Name _____ **Date** _____

The Physical Properties of Matter

Key Words		
conductor	gas	insulator
liquid	mass	matter
freezing point	physical property	melting point
solid	volume	plasma
weight	magnetism	boiling point

What do leaves on a tree, gravel on a driveway, water in a pond and people all have in common? All of these objects are made of matter. **Matter** is anything that takes up space and has mass. All living and non-living things are made up of matter. Even things you can't see, like air, are made of matter.

Have you ever thought about the different types of matter you see and use every day? From the time you get up in the morning until you go to bed at night, you rely on matter. Cotton hoodies keep you warm when it's cool. Plastic containers keep your lunch fresh. Different kinds of matter can be useful to you in many ways.

Suppose you want to describe something like water to someone else. What would you say? How might you describe it? We describe substances and objects by their color, their shape, their size, and so on. These descriptive words are called **physical properties**. When you describe water, you might say that it is a clear, colorless liquid at room temperature. Water flows, takes the shape of its container, and has no odor. Water becomes solid when frozen and turns to vapor (a gas) when it is heated. We are able to use water for certain jobs because of its physical properties. We use the physical properties of matter to help us classify, or group, objects. Physical properties are what make one thing different from another.

One of the simplest properties of matter that we can observe is its state—whether the matter is solid, liquid, or gas. A **solid** has a definite shape and volume (the amount of space that matter takes up). **Liquids** take the shape of their container and have a definite volume. A **gas** has no definite shape or volume. There is a fourth state of matter called **plasma**. Plasma is a gas so hot that its tiny particles begin to fall apart. Plasma is found in stars, but is not normally found on the Earth. However, plasma can be created in certain science laboratories.

Matter can have many other physical properties. To help describe objects, we can measure their mass, weight and size. **Mass** is the amount of matter in an object or substance. **Weight** is the measure of the pull of gravity on an object. **Magnetism** is also a physical property. Magnets are objects that pull some materials closer. We say

that magnets attract certain objects when they pick them up or stick to them. Magnets attract things that contain iron. Iron is said to be magnetic because it reacts to the pulling force of a magnet.

Some materials are very useful to us because they can conduct heat, electricity, or light. **Conductors** allow energy to flow freely. Most metals are good conductors of heat and electricity. Other materials are **insulators**. These materials stop or slow down the movement of energy.

When heat energy is added to or subtracted from matter, its temperature changes. For example, when water is heated to its **boiling point**, tiny water particles begin to move faster and faster. As their speed increases, these particles take up more space. They change from a liquid to a gas as the water bubbles. When matter changes state, a change in phase has occurred. The boiling point of water is about 100°C (degrees Celsius). When solid matter reaches its **melting point,** there is a phase change from a solid to a liquid. The melting point of solid water (ice) is about 0°C. Phase changes can also occur when heat energy is removed from matter. When the temperature of water falls to about 0°C, the water will begin to freeze. The **freezing point** of a liquid is the temperature at which the liquid changes to a solid.

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1. An ice cube is placed near a hot lamp. All off the following are likely to happen **EXCEPT**—

   A a change in state
   B melting
   C formation of a liquid
   D freezing

2. Which of the following would be most useful for separating steel paper clips from sand?

   A 50 mL of water
   B A hair dryer
   C A magnet
   D A tea strainer

3. When a piece of butter melts on a piece of hot toast, the butter has reached its—

   A boiling point
   B melting point
   C liquid point
   D freezing point

4. What is the approximate melting point of frozen water?

   A 0°C
   B 10°C
   C 100°C
   D 1000°C

5. Which of the following lists of physical properties correctly identifies the air we breathe?

A gas, magnetic, does not conduct sound, conducts heat

B gas, nonmagnetic, conducts sound, conducts heat

C gas, magnetic, conducts electricity well, conducts heat

D gas, nonmagnetic, does not conduct electricity, does not conduct heat

6. Unknown substances are classified based on their physical properties. Some students were asked to classify a substance. The substance's physical properties were: light-weight solid, nonmagnetic, does not conduct electricity, is a good heat insulator, and does not conduct sound well. The unknown substance is MOST LIKELY—

A a large metal spoon

B an aluminum pie pan

C a glass baking dish

D a Styrofoam bowl

7. A certain scientist likes to drink hot coffee out of a particular cup that his son gave him. One day he used a different cup and noticed that the coffee stayed warm a lot longer. Which of the following is a possible explanation for this occurrence?

