

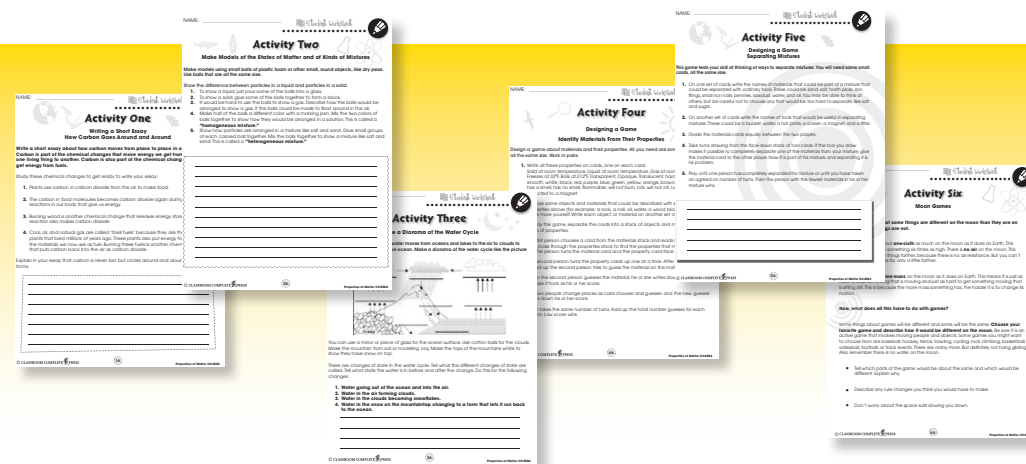
	TEACHER GUIDE	
•	Assessment Rubric	4
•	How Is Our Resource Organized?	5
•	Bloom's Taxonomy for Reading Comprehension	6
•	Vocabulary	6
	STUDENT HANDOUTS	
•	Reading Comprehension	
	1. <i>What Is Matter?</i>	7
	2. <i>Three States of Matter</i>	
	3. <i>Physical Properties of Matter</i>	
	4. <i>Physical Changes of Matter</i>	
	5. <i>Physical Changes vs. Chemical Changes</i>	
	6. <i>Chemical Changes and Chemical Properties</i>	
	7. <i>Mixtures and Solutions</i>	
•	Hands-on Activities	12
•	Crossword	16
•	Word Search	17
•	Comprehension Quiz	18
	EASY-MARKING™ ANSWER KEY	20
	MINI POSTERS	22

FREE! 6 Bonus Activities!

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- Go to our website:
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- Click on item CC4504 – Properties of Matter
- Enter pass code CC4504D





What is Matter?

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

atom mass matter molecule particle

- a) _____s are made up of more than one atom.
 b) The scientific word that is closest to the everyday word "stuff" is _____.
 c) _____s 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?

Matter 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.

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

- c) **Underline** the words for things made of matter.

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



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 2000 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.



Finding Changes In the Kitchen

A picture of a kitchen and kitchen appliances is shown below



Many physical and chemical changes take place in the kitchen.

One physical change is shown by the box and arrow.

- Look at the picture carefully. How many places you can find in the kitchen where physical and chemical changes can happen? You may want to read some things about the science of cooking to help you understand the changes better.
- Make more boxes and arrows like the one above to show where the changes you found take place.
- In the boxes, tell whether each change is a **chemical change** or a **physical change**.
- Tell the **cause** of as many changes as you can. For example, many changes in a kitchen are caused by adding or removing heat.
- If you think you will need more room, copy the picture of the kitchen and paste it onto a larger piece of paper. You may also use a picture like it cut from a magazine or found on the Internet.



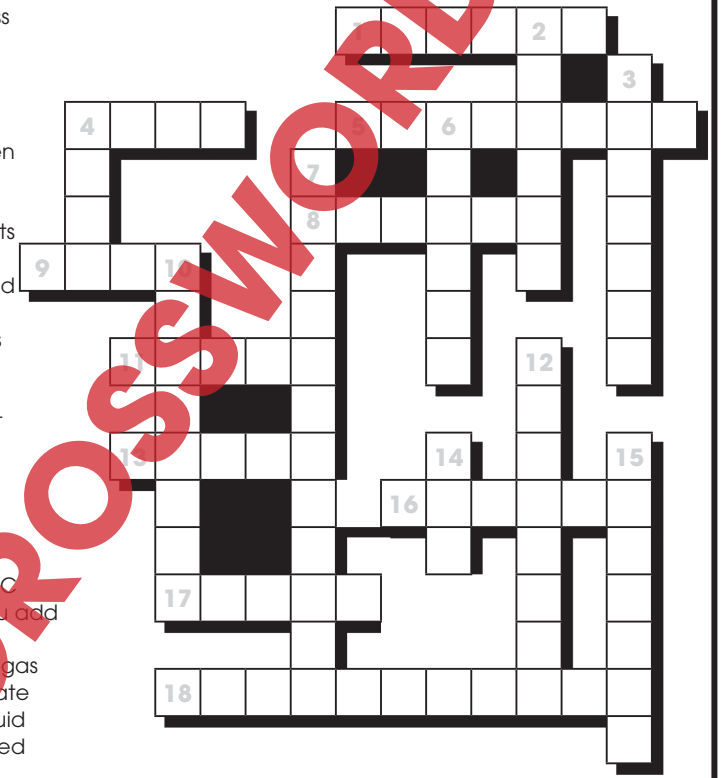
Crossword Puzzle!

