

Great Men of Science

Grade Level: 5th Grade

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Length of Unit: 10 Lessons (10 to 12 Days)

I. ABSTRACT

The Great Men of Science is a unit designed to develop an appreciation and understanding of Galileo, Linnaeus, Just, and Julian. It explores through text, technology and experiments the men and their contributions to science. This unit is designed to be taught as a whole or divided and taught within the areas these men contributed to. The students will learn about each man individually and complete activities to explore the discoveries and inventions of each of these great scientists. The unit ends with the students sharing what they think about these men and how their discoveries affect our world today.

II. OVERVIEW

A. Concept Objectives

1. Develop an appreciation for scientists and their contributions to our world. (TEKS Science 5.3 E)

B. Content from the *Core Knowledge Sequence* (page 129)

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

C. Skill Objectives

1. Read varied sources such as nonfiction when reading for information. (TEKS Reading 5.8 B)
2. Acquire an extensive vocabulary through multiple reference aids to clarify meaning and usage. (TEKS Reading 5.9 C)
3. Represent text information in a timeline. (TEKS Reading 5.10 L)
4. Respond to text by comparing and contrasting ideas and themes. (TEKS Reading 5.11 D)
5. Describe the contributions of famous inventors and scientists. (TEKS Social Studies 5.24 A)
6. Explain how scientific discoveries in the field of medicine have benefited individuals. (TEKS Social Studies 5.24 C)
7. Give examples of scientific discoveries, including the role of scientists and inventors, which have shaped the world. (TEKS Social Studies 6.20 A)
8. Collect information by observing and measuring. (TEKS Science 5.2 B)
9. Construct a chart or map using tools including computers to organize, examine, and evaluate information. (TEKS Science 5.2 E)
10. Label a cell. (TEKS Science 6.10 B)

III. BACKGROUND KNOWLEDGE

A. For Teachers

1. *Core Knowledge, Text Resources Grade 5*, Core Knowledge Foundation, 2004 ISBN 1-890517-64-X.
2. *American Profiles, Black Scientist*, Yount, Facts on File, Inc., New York, 1991.
3. *Great Men of Science, Carl Linnaeus*, Silverstein, The John Day Company, Inc., 1969.

4. *Truth on Trial, The Story of Galileo Galilei*, Cobb, Coward, McCann & Geoghegan, Inc., New York, 1979.

B. For Students

1. Astronomy, the order of the planets from third grade. (page 83)
2. Classification of Living Things from fifth grade. (page 126)
3. Cell Structure from fifth grade. (page 127)

IV. RESOURCES

Prior to beginning this lesson, collect books on these men and their works. You may want to also place several web sites in a folder for the students to view when they finish their assignments. (Yahooligans is a great place to find web sites for students)

- A. *Core Knowledge, Text Resources Grade 5*, Core Knowledge Foundation, 2004
ISB 1-890517-64-X.
- B. Suggested web sites:
 1. Solar System web sites such as
<http://www.nineplanets.org/overview.html> .
 2. Web site on Galileo
http://www.imahero.com/.../herohistory/galileo_herohistory.htm .
 3. Web site on Julian <http://www.uh.edu/engines/epi659.htm> .
 4. Web site on Just <http://www2.sjsu.edu/depts/Museum/ernest.html> .
 5. Web site on Linnaeus
http://www.linnean.org/contents/history/linnaeus_biography.html .

V. LESSONS

Lesson One: The Life of Galileo Galilei (1 day)

A. *Daily Objectives*

1. Concept Objective
 - a. Develop an appreciation for scientists and their contributions to our world. (TEKS Science 5.3 E)
2. Lesson Content
 - a. Science Biographies (page 129)
Galileo
3. Skill Objective(s)
 - a. Read varied sources such as nonfiction when reading for information. (TEKS Reading 5.8 B)
 - b. Give examples of scientific discoveries, including the role of scientists and inventors, which have shaped the world. (TEKS Social Studies 6.20 A)
 - c. Acquire an extensive vocabulary through multiple reference aids to clarify meaning and usage. (TEKS Reading 5.9 C)

B. *Materials*

1. Copies of “Galileo Galilei” from the *Text Resources Grade 5*.
2. 11 note cards per group
3. Poster labeled ‘Galileo’s Discoveries’.
4. Pencils
5. Thin, washable markers
6. Picture of Galileo
7. Student science journals

