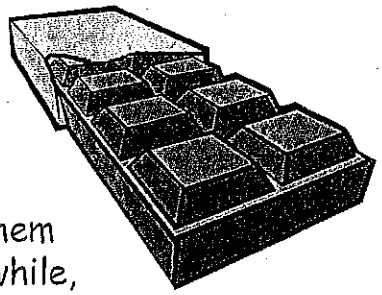
Name _____

1—Observable Physical Properties of Objects & Materials

A [1]Have you ever seen the color of a snowflake? [2]Have you felt the softness of a pillow or the roughness of sandpaper? [3]These qualities that describe objects or materials are their **properties**.

B [4]Physical properties are properties that we can easily **observe** with our **senses**—by seeing, hearing, touching, or smelling. [5]Color, hardness, texture, size, shape, and smell are physical properties.

C [6]Physical properties are helpful when we need to identify substances. [7]Sometimes two different substances can appear the same until we observe them more closely. [8]For example, both salt and sugar are white, are made up of small crystals, and look powdery. [9]You might not be able to tell them apart by just looking, though. [10]A piece of brown plastic might look just like a piece of chocolate. [11]However, they melt at different temperatures. [12]If you hold them in your hand awhile, you'll see which is the real chocolate by the mess it makes!



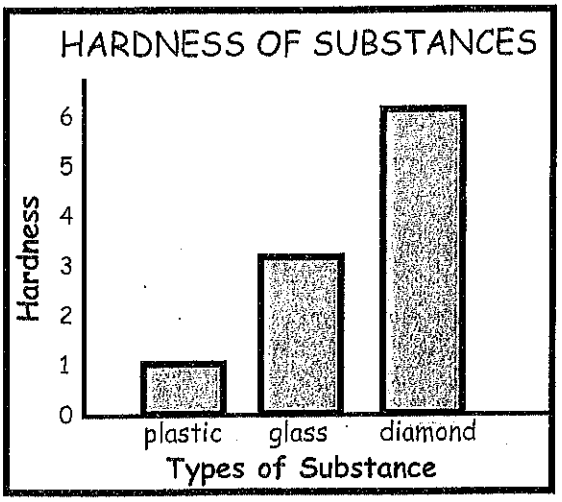
D [13]The temperature at which a substance starts changing from solid to liquid is its **melting point**. [14]When a substance boils, it is at its **boiling point**. [15]The melting point and the boiling point are physical properties of a substance. [16]Some melting and boiling points are listed below.

Melting Points		Boiling Points	
salt	800°	water	100°
sugar	450°	alchohol	80°
ice	0°	mercury	350°

800° means 800 degrees. Degrees are given in Celsius, described in the next lesson.

Mercury is the liquid used in thermometers.

E [17]Melting points, boiling points, and other kinds of information can be displayed by using a **bar graph**. [18]This type of diagram is often used by scientists to compare information. [19]The graph below allows you to compare the hardness of three substances.



1. For each statement, circle T or F for true or false. In each blank, write the letter of the PARAGRAPH that gives the best evidence for your answer.

   a. An object's size is a physical property. T F ___

   b. Physical properties are difficult to see. T F ___

   c. Bar graphs are rarely used in science. T F ___

2. Which of the following conclusions does the *Hardness of Substances* graph support? Circle Yes or No for each.

   a. Glass is harder than plastic.
   Yes No

   b. Glass could scratch a diamond.
   Yes No

   c. Plastic is harder than rubber.
   Yes No

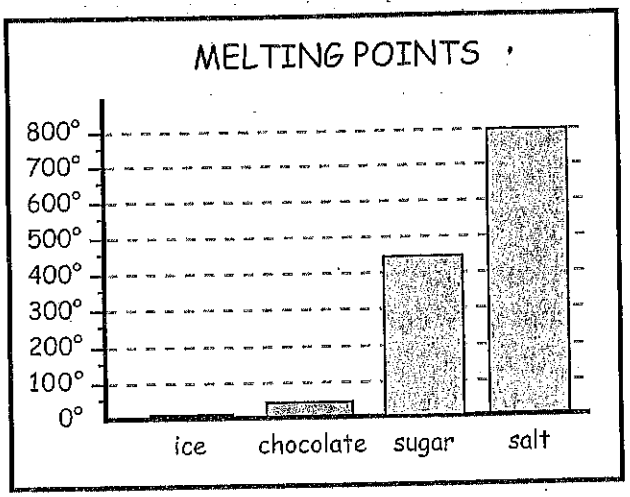
3. What is the increase in temperature from the time ice melts until it boils?

