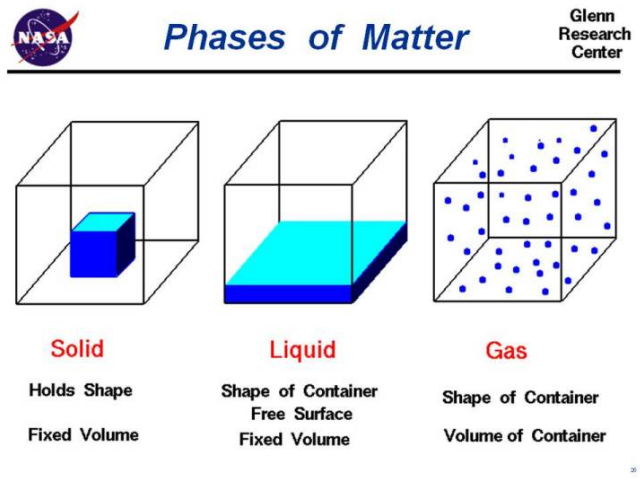
NASA Spotlite
Interactive Lesson

Movement of Molecules
Grades 5-8



Student Packet

NASA Spotlite Interactive Lesson Guide

What are NASA Spotlites?

NASA Spotlites are 90-120 second student-produced video segments that address common science misconceptions.

NASA Spotlites are designed to increase scientific literacy in a standards-based classroom. By producing Spotlite videos, students gain production experience, as well as deepen their understanding of science content. Approved NASA Spotlites can be found at the NASA eClips™ website.
https://nasaeclips.arc.nasa.gov

A misconception is a view or opinion that is incorrect because it is based on faulty thinking or understanding.

This is an Interactive PDF. Features in this packet may include:

- fillable boxes
- quick checks
- multiple choice questions
- interactive GIFs (graphics interchange format)
- links to videos and online interactives

The hyperlinks included in this document open PDFs or webpages and may perform differently based on the device being used. Links may have to be cut and pasted into a web browser to open. PDFs and other documents may need to be downloaded to view.

Try using Adobe Acrobat Reader and Flash Player for optimal performance of all interactive features included in this guide.

Remember to save your responses.
Under "file" choose "save as." Type your name in front of the document name. Choose "save."

Pretest

Movement of Molecules Pretest
NASA Spotlite Interactive Lesson

Read each question and select the best choice.

1. A woman buys her son a baseball. The molecules in the baseball:

Select the best answer.
A. are packed tightly together and vibrate in place.
B. are moving freely around each other.
C. spread apart and move quickly.
D. are not moving at all.

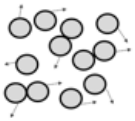
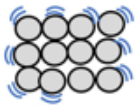
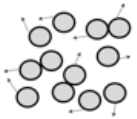
2. How will an increase in temperature affect the movement of molecules?

Select the best answer.
A. The molecules will slow down.
B. The molecules will not move.
C. The molecules will move faster.
D. There will be no change in the movement of the molecules.

3. Which of the following items would have molecules that are tightly packed together and vibrating?

Select the best answer.
A. river water
B. melting snow on a mountain
C. air
D. rock making up a mountain

4. When heat is added to matter, the activity of the molecules changes. Which picture best represents the movement of molecules in a solid?

A. 
B. 
C. 
D. 

Select the best answer.
A.
B.
C.
D.

5. When a substance changes from a liquid to a solid, the molecules:

Select the best answer.
A. get closer together and stop moving.
B. maintain the same motion and separation.
C. move faster and farther apart.
D. move closer together and vibrate in place.

Engage

Today's Lesson

Today we are going to identify a common misconception about the movement of molecules in a solid by watching a video, explore new vocabulary using Frayer Models, and applying our new vocabulary to explain how molecules move in different phases of matter. Finally, we will take a quiz to evaluate what we've learned.

What do you already know about how atoms and molecules move in the different phases of matter?

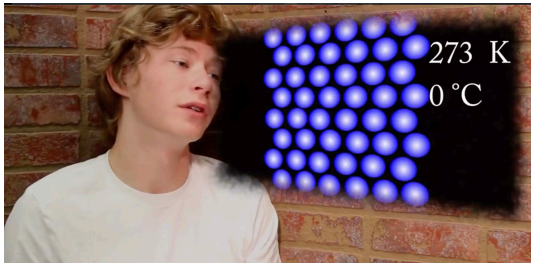
True or False: Atoms and molecules in a solid move.

