

The Lives of Four Famous Scientists: Banneker, Blackwell, Drew, and Faraday

Grade Level: Fourth

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Length of Unit: Ten days

I. ABSTRACT

This is a fourth grade unit on four famous scientists: Benjamin Banneker, Elizabeth Blackwell, Charles Drew, and Michael Faraday. The students will hear about each individual life and the accomplishments that made them famous. We will explore their inventions and accomplishments with hands-on activities. We incorporated skills including letter writing, math skills, outlining, and sequencing.

II. OVERVIEW

A. Core Knowledge Sequence

1. Biographies of Banneker, Blackwell, Drew and Faraday
2. Concepts of electricity, planning of our nation's capital, circulatory system

B. Skills taught

1. Letter writing
2. Circle, radius and diameter
3. Outlining
4. Direction following
5. Roman numerals
6. Sequencing
7. Comprehension

C. Goals and Objectives

1. Develop a sense of historical empathy seen through the eyes of these four historical scientists.
2. Develop an understanding of four scientists and their contributions of sanitation, hygiene, nutrition, blood bank, math and astronomy and mass use of electricity to our modern civilization.

III. BACKGROUND KNOWLEDGE

A. Books

1. Brophy, Michael. *Pioneers of Science, Michael Faraday*. New York: The Bookwrite Press, 1990. 0-531-183769
2. Mahone-Lonesome, Robyn. *Black American of Achievement, Charles Drew*. New York: Cheleas House Publishers, 1990. 1-55546-581-1
3. Pinkney, Andrea. *Dear Benjamin Banneker*. San Diego: Gulliver Books, 1994. 0-15-200417-3
4. Talmadge, Katherine. *The Life of Charles Drew*. Frederick Maryland: Twenty-First Century Books, 1992. 0-941477-65-7

IV. RESOURCES

A. Books

1. Brophy, Michael. *Pioneers of Science, Michael Faraday*. New York: The Bookwrite Press, 1990. 0-531-183769
2. Brown, Jorday. *American Women of Achievement. Elizabeth Blackwell*. New York: Chelsea House Publishers, 1989. 1-55546-642-7
3. Conley, Kevin. *Black American of Achievement, Benjamin Banneker*. New York: Chelsea House Publishers, 1989. 1-55546-573-0
4. Gutnik, Martin. *Michael Faraday, Creative Scientist*. Chicago: Children's Press, 1986. 0-516-03224-0
1970. 5. Haber, Lewis. *Black Pioneers*. San Diego: Harcourt Brace Jovanovich Publishers, 0-15-208566-1
6. Heit, Philip, and Linda Meeks. *Health Focus on You*. Columbus: Charles E. Merrill Publishing, 1984. 00675-077834-06
7. Latham, Jean. *Elizabeth Blackwell*. New York: Chelsea Juniors, 1991. 0-7910-1406-1
8. Mahone-Lonesome, Robyn. *Black American of Achievement, Charles Drew*. New York: Chelsea House Publishers, 1990. 1-55546-581-1
- 8167- 9. Makhmaltchi, Vivian. *Hands On! Science Activities for Grades 4-6*. Toll, 1992. 0-2592-6
10. Pinkney, Andrea. *Dear Benjamin Banneker*. San Diego: Gulliver Books, 1994. 0-15-200417-3
11. Sabin, Francene. *Elizabeth Blackwell, The First Woman Doctor*. Troll, 1982. 0-89375-757-8
12. Talmadge, Katherine. *The Life of Charles Drew*. Frederick Maryland: Twenty-First Century Books, 1992. 0-941477-65-7

V. LESSONS

Lesson One: Benjamin Banneker-Mathematician, Astronomer and Surveyor

A. Objectives

1. *Lesson Content:* Develop a sense of historical empathy seen through the eyes of Benjamin Banneker
2. *Content Objective:* Students will understand that Benjamin Banneker, as a black man, invented the first clock, surveyed Washington D.C., and wrote almanacs.
3. *Skill Objective:* The students will outline the information on Benjamin Banneker