   a. 100 degrees c. 800 degrees
   b. 450 degrees d. 0 degrees

4. What is the most likely meaning of *observe*, as it is used in sentence 4?

   a. figure out c. explain
   b. notice d. ignore

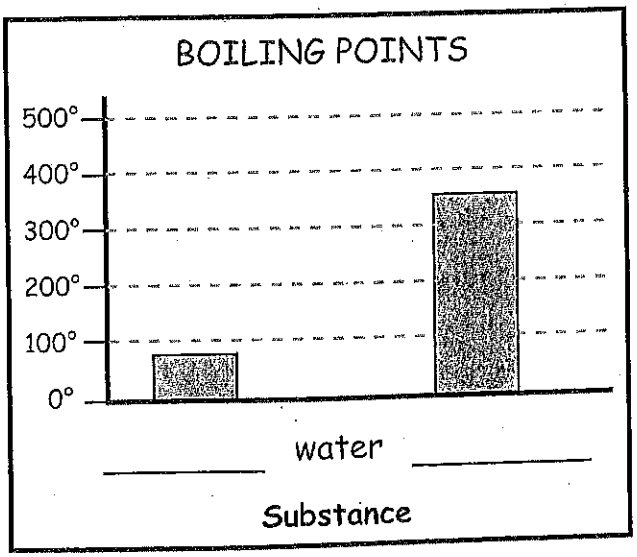
5. Look at the bar graph below, and then answer the question.



   What is the difference between the melting points of chocolate and sugar?

   a. 100 degrees c. 400 degrees
   b. 250 degrees d. 700 degrees

6. Complete the bar graph below. Write the labels *mercury* and *alcohol* under the bars showing their boiling points. Above the *water* label, draw a bar to show the boiling point of water.



2—Measuring Physical Properties

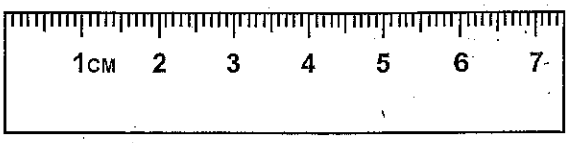
A [1]Before you dress for school, you need only know whether it is very cold or hot outside. [2]But in science, it is important to know the *exact* temperature.

B [3]When you measure carefully to get exact information, you are being accurate. [4]**Accuracy** is making careful measurements that are exactly correct. [5]How could you be more accurate about describing the temperature outside? [6]You might look at a thermometer and read the numbers giving the exact temperature.

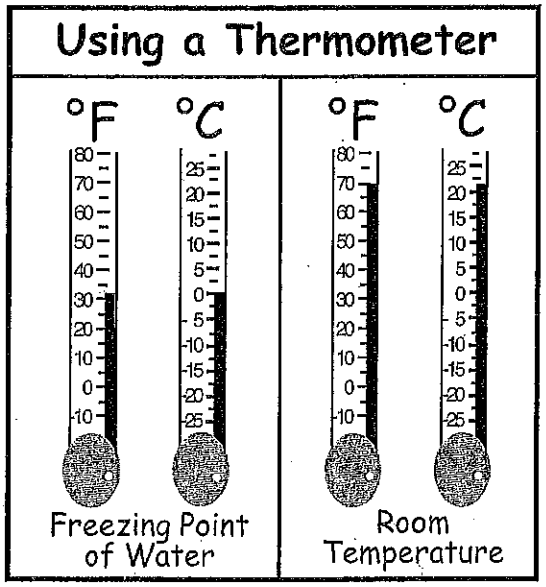
C [7]**Temperature** is a measure of how hot or cold an object is. [8]When you use a thermometer to find how hot or cold something is, you are measuring a physical property. [9]Therefore, the temperature of the air outside is a physical property. [10]**Measuring** is using a tool to accurately describe a physical property—for example, using a thermometer to measure temperature.

