

Timeline of Notable Scientists in Physics and Chemistry

Lesson Overview

Overview:	To review, students will match the names of scientists with their respective contributions to science. The teacher will guide the students through the correct chronological sequence of achievements. In groups, students will use reasoning and deduction skills to match the name of the scientist to the picture of the scientist.
Grade Range:	9-12
Objective:	After completing this activity students will be able to: <ul style="list-style-type: none">• Summarize the accomplishments of 12 chemists and physicists.• Recognize famous scientists from portraits and photographs.• Arrange scientific accomplishments chronologically.
Time Required:	One class period of 45 minutes.
Discipline/Subject:	Science/Chemistry
Topic/Subject:	Technology
Era:	Settlement, Beginning to 1763, Civil War and Reconstruction, 1861-1877, Progressive Era to New Era, 1900-1929, Great Depression/World War II, 1929-1945, Postwar United States, 1945-1968

Standards

Illinois Learning Standards:

- Science:
- 12.C.4b Analyze and explain the atomic and nuclear structure of matter.
 - 12.F.4a Explain theories, past and present, for changes observed in the universe.
 - 13.A.4c Describe how scientific knowledge, explanations and technological designs may change with new information over time.

Materials

Handouts:	Worksheet 1, including matching achievements with names, as well as chronologically arranging the sequence of events.
Analysis Tools:	Worksheet 2, including the use of primary sources and deduction skills to identify scientists from pictures obtained from the Library of Congress website.
Books:	Modern Chemistry, Holt, Rinehart, and Winston, ISBN 13:978-0-03-036786-1, though most chemistry textbooks would be sufficient.

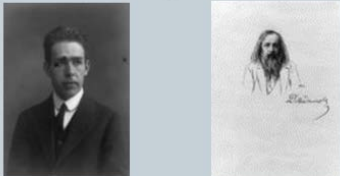
PowerPoint Slides:

1

Atomic Theory and Primary Sources

FROM NEWTON TO FERMI

3




Two black and white portraits of scientists. On the left is Isaac Newton, a man with a high forehead and a dark suit. On the right is John Dalton, a man with a full white beard and a dark coat.

2

Review of Atomic Theory


- Describe the scientific contributions to Atomic Theory of the following:
 - Isaac Newton
 - John Dalton
 - Michael Faraday
 - Dmitri Mendeleev
 - J.J. Thomson
 - Marie Curie
 - Max Planck
 - Albert Einstein
 - Ernest Rutherford
 - Niels Bohr
 - Werner Heisenberg
 - Enrico Fermi
- Identify the scientist from the following items.

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Two black and white portraits of scientists. On the left is Michael Faraday, a man with long, wavy hair and a dark coat. On the right is Dmitri Mendeleev, a man with a mustache and a dark suit.

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Two black and white portraits of scientists. On the left is J.J. Thomson, a man with white hair and a dark suit, pointing upwards. On the right is Marie Curie, a woman with dark hair and a dark dress, sitting at a desk.

6




Two black and white portraits of scientists. On the left is Albert Einstein, a man with wild hair and a dark coat. On the right is Ernest Rutherford, a man with a mustache and a dark suit, holding a book.

7



Two black and white portraits of scientists. On the left is Niels Bohr, a man with dark hair and a dark suit. On the right is Werner Heisenberg, a man with a mustache and a dark suit.

8



Two black and white portraits of scientists. On the left is Enrico Fermi, a man with a mustache and a dark suit. On the right is another man with a mustache and a dark suit, possibly a lesser-known scientist.

Primary Sources

- Primary sources provide first-hand testimony or direct evidence concerning a topic under investigation.
- They are created by witnesses or recorders who experienced the events or conditions being documented.
- Often these sources are created at the time when the events or conditions are occurring, but primary sources can also include autobiographies, memoirs, and oral histories recorded later.
- Primary sources are characterized by their content, regardless of whether they are available in original format, in microfilm/microfiche, in digital format, or in published format.

Retrieved from <http://www.galileo.usg.edu/galileo/items/collectionbrowse/c/primary-sources/primary-sources.html> on February 15, 2012

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Using Primary Sources

- What are the benefits of using primary sources?
- What details might a primary source contain that is not found in a secondary source?
- What primary sources have you encountered in the classroom this year?
- What primary sources do you encounter in your day-to-day activities?

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Library of Congress Items:

Title of Source: Sir Isaac Newton, ob. 1727/Engraved by W.T. Fry

URL of Source: <http://www.loc.gov/pictures/item/91789195/>

Title of Source: Dr. Dalton, F.R. S. – president of the Literary & Philosophical Society

URL of Source: <http://www.loc.gov/pictures/item/2004671522/>

Title of Source: Michael Faraday, 1791-1867

URL of Source: <http://www.loc.gov/pictures/item/2004668160/>

Title of Source: Dimitri Mendeleev, 1940

URL of Source: <http://www.loc.gov/pictures/item/2003663410/>

Title of Source: Prof. J.J. Thompson

URL of Source: <http://www.loc.gov/pictures/item/ggb2004003500/>

Title of Source: (Marie Sklodowska Curie, half-length portrait, seated, facing right)

