

# Natural Science Mysteries



Lesson 1  
Biology

## Chapter 1

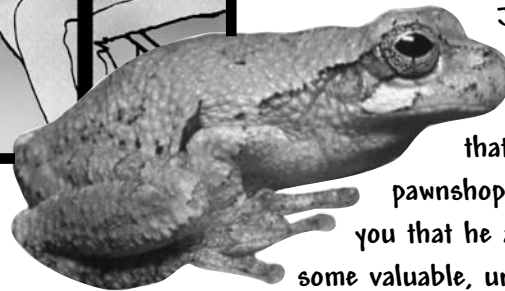
States of Matter and  
Animal Kingdom Overview

### Section 1

Lessons 1-5



Your school had started a recycling drive. The students and teachers had been asked to bring items to school that might be recycled. Suggested items included plastic containers, glass bottles, newspapers and aluminum cans. You and Jason had been asked to sort the items donated by your classmates. Once the items were organized, they would be taken to the recycling center by yourself and a teacher.



Jason was especially good at sorting the items, because he helped his uncle group things that people brought to the pawnshop his family operated. Jason told you that he and his uncle had discovered some valuable, unwanted items that people decided to trade or sell. He invited you to stop by the pawnshop after school.

Everything that was in the pawnshop and in the recycling bin at school had something in common. All items were made of matter. In fact, you recalled that everything around you was made of matter including the air you breathed, the food you ate, and the clothes you wore.

**Matter** is simply defined as anything that takes up space and has **mass**. To take up space means that it fills up a space or a location. You can pour water into a glass. The water fills the glass. You can describe the glass as being occupied by water. Before you poured the water into the glass, air filled the space. Everything takes up space.

The second part of the definition of matter concerns the use of the word mass. **Mass** is the amount of matter in an object or a material. A golf ball and a ping pong ball are about

## VOCABULARY

**Matter:** anything that takes up space and has mass

**Mass:** the amount of matter in an object

**Solids:** compose a state of matter that has a definite volume and a definite shape

**Liquids:** compose a state of matter that has a definite volume but no definite shape

**Gases:** compose a state of matter that has no definite volume and no definite shape

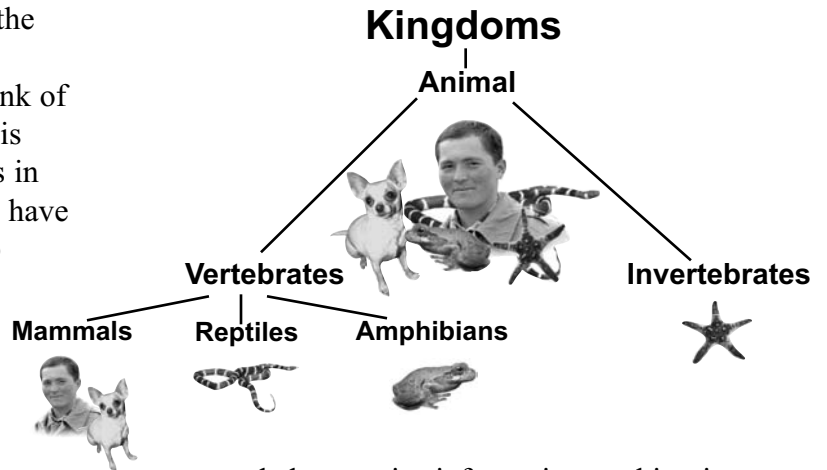
the same size. However, when you pick them up, you know that the golf ball feels much heavier than the ping pong ball. The golf ball contains more material than the ping pong ball. The golf ball has more mass than the ping pong ball.

Every physical item you can think of has something in common. Everything is made of matter. Items have other things in common as well. However, some items have major differences also. Scientists group things according to what they have in common so they can be studied more easily.

Examples of how scientists group things include the classification system for living things. All living things can be grouped into five kingdoms according to the types of cells in the living things. You are probably most familiar with two of those kingdoms: the animal kingdom and the plant kingdom.

