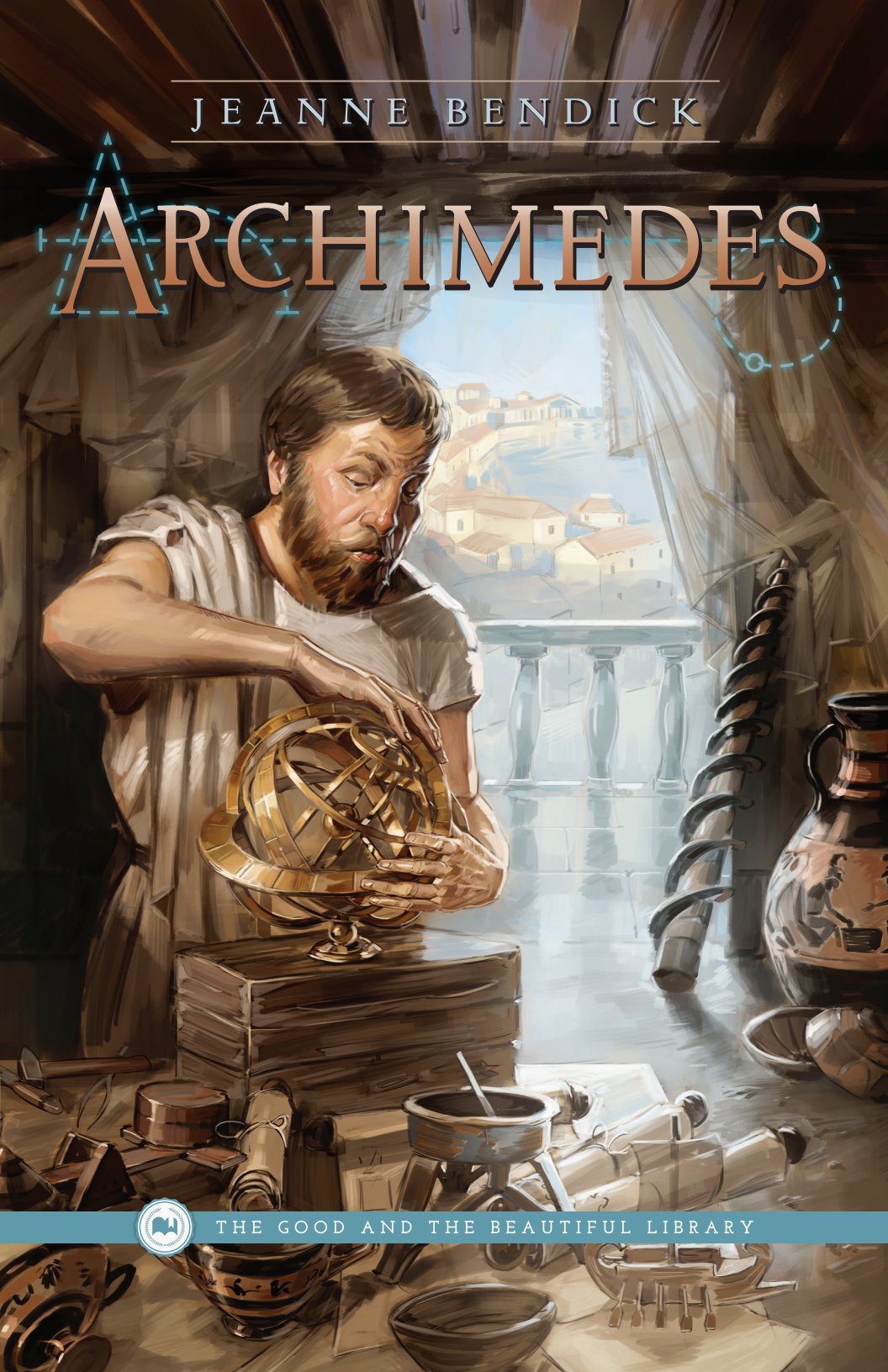
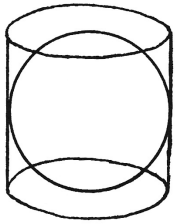
JEANNE BENDICK

ARCHIMEDES



THE GOOD AND THE BEAUTIFUL LIBRARY



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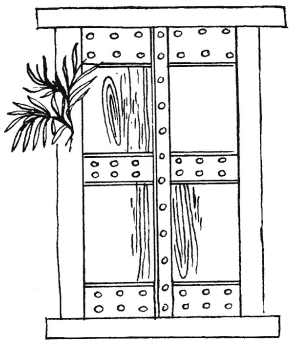

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Who Was Archimedes?

