

Reading

Directions

You will now read two passages and answer the questions that follow. Some of the questions may ask you to compare the two passages.

Passage 1

Galileo's Starry Night

by Kelly Terwilliger

- 1 On a warm June evening in 1609, Galileo Galilei, a 45-year-old Italian mathematics teacher and father of three, listened as a friend described the latest invention to hit Europe: a long tube containing two glass lenses, called a spyglass.
- 2 "It makes faraway things appear close! We could use one of those here in Italy," the friend said. "Perhaps you could try to build one, if you're interested."
- 3 Was he ever! Galileo loved trying to figure out how the world and the things in it worked. That very night he leaped into the project with gusto. In a short time, he not only figured out how to construct a spyglass, he improved upon the existing model as well.
- 4 When he later presented his device to the rulers of Venice, they marveled at how far it could see. The spyglass would be quite useful for spotting distant enemies, making it hard for anyone to launch a sneak attack!
- 5 Galileo wasn't satisfied, however, and he kept fiddling with his "telescope," as his fellow mathematician friend Giovanni Demisiani had called it (the word means "farlooker"). He tried new adjustments and worked at grinding better lenses. Within a few months, he had a telescope that was three times more powerful than his first.
- 6 By now, autumn had arrived, and evenings darkened early. One night as the moon rose, Galileo pointed his telescope toward the sky. If it could see far on Earth, why not into the heavens as well? Who knew what the moon might look like close up?
- 7 What Galileo saw astonished him. The moon was not perfectly smooth, as it appeared to the naked eye. It was a bumpy moon. Its edges had "ridges of darkness" and "pips of lights," and it was covered with what looked like craters, mountains, and valleys. Entranced by these unexpected details, Galileo drew picture after picture of what he saw through the telescope.
- 8 A craggy moon wasn't all that he discovered. Galileo could now see that the Milky Way, seemingly a bright cloud across the sky, was in fact made of millions of stars. He also noticed that while fixed stars of constellations looked like twinkling lights, the "wandering stars," or planets, seemed to be solid spheres—like the moon.
- 9 All through that December, Galileo peered into the night sky at what had never been seen before. Sometimes his hands shook with the cold. The chilled lens of his telescope fogged up whenever he put his eye near the glass, and he had to keep wiping it clear.

- 10 On January 7, 1610, Galileo focused his gaze on Jupiter. He noticed three bright stars beside it and drew a sketch of them. The next night he looked again. The three stars had scooted to new positions! How odd, he thought. The following night, Galileo saw only two stars. What was going on? A few nights later he saw four. Galileo kept watching and recording his observations until he concluded that these dots were neither stars nor planets—they were little moons, circling Jupiter!
- 11 Galileo wrote down his observations and thoughts in a book called *The Starry Messenger*. The book immediately sold out. People were very excited—and troubled—by his discoveries.
- 12 Little moons circling not Earth, but Jupiter? Our own moon a bumpy one? Sightings like these could change how people thought about the universe. Some skeptics chose not to look through the new telescopes; others refused to believe what they saw. They insisted that Galileo put specks in his telescopes to trick people.
- 13 Feverishly, Galileo built more telescopes, hoping to make the truth visible to everyone. But what kind of truth was this? Could you really trust a telescope? And what did it all mean?
- 14 These early telescopes weren't perfect, but what they showed was true enough: the heavens were not "flawless," nor did they revolve around the earth, as many believed. Instead, it looked like the many planets, including Earth, revolved around the sun.

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Passage 2**An Inquisitive Mind***by Kim Zarins*

- 1 Galileo unlocked some of nature's secrets through the use of seemingly simple inventions, including the telescope and the pendulum. Nothing was too small for his attention. He said only great minds could "divine that wonderful arts lie hid behind trivial and childish things." His inquisitive attitude made him a pioneer in physics, as well as the founding father of the scientific method. He developed the process of learning new principles by observation and experimentation, whether that meant viewing the heavens through a telescope or dropping a weight to study how it falls.
- 2 Galileo took an interest in how things move, and this curiosity led to important discoveries in physics. For example, he questioned the then current belief that heavy objects fall faster than light ones. It is said that he dropped two different weights (imagine, for example, one stone ball weighing two pounds and the other 20 pounds) from the Tower of Pisa to show that they hit the ground at the same time, a demonstration that paved the way for Isaac Newton's Laws of Motion.
- 3 Galileo solved a related puzzle when experimenting with a pendulum. He made two pendulums with string of equal lengths and a lead ball at the end of each. Then he pulled one ball back twice as far as the other, and let them both go at the same time. He expected to see the ball with the longer swing take a longer time to move back and forth. In fact, both pendulums moved in perfect synchronization! They swung at the same rate, even though one pendulum was moving twice as far and one ball was heavier than the other.
- 4 Galileo's experiments with moving objects led him to the principle of inertia. According to this rule, an object at rest tends to stay at rest, while an object in motion continues moving, unless another force, such as friction, brings it to a halt. This concept is considered basic today. In Galileo's time, however, scholars supported Aristotle's argument that objects stay at rest unless they are pushed or pulled.
- 5 Today, we assume that scientists regularly question theories and assumptions. The same was not always true in Galileo's day. Rather, many scientists relied more on Aristotle's teachings and currently accepted belief than upon observation. As a result, even though Galileo's telescope revealed lunar craters and Jupiter's moons, many people refused to trust that such findings could exist.
- 6 Galileo challenged that notion of blindly trusting authority or traditional thinking. Instead, he taught his students to say, "I do not know," rather than give easy answers that dodge the facts. . . .

- 7 Rejecting tradition, Galileo maintained that nature was a book written in a mathematical language. Further, he considered nature as something that was waiting to be read through observation and experimentation. To do so, he needed precise measurements, and so he invented many scientific tools. Besides his role in the development of the telescope, he improved the microscope and invented the first thermoscope (a predecessor to the modern thermometer). His approach continues to form the basis of scientific discovery today.

“An Inquisitive Mind” by Kim Zarins, from *Calliope* Magazine; February 2004. Copyright © 2004 by Carus Publishing Company d/b/a Cricket Media.