D [11]Can you name other physical properties and the tools that are used to measure them? [12]You already know that you can measure weight using a bathroom scale. [13]The length of an object can be measured using a ruler. [14]When making a cake, you would need to measure how much space flour takes up—its *volume*.

E [15]Saying that something has a big or small size is not an accurate way to describe it. [16]To be accurate, you must use a tool like a **metric ruler**, shown below: [17]A metric ruler accurately measures short distances like the width of a coin or the length of a paper clip.



F [18]A **thermometer** is a tool that accurately measures temperature. [19]It is made of a hollow glass or plastic tube. [20]At the bottom of the tube is a bulb filled with a red liquid. [21]When the liquid gets warmer, it takes up more space. [22]So as the liquid heats up, it climbs the hollow tube. [23]As it cools down, it takes less space and goes lower.



G [24]The unit used to measure temperature is the *degree*. [25]Its symbol is a small circle. [26]Notice that there are two different temperature scales. [27]One is the Fahrenheit (F) scale, and the other is the Celsius (C) scale.

1. For each statement, circle T or F for true or false. In the blanks, write the letter(s) of the PARAGRAPH(s)that give the best evidence for your answer.

   a. An accurate measurement is a correct measurement.
   T F ____

   b. Students need to know the exact outside temperature before dressing for school.
   T F ____

   c. Weight is measured with a ruler. T F ____, ____

2. Room temperature is about

   a. 0° F. c. 22° F.
   b. 22° C. d. 15° C.

3. If you need two cups of sugar to make cookies, what physical property will you measure?

   a. volume c. temperature
   b. height d. weight

   Which sentence provides the best evidence for your answer?
   ____

4. Write the abbreviation for each kind of temperature scale.
   Fahrenheit _____ Celsius _____

   It is 32° C outside. It is probably which season? (Use the thermometers in the lesson to see what 32° Celsius equals in Fahrenheit degrees.)

   winter summer

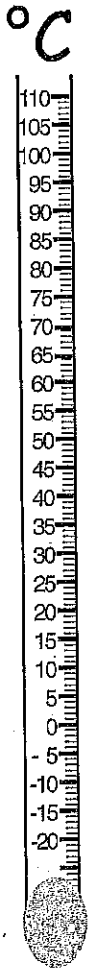
5. Place each coin on the metric ruler and measure its length. (You may round to the nearest 1/2 cm.)

   a. dime _____ cm
   b. nickel _____ cm
   c. quarter _____ cm

6. The difference in size between a dime and a quarter is _____ the difference between a dime and a nickel.

   a. the same as
   b. larger than
   c. smaller than

For questions 7 and 8, see *Using a Thermometer* in the lesson.



7. On the thermometer at the right, circle the Celsius temperature that is the same as 32° Fahrenheit. Label it "F."

8. On the thermometer at the right, draw a box around the Celsius temperature that is the same as room temperature. Label it "R."

9. True or false: Thermometers use liquids that take up less space as they get warmer.

   T F

   Which sentence provides the best evidence for your answer?
   ____

3—Classification of Matter

A [1]Imagine trying to find a book in a library if the thousands of books were not organized into topics. [2]It would be difficult! [3]Could you find a book about baseball in a library that did not have a section called sports? [4]You would have to search through all the books until you found the one you were looking for. [5]It might take weeks! [6]To make it easy to find what you want, libraries organize books with similar topics together.

