Atoms Through Time

Read the evidence behind changes to the atomic model.

P.7.5C.2 "Use informational text to sequence the major discoveries leading to the current atomic model."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline each dated discovery, number the discoveries from earliest to latest, and circle what each discovery changed about the model.

How the Atom Changed

1. Imagine trying to describe an atom when you cannot see one. In the early 1800s, John Dalton used evidence from chemical reactions to argue that matter is made of tiny atoms. He pictured atoms as solid spheres, with no smaller parts. In 1897, J. J. Thomson found electrons, tiny particles with negative charge, inside atoms. His result showed that Dalton's spheres were not the whole story. Thomson proposed that negative electrons were spread through a sphere of positive charge, much like chips inside a cookie.

2. Then a surprising test changed the picture again. In 1911, Ernest Rutherford studied what happened when positively charged particles struck a thin sheet of gold. Most passed through, but a few bounced sharply away. He concluded that an atom has a tiny, dense, positively charged nucleus and is mostly empty space. This ruled out Thomson's model of positive charge spread throughout the atom. In 1913, Niels Bohr proposed that electrons could occupy only certain energy levels around the nucleus. His model kept Rutherford's nucleus but changed how electrons were described.

3. Scientists kept testing and revising the model. During the 1920s, work by several physicists led to a quantum model: electrons do not follow fixed paths like planets. Instead, an electron cloud shows regions where electrons are likely to be found. In 1932, James Chadwick discovered the neutron, a particle with no electric charge in the nucleus. Today's model combines a nucleus of protons and neutrons with electrons described by probability. Each step depended on earlier evidence, but new results also showed what older models missed.

2 ANSWER WITH EVIDENCE

Use the passage

1. Put Dalton's and Thomson's ideas in time order. What discovery made the second idea different?

2. Which came first, Rutherford's model or Bohr's model? What part of the earlier model did the later scientist keep?

3. Which came first, the quantum electron-cloud model or Chadwick's discovery of the neutron? Give the time stated for each.

4. List these milestones from earliest to latest: finding electrons, finding the nucleus, proposing energy levels, and discovering neutrons.

3 YOUR TURN

Your own words

Write a five-sentence museum label tracing at least five discoveries from Dalton to today's atomic model in time order. Explain how at least two later findings changed earlier ideas, and end with what the current model includes.

ANSWER KEY

Atoms Through Time

GRADE 7 · P.7.5C.2

PART 1 · READ AND MARK

Underline each dated discovery, number the discoveries from earliest to latest, and circle what each discovery changed about the model. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Put Dalton's and Thomson's ideas in time order. What discovery made the second idea different?	**Dalton's solid-sphere model came first. Thomson later discovered electrons inside atoms, showing that atoms had smaller parts.**
2	Which came first, Rutherford's model or Bohr's model? What part of the earlier model did the later scientist keep?	**Rutherford's model came first. Bohr kept Rutherford's nucleus.**
3	Which came first, the quantum electron-cloud model or Chadwick's discovery of the neutron? Give the time stated for each.	**The quantum model developed during the 1920s. Chadwick discovered the neutron in 1932.**
4	List these milestones from earliest to latest: finding electrons, finding the nucleus, proposing energy levels, and discovering neutrons.	**Finding electrons, finding the nucleus, proposing energy levels, discovering neutrons.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Dalton pictured atoms as solid spheres with no smaller parts, but Thomson's discovery of electrons showed that atoms had parts inside. Rutherford's gold-sheet results then showed a tiny, positive nucleus instead of positive charge spread through the atom. Bohr kept the nucleus and proposed that electrons occupy certain energy levels. During the 1920s, the quantum model replaced fixed electron paths with regions where electrons are likely to be. After Chadwick discovered neutrons in 1932, today's model included protons and neutrons in the nucleus and electrons described by probability.

Accept equivalent wording that preserves the order and the changes supported by the passage. The museum label should include at least five discoveries in sequence and explain two changes to earlier ideas.