

Exercise: The Galilean Moons

Difficulty: Easy

OBJECTIVE

Jupiter rises at dusk. The great planet is now starting its grand showing for the late Summer and Autumn", It may be the brightest object that you can see in the night sky. In this simple practical experiment you will observe Jupiter's moons over a number of nights to learn about their movement around this impressive planet.

If you are particularly determined (and lucky with the weather) you can observe the moons over ten to twenty nights, you can try to determine their orbital periods (how long it takes each moon to complete one orbit around the planet).

EQUIPMENT

All you need to perform this experiment are:

- Binoculars or a small telescope
- A pen and paper to record your observations
- An up to date star map to give you the location of Jupiter in the sky

SOME BACKGROUND – The Galilean Moons

In 1610 Galileo pointed his telescope at Jupiter and in doing so he discovered that it was surrounded by four stars. His observations on successive nights showed that their positions of these stars was changing and he concluded that they must be circling the planet in the same way as the Moon orbits Earth Galileo's observations launched a revolution that changed our view of an Earth-centred universe.

These four wandering stars first seen by Galileo are Jupiter's brightest moons and are now known as Jupiter's Galilean moons. In order of their distance from Jupiter these moons are called Io, Europa, Ganymede, and Callisto. In fact Jupiter has many more moons but these are not bright enough to be seen with a small telescope.

METHOD

Look at Jupiter through your telescope or binoculars and record the number of Galilean Moons you can see in a notebook and draw a diagram of their positions. If you are using binoculars you may need to use a tripod or rest the binoculars against a lamp post or the wall of a building to keep them steady enough. If this is not possible hold the binoculars close to the objective lens, instead of the eyepiece, this helps to support the weight and is steadier. Repeat your observations on a number of different nights.

The best way to record your observation is to draw a circle with Jupiter in the centre and then just mark the Moons. (You can mark any other stars that you see through the binoculars or telescope as well). Try to show the relative distances to each moon accurately. You can use the observation log at the end of this report – print off as many copies as you need to record what you see on each successive night

Each night you make an observation, record the following information.

- Your location
- Date
- Time
- Weather conditions
- Cloud cover
- How well you can see the stars with the naked eye (e.g. How much are they shimmering? Is there much light pollution?)
- If you are using a small telescope, can you see any cloud detail on Jupiter?

You will sometimes find that one or more of the moons are not visible so just record what you can see.

Try making more than one observation on the same night – say two hours apart. Record these extra observations in exactly the same way.

You can use the observation record sheet at the end of this document to record what you see – print off as many copies of this sheet as you need to record your nightly observations.

ANALYSIS OF YOUR RESULTS

Compare your observations on different nights:

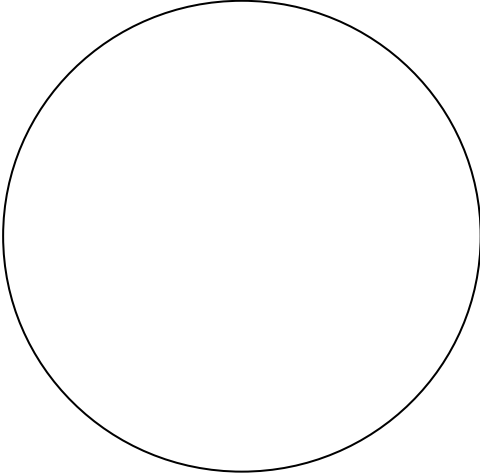
- Are the positions of the moons the same or have they changed and why?
- Can you see any patterns in the movements?
- Can you use the patterns to determine which moon is which?
- Did you observe any nights when there were fewer than four moons? Can you explain why this happens?

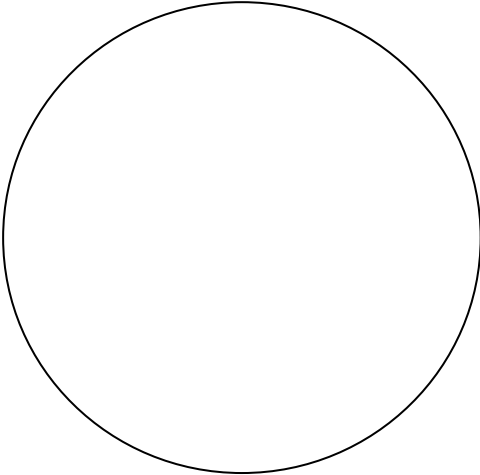
If you try this experiment for yourself let us know how you got on by using the comment form at the bottom of this post to leave your answer.

If you are feeling adventurous and are lucky enough to get a run of clear nights (say more than 10 clear nights over 20 days) you can copy your observations for each moon on to the graph at the end of this document. If you have a number of observations in one night try making an hourly graph.

Observing Log

Sheet #: _____

| | | | |
|--|--------------|-------------|--|
| Date: | | Time | |
| Location | | | |
| Weather: | | | |
| Cloud Cover: | | | |
| Visibility: | | | |
| Draw your observation here: | Notes | | |
|  | | | |

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|---|--------------|-------------|--|
| Date: | | Time | |
| Location | | | |
| Weather: | | | |
| Cloud Cover: | | | |
| Visibility: | | | |
| Draw your observation here: | Notes | | |
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