SCIENCE GRADE 5

Spring Break Learning

March 10-14

2025

The Department of Curriculum & Instruction

Hello MSCS Family,

This resource packet was designed to provide students with activities that can be completed during the Spring Break Academy independently or with the guidance and supervision of family members or other adults. The activities are aligned to the TN Academic Standards for Science and will provide additional practice opportunities for students to develop and demonstrate their knowledge and understanding. A suggested pacing guide is included. However, students can complete the activities in any order over three days. Below is a table of contents that lists each activity.

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5th Grade Science: Why Does Matter Matter?	
Grade Level Standard(s)	5.PS1.1: Analyze and interpret data from observations and measurements of the physical properties of matter to explain phase changes between a solid, liquid, or gas.
Caregiver Support Option	Help your student by guiding them through the reading and answering the questions.
Materials Needed	*Why Does Matter Matter?* Article
Essential Question	How are the particles in matter organized?
Learning Outcome	Students will design a model to show their understanding of the structure of the three states of matter.

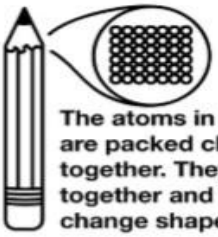
Why Does Matter Matter?

by Kelly Hashway

What do trees, air, and water have in common? They all have matter. That means they take up space. You might be wondering why these things look so different if they all have matter. Everything found on Earth can be grouped into one of three states of matter: solid, liquid, or gas. In order to figure out which state of matter an object fits in, we have to examine its properties. The properties we look at are shape, mass, and volume. Mass is the amount of matter an object has, and volume is the amount of space the matter takes up.

Solid

Solids are easy to recognize. They have definite shape, mass, and volume. Trees are solids. They are made up of tiny particles called atoms. These atoms are packed closely together, and they hold the solid in a definite shape that does not change. If you look around your house, you will see lots of solids. Televisions, beds, tables, chairs, and even the food you eat.



The atoms in a solid are packed closely together. They bond together and do not change shape.

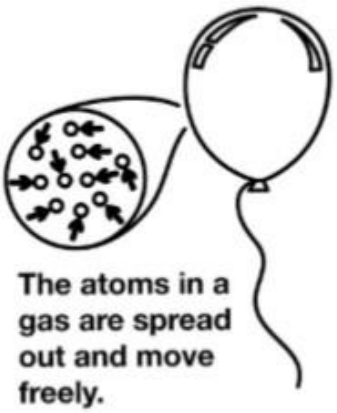
Liquid

Liquids do not have definite shape, but they do have definite mass and volume. Liquids are similar to solids because their atoms are close together, but what makes a liquid different is that those atoms can move around. Liquids can change shape by flowing. If you've ever spilled a glass of milk, then you know it spreads out across the floor. It does this because the milk is taking the shape of the floor. Since liquids do not have a definite shape of their own, they will take the shape of their containers. This is why the same amount of milk can look different in a tall glass, a wide mug, or spread out on your kitchen floor.

The atoms in a liquid are close together. They slide around.

Gas

Gases do not have definite shape or volume. Like liquids, gasses will take the shape of their containers. If a gas is not in a container, it will spread out indefinitely. This is because the atoms in a gas are spaced farther apart than in a solid or a liquid. And being spread out like this allows them to move around freely. Think about the air you breathe everyday. That air is spread across the empty space around the earth. You've probably also noticed that you usually cannot see the air. This is another property of gases. Even though we cannot see them, you come in contact with them everyday. There's air in the tires of your family car and your bicycle. There are many different types of gas in the earth's atmosphere, such as oxygen, carbon dioxide, nitrogen, water vapor, and helium.



The atoms in a gas are spread out and move freely.

When trying to remember the three states of matter, think about water. If it freezes into a solid, it becomes ice. Its atoms are packed together keeping its shape. Of course, we know water can also be a liquid. It flows in rivers or it can be poured from a glass. When water evaporates it becomes water vapor, a type of gas in the air. Try a little experiment of your own by placing an ice cube in a covered glass or container. You will be able to observe the ice first in its solid form and then watch as it melts into a liquid to become water. Eventually the water will turn to water vapor and your glass or container will be filled with this gas.

You can see three different states of matter in this picture. The pot is made of solid matter. The water inside the pot is liquid. When the liquid is heated it becomes water vapor, which is a gas.

Matter is everywhere! Can you find a solid, a liquid, and a gas around you right now?

