



# LESSON PLAN

## ATOMS AND MOLECULES GRADES 6-8

### SUMMARY



**MS-PS1-1.** Develop models to describe the atomic composition of simple molecules and extended structures.

Science & Engineering Practices	Connections to Classroom Activity
<p><b>Developing and Using Models</b> Develop a model to describe unobservable mechanisms. (MS-PS1-5)</p>	<ul style="list-style-type: none"> <li>Students will create a model of a specific element's atomic structure including protons, neutrons and electrons.</li> </ul>
Disciplinary Core Ideas	Connections to Classroom Activity
<p><b>PS1.A: Structure and Properties of Matter</b> 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. (MS-PS1-1)</p>	<ul style="list-style-type: none"> <li>After students create their specific atom, they will combine their model with classmates to create different molecules.</li> </ul>
Cross Cutting Concepts	Connections to Classroom Activity
<p><b>Scale, Proportion and Quantity</b> Time, space and energy phenomena can be observed at various scales using models to study systems that are too large or too small. (MS-PS1-1)</p>	<ul style="list-style-type: none"> <li>Students build a model of an atom in a much larger scale, making the components of a normally impossible to see atom visible.</li> </ul>



## DURATION

45 minutes

## PRE-ASSESSMENT QUESTIONS

See the questions under the video.



## ENGAGE

Give each student a small square of paper and scissors. Ask, “How many times do you think you can cut this paper in half until you can’t cut it up any smaller?” “Once you tell your guesstimate to a neighbor, try it and count.”

Give students a few minutes to tear or cut their square of paper. Have them share their results. Next mention that the smallest piece of paper they have in front of them is more than 100,000 times larger than an atom. Atoms are so tiny that they can only be seen with special microscopes. All matter is made up of atoms. Today they will be making models of atoms that show all their components.



## EXPLORE

Draw a model of an atom on the board. Carbon for example (6 protons, 6 neutrons and 6 electrons). Ask, “What do you notice about this structure?” They should notice that it has 3 basic components. If students are unfamiliar with the vocabulary, write proton, neutron and electron on the board. Next ask if they notice anything about the number of each component. They should notice that the number of protons and electrons are the same. Next refer to the Periodic Table of Elements to help students identify which element is represented with the model. They should notice that the number of protons and electrons is the same as the atomic number of the element.

For the activity, students will choose one element (or you can assign) to build a model for. They can choose whichever materials they want to, as long as they are prepared to explain what the materials represent. Give students about 20 minutes to build their models. Since this lesson does not include calculations with atomic mass and atomic weight, tell students how many neutrons to include. These calculations are included in our separate lesson on the periodic table and reactivity. This lesson focuses on the basic structure of an atom.



## EXPLAIN

Allow students to share their models with the class. If a document camera is available, this is a great way to share. Before revealing the element, have students guess which element was being modeled.

## MATERIALS

- Toothpicks
- Gum drops in various sizes
- Pom Poms
- Pipe Cleaners
- String
- Beads
- Paper Plates
- Glue
- Tape

### DIY Activity

- Box of Total Cereal
- Strong Ziploc Bag
- Cup of Warm Water
- Strong Magnet



## WATCH THE GENERATION GENIUS ATOMS AND MOLECULE VIDEO AS A GROUP

Facilitate a conversation using the Discussion Questions.



### ELABORATE

Next have students find other atoms to “connect” with their atoms to make molecules. (For example, if 2 students have hydrogen, they could find another student who has oxygen to make a water molecule). To help students make molecules, list some common molecules on the board such as  $\text{CO}_2$ ,  $\text{H}_2\text{O}$ ,  $\text{NaCl}$ ,  $\text{O}_2$ , or  $\text{N}_2$ .



### EVALUATE

Students can play the online Kahoot! quiz game located below the video which provides downloadable scores at the end of the quiz game. Alternatively, you can use the paper quiz, or the exit ticket questions. All these resources are located below the video in the Assessment section.



### EXTENSION

Introduce your students to the concept of isotopes and calculating the number of neutrons in an atom from the periodic table. For higher grade levels, you can also extend the lesson to talk about orbitals and how many electrons can fit in each one.

