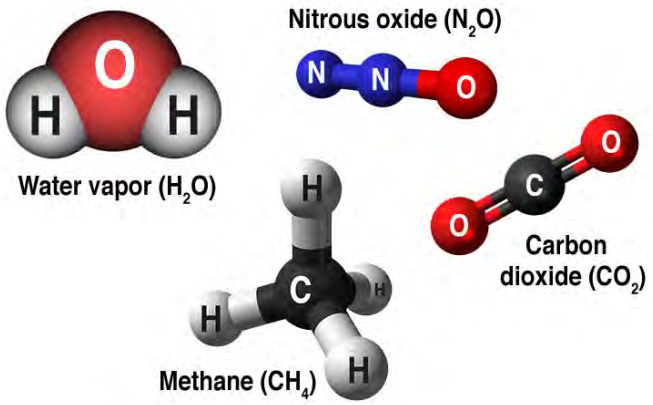
NASA Spotlite
Interactive Lesson

Gases and Mass
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:ljnasaeclips.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

Gases and Mass Grades 5-8
NASA Spotlite Interactive Lesson

Read each question and select the best choice.

1. Gases are one of the four phases of

Select the best answer.
A. elements
B. matter
C. mass
D. plasma

2. All gases

Select the best answer.
A. have mass and volume.
B. are mixtures of compounds.
C. have a definite volume.
D. have a definite shape.

3. A gas, like all matter, is made up of tiny particles called:

Select the best answer.
A. cells
B. nuclei
C. compounds
D. atoms

4. This is a measure of the amount of matter in a substance.

Select the best answer.
A. volume
B. phases
C. mass
D. weight

5. The _____ of a gas can be measured.

Select the best answer.
A. shape and size
B. volume
C. shape
D. size

6. Jaden blew up a balloon and measured its mass. He then measured the mass of an identical but deflated balloon. Here is what he found.

Inflated Balloon	Deflated Balloon
3.0 grams	0.75 grams

Jaden's experiment illustrated that gases:

Select the best answer.
A. have a definite volume.
B. have mass.
C. are elements.
D. are compounds.

Engage

Pre-assessment

In today's lesson you will learn about the characteristics of gases. Using interactive Frayer Models, you will learn key vocabulary that will help you form a clearer understanding of the properties of gases.

What do you already know about the characteristics of gases?

True or False: Gases have no mass.

Select the best choice.
This statement is TRUE.
This statement is FALSE.

