Venn Diagram.
 - b. The student will gather research and create upper level thinking questions to present to the class.
 - c. The student will hypothesize an experiment and test the results.
 - d. The student will gather data and give explanations for an event.

B. Materials

1. *Extraordinary Black Americans*, by Susan Altman
2. Appendices P, Q, R, and S
3. white construction paper, stapler, markers and crayons
4. computer lab with Internet or various books on Percy Lavon Julian
5. film canisters- both black (with loose fitting caps) and white (tight fitting caps)
6. Alka-Seltzer tablets and water

C. Key Vocabulary

1. Percy Lavon Julian- a leading African American chemist whose discoveries saved many people from blindness

2. chemistry- a type of science where chemicals are mixed in laboratory settings
3. glaucoma- a disease that results in blindness
4. cortisone- a drug that relieves arthritis pain
5. arthritis- a disease that causes crippling pain in joints (especially in the hands)
6. inquiry- a science method where you discover facts based on conducting experiments to explore a hypothesis

D. Procedures/Activities

1. Introduce the scientist Percy Lavon Julian to the class by going over the key vocabulary words and reading pages 167-168 out of the book, Extraordinary Black Americans, by Susan Altman. Talk about the significance of his discoveries and how he helped to make the world a better place. Then pass out Appendix P which is a song about the life of Percy Lavon Julian and sing this together highlighting and discussing his life of achievement.
2. Next, have children work in groups to make a Venn Diagram. (Appendix Q) They are to have Percy Lavon Julian as one category and select one of the other three scientists from this unit of study. (Galileo, Ernest Just, Carl Linnaeus) They are to compare and contrast these men together. Then we will come together as a class and present their Venn Diagrams.
3. After they have a basic understanding of Julian's accomplishments, the class will take a quick trip to the computer lab for some more research. (If a computer lab is not available, you can do this assignment using books gathered from the library about Julian.) Students are encouraged to take as many notes as they possibly can, noting important details and major accomplishments.
4. After the students have gathered notes, they will work in pairs to create a "Question Book" about the life of Percy Lavon Julian. (See Appendix R)
Note: This activity might take longer than the class period and students really seem to get into the whole idea of creating a "Jeopardy Type Game". You may have to assign this as homework or allow another class period to complete this book activity.
5. **Day Two of this lesson:** Students will have fun taking turns, presenting their "Question Book". Allow extra time because students will want to share their books in the form of questions and see if the class knows the answers to their constructed riddles.
6. After presentations of "Question Books" it is time to conduct the scientific experiment. (Appendix S) Explain that you have selected this experiment because it is based on chemical reactions and this is the type of experimenting that Julian did. Next, go over the inquiry process with students and expectations for filling out the experiment sheet. Make sure students understand that it is OK to have a hypothesis that is wrong, as long as they can explain how the data supports the results of the experiment.
7. *You want the students to find out the following information: The white canister works better because the lid fits tight. If you fill up the white canister with ¼ water, you will get the best chemical reaction and the "rocket"....(white film canister) will go the highest. This is because the chemical reaction requires air. The reaction of the Alka-Seltzer, mixed with the air, builds up pressure forcing the cap to shoot off and up into the air. However, it is important that you do not tell them these results. Allow time for inquiry and discovery so that students will get results based on data.*

E. Assessment/Evaluation

1. The Venn Diagram will be graded according to the rubric given.

2. The “Question Book” and scientific experiment will be graded by percentage points.

Lesson Ten: It's In The Bag

A. *Daily Objectives*

1. Concept Objectives
 - a. The student will gain an understanding of the reasons for change and the results that change can have on society.
 - b. The student will see how logic and reasoning can be a springboard for the birth of new ideas.
 - c. The student will explore the inquiry method of science and make connections with the four men represented in this unit.
 - d. The student will make connections between ordinary people becoming extraordinary through tenacity and perseverance.
2. Lesson Content
 - a. Science Biographies
 - b. Galileo
 - c. Carl Linnaeus
 - d. Ernest Just
 - e. Percy Lavon Julian
3. Skill Objectives
 - a. The student will use comprehension skills to answer questions.
 - b. The student will make connections between people and events.
 - c. The student will summarize facts from the lives of 4 scientists.

B. *Materials*

1. pillow case or brown grocery bag
2. small telescope or magnifying glass
3. picture of Leaning Tower of Pisa
4. ball
5. a leaf
6. classification chart
7. Bible
8. starfish or picture of a starfish
9. picture of animal or plant cell
10. trophy or medal
11. test tube
12. baggie of beans
13. piece of paper to look like a patent
14. Appendices T and U

C. *Key Vocabulary*

1. Categorize- to put things in groups based on a trait
2. culmination- review over all studied topics
3. association- to make a connection between two objects, people, or ideas

D. *Procedures/Activities*

1. Tell children that they will be taking a test over all four men that we have studied during this unit on science biographies. To help them review for the test, we will be playing a matching game. The teacher will pull things out the pillowcase or bag, one at a time and the class will be expected to raise their hand and tell which man the object could be associated with. Tell them to listen carefully, because this is exactly what their test will look like and you are just helping them to

review for this culminating test. The students do not have to give the same answer that the class discussed. As long as they can justify their answer, it will be acceptable. Once the class has played this association game, pass out the chart for students to complete independently. (Appendix T, See Appendix U for possible answers)

E. Assessment/Evaluation

1. Appendix T will be used as the culminating test over this unit. Percentage points will be given and a double grade for this test.

