

Galileo | Lesson Plan

How is scientific exploration a never-ending process of questioning and testing?

Students will understand that science involves more than following rules and steps. Sometimes it means questioning, testing, and discovering new information.

Learning Objectives:

- Describe the process by which Galileo invented his telescope.
- Analyze the benefits of questioning and testing hypotheses.
- Explain that in scientific exploration, it is acceptable to question, try to make improvements, and look for alternatives.
- Explain why questioning established beliefs is not rebelling against government authority or going against God.

Key Vocabulary:

- **Experiment:** A methodical procedure carried out to validate, refute, or establish the validity of a hypothesis by systematically observing, measuring, and analyzing results under controlled conditions.
- **Hypothesis:** A well-informed prediction or proposed explanation based on limited evidence as a starting point for further investigation.
- **Science:** The systematic study of the natural world through observation and experiment, aiming to understand and explain how things work.
- **Telescope:** An optical instrument for making distant objects appear larger and nearer.

Educational Standards: CCRA.L.1, CCRA.L.2, CCRA.L.4, CCRA.W.4, CCRA.R.7, CCRA.SL.1, CCRA.SL.2, CCRA.SL.4, CCRA.W.2

Academic Subject Areas: Biography, Western Civilization, Science

What You'll Need

- Video: *Galileo: The Scientist Who Dared to Question* (Watch [Here](#))
- Worksheet: *Galileo: The Scientist Who Dared to Question* (Click [Here](#))
- Small classroom magnifying glasses
- Items from nature (flowers, pine straw, seashells, leaves, etc.)
- Simple telescope and binoculars, or images of a telescope and binoculars

Lesson Plan (45 minutes)

Warm-Up: (20 minutes)

1. Give each small group of students magnifying glasses and several objects from nature. (If time allows beforehand, take a short nature walk to collect these materials.)
2. Encourage students to closely examine each object, take notes, and discuss their observations within their groups.



3. After several minutes, collect the materials and exhibit the telescope and binoculars. Explain that telescopes and binoculars are types of magnifying tools that, like a magnifying glass, can magnify the sizes of distant objects so that the human eye can see them more clearly.
4. Ask students if they have ever heard of a man named Galileo. Reveal that Galileo invented the most powerful telescope of his time and is known as the “Father of Modern Science.”
5. Explain that Galileo was an Italian astronomer, physicist, and engineer. He lived in a time when many new inventions allowed the universe to be observed more closely than ever before. Galileo sought to answer questions and discover the truths of the universe. In making his telescope, Galileo built on the findings of other scientists around Europe. He followed their steps perfectly, but after careful observation, noticed that if he changed some of the instructions, he could make a more powerful telescope.
6. Display the “Galileo Worksheet” and distribute individual copies to students.
7. Read over the worksheet as a class so that students know what to listen for during the video.

Watch and Complete: (15 minutes)

1. Watch the video.
2. Pause throughout the video to allow students to complete answers and notes on the worksheet. Assist as needed.

Wrap-Up: (10 minutes)

1. Allow students several minutes to complete the worksheet independently.
2. Invite volunteers to share their responses to number 9 on the worksheet.
3. Collect the worksheet as a formative assessment or participation grade.
4. As a culminating discussion, pose the following questions:
 - Why is it important to thoroughly question and test scientific hypotheses?
 - Why do you think Galileo’s methods and experiments to discover natural truths were met with resistance and anger from some people?
 - What strategy did Galileo use when he made his first telescope?
 - How is studying Galileo helpful in understanding the value of questioning, making improvements, and looking for alternatives?
5. Summarize the lesson by reviewing the concept that science is both a collection of steps and rules from past experiments and a never-ending process of questioning and testing. Relay that both aspects are equally important in learning new things.
6. Conclude by encouraging students to reflect on Galileo’s methods of exploring natural truth. Galileo’s example of observing, questioning, and thoroughly testing hypotheses makes him truly worthy to be remembered as the “Father of Modern Science.”

Don’t have time for the full lesson? Quick Activity (15-20 minutes)

Distribute the worksheet and allow students to complete it while they follow along with the video.