

## States of Matter

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

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

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

D. These states of matter can be described by *shape*. Think of brick, water, and air as examples of matter in the three states. In which state does matter always keep the same shape? In which states can the shape change?

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

F. To easily understand information, we can

organize it in a table. For example, the table below makes it easy to compare information about utility vehicles. See if you can tell which vehicle costs the most money. Which gets the best gas mileage? 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. Tables are very useful for organizing information—maybe that's why science textbooks are filled with them! Tables make it easy to learn by comparing. The table below arranges information about solids, liquids, and gases. Look at the table and think about the following questions. Does a solid have a definite shape? 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      b. rocks
  - c. the whole thing    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 Vehicle
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	OOOO OOOO OOOO	
Liquid		
Gas		<b>Quick</b>

## Position, Distance, and Motion

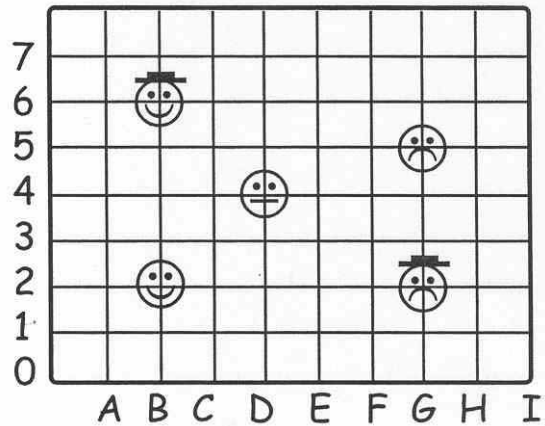
A. When you tell someone where an object is, you describe its position. Position is the exact location of an object. Think about lost treasure. A treasure map describes the exact position of a treasure chest. Knowing the object's position helps you find it easily.

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

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

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

### Finding the Position of an Object



E. The diagram above shows the position of happy and sad faces. Each face is located at a place where a vertical line and a horizontal line cross each other. A vertical line goes up and down. A horizontal line goes left and right. Look at the happy face wearing a hat. Two lines are passing through it. One line is vertical. The other line is horizontal.

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

G. A diagram that uses vertical and horizontal lines to show a position is called a grid. Grids can be labeled with letters or numbers or both. 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   6     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?

### Heredity

- A. Which rabbit is most likely to survive in snowy Alaska? One that is white or one that is brown? White, of course. Where do you think the color of a rabbit's fur comes from? It comes from the rabbit's parents. This lesson is about the passing of characteristics like fur color from parent to offspring.
  
- B. Offspring are the children of people or the young of animals. Pups are the offspring of dogs. Cubs are the offspring of bears or lions. Can you think of other types of offspring?
  
- C. Characteristics are a category used to describe how an object looks. For example, fur color is a characteristic of rabbits. Seed shape is a characteristic of pea plants.
  
- D. However, when describing specific characteristics of organisms, scientists use a different term. A trait is an exact characteristic of an organism. For example, white fur and brown fur are traits of a rabbit. Smooth or wrinkled seeds are traits of a pea plant. Can you name three traits of a person you know?

## Animal Needs and Animal Behavior

- A. Animal use energy to do work. For example, a lion uses energy to hunt, get shelter, and communicate. Like other mammals, a lion also uses energy to keep a constant body temperature, digest food, keep its heart beating, and breathe.
- B. In order to survive, animals must use energy to get what they need from their environment. For example, if a lion is hungry, it must track its prey and then run fast to catch it. If there is a storm, a lion must use energy to find shelter. An animal uses energy to move so it can get what it needs.
- C. When an organism reacts to something, it responds. For example, a lion responds to thirst by drinking. How would you respond to a cold day? Would you add more clothing or take it off?
- D. Anything that makes you use energy is called a stimulus. Rain is a stimulus. It makes you go inside. Thirst is a stimulus as well. It makes you get a drink. Moving inside and drinking are responses. Each of these stimuli causes a response. Ducking a snowball, laughing at a joke, and coming in out of the cold are responses. Responses use up energy. Animals need energy to respond to stimuli in their environment. Therefore, animals need energy to survive.
- E. The response of an animal to a stimulus is called a behavior. For example, animals respond to thirst by drinking water. Drinking is a behavior. Animals respond to fear by running away. Running away is a behavior, too.

What behavior do people show when they are happy? When they are sad?

F. Some behaviors are responses to stimuli in the environment. A typical response to cold weather is to look for shelter. Other behaviors are responses to stimuli that happen inside the animal. For example, thirst is an inside stimulus. Can you think of another example of an inside stimulus?

G. Some responses are automatic. When you feel cold, you shiver. What happens when you touch something very hot? You jerk your fingers back without thinking about it. When a behavior is automatic, it is called a reflex. When a dog scratches an itch, the scratching is a reflex.

H. Look at the *Animal Behavior* chart below. It contains a list of stimulus/response pairs.

ANIMAL BEHAVIORS

Stimulus	Internal	External	Response
Hunger	X		Get food, eat
Flood		X	Find high ground
Getting tired	X		Sleep
Thirst	X		Find water, drink
Forest fire		X	Run away

I. What do you think is meant by the words "Internal" and "External" as they are used on the chart above?

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. To keep a constant body temperature, humans need food.  
T F \_\_\_\_\_
  - b. A stimulus causes a response.  
T F \_\_\_\_\_
  - c. Doing homework is a reflex.  
T F \_\_\_\_\_
  - d. A stimulus can come only from outside an organism.  
T F \_\_\_\_\_

2. What is the most likely meaning of track as it is used in sentence 5?
- a. footprint
  - b. stay away from
  - c. follow
  - d. eat

3. Internal and External, used in sentence 43, probably mean stimuli that are \_\_\_\_\_ the animal.
- a. automatic and reflexive
  - b. above and below
  - c. inside and outside
  - d. hot and cold

4. Explain how an animal responds to a forest fire. Write a complete sentence.
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

5. Are the following statements examples of reflexes? Circle the correct answer.
- a. A doctor hits your knee with a rubber hammer and your leg jerks up.  
Yes No
  - b. Dark clouds roll in, and it begins to thunder. You run inside your house.  
Yes No
  - c. You accidentally touch a hot stove. Your hand jerks away.  
Yes No
  - d. You put on the brakes of your bicycle to slow down.  
Yes No

6. Complete the chart below. Put an X in the correct column to show whether each stimulus is internal or external. State the correct response to each stimulus.

**SCHOOL BEHAVIORS**

Stimulus	Internal	External	Response
Hunger			
Fire alarm			
Homework			
Thirst			
Test			