VI. CULMINATING ACTIVITY (Optional)

- A. Lesson Ten will be used as a culminating test over this entire unit.
- B. Fieldtrip- We will also take a trip to the Arizona Science Center which highlights inquiry science and has pamphlets on these four scientists as well as others. (For teachers not in Arizona, you may want to consider looking up and science museums in your area.)
- C. Students will create a PowerPoint Presentation in groups of 3-4 to present to the class their findings over these four scientists. (*I find students do an excellent job when using PowerPoint Presentations because they are presenting to their peer and they want their friends to see their best work.*)
- D. Appendix V- Students will use the inquiry method to create their own experiment. The object is for students to use the “Poppers” given to them in a baggie, (give them various sizes and colors of poppers) and design tests to figure out which popper can actually pop the highest.

*******Note: Adding these culminating activities will make this unit three weeks instead of two weeks!**

VII. HANDOUTS/WORKSHEETS

Appendix A	Galileo: Rebel With A Cause
Appendix B	Making Craters Experiment
Appendix C	It's a Scientific World (Song)
Appendix D	Making a “Stair Step Book”
Appendix E	Timeline of the Life of Carl Linnaeus
Appendix F	“People Book” Directions
Appendix G	Carl Linnaeus Song
Appendix H	Classification Chart
Appendix I	Science Classification
Appendix J	Candy Classification
Appendix K	Candy Classification Sample
Appendix L	Dichotomous Key
Appendix M	Ernest Just Song
Appendix N	The Life of Ernest Just
Appendix O	Making a “Quadrrama”
Appendix P	Percy Lavon Julian Song
Appendix Q	Famous Scientists Venn Diagram
Appendix R	Creating a “Question Book”
Appendix S	Making a Rocket
Appendix T	Culminating Test: It's In The Bag
Appendix U	Culminating Test: It's In The Bag Answer Key
Appendix V	Using the Inquiry Method

VIII. BIBLIOGRAPHY

1. Altman, S. *Extraordinary Black Americans*. Chicago: Children's Press, 1989, ISBN 0-516-00581-2
2. Anderson, M. *Carl Linnaeus: Father of Classification*. New Jersey: Enslow Publishers, 1997, ISBN 0-89490-7867
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Appendix A Spectacular Science Biographies

Galileo: Rebel With A Cause

(Questions taken from page 32 of the Core Knowledge Teacher's Guide to:
Rats, Bulls, and Flying Machines)

1. How did Galileo earn the nickname, "The Wrangler?"

2. What is the law of falling bodies, and how does it differ from Aristotle's ideas about falling objects?

3. What do the adjectives heliocentric and geocentric mean?

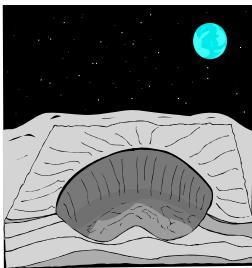
4. In the Middle Ages, which theory about the universe did people believe, the heliocentric theory or the geocentric theory and why?

5. Who was Copernicus and why did he keep quiet about his ideas?

6. How did people respond to the publication of Galileo's book, *The Starry Messenger*?

7. What did the Inquisition decide about Galileo's teachings, and how did he respond?





Appendix B Spectacular Science Biographies

MAKING CRATERS EXPERIMENT

Materials Needed:

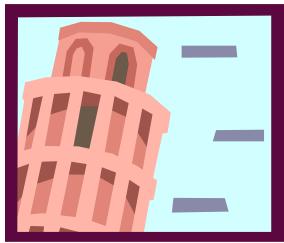
Water
Bowl
Coke flats
Flour
Various objects of different weights and sizes

1. Mix the flour and water in the bowl until it has a soft consistency.
2. Pour this mixture into the Coke flat and place it on the ground.
3. Stand above the mixture with a friend and drop your objects from different heights.
4. Carefully remove each object and take note of what happened in your journal.
5. Try dropping heavier objects from a lower position and lighter objects from a higher position. Change this around the repeat the experiment taking notes.
6. Which objects make the biggest craters?

7. Did the height you dropped the objects from make any difference? Explain.

8. Explain what you discovered by conducting this experiment.





Appendix C
Spectacular Science Biographies



It's A Scientific World (Song)

(To be sung to the tune of *It's a Small World*)

It's a world of science
A world of thought-
There's so much to wonder,
So much to be sought-
Galileo was brave
Discoveries he made,
Finding earth goes round' the sun

(Chorus)
Galileo was his name-
Hypothesizing was his game-
Experimenting was his thing-
It's a scientific world!

He improved the telescope
To look up at the sky
Challenged "Laws of Motion"
Dropping "stuff" from way up high
The church caused him strife
Because science was his life
Testing things in this world

(Chorus)
Galileo was his name-
Hypothesizing was his game-
Experimenting was his thing-
It's a scientific world!



