

# LESSON ONE

What is an atom?

## SCIENCE

Asking Questions, Constructing Explanations, and  
Obtaining, Evaluating, and Communicating Information

## ENGLISH LANGUAGE ARTS

Reading Informational Text, Writing an Explanation

GRADE 8

90  
minutes



### PURPOSE

In this lesson, students learn about the basic structure of atoms. Students gather information from a variety of informational sources, including text excerpts and videos, to answer the question: What is an atom? Throughout the lesson, students consider these different sources of information to develop, review, and revise their understanding of atoms and their basic components.



### STANDARDS

#### ● Common Core State Standards

- Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions. CCSS.ELA-LITERACY.RST.6-8.2
- Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples. CCSS.ELA-LITERACY.WHST.6-8.2.B
- Use precise language and domain-specific vocabulary to inform about or explain the topic. CCSS.ELA-LITERACY.WHST.6-8.2.D
- Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation. CCSS.ELA-LITERACY.WHST.6-8.8



## STANDARDS CONTINUED

### ● Common Core State Standards

- Draw evidence from informational texts to support analysis, reflection, and research. CCSS.ELA-LITERACY.WHST.6-8.9
- Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. CCSS.ELA-LITERACY.SL.8.5

### ● Next Generation Science Standards

- Develop models to describe the atomic composition of simple molecules and extended structures. MS-PS-1-1
- Structures and Properties of Matter. PS1.A

Substances are made from different types of atoms, which combine with one another in various ways. Atoms form molecules that range in size from two to thousands of atoms.

Solids may be formed from molecules, or they may be extended structures with repeating subunits (e.g., crystals).

### ● Science and Engineering Practices

- Asking questions and defining problems
- Constructing explanations and designing solutions
- Obtaining, evaluating, and communicating information



## LEARNING GOALS

- Understand that atoms are made up of three particles.
- Explain the basic structure of an atom.



- 1 Identify the three particles that make up an atom.
- 2 Construct a written explanation of the basic make up of atoms.
- 3 Identify main ideas and supporting details from text.
- 4 Reference relevant and appropriate evidence from the texts to support explanation of atomic makeup.



### SUMMARY OF LESSON TASKS

- 1 Read and annotate: [Middle School Chemistry Chapter 4](#).
- 2 Complete Double Entry Journal and discuss.
- 3 Watch video and discuss: [A Boy and His Atom](#) (1:33).
- 4 Record conjectures.
- 5 Watch two IBM Atomic Shorts videos and compare conjectures: [How to Move an Atom](#) (1:55) and [Ripples on the Surface](#) (0:57).
- 6 Write an explanation.



Write a one to two-paragraph explanation in response to the question, “What is an atom?” Reference and include information from the reading and videos, as well as your relevant personal experience and knowledge about atoms. Support your claim with evidence. Cite your sources.

## PART I: INTRODUCTION

**READ AND ANNOTATE** Provide students with a copy of the text [Middle School Chemistry Chapter 4](#)

([\[MVr8DTxmdUWqBly4qN\\\_pkQ&sig2=HOQzN9QqOCzsYP0PmfyDaw&bvm=bv.124088155,d.cG\]\(https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0ahUKEwihqTu7pvNAhUP22MKHY5gAKoQFeggMAA&url=http%3A%2F%2Fwww.middlechoolchemistry.com%2Fpdf%2Fchapter4%2Fchapter4\_student\_reading.pdf&usg=AFQjCNG2SJt-MVr8DTxmdUWqBly4qN\_pkQ&sig2=HOQzN9QqOCzsYP0PmfyDaw&bvm=bv.124088155,d.cG\)\). The text excerpt provides information about the parts of an atom. Remind students of the original question for the lesson: What is an atom? Students read and annotate the text for main idea and supporting details, also using the lesson question to guide their reading. If this is your students' first experience with annotation, you will want to spend some time introducing annotation, its purpose, and the different symbols associated with the different types of information annotated. Modeling how to annotate the text will also be important if students are unfamiliar with the process of annotation.](https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0ahUKEwihqTu7pvNAhUP22MKHY5gAKoQFeggMAA&url=http%3A%2F%2Fwww.middlechoolchemistry.com%2Fpdf%2Fchapter4%2Fchapter4_student_reading.pdf&usg=AFQjCNG2SJt-</a></p></div><div data-bbox=)

**COMPLETE DOUBLE ENTRY JOURNAL AND DISCUSS** Students revisit the Double Entry Journal, recording main ideas and supporting details when they finish reading and annotating the text. Remind students to paraphrase the information from the text. Students discuss their Double Entry Journals in pairs or small groups, comparing main ideas and supporting details in preparation for a whole-class discussion.