8. Students science folders
 9. Answer key for Galileo’s discoveries – Appendix A
- C. *Key Vocabulary*
1. Controversial – conflict of opinion
 2. Heresy-to oppose a religious belief
 3. Philosophy-the general laws or principles of a field of knowledge
 4. Phenomenon-any observable fact or event that can be scientifically described
 5. Nautical-of sailors, ships, or navigation
- D. *Procedures/Activities*
- Today the students are going to read about Galileo Galilei. Then they will work together to list the discoveries and inventions mentioned in the passage.
1. Show students a picture of Galileo Galilei. (The cover of a book or poster)
 - a. Ask students to study the picture and tell you all they can about it. (Who it might be, when he might have lived, etc.)
 - b. Identify Galileo from the Renaissance period.
 2. Introduce the vocabulary for this lesson.
 - a. Give students the vocabulary words and have them write down the words and the definition in their science journals.
 3. Hand out the story “Galileo Galilei” from the *Text Resources Grade 5*.
 4. Read the story and discuss while you read.
 5. Have students work in small groups. (Each group will need 11 note cards.)
 - a. Each small group will write down Galileo’s discoveries discussed in the story.
 - b. Write one discovery or invention on each note card using markers.
 6. When each group is finished, have the groups take turns placing note cards on the poster ‘Galileo’s Discoveries’.
 - a. There should not be any duplicate cards on the poster. Once a discovery is placed no one else can add that event, they must choose another one.
 - b. Take turns until all 11 discoveries or inventions have been placed on the poster.
 7. Place the story of Galileo in science folder.
- E. *Assessment/Evaluation*
1. As closure, each student will write in their journal.
 - a. They should give at least one example of Galileo’s contributions to science and tell how it is significant today.

Lesson Two: Experiment with Galileo (1 to 2 days)

- A. *Daily Objectives*
1. Concept Objective
 - a. Develop an appreciation for scientists and their contributions to our world. (TEKS Science 5.3 E)
 2. Lesson Content
 - a. Science Biographies (page 129)
Galileo
 3. Skill Objective(s)
 - a. Collect information by observing and measuring. (TEKS Science 5.2 B)
 - b. Construct a chart or map using tools including computers to organize, examine, and evaluate information. (TEKS Science 5.2 E)

B. *Materials*

1. Sheets of cardboard (1 per group) about 3 feet long and 18 inches across
2. Books to prop the cardboard on (you will need to give height to one end)
3. Balls of different weights (Each group will need 2 balls of different weight. Golf balls and plastic golf balls work great!)
4. Recording sheet - Appendix B1 and B2
5. Thumbtacks (one per group)
6. String
7. Fishing weights (one per group)
8. Tape
9. Stop watches
10. Calculators
11. Student science journals

C. *Key Vocabulary*

1. Motion-moving from one place to another; movement
2. Friction-a rubbing of one object against another
3. Pendulum-an object hung so as to swing freely to and fro: used to regulate clock movements

D. *Procedures/Activities*

Today the students are going to recreate a couple of Galileo's experiments. They will be testing the speed of objects going down a ramp and timing the swing of a pendulum.

1. Review Galileo by using the poster of 'Galileo's Discoveries'.
2. Introduce the vocabulary for this lesson.
 - a. Give students the vocabulary words and have them write down the words and the definition in their science journals.
3. Experiment – Motion – students will work in groups
 - a. Hand out cardboard, books, and tape.
 - b. Students will need to stack the books in order to raise one end of the cardboard. It should create a ramp.
 - c. Tape the cardboard to the books so it will stay securely in place.
 - d. Pass out recording sheet - Appendix B1 - and read over the direction together.
 - e. Pass out the balls (each group will need two balls of different weight).
 - f. The students will work together to roll the balls down the ramp.
 - g. Both balls should be released at the same time from the top of the ramp.
 - h. The students will record which ball wins the race on Appendix B1.
 - i. Repeat this ten times.
 - j. When everyone has finished, compare results and clean up.
4. Experiment – Pendulum – students will work in groups
 - a. Pass out string, (string should be about 2 feet long) 1 thumbtack, and 1 fishing weight per group.
 - b. Students should tie one end of the string to the hook on the fishing weight.
 - c. Tie the other end of the string to the thumbtack. (Leave the string between the fishing weight and thumbtack as long as possible.)
 - d. Push the thumb tack into one end of a student's desk so that it will swing freely. (You can also push the tack into the top of a doorway.)
 - e. Pass out the recording sheet Appendix B2 and read the directions together.

- f. Students will now gently pull the fishing weight back about 5 inches and time how long it takes it to go back and forth 50 times. (In seconds)
- g. Divide the time by 50 to see how many seconds it takes the pendulum to make one complete swing. Record your answer.
- h. Repeat the experiment, but this time just pull the fishing weight back about 2 inches – record results.
- i. Repeat the experiment, but this time shorten the string and pull it about 5 inches again– record results.
- j. Repeat the experiment, but this time, with the shortened string, just pull the fishing weight back about 2 inches – record results.

E. *Assessment/Evaluation*

1. Walk around as the students are completing their experiment and see how they are progressing. Make sure that everyone is participating and understanding the process.

Lesson Three: Copernican system (1 to 2 days)

A. *Daily Objectives*

1. Concept Objective
 - a. Develop an appreciation for scientists and their contributions to our world. (TEKS Science 5.3 E)
2. Lesson Content
 - a. Science Biographies (page 129)
Galileo Galilei
3. Skill Objective(s)
 - a. Construct a chart or map using tools including computers to organize, examine, and evaluate information. (TEKS Science 5.2 E)

B. *Materials*

1. Computers
2. Poster of the solar system
3. Telescope

C. *Key Vocabulary*

1. Telescope-an optical instrument for making distant objects appear nearer and larger.

D. *Procedures/Activities*

Today the students will be creating a pictorial model of the solar system.

