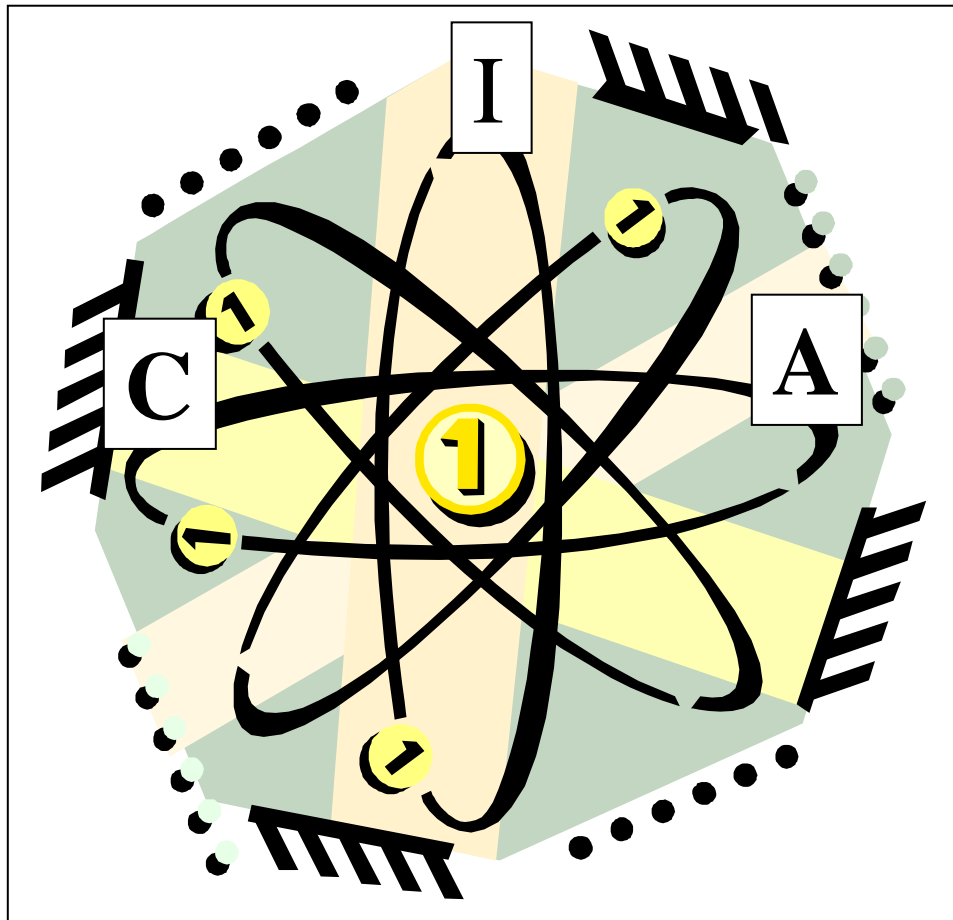


Curriculum, Instruction, Assessment (CIA) Alignment

Science, Grade 1 Unit 1: Matter

Task Analysis and Hands-on Investigations



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Orange County Public Schools
Orlando, Florida**

2003-2004



Subject Area: Science
Strand A: The Nature of Matter
Grade: 1

BLOOM'S TAXONOMY

Level 1	Level 2
Knowledge	Application
Comprehension	Analysis
Application	Synthesis
	Evaluation

Benchmark

SC.A.1.1.1: The student knows that objects can be described, classified, and compared by their composition (e.g., wood or metal) and their physical properties (e.g., color, size, and shape).

TASK ANALYSIS	
The student...	
STATES OF MATTER	
<ul style="list-style-type: none">manipulates and observes three different states of matter: solid, liquid, and gas.compares and contrasts solids, liquids, and gases.	



IS AIR REALLY THERE?



BENCHMARK and TASK

SC.A.1.1.1 The student knows that objects can be described, classified, and compared by their composition (e.g., wood or metal) and their physical properties (e.g., color, size, and shape).

- The student manipulates and observes three different states of matter: solid, liquid, and gas.

KEY QUESTION

How do we know that air is present?

BACKGROUND INFORMATION

All materials and objects are considered to be matter. Matter is anything that takes up space and has mass. If something isn't matter, it's energy. Matter is made up of tiny particles called atoms.

Everything alive, dead or never having lived is made up of atoms.

Matter exists in three forms on earth: solid, liquid, and gas. The particular state of a type of matter depends both on the matter itself and the temperature. A change in temperature can result in a change in the state of matter.

A solid is something that maintains its shape. The atoms of a solid vibrate in a fixed place. A liquid maintains its volume (the amount of space it takes up), but takes the shape of its container. The atoms of a liquid vibrate and move around slowly. A gas has no fixed volume, but takes up the volume of its container. The atoms of a gas move around quickly and are spaced far apart.