Appendix D Spectacular Science Biographies

Directions: Making A “Stair Step Book”

1. Get three pieces of white Xerox paper or construction paper.
2. Line them up and overlap the pieces so that they are about 1 inch apart.
3. Make sure they are even and fold them over once to make a crease.
4. You should have equal steps going down the paper.
5. Staple the paper three times across the top.
6. Label the “stairs” as seen below.

staple here	staple here	staple here
YOUR NAME GOES HERE/THE DATE GOES HERE		
THE LAWS OF MOTION EXPERIMENT		
THE BOOK TITLED: STARRY NIGHT		
GALILEO AND THE CATHOLIC CHURCH		
GALILEO GROWING UP		
GALILEO AND THE TELESCOPE		

Rubric: 5 points each

- labels are given as seen above
- correct spelling conventions
- all illustration is given on each page under the flap to match the topic
- 3 facts are listed under each topic (lift flap to write the information)
- oral presentation is given over each topic
- Total Points



Appendix E Spectacular Science Biographies

Timeline of the Life of Carl Linnaeus

- 1707--Born in Rashult, May 23rd
- 1717--Goes to school in Vaxjo
- 1727--Enters University of Lund
- 1728--Transfers to University of Uppsala
- 1730--Gives botany lectures at Uppsala
- 1733--Death of Linnaeus's mother, Christina Linnaeus
- 1735--Earns doctor's degree in Holland
- 1739--Marries Sara Lisa Moraea
- 1741--Birth of son Carl
- 1743--Birth of daughter Lisa Stina
- 1748--Death of Linnaeus's father, Nils Linnaeus
- 1749--Birth of daughter Louisa
- 1751-- Birth of daughter Sara Stina
- 1753--Species Plantarum is published
- 1754- -Birth of son Johannes (died 1757)
- 1757--Birth of daughter Sophia
- 1762--Knighted by King of Sweden
- 1772--Appointed Rector of the University
- 1778--Dies in Uppsala, January 10th

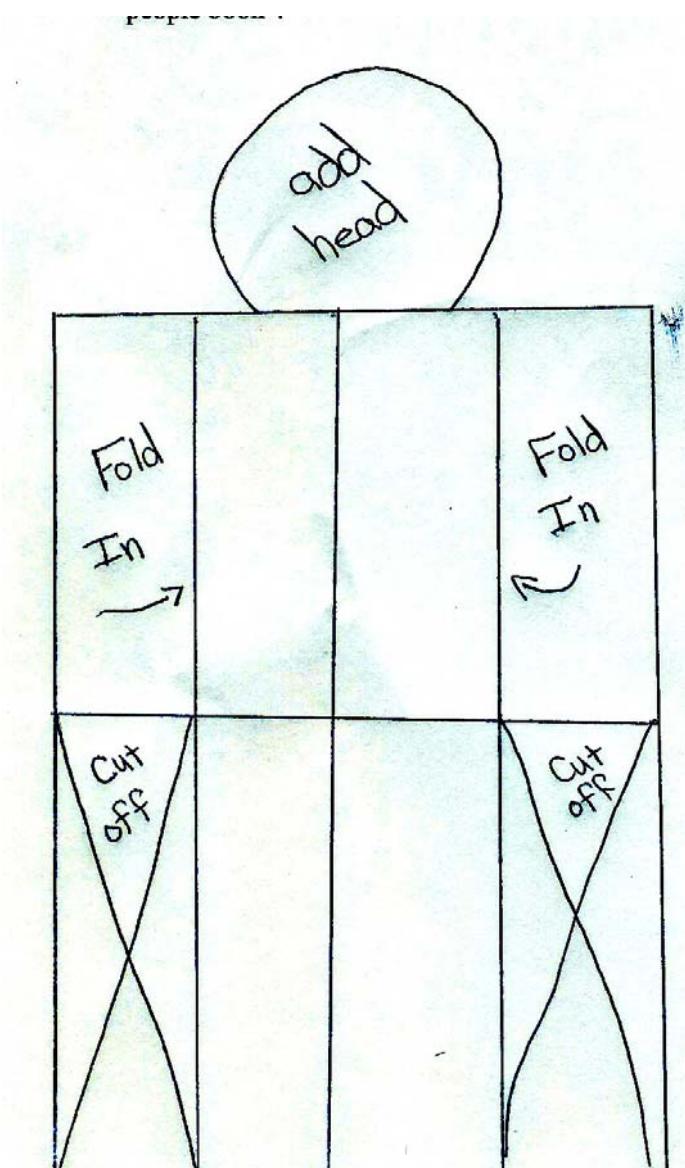


Appendix F

Spectacular Science Biographies

“People Book” Directions

1. Get a large piece of construction paper.
2. Fold it in half three times.
3. Unfold it and hold it “hamburger” style.
4. Cut off the 2 squares on the outside of the bottom. (see diagram)
5. Use these two pieces to glue on the back and stick out as arms.
6. Fold the 2 pieces that are sticking out inward so that it closes like a scroll.
7. Make a round head out of another piece of construction paper.
8. Decorate your people book to look like Carl Linnaeus.
9. Use construction paper and be creative!
10. Unfold the scroll pieces and the inside is your book.
11. Write 5 facts that you learned about Carl Linnaeus on the inside of this “people book”.



Rubric: 10 points each

- | | |
|--------------------------|--|
| <input type="checkbox"/> | spelling conventions |
| <input type="checkbox"/> | neat appearance |
| <input type="checkbox"/> | clothes made out of construction paper |
| <input type="checkbox"/> | 5 neatly written facts |
| <input type="checkbox"/> | overall creativity |

Total Points _____

Appendix G
Spectacular Science Biographies

Carl Linnaeus Song

(To the tune of, *Where is Thumbkin*)

Carl Linnaeus, Carl Linnaeus
Scientist, Scientist
Father of Classification
For nature he had a passion,
Giving names
Classifying things

Carl had no surname
His grandfather invented Linnaeus
Referring to a tree,
An old and ancient tree-
Known as a Linnegard
Growing in the front yard
Family property, Family property