Select the best answer.
True
False

Spotlite Video

Next, watch one of the Spotlite videos on the movement of molecules . As you watch pay attention to any new vocabulary.

Video Link- NASA Spotlite: Movement of Molecules
NASA eClips Website - https://nasaeclips.arc.gov
NASA eClips YouTube - https://youtu.be/sPly3wwK5dw

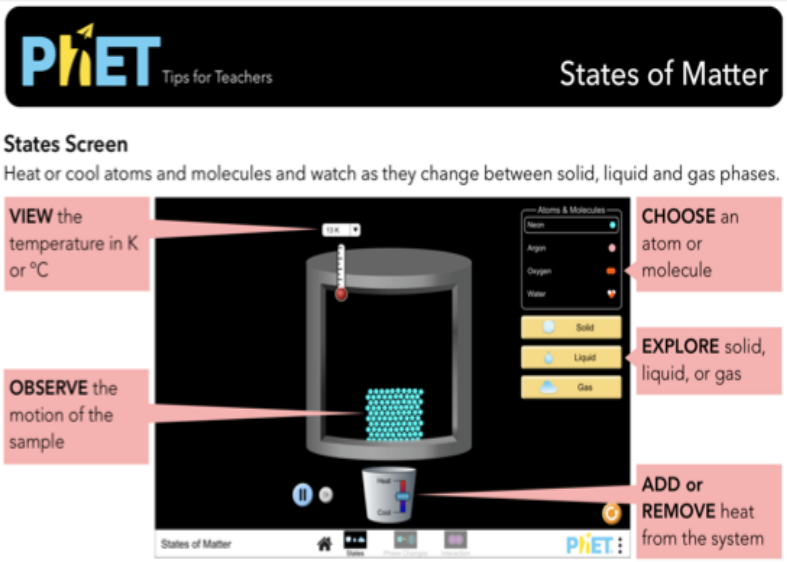


Video Link- NASA Spotlite: Movement of Molecules
NASA eClips Website - https://nasaeclips.arc.gov
NASA eClips YouTube - https://youtu.be/hS2U_Ro-984

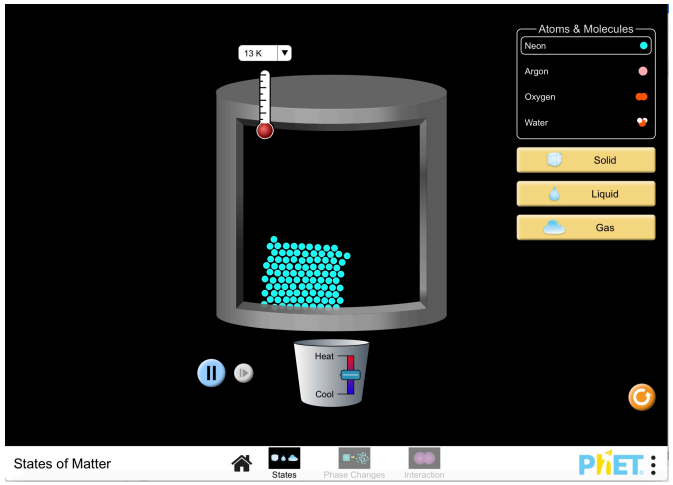
Explore

Explore Activity

This PhET interactive lets you explore how the movement of molecules changes between different states of matter. Add or take away heat to the atoms and molecules. Pay attention to how the substance changes between solid, liquid, and gas phases. Describe the difference in the movement of the particles in a solid, liquid, and gas.