- Identify main ideas and supporting details from text.

While students complete their Double Entry Journals, check that students have identified appropriate main ideas and supporting details.



### ANTICIPATED RESPONSE PEDAGOGICAL ACTION

If you notice that many students have difficulty identifying main ideas and/or supporting details, bring the whole group together and model annotation for a portion of the text.

**DISCUSS AS A WHOLE CLASS** Have students use their completed Double Entry Journals to support them in participating in a whole class discussion about the question, “What is an atom?”



### SUCCESS CRITERION

#### EVIDENCE-GATHERING OPPORTUNITY

- Identify the three particles that makeup atoms.
- Reference relevant and appropriate evidence from texts to support explanation of atomic makeup.

During the whole class discussion, check students’ understanding of atomic makeup, including the use of language: protons, neutrons, electrons. Use this as an opportunity to assess the degree to which students reference evidence from the text to support their discussion. You can also observe how students use the Double Entry Journal as an aid to support their ability to engage in classroom discussion.



If you notice students require assistance expressing their ideas or using appropriate evidence, use the following prompts to support discussion:

- Help me understand. What information in the text makes you say that?
- What evidence do you have to support your assertion?
- How does your idea connect with \_\_\_\_\_’s thinking?

## PART II: GUIDED PRACTICE

used atoms to tell the story. Tell students to watch the short movie and, as they do, think about the question, “How did researchers move and capture atoms to create this film?”

**RECORD CONJECTURES AND DISCUSS** Give students time to work with their table groups and formulate initial conjectures about what might be happening, basing these on their current knowledge of atomic structures. In small groups, students record their ideas and evidence for their ideas in a Double Entry Journal format. They should use this as preparation for discussing their thinking in a whole group. You may want to assign group roles, including a recorder, in preparation for discussion. Engage students in a whole class discussion in response to the question, “How did researchers move and capture atoms to create this film?” You may choose to chart students’ conjectures in a whole class Double Entry Journal chart. You can return to the chart later in the lesson to model revision.

**WATCH IBM ATOMIC SHORTS VIDEOS AND COMPARE CONJECTURES** Introduce two behind-the-scenes videos: [How to Move an Atom](https://youtu.be/rNf-A3m6HV0) (1:55) (<https://youtu.be/rNf-A3m6HV0>) and [Ripples on the Surface](https://youtu.be/bZ6Hv_du2Zo) (0:57) ([https://youtu.be/bZ6Hv\\_du2Zo](https://youtu.be/bZ6Hv_du2Zo)). Explain that the videos discuss how researchers were able to capture and manipulate the atoms for the film. Provide time for students to discuss what researchers did to capture and animate the atoms for the film in their small groups. Remind students to focus their discussions on atomic structure. Students should then



If students do not readily see how their explanation is different from the researchers’ or understand how researchers were able to capture and animate the atoms, support students in making connections to the main ideas of the text and the notes in their Double Entry Journals.

## PART III: CULMINATING TASK

**WRITE AN EXPLANATION** All four Success Criteria should be addressed in the final task. Students write an explanation that demonstrates understanding of the basic structure of an atom. They use the notes in their Science Notebooks for support as they write the explanation, making reference to relevant and appropriate evidence from text,

videos, and discussions. Explanation includes:

- a basic description of an atom and the three particles that are part of its basic structure: protons, neutrons, electrons
- relevant and appropriate supporting evidence and reasoning



### Videos

- [Just How Small are Atoms?](http://ed.ted.com/lessons/just-how-small-is-an-atom) - <http://ed.ted.com/lessons/just-how-small-is-an-atom>
- [The Sound of Moving Atoms](https://youtu.be/FbLvy-ayi4A) - <https://youtu.be/FbLvy-ayi4A>

### Audio and Transcript

- [Picturing Atoms](http://www.pbs.org/wgbh/nova/physics/atoms-electrons.html) - <http://www.pbs.org/wgbh/nova/physics/atoms-electrons.html>

### Simulation

- [Build an Atom](https://phet.colorado.edu/en/simulation/build-an-atom) - <https://phet.colorado.edu/en/simulation/build-an-atom>

**DOUBLE ENTRY JOURNAL**

<b>What is an atom?</b>	<b>How do you know? What is your evidence? Cite your source.</b>