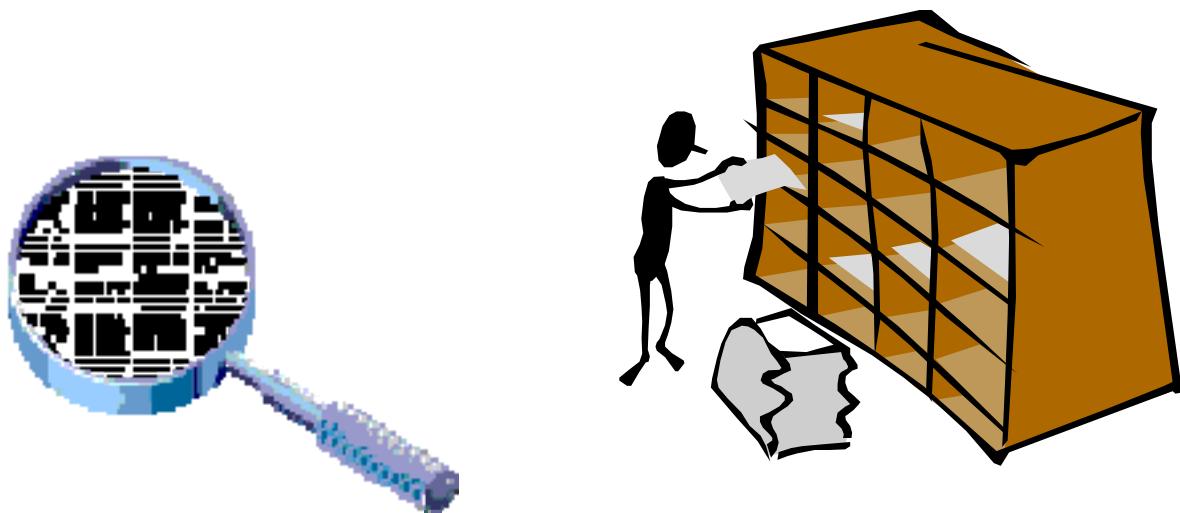
His father was a minister
But Carl pursued medicine
At the university
And then he gathered plants,
Plant exploration
Latin binomial system
Taxonomy, Taxonomy-



Appendix H
Spectacular Science Biographies

CLASSIFICATION CHART

Kingdom	Phylum	Class	Order	Family	Genus	Species
Kids	Playing	Catch	On	Freeway	Get	Smashed



Appendix I
Spectacular Science Biographies

SCIENCE CLASSIFICATION

Kingdom, Phylum, Class, Order, Family, Genus, Species

Real Animal #1

Kingdom: _____

Phylum: _____

Class: _____

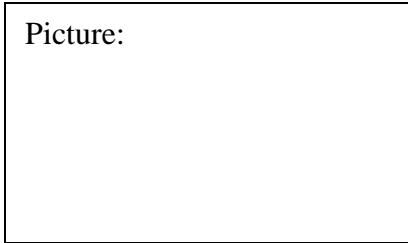
Order: _____

Family: _____

Genus: _____

Species: _____

Picture:



Real Animal #2

Kingdom: _____

Phylum: _____

Class: _____

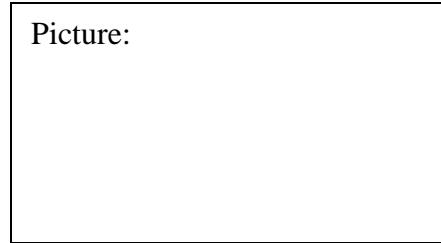
Order: _____

Family: _____

Genus: _____

Species: _____

Picture:



Make Believe Animal:

Kingdom: _____

Phylum: _____

Class: _____

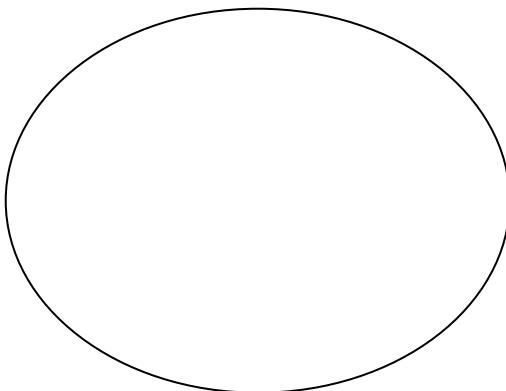
Order: _____

Family: _____

Genus: _____

Species: _____

Picture:



Appendix J
Spectacular Science Biographies

CANDY CLASSIFICATION

**Scientists have discovered a new treat! What is it?

Remember to start BROAD (BIG).....and then narrow it down...(get smaller and more specific)

	<u>CLASSIFICATION</u>	<u>REASON</u>
KINGDOM	Food	Sample is edible
PHYLUM		
CLASS		
ORDER		
FAMILY		
GENUS		
SPECIES		

The new treat's scientific name is _____

Here is a sample. (Illustration)

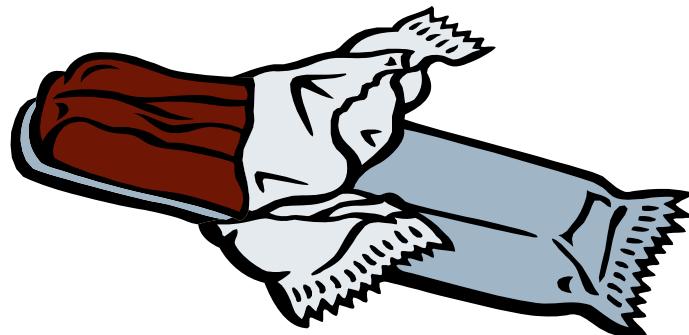
Appendix K
Spectacular Science Biographies

