



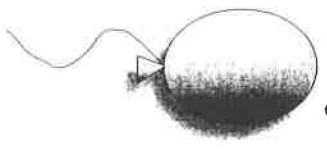
What is Matter?

1. Complete each sentence with a word from the list. Use a dictionary to help you.

atom	mass	matter	molecule	particle
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- a) _____ \$ are made up of more than one atom.
- b) The scientific word that is closest to the everyday word "stuff" is _____.
- c) _____ \$ cannot be divided into smaller bits with everyday tools.
- d) Atoms and molecules are very small _____ \$.
- e) _____ \$ is the property of an object that tells how much matter it contains.

2. The picture below shows sunlight shining on a balloon. Circle **Yes** or **No** to the following questions.



- Yes** **No** a) Is the balloon made of matter?
- Yes** **No** b) Is there any matter inside the balloon?
- Yes** **No** c) Is the sunlight made of matter?
- Yes** **No** d) Is there matter in the air that surrounds the balloon?
- Yes** **No** e) Does the balloon have mass?

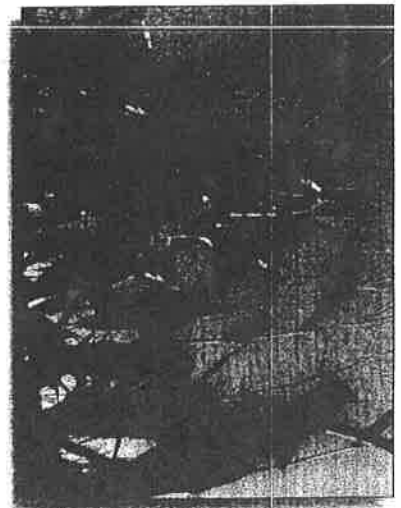


What is Matter?

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atter is what people often call "stuff." In fact, "stuff" sounds almost like the German word for matter, "Stoff." All objects and materials we can touch are made of matter, and all matter takes up space. Rocks, trees, bugs, water, and air are all forms of matter. You are matter. Light, sound, heat, ideas, and wishes are not matter.

Different objects have different amounts of matter. When we measure the amount of matter in something, we say we measure the **property** called **mass**. As long as nothing is added to or removed from an object, its mass does not change. Later, we will look at other properties of matter like **density** and **weight**.



Name **TWO** things that have mass and **ONE** thing that does not have mass.

People have always wanted to know the true nature of matter. For thousands of years most people thought that matter could be divided into smaller and smaller pieces forever. When scientists had better tools, they found that matter is really made of tiny bits. These bits, called **atoms**, cannot be divided into smaller parts with everyday tools. Atoms are one kind of **particle**. When atoms stick together in a group, they form another type of particle called a **molecule**. All the particles in a pure material are the same.

Atoms are very, very small. They are so small that billions of them make up a speck of dust. If you had one penny for every atom in a penny, you would have much more money than everyone in the world put together!



What is Matter?

1. Put a check mark (✓) next to the answer that is most correct.

a) It is possible to measure the mass of all of these things, *except*

- A a fly
- B a sunbeam
- C a polar bear
- D a cotton ball

b) Which of these is a property?

- A atom
- B mass
- C molecule
- D particle

c) Which of these pairs of words *both* refer to kinds of particles?

- A matter and mass
- B mass and atom
- C atom and molecule
- D molecule and matter

2. a) ~~Cross out~~ the words for things that have no mass.

air sound the planet Earth a deep thought an ant an elephant

b) Circle the words for things that have the property of mass.

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c) Underline the words for things made of matter.

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What Is Matter?

3. Imagine trying to divide a piece of gold into smaller and smaller pieces. Even if you could see and cut the smallest pieces of gold, you would reach a point where you would have to stop. Explain why you would have to stop dividing the gold.

4. A cookie has a certain mass. Explain why breaking the cookie in half does not change its mass.

Extensions & Applications

5. People have been trying to understand the true nature of matter for a long time. People in ancient Greece thought about matter more than 2,000 years ago. The big question was whether matter is made of the small bits we call atoms or whether it is just some sort of uniform stuff that can be divided again and again without end. If matter can be divided forever, we would say it is **continuous**. So is matter separate bits, or is it continuous?

a) Study the history of this question by learning what a few famous thinkers and scientists had to say about it.

FIRST find out what two ancient Greeks, named **Democritus** and **Aristotle** thought. Also try to find out which one most people believed.

NEXT learn what **John Dalton** said about matter and atoms 200 years ago. Did other scientists believe him?

Show what you found out about the history of ideas about matter by writing names in the table on the next page.

b) We know now that matter is made of separate bits called atoms. Suppose you didn't know this. Which would make more sense: that things are made of separate bits or that things are continuous? Tell why you think this.
