

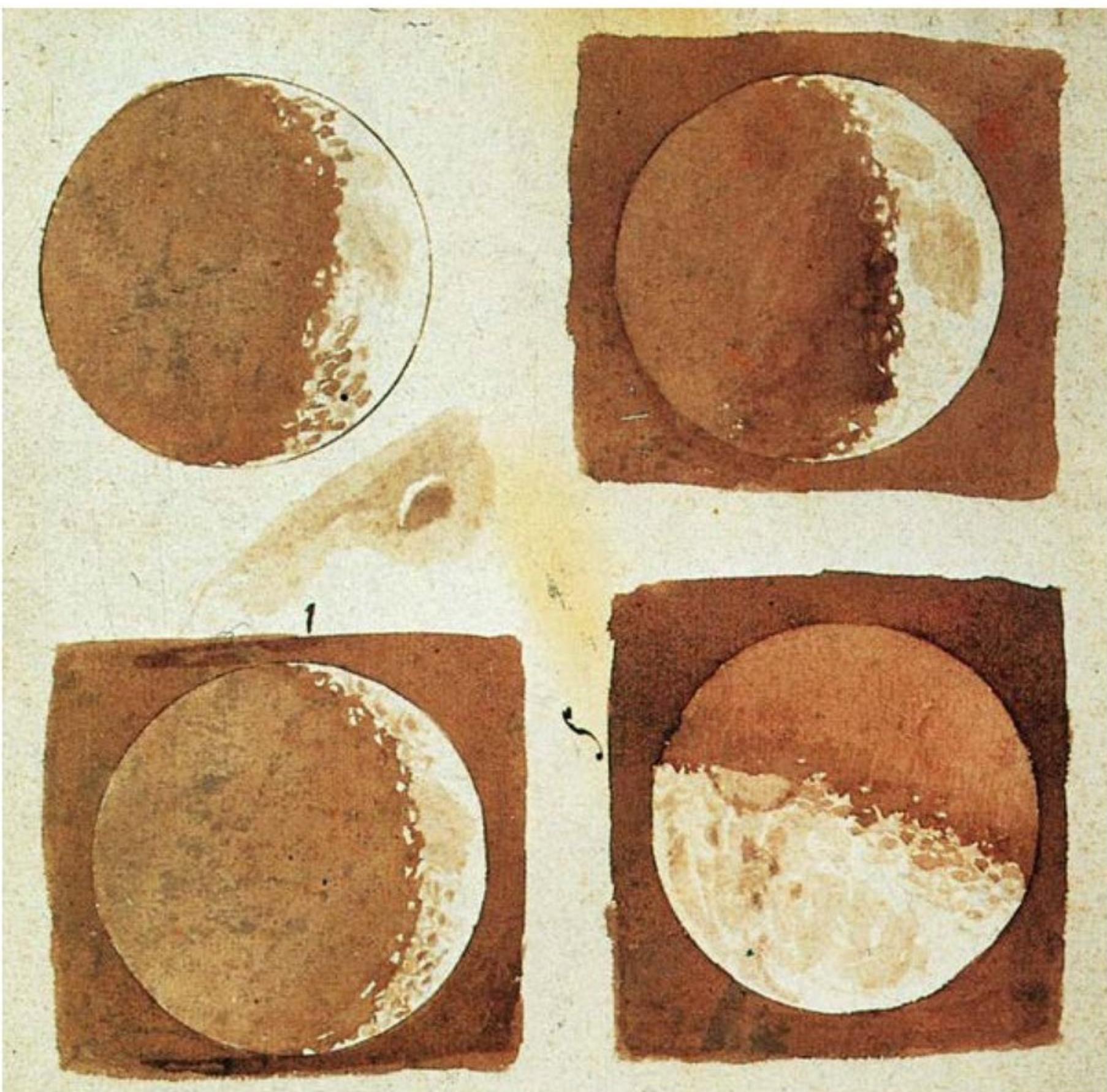
LEVELED BOOK • P

Galileo

MULTI
level
P•S•V

Written by Keith and Sarah Kortemartin
Illustrated by Wesley Lowe

Galileo



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Focus Question

How do questions lead to new discoveries?