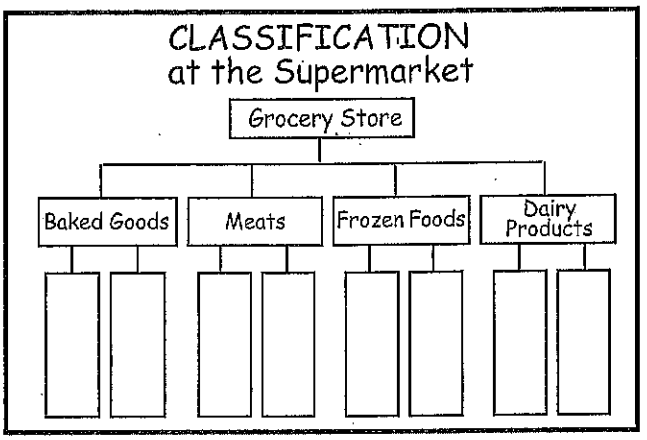
B [7]A **classification system** is used to *organize* things or ideas so that they are easy to find or use. [8]Classification systems are made up of categories. [9]A **category** is a group of things that have a lot in common. [10]Once the system has been created, any new thing or idea can be easily put in the right place.

C [11]Classification systems are used all the time to help scientists organize information and ideas. [12]For example, they organize information about matter. [13]**Matter** is anything that takes up space and has mass. [14]**Mass** means how much stuff an object is made of. [15]Scientists classify matter into three categories: solid, liquid, and gas.

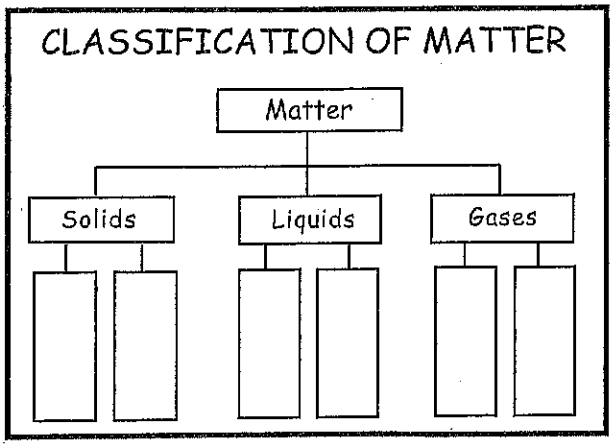
D [16]Scientists also classify matter as either a metal or a nonmetal. [17]If a material is shiny and hard, it is considered a metal. [18]If it is not shiny and is soft, it is a nonmetal. [19]Wood and chalk are nonmetals; iron and silver are metals.

E [20]Often, it is helpful to make a diagram of a classification system. [21]This makes it easier to see how categories are connected to each other. [22]A **classification chart** shows how categories are organized in a classification system.

F [23]For example, think about the way a grocery store organizes what it sells into categories. [24]Can you think of examples to put in each food category below?



G [25]Below is a chart showing how a scientist might classify different forms of matter into categories. [26]Can you think of examples of solids, liquids, and gases that belong in the categories of the chart below?



1. For each statement, circle T or F for true or false. In each blank, write the number of the SENTENCE that gives the best evidence for your answer.

   a. You are likely to find a book about the basketball player Michael Jordan in the science section of the library. T F ___