1. Have a telescope set up when the students enter the room.
2. Orally review Galileo’s contribution to the telescope.
 - a. Telescopes were very fussy and only magnified objects three times prior to Galileo’s telescope.
 - b. He made telescopes much clearer and improved their magnification up to 20 times the objects true size.
3. Ask students what Galileo learned looking through his telescope.
 - a. Our moon is not smooth – there are mountains.
 - b. The Milky Way is made up of stars.
 - c. He found 4 of Jupiter’s moons.
 - d. Discovered Venus has phases which indicated...
 - e. That the planets revolve around the sun – not Earth.
4. Review the order of the planets using a poster of the solar system.

5. If a computer lab is available, take the students to the computer lab. If there is not a lab available the students can draw a picture or take turns using the computer(s) in the classroom.
 6. The students will use a computer program like Windows or Kidpix or paper to draw and label a picture of the solar system.
 - a. The planets must be in order from the sun and include the asteroid belt.
 - b. The picture should be neatly labeled and colored.
 7. Students should then add the vocabulary word telescope to their journals.
- E. *Assessment/Evaluation*
1. Monitor the students as they complete and label their model of the solar system.

Lesson Four: The Life of Carl Linnaeus (1 day)

A. *Daily Objectives*

1. Concept Objective
 - a. Develop an appreciation for scientists and their contributions to our world. (TEKS Science 5.3 E)
2. Lesson Content
 - a. Science Biographies
Carl Linnaeus
3. Skill Objective(s)
 - a. Read varied sources such as nonfiction when reading for information. (TEKS Reading 5.8 B)
 - b. Acquire an extensive vocabulary through multiple reference aids to clarify meaning and usage. (TEKS Reading 5.9 C)
 - c. Represent text information in a timeline. (TEKS Reading 5.10 L)

B. *Materials*

1. Copies of “Carolus Linnaeus” from the *Text Resources Grade 5*
2. Timeline - Appendix C1
3. Timeline Answer key– Appendix C2
4. Student science folders
5. Student science journals
6. Pencils
7. Baggies for each table group
 - a. each baggy should contain items for the students to categorize such as: plastic animals, fish, insects, and plants.

C. *Key Vocabulary*

1. Botanical-plant or plant life
2. Specimen-a part of something used as a sample

D. *Procedures/Activities*

Today the students are going to read about Carl Linnaeus and then put the important events of his life on a timeline.

1. Give each table group a baggy of items to categorize.
2. Ask the students to place the items from the baggy into groups. (They can choose the groups they use – there is no right or wrong way to group the items.)
3. Let each group tell the class how they chose to group the items.
4. Discuss the importance of having a set way to categorize all living things.
5. Tell students we are going to read about the man that invented the way in which we categorize all living things.
6. Orally review the vocabulary words for this lesson.

7. Pass out the story about “Carolus Linnaeus” from the *Text Resources Grade 5*.
 8. Read story and discuss as you read.
 9. Have students go back and reread the story. As they read they need to underline the important dates and the information that goes with each date.
 10. Pass out the timeline - Appendix C1.
 11. Students need to fill in the title and all of the important dates from Linnaeus’ life in chronological order.
 12. Then have them fill in the information that goes with each date.
 13. Place the story of Linnaeus in student’s science folder.
- E. *Assessment/Evaluation*
1. The timeline above will make a great grade. Answer key Appendix C2
 2. Have students that finish early write about Carl Linnaeus in their journal.

Lesson Five: Classification According to Carl (1 day)

- A. *Daily Objectives*
1. Concept Objective
 - a. Develop an appreciation for scientists and their contributions to our world. (TEKS Science 5.3 E)
 2. Lesson Content
 - a. Science Biographies (page 129)
Carl Linnaeus
 3. Skill Objective(s)
 - a. Construct a chart or map using tools including computers to organize, examine, and evaluate information. (TEKS Science 5.2 E)
- B. *Materials*
1. Poster of Classification words and definitions - Appendix D1
 2. Classification Cards for matching game - Appendix D2 (1 set for each pair of students)
 3. ‘Classification for Fun’ - Appendix D3
- C. *Key Vocabulary*
- If you have already taught Classification (page 126) these words will be a review.
1. Kingdom-the largest group in the classification system, dividing things on the most basic features. (Animal, Plant, Fungi, Protist, and Moneran)
 2. Phylum-the second level of classification. (Within the animal kingdom we divide into vertebrate and invertebrate.)
 3. Class-the third level of classification. (Within the animal kingdom we divide into birth, outer covering or skin, where they live, warm blooded or cold blooded, and appendages.)
 4. Order-the fourth level of classification. (Within the animal kingdom this is divided by what they eat: herbivore, carnivore, omnivorous.)
 5. Family-The fifth level of classification.
 6. Genus-the sixth level of classification (This is like your last name)
 7. Species-the final level of classification-identifies the specific plant, animal, etc. (this is like your first name)
- D. *Procedures/Activities*
- Today the students are going to learn more about classification and the characteristics of each level.
1. Ask students:
 - a. Who did we read about yesterday? (Carl Linnaeus)