Words to Know

chandelier

experiments

laws of nature

measurements

model

publish

solar system

telescope

trial

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Level P Leveled Book

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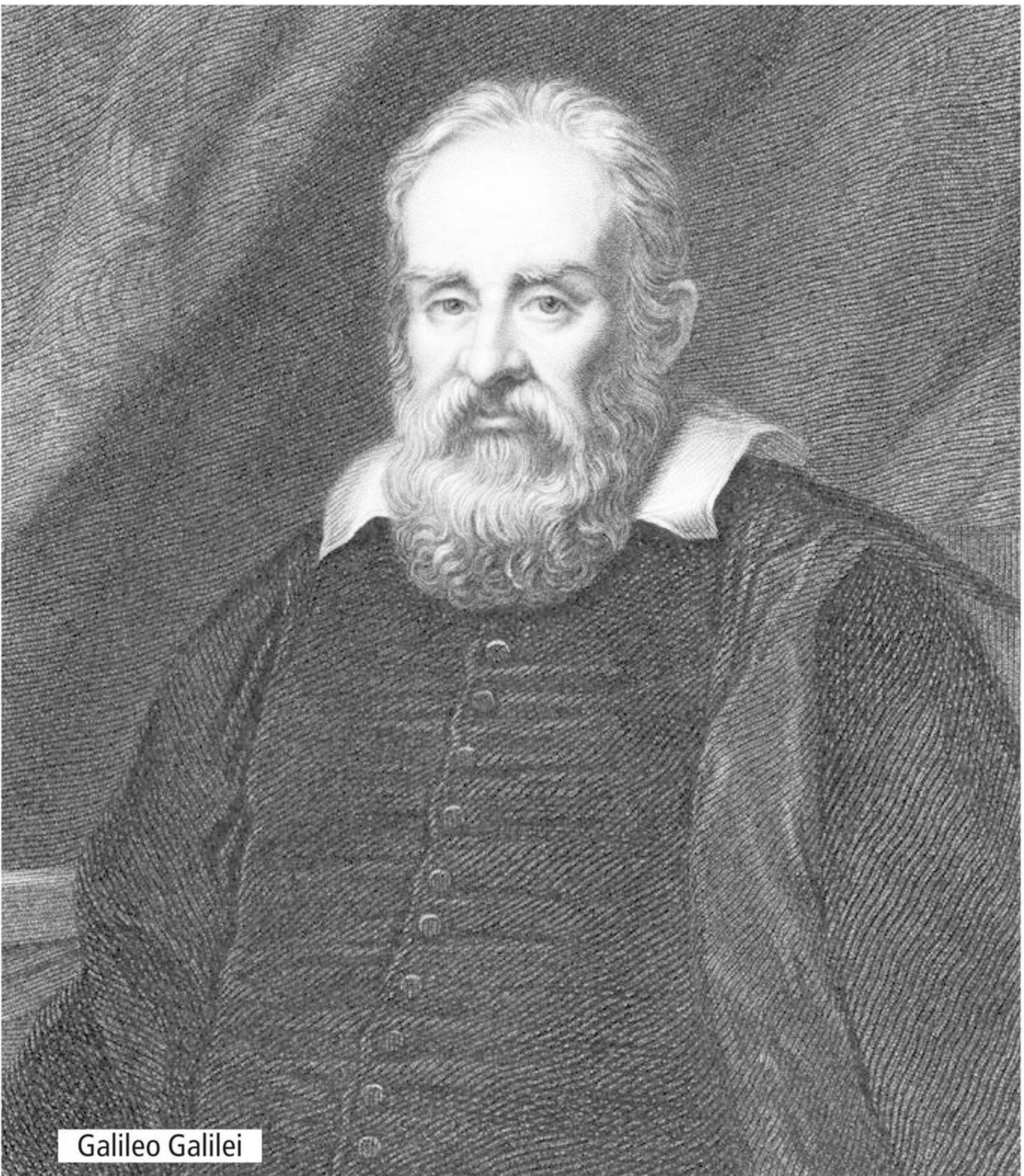
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Galileo Galilei