URL of Source: <http://www.loc.gov/pictures/item/96512741/>

Title of Source: Dr. Max Planck, 1930

URL of Source: <http://www.loc.gov/pictures/item/2003663400/>

Title of Source: Albert Einstein/C. Wide World

URL of Source: <http://www.loc.gov/pictures/item/92519646/>

Title of Source: Prof. Ernest Rutherford, portrait

URL of Source: <http://www.loc.gov/pictures/item/ggb2004003392/>

Title of Source: Niels Bohr

URL of Source: <http://www.loc.gov/pictures/item/2002715787/>

Title of Source: (Werner Heisenberg, 1901-, head-and-shoulders portrait)

URL of Source: <http://www.loc.gov/pictures/item/2005691342/>

Title of Source: (Enrico Fermi, head-and-shoulders portrait, facing front)

URL of Source: <http://www.loc.gov/pictures/item/98518701/>

Procedures

Procedure Step #	Resource or Material Used
1. Teacher will show Introduction to Primary Sources Slideshow presentation of scientists asking students to identify any scientist that they recognize. There will probably only be a few such as Einstein and Curie that students will know with confidence.	PowerPoint
2. Using the Introduction to Primary Sources Slideshow, the teacher will explain what primary sources are. The teacher will describe what type of information can be used involving primary sources.	PowerPoint
3. The teacher will hand out Worksheet 1, and students will complete a matching section involving the scientist and their contribution to atomic theory. After students individually complete this, the teacher will review the answer.	Handout
4. The teacher will assign students to groups of about four. Students will then go through the worksheet together and try to correctly complete the sequence.	Handout
5. The teacher will hand out Worksheet 2, and students will first look at each item and describe notable features of this item.	Handout
6. After thoroughly describing each picture, the entire class will share their observations.	Handout
7. Using deductive skills about specific features of the items along with the timelines, students will try to identify each scientist, including reasons why they believe they have matched them correctly.	Handout
8. The teacher will collect Worksheet 2 toward the conclusion of the period, and assess the students on the accuracy of their matching in addition to their reasoning behind their choices.	Handout
9. A class discussion should be held identifying which scientists were difficult to match with their items. The teacher will go through the PowerPoint again during this discussion. The students should also talk about what they learned from the use of primary sources.	PowerPoint

Evaluation

The teacher will evaluate students based on their completion of Worksheet 2. It will involve not only matching the scientists correctly, but partial credit can also be given if students thoroughly explain an incorrect choice.

Extension

After the completion of this exercise, students could use the Library of Congress website to find an early invention or experiment of one of the scientists mentioned in the activity and write a short paragraph describing why this item was indicative of the time period.

Author Credits:

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Name _____ Period _____ Date _____ Chemistry-Atomic Theory

Using your books as a reference, correctly match the following scientist to their contribution to the field of atomic theory.

- | | |
|-----------------------------|---|
| 1. _____ Werner Heisenberg | A. Split molecules with electricity |
| 2. _____ Albert Einstein | B. Determined that one cannot know both the position and velocity of a particle |
| 3. _____ Dmitri Mendeleev | C. Conducted first controlled chained reaction releasing energy from nuclei |
| 4. _____ Max Planck | D. Proposed "plum pudding" model of the atom |
| 5. _____ John Dalton | E. Used quanta to explain emission and absorption |
| 6. _____ Niels Bohr | F. Published equation showing relationship between energy and mass |
| 7. _____ Enrico Fermi | G. Proposed mechanical universe with small solid masses in motion |
| 8. _____ Isaac Newton | H. Studied spontaneous decay of atoms |
| 9. _____ Marie Curie | I. Proposed atomic model of atoms including orbital shells |
| 10. _____ J.J. Thomson | J. Performed gold foil experiments to show small, dense, positively-charged nuclei |
| 11. _____ Ernest Rutherford | K. Proposed atomic theory with spherical solid atoms with measurable properties of mass |
| 12. _____ Michael Faraday | L. Arranged elements into groups with similar properties |

In groups designated by your teacher, complete the following timeline by writing the correct name of the scientist in the blank.

Werner Heisenberg
Albert Einstein
Dmitri Mendeleev
Max Planck
John Dalton
Niels Bohr

Enrico Fermi
Isaac Newton
Marie Curie
J.J. Thomson
Ernest Rutherford
Michael Faraday

_____ 1704

_____ 1803

_____ 1832

_____ 1869

_____ 1897

_____ 1898

_____ 1900

_____ 1905

_____ 1911

_____ 1922

_____ 1927

_____ 1942

Name _____ Period _____ Date _____ Chemistry-Atomic Theory

In groups designated by your teacher, write statements that you know or think to be true about the following scientists that would help you to identify them from a picture.

Isaac Newton- _____

John Dalton- _____

Michael Faraday- _____

Dmitri Mendeleev- _____

J.J. Thomson- _____

Marie Curie- _____

Max Planck- _____

Albert Einstein- _____

Ernest Rutherford- _____

Niels Bohr- _____

Werner Heisenberg- _____

Enrico Fermi- _____

Use the information from the previous page to identify scientists from their photographs.