- b. What is he famous for? (Developing the Classification System)
- c. Why is this system important? (Plants and animals used to have several different names due to the fact that there was no system or rule of naming new plants and animals as they were discovered.)
- 4. Today we are going to learn about (review) the Classification System.
- 5. Show students the Classification poster - Appendix D1.
- 6. Read together and explain the classification system. (If students have not previously studied the classification system, this will be a great deal of information. Just focus on why we have the system and that it is broken up into these levels as seen on the poster.)
- 7. Pass out cards to play the Classification Matching Game - Appendix D2.
- 8. Classification Matching Game
 - a. Explain the rules of the game.
 - i. Each pair of students will mix up the cards and lay them face down on their desk.
 - ii. The students will then take turns turning over two cards and trying to make a match.
 - iii. A match consists of one of the levels of classification (Kingdom, Phylum, Class, Order, Family, Genus, and Species) and the characteristics of that level.
 - iv. If a student makes a match they keep that set of cards and it is the next player's turn.
 - v. If they do not make a match, they turn the cards over and it is the next player's turn.
 - vi. The one with the most cards at the end wins.
- 9. Use Appendix D3 to have fun with classification.
- E. *Assessment/Evaluation*
 - 1. Observe students as they play the matching game to see if they are associating the names and characteristics.

Lesson Six: The Life of Ernest Just (1-2 days)

A. *Daily Objectives*

- 1. Concept Objective
 - a. Develop an appreciation for scientists and their contributions to our world. (TEKS Science 5.3 E)
- 2. Lesson Content
 - a. Science biographies (page 129)
Ernest Just
- 3. Skill Objective(s)
 - a. Read varied sources such as nonfiction when reading for information. (TEKS Reading 5.8 B)
 - b. Acquire an extensive vocabulary through multiple reference aids to clarify meaning and usage. (TEKS Reading 5.9 C)
 - c. Describe the contributions of famous inventors and scientist. (TEKS Social Studies 5.24 A)

B. *Materials*

- 1. Copies of "Ernest Just" from the *Text Resources Grade 5*
- 2. 'Ernest Just Face of Facts' - Appendix E
- 4. Pencils

5. Student science folders
 6. Student science journal
- C. *Key Vocabulary*
1. cytology-the study of cells
 2. embryology-the branch of study dealing with the development of embryos
 3. embryo-the earliest stage of life
 4. ectoplasm-the outer cytoplasm
- D. *Procedures/Activities*
- Today the students are reading about Ernest Just and listing facts about his life.
1. Show students a live plant, a live animal, and a child.
 - a. Ask students to identify each.
 - b. Ask the question; What are ALL LIVING things are made of? (Cells)
 - c. Tell students that today we are going to learn about the man that lead advances in cell research.
 2. Introduce the vocabulary for this lesson
 - a. Give students the vocabulary words and have them write down the words and the definition in their science journals.
 3. Pass out copies of “Ernest Just” from the *Text Resources Grade 5*.
 4. Read and discuss the story about Just.
 5. Pass out “Face of Facts” - Appendix E.
 6. Have students neatly fill in facts about Ernest Just in complete sentences. (These make a great bulletin board and can be a grade)
 8. Place story about Just in student science folders.
- E. *Assessment/Evaluation*
1. Walk around as the students are writing facts. Have them read what they have written and discuss their choice of answers.

Lesson Seven: Cells Inside and Out (1 day)

- A. *Daily Objectives*
1. Concept Objective
 - a. Develop an appreciation for scientists and their contributions to our world. (TEKS Science 5.3 E)
 2. Lesson Content
 - a. Science biographies (page 129)
Ernest Just
 3. Skill Objective(s)
 - a. Label a cell. (TEKS Science 6.10 B)
- B. *Materials*
1. Overhead projector
 2. Animal and plant cells - Appendix F1 and F2
 3. Paper
 4. Pencils
 5. Crayons
 6. Student science journal
- C. *Key Vocabulary*
1. Cell membrane-a thin, soft outer layer of animal or plant cell
 2. Nucleus-structure that controls all the activities of a cell
 3. Cytoplasm-the protoplasm of a cell that is outside the nucleus

4. Mitochondria-cell structure that breaks down fats and carbohydrates and releases energy.
5. Vacuoles-a pocket of fluid found in the cytoplasm of a cell.
6. Chloroplasts-part of the plant cell that converts sunlight, carbon dioxide, and water into sugar.

D. *Procedures/Activities*

Today the students will be drawing and labeling plant and animal cells.

1. Pass out plain white paper and have student fold the paper in half to make to equal halves. (5 ½ X 4ish)
2. Label each half at the top – “Animal Cell” & “Plant Cell”.
3. Walk the students through drawing and labeling the Animal cell.
 - a. Use Appendix F1 as a guide.
 - b. Draw one part at a time and label as you draw.
4. Walk the students through drawing and labeling the plant cell
 - a. Use Appendix F2 as a guide.
 - b. Draw one part at a time and label as you draw.
5. On the bottom of the page or on the back have students:
 - a. Write a few sentences to describe and compare the two cells and
 - b. Describe why Dr. Just cell research was important.

