Galileo Observing Program

Galileo Observing Program Coordinator:

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Special Note

The Astronomical League is now offering two versions of the Observing Program: Traditional and Binoculars Only. Be sure to specify if you do the required observations using only binoculars. The Traditional certification includes the use of low-power telescopes as well. Some requirements can be done with the unaided eye and will count towards either form of certification.

Introduction

Quick View of Requirements	
Galileo Observing Program	
Regular / Binocular	
Uses Eyes	
Uses Binoculars	Yes
Uses Telescopes	Yes
Must be an AL Member	Yes
Date Deadline for Submission	
Minimum Instrument Size	
Manual Observations Required	Yes
Go-To Telescopes Allowed	
Remote Telescopes Allowed	
Number of Observations	13
Option for Imaging	
Special Equipment Required	
Equipment Must Be Constructed	
Observations Must Be Submitted to an On-Line Database	

Welcome to the Astronomical League's Galileo Observing Program. The purpose of this Observing Program is to experience the thrill that Galileo had when he was the first person to turn a telescope towards the sky. You will make observations like those that caused such a great uproar throughout Europe as you find evidence that shows that the Ptolemaic model of the Universe (geocentric) was wrong and that Copernicus might be right (heliocentric), and that Aristotle may not have been right either…

At the time of Galileo, the Universe was generally believed to be as Aristotle and Ptolemy envisioned it. The Earth was the center and everything revolved around us. Copernicus had proposed the idea that the planets all orbit the sun about 100 years earlier, but his solution was inaccurate when predicting the future behaviors of the planets. Aristotle's premise was that the heavens were made of a fifth, "divine element" and that: "The universe is uncompounded, ungenerated, eternal, unalterable, and neither heavy nor light." This implies that things are perfect in space (the moon and beyond). So objects are spheres and travel in circles. They are flawless and have no detailed features.

Picture yourself as Galileo Galilei. It is the turn of the century; the 17th century! It is the early 1600's and you are a scientist and mathematician. You see your role to help determine how the universe works. You are not happy with the scientific philosophers who use logic to prove their theories. You believe in experimentation and observation, and you have a brand new tool, a telescope (which incidentally you made yourself). It is June of 1609 and it is only 3-power, but you quickly follow that with one of 8-power and then another with 20-power in October.So much to see, that nobody has seen before.

The Rules and Regulations

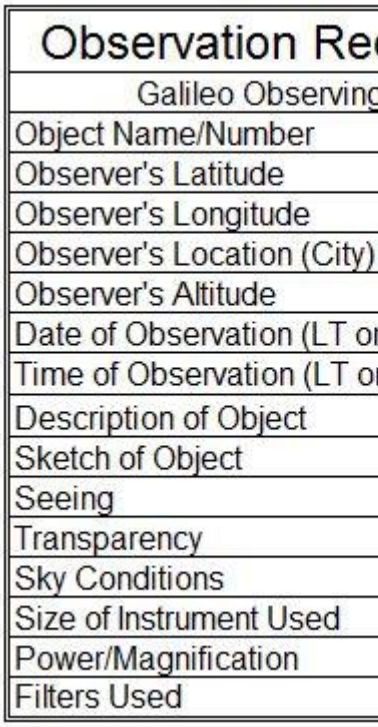
All observations must be done at a magnification between 10 and 20. Either binoculars or a telescope may be used. The instrument should be mounted to provide adequate stability. Go-To equipment is allowed. Two types of certificates will be issued. One will be for those observers who certify that they did all of their observations using binoculars and unaided eyes (Galileo Binocular Observing Program). The other is for those who employed any combination of a telescope, binoculars, and unaided eyes (Galileo Observing Program).

You must complete all of the requirements except those that are labeled "Optional". The optional ones should be done if you are able, but by their nature it is expected that many observers may not be able to do them.

To earn this certification, you must be a member of the Astronomical League in good standing as a member of an affiliated society or as a Member at Large.

You should document:

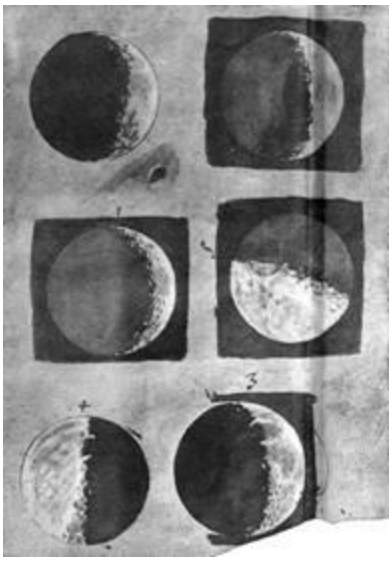
- the requirement number
- the date and time of your observation (local or UT)
- the Latitude and Longitude
- the Seeing and Transparency
- the equipment used and its magnification
- a sketch and description.