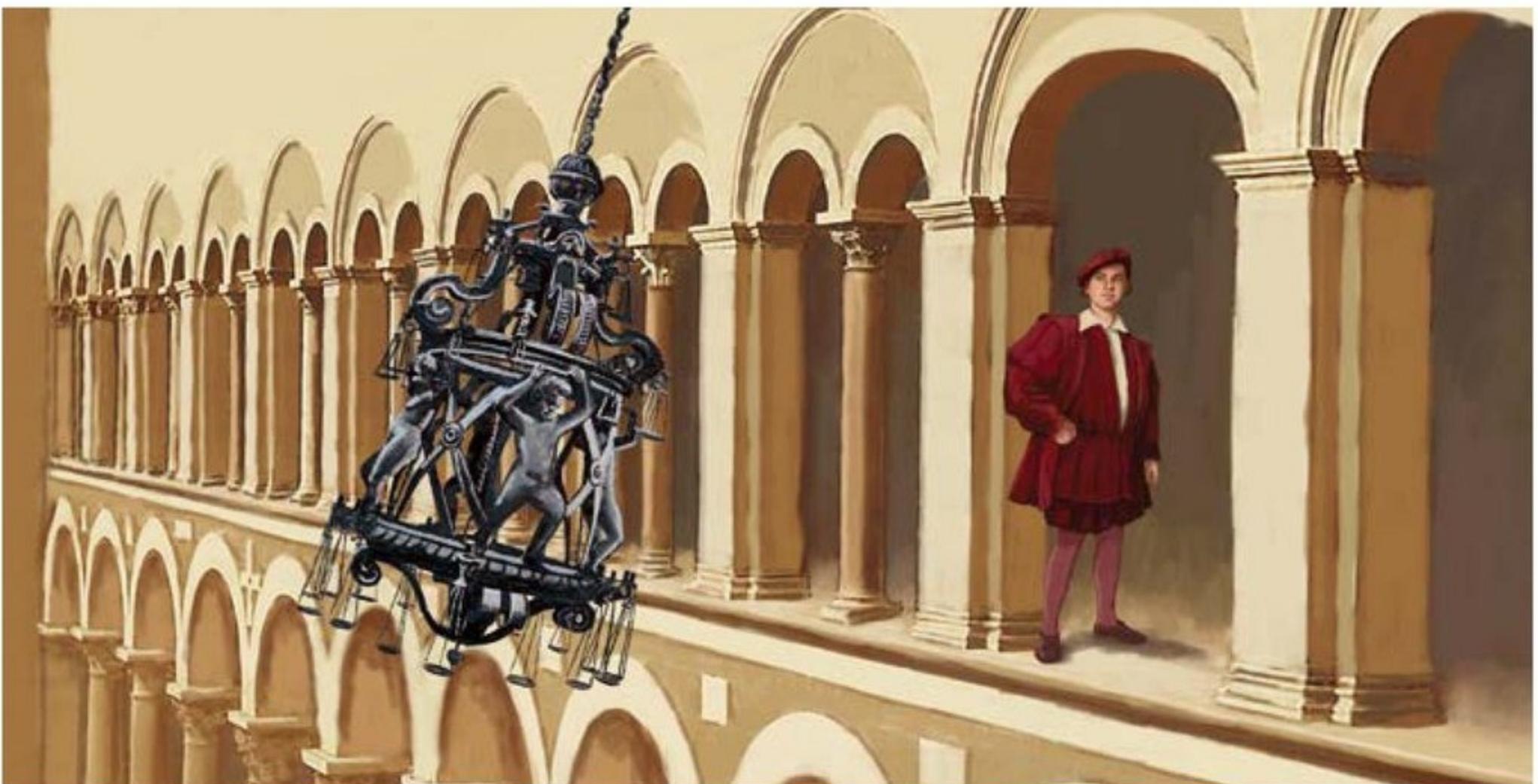
Introduction

What do a **chandelier** and the planet Venus have in common? They each played a part in the discoveries of one of history's greatest scientists five hundred years ago. His name was Galileo Galilei.



Galileo's Childhood

Galileo was born in Italy in 1564. From a young age, he was good at asking questions. Though his questions got him in trouble, Galileo changed the way we understand the world.



The Student

As a young man, Galileo wanted to learn about math and physics (the science of matter, energy, and motion). He made one of his first discoveries in physics a year before he entered university.

One day in 1582, Galileo watched a chandelier hanging from the ceiling inside a church. He saw that the wind outside was making the chandelier swing back and forth. He also saw something strange. Although some swings were wider than others, every swing took exactly the same amount of time.

By watching the chandelier, Galileo discovered that a weight that swings back and forth can keep time. Later, he figured out how to build a clock using this idea. Clocks like his are still in use today.

