

## PHYSICS—THE STUDY OF THE PRINCIPLES THAT GOVERN THE UNIVERSE

A thorough study of science might best start with the science upon which all other sciences are based. As surely as God created Adam, he placed in him a curiosity. With that curiosity he also provided him with the ability to gather knowledge and to apply it in the solving of everyday problems. In our study, we will not approach the vast creative abilities of our Creator, nor will we presume to approach his wealth of knowledge. Instead, we will seek out solutions to the practical problems that face us as people while continuing on our greater mission of pleasing Him who gave us this unspeakable blessing of fruitful curiosity.

To study physics is to attempt to know and understand the principles that God used in creating and sustaining the universe. These are the simplest (if not *easiest*) of all observations. What are space and matter, and what are their properties? What are the basic forces that operate in the universe and what are their effects on matter? The science of physics provides a viewpoint from which we are able to solve many of the problems we face. We will now begin to help you to see from that viewpoint. But be prepared—you will be introduced to things you have never seen before, nor anticipated seeing.

### 1: *Inertia and Flying Objects*

Where does a person begin to study the design that has gone into the universe? Well, if you're human (and I'm assuming that you are), the best way to start is to be aware and take notice of the world around you. The most famous scientists in history were particularly good at noticing and recording the things that they noticed. There were probably others who were equally good or even better at noticing, but didn't write what they noticed. We know nothing about those.

Take, for example, the scientist who is the subject of this lesson. One of the most famous scientists of all times, **Sir Isaac Newton** (1642-1727), was once on recess for a year and a half while waiting for a bout of the bubonic plague to be eliminated from his school. During this time he wrote the founding observations for the mathematics of integral calculus. What do you do in your time off?

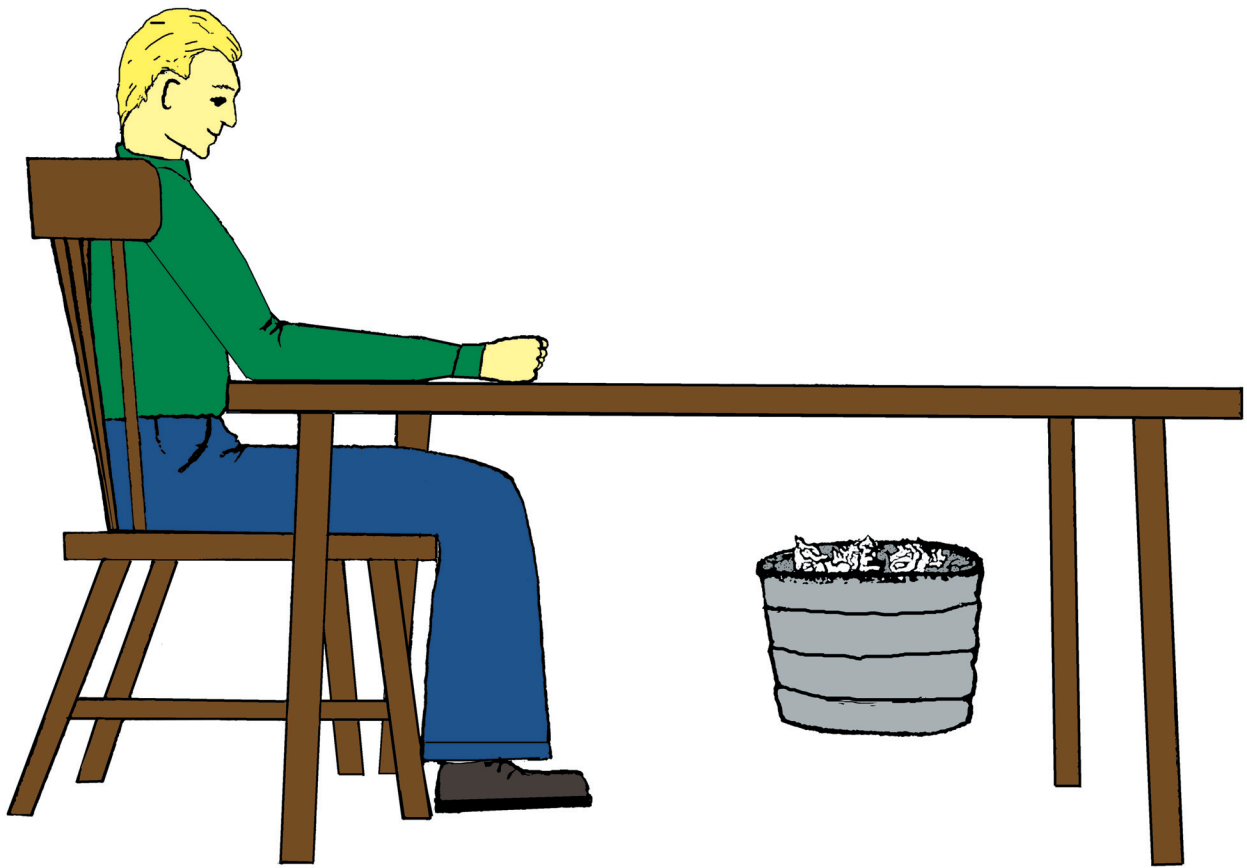
Look about you. Notice that you are surrounded by objects. No matter where you go, or what you do, objects are everywhere. Go ahead, just try getting away from objects. You can't do it! These are the subjects of the science of physics: objects, all objects, and the things that happen to them.

Looking around, we notice right away that most objects—books, chairs, desks, pencils, pads of paper, trash cans full of crumpled paper—appear to be lazy. They don't seem to move around unless we do something to them. This is very important. Just imagine what your day would be like if all of these objects were flying about aimlessly. Life would be a continuous hazard and horribly unpredictable.

No, the universe isn't nearly as complex as it could be. There are laws—rules of nature—that all objects obey. Some of the most important laws are the simplest:

Rule 1: Objects stay where they are unless somebody throws them.

Rule 2: Once objects are thrown through empty space, they keep traveling at the same velocity and in the same direction until something stops them or changes their course.



*In our universe there are laws that are obeyed by all matter. These include the observation of Sir Isaac Newton that matter tends to stay in its place unless some force causes it to move.*

These two rules taken together are great simplifying rules of the universe. To demonstrate the first rule, place a pencil on the table. (If your table is lop-sided, the experiment will be a dud.) Now go away, and come back after two million years. See? The pencil is still there.

To demonstrate the second rule, roll your pencil gently across the table top. If it keeps going forever, the second rule is true. If it stops, the second rule is still true, but something has acted on the pencil to stop its rolling.

Congratulations! You've just mastered one of the great scientific observations of all time. These two rules make up **Newton's First Law of Motion**. Objects at rest remain at rest unless they are acted upon by some force. Objects in motion remain in motion at the same velocity and in the same direction unless acted upon by some force. The property of an object that makes it resist changes with regard to its motion is called **inertia**.



*Imagine a disorderly universe—a place where matter does not obey this simple rule. Movement would be unpredictable, and the universe would be completely chaotic.*

This is really what physics is all about—making observations that simplify a complex situation so that we can understand what we see happening and may even be able to predict what might happen.

Exercises:

1. If a perfectly round marble were placed in the middle of a perfectly flat table and left alone with no other influences on the marble, what would happen? Why?
2. In the example mentioned in the text, what forces were acting on the pencil to make it stop rolling?