A fourth state of matter is called plasma. Like a gas, plasma does not have a definite shape or volume. Plasmas only exist at very high temperatures. Stars, including the sun, are made of matter in a plasma state.

MATERIALS

Teacher

1 feather
1 empty, plastic 2-L soda bottle
bubble solution ingredients:
 2-4 Tbsp. Dawn or Joy liquid detergent
 4 cups water
 ½ cup glycerin (optional)

Per group

newspaper
1 shallow container of bubble solution
paper towels

Per student

1 styrofoam cup
1 sharpened pencil
1 straw

TEACHING TIPS

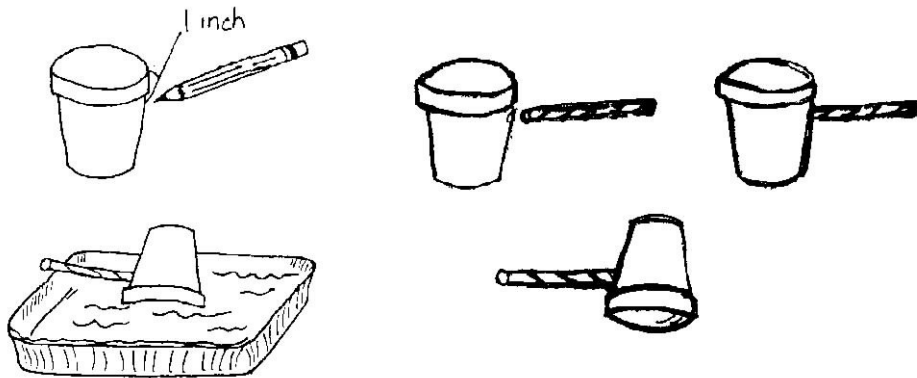
1. Mix the bubble solution ahead of time so it can settle. The ingredients may need to be doubled, depending on the number of groups in your class.
2. Plan to take the class outside, if possible.

ENGAGE

1. Show the students an empty 2-liter soda bottle.
Ask:
Is there anything inside this bottle?
2. Place a feather on top of the opening of the soda bottle and squeeze the bottle while students observe.
3. Ask:
What happened?
Why do you think the feather moved?
When I squeezed the empty bottle, did anything come out?

EXPLORE

1. Arrange the students in groups. Have students cover their tables with newspaper. Pour the bubble solution that you have prepared ahead of time into shallow containers (1 per group).
2. Distribute 1 styrofoam cup and 1 straw to each student.
3. Demonstrate how to make a hole in the styrofoam cup by using a pencil point. The hole should be made on one side about one inch from the top. Students should then place a straw through the hole in the cup.



4. Students should place the open end of the cup in the bubble solution, then remove it and observe the soap film across the cup opening.
5. Show students how to hold the cup upside down and blow slowly through the straw to form large bubbles. Give the students ample time to explore.

EXPLAIN

After students have had time to explore, challenge them with the following questions:

What do you think is inside the bubbles? Why do you think so?

How could air get inside the bubbles?

Can you think of a way to make smaller or larger bubbles?

(Students may discover that they can control the size of the bubbles by the amount of air they blow into the cups.)

EXTEND/APPLY

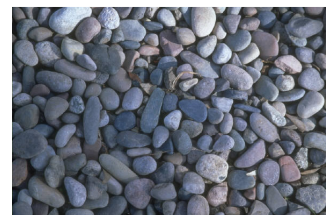
Brainstorm a list of other things that have air in them.

IS IT A SOLID OR A LIQUID?

BENCHMARK and TASKS

SC.A.1.1.1 The student knows that objects can be described, classified, and compared by their composition (e.g., wood or metal) and their physical properties (e.g., color, size, and shape).

- The student manipulates and observes three different states of matter: solid, liquid, and gas.
- The student compares and contrasts solids, liquids, and gases.



KEY QUESTION

How is a solid different from a liquid?

BACKGROUND INFORMATION

Matter exists in three forms on earth: solid, liquid, and gas. The particular state of a type of matter depends both on the matter itself and the temperature. A change in temperature can result in a change in the state of matter.

A solid is something that maintains its shape. The atoms of a solid vibrate in a fixed place. A liquid maintains its volume (the amount of space it takes up), but takes the shape of its container. The atoms of a liquid vibrate and move around slowly. A gas has no fixed volume, but takes up the volume of its container. The atoms of a gas move around quickly and are spaced far apart.

A fourth state of matter is called plasma. Like a gas, plasma does not have a definite shape or volume. Plasmas only exist at very high temperatures. Stars, including the sun, are made of matter in a plasma state.