Galileo did not study math when he first entered university in 1583. His father wanted him to become a doctor instead. Galileo's study of medicine never interested him much, though. In fact, he never finished his studies; he left university in 1585 because of money problems. For the next four years, Galileo taught math. However, he did not give up his interest in science.



Grandfather clocks such as this one still use pendulums to keep time.

The Professor

In 1589, Galileo returned to the university as a math professor. He continued to ask questions and test things. For example, he did several tests with falling objects to see what would happen. However, the discoveries that would make him famous were still to come.

Do You Know?

There is a famous story about one of Galileo's experiments. When he was a young professor, the story goes, he dropped two cannonballs from the Leaning Tower of Pisa. One cannonball was much heavier than the other, but they fell at the same speed. Today, it's not certain whether Galileo really tossed cannonballs from the Leaning Tower of Pisa.





The Astronomer

In 1609, Galileo heard about a “spyglass” invented in the Netherlands. When a person looked through the spyglass, faraway objects looked closer. Galileo had never seen a spyglass, but he figured out how to build one. Soon he was able to make objects far away look thirty times bigger. In other words, Galileo built a **telescope**. He began to use his telescope to study the night sky. Galileo’s telescope changed his life, and science, forever.

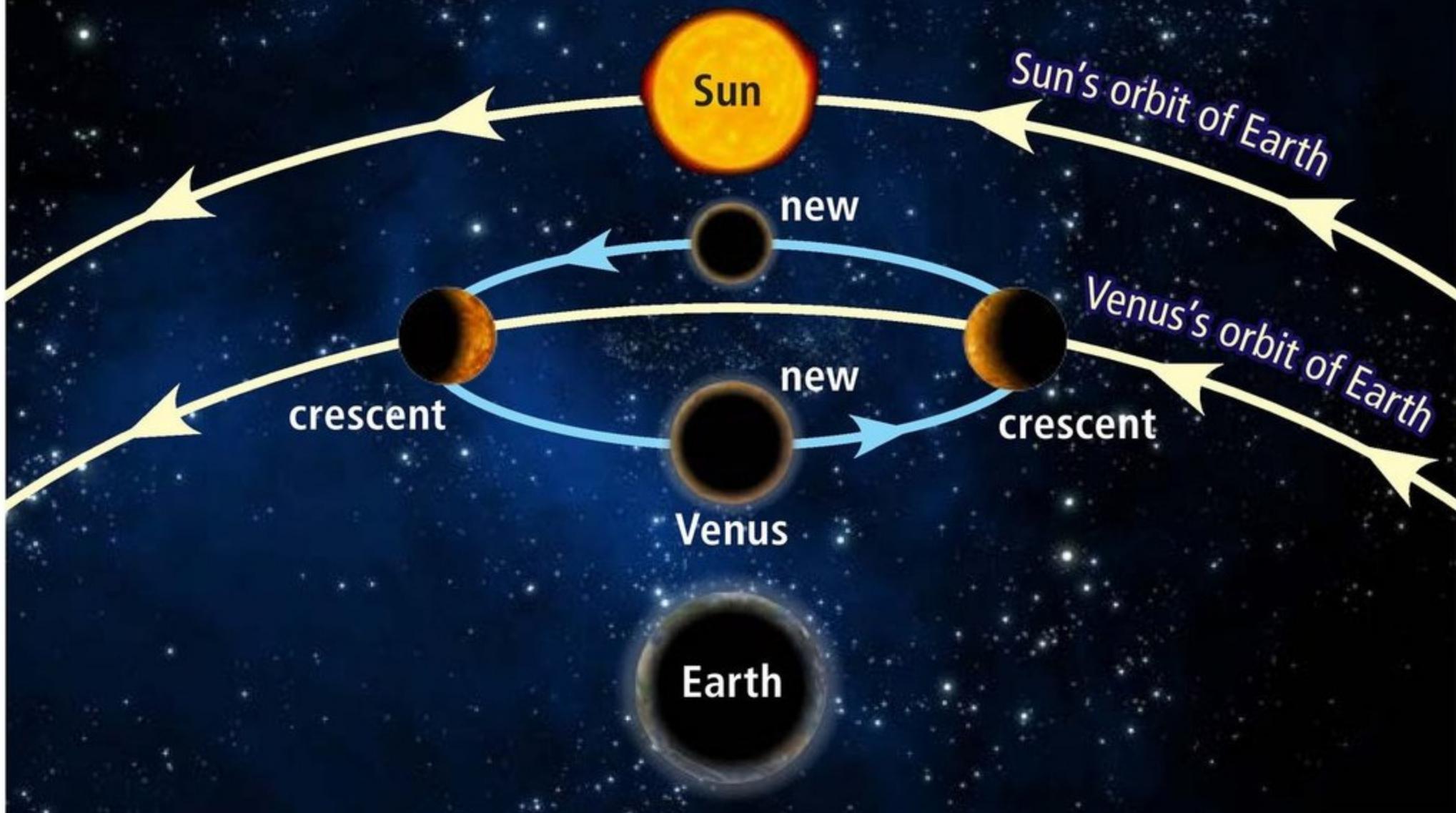
With his telescope, Galileo made discovery after discovery. He saw that the surface of the Sun sometimes had dark spots on it. He discovered Jupiter's four largest moons. He was the first person to see that the planet Venus appeared to change shape, just as the Moon does. Sometimes Venus looked like a full circle, and sometimes it was just a thin slice of light in the night sky.

