

Lesson 2.2: Physical Science – Atoms and Molecules

Weekly Focus: Reading
Weekly Skill: Comprehension

Lesson Summary: This week's lesson has students continuing to work on the basics of matter, but with a focus on atoms and molecules. The reading passages will help students understand and master the vocabulary needed in this area of physical science.

Materials Needed:

- Warm-up Labeling Exercise **Unit 2.2 Handout 1**
- Video "Basic Atomic Structure" **Unit 2.2 Video** (time 1:56 min.)
- Comprehension reading **Unit 2.2 Handout 2**
- Main Idea reading, "Splitting the Atom," **Unit 2.2 Handout 3** (Spectrum Science, Grade 6, pages 26-27)

Objectives: Students will be able to...

- Activate prior knowledge about matter, atoms, and molecules
- Read passages with applied vocabulary related to matter, atoms, and molecules

College and Career Readiness Standards: RI, RST, WHST, LS,

ACES Skills Addressed: EC, LS, ALS, CT, SM

Notes: Please review and be familiar with classroom routine notes for: reading for fluency strategies (**Routine 2**), summarizing techniques (**Routine 4**), self-management skills (**Routine 4**). The notes will help with making a smooth transition to each activity.

GED 2014 Science Test Overview – For Teachers and Students

The GED Science Test will be 90 minutes long and include approximately 34 questions with a total score value of 40. The questions will have focus on three content areas: life science (~40%), physical science (~40%), and Earth and space science (~20%). Students may be asked to read, analyze, understand, and extract information from a scientific reading, a news brief, a diagram, graph, table, or other material with scientific data and concepts or ideas.

The online test may consist of multiple choice, drop down menu, and fill-in-the-blank questions. There will also be a short answer portion (suggested 10 minutes) where students may have to summarize, find evidence (supporting details), and reason or make a conclusion from the information (data) presented.

The work students are doing in class will help them with the GED Science Test. They are also learning skills that will help in many other areas of their lives.

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Activities:

Warm-Up: Label Parts of Atom Unit 2.2 Handout 1 Time: 10 - 15 minutes

As students enter the class, have them work on labeling the parts of the atom in **Unit 2.2 Handout 1**. This is a way for students to test their knowledge about the parts of atoms. It is review information from the previous lesson. If students were not here for Unit 2.1 Matter, have them work with other students who were in the class. Review the labeled document with whole class. While students are working on labeling the parts of the atom, circulate and ask them questions to get them to use the vocabulary in their response. This is a way to have students become more familiar with the vocabulary and to use it in their answers. You may ask questions such as “What small particle of an atom carries a negative charge?” (electron) or “What is the basic building block of all matter?” (atom)

Activity 1: Review of Atoms (video) Time: 10 – 15 minutes

- 1) Show the “Basic Atomic Structure” video to review atoms with the class. The video is 1:56 minutes in length. The narrator has an accent, which students may have to get used to, however the information is presented in a very straightforward fashion.
- 2) Have students watch the video and look at their labeled diagram from the warm-up activity (**Unit 2.2 Handout 1**).
- 3) Ask students to think of questions they may have after watching the video.
- 4) If possible, answer the questions students may have. If you are not able to answer their questions, you may want to write them down and answer during the next class, or use a Google search to find an answer in class.
- 5) Wrap up the activity by reminding students that this foundational knowledge of matter, atoms, and molecules is important for upcoming lessons in physical science.

Activity 2: Comprehension Reading (Unit 2.2 Handout 2) Time: 30 - 45 minutes

- 1) Hand out **Unit 2.2 Handout 2** to students.
- 2) Discuss with students that when reading, they should pay close attention to what all of the passage is about. Inform students that the passage will go more in depth on atoms and molecules than the video and the labeled diagram from the warm up activities.
- 3) Ask students to read the passage and answer the questions that follow. Circulate the class while students are working independently to help as needed.
- 4) When students are finished, review answers as a whole class. Ask for students to share their answers if they would like. If there is time, you may have students practice reading for fluency and read the passage to each other in pairs. (See **Classroom Routine 2 - Reading for Fluency**)
- 5) When all comprehension questions are answered, ask students to summarize the reading in 3 to 5 sentences. They can do this on the back of their paper or in a notebook. Explain to students that this is an excellent method for them to self-assess if they understand the material. It is also something they may encounter on the GED 2014 Science Module. (See **Classroom Routine 4 – Summarizing Techniques**)