CANDY CLASSIFICATION

**Scientists have discovered a new treat! What is it?

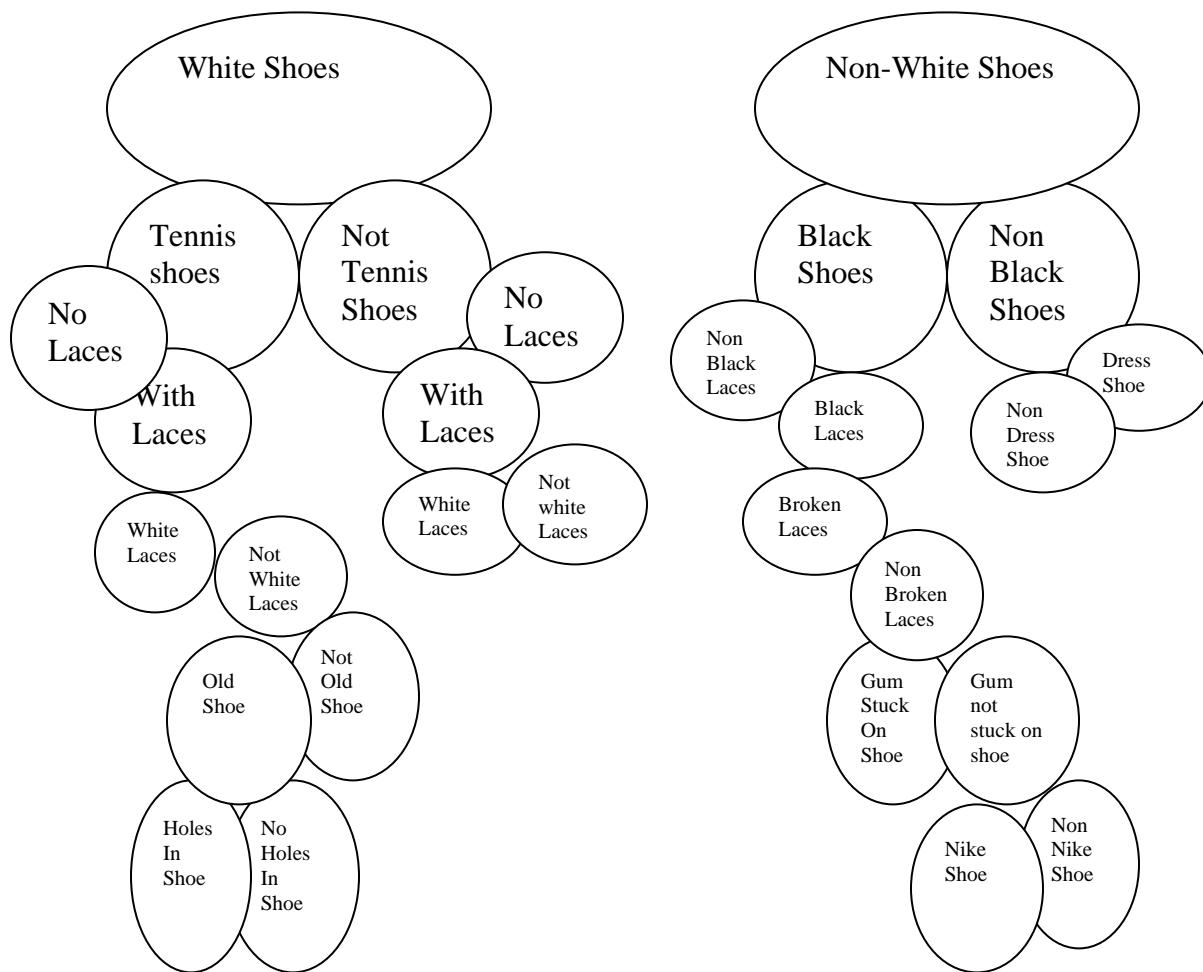
	<u>CLASSIFICATION</u>	<u>REASON</u>
KINGDOM	FOOD	It is edible.
PHYLUM	SNACK	Eat this in between meals.
CLASS	JUNK FOOD(TYPE of SNACK)	No nutritional value-
ORDER	Sugary	Main ingredient
FAMILY	Chocolaty	Light topping of creamy caramel
GENUS	Nutty	Inside of specimen filled with nuts
SPECIES	Candy Bar	Chocolate covering on outside

The new treat's scientific name is: "Snickeralia"
Here is a sample.



Appendix L
Spectacular Science Biographies

Dichotomous Key





Appendix M

Spectacular Science Biographies

Ernest Just Song

(To the tune of, *Clementine*)

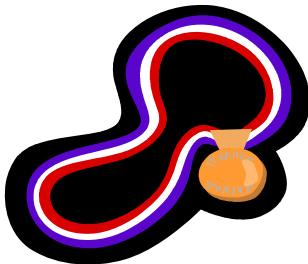
Ernest Just, Ernest Just
African American Scientist
Got a degree,
In biology
One of the best in his field-

At the age of 31
Ernest Just got an award
It was called the Spingarn Medal
No one ever won it, before

After studying all kinds of science
Writing papers and two books
Marine biology was his specialty
He studied all the time, he was hooked

Went to Europe for more study
United States was prejudiced
Became a pioneer in his field
Of fertilization of animal cells

Ernest Just, Ernest Just
African American Scientist
Got a degree,
In biology
One of the best in his field-



Appendix N
Spectacular Science Biographies

The Life of Ernest Just

1. Give the names of his parents.

2. Why was it so challenging for Ernest Just to become a scientist?

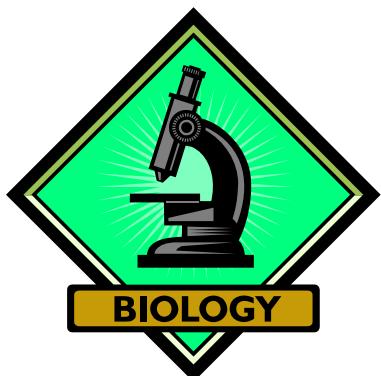
3. Describe the medal that he received and why he received this medal.