   b. A classification system can help organize foods into similar groups. T F ___

   c. Solids, liquids, and gases belong to a group called *matter*. T F ___

   d. Matter is anything that takes up space and has mass. T F ___

2. The oxygen that we breathe can be classified in which group of matter?

   a. metals c. gases

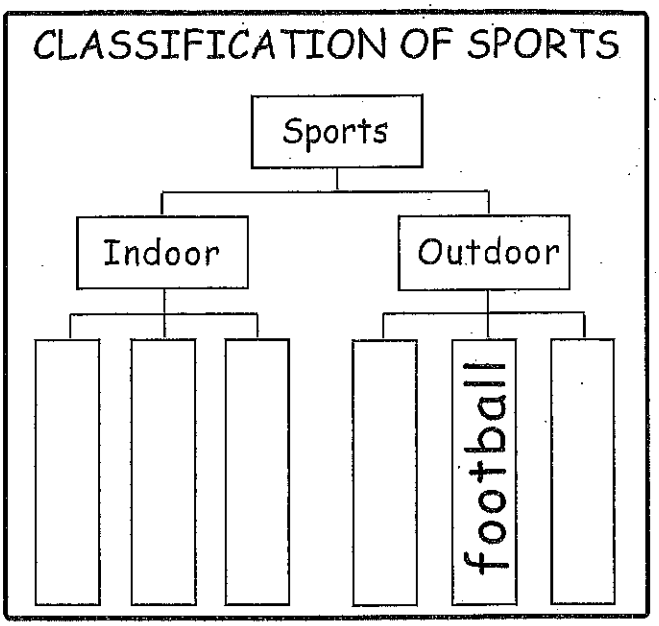
   b. solids d. liquids

3. What is the most likely meaning of *organize* as it is used in sentence 7?

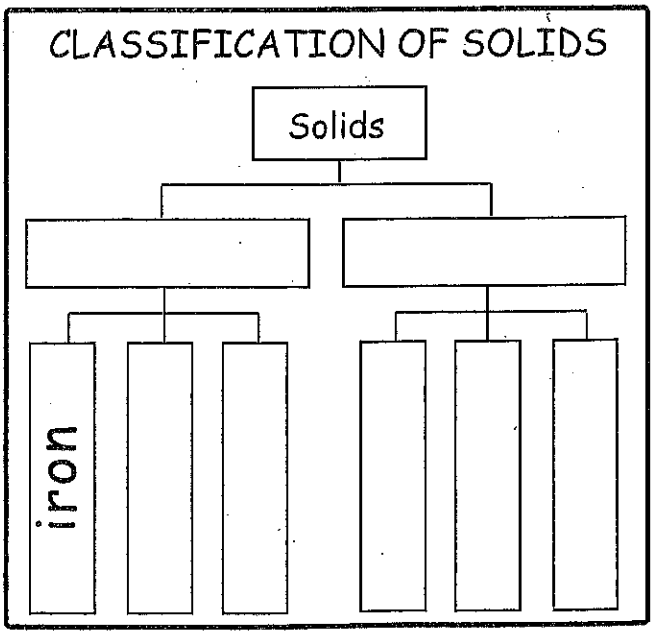
   a. recycle c. throw out

   b. put in order d. put together

4. Look at the classification chart below. Think about sports that you have seen or played. Finish filling in the chart.



5. Think about the differences between metals and nonmetals, and then finish filling in the chart below. Use paragraph D to help you.



4—States of Matter

A [1]For many years, people did not know what matter was made of. [2]The ancient Greeks tried to figure out what would happen if a rock were broken into smaller and smaller pieces.

B [3]They predicted that you would get to a point where you could not break it down further. [4]You would be left with tiny particles. [5]They would be so small that you would not be able to see them with your eyes. [6]They called these particles *atoms*. [7]An **atom** is the building block of all matter.

C [8]Matter can be classified into three states: solid, liquid, or gas. [9]In the **solid state**, atoms are tightly packed and move very little; they vibrate but stay in one place. [10]In the **liquid state**, atoms can move enough to slide past each other. [11]In the **gas state**, atoms are free from one another and move quickly, so they are farther apart.

D [12]The states of matter can be described by *shape*. [13]Think of brick, water, and air as examples of matter in the three states. [14]In which state does matter always keep the same shape? [15]In which states can the shape change?

E [16]The states of matter can also be described in terms of **volume**. [17]Volume is the amount of space an object takes up. [18]Do you think the volume of a solid is constant? [19](If you move a brick, will its volume change?) [20]How about gas in a balloon after it is heated so the atoms move far apart? [21]Does the volume of gas change?

F [22]To easily understand information, we can organize it in a table. [23]For example, the table below makes it easy to compare information about utility vehicles. [24]See if you can tell which vehicle costs the most money. [25]Which gets the best gas mileage? [26]Which would be the best choice for a large family?

Utility Vehicles

	Miles per Gallon (fuel)	Number of Passengers	Price of Vehicle
Pickup Truck	17	3	$25,000
Minivan	20	7	$30,000
SUV	12	5	$35,000

G [27]Tables are very useful for organizing information—maybe that's why science textbooks are filled with them! [28]Tables make it easy to learn by comparing. [29]The table below arranges information about solids, liquids, and gases. [30]Look at the table and think about the following questions. [31]Does a solid have a definite shape? [32]Do atoms of gas move slowly or quickly?