Break: 10 minutes (You may need to have students take a break while working on Activity 2)

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Activity 3: Main Idea Reading (Unit 2.2 Handout 3)

Time: 45 minutes

- 1) Hand out **Unit 2.2 Handout 3** to students.
- 2) Discuss with students that when reading, they should pay close attention to what all of the passage is about.
- 3) Ask students to read the passage and answer the questions that follow. Circulate the class while students are working independently to help as needed. Remind students to review the guide words in bold on the left to help with new vocabulary.
- 4) When students are finished, review answers as a whole class.
- 5) Ask for students to share their answers if they would like. If there is time, you may have students practice reading for fluency and read the passage to each other in pairs. Students who finish early should be encouraged to summarize the passage. They can also find the main idea and then paraphrase it.

Wrap-Up: Summarize

Time: 5 minutes

Have students turn to a partner (or write in their journals) about what they have learned today about atoms and molecules. If they have any wonderings on this lesson, they should write them down. *Note: Use **Classroom Routine 4 Handout***

Extra Work/Homework: Unit 2.2 Handout 4

Time: 10 minutes outside of class

Students can fill in the crossword puzzle with vocabulary related to matter, atoms, and molecules.

Differentiated Instruction/ELL Accommodation Suggestions	Activity
If some student groups finish early, they can turn their paper over and write the words and their meanings in a notebook. They can also work in pairs to quiz each other on the words.	Unit 2.2 Handout 1
Some students, especially ELLs, may not be familiar with how to do a crossword puzzle. You may want to check with students before they leave the class to see that they understand the columns and numbers.	Unit 2.2 Handout 4

Online Resources:

Jefferson Lab Online Science: <http://education.jlab.org/indexpages/teachers.html>

Suggested Teacher Readings:

- GED Testing Service – GED Science Item Sample (to get an idea of what the test may be like)
<http://www.gedtestingservice.com/itemsamplerscience/>
- Assessment Guide for Educators: A guide to the 2014 assessment content from GED Testing Service:
<http://www.riaepdc.org/Documents/ALALBAASSESSMENT%20GUIDE%20CHAPTER%203.pdf>

Lesson 2.2: Physical Science – Atoms and Molecules

Unit 2.2 Handout 1 (1 page)

Name _____ Date _____

The Atom

Atoms are the tiny building blocks of matter. All the matter on Earth is made up of various combinations of atoms. Atoms are the smallest particles of an element that still exhibit all the characteristics of that element. Use the terms in the word box to label the diagram of an atom. Then match each term to its definition. Most terms are used twice.

electron
nucleus
electron orbit
proton
neutron
atom

1 _____

2 _____

3 _____

4 _____

5 _____

6 _____

7 _____ This small particle of an atom carries a negative charge.

8 _____ Made up of the protons and neutrons, this part of the atom contains nearly all the mass of the atom.

9 _____ This small particle of an atom carries a neutral charge.

10 _____ This is the area where electrons travel around the nucleus.

11 _____ This is the basic building block of all matter.

12 _____ This small particle of an atom carries a positive charge.

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Atoms and Elements **17**

Unit 2.2 Handout 1 (1 page)

TEACHER ANSWER KEY

1. atom
2. electron
3. electron orbit
4. neutron
5. nucleus
6. proton
7. electron
8. nucleus
9. neutron
10. electron orbit
11. atom
12. proton

Lesson 2.2: Physical Science – Atoms and Molecules

Unit 2.2 Handout 2 (2 pages total)

Name: _____

An Atom Apart

by Leslie Cargile

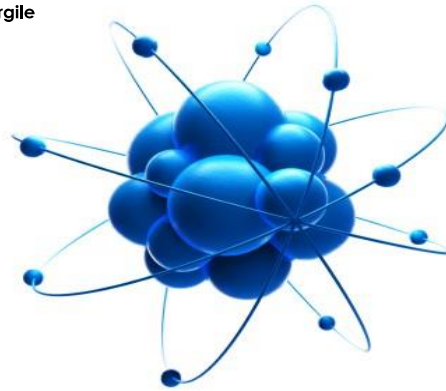
Have you ever walked through a cloud of gnats on a hot summer, only to have them follow you? No matter how you swat at them, or even if you run, they won't leave you alone. If so, then you have something in common with an atom.

Atoms are the building blocks of molecules, which when combined, make up everything. From the smallest one-celled amoeba, to every person who has ever lived, to the largest and brightest stars in the sky, atoms are everywhere.