Across

- How much space something takes up
- How much matter is in something
- A material dissolved in a liquid
- Something light cannot pass through
- A particle that cannot be divided with everyday tools
- A new material formed when something combines with oxygen
- What iron does when it reacts with oxygen
- Something that has mass and takes up space
- The state of matter that has a fixed shape and a fixed volume
- Some light passes through it and some does not

Down

- See 16 Across
- What water is doing at 212°C
- What a solid does when you add heat
- A material that is not in the gas state and not in the solid state
- The change from gas to liquid
- Two pure materials scrambled together
- Either an atom or a molecule
- Oxygen is one of these
- It keeps you from floating off into space



Comprehension Quiz

Part A

Circle **T** if the statement is **TRUE** or **F** if it is **FALSE**.

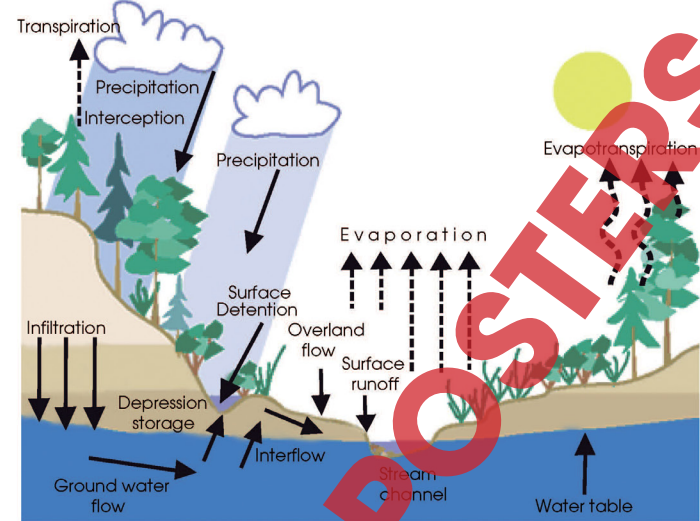
- T F** 1) Mass is a property of matter
- T F** 2) Atoms and particles are two kinds of molecules.
- T F** 3) When water boils, it changes into a new material.
- T F** 4) You would have less weight on the moon than you do on Earth.
- T F** 5) Smashing a pumpkin is a chemical change.
- T F** 6) When salt dissolves in water, it forms a mixture.
- T F** 7) Chemical changes cause atoms to fasten together a different way.

Part B

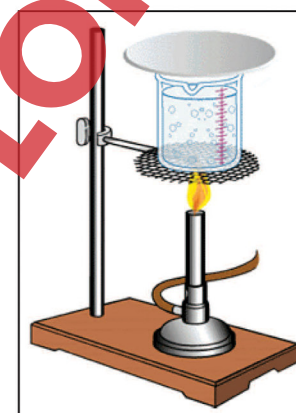
Put a check mark next to the answer that is most correct.

- When water changes from a gas to a liquid it is called
 - A boiling
 - B condensation
 - C evaporation
 - D freezing
- Which is a property of glass?
 - A It is soluble
 - B it is opaque
 - C it is flammable
 - D it is transparent
- Which tool could be used to separate sugar from water?
 - A a screen
 - B a refrigerator
 - C a kitchen stove
 - D a bucket of water

Phase Changes



Evaporation as water leaves ocean, Condensation as water forms clouds, Freezing as water goes from clouds to snow, and Melting as water goes from snow-capped mountains to run off.



Boiling



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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.

3. You would come to a piece that was just one atom.

Answers will vary

12

4. No mass is lost in physical changes.

5. Accept any reasonable answer.

10

a) Democritus and Dalton

b) Aristotle

c) Aristotle

d) Dalton

e) Dalton

11

A. No

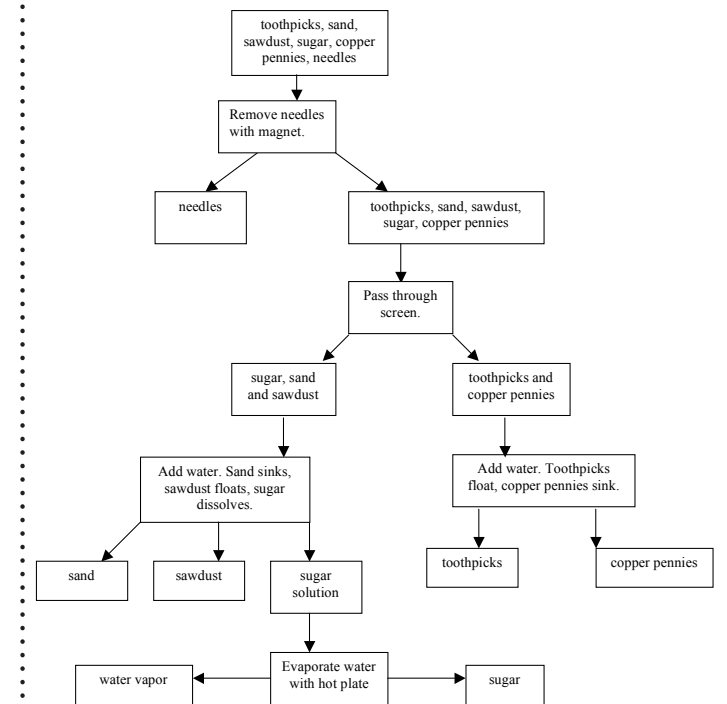
B. Yes

C. No matter could enter or leave in the first experiment. In the second experiment, no iron left, but oxygen from the air combined with the iron and added to the mass.

D. Yes, because the mass gained by the rusting iron equaled the mass lost by the air.

13

14



EASY MARKING ANSWER KEY