Spotlite Video

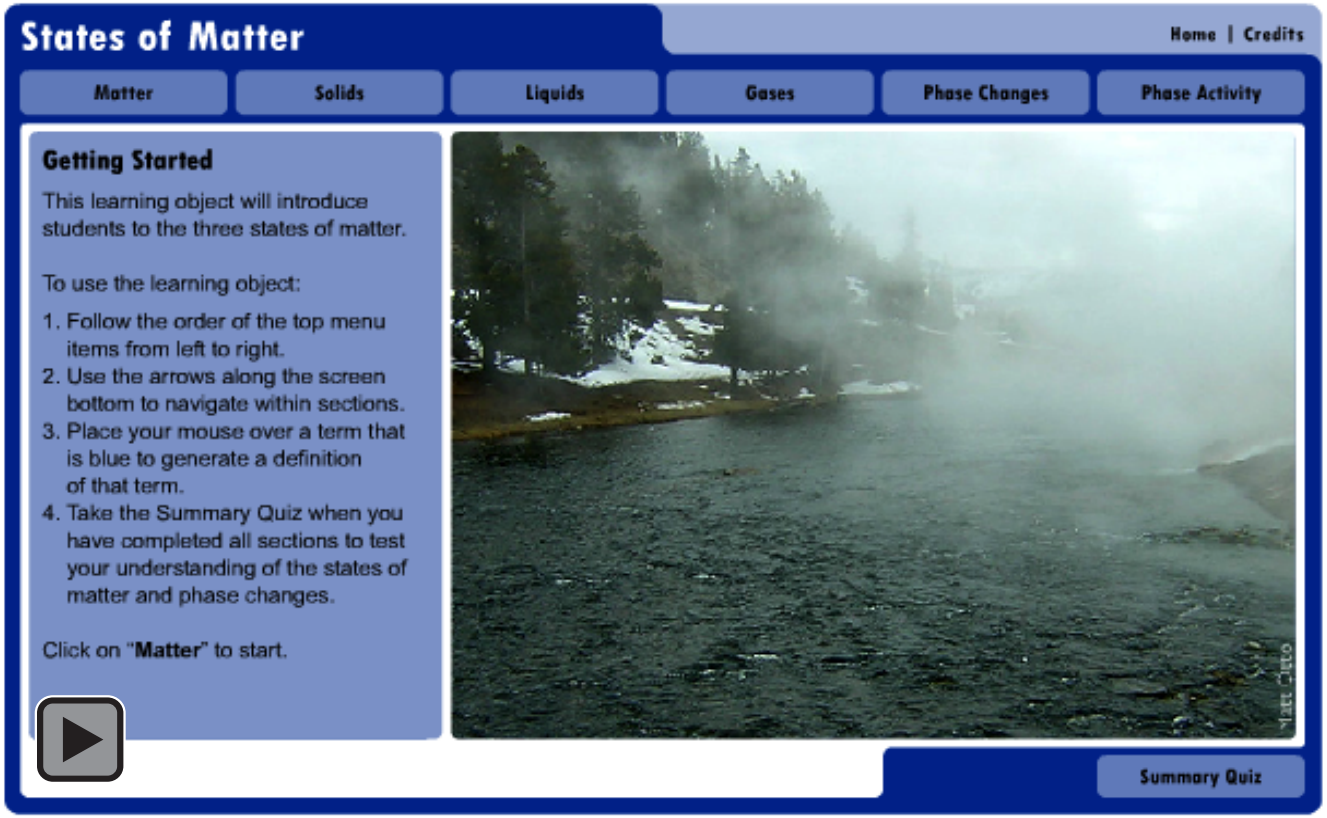
Next, you will watch a short video on the characteristics of gases. As you watch the video, pay close attention to any new vocabulary.

Video Link - NASA Spotlite: Gassy Games
NASA eClips™ Website - https://nasaeclips.arc.nasa.gov/spotlite/gas-and-mass/gas-and-mass_nasa-spotlite-gassy-games-aps
NASA eClips™ YouTube - https://youtu.be/WaDrmYjTBIw

Explore

Explore Activity

Use the interactive to observe the differences between solids, liquids, and gases. How are they alike? How are they different? On the interactive, press play and then choose a tab to learn more.



Think-Pair-Share

With a partner, discuss how solids, liquids, and gases are alike and different.

Explore

Explore Activity

Draw and label what you think is inside each ball.

Now watch the video. Revisit your drawing and labels.