States of Matter

	Movement of Atoms	Definite Shape?	Definite Volume?
Solid	vibration	yes	yes
Liquid	slow	no	yes
Gas	quick	no	no

1. For each statement, circle T or F for true or false. In each blank, write the number of the SENTENCE that gives the best evidence for your answer.

   a. All things are made of atoms. T F ____

   b. Metal is one of the three states of matter. T F ____

   c. In a gas, atoms stay together in one place. T F ____

2. When ice melts, it changes into water. It goes from a solid state into a liquid state. Describe what happens to the motion of the atoms when ice melts.

   _____

   _____

   _____

   Write the numbers of the two sentences that give the best evidence for your answer. ____, ____

3. What is the most likely meaning of the word *particles*, as it is used in sentence 6?

   a. large pieces c. the whole thing

   b. rocks d. small pieces

4. Use the information in the *Utility Vehicles* table in the lesson to complete the following chart. In each blank cell, write PT (for Pickup Truck), MV (for Minivan), or SUV. (Remember: it is best to have the most room and the least cost!)

Utility Vehicles

	Miles per Gallon (fuel)	Number of Passengers	Price of Vehicles
Best			
Worst			

5. Complete the table below. Show how the atoms might be spaced apart in a liquid and in a gas (atoms of a solid are drawn for you).

   Also, describe the speed of movement of atoms in a solid and in a liquid (the movement of gas is described for you).

States of Matter

State	Spacing of atoms	Movement of atoms
solid		
liquid		
gas		quick

5—Change of Phase

A [1]Rub your hands together quickly for 10 seconds then hold them to your face. [2]Notice how warm your palms feel. [3]When you rubbed your hands, you created *friction*. [4]Friction produces **heat**, a form of energy.

B [5]It took muscle energy to move your hands. [6]Was the muscle energy changed into heat energy when you rubbed your palms together?

C [7]When you rub your hands together quickly, the atoms that make up your skin move faster. [8]As they do, they produce friction, and friction produces heat. [9]Therefore, your palms get warmer. [10]Heat can also come from other sources, such as fire, the sun, or an electric stove. [11]When heat from any source is applied to a substance, the atoms in that substance speed up and the substance gets warmer.

You put a warm substance in the refrigerator. Is heat removed from the substance? What happens to the speed of the atoms?

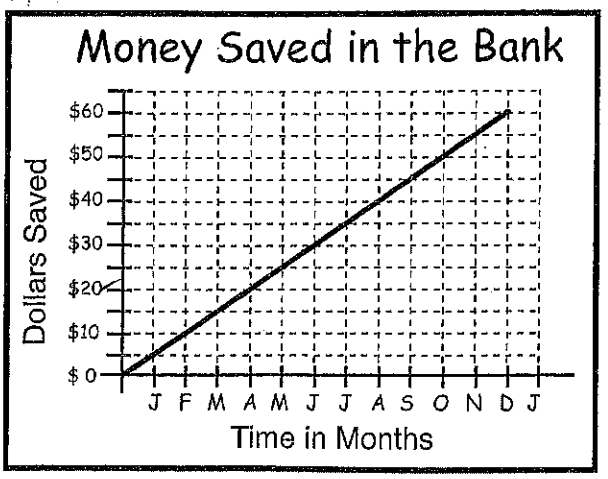
D [12]The atoms of a solid normally move very little. [13]As you add more heat to a solid, its atoms move faster and faster. [14]When enough heat is added, the solid melts. [15]That means that when enough heat is *applied* to a solid, it changes state from a solid to a liquid. [16]This change in state from solid to liquid is called **melting**. [17]Think of a similar definition for *freezing*.

E [18]When there is a change in state because atoms have speeded up or slowed down, scientists say that there has been a **change in phase**.