4. What type of science was Ernest Just most interested in?

5. Why was he called a “pioneer”?

6. Ernest Just went to Europe. Why did he choose to take this path?

7. Explain one of the things that Ernest Just discovered.



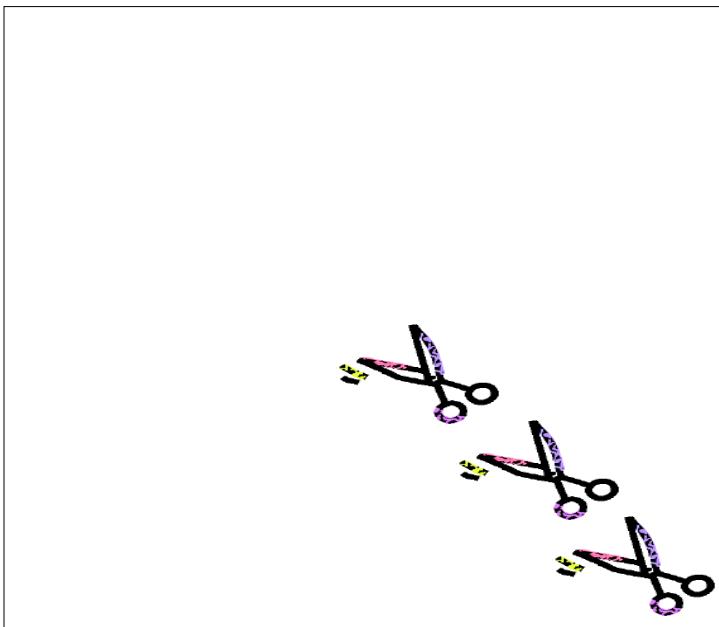
Appendix O
Spectacular Science Biographies

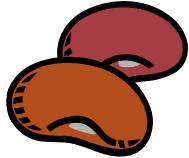
Making a “Quadrama”

1. Fold one corner all the way down to the edge to make a triangle.
(like you are making a paper airplane)
2. Cut the bottom rectangular piece off.
3. Unfold it and cut along the crease half way.
4. Pull one piece over and glue it down.
5. Glue the back down as well.
6. You will now have a three dimensional triangle.
7. You will need to make four of these for this project.
8. Glue or staple all four together so that they are connected in a circular type shape.

*******Note: Stop after step three to do your writing and drawing. When you are finished writing and drawing, continue with the rest of the steps.**

***After doing research on Ernest Just, select four facts about his life that you think are important. Summarize each fact on the bottom of each “quadrama” paper and then illustrate it on the background. Use color and add construction paper for a 3-dimensional effect.





Appendix P
Spectacular Science Biographies



Percy Lavon Julian Song

(To the tune of, *The Adams Family*)

A man named Percy Julian
An African American
Was interested in medicine
Especially Chemistry
(Chorus)

Da, na, na, na, Snap, Snap
Da, na, na, na, Snap, Snap
Da, na, na, na, Da, na, na, na,
Da, na, na, na, Snap, Snap

Born in Alabama
His father was an ex-slave
He had to fight off prejudice
To study chemistry
(Chorus)

Da, na, na, na, Snap, Snap
Da, na, na, na, Snap, Snap
Da, na, na, na, Da, na, na, na,
Da, na, na, na, Snap, Snap

With over 100 patents
The man became a genius
With scientific breakthroughs
The field of chemistry
(Chorus)