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solids	volume	container	matter	ice	juice
gases	mass	atoms	chair	oxygen	melting
liquids	shape	space	milk	helium	

Choose a word from the box to complete each sentence.

1. The three basic properties of matter are _____,

   _____, and _____.

2. All matter is made up of tiny particles called _____.

3. Volume is the amount of _____ that matter takes up.

4. Mass is the amount of _____ an object has.

5. Liquids take the shape of their _____.

6. _____ do not have a definite shape or volume.

7. _____ do not have a definite shape, but they do have a definite volume.

8. _____ have a definite shape and volume.

9. A _____ and _____ are examples of solids.

10. _____ and _____ are examples of liquids.

11. _____ and _____ are examples of gas.

12. Solid ice is _____ when it is changing into a liquid.

5th Grade Science: Adventure on A Hot Air Balloon	
Grade Level Standard(s)	5.PS1.1: Analyze and interpret data from observations and measurements of the physical properties of matter to explain phase changes between a solid, liquid, or gas.
Caregiver Support Option	Help your student by guiding them through the directions.
Materials Needed	*Adventure on A Hot Air Balloon* Article
Essential Question	Help your student by guiding them through the reading and answering the questions.
Learning Outcome	Students will design a model to show their understanding of the structure of the three states of matter.

Adventure on a Hot Air Balloon

by ReadWorks

The wind is starting to blow stronger, and when you're riding in a basket under a hot air balloon, just 400 feet above ground, that's not necessarily a good thing. Keith Rodriguez looks to the horizon and squints. He had planned to take off from Scioto Downs, a horse racetrack south of Columbus, Ohio, fly a few miles north, and land his balloon in a barren cornfield next to his pickup truck.

Then the wind changed. Instead of a light breeze from the south, now Rodriguez's bright red balloon is getting hit by stronger, colder winds headed west. He has plenty of propane fuel in his tank-he probably could ride the wind halfway to Pennsylvania. But that would be dangerous. Rodriguez's choice of landing sites just became very limited. As the balloon switches direction and floats east, everything below becomes a wide carpet of suburban sprawl-big-box stores, major highways, and strip malls. Beyond the stores lie forests.

The only factor in Rodriguez's favor is that it's early, just after 7 a.m. The highways are filling up with people driving to work, but otherwise the morning is quiet and still.

"Oh boy," Rodriguez thinks. "If I don't land, like now, this could get bad."

The balloon has no propeller or engine, so Rodriguez can't change direction on his own-he's entirely dependent on the wind. The only thing he controls is altitude. He does this by changing the air temperature inside the balloon.

Sitting on the floor of the wicker gondola are three tanks of liquid propane. The tanks are connected via black rubber hoses to two burners overhead. Each burner is nearly as big as Rodriguez's head. Rodriguez turns a knob on one side of the burners. This releases propane from a tank into the heating coil, where the liquid propane is heated to a gas and mixed with the air. Then the mixture is ignited by a pilot light. The

mixture catches fire, and flames leap two feet high into the balloon.

The balloon rises. Rodriguez has a plan in mind. The flame heats the air inside the nylon balloon. This works on a simple principle: hot air is lighter than cold air. One cubic foot of air weighs about an ounce. If you heat that air by 100 degrees Fahrenheit, its weight drops by about 7 grams. This means every cubic foot of heated air inside Rodriguez's balloon can lift about 7 grams. Just by himself, Rodriguez weighs 170 pounds, which equals about 77,110 grams. That means he needs about 11,016 cubic feet of hot air just to raise his own body off the ground. This is why hot air balloons are so big-they must trap tremendous amounts of heated air. Rodriguez's balloon is a common size, trapping about 100,000 cubic feet of air. The balloon is 80 feet tall and 60 feet wide. As Rodriguez gives his short burst of flame, the air inside swirls in complicated, invisible patterns.

To drop in altitude, Rodriguez can pull a cord attached to a parachute valve at the very top of the balloon. Since the hottest air sits at the top, this releases the balloon's most buoyant air, which makes the balloon descend.

Rodriguez gives the cord a short pull, and the gondola drops a little.

"I don't have an altimeter, and I can't really see anything happening inside the balloon," Rodriguez thinks. "I have to pilot by feel."

Pushed by the wind, the balloon is flying quickly now. It's floating over the back wall of a supermarket when Rodriguez grabs hold of the parachute valve cord and gives it a long, hard tug. The balloon drops. Quickly. The hot air balloon is sinking, but still flying forward.

