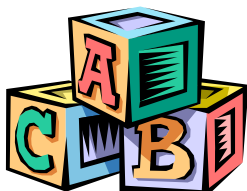


# MIND OVER MATTER

## 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:

<b>Criteria</b>	<b>Novice</b>	<b>Basic</b>	<b>Exceeds</b>
<b>Correctness of identification</b>	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.
<b>Accuracy of properties</b>	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.