

**5th Grade: Lesson 1.1**  
**Activity Sheet**  
**Matter is Made of Tiny Particles**

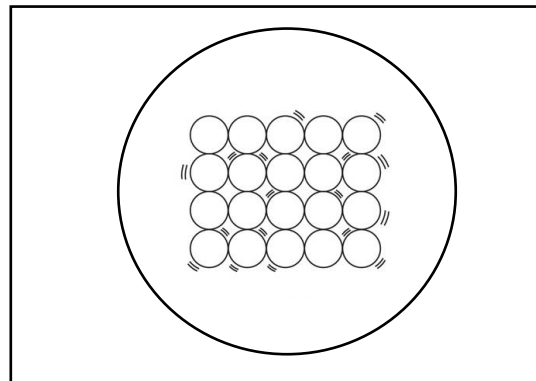
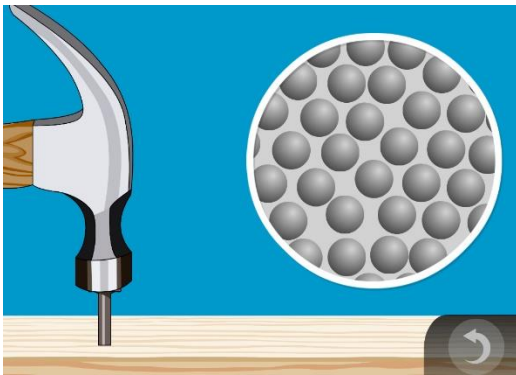
Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Safety:** Wear safety glasses or goggles, and be sure to follow all safety instructions given by your teacher. Wash your hands after completing the activity.

**DEMONSTRATION**

To start the lesson, your teacher demonstrated the hardness of a hammer. You also saw an animation showing a model of the atoms that make up the solid material of the hammer.



Very Attracted

**EXPLAIN IT WITH ATOMS AND MOLECULES**

1. In the round area, draw circles to make a model of the atoms in a solid. Under the drawing, write down whether the atoms are *very attracted*, *somewhat attracted*, or *not attracted* to each other.

**ACTIVITY**

**Question to investigate:**

Is an empty bottle really empty?

**Materials for each group**

- Flexible plastic soda bottle (about 18–20 oz.) with cap
- Balloon

**Procedure**

1. Look at and touch the uncapped bottle.
2. Do you think the bottle is completely empty? **YES** or **NO**  
If not, what do you think is in the bottle?

**No. The bottle contains air which is made up of molecules of different gases.**



### Procedure

1. Carefully put a balloon on the top of the bottle.
2. Hold the bottle and squeeze it until you can't squeeze it any further.



### WHAT DID YOU OBSERVE?

3. What happens to the balloon when you squeeze the bottle?

The balloon inflates a little.

4. The bottle contains gas molecules. What do you think happened to the molecules when you squeezed the bottle and the balloon expanded?

They were forced out of the bottle and into the balloon.

### Question to investigate

Can you force the molecules of a gas to move closer together?

### Procedure

1. Take the balloon off the bottle and put the cap on tightly.
2. Squeeze the bottle.



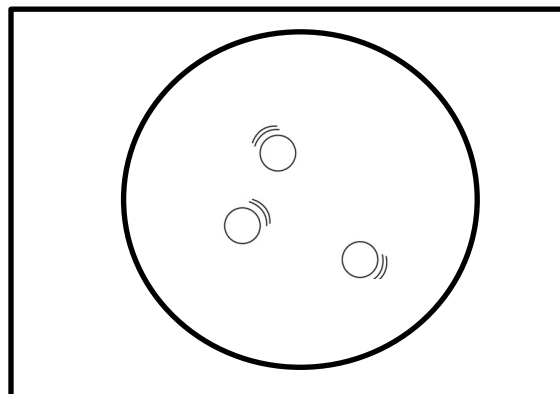
### WHAT DID YOU OBSERVE?