E. *Assessment/Evaluation*

1. Look at student’s cell drawing and read through their thought about Ernest Just.

Lesson Eight: The life of Percy Lavon Julian (1 day)

A. *Daily Objectives* Concept Objective

- a. Develop an appreciation for scientists and their contributions to our world. (TEKS Science 5.3 E)
1. Lesson Content
 - a. Science Biographies (page 129)
Percy Lavon Julian
2. Skill Objective(s)
 - a. Read varied sources such as nonfiction when reading for information. (TEKS Reading 5.8 B)
 - b. Acquire an extensive vocabulary through multiple reference aids to clarify meaning and usage. (TEKS Reading 5.9 C)

B. *Materials*

1. Copies of “Percy Lavon Julian” from the *Text Resources Grade5* .
2. Poster board with the title ‘Percy Lavon Julian’.
3. Student science journals
4. Student science folders

C. *Key Vocabulary*

1. Synthesis-the combination of parts or elements so as to form a whole, a compound
2. Centrifuge-a machine that separates particles.
3. Hormone-a substance formed in some organ of the body

D. *Procedures/Activities*

Today the students will read about Percy Lavon Julian and generate a list of his accomplishments.

1. Tell students that starting today those with blond hair can no longer attend school. They can not further their education and that they have to get a job with the education they have now.
 2. Discuss how this makes them feel and why.
 3. Tell students that the man we are studying today was given limits like these – and overcame them.
 4. Introduce the vocabulary for this lesson.
 - b. Give students the vocabulary words and have them write down the words and the definition in their science journals.
 5. Pass out copies of “Percy Lavon Julian” from the *Text Resources Grade 5*.
 6. Read and discuss the story about Julian.
 7. Have students generate a list of Julian’s accomplishments for you to write on the poster board entitled Percy Lavon Julian’s Accomplishments.
 8. Place story of Julian in science folders.
- E. *Assessment/Evaluation*
1. Observe students as you read and discuss.
 2. Check to see who is participating in generating a list of Julian’s accomplishments.

Lesson Nine: Scientist vs. Scientist (1day)

A. *Daily Objectives*

1. Concept Objective
 - a. Develop an appreciation for scientists and their contributions to our world. (TEKS Science 5.3 E)
2. Lesson Content
 - a. Science biographies (page 129)
 1. Ernest Just
 2. Percy Lavon Julian
3. Skill Objective(s)
 - a. Respond to text by comparing and contrasting ideas and themes. (TEKS Reading 5.11 D)

B. *Materials*

1. Copies of “Percy Lavon Julian” from the *Text Resources Grade 5*.
2. Copies of “Ernest Just” from the *Text Resources Grade 5*
3. Overhead projector
3. Transparency of - Appendix G1
4. Copies of “Scientist vs. Scientist” - Appendix G2
5. Scientist vs. Scientist Answer key– Appendix G3
5. Student science folders

C. *Key Vocabulary*

D. *Procedures/Activities*

Today the students are doing a Venn diagram to compare the lives and works of Just and Julian.

1. Students need to get the two reading passages “Percy Lavon Julian” and “Ernest Just” out of their science folders.
2. Place transparency of Appendix G1 on overhead for the students to see.
3. Pass out Scientist vs. Scientist Appendix G2.
4. Read the directions for the Venn diagram and answer any questions.
5. Have students reread both passages.

6. Then complete the Venn diagram – Scientist vs. Scientist.
 7. Make sure everyone double checks their work before turning in their paper.
 8. Place stories back in science folders.
- E. *Assessment/Evaluation*
1. Take a grade on the Venn diagram Scientist vs. Scientist. – Appendix G3

Lesson Ten: The Great Men of Science (1 day)

- A. *Daily Objectives*
1. Concept Objective
 - a. Develop an appreciation for scientists and their contributions to our world. (TEKS Science 5.3 E)
 2. Lesson Content
 - a. Science biographies (page 129)
 1. Galileo
 2. Carl Linnaeus
 3. Ernest Just
 4. Percy Lavon Julian
 3. Skill Objective(s)
 - a. Describe the contributions of famous inventors and scientist. (TEKS Social Studies 5.24 A)
 - b. Explain how scientific discoveries in the field of medicine have benefited individuals. (TEKS Social Studies 5.24 C)
 - c. Give examples of scientific discoveries, including the role of scientist and inventors, which have shaped the world. (TEKS Social Studies 6.20 A)
- B. *Materials*
1. The Great Men of Science - Appendix H1
 2. The Great Men of Science Rubric - Appendix H2
 2. Pencils
 3. Science folders
- C. *Key Vocabulary*
- D. *Procedures/Activities*
- Today the students will show off what they have learned about these great men of science.
1. Orally review the 4 scientists that you have studied.
 - a. Have students give examples of the men’s discoveries and inventions.
 - b. Have them think about why these men and their discoveries are important to us today.
 2. Students need to get their science folders so that they have all the information on the 4 scientists.
 3. Pass out The Great Men of Science - Appendix H1
 4. Read the instructions together and answer any questions.
 5. Take up for a final grade for this unit.
- E. *Assessment/Evaluation*
1. On Appendix H the students are giving examples of discoveries and inventions for each of the 4 scientists. They then have to write about why these discoveries and inventions are important to the world today. These papers will give them a chance to show everything they have learned about these men and how their discoveries affect our world today. Rubric Appendix H2

VI. CULMINATING ACTIVITY

- A. The above lesson can be a culminating activity.
- B. Plan a field trip to your local museum to learn more about scientist and their inventions.