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 a Native American 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 around 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.

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.

Archimedes' 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 mankind has 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.

He began the science of hydrostatics, which deals with the pressure of liquids.

He discovered the laws of the lever and pulleys, which led to machines that could move heavy loads or increase speeds or change directions.

He discovered the principle of buoyancy, which tells us why some things float and some things sink and some things rise into the air.

He discovered the principle of specific gravity, which is one of the basic scientific tests of all the elements.

An element is a substance that is made of only one kind of atom. There are no combinations of atoms in an element. Gold is an element, and so is silver, and so is lead. They are each made of one kind of atom.

The gas hydrogen is an element, and so is oxygen. But if you mix them together, you get water, which is not an element but a compound.

Archimedes discovered that every element, and even every combination of elements, has a different density, or weight, for its size—and that this is a good way to tell one substance from another, even if they look alike. The density of any substance, compared with the density of an equal amount of water, is its *specific gravity*.

He invented the Archimedean screw, a device that is still used to drain or irrigate fields and load grain and run high-speed machines.

He invented a kind of astronomical machine that showed eclipses of the sun and moon. He estimated the length of the year and the distances to the five planets that were known to the ancient world.

For three years his war machines defended the city of Syracuse against a great Roman fleet and army.

But, although he was a great inventor, he considered inventing an amusement and mathematics his real work.

Archimedes wrote brilliantly on almost every mathematical subject except algebra, which was unknown to the Greeks. (You can't have algebra without the idea of zero, and no one thought of zero until hundreds of years after Archimedes lived.) Some of Archimedes' mathematical theories were so complicated that even today they can be understood only by experts.

He was the first to show that numbers unimaginably big, bigger than all the things there are, could be written and used.

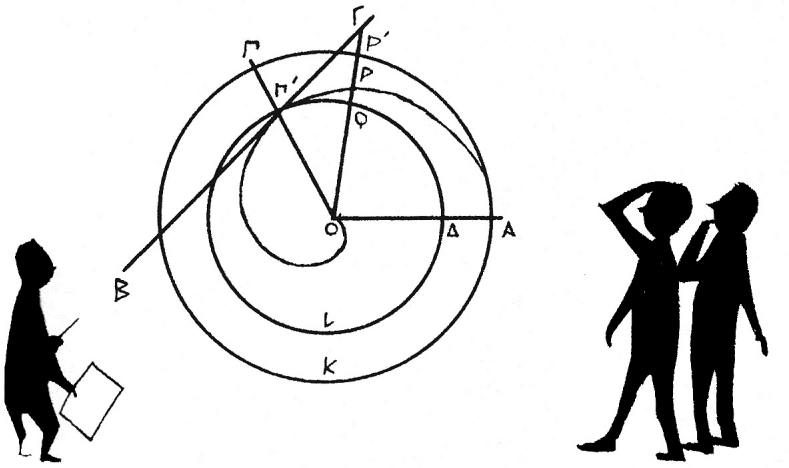
He lit the flame that led to the invention of calculus, which is the mathematics of changing rates and speeds and quantities.

The door to modern science opened through the mind of Archimedes.

But probably the most important thing Archimedes gave to the world was a logical way of *thinking* about mathematics. He had a way of taking things in order, step by step, so that he could prove or disprove his ideas as he went along.

Archimedes lived in one of the greatest civilizations the world has ever known, among many brilliant minds, and yet he was outstanding even there.

What was the world of Archimedes like?



Archimedes

Archimedes is one of the greatest thinkers the world has ever known. He invented screws and levers and discovered the law of buoyancy. But what was his life like? Step into the world of Ancient Greece and learn about how Archimedes lived and what led him to make such remarkable discoveries.

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