MATERIALS

Teacher

variety of liquids, such as soda, water, vinegar, liquid detergent, Kool-aid
several empty containers
food coloring
liter box
pencil
Solid or Not? (Benchmark Education Co.)

Per group

3 clear, plastic containers of various shapes, such as a plastic cup, jar, liter box, graduated cylinder, or beaker (These should be the same for all groups.)
1 measuring cup containing a small amount of colored water
crayons
pencil
paper towels
Solid and Liquid Shapes recording sheet

DAY ONE

ENGAGE

1. Display several liquids (such as soda, water, vinegar, milk) in different sized containers. Pour liquid #1 into a different container. Ask a student to pass his/her finger through the liquid.

Continue doing the same with each of the liquids: pouring into different containers and having a student pass his/her finger through the liquids.

Ask: *What do we know about liquids now?* (They can be poured and solids pass through liquids easily.)

2. Tell the students that they will be exploring these and other properties of liquids. Introduce the word “liquid” by telling them that scientists have a word for matter that has the above properties. This word is liquid.

EXPLORE

1. Pour some colored water from a measuring cup into an empty container, such as a liter box.

Ask:

What do you see?

What is the shape of the water that is in the container?

2. Distribute materials to each group.
3. Each group should have one student draw the **shape of each container** at the top of the three columns on the recording sheet. Tell groups to pour their water into the liter box or similar container. Then the student will draw the **shape of the water** as it appears in that container under the picture of the same container on the worksheet.
4. Students should pour the water back into the measuring cup. (This will allow students to see that they are pouring the same amount of water each time.) They should then pour the water into the second container, such as the graduated cylinder. On the worksheet, one student should draw a picture of the water as it appears in the graduated cylinder.
5. Students should repeat the activity, pouring water back into the measuring cup and then into the beaker or jar. The group member should illustrate the results on the worksheet.

EXPLAIN

Ask different students to come to the board and draw the shape of the water in each of the three containers. Discuss their observations:

What can you tell us about the pictures that you drew?

Are the pictures the same or are they different?

Did the shape of the water stay the same when you poured it?

Did the shape of the water change when you poured it?

How did the shape of the water change?

How would you describe the shape of the water? (Students should notice that the water is always the same shape as the container.)

What does this tell us about the shape of liquids? (Liquids take the shape of their containers.)

DAY TWO

EXPLORE

1. Hold up a pencil. Place the pencil in an empty liter box.

Ask:

What do you see?

What is the shape of the pencil now that it is in the container?

2. Give students time to place the pencil in each of their three containers. Remind them to have a group member draw a picture of the pencil in each container on the recording sheet, just like they did with the water.

EXPLAIN

1. Ask different students to come to the board and draw the shape of the pencil as they observed it in each of the three containers.
2. Discuss their observations:
What can you tell us about the pictures you drew?
Are the pictures the same or are they different?
Did the shape of the pencil stay the same when you placed it in different containers?
Did the shape of the pencil change when you placed it in different containers?
What does this tell us about the shape of solids? (Solids do not take the shape of their containers.)
Introduce the word “solid” by telling them that scientists have a word for matter that has the above properties. This word is solid.
How is the shape of solids different from the shape of liquids?

EXTEND/APPLY

1. Just before going to lunch, ask the students to observe their food at lunch and think about whether it is a solid or a liquid. Tell them to ask themselves, *Does it take the shape of its container?*
2. Make a chart of the solids and the liquids served at lunch one day. (This could also be done as a take-home assignment.)
3. Read and discuss *Solid or Not?*

ASSESSMENT

Have a display of liquids and solids. Students will classify each item as liquid or solid and tell why they are classified as a liquid or a solid.



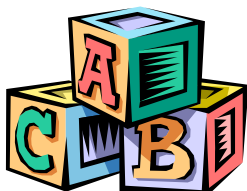
Shape of container			
Shape of water			
Shape of pencil			

MIND OVER MATTER

BENCHMARK and TASKS

SC.A.1.1.1 The student knows that objects can be described, classified, and compared by their composition (e.g., wood or metal) and their physical properties (e.g., color, size, and shape).

- The student manipulates and observes three different states of matter: solid, liquid, and gas.
- The student compares and contrasts solids, liquids, and gases.



KEY QUESTION

Into what three groups can we sort almost every kind of material on earth?

MATERIALS

Teacher

food coloring (optional)
empty container
4 resealable sandwich baggies
class chart
pencil
rock
water

Per group

3 resealable sandwich baggies (one containing water, one a solid object, and one containing air)
1 tray
pencil or pen

Per class

magazines for pictures of matter

TEACHING TIPS

Prepare a set of three baggies for each group and for yourself. Place a common solid object, such as a rock, in the first bag. Put a small amount of water in the second bag. (Adding food coloring to the water makes it easier to see.) Blow air into the third bag and seal it.