VII. HANDOUTS/WORKSHEETS

- A. Appendix A: Discoveries of Galileo Galilei
- B. Appendix B1: Galileo's Motion
- C. Appendix B2: Galileo's Pendulum
- D. Appendix C: Timeline of Carl Linnaeus' Life
- E. Appendix C: Timeline of Carl Linnaeus' Life answer key
- F. Appendix D1: Carl Linnaeus' Classification of all Living Things
- G. Appendix D2: Classification Cards for Match Game
- H. Appendix D3: Classification for Fun!
- I. Appendix E: Ernest Just Face of Facts
- J. Appendix F1: Animal Cell
- K. Appendix F2: Plant Cell
- L. Appendix G1: Scientist vs. Scientist events
- M. Appendix G2: Scientist vs. Scientist Venn diagram
- N. Appendix G3: Scientist vs. Scientist Venn diagram answer key
- O. Appendix H1: The Great Men of Science
- P. Appendix H2: The Great Men of Science Rubric

VIII. BIBLIOGRAPHY

- A. *Core Knowledge Sequence*, Virginia: Core Knowledge Foundation, 1997, ISBN 1-890517-20-8.
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- C. Gardner, Robert. *Famous Experiments You Can Do*. New York: Franklin Watts Publishing, 1990, ISBN 0-531-10883
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- E. Silverstein, Alvin and Virginia. *The Great Men of Science, Carl Linnaeus, The Men Who Put the World of Life in Order*. New York: The John Day Company, 1969.
- F. <http://sun.menloschool.org/~cweaver/cells/>

Appendix A
Discoveries of Galileo Galilei

1. Motion – objects, regardless of weight, will fall at the same speed.
2. Pendulum - the time of the swing is regular, regardless of the arc of the swing.
3. Sector – a type of compass used in nautical navigation.
4. Pump – a device that raised water.
5. Hydrostatic balance – a balance used to weigh objects in both air and water.
6. Telescope – magnifies objects viewed by twenty times the object's size.
7. Mountains on the moon – scientist believed that the moon was smooth until they saw it through the telescope.
8. Milky Way made up of stars – never before viewed before the telescope.
9. 4 moons around Jupiter - never before viewed before the telescope.
10. Phases of Venus – just like our moon.
11. Planets orbit the sun – it was believed that everything circled around the Earth.



Galileo's Motion



Directions: Release two balls of different weight from the top of a ramp at the very same time. Repeat the roll ten times. At the end of each roll, record which ball won the race.

Number of Rolls	Heavy ball won!	Light ball won!	The balls tied!
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Galileo believed that weight did not matter, that the balls would fall at the same rate.

From the test you just did, do you believe he was right or wrong? Why?

Galileo's Pendulum



Directions: Start your stop watch at the same time you release the weight. Watch the ball make 50 swings. At the end of the 50th swing, STOP the time. Now, follow the formula to see how many seconds it took to make each swing.

Long string

Pull weight back...	Seconds on the stop watch	Divided by...	Swings of the pendulum	Equals	Seconds to make one swing
5 inches	_____	÷	50	=	_____
2 inches	_____	÷	50	=	_____

Short string

Pull weight back...	Seconds on the stop watch	Divided by...	Swings of the pendulum	Equals	Seconds to make one swing
5 inches	_____	÷	50	=	_____
2 inches	_____	÷	50	=	_____

What did you learn? _____

Timeline of Carl Linnaeus' Life



Dates	What happened?

Timeline of Carl Linnaeus' Life

Answer Key



Dates	What happened?
1707	Carl Linnaeus was born I Sweden.
1727	Linnaeus began his scientific studies.
1732	Linnaeus led an exploratory trip to Lapland
1735	Carl Linnaeus went to medical school.
1753	He introduced his naming scale for plants.
1753	Began practicing medicine and was a professor giving lectures around the world
1758	Linnaeus introduced a naming system for animals.
1761	Carl Linnaeus was granted nobility.
1778	Carl Linnaeus died.

Carl Linnaeus' Classification of all Living Things

Kingdom

Phylum

Class



Order

Family

Genus

Species

Kingdom – there are 5 kingdoms: plant, animal, fungus, protist, and moneran.

Phylum – animals are group according to vertebrates and nonvertebrates

Class – animals are grouped by how they are born, their outer covering, where they live, warm blooded or cold blooded, and the number of appendages.

Order – animals are grouped according to what they eat: herbivores, carnivores, and omnivores.