It looks as though it's about to slam into the edge of the supermarket's roof, but it sails over it, with only about 15 feet to spare. Still, Rodriguez does not let go of the cord. He drops and drops, right between the light poles of the nearly empty parking lot. Just a few feet above the ground, Rodriguez releases the parachute cord, turns the knob above his head and fires both burners. The steep descent slows. The gondola touches lightly against the asphalt, and then drags to a stop. There are only two people in the parking lot, standing near the entrance to the store. They look toward the balloon, their eyes and mouths open wide in shock.

"That was a little closer than I expected," Rodriguez says to himself, laughing. "I really needed to land quick."

Use the article "Adventure on a Hot Air Balloon" to answer questions 3 to 4.

13. The only thing Keith Rodriguez controls in his hot air balloon is altitude. How does he control the balloon's altitude?

_____

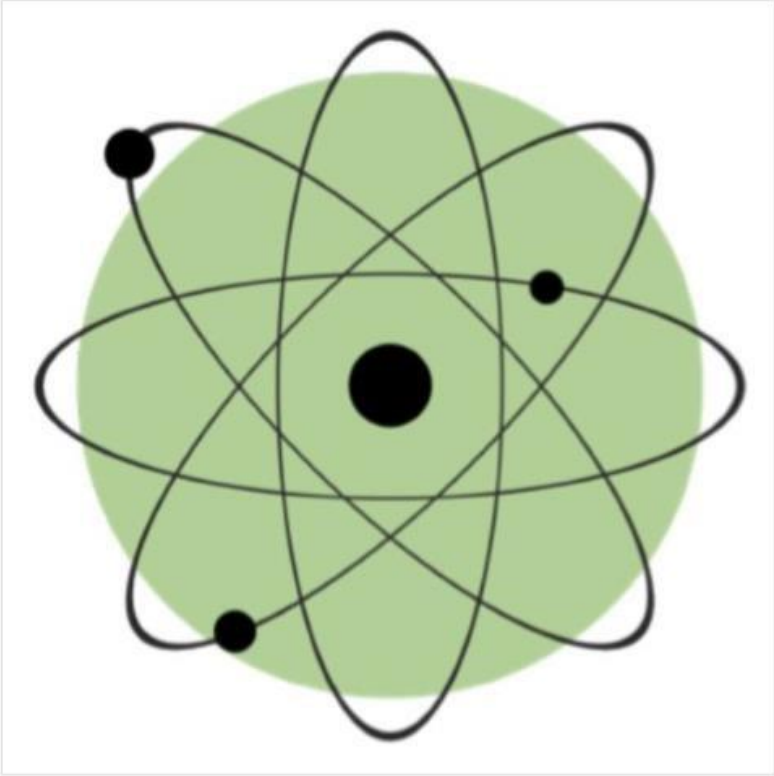
_____

_____

4. What property of propane does Rodriguez change using the burner? Support your answer with evidence from the text.

5th Grade Science: Matter Is Everywhere!	
Grade Level Standard(s)	5.PS1.4: Evaluate the results of an experiment to determine whether the mixing of two or more substances result in a change of properties.
Caregiver Support Option	Help your student by guiding them through the directions.
Materials Needed	*Matter Is Everywhere!* Article
Essential Question	How can one explain the structure, properties, and interactions of matter?
Learning Outcome	The particles in matter affect its properties.

Matter Is Everywhere!



Everything around us is made of matter—your clothes, the trees, even the water you drink! We divide **matter** into four major categories, which are called the four **states** of matter: liquid, gaseous, solid, and plasma. However, we will focus on the first three. Whatever the **state** of **matter** may be, all matter is made of tiny particles called atoms. These particles are too tiny to see with the naked eye;

they're even too small to see with a regular microscope. If you line up a million atoms next to each other, they will be as thick as a single piece of human hair. So, we can only look at atoms through very powerful tools, one of them being the "scanning tunneling" microscope.

How Do We Know?

We can easily see liquids and solids around us, but most gases aren't visible. We can't see the air around us, but it is still made of atoms that constantly move around freely in space. How can we tell?

Take a balloon, for example. When we pump air into a balloon, it visibly inflates. That means that gaseous **matter** is filling the balloon and taking up space. The more air we blow into the balloon, the bigger it gets. Therefore, we can observe the way gas moves around space. In the same way, inflatable pool toys also fill with air so that they can float on water. When we fill the plastic shells with air, the toys take shape. Since air is lighter than water, the pool toys can rest on the water without sinking. And then we can enjoy a sunny day while floating in a pool!