5. Even though the closed bottle with its cap on tight contains gas molecules, were you still able to squeeze the bottle?

Yes, you can squeeze the bottle so you must be able to squeeze gas molecules closer together.

### EXPLAIN IT WITH ATOMS AND MOLECULES

You saw an animation of gas in a bottle with the cap on.



6. In the round area, draw circles to represent the molecules of a gas. Under the drawing, write down whether the molecules are *very attracted*, *somewhat attracted*, or *not attracted* to each other.

Describe how the molecules of a gas act differently than the molecules of a solid.

You can squeeze the molecules of a gas closer together but you can't squeeze the molecules of a solid closer together.

7. You can't squeeze a solid like metal or rock, so what is it about the molecules of a gas that allows you to squeeze it?

The molecules of a gas are much further apart from each other than the molecules of a solid.

### Question to investigate

Can you force the molecules of a liquid to move closer together?

#### Materials for each group

- Flexible plastic soda bottle (about 18–20 oz.) with cap
- Water

#### Procedure

1. Fill the bottle with water to the very top and put the cap on securely.
2. Squeeze the bottle.

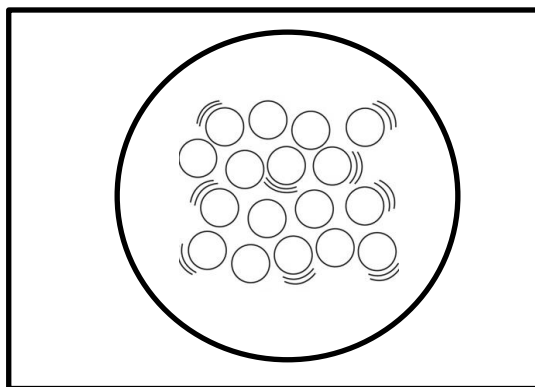


### WHAT DID YOU OBSERVE?

8. Were you able to squeeze the bottle filled with water as much as when there was only air in the bottle? No, it was much harder to squeeze.

### EXPLAIN IT WITH ATOMS AND MOLECULES

You saw an animation of water in a bottle.



Very Attracted, but not as much as a solid

9. Use the round area to draw circles to represent the molecules of a liquid. Under the drawing, write down whether the molecules of the liquid are *very attracted*, *somewhat attracted*, or *not attracted* to each other.

10. Describe how the molecules of a liquid act differently from the molecules of a gas.

The molecules of a liquid are much more attracted to each other than the molecules of a gas, so they are much closer together.

11. Based on your models of the molecules in a gas and a liquid, why do you think a closed bottle of gas is easier to squeeze than a closed bottle of liquid?

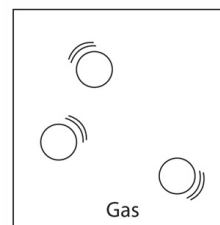
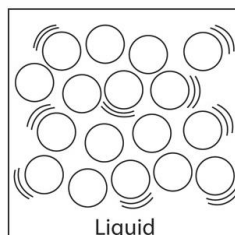
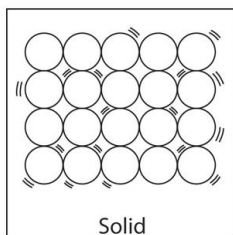
Since the molecules of a gas are much further apart than the molecules of a liquid it is easier to squeeze them together.

### TAKE IT FURTHER

You saw a demonstration in which you saw sand poured into a cup.

12. When sand is poured into a cup, it takes the shape of the cup. Does that make sand a liquid? No, it's very tiny bits of solid.

13. If you could look at the atoms in a single grain of sand, what do you think they would look most like? Like a solid



14. A mound of shaving cream keeps its shape even though it is not in a container. Does that mean that shaving cream is a solid? No. Even though it keeps its shape, it is not a solid.

15. What states of matter is shaving cream made from? Shaving cream is made from a liquid and many tiny gas bubbles which make the shaving cream a foam.