Family – animals grouped by things they have in common like brain size

Genus – more specific group (like an animal's last name)

Species – most specific (like an animal's first name)

Appendix D2

<p>Classification Matching Game</p>	<p>Kingdom</p>	<p>Phylum</p>
<p>Class</p>	<p>Order</p>	<p>Family</p>
<p>Genus</p>	<p>Species</p>	<p>There are 5 kingdoms: plant, animal, fungus, protest, and moneran.</p>
<p>Animals are group according to vertebrates and nonvertebrates.</p>	<p>Animals are grouped by how they are born, their outer covering, where they live, warm blooded or cold blooded, and the number of appendages.</p>	<p>Animals are grouped according to what they eat: herbivores, carnivores, and omnivores.</p>
<p>Animals grouped by things they have in common like brain size.</p>	<p>More specific group (like an animal's last name).</p>	<p>Most specific (like an animal's first name).</p>

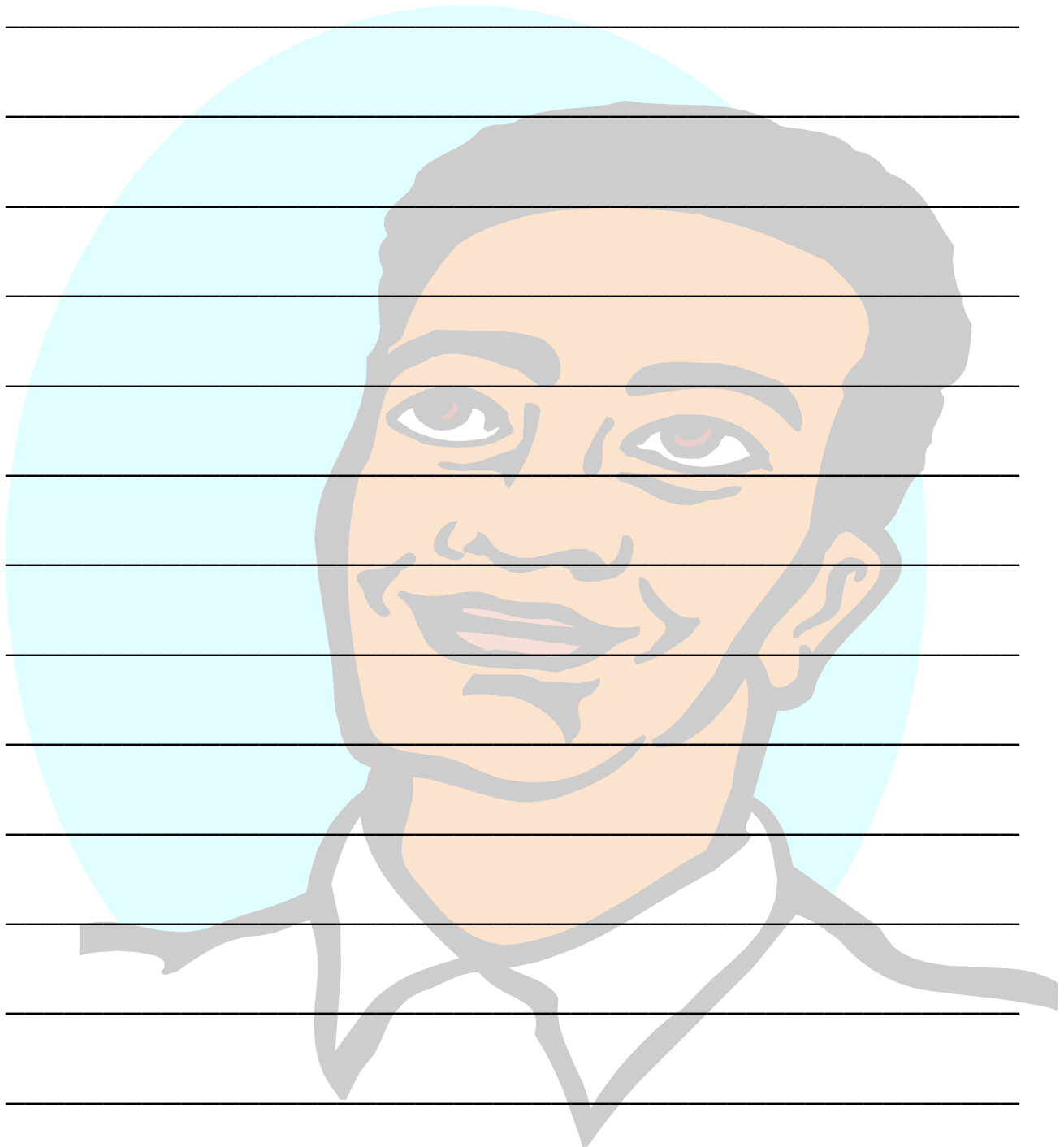
Appendix D3
Classification for Fun!



Directions: Fill in correct information for yourself.

Kingdom	Country	
Phylum	State	
Class	City	
Order	School	
Family	Homeroom teacher	
Genus	Your last name	
Species	Your first name	

Appendix E
Ernest Just
Face of Facts



Appendix F1

ANIMAL CELL

<http://sun.menloschool.org/~cweaver/cells/>

Appendix F1

PLANT CELL

<http://sun.menloschool.org/~cweaver/cells/>

Scientist vs. Scientist

Direction: Neatly write these statements in the correct area of your Venn diagram according to whom they are referring.