Moving Atoms

Atoms are constantly moving. However, atoms move at different speeds within different **states** of **matter**. Atoms move more slowly when they are more densely packed. Atoms in solids are usually tightly packed and have less space to move around freely. This means that atoms in most solids move more slowly than atoms in most liquids.The atoms in gas usually move the fastest. Since the atoms usually move more freely in liquids and gases, they can undergo a process called diffusion. (Solids can diffuse as well, although it's a much longer process.) Diffusion is the movement of particles from a higher concentration to a lower concentration. That's why, when you spray perfume in a corner of a room, you

will eventually smell it on the other side of the room. The atoms from the perfume diffuse through the air. Because of this diffusion, the perfume scent is spread.

Identification

We can **identify** materials according to a variety of properties. Scientists have determined several different measurements to help label materials. Some examples are temperature, hardness, color and length. Usually, these are used to measure solids, like rocks and minerals. However, temperature can be used to measure liquids as well. When geologists study rocks, they often use the Mohs scale of mineral hardness. This scale allows us to characterize the scratch resistance of various minerals. A diamond is described as hard because it is extremely difficult to scratch. Scientists can measure hardness with the Mohs scale and compare minerals to other minerals.

Scientists always use various methods to group materials together—that way, it's easier to study and compare them. That's another reason why we differentiate between liquids, gases, solids and plasmas!

1. Everything around us is made of

A. liquids

B. matter

C. plasma

D. gas

2. Why does the author describe the balloon and inflatable pool toys filling up with air?

A. in order to explain that it is impossible to observe the way gas moves around space

B. in order to explain that air is not made of atoms that take up space

C. in order to explain that air is made of atoms that take up space even though air is invisible

D. in order to prove that these are fun objects to inflate

3. Usually, atoms move slower in solids than they do in liquids. Which evidence from the passage best supports this statement?

A. Solids, liquids, and gases can all undergo the process of diffusion.

B. Diffusion is the movement of particles from a higher concentration to a lower concentration.

C. The atoms in gas move the fastest.

D. Atoms in solids are often more tightly packed than atoms in liquids, and have less space to move around freely.

4. Based on the passage, the corner where a perfume is initially sprayed has

A. has no concentration of perfume particles

B. has the same concentration of perfume particles as the rest of the room

C. a lower concentration of perfume particles than the other corners of the room

D. a higher concentration of perfume particles than the other corners of the room

5. What is this passage mainly about?

A. matter and the properties it has in certain states

B. the process of diffusion

C. the different measurement scientists use to label materials

D. the inflation of balloons and pool toys

6. Read the following sentences from the passage: "Whatever the state of matter may be, all matter is made of tiny particles called atoms. These particles are too tiny to see with the naked eye; they're even too small to see with a regular microscope. If you line up a million atoms next to each other, they will be as thick as **a single piece of human hair**."

The author uses the example of "**a single piece of human hair**" to illustrate

A. how atoms can be seen with a regular microscope
B. how tiny atoms actually are
C. how hairy atoms actually are
D. how much they look like hair

7. Choose the answer that best completes the sentence below.

Scientists group materials together _____ it is easier to compare and study them that way.

A. however
B. but
C. although
D. because

8. Explain why atoms move at different speeds depending on whether they are in liquids or solids.

9. What is diffusion?

10. Explain whether smoke filling up a room is diffusion or not.

5th Grade Science: Why Does Matter Matter?	
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Solid

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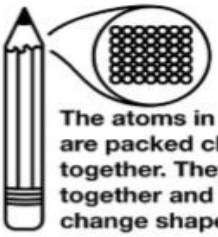


The atoms in a solid are packed closely together. They bond together and do not change shape.

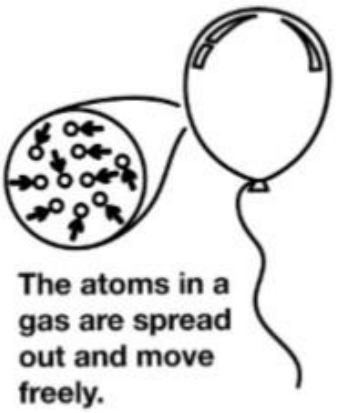
Liquid

Liquids do not have definite shape, but they do have definite mass and volume. Liquids are similar to solids because their atoms are close together, but what makes a liquid different is that those atoms can move around. Liquids can change shape by flowing. If you've ever spilled a glass of milk, then you know it spreads out across the floor. It does this because the milk is taking the shape of the floor. Since liquids do not have a definite shape of their own, they will take the shape of their containers. This is why the same amount of milk can look different in a tall glass, a wide mug, or spread out on your kitchen floor.

