

Lesson 1

HOW CAN WE SEE MATTER?

THE BIG IDEA

- Matter is made of particles that are too small to see, but we can observe it in other ways.
- A model can explain how gases consist of matter particles that are too small to see and move freely in space.

WHAT I NEED TO KNOW

Matter is all around us. In fact, we are matter! Matter is anything that has mass and takes up space.

You can make observations about matter. For example, you can bounce a ball and feel if it is soft or hard. You can even make changes to matter like tearing a piece of paper into smaller pieces. You can also measure its mass or volume.

While there are many examples of matter, the human eye cannot see the building blocks of all matter—**atoms**.

Atoms can combine in many different ways. One of the simplest combinations creates a **molecule**. A molecule is a group of atoms bonded together. Because atoms and molecules are so small, we can use models of individual atoms to show how atoms bond together to form molecules. A molecule of water, for example, is made of two hydrogen atoms and one oxygen atom.

Individual atoms and molecules are not visible to the eye, but they make up everything around us. This includes matter that is or is not visible to the eye. Think for a moment: how can you observe matter if its tiny **particles** are not visible?

Air is an example of matter you cannot see, but you can observe it. We can observe air by looking at some of the ways air behaves. For

WORDS TO KNOW

matter

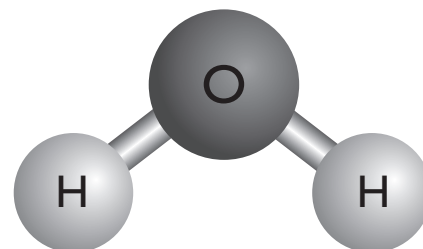
atom

molecule

particle

THINK ABOUT IT

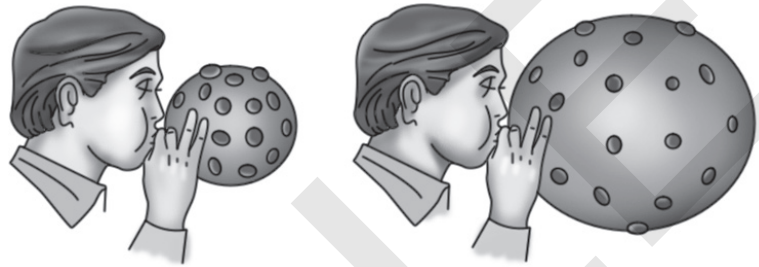
What is the smallest thing you can see using just your eyes? Do you think things exist that are too small to see?



TURN AND TALK

Matter is composed of small particles called atoms. What are some other examples of large objects that are made up of many smaller pieces?

example, think of a balloon. When you blow into a balloon, you can observe the air inflating the balloon and stretching the rubber until the balloon is fully inflated. If you let go, you can observe the air leaving the balloon. Can you think of another example in which you can observe how matter behaves, even if you cannot observe the matter particles?



WHAT I HAVE LEARNED

1. Which is the **best** definition of matter?

- (A) Anything that is visible
- (B) Anything that has mass and takes up space
- (C) Things that can change from visible to invisible
- (D) Things that we cannot see but can observe how it behaves

2. Air is matter that you cannot easily see. Which of the following describes a way you can observe air?

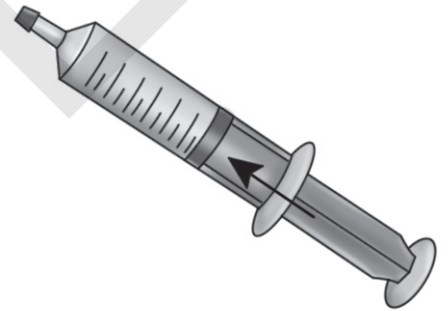
- (A) Watch for particles of air.
- (B) Watch for individual air atoms.
- (C) Watch for air that moves tree branches.
- (D) Watch for air molecules that become visible.

3. A student places several ice cubes in 100 milliliters of water. She leaves for several minutes. When she comes back, there is no ice in the glass, just water. How can she observe that the matter in the ice did not disappear, but it only changed?

- (A) She can feel the water.
- (B) She can look carefully for small particles of ice.
- (C) She can ask if anyone saw the ice melt while she was away.
- (D) She can measure the volume of the water to see if it has increased.

4. A student has made a simple model. It involves a capped syringe and a plunger (there is no needle). The student can move the plunger halfway down the syringe before it can no longer move. What idea is this simple model illustrating?

- (A) Matter escaped from the syringe when pushed.
- (B) There is no matter inside the syringe.
- (C) Matter can be completely compressed when pushed.
- (D) The syringe is filled with matter.



5. Which of the following is **not** matter?

- (A) An idea
- (B) An atom
- (C) A building
- (D) A molecule

◀ HINT, HINT

Remember that matter is everywhere, even if it cannot be seen!

HINT, HINT

You can draw a model of the molecule of carbon dioxide to help you solve this calculation.

6. Carbon dioxide molecules are composed of one carbon atom and two oxygen atoms. If a student wants to draw a model of seven carbon dioxide molecules, how many individual atoms does he need to draw?
- (A) 7
 - (B) 10
 - (C) 14
 - (D) 21
7. Which of the following examples describes an investigation that would allow a student to see particles that at one time were not visible?
- (A) Blow up an empty basketball with air.
 - (B) Tear apart a slice of bread into tiny pieces.
 - (C) Dissolve a spoonful of sugar into a glass of water.
 - (D) Evaporate the water from a glass of salt water.