- 

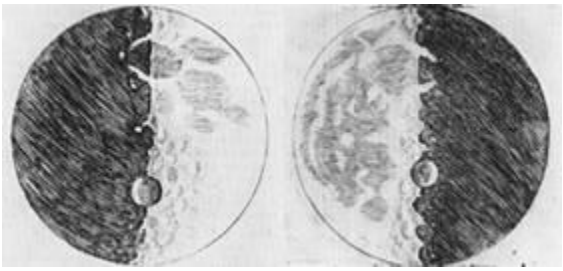
Observation Re
Galileo Observing
Object Name/Number
Observer's Latitude
Observer's Longitude
Observer's Location (City)
Observer's Altitude
Date of Observation (LT o
Time of Observation (LT o
Description of Object
Sketch of Object
Seeing
Transparency
Sky Conditions
Size of Instrument Used
Power/Magnification
Filters Used

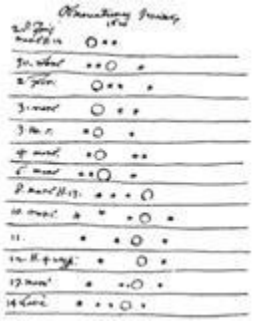
Repeat Galileo's Observations of the Heavens

- 1. December 24, 1604 – Supernovae (optional): The objective is to show that the heavens do change. Observe a naked-eye supernova in the Milky Way galaxy. Make a sketch of the sky during the supernova and one after the supernova has faded below the level of visibility. Estimate its maximum brightness. It should be noted that the last time a supernova was visible in the Milky Way galaxy was in the early 1600's when Galileo observed one.



- 2. November 30 through December 19, 1609 – The Moon: The objective is to show that the moon is not a flawless sphere; it has mountains. Observe and sketch the moon. It may be done at any phase where enough detail can be seen to show that there are mountains and valleys on the moon. Near the first or last quarter phases is the best time for this observation. Include only the details that you can see.





- 3. January 1, 1610 – Jupiter's moons: The objective is to show that all objects in the universe do not orbit the Earth. Observe and sketch Jupiter and its moons daily through at least one cycle of their orbits. This will be a minimum of 17 days, and you may have to do multiple orbits to get the entire orbits. From these sketches, note the dates and times of their greatest distance from Jupiter, and calculate the orbital periods of the four Galilean moons: Io, Europa, Ganymede, and Callisto.

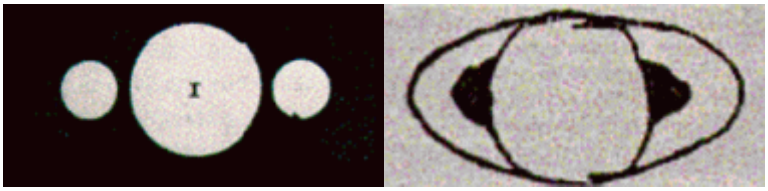
- 4. 1612 – Jupiter's moons in eclipse: The objective is to show that in addition to the moons being occulted by Jupiter, they also travel through Jupiter's shadow and are eclipsed. Observe and sketch, noting the timing, one of Jupiter's moons during an ingress or egress with Jupiter's shadow. Callisto or Ganymede is the most dramatic. Two observations should be done. One should be close to when Jupiter is at opposition. The second should be done when Jupiter is at quadrature (90 degrees from the sun). Note how close to the planet the moon is when the event occurred. (Editor's note: At least two observations and timings are required.)

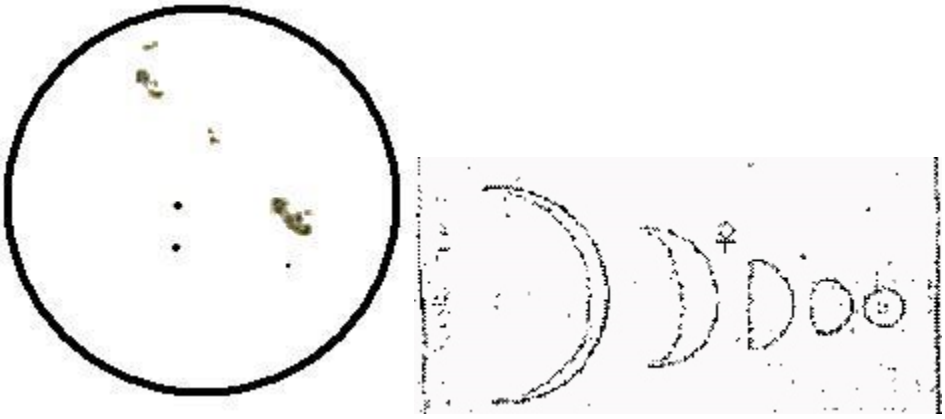
- 5. 1610 – Orion's Head Nebula: The objective is to show that there are more stars visible through a small telescope that there are with the naked eye. Observe and sketch the region at the head of Orion (the star is called Meissa or Lambda Orionis). You will note that what looks like 1 star naked eye is actually 3 bright stars and many lesser ones. Sketch what you see.Galileo was able to see 20 in a region about 2 degrees across.North is up in this sketch.