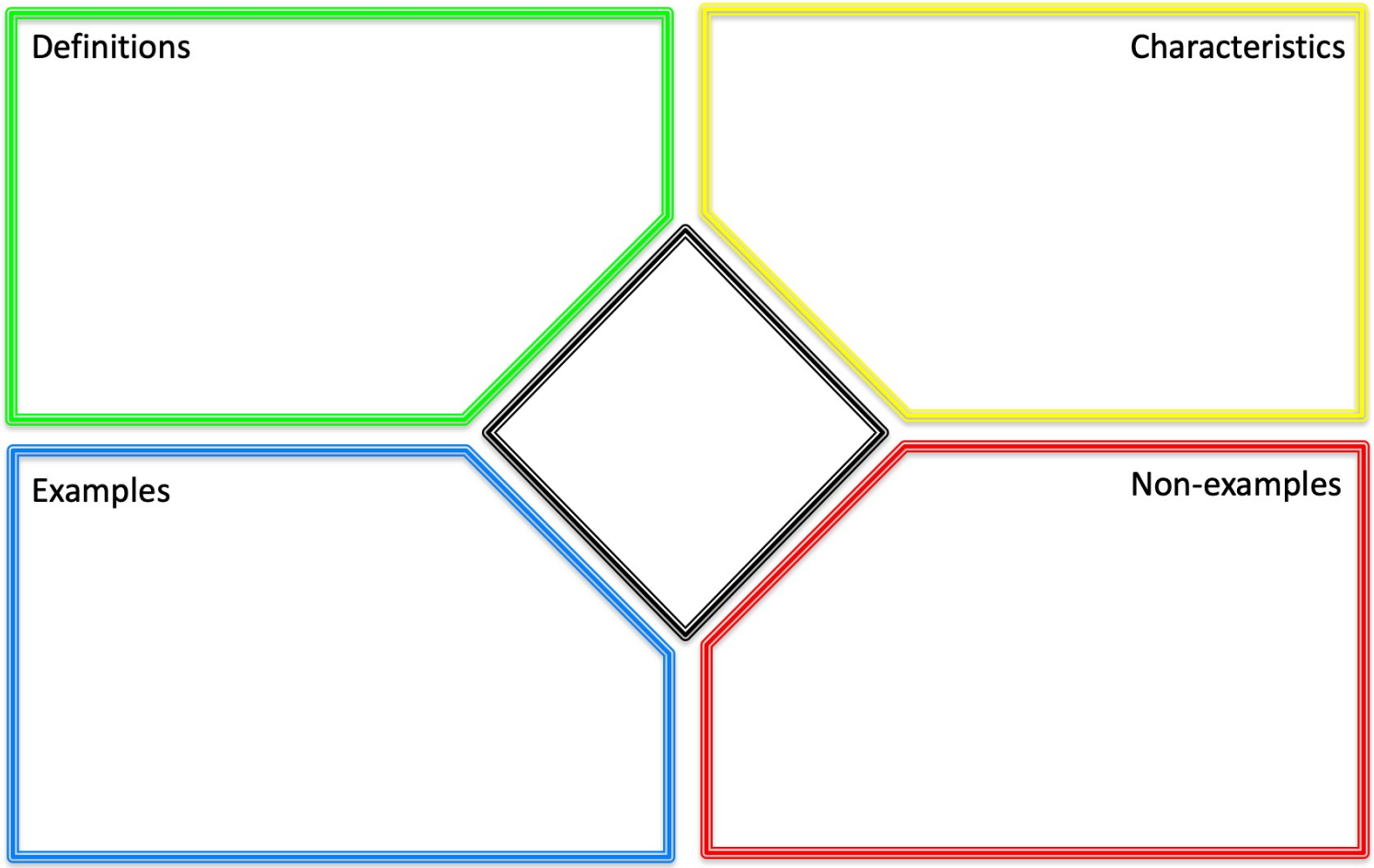
Video Link -American Chemistry Society - Middle School Chemistry http://www.middleschoolchemistry.com/multimedia/chapter1/lesson5 - particles_of_a_gas

Do you still agree with your earlier prediction? Why or why not?

Explain

Frayer Model for Vocabulary Development

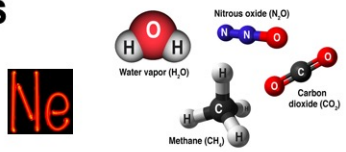
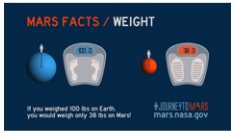
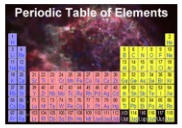
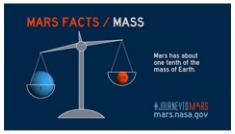
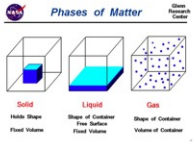
Use the graphic organizer to write definitions, characteristics, examples and non-examples for a vocabulary word. You can include drawings, graphics, and diagrams.



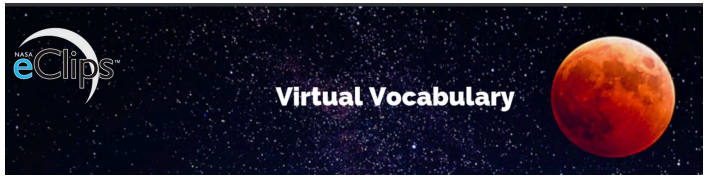
Explain

Vocabulary Words

You will review key vocabulary. Pay attention to how your definitions compare to standard definitions.