F [19]Now think about liquids. [20]If enough heat energy is applied to a liquid, it will become a gas. [21]As water is heated, it gets hotter and hotter until it boils. [22]A gas called water vapor is produced. [23]If the water is left to boil long enough, all the water will vaporize. [24]**Vaporization** is the change in phase from a liquid to a gas.

G [25]Sometimes a gas will lose heat and return to liquid. [26]Think of a hot shower. [27]The hot water produces a lot of water vapor. [28]You may have seen what happens when hot water vapor touches a cold surface like a bathroom mirror! [29]The vapor cools and changes into a liquid. [30]The change in phase from a gas to a liquid is called **condensation**.

H [31]A **line graph** shows how one thing affects another over a period of time. [32]The line graph below shows what happens when you deposit 5 dollars a month in a savings account. [33]Think about how much money you save as time goes by. [34]How much money do you save in 3 months?



1. For each statement, circle T or F for true or false. In the blanks, write the letter(s) of the PARAGRAPH(s)that give the best evidence for your answer.

   a. Friction produces energy. T F ____

   b. Cooling an object speeds up its atoms. T F ____, ____

   c. A solid can become a liquid by slowing its atoms. T F ____

   d. A vapor is a gas. T F ____

2. Look again at the graph called *Money Saved in the Bank*. How much money has been saved after 1 year and 1 month? (Hint: use a ruler to continue the line.) _____

3. What is the most likely meaning of *applied to*, as used in sentence 15?

   a. taken off c. removed from

   b. made into d. added to

   Write the number of the sentence that gives the best evidence for your answer. _____

4. Does it take energy to change liquid water into water vapor? ____

   Write the letter of the paragraph that best supports your answer. ____

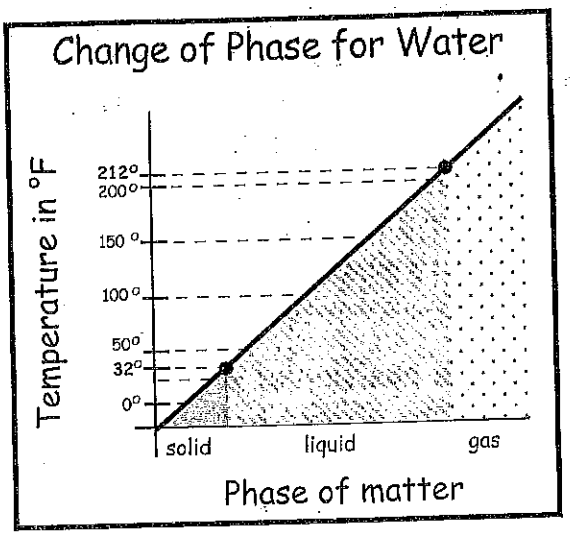
5. Based on paragraph D, what is a likely definition for *freezing*?

   _____

   _____

   _____

Use the graph below to answer questions 6 and 7.



6. Which statement is supported by the graph? Water is

   a. a solid at 190° F.

   b. a gas at 190° F.

   c. a liquid at 190° F.

   d. a vapor at 0° F.

7. Look at the graph above. Water is in which phase of matter at the following temperatures? (S = solid, G = gas, L = liquid)

   a. 19° F _____ c. 230° F _____

   b. 90° F _____ d. 0° F _____

8. What could you do to a bathroom mirror to prevent it from fogging up during a hot shower?

   _____

   _____

   Write the letter of the paragraph that best supports your answer. ____

6—Position, Distance, and Motion

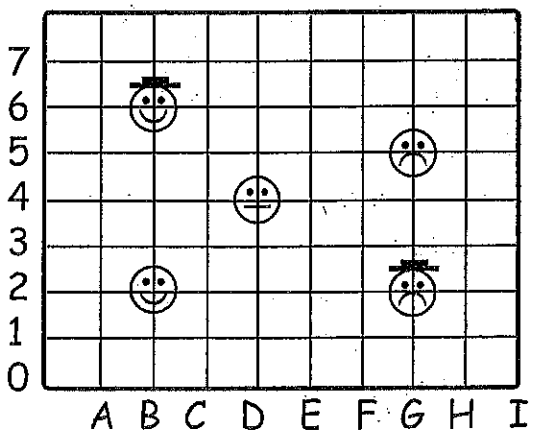
A [1]When you tell someone where an object is, you describe its position. [2]**Position** is the exact *location* of an object. [3]Think about lost treasure. [4]A treasure map describes the exact position of a treasure chest. [5]Knowing the object's position helps you find it easily.