- 6. Praesepe Nebula: The objective is to show that there are more stars visible through a small telescope than there are using just the eyes. Observe and sketch the area of M44 in Cancer. In a field of about 3.5 degrees, stretching from Asellus Australis to Ausellus Borealis Galileo was able to see 38 stars. North is up in this sketch.

- 7. Pleiades Nebula: The objective is to show that there are more stars visible through a small telescope than there are using just the eyes. Observe and sketch the area of M45 in Taurus.

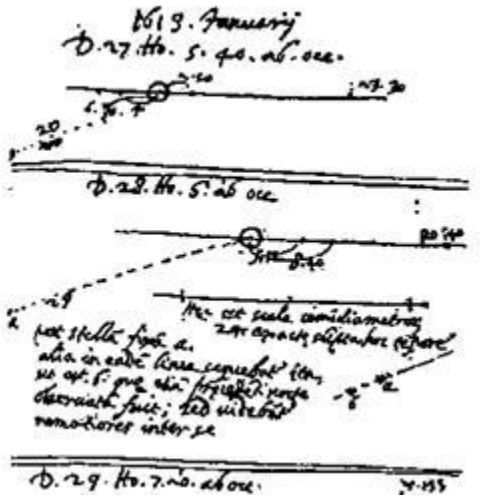
- 8. July, 1610 – Saturn's Ears: The objective is to show that Saturn does not appear as a perfect sphere. Observe and sketch Saturn. The sketch should show that Saturn is not a perfect sphere. The rings do not appear as rings at this power, but appear as ears on the planet.





- 9. December 1610 – Venus phases: The objective is to show that Venus has phases like the moon, that it changes in size dramatically, and that one cycle of the phases is rather long. ***** Be careful. Do not observe Venus when it is near the Sun. ***** Observe and sketch Venus monthly through at least a half cycle of phases. Since Venus is not visible when it is in the full or new phases, you can do this from the time it first appears in the morning or evening sky until the last time it is visible. Calculate the length of the cycle and be sure to capture the relative size of Venus.

- 10. May 1611 – Sunspots: The objective is to show that the sun is not perfect (has sunspots) and is rotating. Observe one large spot that completes one complete rotation of the sun. ***** Solar Observing is the only dangerous activity that astronomers do. This requirement requires observing the sun, using a proper and safe solar filter. ***** Full-face sketches should be made about once per week. Sunspots measured should be fairly close to the solar equator and measurements should be done from meridian crossing to meridian crossing. What is the rotational period for the sun near its equator?



- 11. October, 1618 – Comets: The objective is to show that the path of a comet is not a straight line through the sky. Make at least three observations of a comet and plot its progress among the stars. Although you will not do the calculations, this data is enough to show that the comet is not moving in a straight line through space.
- 12. February, 1619 – Neptune: Although Galileo observed Neptune, he did not recognize that it was anything other than another star. Observe Neptune and sketch what you see in your field of view.
- 13. 1619 – Aurora (Optional): Galileo coined the term Aurora Borealis for the Northern Lights. He was mistaken in that he thought it was sunlight reflecting off of the Earth's Atmosphere. Observe and sketch either the Aurora Borealis or the Aurora Australis.

Submitting for Certification

Submission Requirements	
Galileo Observing Program	
Observer's Name	Yes
Obsever's Mailing Address	Yes
Observer's Club Affiliation	Yes
Observer's Phone Number	Yes
Observer's E-Mail Address	Yes
Information for Person to Send the Award To For Presentation	Yes

This Observing Program has a pin and certificate for those who successfully complete all of the required activities. Once you have made the necessary observations and sketches, either send **copies** of them to the Galileo Program coordinator, or have them reviewed and approved by an officer of your local club. Be sure to indicate if your observations were all done using binoculars and unaided eyes (Galileo Binocular Observing Program). That officer should then send an email to the Galileo Observing Program Coordinator with your name, affiliated society, email address, and mailing address. Also send the name and address of the person to whom the pin and certificate should be sent.

A member may earn both versions of the certification, but only one pin will be issued.

Galileo's TOES

The Galilean Moons that orbit Jupiter are in a continual dance with the planet. For those who take the time and make the effort, we have developed an award (certificate) to recognize their accomplishment.

For information about this new certification go to the AL webpage for Galileo's TOES.

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