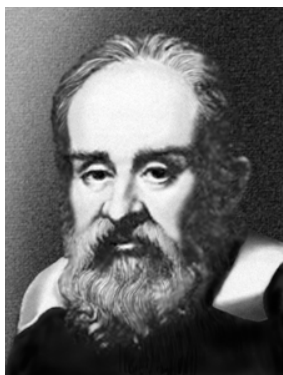




26.1 Galileo Galilei

Galileo Galilei was a mathematician, scientist, inventor, and astronomer. His observations led to advances in our understanding of pendulum motion and free fall. He invented a thermometer, water pump, military compass, and microscope. He refined a Dutch invention, the telescope, and used it to revolutionize our understanding of the solar system.

An incurable mathematician



Galileo Galilei was born in Pisa, Italy, on February 15, 1564. His father, a musician and wool trader, hoped his son would find a more profitable career. He sent Galileo to a monastery school at age 11 to prepare for medical school.

After four years there, Galileo decided to become a monk.

The eldest of seven children,

he had sisters who would need dowries in order to marry, and his father had planned on Galileo's support. His father decided to take Galileo out of the monastery school.

Two years later, he enrolled as a medical student at the University of Pisa, though his interests were mathematics and natural philosophy. Galileo did not really want to pursue medical studies. Eventually, his father agreed to let him study mathematics.

Seeing through the ordinary

Galileo was extremely curious. At 20, he found himself watching a lamp swinging from a cathedral ceiling. He used his pulse like a stopwatch and discovered that the lamp's long and short swings took the same amount of time. He wrote about this in an early paper titled "On Motion." Years later, he drew up plans for an invention, a pendulum clock, based on this discovery.

Inventions and experiments

Galileo started teaching at the University of Padua in 1592 and stayed for 18 years. He invented a simple thermometer, a water pump, and a compass for accurately aiming cannonballs. He also performed experiments with falling objects, using an inclined plane to slow the object's motion so it could be more accurately timed. Through these experiments, he realized that all objects fall at the same rate unless acted on by another force.

Crafting better telescopes

In 1609, Galileo heard that a Dutch eyeglass maker had invented an instrument that made things appear larger. Soon he had created his own 10-powered telescope. The senate in Venice was impressed with its potential military uses, and in a year, Galileo had refined his invention to a 30-powered telescope.

Star gazing

Using his powerful telescope, Galileo's curiosity now turned skyward. He discovered craters on the moon, sunspots, Jupiter's four largest moons, and the phases of Venus. His observations led him to conclude that Earth could not possibly be the center of the universe, as had been commonly accepted since the time of the Greek astronomer Ptolemy in the second century.

Instead, Galileo was convinced that Polish astronomer Nicolaus Copernicus (1473-1543) must have been right: The Sun is at the center of the universe and the planets revolve around it.

House arrest

The Roman Catholic Church held that Ptolemy's theory was truth and Copernican theory was heresy. Galileo had been told by the Inquisition in 1616 to abandon Copernican theory and stop pursuing these ideas.

Despite these threats, in February 1632, he published his ideas in the form of a conversation between two characters. He made the one representing Ptolemy's view seem foolish, while the other, who argued Copernicus's theory, seemed wise.

This angered the church, whose permission was needed for publishing books. Galileo was called to Rome before the Inquisition. He was given a formal threat of torture and so he abandoned his ideas that promoted Copernican theory. He was sentenced to house arrest, and lived until his death in 1642 watched over by Inquisition guards.



Reading reflection

1. What scientific information was presented in Galileo's paper "On Motion"?
2. **Research** one of Galileo's inventions and draw a diagram showing how it worked.
3. How were Galileo's views about the position of Earth in the universe supportive of Copernicus's ideas?
4. Imagine you could travel back in time to January 1632 to meet with Galileo just before he publishes his "Dialogue Concerning the Two Chief World Systems." What would you say to him?
5. In your opinion, which of Galileo's ideas or inventions had the biggest impact on history? Why?