The atoms in a liquid are close together. They slide around.

Gas

Gases do not have definite shape or volume. Like liquids, gasses will take the shape of their containers. If a gas is not in a container, it will spread out indefinitely. This is because the atoms in a gas are spaced farther apart than in a solid or a liquid. And being spread out like this allows them to move around freely. Think about the air you breathe everyday. That air is spread across the empty space around the earth. You've probably also noticed that you usually cannot see the air. This is another property of gases. Even though we cannot see them, you come in contact with them everyday. There's air in the tires of your family car and your bicycle. There are many different types of gas in the earth's atmosphere, such as oxygen, carbon dioxide, nitrogen, water vapor, and helium.



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ANSWER KEY

Why Does Matter Matter?

by Kelly Hashway

solids	volume	container	matter	ice	juice
gases	mass	atoms	chair	oxygen	melting
liquids	shape	space	milk	helium	

Choose a word from the box to complete each sentence.

1. The three basic properties of matter are volume, mass, and shape.
2. All matter is made up of tiny particles called atoms.
3. Volume is the amount of space that matter takes up.
4. Mass is the amount of matter an object has.
5. Liquids take the shape of their container.
6. Gases do not have a definite shape, mass, or volume.
7. Liquids do not have a definite shape, but they do have a definite volume.
8. Solids have a definite shape and volume.
9. A chair and ice are examples of solids.
10. Milk and juice are examples of liquids.
11. Oxygen and helium are examples of gases.
12. Solid ice is melting when it is changing into a liquid.

5th Grade Science: Adventure on A Hot Air Balloon	
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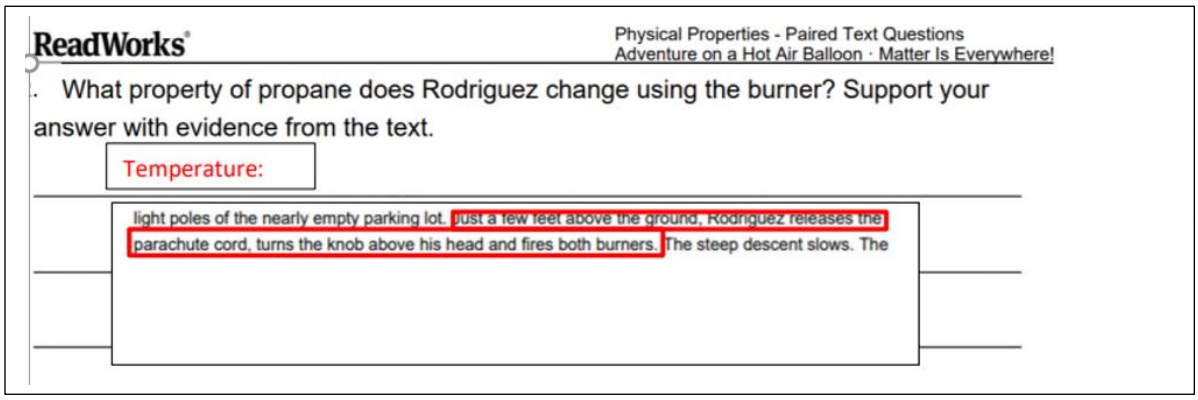

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Temperature:

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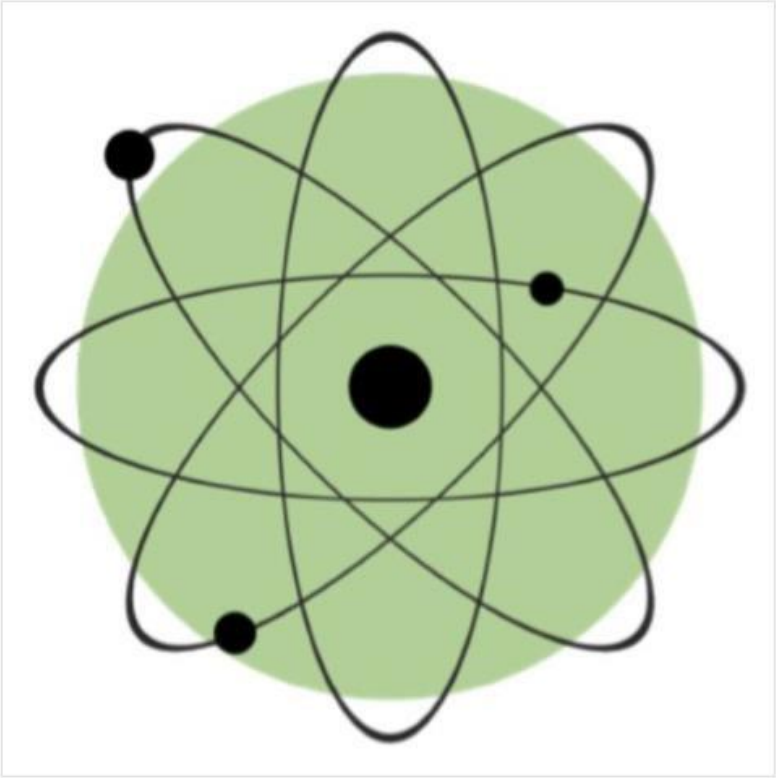
Matter Is Everywhere!