Link to PhET Interactive Simulations: States of Matter https://phet.colorado.edu/sims/html/states-of-matter/latest/states-of-matter_en.html



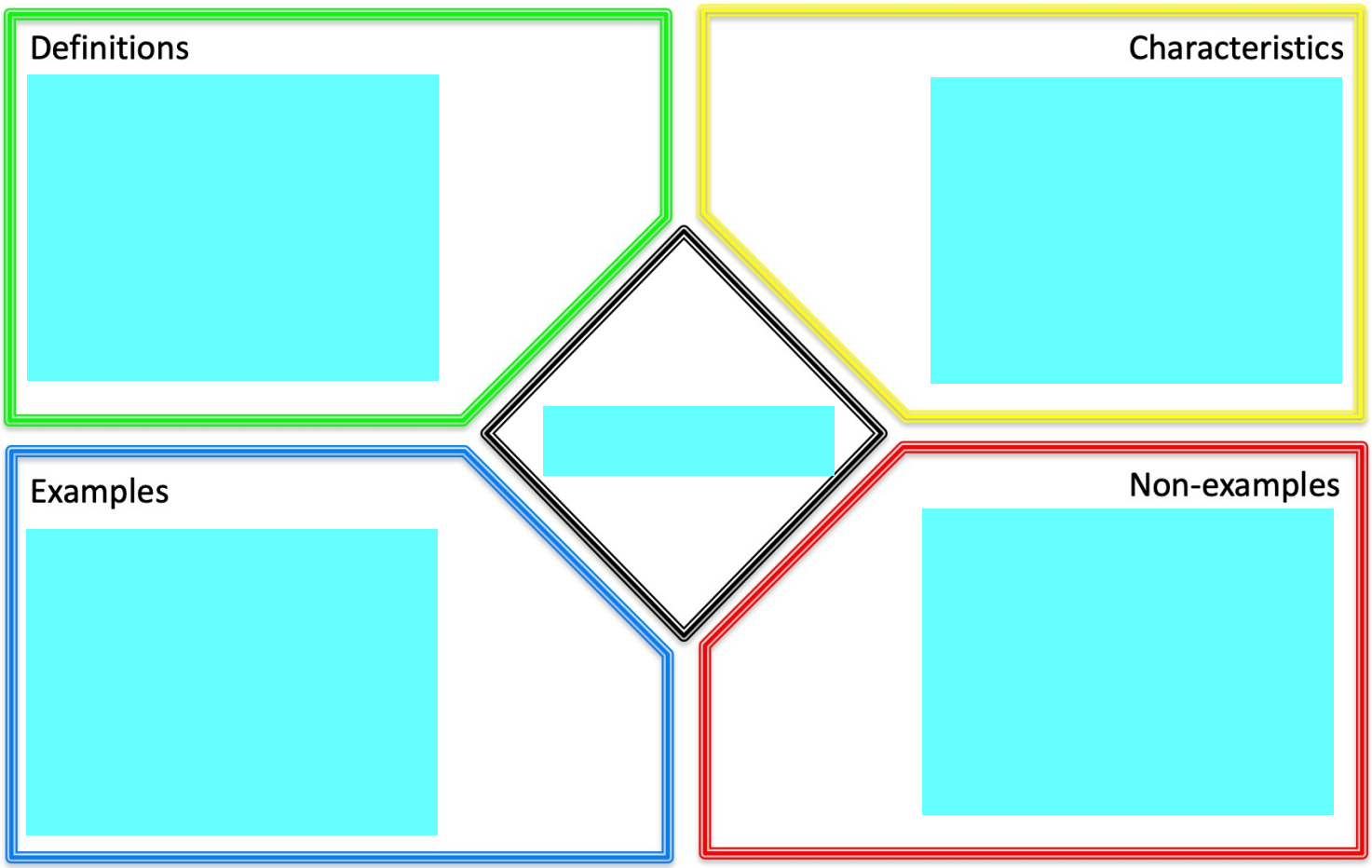
Use this link to see a screen capture of the simulation. https://youtu.be/O9FnVTjQGek

Think-Pair-Share
What did you discover about the movement of molecules in different states of matter?

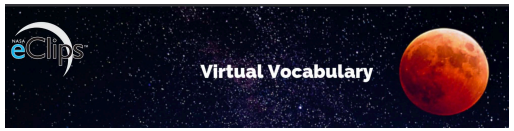
Resources

Frayer Model for Vocabulary Development

Use the graphic organizer to write definitions, characteristics, examples and non-examples for a vocabulary word. You can include drawings, graphics, and diagrams.



Visit the NASA eClips™ Vocabulary for more definitions.