Even way back in the time of ancient Greece, they wondered about atoms. That's where the word comes from, ancient Greece. The word *A'tomos*, when translated into English, means: *something that cannot be divided any further*. So what's an atom look like? Up until very recently no one could say one way or another.

Technically we can't see individual atoms, since there are no microscopes powerful enough. Since technology improves all the time, it may not be long before we can actually see a whole atom through a special microscope. Even though scientists cannot see atoms with microscopes, they have developed ways to detect them and learn about them.

Atoms are made up of three basic parts; protons, neutrons, and electrons. There is a core, or *nucleus*, and an electron cloud. The nucleus is made up of positively charged protons and neutral neutrons. The nucleus is held closely together by *electromagnetic force*.



Protons and neutrons make up the nucleus of the atom. A cloud of electrons orbits the nucleus.

The negatively charged electrons are bound to the nucleus, and zap around it in a cloud. Do you remember the cloud of gnats? The gnats would be the electrons zipping around you, the nucleus.

There are different ways atoms are classified. They can be classified into elements, like oxygen, carbon, or hydrogen. All of the elements known to man so far can be found on the periodic table. The number of protons an atom has decides the chemical element. The number of electrons defines the atom's chemical properties, like its melting temperature and boiling point.

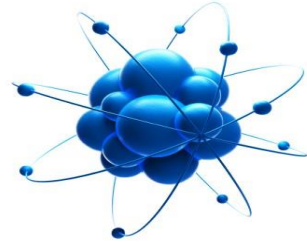
The study of atoms and tiny particles that are even smaller is called quantum mechanics. Scientists still have much to learn about atoms. Maybe you will enter the study of quantum mechanics and find a brand new element. Maybe they'll even name it after you!

Lesson 2.2: Physical Science – Atoms and Molecules

Name: _____

An Atom Apart

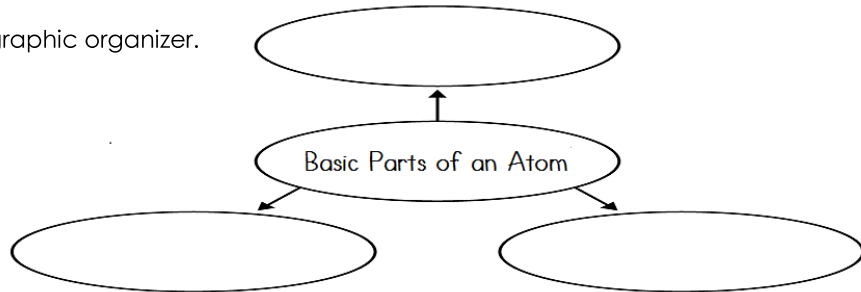
by Leslie Cargile



1. What are atoms?
- a. tiny particles that make up all matter
 - b. tiny particles that can only be seen with a microscope
 - c. tiny particles that look like gnats
 - d. particles that are so large they cannot be seen

2. What does the word *A'tomos* mean in ancient Greece?

3. Complete the graphic organizer.



4. What is quantum mechanics?

5. If you wanted to find the chemical element of an atom, you would need to...

- a. know how many electrons it has
- b. know how many protons it has
- c. know its melting temperature
- d. see it with a microscope

6. The author begins this article by comparing a cloud of gnats to an atom. In this scenario, what do the gnats represent? What does the person walking through the gnats represent?

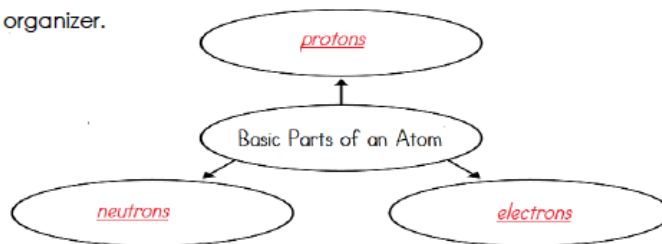
Something to Think About: If you discovered a new element that was added to the periodic table, what would you name it?

Unit 2.2 Handout 2 (2 pages total)

TEACHER ANSWER KEY

1. A
2. Answers may vary: *It means something that cannot be divided further.*
- 3.

Complete the graphic organizer.