A He drank his coffee in a warmer room.

B He used a different brand of coffee.

C The second cup was a better insulator than the first.

D His coffee pot made the coffee cooler.

8. A science student is grouping a set of objects by their physical properties. She has a wooden craft stick, an iron nail, a glass marble, an aluminum ball, a copper penny, and a cotton ball. The student can BEST separate the metals from the nonmetals by determining which objects will—

A conduct electricity

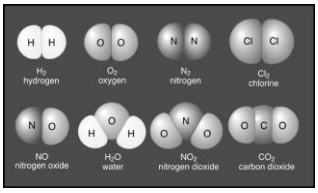
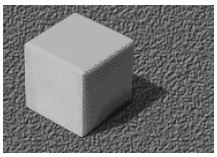
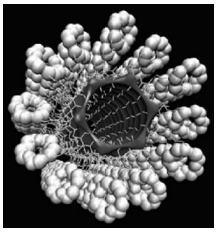
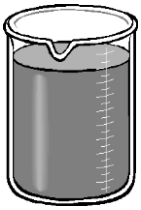
B melt easily

C be attracted to a magnet

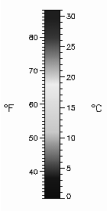
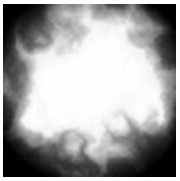
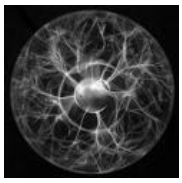
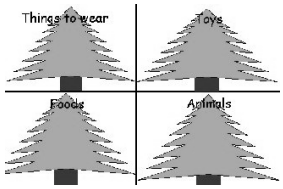
D burn in a fireplace

9. In the table below, list some substances with which you are familiar. Describe as many properties of those substances as possible in the second column. Two objects have been listed to get you started.

Substance	**Physical Properties**
Copper penny	Shiny, conducts electricity, nonmagnetic, conducts heat, solid, hard, smooth, copper colored
Cotton ball	White, fluffy, soft, nonmagnetic, can be pulled apart into strings, has no odor

1  **matter**	2  **solid**
3  **gas**	4  **physical properties**
5  **conductor**	6  **Boiling point**
7  **insulator**	8  **liquid**
9  **volume**	10  **mass**
11  **melting point**	12  **weight**

18 **The characteristics of a substance that can be observed or measured without changing the substance**	20 **The amount of matter in an object**
17 **The temperature at which a solid changes to a liquid**	16 **The state of matter that has a definite volume but takes the shape of its container**
19 **A material that allows electricity or heat to flow easily**	13 **Anything that takes up space and has mass**
24 **A material that slows or stops the flow of electricity or heat**	14 **The state of matter that has no definite volume and takes the shape of its container**
15 **The temperature at which a liquid changes to a gas**	22 **The amount of space an object takes up**
21 **The state of matter that has a definite shape and volume**	23 **The measure of the pull of gravity on an object**

1  **temperature**	2  **heat**
3 **describe**	4  **freezing point**
5  **vapor**	6 **plasma** 
7  **magnetism**	8  **states of matter**
9  **measure**	10  **classify**
11  **thermometer**	12  **observe**

23 **The measure of how hot or cold an object is**	16 **The energy of moving particles in a substance**
19 **A force that pulls magnetic materials across a distance**	21 **A very hot gas found mainly in stars**
13 **A tool used to measure the temperature of matter**	17 **The forms that matter can take (solid, liquid, gas)**
18 **To collect information about matter by using tools**	24 **To sort matter according to physical or chemical properties**
14 **To tell about in words or pictures**	22 **Water in its gaseous state**
15 **The temperature at which a liquid changes to a solid**	20 **To look at carefully with attention to details**