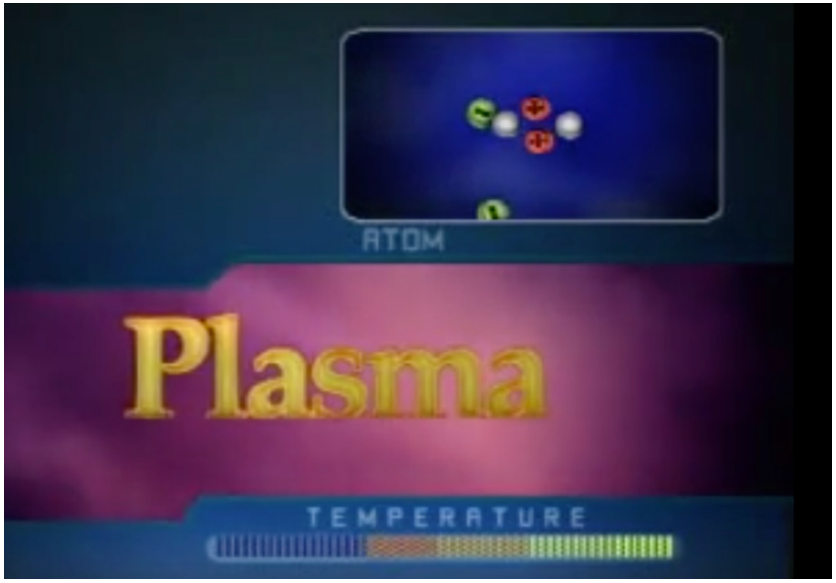


Elaborate/Extend

NASA Connection

Real World: Chemistry and Advanced Propulsion Technologies

In this video review the four states of matter and explore the make-up of atoms. Learn about NASA technologies that use plasma.



What did you learn about how NASA uses plasma?

Analyzing Icicles

An icicle forms when the sun melts snow or ice in below-freezing temperatures. As melting occurs, small water drops form and begin to drip off of a surface (like a roof). In the cold temperatures, the drops begin to freeze again forming an icicle.

1. Draw a picture illustrating the molecules in an icicle. Add a caption that describes the movement of the molecules.
2. Now, draw a picture to illustrate the molecules in the drops of water falling off the icicle. Include a caption that describes the movement of these molecules.

3. How are the two drawings of the molecules different?

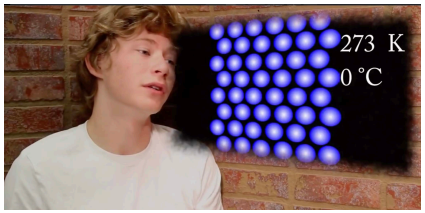
Evaluate

Identify Misconception

What is a common misconception about how molecules move in solids and how can you correct it?

Carefully rewatch one of the NASA Spotlite videos about the movement of molecules to assess your understanding of how molecules behave in different phases.

Video Link- NASA Spotlite: Movement of Molecules



Video Link- NASA Spotlite: Movement of Molecules

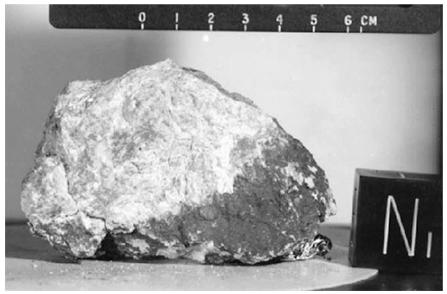
NASA eClips Website - https://nasaeclips.arc.nasa.gov/spotlite

Vocabulary Review

You just landed on the Moon with a new team of NASA astronauts to explore the Moon's surface. Below is an example of the first sample collected called the Genesis Rock. Using what you have learned in this lesson, describe this sample. Be sure to include what you have learned about the particles that make up this sample.

Word Bank

atom
molecule
solid
liquid
gas
vibrate
state of matter
phase



Posttest

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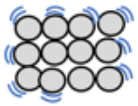
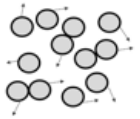
C. 
D. 

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Product Information

This product has been developed by the National Institute of Aerospace's Center for Integrative STEM Education. This document is based upon work supported by NASA under award No. NNX16AB91A. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Aeronautics and Space Administration (NASA).

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