ARCHIMEDES

and the Door of Science

by JEANNE BENDICK

Pictures by the author

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Introduction

Archimedes and the Door of Science is a wonderful book and an outstanding teaching tool. Jeanne Bendick has succeeded in creating a book that is interesting in itself, as well as helpful in any history or science curriculum.

Archimedes was a most remarkable ancient Greek. Our own culture is deeply indebted to the Greek civilization in which he lived. For example, many of our best ideas about education come from the Greek system of education, which is engagingly discussed in the early chapters of this book. The single most important idea about education, in fact, comes from Archimedes and those like him. Their attitude toward truth, the idea that truth is important for its own sake, not for its practical applications, is of enormous importance.

Additionally, the scientific and mathematical ideas of Archimedes, presented here in a way that is both accessible and stimulating (not always an easy marriage!), have formed and informed western thought on those subjects. Archimedes discovered and developed the principles of the sciences of mechanics and hydrostatics. He discovered the princi-

ples of buoyancy and specific gravity, as well as the laws of the lever and the pulley. He figured out how to measure a circle, and gave to mathematicians a way of working. There are those who say that he was the greatest mathematician ever.

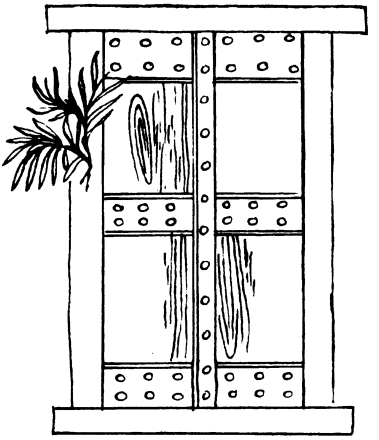
The author's presentation of the particular ideas and contributions of Archimedes, combined with the underlying attitudes and certain characteristics of the world he lived in, make a kind of whole that is singularly engaging. *Archimedes and the Door of Science,* in story form, allows one to assimilate, painlessly, many facts about Greek culture and the way of life of its citizens. One also begins to understand the Greek attitude toward knowledge.

The best way to learn theoretical ideas at a young age is to see them embodied in particular people. It is not enough to say to a child, "The truth is an end in itself." Standard textbooks often fail this way. They tell the facts, but they don't bring those ideas to life. Even the most interesting ideas may seem dull and boring if they are presented too abstractly. In contrast, *Archimedes and Door of Science,* by showing how exciting Archimedes found ideas, and exploring those ideas, allows the reader to experience some of the excitement for himself. In keeping with its title, this book makes a door through which a young reader can enter.

The author's integration of Archimedes' scientific ideas and his personal history, along with the views which he, and others of his culture, held about education grant a further boon. It gives the reader an experience not unlike the education discussed in this book, where every discipline is seen to be a part ofthe truth, not to be understood in isolation from the other disciplines; an important concept and a valuable experience.

Laura M. Berquist
Ojai, California
August, 1995

ARCHIMEDES AND THE DOOR OF SCIENCE



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Who Was Archimedes?

ARCHIMEDES was a citizen of Greece. He was born in 287 B.C. in a city called Syracuse, on the island of Sicily.

When Archimedes was born, an olive branch was hung on the doorpost of the house to announce to all of Syracuse that Phidias the astronomer had a son. A slave dipped the baby in warm water and oil and then wrapped him in a woolen band, from his neck to his feet, like an Indian papoose.

The birth of Archimedes was celebrated by two family festivals. When he was five days old, his nurse, carrying the tightly wrapped baby in her arms, ran round the circular hearth in the main living room of the house, with all the other members of the household, both the family and the slaves, running behind her. This ceremony put the baby forever under the care and protection of the family gods.

The tenth day after he was born was Archimedes' name day. Phidias had a party for all the family and their friends. In front of all the guests he solemnly promised to bring up his son and to educate him as a citizen of Greece. Then he gave the baby his name — Archimedes.

It was just a single name, without a first or last one.

Maybe Archimedes was named after his grandfather, or a friend of the family, or a god. Much thought went into giving the baby a name, which was carefully chosen to bring him luck. Then the guests piled their presents near the swinging cradle, a sacrifice was offered to the gods, and finally a great feast was served.

The family gods must have looked kindly on the baby Archimedes, and his name must have been well chosen, for he grew up to be one of the greatest scientists the world has ever had.

Most of the things *you* know about science would have dazzled and bewildered him. But many of the things you know about science *began* with Archimedes.

What was so unusual about a man who spent almost his whole life on one small island, more than two thousand years ago?

Many things about Archimedes were unusual. His mind was never still, but was always searching for something that could be added to the sum of things that were known in the world. No fact was unimportant; no problem was dull. Archimedes worked not only in his mind, but he also performed scientific experiments to gain knowledge and prove his ideas.

Many of his ideas and discoveries were new. They were not based on things that other people before him had found out.

Imagine what this means.

Nowadays we do not have to think about most things *from the beginning*, because we have the knowledge of all the things that men have learned over thousands of years.

The great mathematicians of modern times have the knowledge and the proofs of thousands of other mathematicians to help them. The greatest scientific discoveries are based on things other scientists have learned, bit by bit.

A famous scientist once said that he was able to see so far because he stood on the shoulders of giants. Archimedes was one of the giants. He was one of the first.

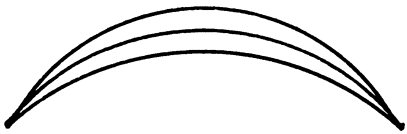
The scientists who came after him had more and

more to work with. Archimedes had only the principles — the basic ideas — of the great mathematics teacher, Euclid, and these ideas —

that a straight line is the shortest distance between two points,

and that the next shortest distance is a shallow curve,

and that each deeper curve is longer.



That's not much! But the mind of Archimedes — that curious, logical, wonderful, exploring mind — made up for the things people before him had not found out.

Archimedes began the science of mechanics, which deals with the actions of forces on things —

solid things, like stones and people,

liquid things, like water,

gases, like air or clouds.