

IT'S MATTER, IT MATTERS (MODIFIED FOR ADEED)



Science Concept:

Solids, liquids, and gases are forms of matter that have specific characteristics that can be compared.

Objectives:

The student will:

- name the three states of matter;
- classify examples of each state of matter; and
- explain his or her reasoning.

GLEs Addressed:

Science

[4] SB1.1 The student demonstrates an understanding of the structure and properties of matter by identifying and comparing the characteristics of gases liquids, and solids.

[4] SA1.1 The student demonstrates an understanding of the processes of science by asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring, and communicating.

Writing

[4] 2.2.2 The student writes for a variety of purposes and audiences by writing in a variety of nonfiction forms using appropriate information and structure (i.e., personal letters, recounts, descriptions or observations).

Vocabulary:

characteristics - a special quality or appearance that makes an individual or group different from others

gas - a substance (as hydrogen or air) that has no fixed shape and tends to expand without limit

liquid - a substance that keeps its volume but can be deformed without effort (water, mercury)

matter - the substance of which a physical object is composed, whether solid, liquid, or gaseous

solid - a solid substance: a substance that keeps its size and shape

state of matter - one of the ways that matter interacts with itself

Materials:

- Trays (two per group)
- Clear plastic cups (three per group)
- Small block of wood (one per group)
- Colored water (1/2 cup per group)
- Three to five different solids (paper, book, piece of hard candy, etc.)
- Three to five different liquids (soda, chocolate syrup, oil, etc.)
- STUDENT WORKSHEET: "Classifying Pages: Gas, Liquid, Solid"

Activity Preparation (30 min.):

1. Label each set of trays #1 and #2 for future reference.
2. Label each set of cups #1, #2, and #3. Place each set of cups on a tray labeled #1. For each tray, place a small wood block in cup #1 and ½ cup of colored water in cup #2. Leave cup #3 empty.
3. On each tray #2, place three to five solids and three to five liquids.

Activity Procedure (1 hour):

Gear Up

Process Skills: observing, communicating, and inferring

1. Display one tray. Without naming any of the substances, ask students to describe the contents of each cup. List student responses on the board. After students have provided a few descriptions, explain these types of descriptions are called "characteristics." Characteristics describe matter and matter can be solid, liquid, or gas.

Explore

Process Skills: observing, communicating, collecting data, inferring, and investigating

2. Divide the class into small groups. Distribute a tray to each group. Ask groups to discover more characteristics about each material by moving the materials from one cup to another. Ask groups to list any new characteristics they discover about each material.

Generalize

Process Skills: communicating, inferring, and collecting data

3. As a class, review the list of characteristics that students made in Activity Procedure #1. Ask groups to add their findings to the list.
4. Discuss the following:
 - a. How did students move each material from one container to another?
 - b. Did the materials move or change shape when touched?
 - c. Describe the shape of each material.
 - d. How much space does each material take up?
 - e. Which material is solid? Liquid? Gas? Based on what you know about the materials, what is the definition of solid, liquid, and gas?

Teacher's Note: Demonstrate that liquid changes its shape, but not its volume, by marking the level of water on the side of a cup, pouring the liquid into another container of a different shape, and then pouring it back into the original cup. Students should observe that the water takes up the same amount of space. Discuss #3 may look empty, but it does contain air, which is a gas.

5. Write the following on the board for students to refer to:

Wood is a SOLID:

Its shape does not change.

It always takes up the same amount of space.

Juice is a LIQUID:

Its shape changes.

It always takes up the same amount of space.

Air is a GAS:

Its shape changes.

It can take up different amounts of space.

Apply/Assess

Process Skills: observing, communicating, collecting data, classifying, and inferring

6. Distribute a tray #2 and the STUDENT WORKSHEET: "Classifying Page.s" to each group. Ask each group to classify each object as solid, liquid, or gas using their worksheet pages.
7. Instruct students to write down why the objects went in each category (characteristics) in their science journals or on a blank sheet of paper, using complete sentences. After each group has classified all the objects, ask them to share their ideas with the class.
8. Ask groups to defend their choices by listing the characteristics of a few of the objects. Remind students they are classifying the contents of the containers, not the container itself.

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Extension Ideas:

1. One way of explaining the three states of matter is to look at a human model. Gather the students in an open space and complete the following kinesthetic activity. (NOTE: The individual students in this model behave like particles. In solids, movement is restricted; in liquids, movement is a bit freer; in gas, there is free motion all over.)
 - a. Solid: Arrange students in rows of three with arms tightly linked together. The people at the end of rows who have a free arm should firmly hold onto the shoulder of the person in front of them. Instruct the class to try and shake.
 - b. Liquid: Ask students to unlink their arms and spread out until they are all just holding hands. Instruct them to continue moving and shaking.
 - c. Gas: Ask students to release their hold so they can run about freely. Instruct them to run in different directions.
2. Provide students with a straw and glop of wet paint on a piece of paper. Ask them how they can create art using the three states of matter. Explain the straw is a solid and the paint is a liquid. Students can blow through the straw to move the paint and make a picture. The air through the straw is a gas.
3. Ask students to describe the state of matter described in each riddle.
 - a. You can't see me but I am there. I make balloons climb higher than a house. What state of matter am I? (*Gas*)
 - b. You can pour me into a glass, but if I get spilled, I lose my shape. What state of matter am I? (*Liquid*)
 - c. My shape never changes by itself. If my shape changed, I would no longer be myself. What state of matter am I? (*Solid*)
 - d. I move a lot. I spread out, and I fill any container. What state of matter am I? (*Gas*)
 - e. I keep my shape, and I don't move. What state of matter am I? (*Solid*)
 - f. I move a lot, and I lose my shape. However, I always take up the same space. What state of matter am I? (*Liquid*)

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RUBRIC

Objective	GLE	Emergent	Developing	Proficient	Advanced
The student names and lists characteristics of the three states of matter.	[4] SB1.1	The student does not name any of the states of matter and/or provides no characteristics for them.	The student correctly names the three states of matter but does not provide correct characteristics.	The student correctly names and describes at least two of the three states of matter.	The student correctly names and describes all three of the three states of matter.
The student classifies examples of each state of matter.	[4] SA1.1	The student does not classify any state of matter.	The student correctly classifies one example of each state of matter.	The student correctly classifies all examples of each state of matter.	The student correctly classifies all examples of each state of matter and mentions additional examples.
The student explains his or her reasoning for how he or she classified objects.	[4] SA1.1 [4] W2.2.2	The student does not explain his or her reasoning.	The student explains how he or she classified his or her objects but does not link characteristics to their states of matter.	The student explains how he or she classified his or her objects and links the characteristics to their states of matter but does not do this for all states of matter.	The student explains how he or she classified his or her objects and links the characteristics to their states of matter for all states of matter.

NAME: _____

STUDENT WORKSHEET

CLASSIFYING PAGES: GAS, LIQUID, SOLID

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GAS

Place matter that is a gas in the square.

NAME: _____

STUDENT WORKSHEET

CLASSIFYING PAGES: GAS, LIQUID, SOLID

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LIQUID

Place matter that is a liquid in the square.

NAME: _____

STUDENT WORKSHEET

CLASSIFYING PAGES: GAS, LIQUID, SOLID

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SOLID

Place matter that is a solid in the square.