Galileo put some of these discoveries in a book called *The Starry Messenger* in 1610. The book made Galileo famous—but fame had a price.

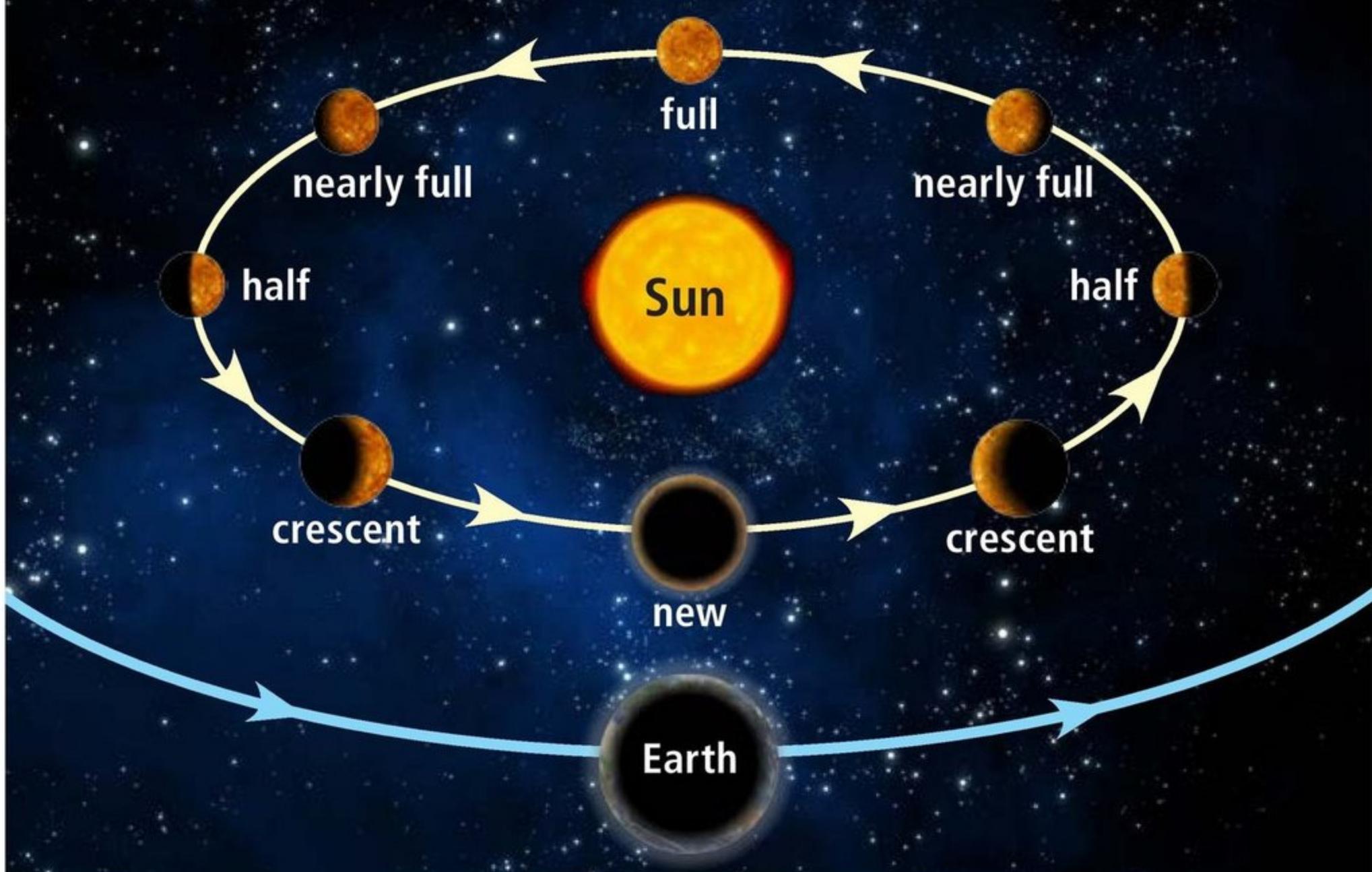


Galileo sketched the surface of the Moon (left) as he saw it through his telescope in 1610. NASA (the National Aeronautics and Space Administration) sent a probe to map the surface of the Moon in 1992 (right).

During Galileo's time, many people believed that Earth was the center of our solar system. They