Humans are classified in the animal kingdom. Although you are not an animal, the cells of human beings are more like those of animals than they are of plants. So humans fall within the animal kingdom. Within that kingdom, you will find groups of animals with certain similarities. Two categories within that kingdom are animals with backbones (called *vertebrates*) and animals without backbones (called *invertebrates*). As you group

animals with backbones into smaller groups, you will find such categories as mammals, reptiles and amphibians. This is an example of how scientists use a classification or grouping



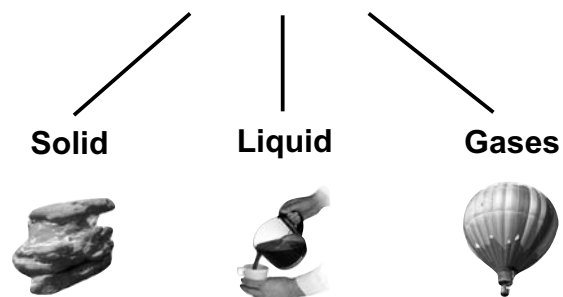
system to help organize information, making it easier to understand.

Scientists have also divided matter into three groups, called the *states of matter*.

**Matter  
(atoms, molecules)**



**States of Matter**



The three states of matter are *solids*, *liquids*, and *gases*. Matter is made up of small particles called *atoms* and *molecules*. A thing is classified as a solid, liquid, or gas according to how tightly its atoms or molecules are held together.

**VOCABULARY**

- Atoms:** smallest particles in matter
- Molecules:** small particles of matter containing more than one atom
- Volume:** the amount of space taken up by a thing

In solids, the molecules are packed together very tightly. Any matter that has a definite **volume** and a definite shape is a solid. A rock is a solid. A feather is a solid. Although the rock is hard and the feather is soft, both exist as solids. Remember, neither hardness nor softness determines whether or not an item is a solid. The definition depends on the item having a definite volume and a definite shape. That means that when you set the rock and the feather on a table, they maintain their shapes.

In liquids, the molecules are not packed as tightly together as with solids. Liquids do not have definite shapes the way solids do. If you spill orange juice on the kitchen counter, it will spread out all over the counter. If you pour orange juice from a pitcher into a glass, its shape will change to fit the shape of the glass. If you were to drop a feather into a glass, the shape of the feather would not change. That's because a feather is a solid.

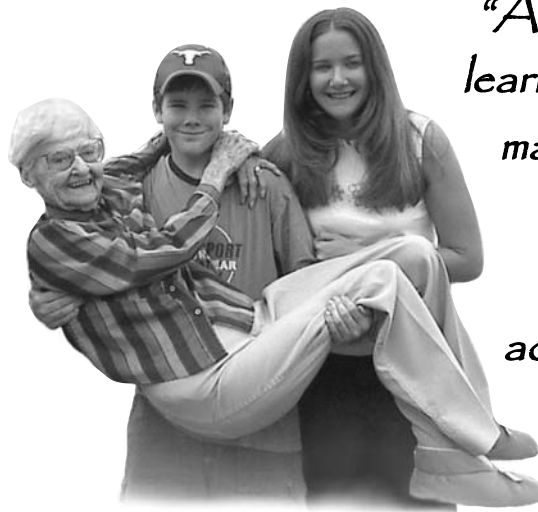
Matter that has no definite shape and no definite volume is a gas. A gas spreads out to fill any container in which the gas is enclosed.

Air is a gas. Think of filling a balloon with air. As you blow air into the balloon, the gas takes on the shape of the balloon. The molecules of a gas are spread farther apart than in a solid or a liquid.

Everything around you can be classified as a solid, liquid or a gas. The three states of matter help in identifying the way substances behave and react. Scientists use those patterns of behavior to make new discoveries and inventions.

After school, you stopped by the pawnshop. Jason was already there, sorting through a big box of items that someone had pawned earlier in the day. Jason put all jewelry in one pile, comic books in another pile, and baseball cards in a different pile. He asked you to sort the baseball cards according to teams. That sounded like fun, so you agreed. What you did not realize is that you were about to make an important discovery.

## *Life Principle*



*“A wise person  
learns what really  
matters in life  
and sets  
priorities  
accordingly.”*

—Dennie Lindsey