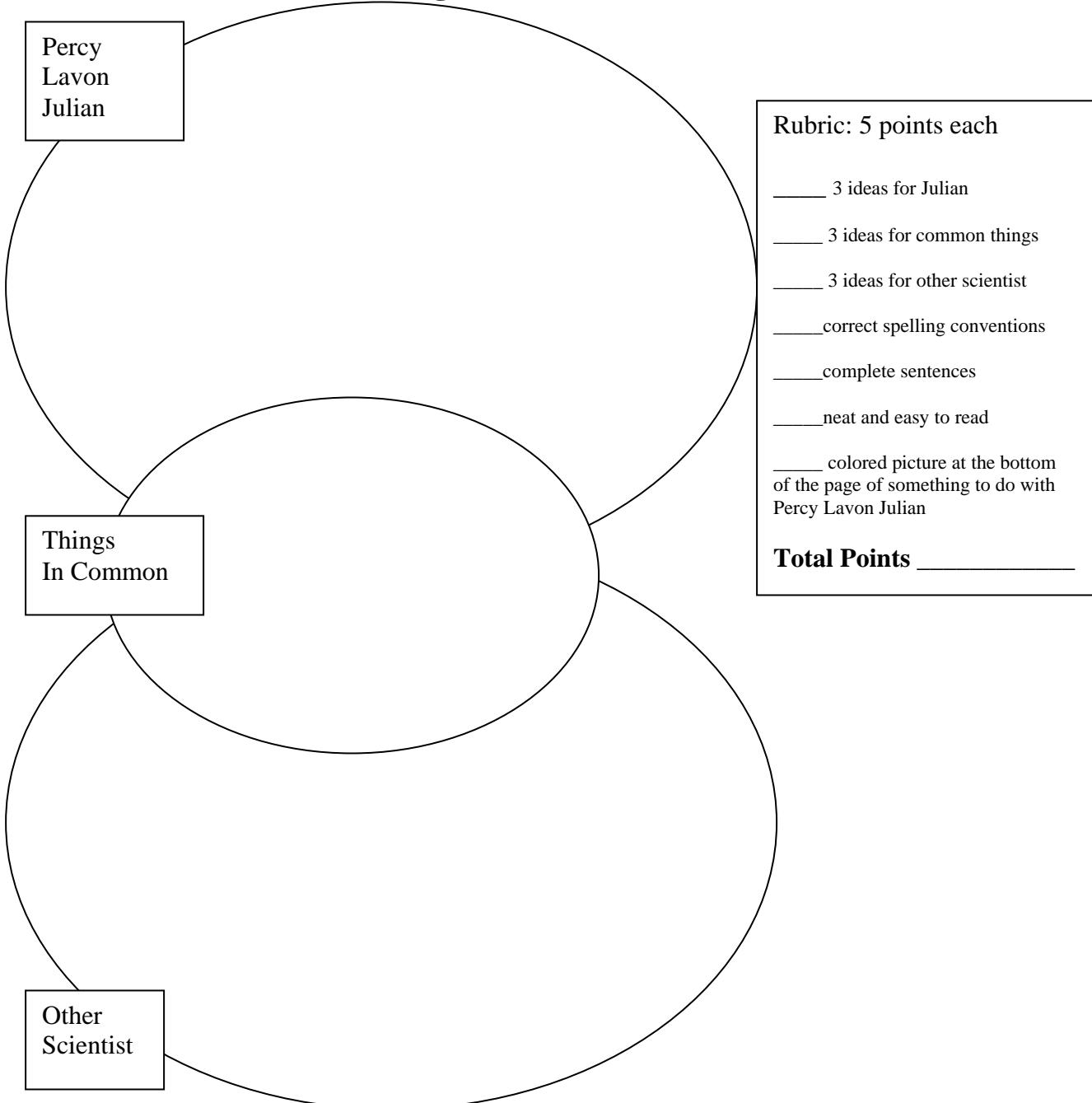
Da, na, na, na, Snap, Snap
Da, na, na, na, Snap, Snap
Da, na, na, na, Da, na, na, na,
Da, na, na, na, Snap, Snap

He invented the drug cortisone
For rheumatoid arthritis
Found uses for the soybean
The field of chemistry
(Chorus)

Da, na, na, na, Snap, Snap
Da, na, na, na, Snap, Snap
Da, na, na, na, Da, na, na, na,
Da, na, na, na, Snap, Snap