thought the other planets and the Sun moved around Earth. They also thought that planets such as Venus moved in small circles as they made a big circle around Earth. This would mean that Venus would only appear as a crescent shape in the night sky when seen from Earth.



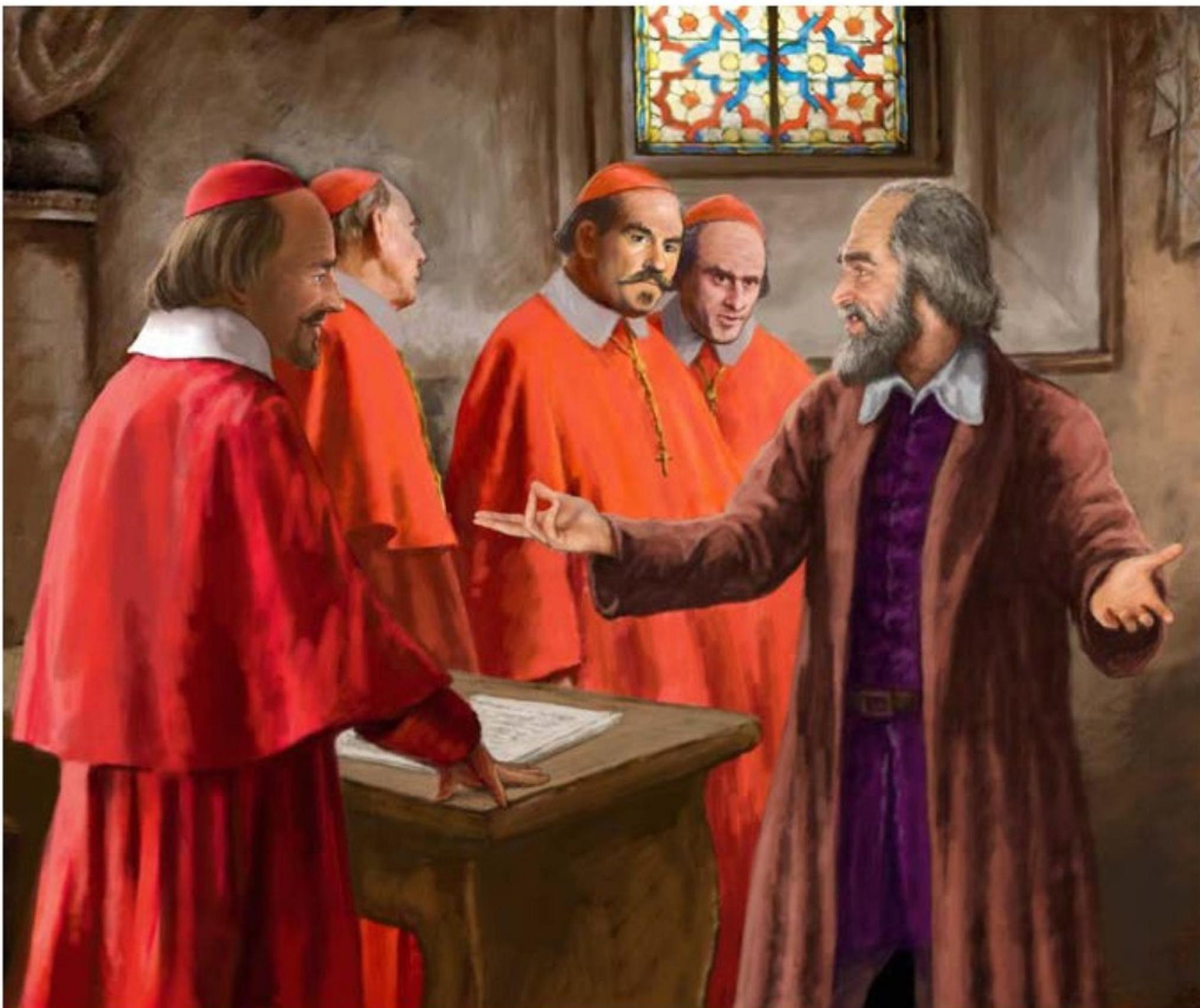
Galileo saw through his telescope that Venus had many different shapes when seen from Earth. These changing shapes suggested that Venus and Earth were both moving around the Sun.