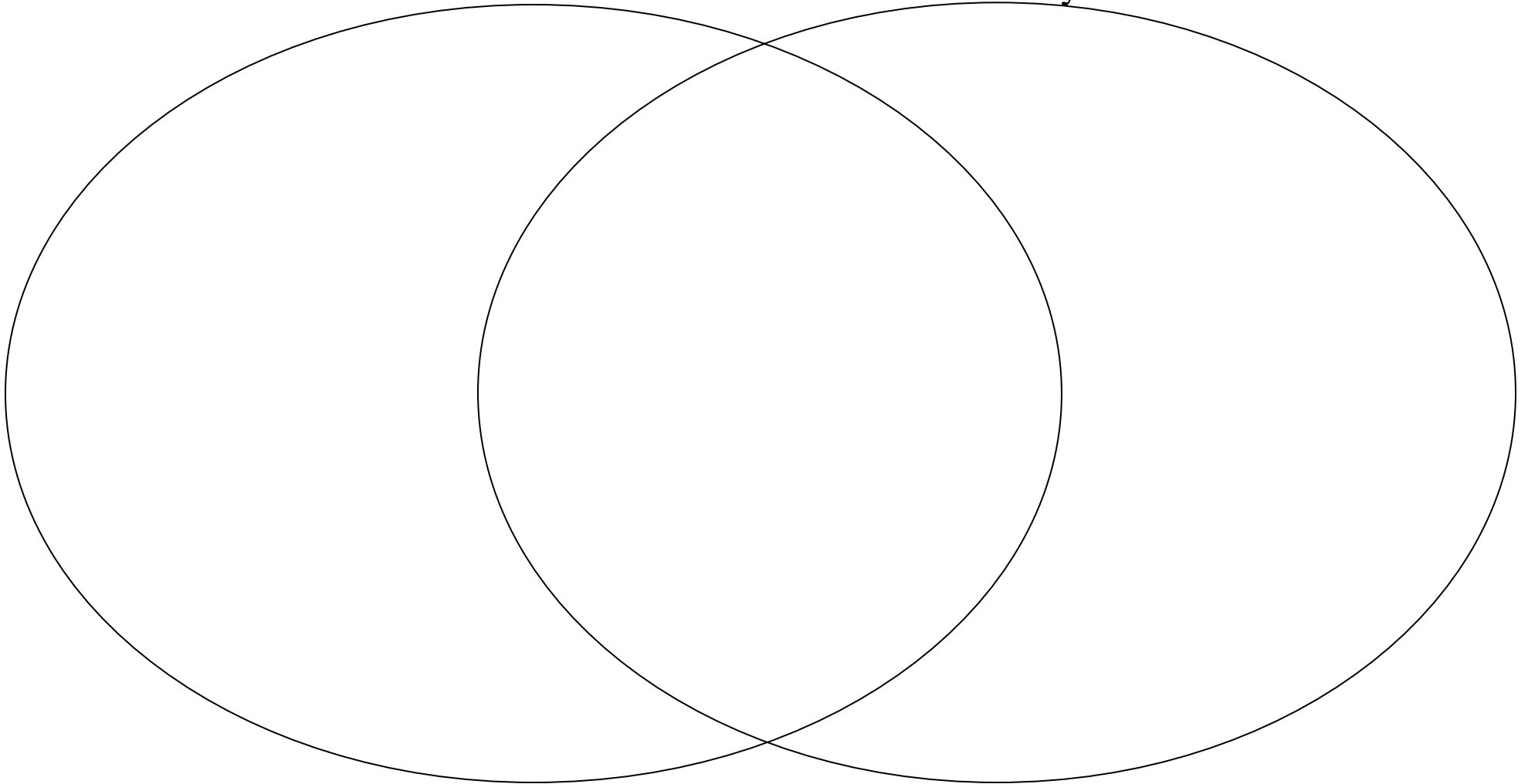
1. Born in the U.S.A.
2. Focused on soybean research
3. Received his PhD
4. Studied in Europe
5. Specialized in the study of cells
6. Grew up in South Carolina
7. African American
8. Was a prisoner-of-war
9. Made medicines cheaper
10. Grew up in Alabama
11. Studied marine mammals and their eggs
12. Made important discoveries
13. His hometown still celebrates his birthday
14. Turned down by white universities

Appendix G2
Scientist vs. Scientist

Ernest Just

Both

Percy Lavon Julian



Appendix G3
Scientist vs. Scientist

Ernest Just

Both

Percy Lavon Julian

Specialized in the study
of cells

Born
in the U.S.A.

Born in Alabama

Born in South
Carolina

Africa American

Focused on soybean
research

Was a prisoner of war

Turned down by White
universities

Made medicine
cheaper

Studied marine
mammals and
their eggs

Made important discoveries

Studied in Europe

His hometown still
celebrates his
birthday

Received PhD

The Great Men of Science

Direction: Using complete sentences give examples of each man's discoveries or inventions and then tell how these men and their works are important to our world today.

Galileo

Carl Linnaeus

Ernest Just

Percy Lavon Julian

Appendix H2
 The Great Men of Science
 Rubric

	15 points	20 points	25 points
Neatness, readability	Messy and hard to read	Pretty neat and readable	Very neat and easy to read
Sentence structure and spelling	Very poor sentence structure and spelling	Sentence structure and spelling is pretty good	Great sentence structure and spelling
Examples of discoveries & inventions	Gave only one example with no detail	Gave one example with detail	Gave more than one example with details
Related importance to today's world	Made no relationship to how the discoveries are important to our world today	Made connections to our world today with some detail	Made connections to our world today with great detail

Total points _____