Appendix Q
Spectacular Science Biographies

Famous Scientists Venn Diagram

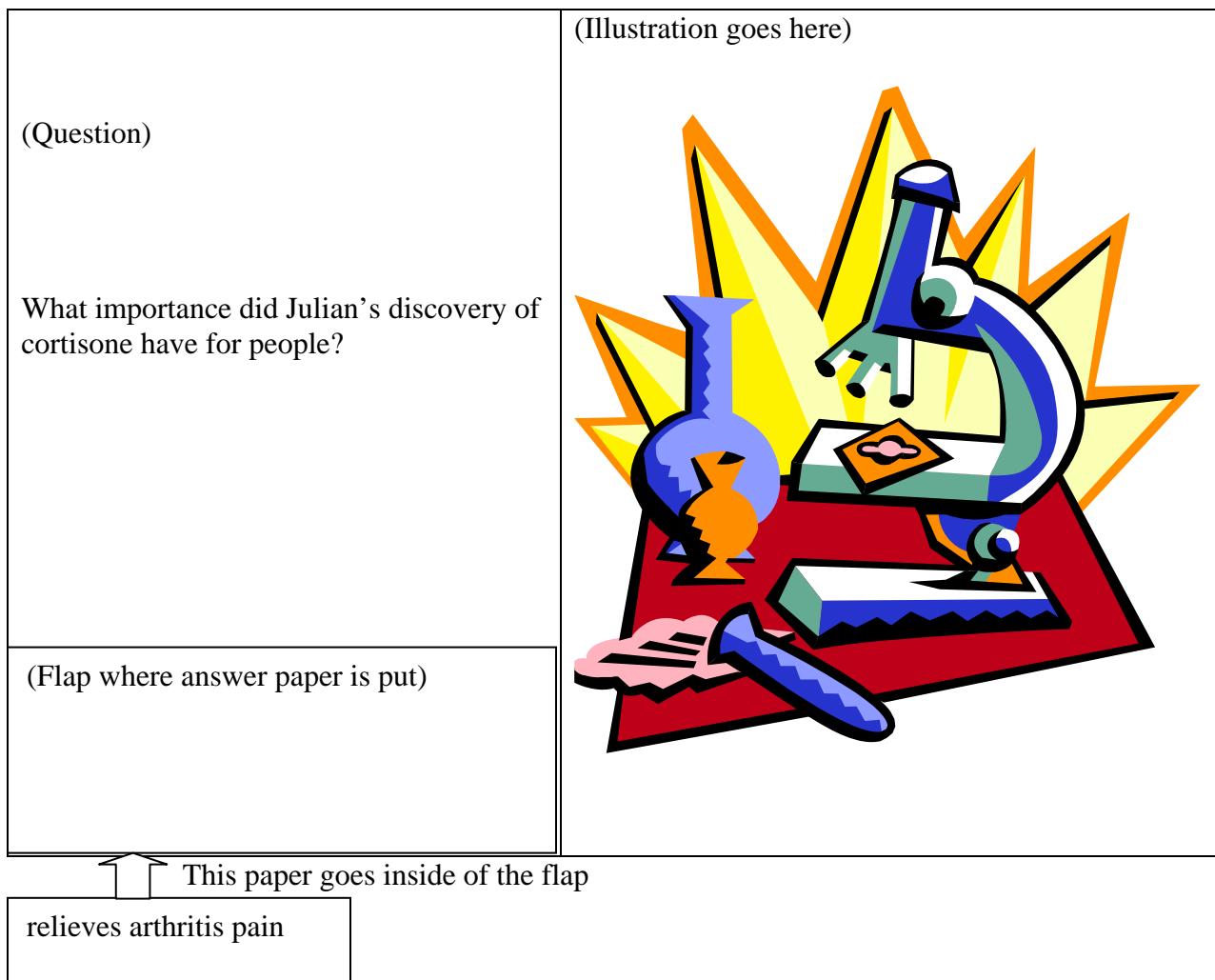


Appendix R

Spectacular Science Biographies

Creating a Question Book

1. Get 3 pieces of Xerox paper or white construction paper.
2. Fold the bottom of each paper up about an inch and staple the sides.
3. Line all 3 papers up on top of each other and fold them in half.
4. Put three staples down the crease so that you have a small book.
5. Staple the middle section shut.
6. You should now have four sections with a flap on each $\frac{1}{2}$ of the page.
7. Title the book, Percy Lavon Julian and make an illustration
8. Don't forget to put your name on the cover.
9. Write a question about Julian's life for each page.
10. Put the answer to the question on a little piece of paper inside the flap.
11. Illustrate this fact on the other half of the page. (See sample below)





Appendix S Spectacular Science Biographies

Making A Rocket



Materials:

Water
Alka-Seltzer tablets
Black and white film canisters

******Warning, you must do this experiment outside and you must instruct students to step back immediately after dropping the Alka-Seltzer tablet into the water.**

***Cooperative groups will work together to find how to make the rocket go the highest. You will use water inside each film canister with **only 1 Alka-Seltzer** table to see how high you can make the rocket go into the air.

Procedure for Experiment:

1. Make a hypothesis about what the results might be.
2. Fill the canister with water- (use however much you think...this is a variable to experiment with as you gain data)
3. Put the Alka-Seltzer tablet in the water and quickly seal the cap.
4. Put it upside down on the ground and **step back and watch.**
5. Repeat this experiment several times with both canisters and various levels of water.
6. Make a bar graph below to show the data of your experiments. (It can be a double bar graph.)
7. Explain why you think the rocket went into the air.



Appendix T
Spectacular Science Biographies

Culminating Test: It's In the Bag

Directions: After each item is pulled out of the bag, write down and tell which scientist it could correspond with. Then, explain your reasoning.

Scientist: Galileo, Ernest Just, Percy Lavon Julian, Carl Linnaeus

Object	Scientist	Reason
Patent Paper		
Trophy		
Starfish		
Small Telescope or Magnifying Glass		
Bible		
Classification Chart		
Picture of Leaning Tower of Pisa		
Bag of Beans		
Ball		
Picture of Plant or Animal Cell		
Leaf		
Test Tube		



Appendix U
Spectacular Science Biographies

Culminating Test: It's In the Bag

Directions: After each item is pulled out of the bag, write down and tell which scientist it could correspond with. Then, explain your reasoning.

Scientist: Galileo, Ernest Just, Percy Lavon Julian, Carl Linnaeus

***Possible answers

Object	Scientist	Reason
Patent Paper	Percy Lavon Julian	He had over 100 patents to try to invent things-
Trophy	Ernest Just	He received the Spingarn Medal-
Starfish	Ernest Just	He was a marine biologist and he studies the cells of starfish-
Small Telescope or Magnifying Glass	Galileo	He improved the invention of the telescope and wanted to see things “bigger”
Bible	Carl Linnaeus	His father was a minister-
Classification Chart	Carl Linnaeus	Father of classification/divided plants into categories-
Picture of Leaning Tower of Pisa	Galileo	Conducted Laws of Motion Experiment from the top of the Leaning Tower of Pisa-
Bag of Beans	Percy Lavon Julian	Invented many uses for the soybean-
Ball	Galileo	Dropped balls from tower for very famous experiment proving Aristotle wrong-
Picture of Plant or Animal Cell	Ernest Just	Studied cells/was marine biologist-
Leaf	Carl Linnaeus	Classified plants-
Test Tube	Percy Lavon Julian	Was a chemist-

Appendix V
Spectacular Science Biographies

Using the Inquiry Method:

****Use the 6 poppers given to you in the baggie to conduct this experiment. Note...you can get these toys at most department stores.*

- A. The Big Question—Which popper can be advertised as the highest popping popper?
- B. Hypothesis- Which one do you think will be the best one and why?

- C. What type of tests will you do, and why?
 - a.
 - b.
 - c.
- D. Once you choose your variables to test, conduct a “popping test” 5 times with each popper and record the results below.

	Popper #1 Height of jump in inches	Popper #2 Height of jump in inches	Popper #3 Height of jump in inches	Popper #4 Height of jump in inches	Popper #5 Height of jump in inches	Popper #6 Height of jump in inches
1 st flip						
2 nd flip						
3 rd flip						
4 th flip						
5 th flip						
Average height of all 5 flips						

- E. Make a quadruple bar graph showing the results of the experiment on the back of this paper.
- F. Which popper would you advertise as the highest popper?
- G. Did the data support your hypothesis? Explain.