ENGAGE

1. Bring out the first bag containing the rock or other solid object. Ask the students what they think is inside the bag. When students respond that they see a rock, ask students if they know what we call objects such as rocks? Explain that scientists call objects like rocks **solids**.
2. Focus on the second bag containing water. Ask students what they think is in the bag. Students will usually answer that the bag contains water. Ask students if they know what we call objects such as water. Explain that scientists call materials like water **liquids**.
3. Hold up the third bag containing air. Ask students what they think is in the bag. Many of them will report that the bag is empty and that they see nothing. Show them a fourth bag that is flat so they can compare it with the full bag of air. Tell students that such materials are called **gases**.

4. Explain to the students that nearly everything on earth may be classified as a solid, a liquid, or a gas.

EXPLORE

1. Organize the students into groups. Distribute the bags containing a solid object to each group. Encourage students to explore the object using their senses. Ask them to discuss within their group how the object looks, how it feels, its shape, its size, etc.
2. Have students put the first bag aside. Distribute the bags containing water. (Have students keep the bag on a tray in case of spills.) Encourage the students to explore the water just as they did the solid object.
3. After students have moved the bag of water aside, distribute the bags containing air. Again, encourage students to explore the properties of the contents of the bag.

EXPLAIN

1. Create a class chart with two columns and the headings: *Changes shape easily* and *Solids pass through it easily*. List the objects to be tested: rock, water, air. Have students vote thumbs up or thumbs down as to whether or not they observed each of the listed properties when exploring the rock, water, and air. Label the chart *yes* or *no*, according to their votes.

	Changes shape easily	Solids pass through it easily
Rock (solid)		
Water (liquid)		
Air (gas)		

2. Guide the students to recognize the differences and similarities of liquids, solids, and gases by further exploring the contents of the bags. Ask the students if the shape of the solid object can be changed easily. “Pour” the rock on the table and show that the shape cannot be changed easily. Ask the students if they think a pencil can be moved easily through the solid rock. Demonstrate that it cannot. Allow the groups time to explore. Discuss the properties of a solid:
 - Doesn’t change shape easily
 - Another solid cannot be passed through it easily
3. Pick up the bag of colored water and move the water around by tipping the bag. Ask the students if its shape can be changed easily. Pour the water into another container and demonstrate that the shape is now different from the shape of the water when it was in the baggie. Ask the students if they think a pencil can be moved easily through the liquid. Demonstrate that it can. Allow the groups time to try this. Discuss the properties of a liquid:
 - Changes shape easily
 - A solid passes through it easily
4. Pick up the bag of air (gas). Ask the students if its shape can be changed easily. Open the bag and release the air. Then ask the students if a solid can be passed through the air easily.

5. Demonstrate by moving your finger or a pencil easily through the air. Allow the groups time to try this. Discuss the properties of a gas:
 - Changes shape easily
 - A solid passes through it easily

EXTEND/APPLY

Ask students to look around at home for things or for pictures in magazines that represent each of the three states of matter. They should draw or cut out pictures of the objects to share with the class. Have students place the pictures on a class bulletin board under the heading, *Solid, Liquid, or Gas*. Discuss the placement of the pictures as they are put on the bulletin board.

EXTENSIONS

Make a chart showing the properties of three states of matter and post it in an activity center. Fill a box with lots of different items. Liquids could be placed in baggies or in plastic containers with lids. Blow up a baggie and a balloon for the gases. Prepare three large sheets of construction paper with the labels *solid, liquid, and gas*. Instruct students to sort the items by placing them on the construction paper and then ask a classmate to check their work.

ASSESSMENT

Have several items of solids, liquids, and containers with gas. Students will identify objects as solid, liquid, or gas and justify their responses by giving the correct properties.

Choose 3 items from each of the following lists (9 total):

Remind students that we're thinking of what is **inside** the inflated objects.

Solids

block of wood
computer disk
ball of clay
empty glass
pencil

Liquids

water
food coloring
cooking oil
syrup
juice

Gases

inflated balloon
inflated bicycle tire
inflated playground ball
inflated swimming wings
inflated water float

Use the following rubric:

Criteria	Novice	Basic	Exceeds
Correctness of identification	Incorrectly identifies the state of matter.	Correctly identifies the state of matter for 6 of the 9 items.	Correctly identifies the state of matter for all objects.
Accuracy of properties	Does not give a correct property with the state of matter.	Correctly gives a property with the state of matter for 6 of the 9 items.	Correctly gives a property for each state of matter.