B. Materials

1. Book *Dear Benjamin Banneker*.

C. Vocabulary

1. Surveyor
2. Mathematician
3. L'Enfant
4. Astronomer

D. Procedures/Activities

1. Read book *Dear Benjamin Banneker* by Brian Pinkney orally to students
2. Tell students about Mr. Banneker's role in surveying Washington, D.C. (information not included in book, see background knowledge).
3. As a class, using the outline form, students will outline key points of Benjamin Banneker's life

E. Evaluation

1. Collect student's outlines and evaluate for completeness and accuracy

F. Standardized Test/State Test Connection

1. Outlining

Lesson Two:

- A. Objectives
 - 1. *Lesson Content:* Develop an understanding of Benjamin Banneker's contribution to math, astronomy, and clocks to our modern civilization
 - 2. *Content Objective:* Develop an understanding of what type of information an almanac has and the use of sundial clocks.
 - 3. *Skill Objective:* Students will learn how to write and read Roman numerals and identify the radius and diameter of a circle
- B. Materials
 - 1. Tagboard (cut into circles and triangles)
 - 2. Glue
 - 3. Scissors
 - 4. Markers
 - 5. Crayons
 - 6. String
 - 7. Paper clips
- C. Vocabulary
 - 1. Radius
 - 2. Diameter
- D. Procedures/Activities
 - 1. Teach or review Roman numerals to students.
 - 2. Teach or review circle, radius, and circumference.
 - 3. Make individual sundials following directions on Appendix A.
 - 4. Mark Roman numerals on the outer part of the circle.
 - 5. Decorate the inner part of the circle if desired.
 - 6. Glue the triangle onto the circle (Appendix A).
 - 7. After the student's sundials are complete, teacher may wish to make a large sundial on the concrete using similar procedures as listed above with the exception of the sundial marker. It can be made from heavy corrugated cardboard.
- E. Evaluation
 - 1. Students will have completed their sundials and experimented with them outside
- F. Standardized Test/State Test Connection
 - 1. Locating information

Lessons Three and Four: Elizabeth Blackwell - First Woman Doctor

- A. Objectives
 - 1. *Lesson Content:* Develop a sense of historical empathy seen through the eyes of Elizabeth Blackwell
 - 2. *Content Objective:* Develop an understanding of the difficulties Elizabeth Blackwell faced in obtaining a medical degree
 - 3. *Skill Objective:* Students will comprehend the story of Elizabeth Blackwell by sequencing events
- B. Materials
 - 1. Book *Elizabeth Blackwell, First Woman Doctor* by Troll Associates (class sets)
 - 2. Appendix b - sequencing sheet
- C. Procedures/Activities
 - 1. Read book *Elizabeth Blackwell, First Woman Doctor* in groups
 - 2. Do sequencing sheet (Appendix B) in their groups
- D. Evaluation
 - 1. Students will be evaluated on their sequencing sheets

- F. Standardized Test/State Test Connection
 - 1. Sequencing

Lesson Five:

- A. Objectives
 - 1. *Lesson Content:* Develop an understanding of Elizabeth Blackwell and her contributions of sanitation, hygiene, and nutrition to our modern civilization
 - 2. *Content Objective:* Understand the importance of avoiding infectious diseases
 - 3. *Skill Objective:* Locating and recalling information
- B. Materials
 - 1. Appendix C - outline of information on infectious diseases
 - 2. Pattern of black medical bag (Appendix D)
- C. Vocabulary
 - 1. Virus
 - 2. Bacteria
 - 3. Protozoa
 - 4. Fungi
 - 5. Antibodies
 - 6. Immunity
 - 7. Disease agent
- D. Procedures/Activities
 - 1. Teacher will present information on preventing disease (Appendix c)
 - 2. With teacher's assistance, students will list the practices to avoid diseases on black medical bag from Appendix D.
- E. Extension
 - 1. Saying: "an ounce of prevention is worth a pound of cure"
 - 2. Students will play a board game that reinforces ways of avoiding infectious diseases.
- F. Evaluation
 - 1. Students will be evaluated on their ability to enumerate good health practices.
- G. Standardized Test/State Test Connection
 - 1. Locating and recalling information

Lesson Six:

- A. Objectives
 - 1. *Lesson Content:* Develop a sense of historical empathy as seen through the eyes of Charles Drew
 - 2. *Content Objective:* Understand the pioneering work of an Afro-American physician in organizing blood banks
 - 3. *Skill Objective:* Students will be able to outline information given on Charles Drew
- B. Materials
 - 1. White lab coat
 - 2. Name tag (Charles Drew)
 - 3. Stethoscope
 - 4. Doctor bag
 - 5. Test tubes with red water in them
 - 6. Microscope
 - 7. Trophy
 - 8. Football
- C. Vocabulary
 - 1. Plasma
 - 2. Centrifuge

- D. Procedures/Activities
 1. Dress up as Charles Drew and tell the story through his point of view including all major aspects of his life.
 2. Students will make an outline on Charles Drew from teacher's presentation.
- E. Evaluation
 1. Students will be evaluated on their outline to see if they understood the content
- F. Standardized Test/State Test Connection
 1. Outlining

Lesson Seven:

- A. Objectives
 1. *Lesson Content:* Develop an understanding of Charles Drew and his contributions of the blood bank of our modern civilization
 2. *Content Objective:* Understand all the aspects of blood and how it is separated and stored for future use
 3. *Skill Objective:* Students will be able to write a thank you letter.
- B. Vocabulary
 1. Blood bank
- C. Procedures/Activities
 1. Local blood bank or School Nurse will visit and present information to students.
 2. Students will write a thank you letter to the blood bank or School Nurse including information obtained from the presentation.
- D. Evaluation
 1. Teacher will evaluate letters written for subject content and correct letter writing skills
- E. Standardized Test/State Test Connection
 1. Letter writing

Lesson Eight:

- A. Objectives
 1. *Lesson Content:* Develop a sense of historical empathy as seen through the eyes of Michael Faraday
 2. *Content Objective:* Students will learn how Michael Faraday's work with magnets and electricity have impacted our use with mass electricity today.
 3. *Skill Objective:* Students will read for comprehension and answer correlating questions and be able to put our modern supplies in order from power station to consumer.
- B. Materials
 1. Appendix F - reading material on Faraday and accompanying questions
 2. Appendix G - power supplies in sequential order
- C. Vocabulary
 1. Transformer
 2. Generator
- D. Procedures/Activities
 1. Students will read information about Michael Faraday.
 2. Students will answer accompanying questions.
 3. Students will cut out power supplies and put them in sequential order on paper connecting them with string for wires (Appendix G).
- E. Evaluation
 1. Evaluation of reading comprehension questions and their sequential order of electricity
- F. Standardized Test/State Test Connection
 1. Comprehension
 2. Sequencing

Lesson Nine:

- A. Objectives
 - 1. *Lesson Content:* Develop an understanding of Michael Faraday's use of electricity in our modern civilization
 - 2. *Content Objective:* Understand how electricity and magnetism are related
 - 3. *Skill Objective:* Students will make and use an electromagnet and be able to follow directions from an instruction sheet.
- B. Materials
 - 1. For each group: size D battery
 - 2. 1 yard of bell wire
 - 3. Scissors
 - 4. Large iron nail
 - 5. Box of paper clips
- C. Vocabulary
 - 1. Electricity
 - 2. Magnet
 - 3. Electromagnet
- D. Procedures/Activities
 - 1. In groups, students will make an electromagnet following instructions from Appendix H
- E. Evaluation
 - 1. Teacher will observe student's successful completion of electromagnet
- F. Standardized Test/State Test Connection
 - 1. Reading and following directions

Lesson Ten:

- A. Objectives
 - 1. *Lesson Content:* Develop a sense of historical empathy seen through the eyes of Benjamin Banneker, Elizabeth Blackwell, Charles Drew and Michael Faraday
 - 2. *Content Objective:* Develop an understanding of four scientists and their contributions to our modern civilization
 - 3. *Skill Objective:* Synthesizing information
- B. Materials
 - 1. Shoeboxes (one per child)
 - 2. Art supplies
- C. Procedures/Activities
 - 1. Students will select one of the four scientists.
 - 2. Cover the outside of their shoebox and indicate their selection of scientists
 - 3. On the inside of the box, the students will include items that represent their scientist's life and their accomplishments
- D. Evaluation
 - 1. Student will share with the class and orally discuss their scientist
- E. Standardized Test/State Test Connection
 - 1. Synthesizing information