In Trouble with the Church

Galileo's discoveries about the **solar system** got him in trouble. The Catholic Church was not happy about his ideas because they were different from Church teachings.

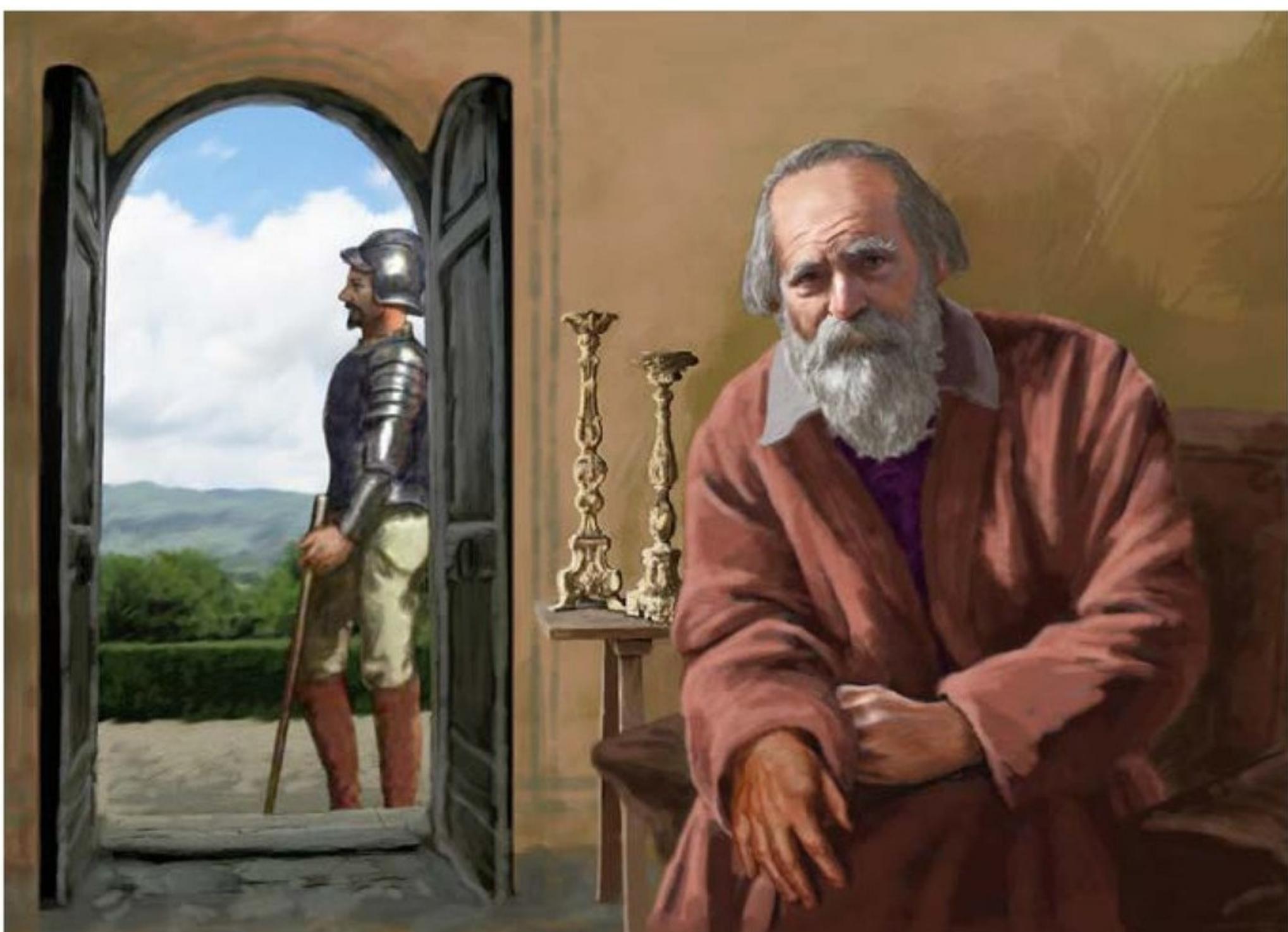
For centuries, the Church had taught that Earth was the center of our solar system. The Church believed the Sun, Moon, planets, and stars all moved around Earth. But Galileo's discovery of the changing shape of Venus didn't fit this picture. Taken together, Galileo's discoveries were big clues that the solar system moved around the Sun, not Earth. He was not the first person to come up with this idea. However, his discoveries were the best proof yet that Earth was not the center of our solar system.