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Moving Atoms

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Identification

We can **identify** materials according to a variety of properties. Scientists have determined several different measurements to help label materials. Some examples are temperature, hardness, color and length. Usually, these are used to measure solids, like rocks and minerals. However, temperature can be used to measure liquids as well. When geologists study rocks, they often use the Mohs scale of mineral hardness. This scale allows us to characterize the scratch resistance of various minerals. A diamond is described as hard because it is extremely difficult to scratch. Scientists can measure hardness with the Mohs scale and compare minerals to other minerals.

Scientists always use various methods to group materials together—that way, it's easier to study and compare them. That's another reason why we differentiate between liquids, gases, solids and plasmas!

1. Everything around us is made of

A. liquids

B. matter

C. plasma

D. gas

2. Why does the author describe the balloon and inflatable pool toys filling up with air?

A. in order to explain that it is impossible to observe the way gas moves around space

B. in order to explain that air is not made of atoms that take up space

C. in order to explain that air is made of atoms that take up space even though air is invisible

D. in order to prove that these are fun objects to inflate

3. Usually, atoms move slower in solids than they do in liquids. Which evidence from the passage best supports this statement?

A. Solids, liquids, and gases can all undergo the process of diffusion.

B. Diffusion is the movement of particles from a higher concentration to a lower concentration.

C. The atoms in gas move the fastest.

D. Atoms in solids are often more tightly packed than atoms in liquids, and have less space to move around freely.

4. Based on the passage, the corner where a perfume is initially sprayed has

A. has no concentration of perfume particles

B. has the same concentration of perfume particles as the rest of the room

C. a lower concentration of perfume particles than the other corners of the room

D. a higher concentration of perfume particles than the other corners of the room

5. What is this passage mainly about?

A. matter and the properties it has in certain states

B. the process of diffusion

C. the different measurement scientists use to label materials

D. the inflation of balloons and pool toys

6. Read the following sentences from the passage: "Whatever the state of matter may be, all matter is made of tiny particles called atoms. These particles are too tiny to see with the naked eye; they're even too small to see with a regular microscope. If you line up a million atoms next to each other, they will be as thick as **a single piece of human hair**."

The author uses the example of "**a single piece of human hair**" to illustrate

A. how atoms can be seen with a regular microscope
B. how tiny atoms actually are
C. how hairy atoms actually are
D. how much they look like hair

7. Choose the answer that best completes the sentence below.

Scientists group materials together _____ it is easier to compare and study them that way.

A. however
B. but
C. although
D. because

8. Explain why atoms move at different speeds depending on whether they are in liquids or solids.

9. What is diffusion?

10. Explain whether smoke filling up a room is diffusion or not.

Matter Is Everywhere! Answers

1. B. matter
2. C. in order to explain that air is made of atoms that take up space even though air is invisible
3. D. Atoms in solids are often more tightly packed than atoms in liquids, and have less space to move around freely.
4. D. a higher concentration of perfume particles than the other corners of the room
5. A. matter and the properties it has in certain states
6. B. how tiny atoms actually are
7. D. because
8. Students should indicate that the speed of the atoms is determined by the amount of space they have to move in. Atoms move slower in solids than they do in liquids. That's because atoms in solids are tightly packed and there is less space to move around freely.
9. Diffusion is the movement of particles from a higher concentration to a lower concentration.
10. Students should argue that smoke filling up a room is diffusion because the smoke particles are moving from an area of high concentration (the area where the smoke is coming from) to low concentration (the areas of the room the smoke is moving towards).