

Name: _____ Period: _____ Date _____

The History of the Atom Project

A Cooperative Learning Activity

In this jigsaw activity, each member of the team is responsible for a specific part of the activity. As “experts” you must be able to teach your part to your group. With that goal in mind, members of each base group leave and form expert teams by topic, e.g. Dalton’s Model. In your expert teams you must master the material and decide how best to teach it to the members of your base group. Finally, as experts, you return to your base groups and take turns using your expertise to teach each other about your topic. You will create a timeline poster including all of the scientists containing the information required. Poster requirements are listed below.

The Activity

Objective: As a group, identify and illustrate the historical developments in our understanding of the structure of an atom from ancient Greece through modern times.

Time Frame: The finished poster is due Tuesday, December 3. We will share posters in class.

1. Break up into expert groups by topics. The scientists/ topics are:
 - a. Aristotle, Dalton and Democritus
 - b. JJ Thomson
 - c. Robert Millikan & James Chadwick
 - d. Ernest Rutherford
 - e. Niels Bohr
2. Begin collecting information about your topic using the internet (at least 2 sources beyond Wikipedia). Cite sources.
3. Use the following questions and directives as a guideline for gathering information. Do not limit your information to just these questions.
 - a. What time period does your topic cover?
 - b. What special equipment did the scientists use to develop and support their model?
 - c. What was the major discovery that led to the development of this model? (Hint: look at your answers to question B above and think. The answer lies in the equipment design and what is needed to operate it).
 - d. Draw an illustration of the model of that atom.
4. Take notes on the material you read.
5. Record your sources on the back of your poster.
6. As an expert group, determine what information you feel is most important to teach to your individual base groups. Go over your questions above and the questions below that pertain to each model to the remainder of your group.

7. At the end of the allotted time, return to your base group and use your expertise to teach the development of your model of the atom to your group members. In addition, with your group, draw a timeline of the history of the development of the atom. **Each student should have a timeline for their own notes.** Be certain your timeline includes what discovery or technology facilitated the development of each of the five models and why each of the models had to be changed.

I. In expert groups: answer only the following questions that apply to your topic

- a. Aristotle, Dalton and Democritus
 1. What did Democritus say about the atom?
 2. What did Aristotle believe about the atom?
 3. Why was Aristotle considered correct over Democritus based on their time period?
 4. Explain the parts of Dalton's Atomic Theory.
 5. What was significant about Dalton's Atomic Theory as opposed to what Democritus or Aristotle supported?
 6. Which portions of Dalton's Atomic Theory are still considered correct?
- b. JJ Thomson
 1. What are cathode rays?
 2. Describe JJ Thomson's Cathode Ray Experiment. **Include a drawing.**
 3. What particle did Thomson discover?
 4. Describe Thomson's "Plum Pudding" model of the atom. **Include a drawing.**
- c. Millikan and Chadwick
 1. Describe Robert Millikan's Oil Drop Experiment.
 2. What did Robert Millikan discover about the electron?
 3. Which subatomic particle did James Chadwick discover?
- d. Rutherford
 1. Describe Ernest Rutherford's Gold Foil Experiment. **Include a drawing.**
 2. Describe Rutherford's model of the atom. **Include a drawing.**
- e. Bohr
 1. Describe Bohr's model of the atom.
 2. Explain why Bohr's model of the atoms is sometimes called the planetary model.
 3. Explain why electrons orbit around the nucleus.

II. Poster Requirements

- a. Poster may be on butcher paper. You may use Presentation (powerpoint) software to create sections of your poster to print out, or information may be neatly hand-written.
- b. Picture(s) of the person(s) – **this is the only computer image allowed on the poster.**
- c. Date of the scientific contribution
- d. Hand-drawn image of any equipment or apparatus used/invented
- e. **hand-drawn** model of the atom, based on the scientist/philosopher's theory
- f. Description of the experiment – how it worked, and how the results contributed to the current theory of the atom.
- g. What was the ultimate result of the experiment?

Atomic Theory

The History of the Atom - Student Worksheet

Directions: each student in the group will answer the questions below in their own words and in complete sentences.

1. What did Democritus say about the atom (1 point)?
2. What did Aristotle believe about the atom (1 point)?
3. Why was Aristotle considered correct over Democritus based on their time period (1 point)?
4. Explain the parts of Dalton's Atomic Theory (1 point).
5. What was significant about Dalton's Atomic Theory as opposed to what Democritus or Aristotle supported (1 point).
6. Which portions of Dalton's Atomic Theory are still considered correct (1 point)?
7. What are cathode rays (1 point)?

8. Describe JJ Thomson's Cathode Ray Experiment. **Include a drawing of the cathode ray experiment** (2 points).

9. What particle did Thomson discover (1 point)?

10. Describe Thomson's "Plum Pudding" model of the atom. **Include a drawing** (2 points).

11. Describe Robert Millikan's Oil Drop Experiment (1 point).

12. What did Robert Millikan discover about the electron (1 point)?

13. Which subatomic particle did James Chadwick discover (1 point)?

14. Describe Ernest Rutherford's Gold Foil Experiment. **Include a drawing** (2 points).

15. Describe Rutherford's model of the atom. **Include a drawing** (2 points).

16. Describe Bohr's model of the atom (1 point).

17. Explain why Bohr's model of the atoms is sometimes called the planetary model (1 point).

18. Explain why electrons orbit around the nucleus (1 point).

History of the Atom Group Rubric

-Staple rubric, student responses, and poster together

Requirement	Points Earned	Points Possible
Name, Class Period, & Rubric		1
Picture of scientists/philosophers		7
All scientists listed		7
Description of experiments		7
Pic of equipment/apparatus/experiment		7
Hand-drawn model of the atom for each scientist/philosopher		7
Discovery		7
Sources		7
Group Grade		50