The Church did not like this idea. At that time, the Church could put people on **trial** for ideas that went against Church teachings. In 1633, the Church put Galileo on trial and found him guilty. Galileo was forced to say that his discoveries had been lies, even though he knew they were not. The Church ordered Galileo to stay in his home for the rest of his life. He was also told not to **publish** any more books.

Do You Know?

A popular, but unproven, story says that Galileo “talked back” to the judges at his trial. The story says that Galileo whispered, “And yet it moves” under his breath after he was forced to say that Earth did not move around the Sun. This story is not included in the records of the trial and is probably not true. However, the words “and yet it moves” have become very famous; people quote them even today.



Galileo continued to write down his ideas anyway. He published his final book, *Two New Sciences*, in 1638.

At this point, Galileo had become blind, and his health was poor. He died in 1642 of natural causes.

Science After Galileo

We now know that Galileo was right: Earth does move around the Sun. Galileo's gift for asking important questions helped him make some of the greatest discoveries of his time.

Galileo was the first scientist to say that the **laws of nature** could be written down using math. He was also one of the first scientists to always use **measurements** in his **experiments**.

In this way, he made it easier for other scientists to test his ideas. Galileo was a **model** for many scientists who followed him, including Isaac Newton and Albert Einstein. Today, we call him the father of modern science.

Science and the Catholic Church

In 1757, the Catholic Church removed Galileo's book from a list of banned books. In 1992, the Church cleared Galileo of any wrongdoing. The modern Church accepts proven scientific facts and has supported scientific research for centuries.

Glossary

chandelier (<i>n.</i>)	a fancy light fixture that hangs from the ceiling, often with branches for holding lights (p. 4)
experiments (<i>n.</i>)	scientific tests or trials (p. 15)
laws of nature (<i>n.</i>)	scientific truths or principles that explain how nature works (p. 15)
measurements (<i>n.</i>)	the act of finding the size, quantity, or amount of something; figures, sizes, or amounts given in measured units (p. 15)
model (<i>n.</i>)	a person or thing that is viewed as an example to imitate (p. 15)
publish (<i>v.</i>)	to make writing available to the public (p. 13)
solar system (<i>n.</i>)	a group of objects in space that orbit a star (p. 12)
telescope (<i>n.</i>)	an instrument used to make distant objects look closer (p. 9)
trial (<i>n.</i>)	a legal process by which a person or group accused of wrongdoing is found innocent or guilty in a court of law (p. 13)

Galileo

A *Reading A-Z Level P Leveled Book*
Word Count: 797

Connections

Writing

Research to learn more about one of Galileo's discoveries. Write at least one paragraph describing the discovery and how it changed people's understanding of the world.

Science

Draw a diagram or create a model of the solar system. Include details that Galileo discovered. Share your work with your class.

The logo for Reading A-Z features the word "Reading" in a red, sans-serif font. Above the letter "R", there is a small icon of a sun with rays. To the right of "Reading", the letters "A-Z" are written in a larger, bold, red, sans-serif font.

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