B [6]If the position of an object has changed, the object has moved. [7]Motion describes the movement of an object from one place to another. [8]Therefore, **motion** is a change of position.

C [9]The measurement of how much an object's position has changed is **distance**. [10]Distance can also be the measurement from one object to another. [11]Think about the distance from your home to your school or the distance between your knee and your ankle. [12]Long distances are usually measured in kilometers or miles. [13]Short distances are usually measured in centimeters or inches.

D [14]Another measurement that involves distance and motion is speed. [15]We think of speed as how fast an object is moving. [16]If two cars are traveling from New York to Boston and one gets there before the other, one changed its position faster. [17]**Speed** is a measurement of distance traveled during a period of time. [18]Speed is measured in units of distance and time, for example in miles per hour.

Finding the Position of an Object



E [19]The diagram above shows the positions of happy and sad faces. [20]Each face is located at a place where a vertical line and a horizontal line cross each other. [21]A **vertical** line goes up and down. [22]A **horizontal** line goes left and right. [23]Look at the happy face wearing a hat. [24]Two lines are passing through it. [25]One line is vertical. [26]The other line is horizontal.

F [27]Find the number of the horizontal line going through the happy face wearing a hat. [28]Find the letter of the vertical line. [29]The position of the happy face wearing a hat is at the point where line B and line 6 cross each other. [30]In other words, the happy face wearing a hat is at B6. [31]What is the position of the sad face wearing a hat?

G [32]A diagram that uses vertical and horizontal lines to show a position is called a **grid**. [33]Grids can be labeled with letters or numbers or both. [34]The letters and numbers used to tell the exact position of an object on a grid are called the **coordinates**.

1. For each statement, circle T or F for true or false. In the blanks, write the number(s) of the SENTENCE(s) that give the best evidence for your answer.

   a. Time is a part of speed.
   T F ___, ___

   b. Things can change position without moving. T F ___

   c. Scientists use the word *distance* to mean movement from one place to another.
   T F ___

2. Look at the grid in the lesson. Write the coordinates of each object next to its description. The first one is done for you.

   a. Sad face with no hat G 5

   b. Happy face with no hat ___ ___

   c. Face with no expression ___ ___

   d. Sad face with a hat ___ ___

3. What is the most likely meaning of the word *location*, as it is used in sentence 2?

   a. motion

   b. objects

   c. certain place

   d. passage of time

4. Look at the grid in the lesson. Find a point exactly between the two happy faces. What are the coordinates of that point? ___ ___

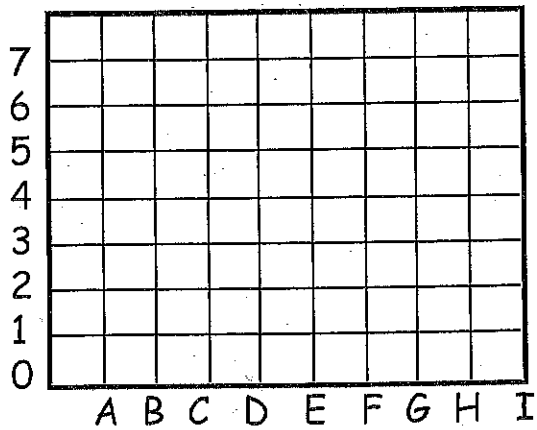
5. On the grid below, draw the faces listed at the coordinates given.

   a. ☺ at B2

   b. ☹ at G5

   c. 😐 at E4

   d. 😇 at H3



6. The map below uses coordinates to help find cities. Next to each city, write the correct letter and number coordinates.

   a. Miami, FL ___ ___

   b. Los Angeles, CA* ___ ___

   c. San Francisco, CA ___ ___

   d. Chicago, IL ___ ___

   *southern California