

COMMON CORE  
Lessons & Activities

States of  
**MATTER**

Reading for Information

Higher-Order Thinking

Writing Prompts

Current Events Analysis

Vocabulary

Cause & Effect

Graphic Organizers

& More!

**REPRODUCIBLE**

*One teacher is allowed to make copies for use in her/his classroom!*



# Common Core Lessons & Activities: States of Matter

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Published by Gallopade International, Inc.  
Printed in the U.S.A. (Peachtree City, Georgia)

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**G:** Includes Graphic Organizer

**GO:** Graphic Organizer is also available 8½" x 11" online  
download at [www.gallopade.com/client/go](http://www.gallopade.com/client/go)

(numbers above correspond to the graphic organizer numbers online)

# Molecules Matter

Read the text and answer the questions.

Molecules, and the atoms that make molecules, behave differently when they are in different states of matter. When molecules are very close together, like sardines in a can, they do not have much room to move. When molecules are spread out, like kindergartners going outside for recess, they can move around a lot.

In a solid state of matter, molecules are very close to one another. Molecules in a solid are locked together in a tight pattern. While the molecules can vibrate, they do not move about freely.

In a liquid state of matter, molecules have a bit more room to move and flow. They still hold together, but they can move and slide past one another. This motion explains why liquids do not have a sturdy shape and take the shape of their container.

In a gas state of matter, molecules are very free to move around. As a gas, molecules can spread out to fill an entire area.

1. A. What two analogies are used in the text?  
B. What is the purpose of the analogies used in the text?
2. Use the three boxes below to illustrate the difference between molecules in different states of matter.
  - A. Draw dots to represent molecules in a solid state in box 1.
  - B. Draw dots to represent molecules in a liquid state in box 2.
  - C. Draw dots to represent molecules in a gaseous state in box 3.

1

2

3

3. Why do liquids take the shape of their container?
4. Write a short journal entry describing an example of each state of matter in a way that you encounter it in your daily life. For each example, tell its state of matter and describe some of its characteristics, such as how it is contained and if and how it moves.

# Feel the Heat

Read the text and answer the questions.

Heat is a form of energy. When heat is applied to or taken from matter, matter will be affected. If the temperature rises or drops a little, you may not see much of a change, but change the temperature enough to hit one of the “magic numbers,” and the effect is remarkable.

Just what are these “magic numbers” that can have such a significant effect? They are the temperatures where matter changes from one state into another. Some of these “magic numbers” occur when matter is heated and some occur when matter is cooled.

- Every solid has a melting point. This is the temperature at which when lowered to, it will change from a solid into a liquid.
- Every liquid has a boiling point. This is the temperature at which when raised to, a liquid will become a gas.
- Every liquid also has a freezing point. This is the temperature at which when lowered to, it will change from a liquid into a solid.
- Every gas has a condensation point. This is the temperature at which when lowered to, it will change from a gas to a liquid.

An amazing thing about matter is that even when it changes its state, it is still made of the same elements! Whether it is in its solid, liquid, or gaseous state, water is still water. It still has the same chemical composition, no matter which state of matter it is in. This holds true for any substance.

- Use the text to label each arrow with a + or – to designate that heat is added or taken away as it changes from one state to the other.
  - Use the text to label each arrow with the name of the “magic number” the temperature must reach in order for the change from one state of matter to the other to occur.



## WRITING

# BEC

Read the text and follow the instructions.

The Bose-Einstein condensate, or BEC for short, is a “new” state of matter. It is not really new since it probably has always existed in the universe, but it is new to us because we did not know it existed until recently. Why did we not know about this state of matter? Because it cannot exist naturally on our planet.

Scientists Satyendra Nath Bose and Albert Einstein predicted the existence of BEC in approximately 1925. Two other scientists, Eric Cornell and Carl Wieman, produced the first gaseous condensate in a laboratory in 1995. It was such an important accomplishment that they received the Nobel Prize for Physics in 2001. In 2010, the first photon BEC was observed.

If plasma is a super-excited gas, then BEC is at the other end of the spectrum. BEC is a solid with atoms that are almost completely still. The BEC state of matter occurs when the atoms in a solid are cooled so intensely that they almost completely stop vibrating. That only happens near absolute zero. Since temperatures on Earth don't get that low, BEC was a state of matter that was conceived by scientists before it could be achieved.

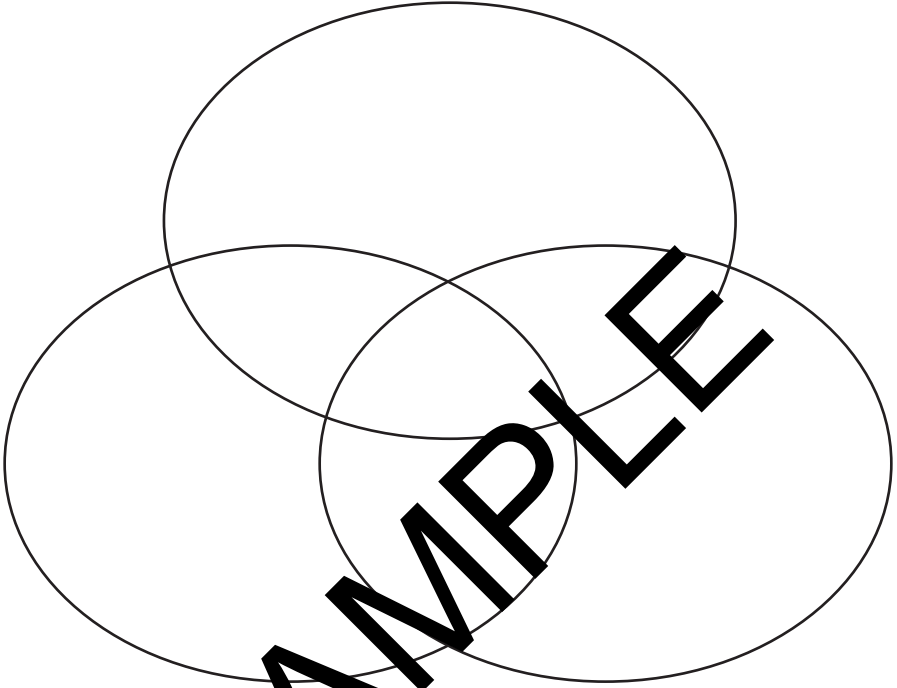
Scientists have theorized that there may be other states of matter in the universe that are unable to exist on Earth. Supersolids and dark matter are hypothetical examples.

1. Tap into your imagination and imagine a new state of matter. Where would you find it? What would it look like? What would it feel like? What other characteristics would it have? How would matter get to this state? What would it be called? Answer these and other questions in an informative essay about your newly discovered state of matter. Include an illustration or other visuals about your new state of matter. If desired, share your discovery with your class.
2. Albert Einstein once said, “The true sign of intelligence is not knowledge but imagination.” How do you think imagination helps scientists develop theories? Can imagination help them test their theories too? Explain.

COMPARE & CONTRAST

# States of Matter

Compare and contrast the three classic states of matter.



Compare and contrast plasma and BEC.