Word	Definition	Word	Definition
GAS 	A gas is a state of matter that has no definite shape and no definite volume. The molecules in a gas move rapidly in all directions and spread out to fill the space they are in. Examples of gases include oxygen, nitrogen, carbon dioxide, and neon.	**WEIGHT** 	Weight is the force of gravity on an object. It is affected by an object's mass and the force of gravity. A person's weight on the moon is less than their weight on Earth because of the difference in gravity.
COMPOUND 	A compound is a substance that is formed by the chemical combination of two or more elements. Carbon dioxide and water vapor are examples of gases that are compounds.	**ELEMENT** 	An element is a substance that cannot be separated or broken down into simpler substances by chemical means. Nitrogen and oxygen are examples of gases that are elements.
MATTER 	Matter is defined as anything that has mass and takes up space (has volume), and it is the generic term for the substance of which all physical objects are composed. Matter can be in several different states, including solids, liquids, gases, or plasma.	**VOLUME** 	Volume is the amount of space an object or substance takes up.
ATOM 	Atoms are the smallest part of an element that maintains the chemical properties of that element.	**MASS** 	Mass is the amount of matter in an object or substance.
PROPERTY 	A property is a characteristic that can be observed or measured. Some examples of physical properties are color, density, and hardness. Some examples of chemical properties that describe how a substance changes into a completely different substance are flammability and resistance to corrosion.	**PHASE** 	Phase describes the physical state of matter. The four common phases of matter are solid, liquid, gas, and plasma.

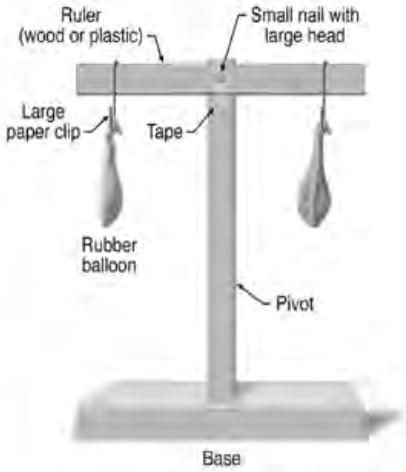
Visit the NASA eClips™ Virtual Vocabulary for more definitions.



Elaborate/Extend

Elaborate/Extend Activity

Does Air Have Weight? How can you use this set up to design an investigation to show that air has mass?



Each bag is filled with air.
What will happen when one of the bags is carefully heated with the heat lamp?

With a partner, discuss how solids, liquids, and gases are alike and different.

Evaluate

Post-Assessment

Identify Misconception
What is a common misconception about the mass of gases and how can you correct this misconception?

Carefully rewatch the NASA Spotlite video about gases to assess your understanding of their characteristics.

Video Link - NASA Spotlite: Gassy Games
NASA eClips™ Website - https://nasaeclips.arc.nasa.gov/spotlite/gas-and-mass/gas-and-mass_nasa-spotlite-gassy-games-aps
NASA eClips™ YouTube - https://youtu.be/WaDrmYjTBIw

Vocabulary Review

You are helping a friend fill balloons with helium for the school carnival. Someone took the new tank of helium out of the box and put it next to an identical looking empty tank.

Use your new vocabulary about gases to explain how you can figure out which tank is the new tank that is filed with helium.

Posttest

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D. are compounds.

Product Information

Image Credit

Cover
gas - https://climate.nasa.gov/causes/ and https://en.wikipedia.org/wiki/Neon

Explore
soccer balls - https://macgyverisms.wonderhowto.com/how-to/inflate-any-ball-without-pump-needle-0147619/

Vocabulary
gas - https://climate.nasa.gov/causes/ and https://en.wikipedia.org/wiki/Neon
compound - https://www.nasa.gov/feature/goddard/2017/atmospheric-beacons-guide-nasa-scientists-in-search-for-life
element - https://science.nasa.gov/science-news/science-at-nasa/2000/ast18jul_1m
phase - NASA image
matter - https://www.flickr.com/photos/121935927@N06/13580404724
property: wall -https://cdn.pixabay.com/photo/2014/09/24/16/28/bricks-459299_1280.jpg; measuring tape - https://cdn.pixabay.com/photo/2014/04/03/11/07/inch-tape-311800_1280.png; density -https://middleschoolscience.com/tag/observations/

Evaluate
helium tanks - https://cdn11.bigcommerce.com/s-owa22vnico/images/stencil/1280x1280/products/34016/74998/10982494__75755.1561405494.jpg?c=2&imbypass=on

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).

Published January 2019