4. Answers may vary: *Quantum mechanics is the study of atoms and tiny particles that are even smaller than atoms.*
5. B
6. Answers may vary: *The gnats represent electrons traveling around the nucleus. The person represents the nucleus of the atom.*

Unit 2.2 Handout 3

TEACHER ANSWER KEY

1. B
2. C
3. Answers may vary: *Isotopes have more neutrons than a stable atom of the same element.*
4. 146
5. Answers may vary: *Nuclear fission is an atomic bomb creates an uncontrolled chain reaction. The chain reaction in a nuclear reactor is controlled.*

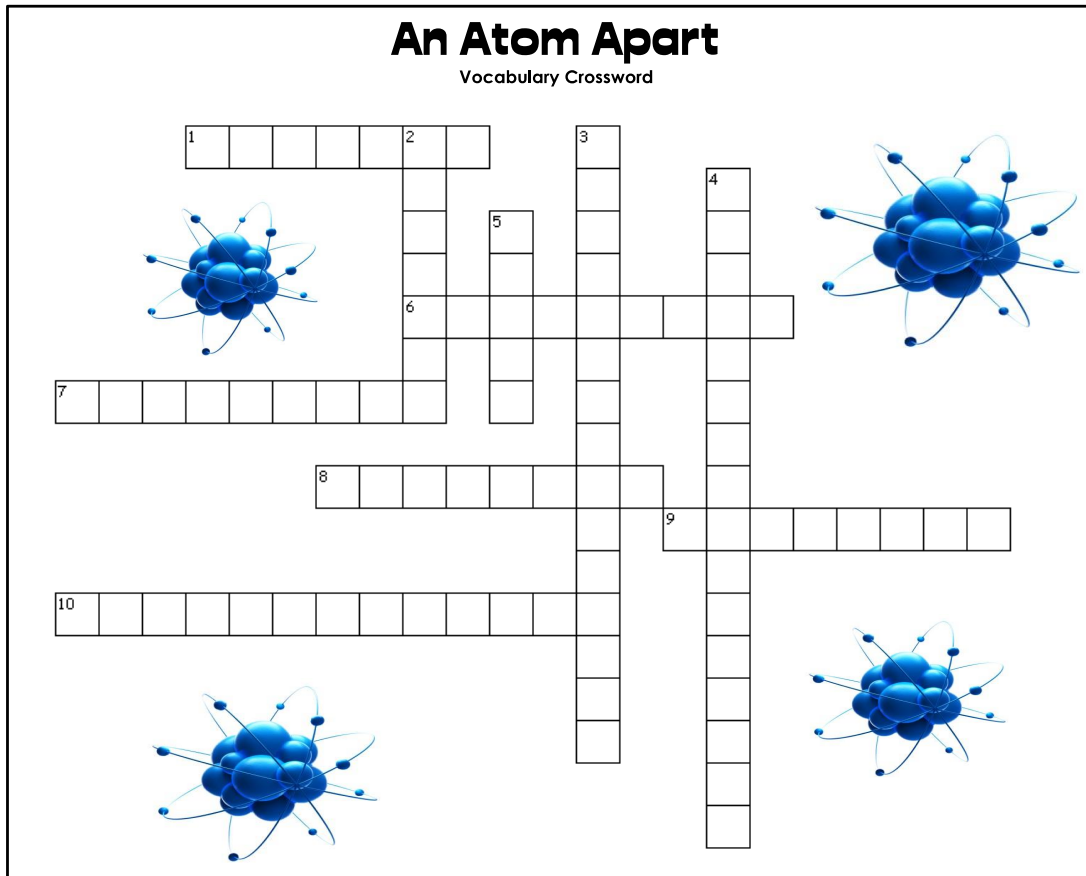
Lesson 2.2: Physical Science – Atoms and Molecules

Unit 2.2 handout 4 (1 page)

Name: _____

An Atom Apart

Vocabulary Crossword



Across

- positively charged parts of an atom
- protons and neutrons are found in this part of an atom
- type of force that holds the nucleus of an atom together
- area of science that studies tiny particles like atoms
- the word a'tomos comes from this language

Down

- negatively charged parts of an atom
- atoms are the building blocks for...
- the number of electrons in atoms determine an element's ___ properties
- neutrally charged parts of an atom
- a chart which lists all of the known elements

Super Teacher Worksheets - www.superteacherworksheets.com

Unit 2.2 handout 4 (1 page)

TEACHER ANSWER KEY

Across

1. protons
6. electrons
7. molecules
8. chemical
9. neutrons
10. periodic table

Down

2. Nucleus
3. Electromagnetic
4. Quantum mechanics
5. Greek